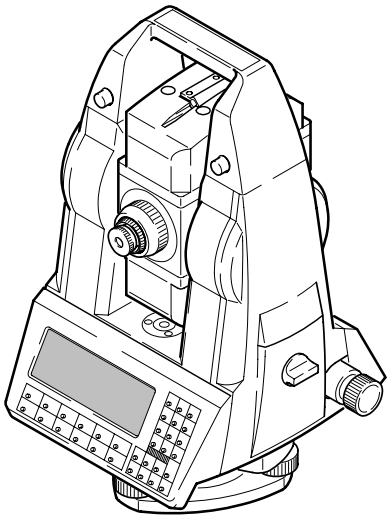
TPS - System 1000

QUICK START

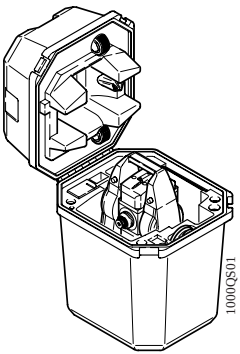
Version 2.2
English



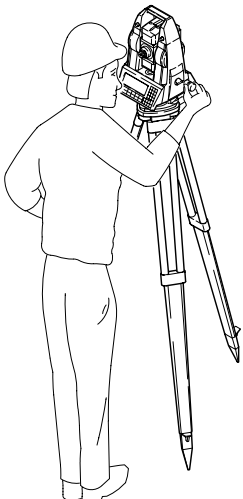
1000Z01

Leica

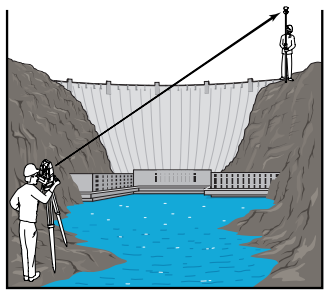
The quick way to start with TPS-System 1000.



1000QS01



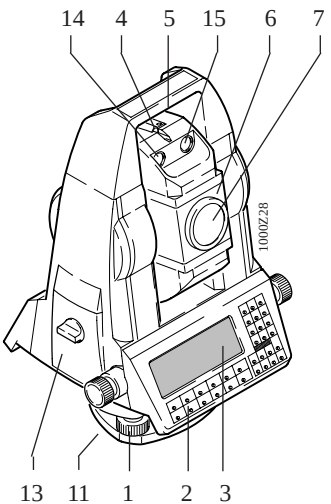
1000QS02

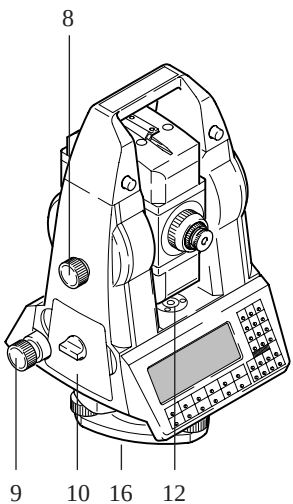


1000QS19

To use the equipment in the permitted manner, please refer to the detailed safety instructions in the user manual.

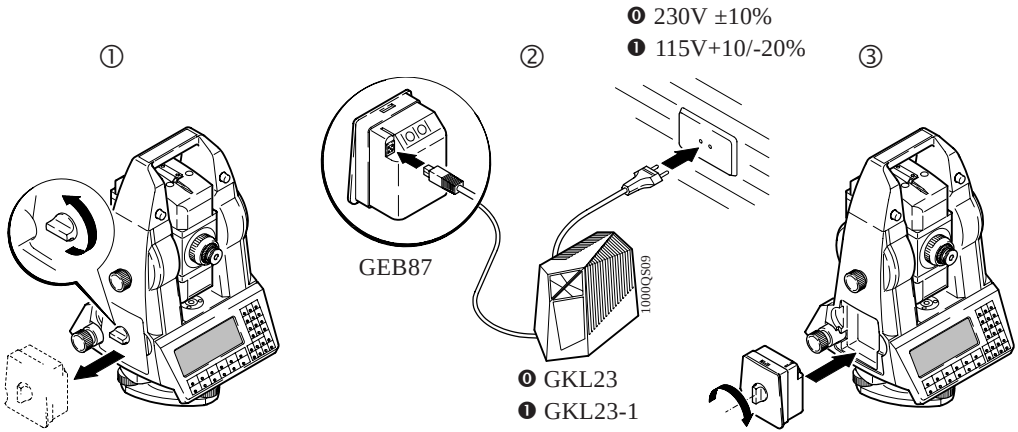
Instrument description





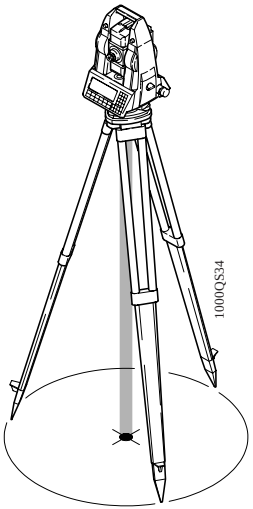
1 Footscrew
2 Keyboard
3 Display
4 Optical sight
5 Carrying handle
6 Telescope with EDM (for TC) or with EDM + ATR (for TCA). EGL1 is optional
7 Coaxial optics for angle- and distance measurement
8 Vertical drive screw
9 Horizontal drive screw
10 Battery housing
11 Tribrach securing knob
12 Bull's-eye bubble
13 Memory card housing
14 Flashing left diode, yellow
15 Flashing right diode, red
16 Laser plummet; TPS1000 with option L

