

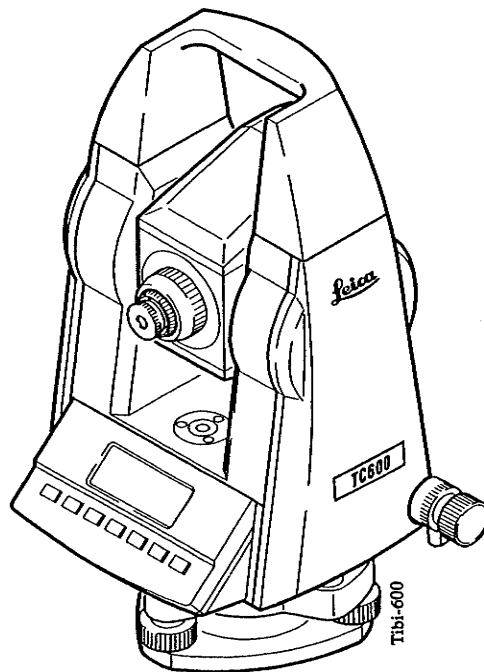
# TC600/TC800

*Electronic total station*

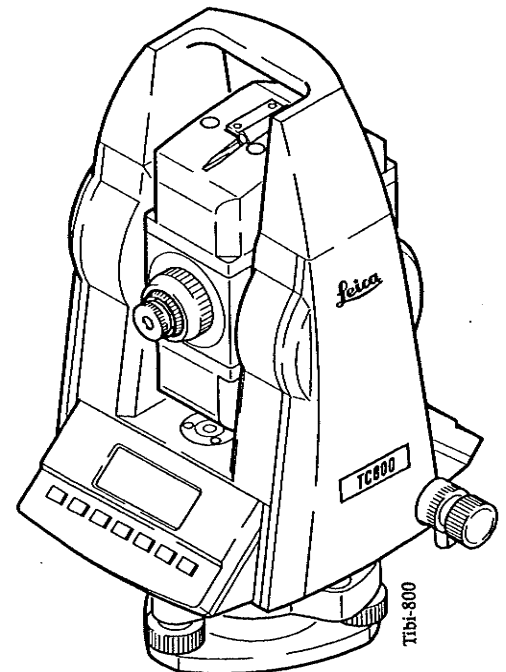
*Version 2.1*

*English*

**TC600**



**TC800**



**USER'S MANUAL**

**Leica**

**Thank you for purchasing this Leica Total Station.**



This manual contains important safety directions (*refer to section "Safety directions"*) as well as instructions for setting up the instrument and operating it. Please read carefully through the User Manual to achieve maximum satisfaction.

# ***TC600/TC800***

## ***Electronic total station***

### ***Product identification***

The instrument model and the serial number of your product are indicated on the label in the battery compartment.

Write the model and serial number of your instrument in the space provided below, and always quote this information when you need to contact your agency or service workshop.

Type: \_\_\_\_\_ Serial no.: \_\_\_\_\_

---

## ***Symbols used in this Manual***

The symbols used in this User Manual have the following meanings:



**DANGER:**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.



**CAUTION:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and / or appreciable material, financial and environmental damage.



Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

---

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## ***Introduction***

The TC600/TC800 is particularly suitable for cadastral and engineering surveying. The accuracy of angle-measuring, and the range of its EDM module, are matched to one another. The measured data can be stored in the internal memory or can be output individually via serial interface to an external recorder.

---

### ***Area of applicability of this User's Manual***

This manual applies to the following types of total stations:

- TC600
- TC800

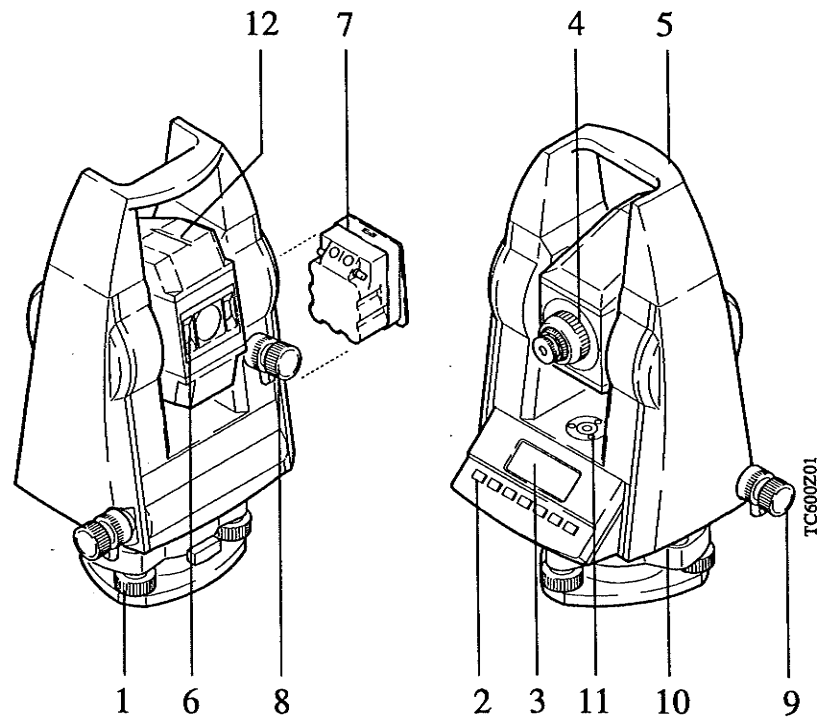
Differences between the two versions are clearly set out and assigned.

General text applies to both versions.



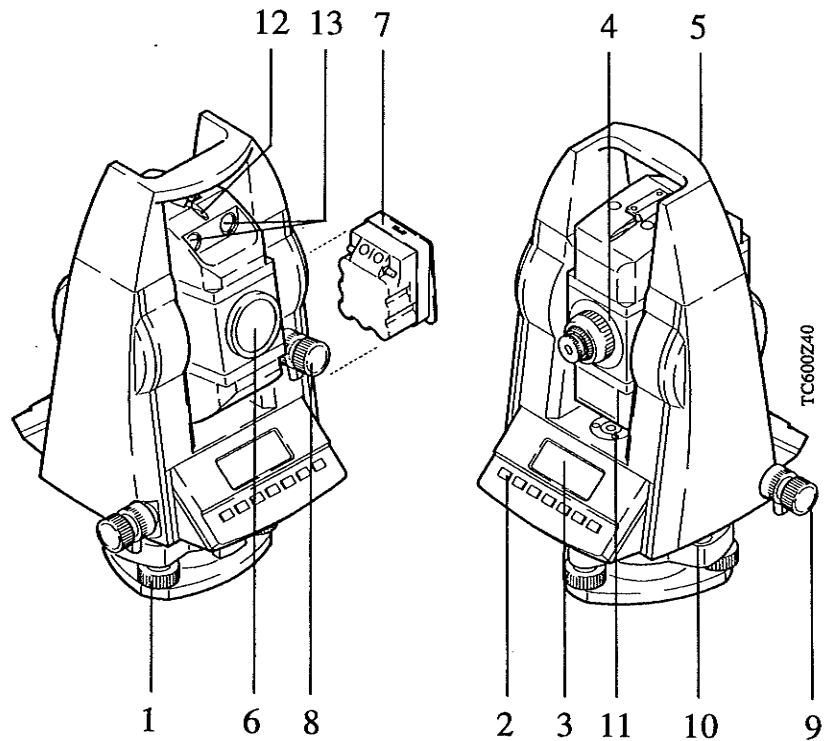
**Important parts**

**TC600**



- |   |                 |    |                        |
|---|-----------------|----|------------------------|
| 1 | Foot screw      | 7  | Battery                |
| 2 | Keyboard        | 8  | Vertical drive screw   |
| 3 | Display         | 9  | Horizontal drive screw |
| 4 | Focusing        | 10 | Interface RS-232       |
| 5 | Carrying handle | 11 | Circular level         |
| 6 | Exit EDM        | 12 | Optical sight          |

