TPS1100 Professional Series

System Field Manual

English

Version 2.2

Leica Geosystems

The quick way to start with the TPS1100.

To use the equipment in the permitted manner, please refer to the detailed safety instructions in the User Manual.

Contents

How to use this Manual

This field manual gives step by step introductions for the use of the TPS1100 system software. It has two objectives:

1. To introduce a novice user to the basic operation concepts and the practical use of a TPS1100 totalstation. We recommend that new users have the instrument set up while they read through this manual.

2. To serve as handy field reference for the experienced user during his daily work. To have the manual at your hands when you need it we recommend to store it in the appropriate slot in the instrument transportation case.

Symbols used in the sequence of operation

Press fixed key PROG.

User input is necessary.

Press function key F1 to activate the function ALL.

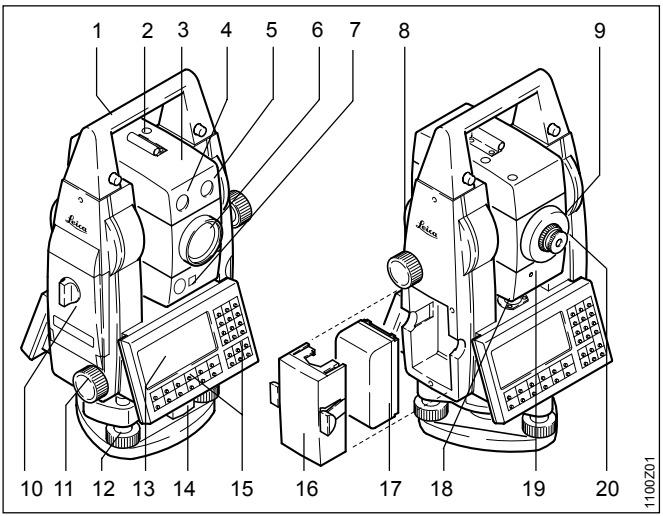
Repeat operation.

Other Symbols

Important information and tips.

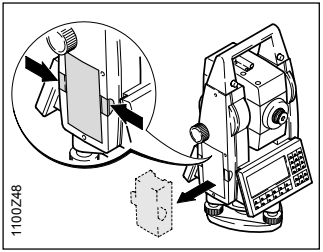
Optional function, not part of the standard sequence of operation.
Here: Press function key labelled "NEW-J".

Instrument description

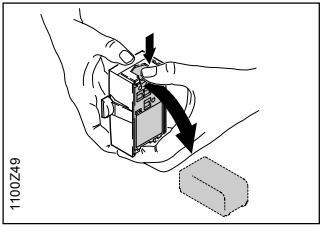


1 Carrying handle
2 Optical sight
3 Telescope with integrated EDM, ATR, EGL and PowerSearch
4 EGL flashing diode (yellow)
5 EGL flashing diode (red)
6 Coaxial optics for angle- and distance measurement; Exit port of red laser beam (only R-model instruments)
7 PowerSearch
8 Vertical drive screw
9 Focusing ring
10 Memory card housing
11 Horizontal drive screw
12 Footscrew (tribrach)
13 Display
14 Tribrach securing knob
15 Keyboard
16 Batteryholder
17 Battery
18 Bull's-eye bubble
19 Laser emission indicator lamp (yellow) - only XR-instruments
20 Exchangeable eyepiece

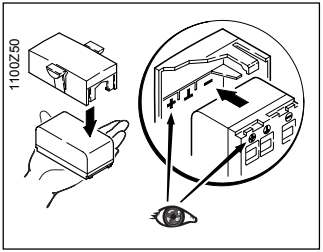
Inserting / replacing battery



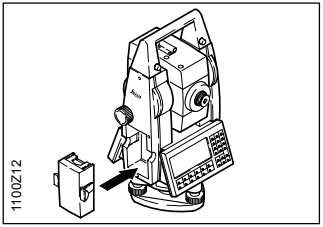
1. Remove battery holder.



2. Remove battery and replace.



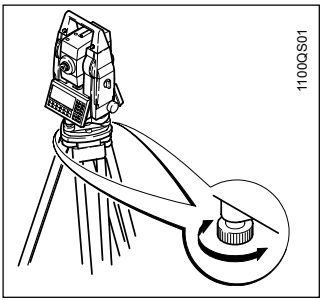
3. Insert battery into battery holder.



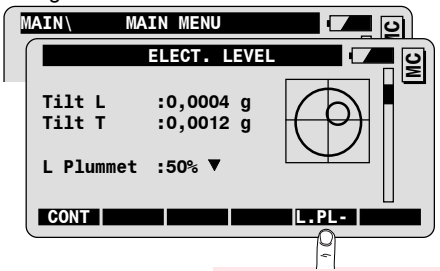
4. Insert battery holder into instrument.

Insert battery correctly (note pole markings on the inside of the battery cover). Check and insert battery holder true to side into the housing.

Center and level



To center and level your instrument, activate the electronic level dialog.



Laser Plummet: ON/OFF

1. Center the instrument, using the laser plummet: a red laser dot is projected on the ground.
2. Level up using the footscrews.

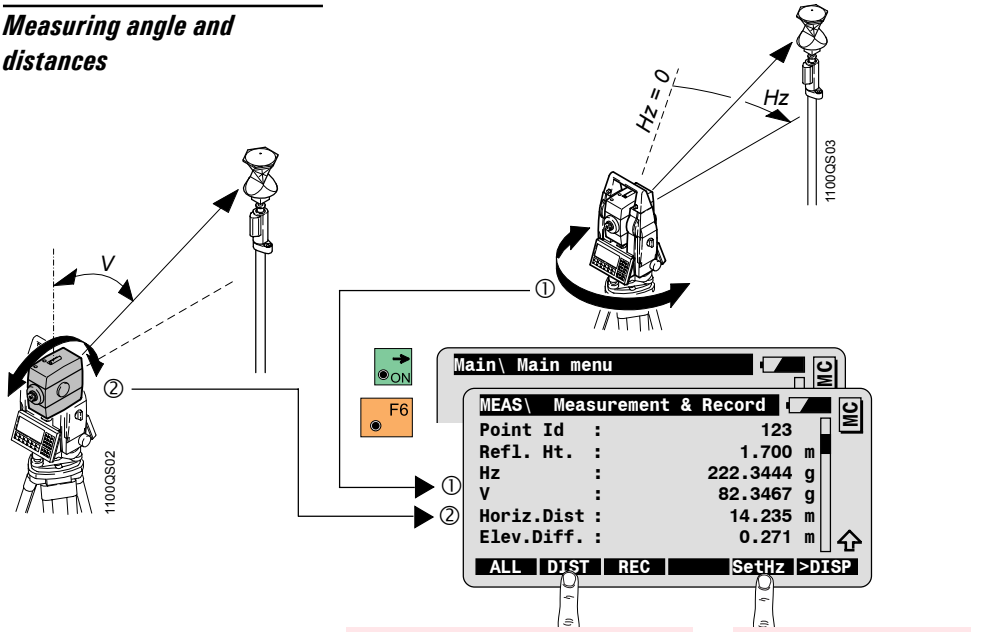
With the electronic level, you don't need to turn the instrument through 90°/180°.

Repeat 1. and 2. until instrument is centered and leveled.

CONT *F1*

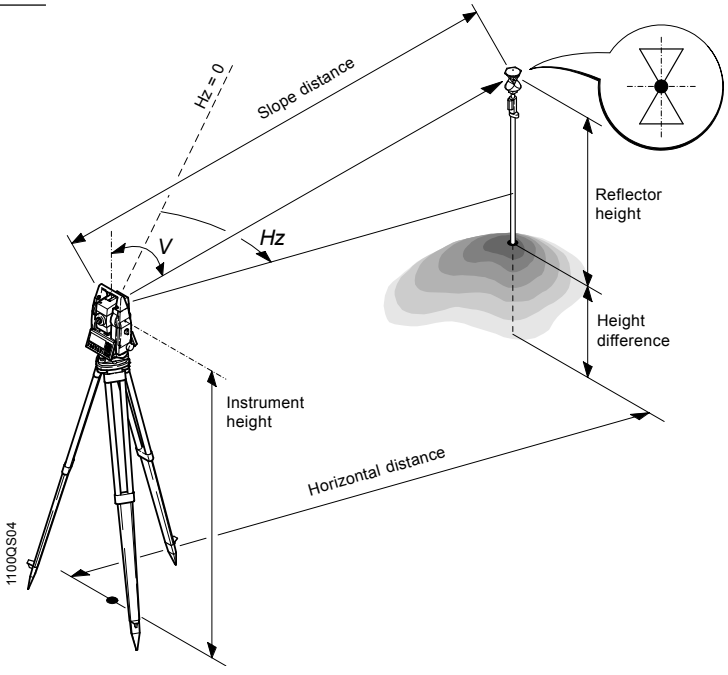
To continue.

Measuring angle and distances

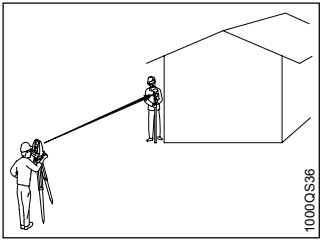


Elements of measurement

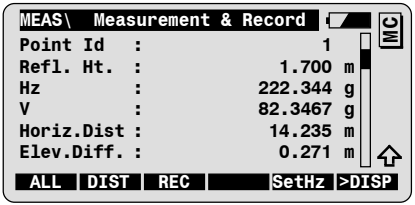
Hz = Horizontal angle
V = Vertical angle



Measuring angles and distances separately



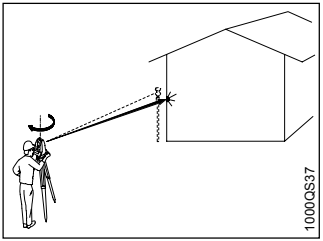
Measuring to inaccessible points.

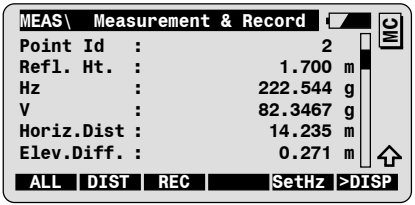


DIST ● *F2* Triggers distance measurement.

The vertical angle is retained after the distance measurement.