Charging battery

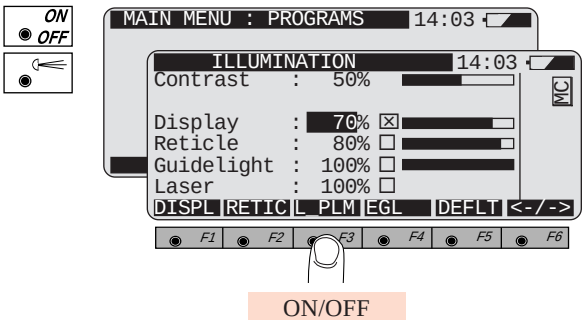


Charging time: 1.5 hours
External batteries:
GEB70: 1.5 hours
GEB71: 5.0 hours

Centring with the laser plummet

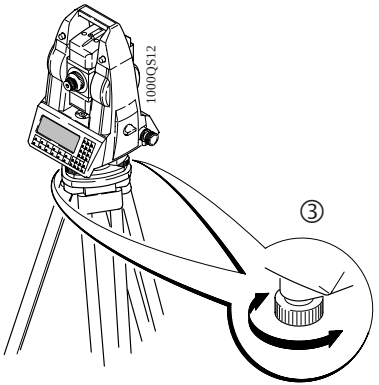


The laser plummet is incorporated into the vertical axis of those TPS1000 instruments which have the suffix "L". A red laser dot projected on the ground makes it much easier to centre the instrument.



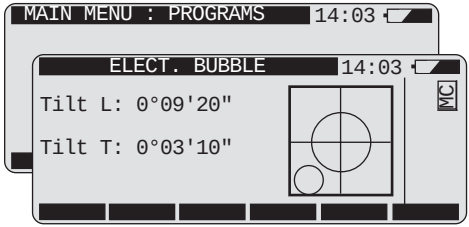
The laser plummet switches off automatically after 3 minutes.

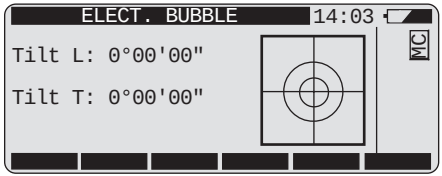
Levelling up with the electronic bubble



① ON OFF

② 



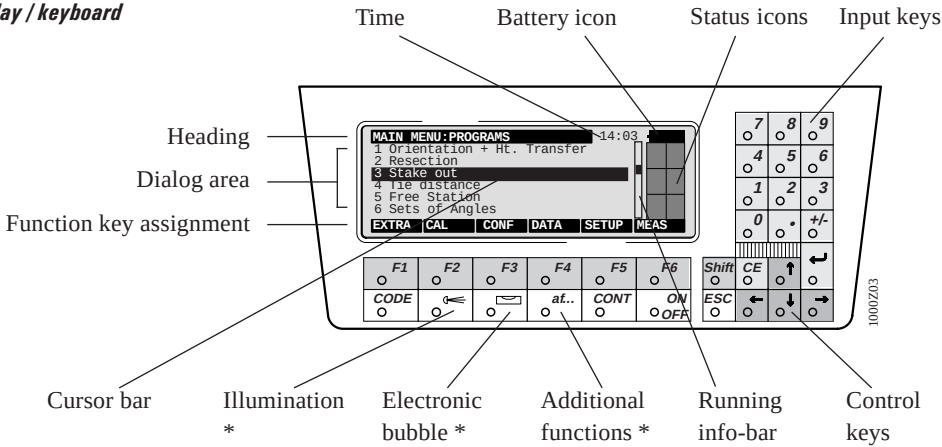


④ CONT

The instrument can be levelled up using the footscrews, without having to turn it through 90° / 180°.

The operating concept

Display / keyboard

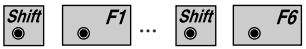


* => always accessible !

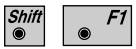
The "running info-bar" indicates that additional information is available in the active dialog.

Switches instrument ON/OFF.

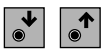
Dialog-dependent function keys; functionality is indicated in last line of display.



Second level of the function keys.



On-line help for current dialog; always available.



Control keys, to set the cursor bar and scroll through the dialog.

Confirms dialog with values set and continues to next dialog.

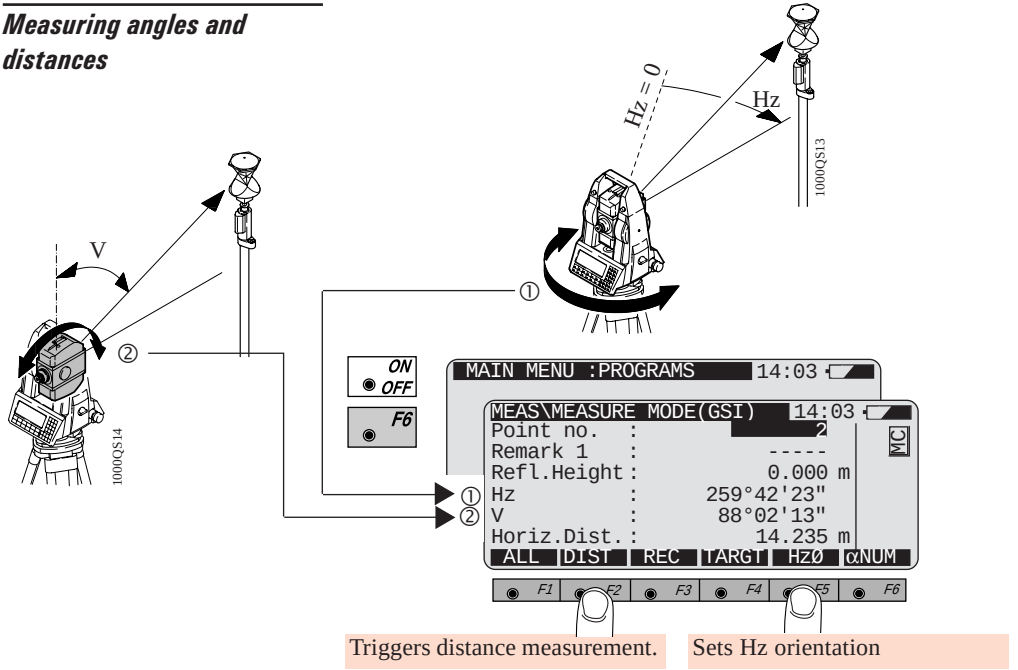
Confirms input. Input values are:

- values selected from list field
- manual input

Returns to previous display. Values altered in dialog are not accepted.