# TC800



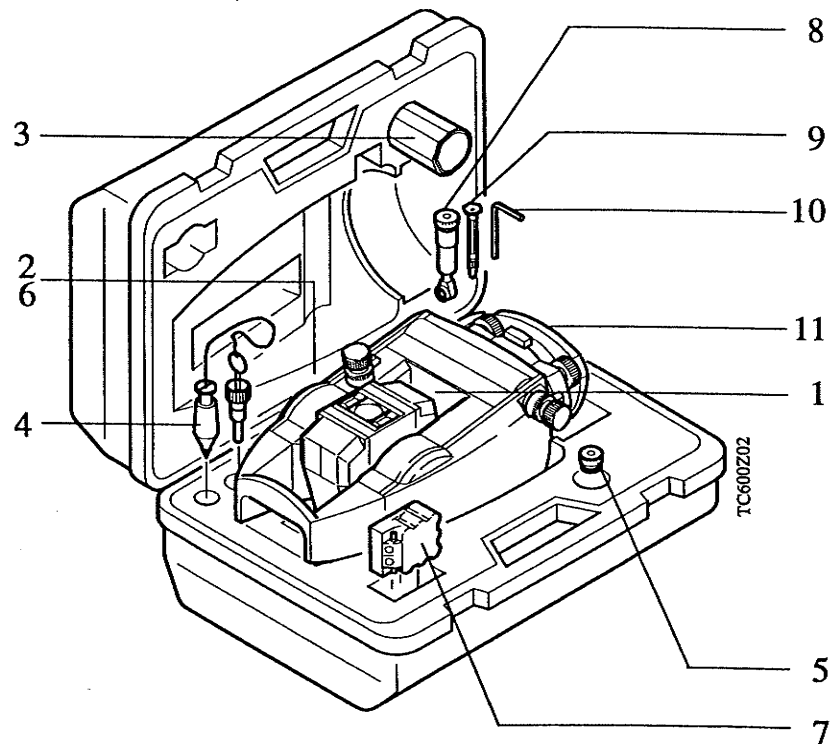
- |                   |                          |
|-------------------|--------------------------|
| 1 Foot screw      | 8 Vertical drive screw   |
| 2 Keyboard        | 9 Horizontal drive screw |
| 3 Display         | 10 Interface RS-232      |
| 4 Focusing        | 11 Circular level        |
| 5 Carrying handle | 12 Optical sight         |
| 6 Exit EDM        | 13 Exit EGL1 (optional)  |
| 7 Battery         |                          |

## Set-up, getting started

### Unpacking

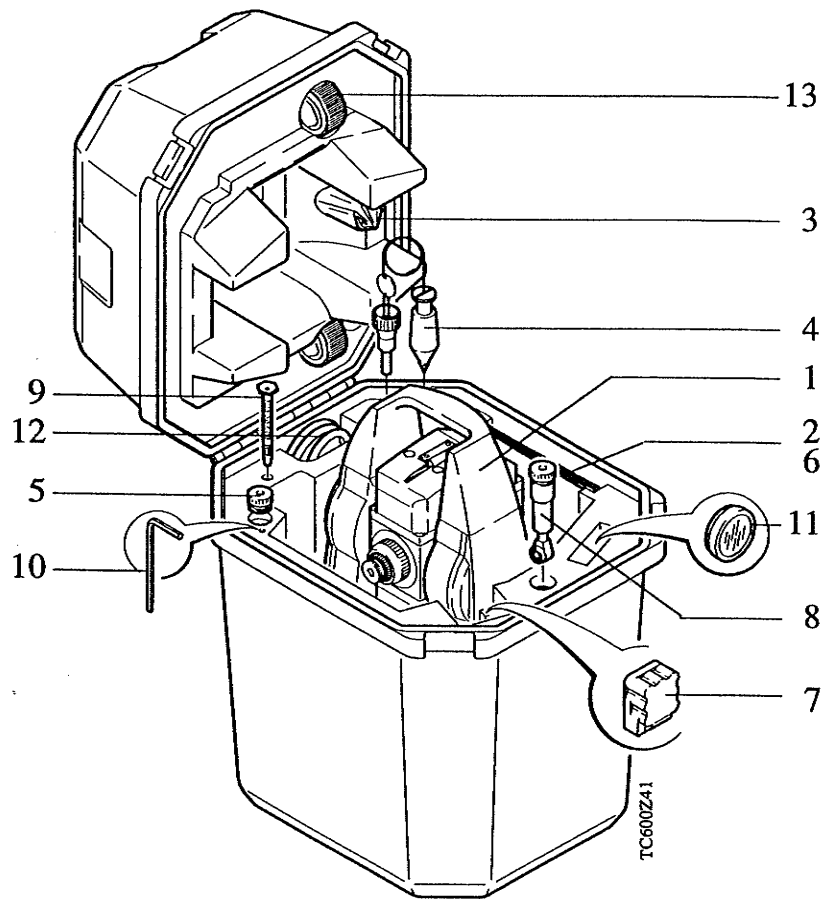
Remove TC600/TC800 from transport case and check for completeness:

#### TC600



- |                         |  |
|-------------------------|--|
| 1 Instrument            | 7 Spare battery (optional)             |
| 2 User's Manual         | 8 Eyepiece for steep angles (optional) |
| 3 Protective cover      | 9 Screwdriver, set of pins             |
| 4 Plummet (optional)    | 10 Allen key                           |
| 5 Eyepiece (optional)   | 11 Tribrach (optional)                 |
| 6 Diskette with TCTOOLS |  |

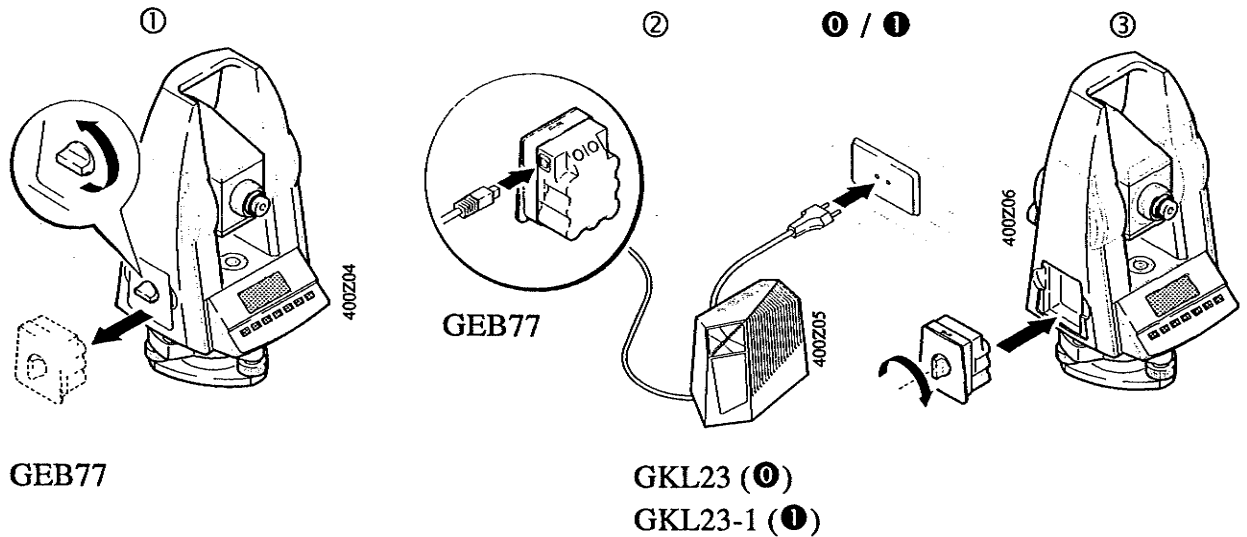
# TC800



- |                            |  |
|----------------------------|--|
| 1 Instrument               | 8 Eyepiece for steep angles (optional) |
| 2 User's Manual            | 9 Screwdriver, set of pins             |
| 3 Protective cover         | 10 Allen key                           |
| 4 Plummet (optional)       | 11 Lens (optional)                     |
| 5 Eyepiece (optional)      | 12 Cable (optional)                    |
| 6 Diskette with TCTOOLS    | 13 Shoulder straps                     |
| 7 Spare battery (optional) |  |

## Charging battery

Charge batteries using GKL12, GKL14, GKL22 or GKL23. For more information about charging batteries refer to chapter "Battery charging".