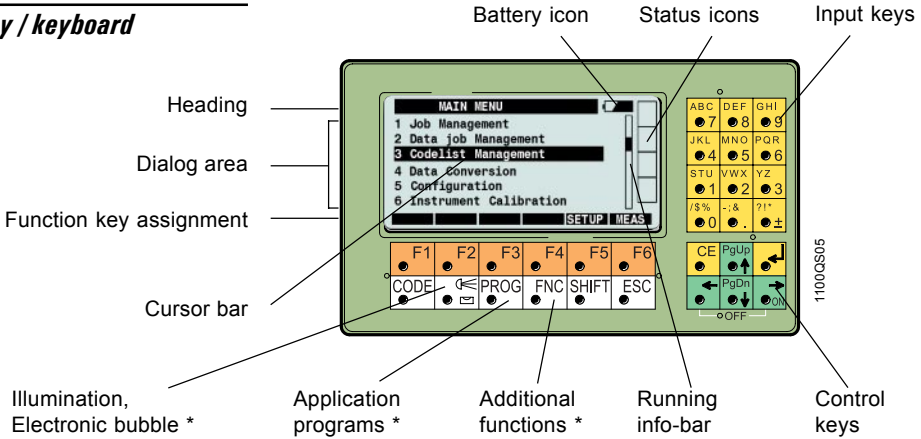
You can now determine the Hz angle of the inaccessible point.





REC ● *F3* Record the displayed measurements.

Display / keyboard

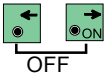


* => always accessible !

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

ON / OFF

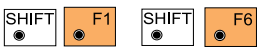
To switch the instrument ON.



To switch the instrument OFF, first press both keys simultaneously and then press F6.

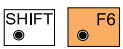
Function keys

Dialog dependent function keys. Assignment is indicated in reverse mode in the bottom line of the display.



Second level of function keys. Pressing on SHIFT changes the assignment of the keys.

Quit / Escape

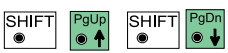


To quit the active function or program. Available in all dialogs.

To return to previous display. Values altered in dialog are not accepted.

Control keys

To scroll through the dialog line by line and to set the cursor bar.



To display the previous or next page of the active dialog.

Fixed key concept

The white keys of the TPS1100 keyboard are fixed keys. Most of them are accessible anytime during operation.

Standard coding key.
Accessible from the measurement dialog and from the TPS1100 application programs.

Illumination and display settings:

- Display illumination, contrast and heating
- Reticule illumination
- Activate the Red Laser beam (option for TCR inst.)
- Activate the guidelight EGL (option)

Accessible anytime.

Electronic level and laser plummet.
Accessible anytime.

Program key for TPS1100 standard or Geobasic programs.
Accessible anytime.

Fixed functions key: contains functions that shall be quickly accessible during measurement or from any location, like ppm settings or reflector selection.
Accessible anytime.

Battery Display

The battery status is displayed beside the title bar.

Battery fully charged.

Battery almost fully charged.

Battery still capable to be used.

Battery reserve power: about 25 more distance measurements possible.

There are two different battery symbols:

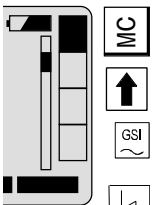
Internal battery is used.

External battery is used.

Graphical status icon

The column to the right of the display is reserved for graphical status icons.

Recording device and communication



PC-Card is inserted. Data is recorded.

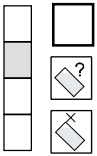
No PC-Card inserted. Data can not be recorded.

RS 232 is selected as recording device. GSI-communication is possible.

Remote Control (RCS) is active. RS 232 is selected for RCS communication.

RS 232 is selected for GeoCOM communication.

Compensator



Compensator functions normally and Hz directions are corrected.

Instrument is tilted, or unstable, or has been turned too quickly.

Compensator and/or Hz corrections are disabled.

Infrared distance measurement active. This icon shows up only on instruments with the option "reflectorless EDM".

Infrared distance measurement active and laserpointer switched on. This icon shows up only on instruments with the option "reflectorless EDM".

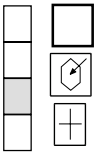
Reflectorless distance measurement active (visible red laser).

Reflectorless distance measurement active (visible red laser) and laserpointer switched on.

Longe range distance measurement active (visible red laser).

Longe range distance measurement active (visible red laser) and laserpointer switched on.

Automatic Target Recognition



ATR and LOCK inactive.

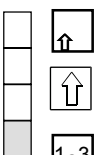
Automatic target recognition (ATR) active.

Automatic target tracking (LOCK) active. But no prism has been aimed at or lock to prism has been lost.

LOCK is active, prism is tracked.

LOCK to prism has been lost. Search in progress.

Key Mode Field



Functions available in the second level of functions keys.

SHIFT has been pressed.

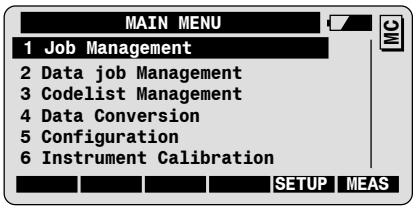
Further digits need to be keyed in.
Displayed when a menu has more than 10 entries.

Quick Code is active. The numeric keys are reserved for Quick Coding.

Select a function from a menu

You can select a function from a menu using the standard or the quick method.

The example below shows how to select the function **“Configuration”** from the main menu dialog.



Standard method

To scroll the cursor bar until the function **“Configuration”** is highlighted.

To confirm the selection and start the function.

Quick method

Press the corresponding numeric key 

to select and start the function **“Configuration”**.

For long menus with 10 items or more, both digits displayed in front of the function must be entered.

User Input

User input field are shown in inverse mode on the display.
TPS1100 has three types of input fields:

- Numeric input fields: only numeric values are allowed (e.g. for the reflector height).
- Alphanumeric input fields: both numeric and alphanumeric values are allowed (e.g. for point Id).
- Input from a choicelist: only values included in a predefined list are allowed.

Numeric input

Position the cursor bar on the corresponding input field (e.g. **Refl. Ht.**).

Enter a new value

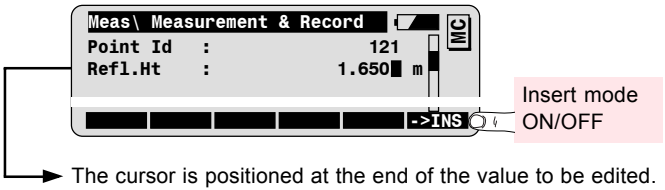
Use the keys [0] to [9] to enter a new numeric value.

The initial value is deleted after the first keystroke.
You can recover it with [ESC].

To confirm the entry.

Edit highlighted value

To start the edit mode for the highlighted value.



To position the cursor on the digit to be edited. The digit can be overwritten now.

To confirm the entry.

Alpha-numerical Input

In alphanumeric mode, one key is used for the input of 3 letters and one number.

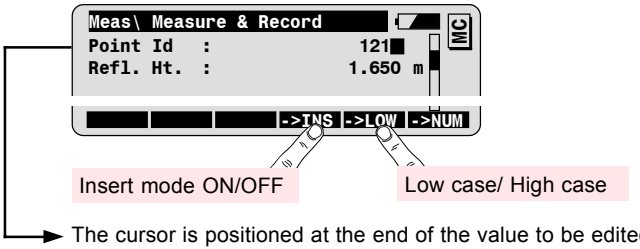
For instance, the key 1 is used to input the letters S, T, U or the number 1.

Press 1 once to input the letter S.

Press 1 twice in quick succession to input letter T, three times to enter letter U and four times to enter number 1.

Enter alpha-numerical value

To start the alpha-numerical input for the highlighted value.



Use the key 0 to 9 to enter alphanumeric characters.

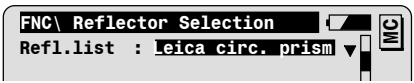
To position the cursor on the digit to be edited. The digit can be overwritten now.

You can change between numeric and alphanumeric input with the key F6 .

To confirm the entry.

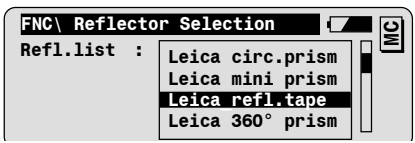
Input from a choicelist

Input fields marked with a triangle (▼) have a predefined list of values (e.g. **Refl.list** in dialog below).

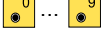


Standard selection method

To open the choicelist



To set the cursor bar on the corresponding value.

Or: 

To start the aphanumeric search for the desired value.

The search feature is available only for longer lists.

To select the highlighted value and close the choicelist.

Quick selection method

To toggle through the choicelist and select the corresponding value.

PC-Card

PC-Cards are used as external memory device on TPS1100 instruments.

Both “SRAM” and “ATA Flash” PC-Cards are supported.

Files and directories

The PC-card can contain any kind of files, whereas the following files are used or created on the TPS1100 instruments:

Type of file	Extension	Fixed Directory
Meas. Job: file for recording measurement data	GSI	PC-Card:\GSI
Data job: file containing control data	GSI	PC-Card:\GSI
Codelist: codelist file	REF	PC-Card:\CODE
ASCII files: files with control data in ASCII format	ASC	free

The filenames are all user defined. The file extension and the file location on the PC-Card are fixed, depending on the type of file.

Data Format

The measurement data can be recorded in GSI-8 or GSI-16 format on the PC-Card.

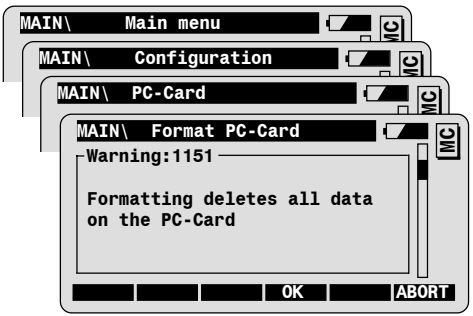
The control data must be available in GSI-8 or GSI-16 format on the PC-Card.

Control data in ASCII format can be converted to GSI format on the instrument using the data converter.

Formatting a PC-Card

The PC-Card can be formatted on the instrument.

5
3
2



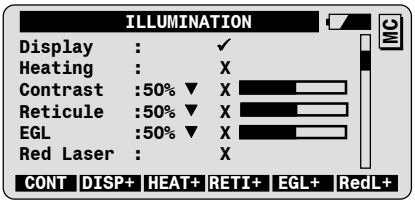
OK
F4

To format PC-Card.