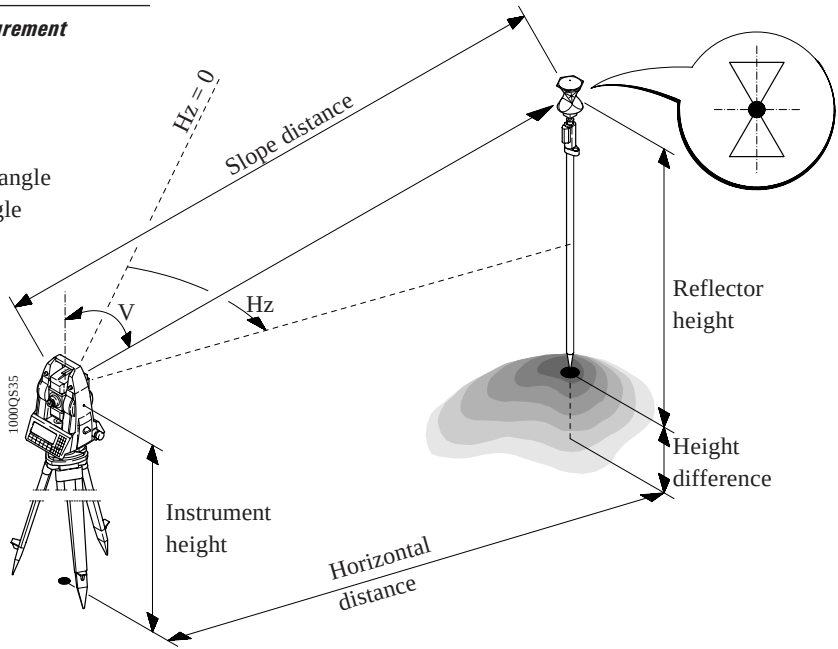
Deletes last character entered.

Measuring angles and distances

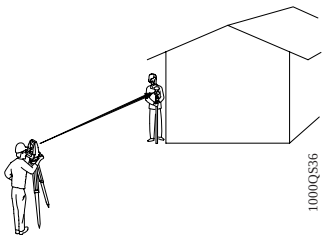


Elements of measurement

Hz = Horizontal angle
V = Vertical angle



Measuring angles and distances separately



Measuring to inaccessible points.

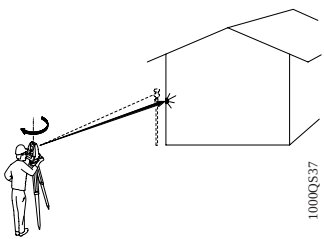
F6

```
MEAS\MEASURE MODE(GSI)    14:03
Point no.   :                1
Remark 1    :            -----
Refl.Height :          1.600 m
Hz          :      259°42'23"
V           :       88°02'13"
Horiz.Dist. :         12.254 m
 ALL | DIST | REC | TARGT | HzØ | αNUM        MC
```

F1 F2 F3 F4 F5 F6

Triggers distance measurement.

The vertical angle is retained after the distance measurement. You can now determine the Hz angle of the inaccessible point.




```
MEAS\MEASURE MODE(GSI)    14:03
Point no.   :                2
Remark 1    :            -----
Refl.Height :          1.600 m
Hz          :      259°43'50"
V           :       88°02'13"
Horiz.Dist. :         12.254 m
 ALL | DIST | REC | TARGT | HzØ | αNUM        MC
```

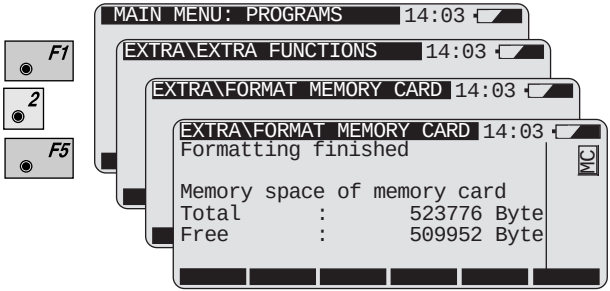
ESC

```
MAIN MENU : PROGRAMS      14:03
```

Memory card

The measurements are stored in the GSI directory on the memory card.

Formatting a memory card

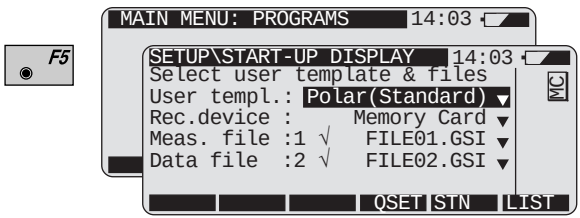


When the memory card is formatted, all data on the card are irretrievably deleted !!!

Setting up the station / orientation to backsight

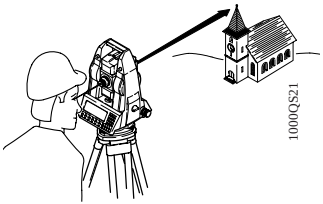
Orientation options:

- orientation using coordinated points
- by entering the azimuth (*see example on page 32)*
- with the help of the program "Orientation and Height Transfer".



Select:

- the user configuration (*see section "Configuration")*
- a measuring file to store data
- a data file to call up coordinates.