- ⓪ Version for 230V mains
- Ⓛ Version for 115V mains

Charging time:

Internal battery:	GEB77	1.0 hours
External batteries:	GEB70	1.5 hours
	GEB71	5.0 hours

(Refer also to chapter "Technical Data")



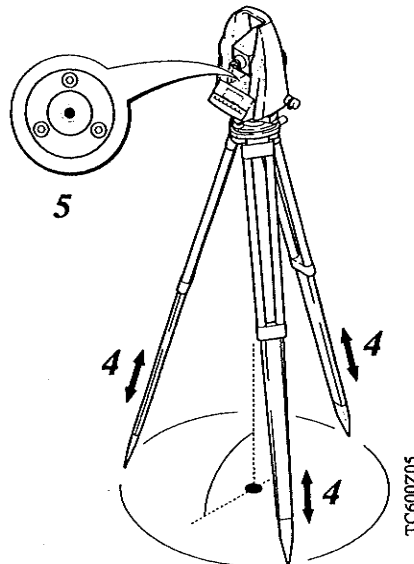
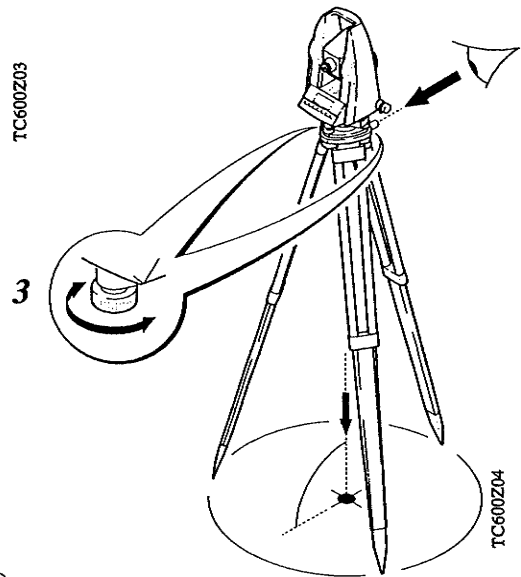
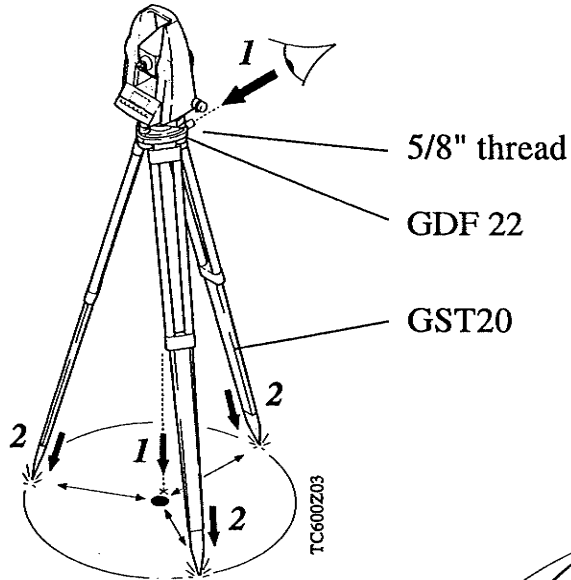
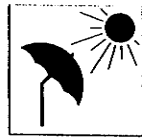
### WARNING:

The battery chargers are intended for indoor use. Only use a battery charger in a dry place, never outdoors.

# Set-up

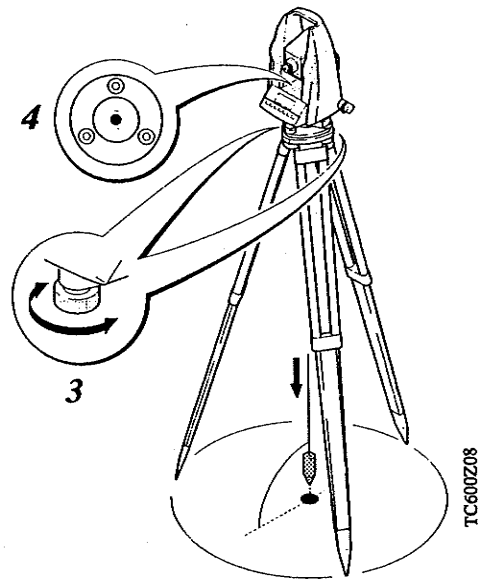
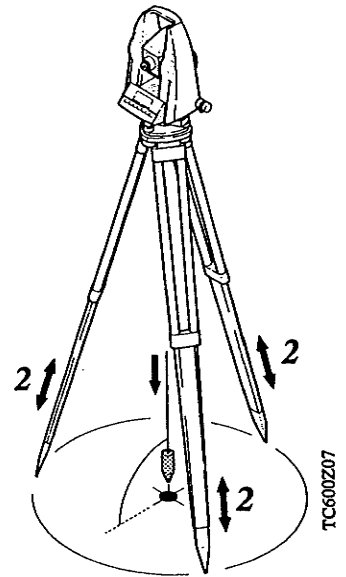
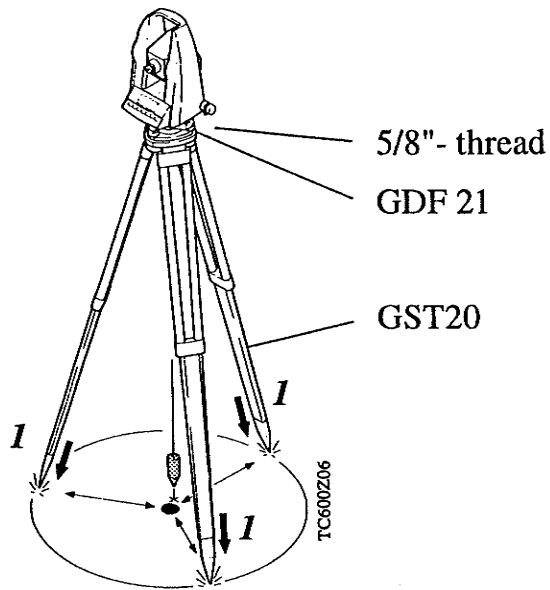
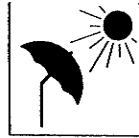
## Tribrach with optical plummet