When the PC-Card is formatted, all data are irretrievably deleted!

Illumination, EGL

The illumination dialog can be called anytime.



Lights, heating: ON/OFF

Use the function keys to switch the lights or the heating ON/OFF.

HEAT+ F2 — To turn the display heating on.

DISP+ F3 — To turn the display illumination on.

RETI+ F4 — To turn the reticule illumination on.

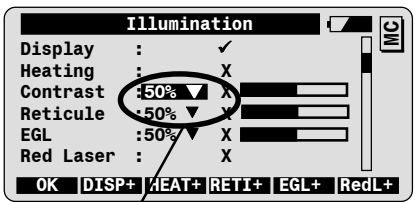
EGL+ F5 — To turn the EGL electronic guide light on (only for TPS1100 instruments with EGL option).

RedL+ F6 — To turn the red laser beam on (only for TPS1100 instruments with Refelctorless EDM).

Intensity settings

You can define the intensity for the following parameters:

- Display contrast
- Reticule illumination
- EGL guide light



To modify the intensity, position the cursor bar on the corresponding field with the PgUp / PgDn -arrow keys, and select the desired intensity with the / ON -arrow keys.

OK F1 To confirm the settings and return to the previous dialog.

Setup

The Setup procedure is used to define the job settings and to setup and orient the instrument on a known station.

To setup the instrument on an unknown station, you can use the TPS1100 programs Resection or Free Station, explained in the Applications Program Field Manual.

The job settings can be defined independantly of the setup procedure, with the function “Job settings” from the FNC-fixed function key (see chapter FNC-fixed function key).

Start the setup procedure from the main menu.

SETUP
F5

To define a new MeasJob.

Job Settings

Meas. Job	Selection of the job for recording measurements.
Data Job	Selection of the job containing the fix point coordinates.
Disp.Mask	Selection of the display mask for the measurement dialog.
REC-Mask	Selection of the GSI recording mask.

Exit after job settings

MEAS F6

To confirm the job settings and continue to the measurement dialog.

Station setup functions

The setup procedure offers two different functions for station setup and orientation:

1. STN F1 — For station setup and orientation by known azimuth.
2. QSET F4 — For station setup and orientation to a known backsight point.

In both functions the orientation is performed to one point.

You can use the TPS1100 program Orientation and Height Transfer to set the orientation from measurements to 1 to 10 tie points.

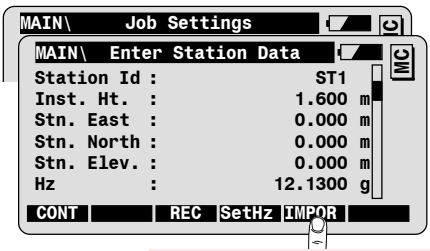
❶ *Station setup and orientation by given azimuth*

This function is used for station setup and instrument orientation, given the station coordinates and the azimut to a backsight point.

Station data

Call the Station function from the Job Settings dialog.

STN
F1

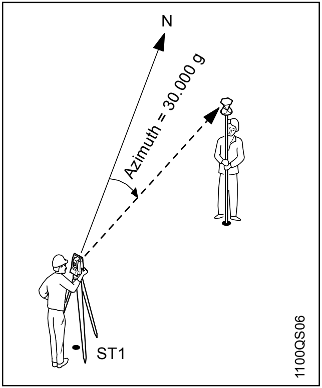


To import station coordinates from data job

Enter the Station Id and the instrument height.

You can enter the station coordinates manually or import them from the data job.

Orientation



Call the dialog for setting the instrument orientation.

SetHz **F4**

```
MAIN\ Set Hz to any angle

Set Hz-direction
Hz          :        12.1300 g
SET |  |  | Hz=0 | HOLD |
```

Aim to the backsight point.

Enter the azimuth value (e.g. 30.0000g).

SET **F1** To set the orientation and return to the station data dialog.

```
MAIN\ Enter Station Data
Station Id :           ST1
Inst. Ht.  :         1.600 m
Stn. East  :      4132.143 m
Stn. North :      3093.967 m
Stn. Elev. :       450.070 m
Hz         :        30.000 g
CONT |  | REC | SetHz | IMPOR |
```

REC **F3** To record the station data in the measurement job (optional).

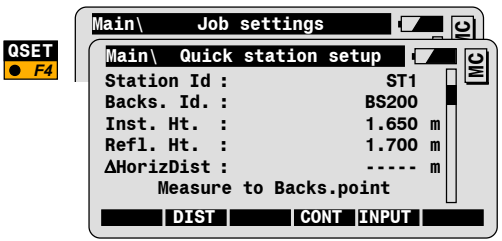
CONT **F1** To set the station and continue to the measurement dialog.

❷ *Quick Set with orientation to one backsight point*

This function is used for station setup and instrument orientation, given the station coordinates and the coordinates of one backsight point.

You can enter the station/ backsight coordinates manually or import them from the data job.

Call the Quick Set function from the Job settings dialog.



Enter the Station Id. If available, the coordinates are automatically retrieved from the data job.

Enter the Backsight Id.

Press SHIFT VIEW F5 to view the coordinates of the highlighted value (Station or Backsight Id).

Press **INPUT** *F5* to manually enter the coordinates for the highlighted value.

DIST *F2* To measure a distance to the backsight and check the difference **ΔHorizDist** between measured and computed distance.

SHIFT **REC** *F3* To record the measurements to the backsight point.
(Instrument not yet orientated !)

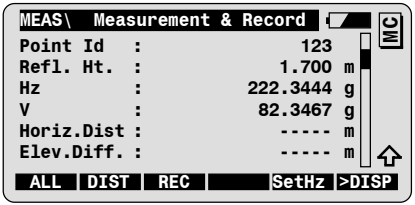
Or **CONT** *F4* To proceed to the next dialog without recording the measurements.

REC *F3* To record station data and backsight point Id. Sets station and orientation and continues to the Measurement dialog.

Or **CONT** *F4* To set station and orientation and continue to the Measurement dialog.

Measure and record

The dialog “Measurement & Record” can be called directly from the main menu or is displayed after the setup procedure.



Angles and distances can be measured and recorded with the following measurement functions.

ALL key

ALL / F1

One keystroke for measuring angles and distance, and for recording measurement data according to the selected REC-mask.

REC key

REC / F3

To record displayed angles according to the selected REC-mask.

DIST and REC combination

DIST / F2

To measure a distance and to display the measured distance.

REC / F3

To record displayed distance and angles according to the selected REC-mask.

Utility functions

List of the functions available in the dialog “Measure & Record”.

SETHZ *F5*

To set a new value for the horizontal angle circle reading.

>DISP *F6*

To modify the display content according to the predefined display masks:

- Standard 1: Angles and distances
- Standard 2: Offset and Coordinates
- Standard 3: Point Code and Attributes

SHIFT **D INP** *F2*

To manually enter a distance.

SHIFT **DEL B** *F3*

To delete the last block registered in the measurement job. The last block can be a measurement or a code block.

SHIFT **I<>II** *F4*

Motorized instruments: changing between face I and face II. Manual instruments: displaying the Hz- and V-differences up to the other face. The instrument must be moved manually by the user until the differences are 0.

SHIFT **INDIV** *F5*

To enter an individual point Id. After the entry of the individual point Id, the running point Id is displayed again.

FNC Fixed function key

The fixed key FNC provides direct access to additional functions, which might be needed during measurement (see next chapter).

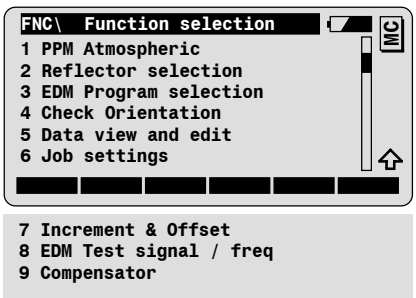
FNC Fixed function key

Introduction

The fixed key FNC provides direct access to a number of functions that are particularly useful during measurement.

Call the FNC function from any dialog.

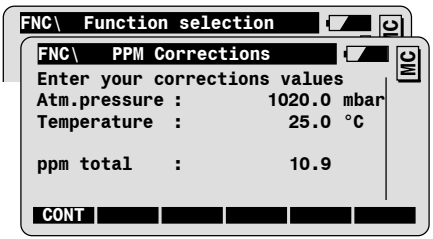
FNC



Start a function by highlighting it with the cursor bar and pressing the -key, or simply by pressing the corresponding numeric key.

PPM Atmospheric

The PPM atmospheric dialog calculates the atmospheric ppm, given the atmospheric pressure and temperature. If needed, the ppm total value can be entered manually.
Call the dialog for PPM atmospheric settings from the Function selection dialog.



Enter the atmospheric pressure and the temperature.
The ppm total value is computed, according to the “Barrel and Sears” equation (see TPS1100 User Manual).

To accept the values and return to the dialog from which FNC has been started.

PPM total manual entry

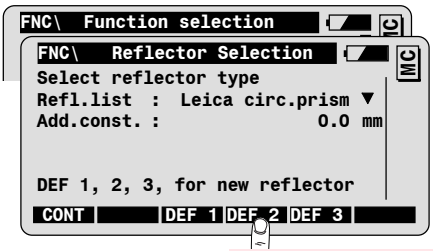
Position the cursor bar on the ppm total value with the cursor key and enter a new value. The values for **Atm. pressure** and **Temperature** are deleted.

Reflector Selection

The Reflector selection dialog allows to select predefined reflectors from a list. The definition of new reflectors with corresponding addition constant is possible.

Call the dialog for Reflector selection settings from the Function selection dialog.

2



To define a new reflector: the reflector name and addition constant can be defined.

Select the reflector from the choicelist.

The addition constant of the reflector is displayd as information.

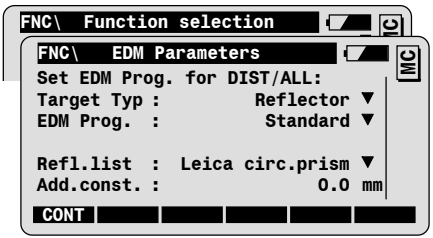
CONT
● *F1*

To accept the selection and return to the dialog from which FNC has been started.

EDM Program selection

Call the dialog for EDM program selection from the function selection dialog.