F4

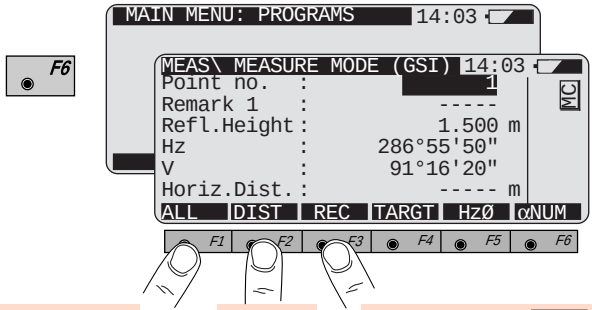
```
SETUP\1-PT. ORIENTATION  14:03
Station     :              1
Backsight   :          CHURCH
Inst.Height :        1.500 m
Refl.Height :        0.000 m
Δ Hz-Dist   :        ----- m
 ALL  DIST  REC        INPUT  NUM
```

- Enter the station number.
- If coordinates are present in the data file, press ↵ to start the search, or
- Press F5 for manual entry of coordinates.
- Enter "Backsight" ("CHURCH").
- Enter instrument and reflector height.
- Aim at the backsight.

CONT

```
Set Station with REC or CONT
            REC
F1  F2  F3  F4  F5  F6
```

CONT sets the station coordinates, and calculates and sets the orientation.



The recorded values are not necessarily the same as the displayed values.

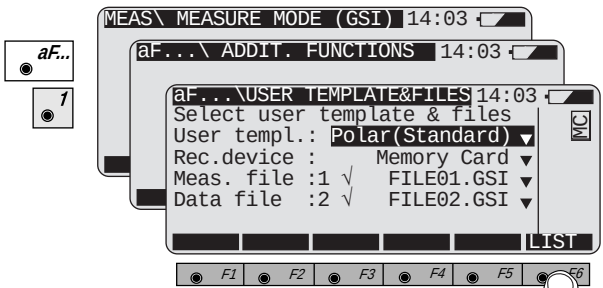
The recorded values can be inspected:

ESC F4 : Enter point number and enter number of measurement file.

F5 : Starts search, displays point data.

Recording coordinates

In the as-delivered instrument, angle and distance are routinely recorded ("Polar" template).
To record coordinates:



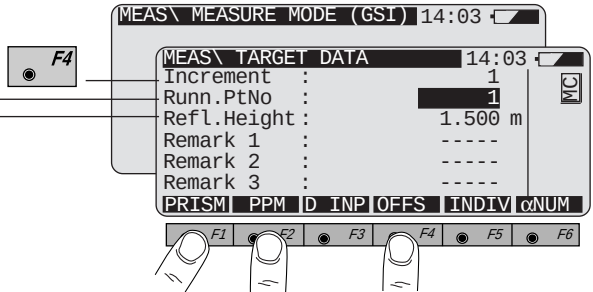
Select "Cartesian" template.

CONT

Confirms selection, returns to "Measure Mode".

For a detailed description of the recording template, *see page 26.*

Target point data (ppm/prism/offset)



Selects prism

Enters 3D offset

Sets ppm corrections.

1. Enter air pressure and temperature; ppm total is calculated

or

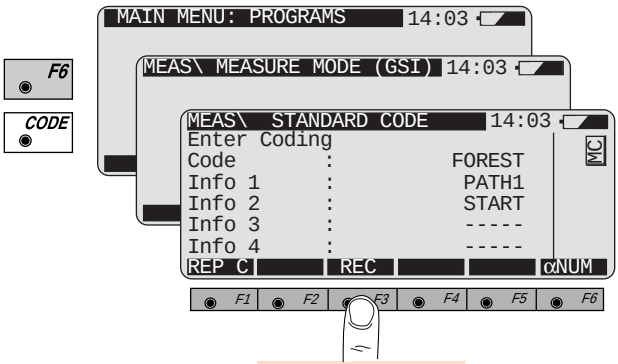
2. enter ppm total directly

Direct input of:

- increment for running point number
- running point number
- reflector height

Coding

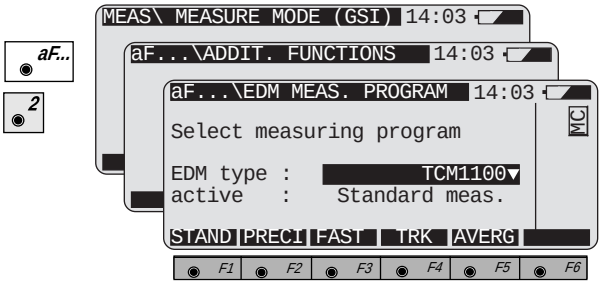
CODE is active in the measurement dialog and during manual data input.



In the standard setting, the code is freely definable, and can be used to record seven additional pieces of information.

User-defined code lists can be compiled with the "Code Developer" utility or with a Geobasic program.

EDM measuring program

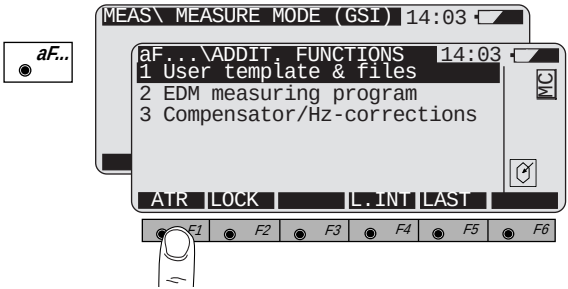


Select the EDM measure mode.
Depending on the instrument, the selection can be:

- F1 Standard
- F2 Precision measurement
- F3 Fast measurement
- F4 Tracking
- F5 Average
- Shift + F4 = Rapid tracking

Automatic target recognition ATR1 (option)

Measuring with ATR1:



ON => 

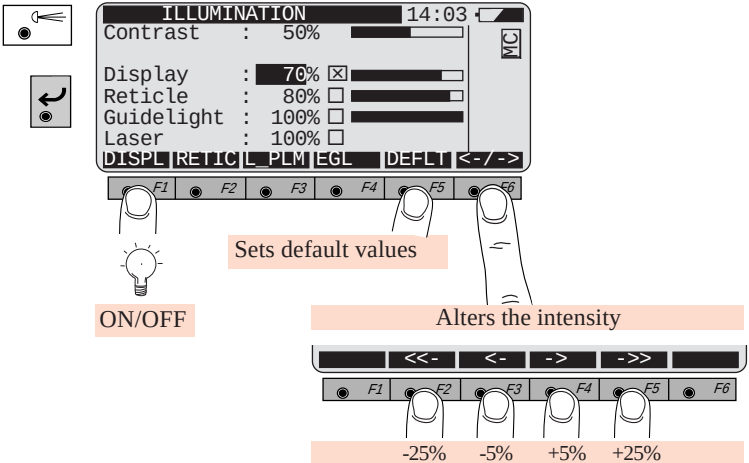
OFF => no icon

Target the prism approximately. No focusing is needed. If a distance measurement is triggered, the fine-targeting is performed automatically.

The ATR1 resolution is automatically defined when the appropriate EDM measuring program is selected.

Illumination

Example of display illumination:



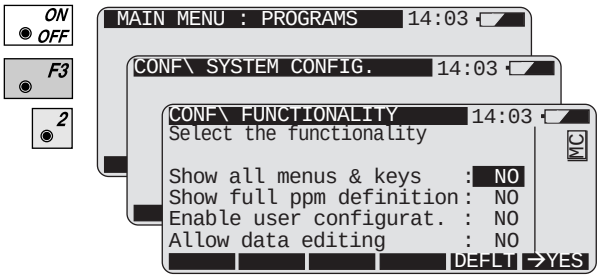
CONT

Confirms values.

Same procedure for crosshair (press F2) and for the two options laser plummet (press F3) and EGL (press F4).

Functionality

In its standard configuration, the instrument starts with a reduced range of functions. You nevertheless have access to the important functions which you need for surveying.
You can switch to the complete range of functions.



For more information about the functionality, please refer to the user manual.

User configuration

In the user configuration the following parameters are set:

- Instrument configuration and units
- Recording template: this determines what data are recorded on the memory card
- Display template: this determines what data are displayed in the measurement dialog.

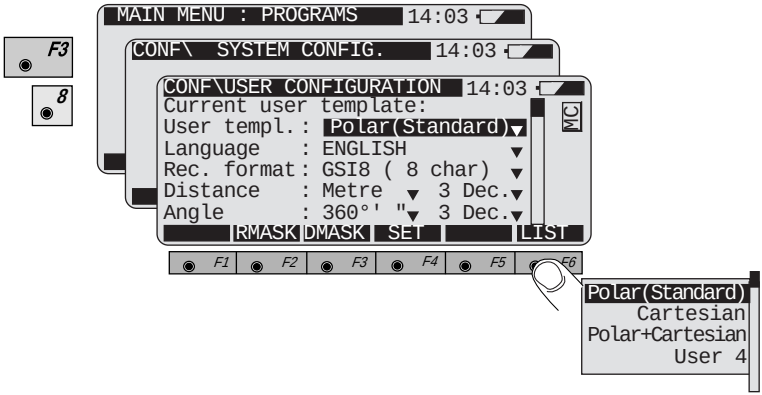
You can define appropriate user settings for various applications, e.g. industrial surveying or cadastral surveying.

First activate the access to the user settings in the functionality dialog *(page 23)*.

```
Enable user configurat. : YES
```

Selection of the user template and recording mask

When a specific user template is chosen, a predefined recording mask is assigned automatically.



Select the "Polar (Standard)" to select the template from the list, and confirm with ↵ .

☺ The display template can be changed with F3 .

Predefined recording templates

There is a choice of three predefined recording templates.

	Polar	Cartesian	Polar+Cartesian
1	Point number	Point number	Point number
2	Hz	Easting	Hz
3	V	Northing	V
4	Slope distance	Height	Slope distance
5	ppm/mm	empty	Easting
6	empty	empty	Northing
7	empty	empty	Elevaton
8	empty	empty	ppm/mm
9-12	empty	empty	empty

The data are stored in the sequence which is defined in the recording template. (not sorted !)

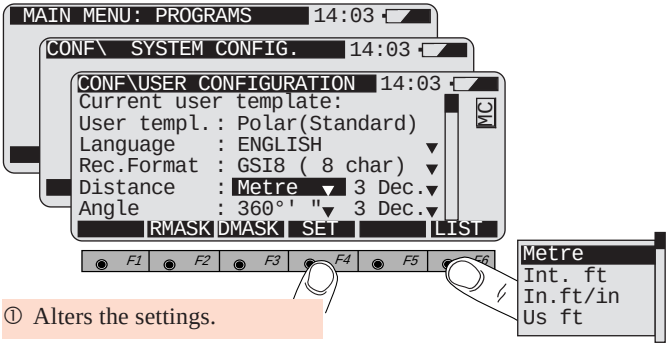
The predefined recording templates can be modified with F2 .

Units, language

The instrument configuration and unit configuration can be modified by pressing F4. The configuration values are automatically stored in the user template selected.

F3

8



① Alters the settings.

↓ / ↑

Select the required parameter, open the list with F6, select, and then confirm choice with ↵.

CONT

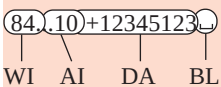
Stores the values, returns to the main menu.