Set-up TC600/TC800  
with tribrach GDF 22 and  
tripod GST20

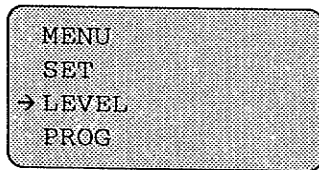
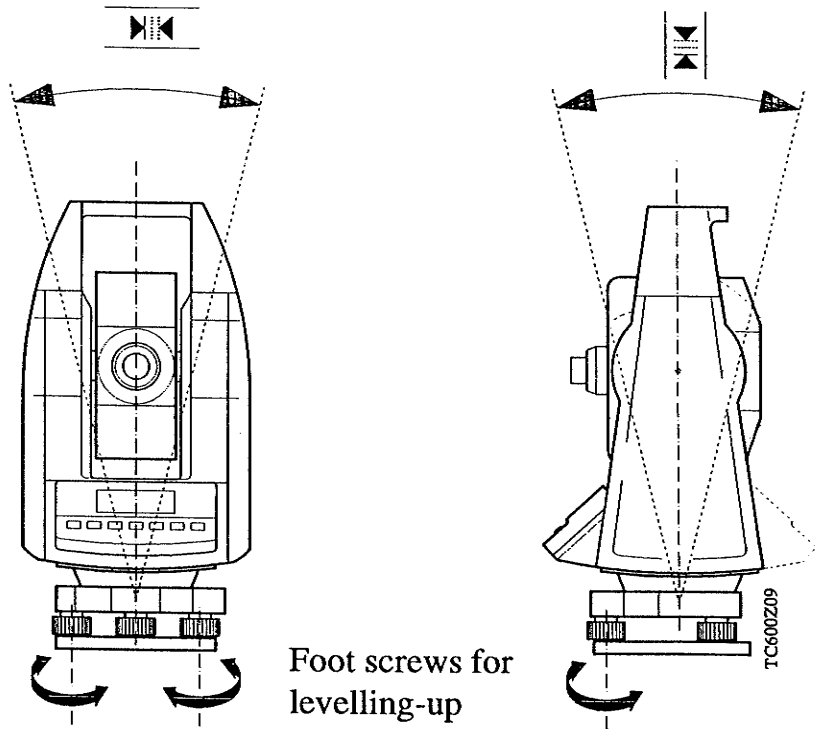


***Tribrach without optical plummet***

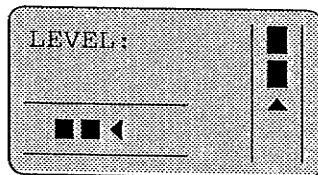
Set-up TC600/TC800  
with tribrach GDF 21 and  
tripod GST20



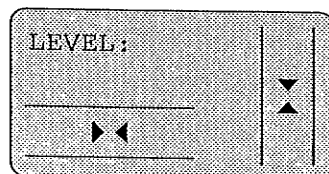
**Level instrument with  
the electronic level**



Insufficient levelling-up



Perfect levelling-up



The TC600/TC800 unit is correctly levelled-up when the triangles are visible only or markers are displayed between the triangles.



---

## ***Operating concept***

---

### ***Settings, first steps***

The following settings are possible:

#### **Units for distance measurement (DIST):**

- m = meters
- US ft = feet (in decimals)

#### **Units for angle measurement (ANGLE):**

- gon = 400gon
- 360d = 359°.999 (in decimals)
- 360s = 359° 59' 59" (sexagesimal)

#### **Display number of decimal places (ROUND):**

- high = 81°45' 24" (1" Interval)
- med = 81°45' 25" (5" Interval)
- low = 81°45' 20" (10" Interval)

For more informations refer to *section "Selecting units (UNITS)"*.

---

### ***Units in this manual***

Specifications within this manual always applies to the following units:

#### **Units of length:**

- in m (meter)
- in addition, within brackets in ft (feet)

#### **Units of angle:**

- in ° ' "
- in addition, within brackets in gon

#### **Units of temperature:**

- in °C
- in addition, within brackets in °F

## Display and keyboard

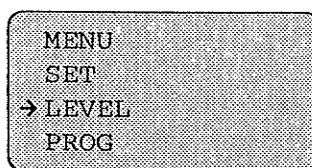
The TC600/TC800 unit has a dual-level interface. Keys are color-coded for each level.

**white keys:** active during measurements.

**orange keys:** key **MENU** activates orange keys for input of measuring and instrument parameters.

### Display and keyboard

Cursor for indicating sub-program



Display, max. 4x16 char.