3



Select the target type. This function is **only available on** instruments with the option **"reflectorless EDM"**.

Select corresponding EDM program:

- **Standard** or **Fast** distance measurement.
- **Tracking** or **Rapid Tracking**
- **Average**: the parameter "**AVG n max**"allows you to set the maximal number of distances to be averaged (from 2 to 999 distances).

CONT *F1*

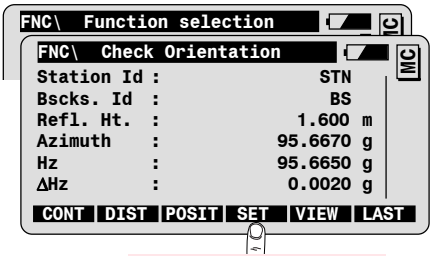
To accept the selection and return the dialog from which FNC has been started.

For more details, refer to the chapter "EDM functions".

Check Orientation

The Check Orientation dialog allows to check the orientation to a known backsight point, and to reset the orientation if necessary.

4



Reset the orientation

Enter the Backsight Id. If available, the coordinates are automatically retrieved from the data job.

Aim to backsight point and compare the angles:

Azimut Calculated Azimut between station and backsight.
Hz Current orientation
ΔHz Difference between calculated azimut and current orientation.

CONT
F1

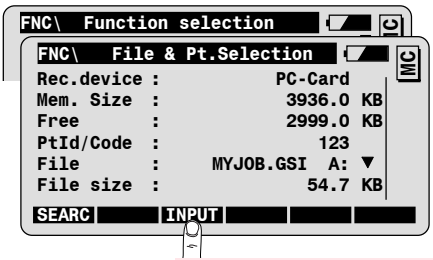
To return to the dialog from which FNC has been started.

Data View and Edit

Data View and Edit allows to search for a point or a code in the measurement job, and/or to manually enter new points.

Call the dialog for data view and edit from the Function selection dialog.

5



Enter the point Id or the Code to be searched for in the measurement job.

SEARC F1

To start the search and display the data found.

CONT F1

To return to the dialog from which FNC has been started.

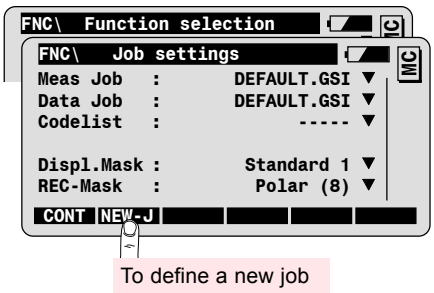
For more details, refer to the chapter “Main Menu Functions”.

Job settings

Job settings allows to modify the current jobs and codelist, and the display and recording mask.

Call the Job settings dialog from the Function selection dialog.

6



Select corresponding measurement job, data job, codelist, display mask and recording mask.

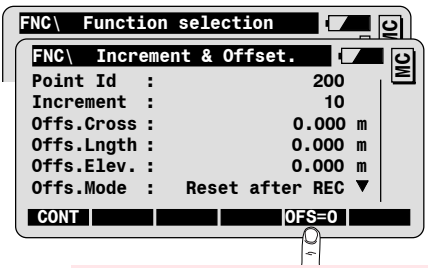
CONT *F1*

To accept values and return to the dialog from which FNC has been started.

Increment & Offset

This dialog allows to define the increment of the point Id. The Cross, length and/ or elevation offsets can be defined for any target point, too.

Call the Increment & Offset dialog from the Function selection dialog.



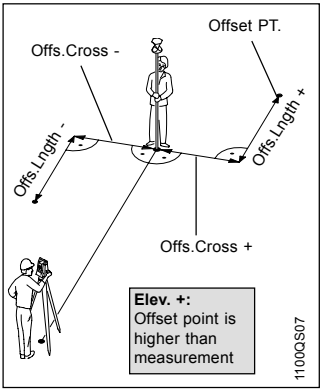
Reset offset values to zero

Increment

Enter the point Id increment and the starting point ID in order to increase the running point no. after every record.

For instance: Increment = 10; starting point Id = 200; point Id's are 210, 220, 230, 240, etc.

Enter Offset values



Enter offset values for the displayed point Id, according to the sign convention explained in the illustration.

Define corresponding Offset mode:

Reset after REC	The entered offset values are reset to zero after the point has been recorded.
Permanent	The entered offset values are applied to all measurements.

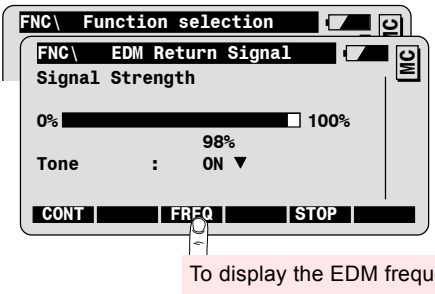
CONT
● *F1*

To accept increment and/or offset values and return to the dialog from which FNC has been started.

EDM Testsignal / freq

Call the function for testing the EDM signal strength and frequency from the Function selection dialog.

8



To display the EDM frequency

The strength of the signal returned by the reflector is displayed in procent on the instrument.

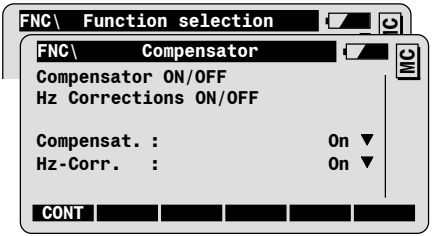
CONT
F1

To return to the dialog from which FNC has been started.

Compensator

Call the Compensator dialog from the function selection dialog.

9



Select the compensator and Hz corrections settings:

Compensat. = ON	V-angles are corrected and relate to the plumb line.
Compensat. = OFF	V-angles are not corrected and relate to the standing axes.
Hz-corr. = ON	Hz-angles are corrected for Hz/V collimation. Standing-axis tilt is corrected only if Compensat.=ON.
Hz-corr. = OFF	Hz-angles are not corrected.

CONT F1

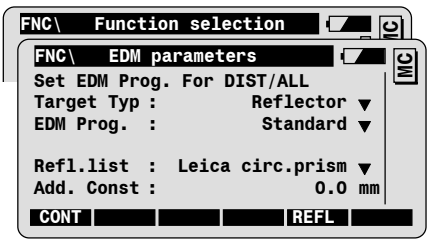
To return to the dialog from which FNC has been started.

EDM Measuring - Program dialog

The selection of the EDM Measuring-program is possible anytime. To set the EDM program to be used when triggering a distance with the functions DIST or ALL, call the FNC-fixed key.

FNC

3



You can also call this function from the Distance Measure dialog after having triggered a distance measurement.

Parameter description

Target Type	Selection of the target type; only on instruments with the option "reflectorless EDM".
= Reflectorless	For reflectorless distance measurement. ☛ The Target type must be set to "Reflectorless" for distance measurements to targets without prism or reflective tape.
= Reflector	For distance measurement to the selected reflector ☛ The target type must be set to reflector for normal and long range distance measurement.
EDM Prog	Selection of the EDM measurement program for the functions DIST and ALL.
= Standard	Standard single distance measurement.
= Fast	Fast single distance measurement.
= Tracking	Continuous distance measurement. The measured distances can be recorded anytime with the REC function key.

EDM Prog (continued)	
= Rapid Tracking	Continuous fast distance measurement. The measured distances can be recorded anytime with the REC function key.
= Average	Average mode.
= Standard Long	For long range distance up to 5000 meters or more. Instruments with the option "reflectorless EDM" only.
= Average Long	Average mode for long range distance measurements. Instruments with the option "reflectorless EDM" only.
AVG n max.	This parameter is displayed only if an averaging EDM program has been selected. Input field for the maximum number of distances to be averaged (from 2 to 999 distances).
Refl.Name	This parameter is displayed only if the target type is set to "Reflector". Selection of the reflector from the list.

Shortcut for switching between EDM-programs

Following functions allow to change the EDM-program for a single distance measurement quickly with two keystrokes.

For instance, if you are measuring distances with the standard EDM-program, and you want to measure a single reflectorless distance.

Switch between reflector and reflectorless

To switch from measurement to a reflector to reflectorless distance measurement (TCR and TCRA only).

To switch from reflectorless to distance measurement to a reflector (TCR and TCRA only).

Switch from single to tracking

To start distance tracking.

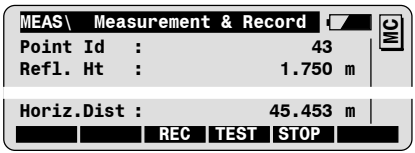
To start standard distance measurement.

To start rapid distance tracking.

To start rapid distance measurement.

Measure and record in tracking mode

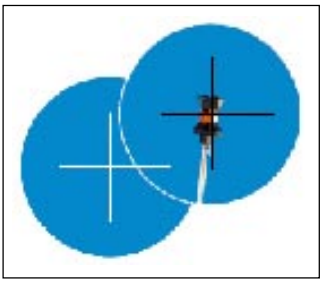
When the instrument is tracking distances, you can edit point Id, Reflector Height, enter codes and record measurement data as usual.



REC ● *F3* To record displayed measurement data, according to the active REC-mask.

STOP ● *F5* To stop tracking.

Introduction



Automatic Target Recognition (ATR) is a feature of TCA and TCRA instruments.

ATR allows automatic angle and distance measurements to prisms. The prism is approximatively targeted with the optical sight on top of the telescope. No focussing is needed. Initiating a distance measurement with ALL or DIST will automatically position the instrument to the prism centre.

The accuracy of ATR measurements depends on the EDM measurement program set. Highest accuracy is achieved with the EDM measurement program “Standard”. Refer to the TPS1100 User Manual, chapter Technical Data for more details concerning ATR accuracy.

As for all other instrument errors, the ATR collimation error can be checked and determined using the calibration function as described in the TPS1100 User Manual.

ATR operating modes

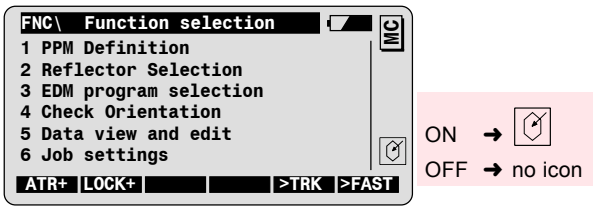
TCA/TCRA instruments can be used in two main operating modes:

- **ATR mode**: automatic measurements to static prisms.
- **LOCK mode**: automatic measurements to moving prism. The instrument follows the moving prism.