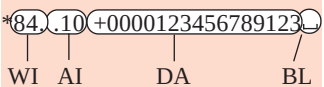
The standard setting of the vertical angle is the zenith angle. Using aF..., this setting can only be altered when in full functionality mode.

GSI storage format

There is a choice of two GSI formats; they have different word lengths. The selection is made in the "User Configuration" (*page 24*).

GSI-8	GSI-16
8-character point names 5-character coordinates with 3 decimal places	16-character point names 9-character coordinates with 3 decimal places





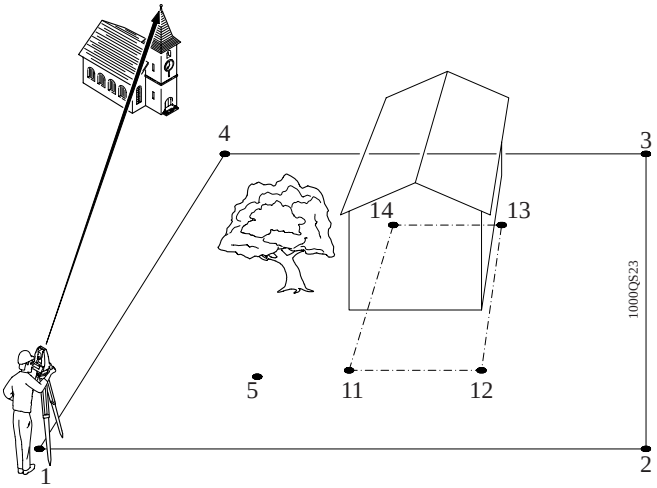
* Tag in front of each GSI-16 data block.

WI	Word index
AI	Additional information
DA	Data
BL	Blank = separating character

A practical example illustrates some of the most frequently-used survey programs.
A piece of chalk and/or a string are useful for working through the example out of doors.

Practical example

Your job is to carry out the survey work for a projected building.
You have already calculated a local two-dimensional grid.
It is assumed that the church is directly north of station 1.
From station 1, you will **set out** and re-mark the boundaries of the property.
Then you will set up the instrument at an unknown point (5) and use "**Resection**" to determine its coordinates.
Because a foundation pit is already present, you will determine the corners of the building with the help of the program "**Reference Line**".



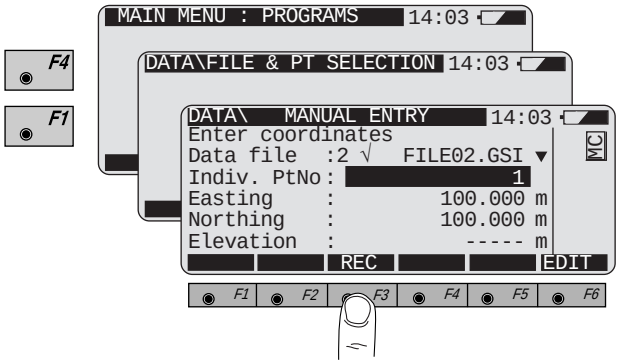
Point coordinates

Point	East (E)	North (N)
1	100	100
2	120	100
3	120	120
4	103	120
11	108	105
12	115	105
13	115	115
14	108	115

- Mark point 1 at any location.
- Set up the instrument.

Entering coordinates

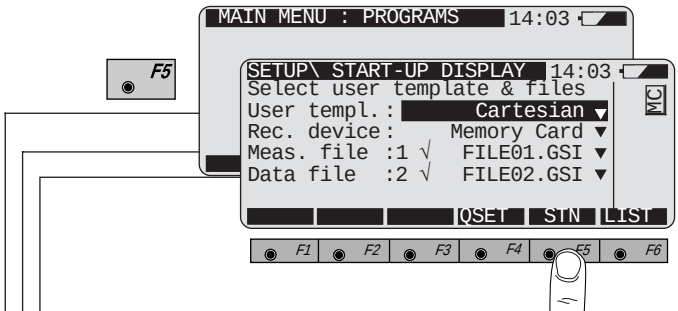
Entering points and coordinates on the theodolite.



Record 2D- and/or 3D points in the data file "FILE02.GSI". Enter all points needed for the example, complete with their coordinates, in this data file.

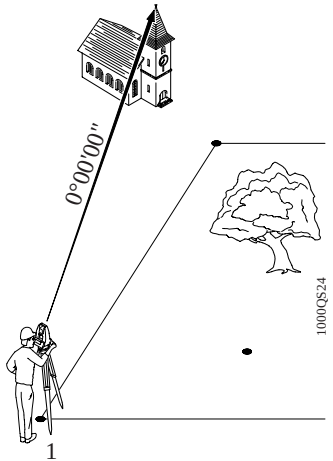
In any TPS1000 program, point coordinates can be imported from a data file or can be entered manually.

Setting up a station by entering an azimuth



Sets the station.

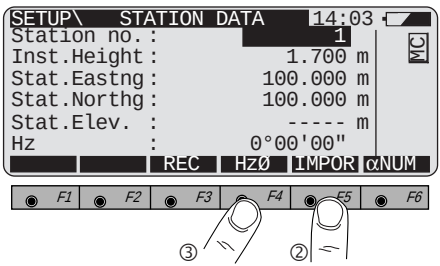
- Choose the configuration template "Cartesian" to store the coordinates.
- Select the measurement file (FILE01.GSI) for storing the measurements.
- Select the data file in which you have stored the point coordinates (FILE02.GSI).



Station parameters:

- Station number
- Easting, Northing, Elevation
- Instrument height (hi)
- Orientation: known azimuth (here Hz = 0)

① Enter the station number and the instrument height directly:



Hz-orientation setting;

F4 => Hz = Ø

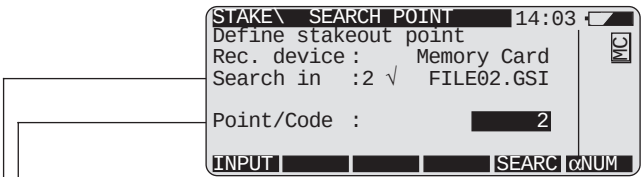
Import station coordinates (if available in data file).