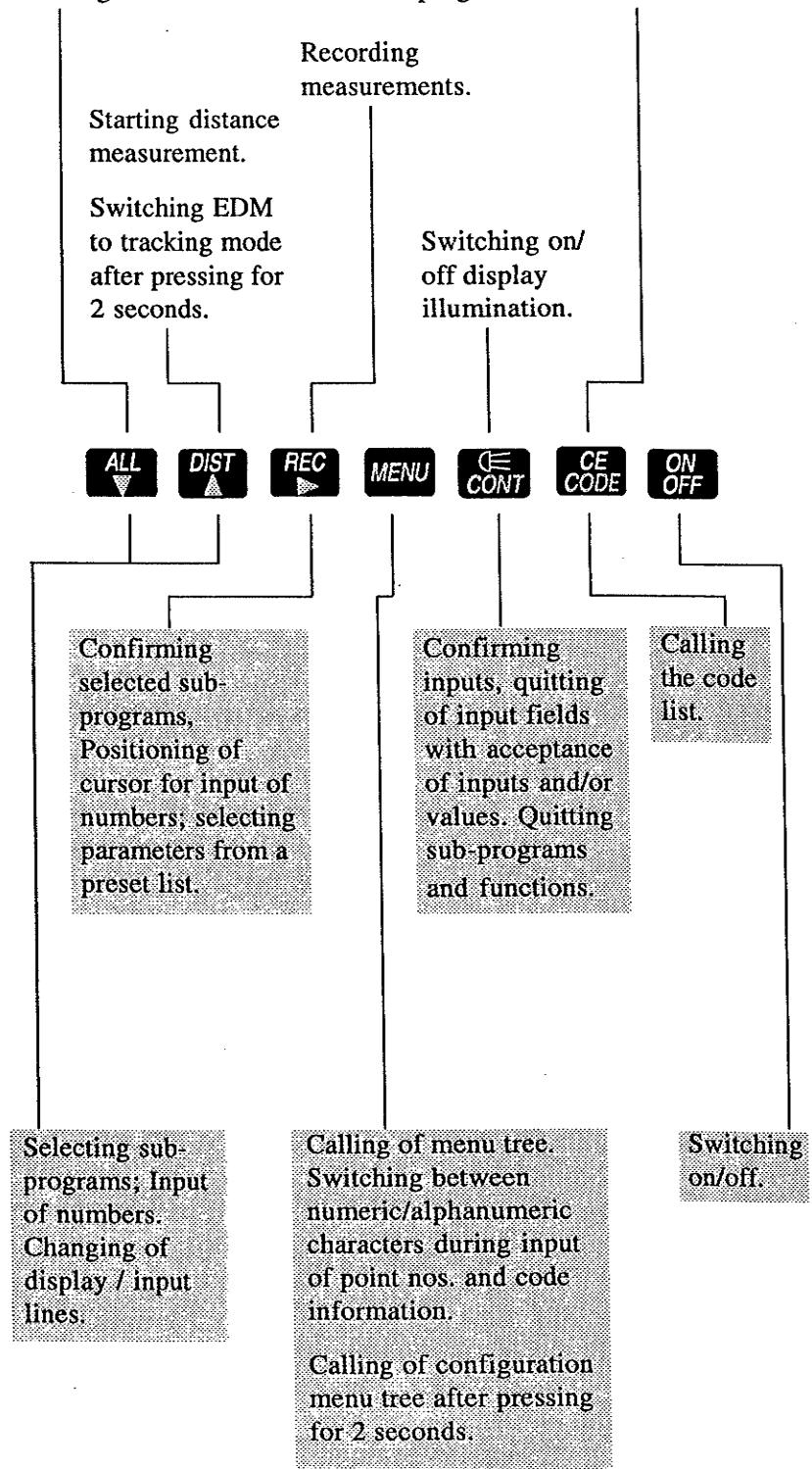


Keys

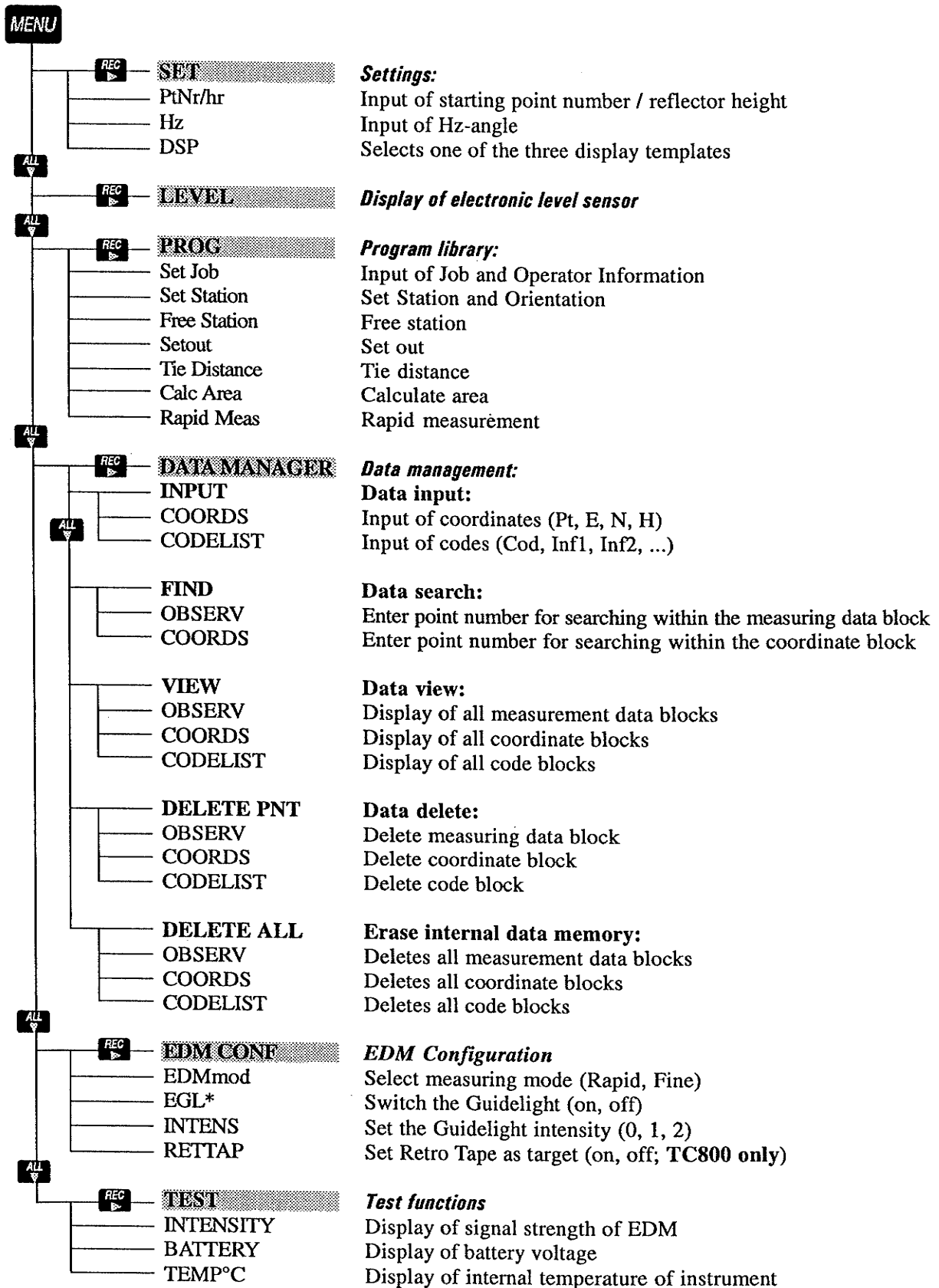
## Key functions

Starting simultaneous measurement of distances and angles including data recording.

Deleting error messages, terminating functions and quitting of input fields without accepting values. Quitting sub-programs and functions.

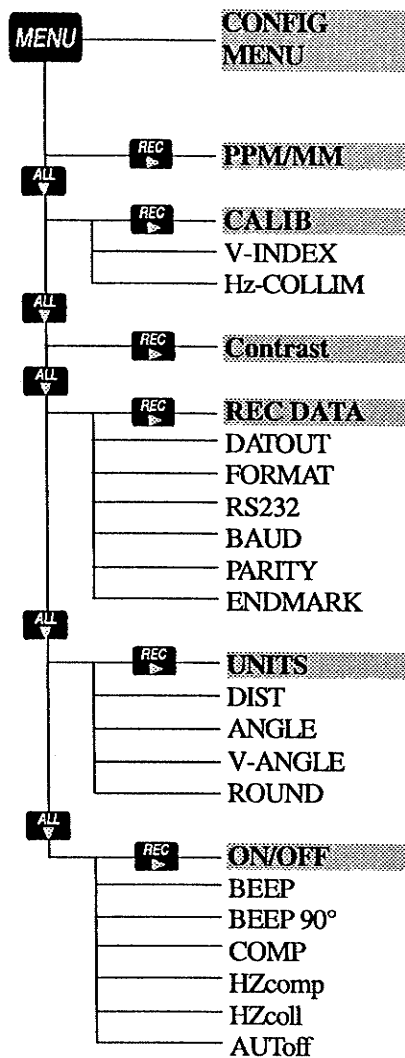


## Menu tree (Main menu)



\* EGL is an optional accessory for TC800

## Menu tree (Configuration)



Press (for about 2 seconds) until the configuration menu appears.

### *Distance corrections*

#### *Instrument error:*

Determination of vertical-index error  
Determination of horizontal collimation error

### *Sets contrast and viewing angle of display*

#### *Settings for recording:*

Select data output (MEM, RS232)  
Length of data string (8, 16)  
Select recording template (MASK1, MASK2)  
Set transfer rate (300, 600, 1200, 2400, 4800, 9600)  
Set parity (EVEN, NONE, ODD)  
Set line end mark (CR/LF, CR)

#### *Units:*

Sets distance units (m, ft)  
Sets angle units (gon, 360d decimal, 360s sexagesimal)  
Select ref.plane of V-angle (V, +/-V, V%)  
Selects angle resolution displayed (low, medium or high)

#### *On / Off:*

Acoustic input signal (ON, OFF)  
Beep at 0°, 90°, 180° and 270° (ON, OFF)  
Compensator (ON, OFF)  
Correction Hz-angle (ON, OFF; only active if COMP = ON)  
Line of sight error (ON, OFF)  
Automatic switch-off (ON, OFF)

---

## **Main menu**


<b>Settings (SET)</b>	Under <b>SETTINGS</b> specifications for measurements are entered (eg, point numbers, selection of display templates).
<b>Electronic level (LEVEL)</b>	For the exact levelling-up of the instrument.
<b>Program library (PROG)</b>	To make survey work easier, additional user programs are stored in the program library.
<b>Data management (DATA MANAGER)</b>	Under <b>DATA MANAGER</b> measurements, coordinates or codes can be entered, deleted and displayed.
<b>EDM configuration (EDM conf)</b>	Several settings for measuring can be carried out under <b>EDM CONF</b> (eg. selecting the EDM mode, Guidelight <b>LIGHTS ON/OFF</b> , setting retro tape as target, etc.)
<b>Testing (TEST)</b>	<b>TEST</b> contains different functions specifying status of instrument (eg, battery etc.)