ATR mode

Call the FNC fixed key from any dialog to switch the ATR on.

FNC



ATR+ F1

To switch ATR on and return to the previous dialog. The ATR icon is displayed in the status icon column of the display.

ATR- F1

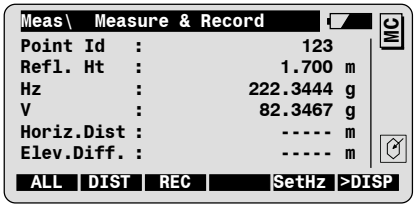
To switch ATR off.

Measure with ATR

ATR is a general function. If switched on, it is active at station setup, during data collection and within all TPS1100 application programs.

To start the Automatic Target Recognition process, you need to trigger a distance measurement with ALL or DIST.

Example: Measure & Record dialog



ALL *F1* To automatically position the telescope to the prism centre, measure angles and distance, and record measurement data.

DIST *F2* To automatically position the telescope to the prism centre, measure and display the distance to the prism.

ATR is also active in the **SetHz** *F5* function, for setting the orientation to a reflector with following procedure:

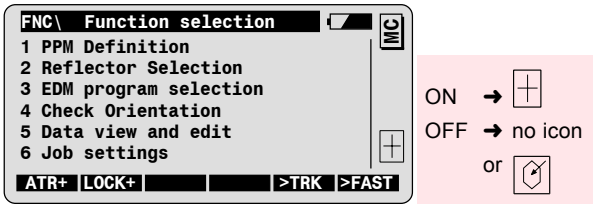
- Approximatively aim at the reflector.
- Enter the azimuth value. ATR will position the telescope to the reflector centre.
- Set the orientation.

If you want to use **SetHz** *F5* to set the orientation to a target without prism, you first need to switch ATR off.

LOCK mode

Call the FNC fixed key from any dialog to switch the LOCK mode on.

FNC



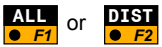
1. Step: Activate LOCK mode

LOCK+ F2

To switch LOCK on and return to the previous dialog.
The icon ⌖ confirms that LOCK is on, but the instrument is not tracking the prism yet.

2. Step: LOCK to stable prism

Approximately aim at the prism. Note that the prism has to be stable and must not move.



To trigger a distance measurement.

Once the icon  is displayed, the instrument is locked to the prism. The rod person can move and the instrument will follow the prism.

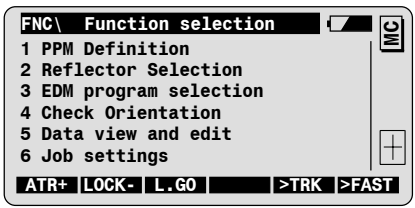
2. Step: LOCK to unstable prism

This functionality is helpful to lock to a prism located on an unstable surface, e.g. on a boat, or near to the instrument.

Aim at the prism and make sure that it is visible within the field of view of the telescope.

FNC

To call the function selection dialog.



L.GO
F3

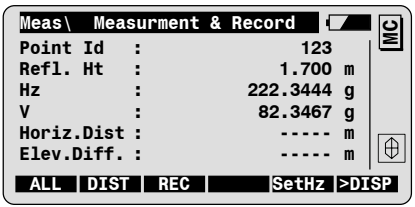
To activate prism tracking and return to the previous dialog.

The icon ⌖ indicates that the instrument is locked to the prism. The rod person can move and the instrument will follow the prism.

Measure with ATR in Lock Mode

Once the TC(R)A is locked to the prism, you can measure and record data with the usual measurement functions. The instrument will follow the prism and position itself to the prism centre everytime you trigger a distance measurement.

If you want to have a realtime display of the distance betweeen the TC(R)A and the moving prism, you can start the distance tracking program, as explained below.

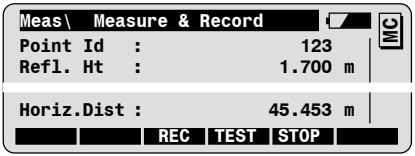


To call the function selection dialog.

Press F5 to switch to the distance tracking mode.

To trigger the distance measurement.

If the EDM Measurement-Program is already set to Tracking or Rapid Tracking, you must only press F2



REC F3 To record displayed measurement data, according to the active REC-mask.

STOP F5 To stop tracking.

Loss of Target Lock

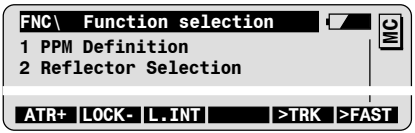
If the instrument looses lock to the prism, the icon is displayed.

A beep signal indicates if the prism has not been found. In this case, you need to manually aim at the prism: the instrument will lock to the prism without additional distance measurement.

LOCK interrupt

To temporarily interrupt lock mode, call the FNC key from any dialog.

FNC



L.INT F3

To interrupt lock and return to the previous dialog.

There are 3 possibilities to re-lock the instrument to the prism:

- Approximatily aim at the prism and measure a distance.
- Approximatily aim at the prism and reactivate lock with the function L.GO F3 from the Function selection dialog.
- Press LAST F5 in the Program selection dialog to position the instrument to the last recorded point.

Note that you can't measure distances to side shot points by interrupting the lock mode. To do so you need to switch the lock mode off.

PowerSearch

Introduction

PowerSearch is an option for the TPS1100plus series that enables the instrument to find a prism at any desired position within a short period of time. When PowerSearch is activated, the instrument starts to rotate around its standing axis. The transmitter emits a vertical laser swath. If the laser swath detects a prism, the rotation of the instrument is stopped. Afterwards a fine aiming in vertical direction is performed by the ATR.

Search modes

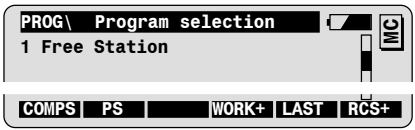
- If no working area has been defined, then the instrument rotates 360° around its standing axis and PowerSearch scans the entire horizon.
- If a working area is defined and activated then PowerSearch only scans within the defined limits.

Starting a search

PowerSearch can always be called up in the menu PROG:

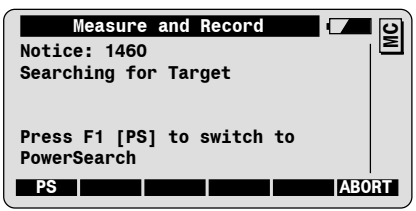
PROG

Calls up the menu selection.



PS
F2

If RCS mode is activated then after triggering ATR search with ALL resp. DIST the following dialogue is displayed:



PS
F1

By pressing PS/F1 the ATR search can be switched to PowerSearch for a quick prism search.

Introduction

TCPS26

RCS1100 Controller

RCS stands for Remote Control Surveying. RCS enables all TPS1100 instruments to be remote controlled. Especially qualified for this purpose are the instrument types with ATR.

The keyboard of the RCS1100 Controller is the same as the TPS1100 keyboard. All functions and programs of TPS1100 instruments are available on the RCS1100.

The communication between the instrument and the RCS1100 is established via radio modems. One radio modem (TCPS26) must be connected to the TCA's serial port. As the RCS1100 has an integrated radio, no additional connections are needed.

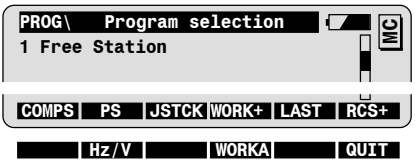
RCS mode must be switched on at the instrument first. After all connections have been made, the RCS1100 can be switched on. This automatically switches on the instrument. After a few seconds, the display of the TCA appears on the RCS1100.

For a complete description of the RCS1100 Controller and the RCS operation functions, please refer to the RCS1100 User Manual.

Measure with RCS

With the RCS1100 controller you can use the instrument measurement functions as if you were using the instrument itself.

Lock the TCA/TCRA to the prism



RCS+ F6

Switch on RCS mode.

Once the RCS mode has been activated, the lock mode on instruments with ATR is switched on automatically, but the instrument is not locked to the prism yet.

If you are at the station, you can manually aim to the prism and trigger a distance measurement with DIST. The icon is displayed as soon as the instrument is locked to the prism.

If you are at the reflector pole, several search modes are available to lock the instrument to the prism. Call the PROG fixed key to access the RCS search modes.

COMPS F1 — To start the compass mode. You need a compass to use this search mode. Refer to the RCS User Manual for more information.

PS F2 — Starts the quick prism search PowerSearch (only available on instruments with optional PowerSearch module)

JSTCK F3 — To position the motorized instruments to the prism with the cursor keys (joystick mode). The left/right cursor keys move the instrument horizontally.

The up/down cursor keys move the instrument vertically. The instrument can be moved faster by pressing a cursor key twice (three different speeds). It can be stopped by pressing any other cursor key.

Confirming with CONT F1 starts to search for the prism and locks if the prism has been found.

SHIFT Hz / V F2 — To position the instrument to the prism by entering angle values. Motorized instruments turn by the corresponding values.

Confirming with CONT F1 starts to search for the prism and locks ifthe prism has been found.

Automatic reflector search

The RCS searching window is rectangular (default: Hz 30gon / V 15gon). If the reflector is found the icon is displayed.

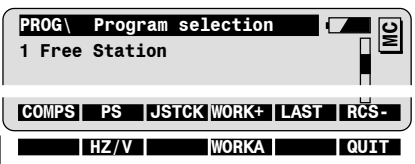
The dimensions of the RCS search window can be defined in the instrument configuration *(see function "RCS Searching Window" in chapter Instrument map)*.

Working Area

In RCS mode it is possible to define a rectangular working area within which the instrument searches for the reflector if the reflector was not found by the default search methods.

Press the PROG fixed key to access the RCS related functions.

PROG

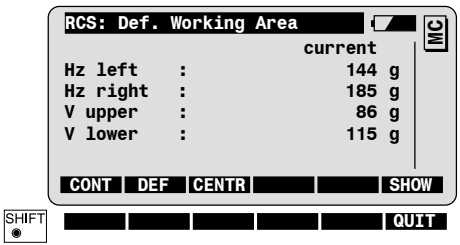


Activate/Deactivate Working Area

WORK+ F4 To activate the defined Working Area.

WORK- F4 To deactivate the defined Working Area.