④ Using F3 or CONT, set the station parameters.

Stakeout

Precondition: The station must already be set up and oriented.

- Start the program "Stakeout" from the main menu.



Select the data file in which you have stored the point coordinates.

Enter the stakeout point.

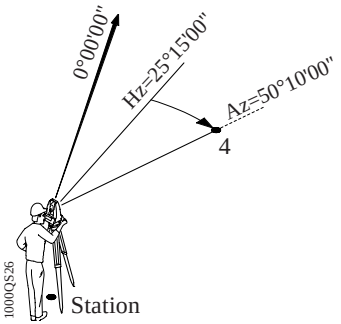
CONT

Starts the search for coordinates in the data file and leads to the coarse setting-out (display "LINE OFFSET").

You can enter the coordinates of the stakeout points manually with F1 .

Coarse positioning

This is an aid to positioning. The difference between the required azimuth and the Hz-angle which is read off permits approximate positioning in the direction of the setting-out point.

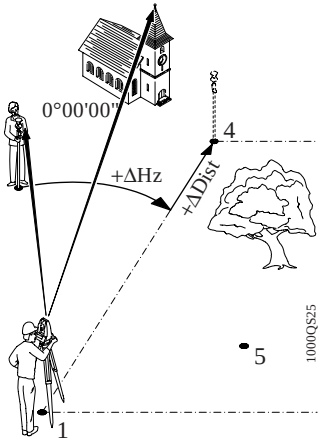



```
STAKE\  LINE OFFSET          14:03
Target no. :                    4
Azimuth    :         50°10'00"
Hz         :         25°15'00"
Line       :              ----- m
Offset     :              ----- m
                                 STAKE
```

"Line" and "Offset" are not available until the third point has been set out.

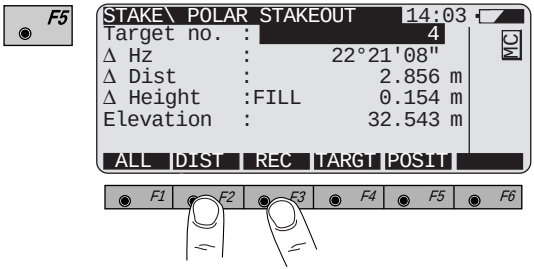
Pressing Shift and F2 (= METHD) presents the option of deactivating the coarse setting-out.

Polar stakeout



Known:
Station 1 (E1, N1), orientation, coordinates of setting-out points 4 (E4,N4), 3 (E3,N3), 2 (E2,N2)

Not known:
Positions of points in field



① Measures a distance

③ Records value in measurement file

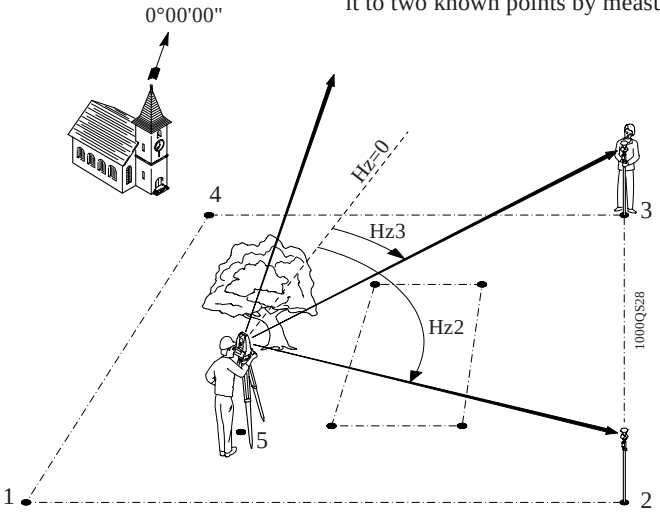
② Repeat procedure until required positioning accuracy is attained.

④ Mark the point measured.
Set out the points 3 and 2 in the same manner.

To select other setting-out methods and to activate the graphic setting-out, use Shift F2 (= METHD).

Resection

Determining the coordinates of an unknown point (5) and orienting it to two known points by measuring angle and distance.



Known:

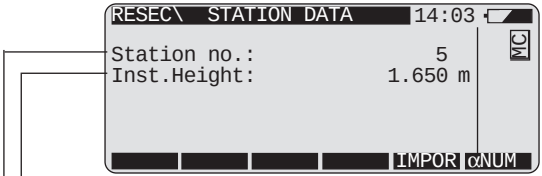
Point 2 (E2, N2)
Point 3 (E3, N3) *
Point 1 (E1, N1)

Not known:

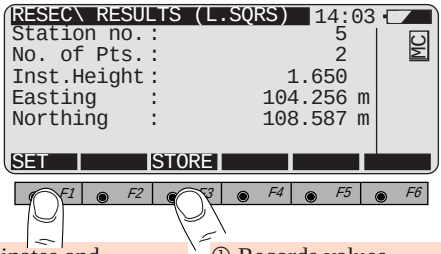
Point 5 (E5, N5), orientation

* Select two points which, together with the unknown station, form a favourable geometrical constellation (2-3, 2-1).

- Start the program "Resection" from the main menu.