## Measure and record



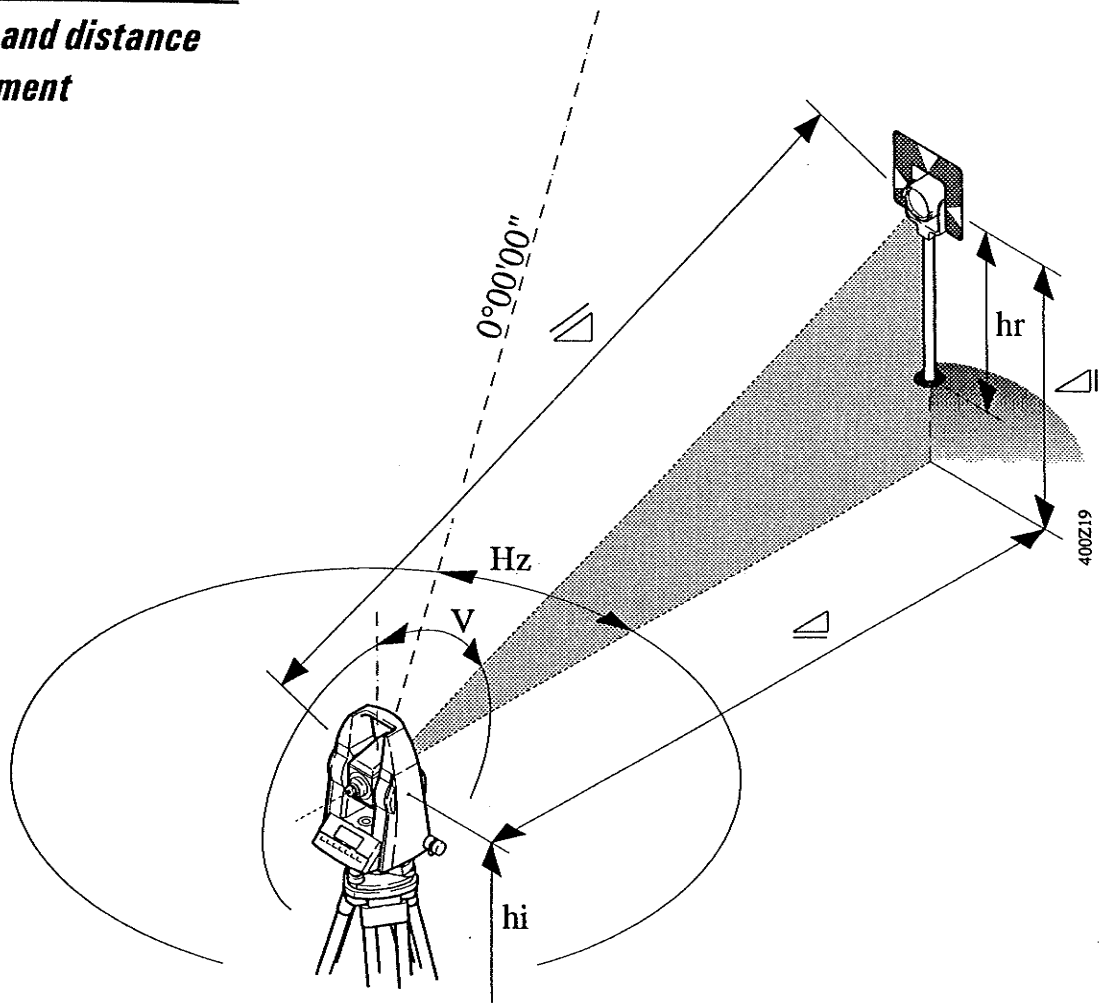
After switching on and setting up the total station correctly, it is immediately ready for measuring.

### Display symbols

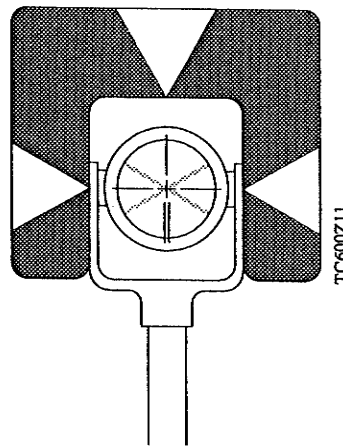
PtNr	:	+00000000
Hz	:	341°17'10
V	:	87°55'10
	:	3.782

- PtNr : Point number
- Hz : Horizontal angle
- V : Vertical angle
-  : Slope distance
-  : Horizontal distance
-  : Height difference
- E : Easting (value right)
- N : Northing (upper value)
- H : Height
- Code : Code (description)
- hr : Reflector height
- hi : Instrument height
- ppm : Atmospheric distance correction
- mm : Prism constant (Leica multiple prism = 0)

**Pointing and distance measurement**



GPH1 prism holder with GZT4 target plate




When pointing through windows or if reflecting surfaces are present, incorrect readings may result. For long-range work or for surveys under unfavorable conditions, multiple prisms (e.g. GPH3 three-prism holder) are necessary.





```

PtNr : +00000000
Hz   : 341°17'10
V    : 87°55'10
 : ----

```


Simultaneous determination of distances and angles, including data recording.

The point number is incremented by 1 after each recording.


or



```

PtNr : +00000000
Hz   : 341°17'10
V    : 87°55'10
 : 3.782

```

Distance measurement without automatic data recording.  will record the measured distance.

The Hz-angle always refers to the actual pointing direction of the telescope.

---

**Example: for offset or hidden points**



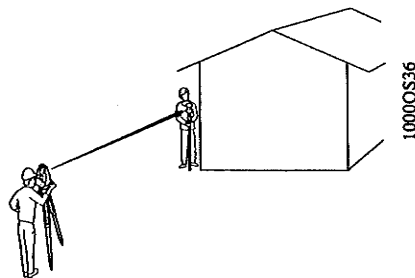
The distances and horizontal angles can be measured separately. First determine the distance and then adjust the direction (e.g. for surveying corners of buildings).



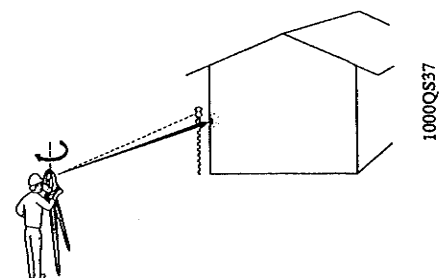
 will record the data (*refer to section "Recording"*).



The recorded V-angle always refers to the time of the completed distance measurement.



Measuring DISTANCE (  )



Storing DATA (  )

---

## Tracking mode



Press for 2 seconds and the tracking is switched on.



Stops tracking mode and returns into single mode.

---

## Display of recorded data



```
◇ MENU
  LEVEL          →
  PROG           →
  →DATA MANAGER →
```



```
◇ *DATA MANAGER
  INPUT          →
  FIND           →
  →VIEW          →
```



```
√*VIEW
  →OBSERV       →
  COORDS        →
  CODES         →
```

```
Obs : 0004/0047
Pt   : +00000072
Type :      Meas.
```

Measuring block

Total measured blocks (max. 1300, refer to section "Recording")



Press to scroll measured data upwards or downwards block by block. By keeping pressed down, measured data is scrolled continuously up or down.



Display of data, line by line within a measurement (block)

---

## Measure and record with coding

Codes can be assigned to each measurement to provide additional information to the measured point.

### Example of a code display in the measurement mode:

**GE  
CODE**

```
List: 0000/0050
Code:      ?
In1 : CodeInp?
In2 :      ?
In3 :      ?
In4 :      ?
In5 :      ?
```

Codes can be entered directly or selected out of 100 pre-defined codes in the code list. Codes consists of max. 8 characters.