SHIFT WORKA F4 To display the current settings of the Working Area.



CONT F1 To define a new Working Area by pointing the telescope to the two opposite corners of a rectangular area.

DEF F2 To position the telescope to the upper left / lower right corner of the defined Working Area.

CENTR F3 To centre the working area to the current telescope position (retains the same size of the WA).

SHOW F6 To confirm the displayed values and return to the previous dialog.

Communication settings

If you have communication problems, check the RCS communication parameters set on your instrument (see chapter "Instrument map", "Configuration") and on your RCS1100 controller (see following chapter “Functions behind the FNC key”). They must correspond to those for the TCPS26, which were set in the factory to the following values:

- 19200 baud
- 8 data bits
- No parity

RCS1100 local functions

The RCS1100 local functions allow to set the local parameters of the RCS1100 controller and radio modems.

Functions status

Press down the illumination key for more then two seconds, until the dialog “RCS\ Status Local” is displayed.

> 2 sec.

This dialog allows to check or set following parameters:

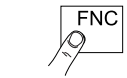
- RCS controller battery
- Quality of the radio link
- Contrast of the controller display
- Illumination of controller display
- Power off mode of the controller
- Key beep mode
- Heating of the controller display

CONT
F1

To confirm the settings and exit the dialog.

Functions configuration

Press down the FNC key for more then two seconds, until the dialog “RCS\ Configuration” is displayed.



This dialog gives access to following functions:

1 To select the language to be displayed on the RCS controller.

2 To select the TPS1100 mode.

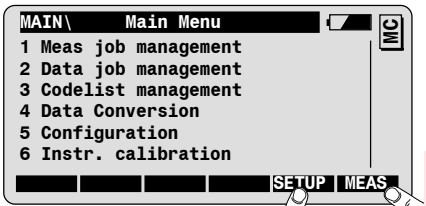
3 To set the serial interface parameters of the RCS controller. They must correspond to the TPCS26 default settings:

- 19200 baud
- 8 data bits
- No parity

4 To configure the link number, which must be changed at the same time on both radio modems. Therefore the TCPS26 must be connected to the RCS Controller.

Main Menu Functions

The Main Menu is the first dialog displayed when the instrument is switched ON.



If desired you can configure your instrument to start up with a dialog of your choice (function "Power On/Power Off" autoexec, see chapter "Instrument map").

General description of the main menu functions

Meas. and Data job management allows to

- Select the measurement and data jobs
- View the job content
- Search for point or code data in the job

- Edit Point Id and codes.
- Input new coordinates.


The maximal number of jobs is 60.

The **Codelist management** function allow to

- Select a codelist from the PC-card and internal memory.
- Create a new codelist.
- Add code and Info's to an existing codelist.


The maximal number of codelist is 32. A codelist can contain up to 500 codes.


Note that the Meas/Data job or codelist selection can also be done in the Job settings dialog, which is part of the Setup procedure.

Data Conversion allows to convert coordinates available in ASCII format on the PC-Card to GSI format, and vice versa.

Configuration gives access to all TPS1100 configuration parameters. Refer to chapter "Instrument map" for a description of the configuration functions.

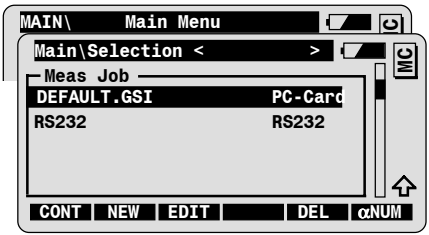
Instrument calibration allows to check and determine the instrument errors (Compensator, V-index, Line of sight, Tilting axis and ATR collimation).
It is explained in detail in the TPS1100 User Manual.

Meas job management

The Meas. job management allows the selection of the measurement job for recording measurement and coding data.

Call the Meas. job management from the Main Menu.

1



Select the measurement job **Default.GSI** for recording data, or any other job available on your PC-Card.

Select RS232 to record data via serial port (RS232) to an external data collector.

CONT *F1* To select the Meas. job.

NEW *F2* To create a new Meas. job.

EDIT *F3* To search for point or code data and to view the job content.

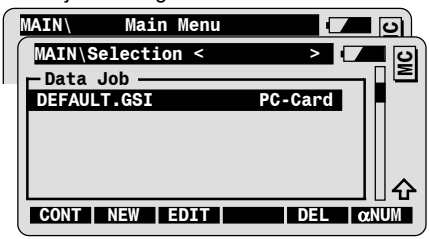
DEL *F5* To delete the selected Meas. job.

Data job management

The Data job is a job containing fixed point coordinates, to be used within stakeout or any other program. The data job must be on the PC-Card in the GSI directory.

Call the Data job management from the Main Menu:

2



Select the Data job.

The Meas. job and the Data job can be the same. In this case, TPS1100 programs will automatically retrieve the first recorded coordinates of the specified point Id.

CONT *F1* To select the Data job.

NEW *F2* To create a new Data job.

EDIT *F3* To search for point or code data and to view the job content.

DEL *F5* To delete the selected Data job.

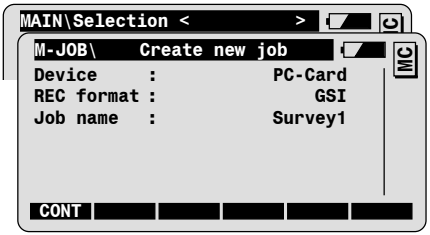
Meas./Data job management functions

The functions explained in this section are available in the Meas. job and Data job management.

Create new job

Call the "New" function from the job selection dialog.

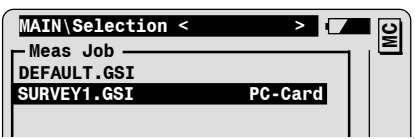
NEW
F2



Enter the name of the Meas. or Data job.

CONT
F1

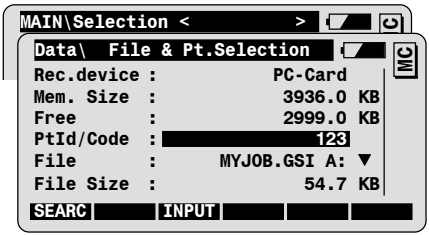
To create new job and continue to the job selection dialog.



Search and view data

Call the Edit function from the job selection dialog.

EDIT *F3*



Enter the point Id or the code to be searched for.

The decimal point can be used as Wild Card

12. search the points beginning with "12"

.A. search the points containing "A"

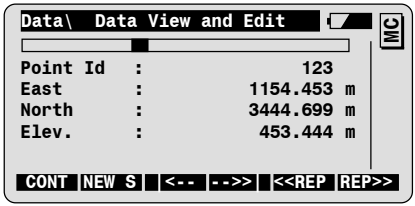
.5 search the points ending with "5"

Select the search file.

SEARC *F1*

To search for point or code data in the selected file.

View / edit data



Values accessible with the cursor bar can be edited, e.g. point Id, Code, Info's.

|<-- F3 --->| F4

To display the previous or the next data block in the file.

<<REP F5 REP>> F6

To search for the previous or the next data block for specified point Id or code.

CONT F1

To return to the job Selection dialog.

NEW S F2

To start a new point Id or code search.

SHIFT |<-- F3 / SHIFT -->| F4

To display the first or the last point of the file.

SHIFT DEL F5

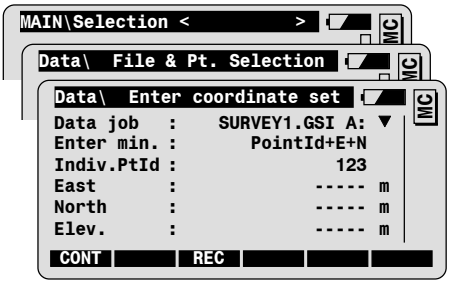
To delete the displayed data block.

Input new point coordinates

Call the "Edit" function from the job selection dialog, then the "Input" function.

EDIT F3

INPUT F3



Enter point coordinates:

Indiv. PtId	Point Id of the new point
East	Easting coordinate
North	Northing coordinate
Elev.	Point Elevation (optional)

REC F3 To record the point coordinates in the selected job.

CONT F1 To return to the File & Pt. Selection dialog.

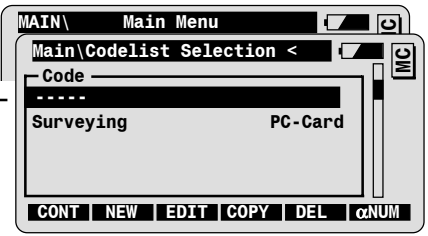
Or SHIFT QUIT F6 To return to the Main Menu.

Codelist management

Call the Codelist Management from the Main Menu.

Note: if no codelist has been found, you will be prompted to define a new codelist.

3



No codelist is selected when the cursor bar is positioned on the dots.

CONT F1 — To select the highlighted codelist.

NEW F2 — To create a new codelist.

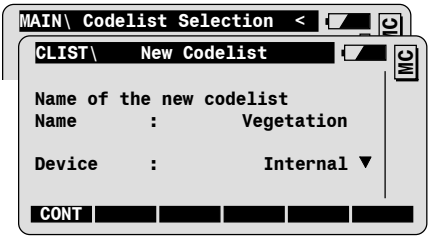
EDIT F3 — To display the list of codes for the selected codelist. Access to the entry of new codes.

COPY F4 — To copy the selected codelist from the internal memory of the instrument to the PC-Card and vice versa.

DEL F5 — To delete the selected codelist.

Create new codelist

NEW
● *F2*

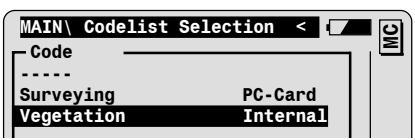


Enter the name of the new codelist.
Enter the device:

Internal	to record the codelist i the internal memory of the TPS1100 instrument
PC-Card	to record the codelist on the PC-Card

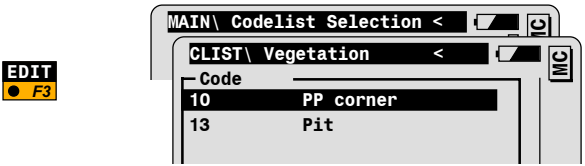
CONT
● *F1*

To create the codelist and continue to the Codelist selection dialog.