- Enter station number (5) and press ↵
- Enter instrument height and press ↵
- Press CONT
- Enter first target point and reflector height, and press CONT
- Target the point and press F1 to measure and record
- Enter second target point and reflector height, and press CONT
- Target the point and press F1 to measure and record



② Sets coordinates and orientation

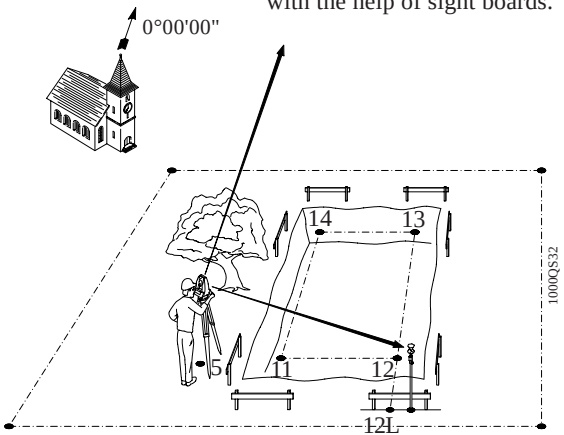
① Records values

The program calculates the coordinates with an a priori accuracy of 2.5 cm for the known points. To select another level of accuracy, press Shift F2 (= CONF) after having started the program. For more information, please refer to the user manual for the programs.

The unknown point can also be determined by using the program "Free Station", with the advantage that the station coordinates can be determined by measuring to several tie points, with or without distance.

Reference line

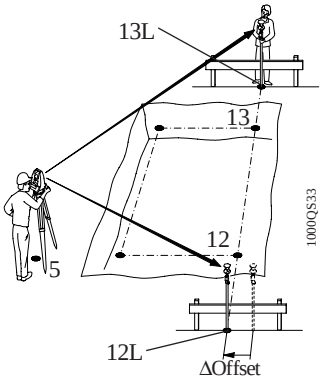
Where the foundation pit already exists, the points are determined with the help of sight boards.



Known:
Station 5 (E5,N5), orientation, Point 12 (E12,N12), therefore 11, 13, 14

Not known:
Position of point 12, as intersection of the lines 11 - 12 and 12 - 13

- Start the program "Reference line" from the main menu.
- First point of baseline is 13: Press CONT
- Second point of baseline is 12: Press CONT
- Offset: 0, press F2



- Enter point no. : 12L
- Pressing [F2] measures a distance
- Repeat these two operations until you have located the extrapolation of the reference line (point 12L) on the sight boards (display shows ΔOffset= 0).

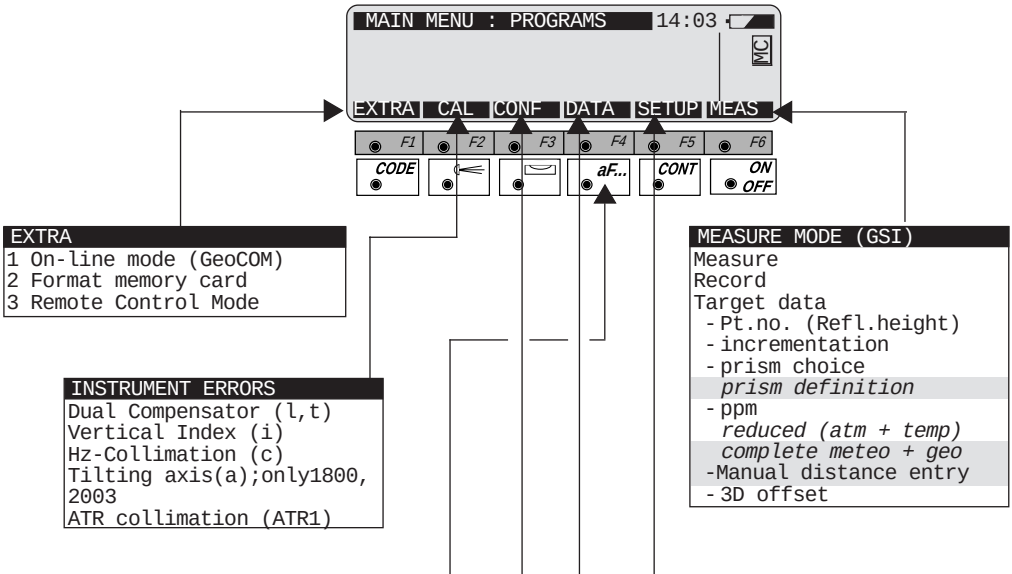
```
REFLN\RESULTS REF LINE      14:03
Point no.   :                 12L
ΔOffset     :           0.000 m
ΔLine       :           1.587 m
ΔH          :           0.235 m
Elevation   :           0.021 m

 ALL | DIST | REC | TARGT
```

- [F3] = Record point, hammer nail into sight board
- [F2] Repeat procedure for point 13L and tighten string between 12L and 13L.
- [F5] Define new reference line 11 - 12 for string 11Q - 12Q and repeat procedure.

The intersection of the strings 11Q - 12Q and 12L - 13L leads to point 12.

Organization of menu



STATION SETUP
Station Coordinate
Orientation:
- to Backsight Pt(QSET)
- Hz input (STN)

DATA
Search
Input

ADDIT. FUNCTIONS
1 User template & files
2 EDM measuring program
3 Compensator/Hz-correct.
4 EDM Test(Signal/Freq.)
5 Beep / Hz-sector
6 V-Angle display
7 Power off, Sleep
8 Accessories
- eyepiece
- lens

ATR ON/OFF
LOCK ON/OFF
LOCK interrupt (L.INT)

RCS Search Functions

CONFIGURATION
1 System date and time
2 Define functionality
3 GSI communicat. param.
4 GeoCOM Com. parameter
5 Instrument identificat.
6 Autoexec-application
7 System protection
8 User configuration

DEFINE FUNCTIONALITY
Show all menus + keys
Reduced/full ppm def.
Enable user configuration
Allow data editing

USER CONFIGURATION
Units
Language
GSI Record format
Record mask
Display mask

Menus in coloured field not accessible when in reduced functionality mode!!

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