Alphanumeric code lists can be defined on the PC using TCTools and then transferred to the TC600/TC800 unit via RS232 interface (*refer to section "TCTOOLS"*). Codes also can be appended to the code list at the instrument using the menu options:

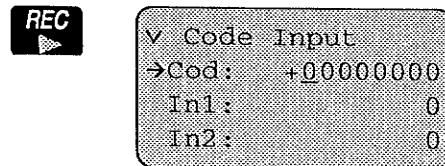
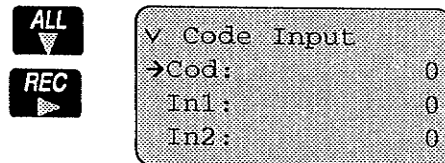
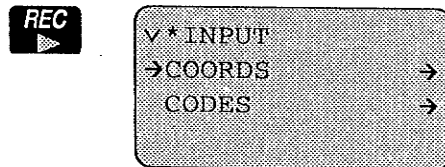
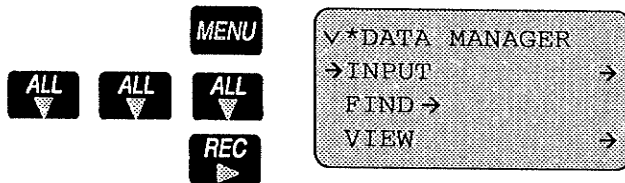
- DATA MANAGER
- INPUT
- CODES

# Coding

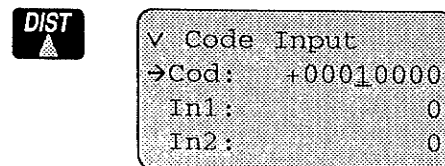
## *Input a new code line to the code list*



Up to 100 code blocks can be specified within a code list. Each code block consists of max. 6 elements, the code itself and five additional elements for description (In1, In2,...,In5).


Appending additional codes at the instrument is carried out in the "DATA MANAGER". For the code itself letters and numbers are allowed.




Press **REC** unless you reach the digit to be modified.



Change characters using the  / -key.

You can toggle between numeric and alphanumeric input mode with the -key.

Confirm your input with .

Similar to the "Cod" line is the additional information input in the lines "In1" .... "In5".

If you confirm a line containing only zeros the program ask you to store this code as follows:

```
Code Input
Append > Yes
```



Toggles between YES/NO.

## ***Simple code input during measurements***

During measurement (like you do it right after switching on the TC600/TC800) you have the possibility to code your measurement directly with one Codeline and max. five additional information entries.



```
List: 0000/0050
Code:      ?
In1 : CodeInp?
In2 :      ?
In3 :      ?
In4 :      ?
In5 :      ?
```

At position 0000 of the code list, a code which allows individual modifications is predefined. This code will not appear in your DATA MANAGER unless you enter individual values using the keys.



```
√ CODE EDIT
→Cod:      ?
In1 : CodeInp?
In2 :      ?
```



To enter new codes into the code list *refer to section "Input a new code line to the code list"*.



The selected or edited code is assigned to the last measurement and stored in the observation area. The instrument returns to the measuring display.



Returns to the measuring display without recording the code.

---

***Using predefined codes  
from the codelist***

If you use a predefined codelist, you can easily select any code out of this list by stepping through the codelist. To create your own codelist *refer to section "Input a new code line to the code list" or refer to "TCTools"*.

**CE  
CODE**

```
List: 0014/0050
Code: House
In1 : floor
In2 : 215
```



**ALL  
▼**

**DIST  
▲**

Select the requested code using the arrow keys. For fast stepping, you may press the corresponding arrow key instantly.

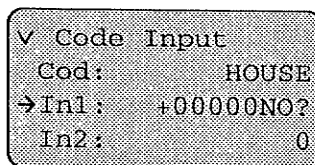
To accept the selected code press **CE  
CONT** or **REC**.

## ***Additional entries to selected code***



There are 2 possibilities to define a special code which can be individually modified. Single digits or lines can be edited. Only lines with a "?" can be modified. Refer to section "Input a new code line to the code list" for similar ways of coding. To create a "?", use the arrow key  . The "?" is between 0 and 9. Question marks are allowed in the code line and in the description lines.


Follow the path:

MENU - DATA MANAGER - INPUT - CODES




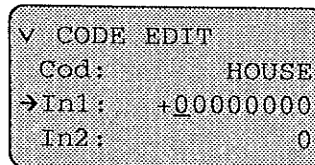
```
v Code Input
Cod:      HOUSE
→In1:    +00000NO?
In2:      0
```

In order to go to the measuring display after code input press once  and then .

To append codes to the measurement, press  and search for your special code using the arrow keys.

To edit this code press . This will lead you directly to the line to be edited.

If no input is made, the value "0" will be recorded. Pressing  will clear the line containing a "?" and you can enter individual numeric or alphanumeric characters.



```
v CODE EDIT
Cod:      HOUSE
→In1:    +00000000
In2:      0
```




Confirm your input and return to the measuring display.

In order to only edit single digits, use "!" instead of a "?" in the code input mode.




When editing just single digits, select the requested code using the arrow key.

For fast stepping, you may press the corresponding arrow key instantly.

To accept the selected code press .



```
v CODE EDIT
Cod:      HOUSE
→In1:    +00000NO!
In2:      0
```

Enter your individual code or description and confirm with .



When entering the "CODE EDIT" display, the cursor is always at the position of the first "!".

---

## ***User Programs***



In order to use the software correctly and reliably, you must follow the instructions given in the user manual. You must also adhere to the directions given in the user manual for the product with which you are using the software.

---

### ***Introduction***


The integrated programs enhance the functionality of the TC600/TC800 total station.

Daily survey work is simplified by using internally stored coordinates. This largely eliminates the risk of entering wrong informations in the field. Points with given coordinates or measured points can be used within the programs.

The following programs are installed in the instruments:

- Set Job and User (**Set Job**)
- Set Station and Orientation (**Set Station**)
- Free station (**Free Station**)
- Setting-out (**Setout**)
- Tie distance (**Tie distance**)
- Area computation (**Calc Area**)
- Rapid measurement and recording (**Rapid Meas**)



Programs are generally exit using the key .

---

## Set Job



```
◊ MENU
  SET      →
  LEVEL    →
  → PROG   →
```






```
◊ MENU*PROG
  → Set Job   →
  Set Station →
  Free Station →
```



```
◊ Set Job
  → Job:      JOB1
  Ope:        MUE
```



Edit or input job name using  and  and confirm with .



Inputs are stored by the instrument; program back to the menu item **PROG**.



Cancel input line or quit without recording data.

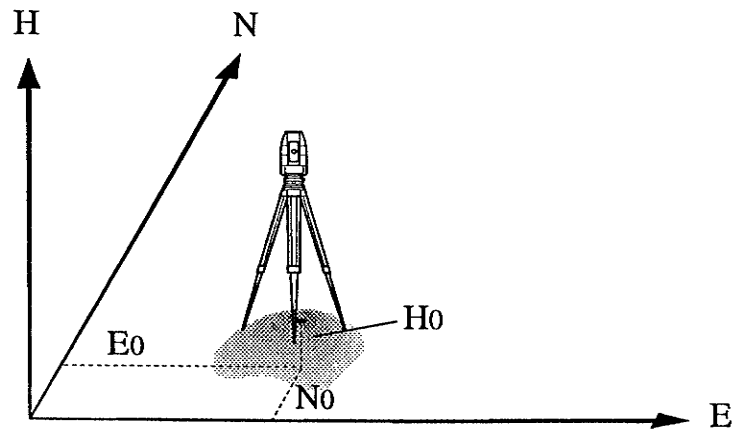
Jobname and Operatorname can be entered. This is automatically stored in the Obs data range of the internal memory. The information can be read out and used as an information about the next stored measurements.



Data are not linked in any way to the Job.

## Set station coordinates (Station Coord)

The program "Station Coord" is used for setting station coordinates in the instrument. These can be entered manually or can be read from the internal memory.



TC600Z27

With manual input, the entered coordinates are stored in the OBS data range. The station coordinates are set simultaneously.

The coordinates are stored in the format PtNr, E, N, H.

MENU

ALL

```

◇ MENU
  SET          →
  LEVEL        →
  → PROG       →
  
```

REC

ALL

```

√ MENU*PROG
  Set Job      →
  → Set Station →
  Free Station →
  
```

REC

DIST

```

◇ SET STATION
  → Get DATA> Keyb.
  Pt   : 00001100
  hl   : 1.600
  
```

REC

Optionally select manual input (**Keyb.**) or point search from internal memory (**IntMem**).