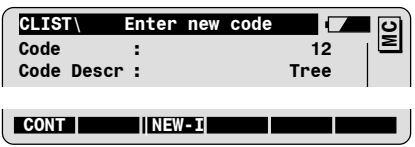


Define new codes

Call the Edit function from the codelist selection dialog to display the list of codes for the selected codelist.



NEW *F2* To add new codes to the list.

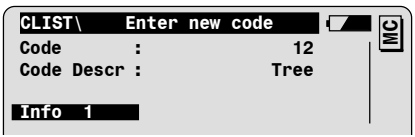


Enter the code data:

Code	Code to be recorded in the measurement job. Alphanumeric values are accepted.
Code Descr	Description of the code: optional. This information will not be recorded in the measurement job.

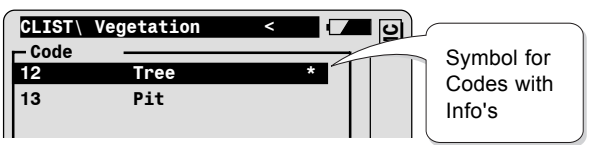
Define Info's for the new code

NEW-I / *F4* To define additional code Infos.
Note: you can define up to eight code Infos.



You can overwrite the default text **Info 1** (e.g. for the code **Tree**, the information **Diameter** might be needed.)

CONT / *F1* To create the new code and display the new content of the codelist.

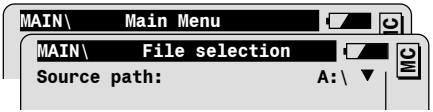


CONT / *F1* To return to Codelist Selection dialog.

Data conversion

Call the "Data conversion" function from the Main menu.

4



Set the file selection parameters:

Source path	Selection of the source file path on the PC-Card
Source file	Selection of the file to be converted from the choicelist.
Format	Display of the source file format.
Output path	Selection of the path for the output file. ☞ Select the path "a:\GSI" for GSI-files to be further used on the instrument.
Output file	Filename of the output file. The filename and its default extension can be modified. Note that the extension must be part of the filename.
Format	Selection of the output format. (GSI-8, GSI-16 or ASCII)

GO F1

To start the file conversion (the function is available only if the file selection matches with the program configuration).

Data conversion configuration

Call the Data conversion configuration from the Data conversion / File selection dialog.

CONF
F2

Set the source file parameters first:

Search extens.	Entry of the source file extension. - If the source format is GSI, the extension must be **GSI** - If the source format is ASCII, the extension is user definable (e.g. **TXT, ASC**, etc...). Only the files with defined extension will be displayed in the source file choicelist in the File Selection dialog.
Coord. Order	This parameter must correspond to the coordinate sequence in the source file.
Header lines	Number of header lines in the source file. The header lines are ignored during conversion.

Set the output file parameters:

Default extens.	Entry of the output file extension. ☞ If the output format is GSI, the extension must be **GSI** for further use of the converted file on the instrument.
Coord. Order	Selection of the coordinate sequence in the output file.
Separator	Selection of the field separator from the choicelist (parameter available only for ASCII output format)
Decimals	Selection of the number of decimals for the coordinate output.

To accept the settings and return to the File selection dialog.

Standard Coding

The TPS1100 keyboard is equipped with a coding key, CODE

With the coding key, you can enter codes plus up to eight additional informations from the following dialogs:

- from the main measurement dialog.
- from the measurement dialogs of all TPS1100 application programs.
- from the station setup dialogs

The codes and informations are recorded **independently** of the measurement data. You may record the code before or after you have measured and recorded the target point data.

The standard use of the coding key allows the **manual entry** of codes and informations.

You can select a **codelist** to be used with the coding key.

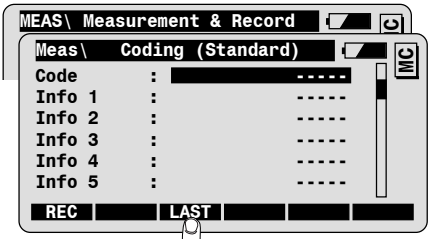
Codelists can be created:

- On the instrument (basic functionality).
- With the PC-software “Codelist Manager”. Please refer to the on-line help of the Leica SurveyOffice Software for more information.

Manual code entry

Press the code key before or after you have measured and recorded the target point data.

CODE



Enter the **code**.
In addition, you may enter up to 8 **Infos** to the code.

REC F1

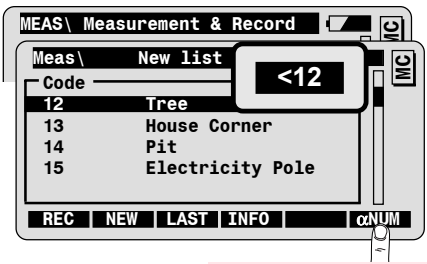
To record code and Infos in the active measurement job.

Code and Infos are recorded in a GSI code block as WI41-WI49.

Standard Coding with a codelist

For coding with a codelist, you must have selected a codelist in a previous step, during the setup procedure or in the codelist management function.

CODE



Code search settings:

αNUM = alpha-numerical search

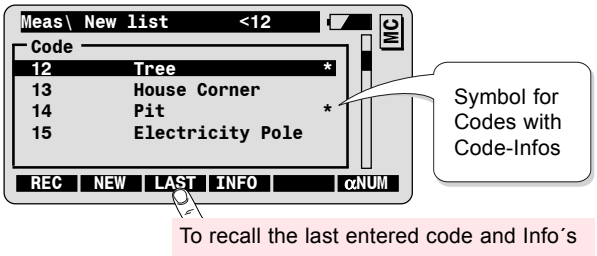
->NUM = numerical code search

Enter the code to be searched for in the title bar (e.g. 12). The cursor bar will be positioned automatically on the corresponding code. You can also step through the list with the UP/DOWN keys after having exited the search mode with the ENTER key.

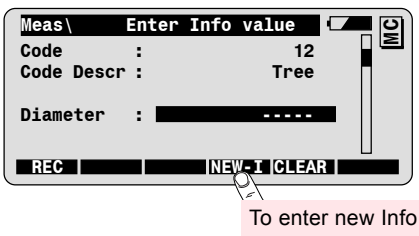
REC *F1*

To record the selected code, and to return to the previous dialog.

Advanced Feature: Enter Info



INFO / **F4** To enter additional code Infos and/or check default Info values possibly defined in the codelist.



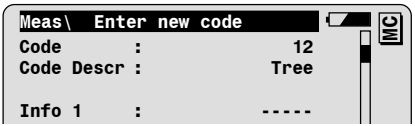
Enter the value for the corresponding code Info.

REC / **F1** To record the code and the Info values.

Advanced Feature:
Enter new code

NEW F2

To enter a new code to the currently selected codelist.



Enter the code data:

Code	Code to be recorded in the measurement job.
Code Descr	Description of the code: optional This information will not be recorded.
Info 1	Info to be recorded together with the code in the measurement job.

REC F1

To record the code data in the measurement job and add the new code in the codelist.

Advanced Feature: Quick Coding

Quick Coding is a special function for data collection with coding. With one keystroke, you can measure and record target points with code data.

The codes must be available in a codelist, which has been defined with the Codelist Manager from your Leica SurveyOffice Software. The codes must be identified with short cuts to work with Quick Coding. The short cut is a number with one or two digits which is clearly associated to one code.

Typing the short cut number on the numeric keypad will start the **Quick Coding sequence**:

- **ALL :** to simultaneously measure a distance and record a measurement block.
- **CODE :** to select the corresponding code from the codelist and record a code block.

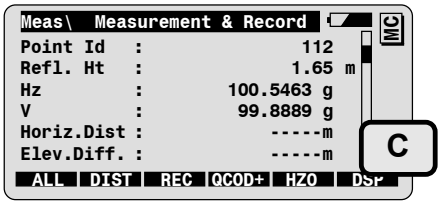
You can configure the quick coding sequence to your needs:

ALL/CODE to record the measurement data first.

CODE/ALL to record the code data first.

Switch ON and measure with Quick Coding

You can switch ON/OFF the Quick Code function in the measurement dialog.



Qcod+ F4

To switch ON Quick Coding. The symbol “C” is displayed as long Quick Coding is switched ON.

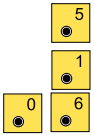
The function Qcod+ F4 is visible only if a codelist with short cuts have been selected.

Enter the short cut number on the numeric keypad to start the combined ALL/CODE sequence.

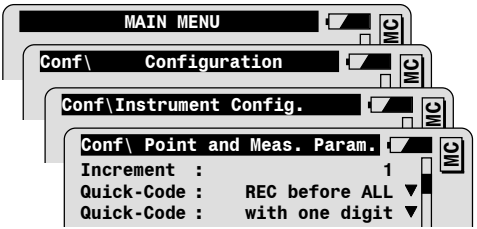
You can use all functions keys available in the measurement dialog while Quick Coding is active.

You can edit values (e.g. Point Id). You need to position first the cursor bar with the up/down arrow keys, then press ↵ to start the edit mode for the highlighted value.

Quick Coding settings



Access the Quick Coding configuration settings from the main menu:



Recording sequence

REC before ALL	Code block recorded before measurement block.
REC after ALL	Code block recorded after measurement block.

Short Cut: number of digits

with one digit	Enter a short cut number with one digit to start the Quick Coding sequence.
with two digit	Enter a short cut number with two digits to start the Quick Coding sequence. ☛ For short cuts with one digit (e.g. 7), you must first enter a zero, then the corresponding digit to start the Quick Coding sequence (e.g. 07).

Point Coding

Point coding allows to record point related codes with up to eight attributes.

The input of point codes is possible in the following dialogs:

- in the main measurement dialog, if point code and attributes have been defined in the display mask.
- in the measurement dialog of some of the TPS1100 application programs. The programs must be configured to use the user display mask and the display mask must contain point code and attributes.

The point codes and attributes are recorded **together with the target point data** (with the function keys REC or ALL).
Note: point code and attributes will be recorded only if defined so in the REC-Mask.

Point codes can be **entered manually** or selected from a **codelist** containing predefined point codes.

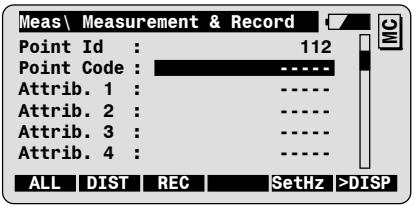
Such a codelist can be created with the PC-software “Codelist Manager”. Please refer to the on-line help of the Leica SurveyOffice Software for more information.

Manual point code entry

Point code entry in the measurement dialog:

To toggle the display mask until **Point Code** and **Attributes** are displayed as shown below:

>DISP
F6



Enter the point code and up to 8 attribute values.

ALL
F1

To simultaneously measure a distance, record the measurement data, the point code and the attribute values.

Or REC
F3

To record the measurement data, the point code and attribute values.

The entered point code and its attributes will be recorded everytime ALL F1 or REC F3 are pressed.

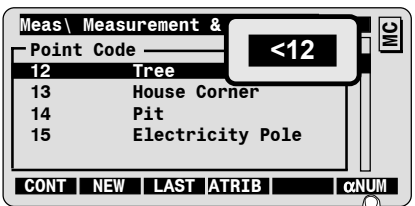
The point code and attributes are recorded together with the measurement data in the GSI measurement block as WI71-WI79 if defined so in the REC-Mask.

Point Coding with a codelist

In order to enable the point code selection from a codelist, you must have selected a codelist in a previous step.

Position the cursor bar on the point code field.

Enter the point code to be searched for (e.g. 12). The correponding point code will be highlighted:



Code search settings:

αNUM = alpha-numerical search

->NUM = numerical code search

CONT / *F1* To confirm selection and to return to the measurement dialog.

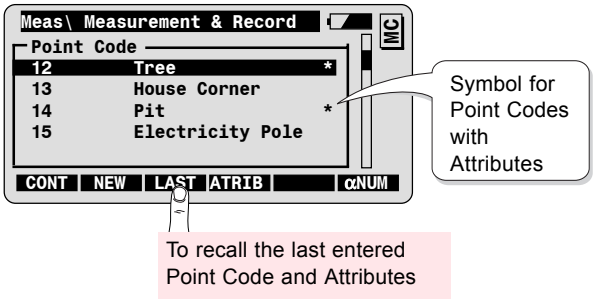
ALL F1 To simultaneously measure a distance, record the measurement data and the selected point code.

Or REC F3 To record the measurement data and the selected point code.

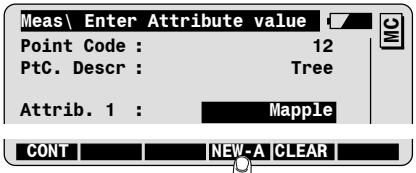
The selected point code will be recorded everytime ALL F1 or REC F3 are pressed.

The point code will be recorded together with the measurement data only if defined so in the REC- Mask. Check your REC-Mask to make sure that the point code belongs to your REC-Mask.

Advanced Feature: Enter attributes



ATRIB F4 To enter additional attribute values to the point code and/or check default values possibly defined in the codelist.



Enter the value for the corresponding attribute.

Note that user input is not possible if the attribute can not be recorded in the measurement job. In this case, check and modify the REC-mask definition.

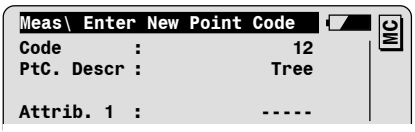
CONT *F1*

To accept the point code and the “Attribute” values and return to the measurement dialog.

Advanced Feature: Enter new point code

NEW *F2*

To enter a new point code to the currently selected codelist.



Enter the point code data:

Point Code	Point Code to be recorded in the measurement job.
PtC. Descr	Description of the Point Code: optional. This information will not be recorded.
Attrib. 1	Attribute to be recorded together with the Point Code in the measurement job.

CONT *F1*

To accept the point code data and return to the measurement dialog. The new point code is added to the codelist.

Measurement functions

Coding

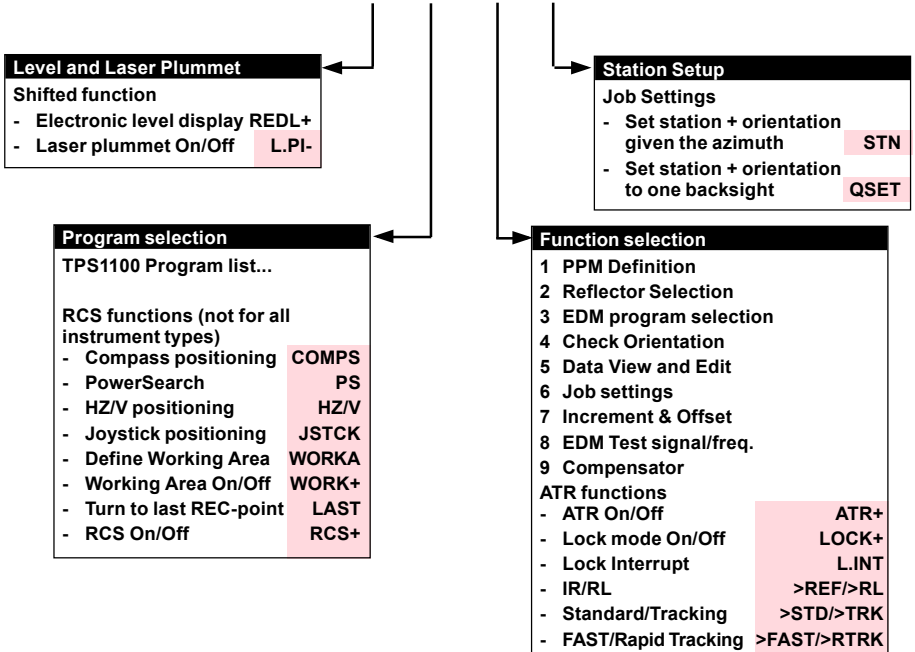
Standard Coding:
Manual entry or codelist selection if codelist selected

Light settings

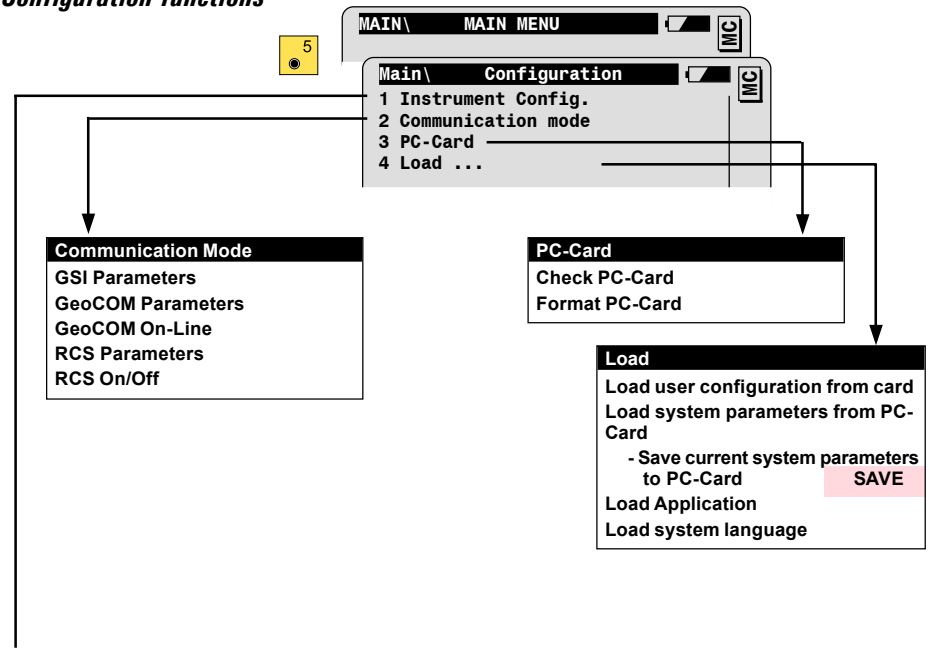
Display light	DISP+
Display heating	HEAT+
Reticule light	RETI+
EGL option	EGL+
Red Laser option	REDL+

Measure & Record

Measure and record functions	ALL, DIST, REC
Quick Coding On/Off	QCOD+
Set Hz reading	SetHz
Toggle display mask	>DISP
Manual distance input	D INP
Face I / Face II	I<>II
Delete last rec. block	DEL B
For individual Pt.Id	INDIV


Level and Laser Plummet
Shifted function
- Electronic level display REDL+
- Laser plummet On/Off L.PI-
Station Setup
Job Settings
- Set station + orientation given the azimuth STN
- Set station + orientation to one backsight QSET
Program selection
TPS1100 Program list...
RCS functions (not for all instrument types)
- Compass positioning COMPS
- PowerSearch PS
- HZ/V positioning HZ/V
- Joystick positioning JSTCK
- Define Working Area WORKA
- Working Area On/Off WORK+
- Turn to last REC-point LAST
- RCS On/Off RCS+
Function selection
1 PPM Definition
2 Reflector Selection
3 EDM program selection
4 Check Orientation
5 Data View and Edit
6 Job settings
7 Increment & Offset
8 EDM Test signal/freq.
9 Compensator
ATR functions
- ATR On/Off ATR+
- Lock mode On/Off LOCK+
- Lock Interrupt L.INT
- IR/RL >REF/>RL
- Standard/Tracking >STD/>TRK
- FAST/Rapid Tracking >FAST/>RTRK

Configuration functions



Instrument Config.

- 01 Units, Decimals, and V-angle display
- 02 Reflector selection
  - Definition of new reflectors DEF1, DEF2, DEF3
- 03 EDM program selection
  - switch reflector to reflectorless
- 04 Power On, Power Off
  Autoexec mode
- 05 Display and Record
  - Define Display Mask DMask
  - Define Recording Mask RMask
  - PPM entry
- 06 Point & Meas. Param
  - Pt.Id mode
  - Increment
  - Offset mode
  - Quick Code settings
  - Info/Attribute entry
  - Auto Dist.

Instrument Config. (continued)

- 07 Date and Time
- 08 RCS Searching Window
- 09 Beep/Hz sector
- 10 Compensator
  - Compensator On/Off
  - Hz corrections On/Off
- 11 Hz System and Face
- 12 Alpha Input mode
  - Delay for character input
- 13 Language

The configuration parameters are explained in detail in the TPS1100 User Manual.

Leica Geosystems AG, Heerbrugg, Switzerland has been certified as being equipped with a quality system which meets the International Standards of Quality Management and Quality Systems (ISO standard 9001) and Environmental Management Systems (ISO standard 14001).

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