- point number entry
- instrument height entry

**Manual point entry  
(Keyb)**

(for alphanumeric entry refer to section "Entering point number")



```
◇SET STATION
→Get DATA> Keyb.
Pt : 00001100
hi : 1.600
```



Confirm manual point entry.



```
▽STATION COORD
→E : 40.000
N : 45.500
H : 33.520
```

- Input of Easting (E0)
- Input of Northing (N0)
- Input of Height (H0)



Instrument stores the data in the Obs data range of the internal memory.



```
▽SET STATION
•Pt : 00001100
E0 : 40.000
N0 : 45.500

H0 : 33.520
hi : 1.600
```



Sets the displayed coordinates as the instrument station coordinates and quits the program.

```
^ORIENTATION
Get DATA>
→Pt : 00000001
```

The program automatically moves to the "ORIENTATION", for more information please refer to chapter "Orientation".

**Read the station  
coordinates from internal  
memory (IntMem)**



```
vSET STATION  
→Get DATA> IntMem  
Pt : 00001100  
hi : 1.600
```

On the basis of the point number entered, the coordinates are searched for in the COORD area of the internal COORD area (RAM).



Enter instrument height.

The search for the point number entered always proceeds from the end to the beginning within the COORD area.

If the same point number is stored more than once, the last point in memory will be found.



```
SET STATION  
• PtNr : 00000100  
EO : 40.000  
NO : 45.500  
  
HO : 33.520  
hi : 1.600
```

Displays coordinates.

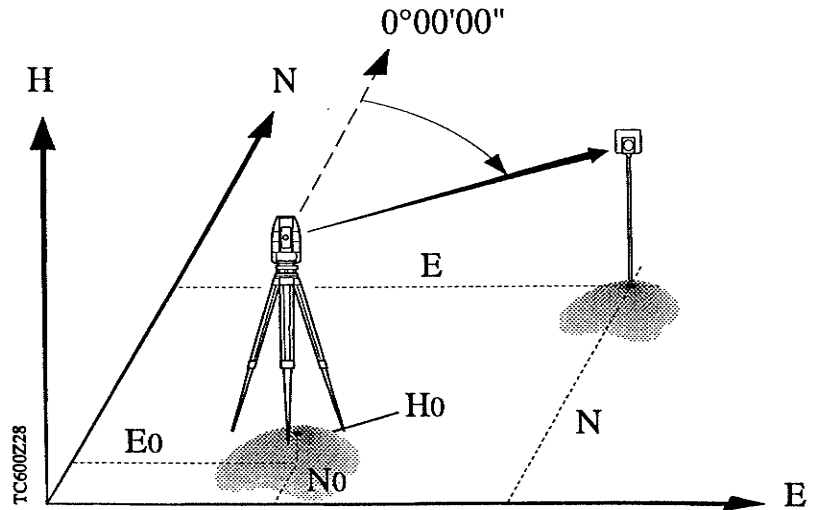


```
^ORIENTATION  
Get DATA> IntMem  
→Pt : 00000001
```

Confirms that station coordinates have been set. The program automatically moves to the "ORIENTATION", for more information please refer to chapter "Orientation".

**Orientation (of  
horizontal circle)**

It is possible to carry out the horizontal circle orientation with internally stored coordinates, manually entered coordinates and manual angle entries. The ORIENTATION is integrated in SET STATION.



```

^ORIENTATION
Get DATA>IntMem
→Pt : 00000001
    
```



Optionally select manual input (**Keyb.**) or point search from internal memory (**IntMem**) or enter the angle directly (**Angle**)



Select line to enter the point number entry.

Enter point number directly or step through a list using the wildcard search. For wildcard search please refer to chapter "Wildcard search for point numbers", page 66.



Starts the search.



```

Coor : 0001/0040
Pt   : 5
    
```

Scroll through data and confirm requested point with



ORIENTATION  
Pt : P1  
Hz: 65°50'00  
V : 90°20'12

Selected orientation point is displayed but cannot be changed in this display.



ORIENTATION  
Orientation  
SET

Short display for confirmation: Orientation is set.

Data are stored by the instrument and the program returns to the menu PROG.

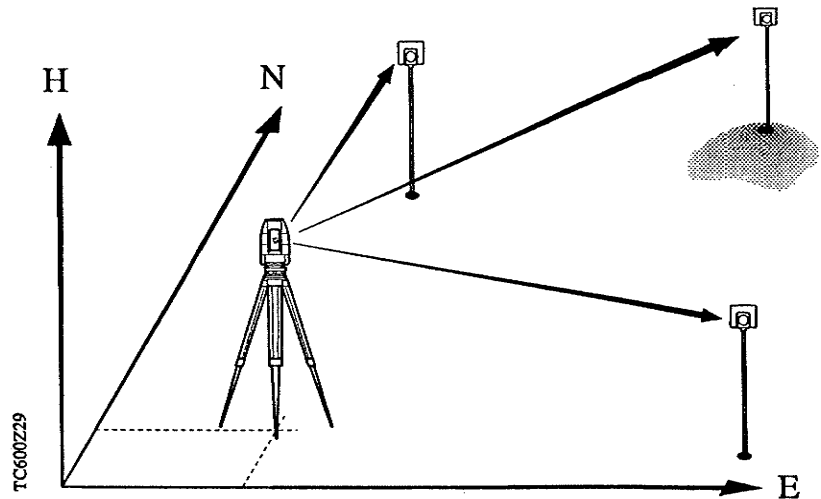


The option "Angle" acts in the same way as setting the horizontal circle reading in "SET HZ".



## Free Station

Calculates coordinates, height and horizontal circle orientation of the instrument position using min. 2 to max. 5 known points with coordinates.



MENU

ALL  
▼

REC  
▶

```
◇ MENU*PROC
  1.Set Job      →
  2.Set Station →
  →3.Free Station→
```

ALL  
▼

REC  
▶

```
√ FREE STATION
→Pt :          0
hi  :          0.000
```

Two different methods can be used, which the program automatically recognizes.

### Procedure 1

Distances are measured to all points. Station coordinates (E, N, H) are computed using a Helmert-Transformation. The computed standard deviation for the position (mp) is derived from the best fit.

### Procedure 2

Not all distances are measured. In this case the shortest measured distance is used to determine the station coordinates.

The point with the shortest distance is **not** used for orientation.

The shortest measured distance must be less than the calculated distance between the 2 target points, otherwise the error message "Bad Configuration" appears and the program terminates.

The computed standard deviation for the position (mp) refers to the accuracy of orientation (mo) used for the shortest measured distance.

**Valid for both procedures:**

The orientation is calculated by the arithmetic mean of all point orientations.

The calculation of the station height uses only those points with a measured distance and heights not equal zero.

The station height is the mean of the single heights.

The standard deviations for the orientation (mo) and the station height (mp) are computed using residuals derived from the arithmetic mean.

```
√ FREE STATION
→Pt :          44
hi :          1.200
```

Input of station number and instrument height (*for alphanumeric point entry see chapter "Settings" / "Entering point number and reflector height"*).



Confirm input.

```
FREE STATION
2 Faces > YES
```



Selection: Yes: 2 Faces  
No: 1 Face



Confirming the selection.

## Definition of target points

Point entries can be carried out in two ways:

1. IntMem: Points are searched in the data memory.  
Wildcards can be used (*refer to section "Wildcard search for point numbers", p. 66*).
2. Keyb.: Manual entry of coordinates



```
FREE STATION 1
Get DATA> IntMem
→Pt : +00000010
hr : 1.500
```

Input of point number and reflector height.



Confirm input.



```
FREE STATION 1
Hz : 165°50'00
V : 90°20'51
△ : ----
```

— first point

Showing the measuring display; aim first point.



Measure and record the data simultaneously.



It is also possible to measure using  and .

```
FREE STATION 1
Other face
```

The program advises you automatically to change to the other face if selected before.




Measure and record the data simultaneously.

It is also possible to measure using  and .

```
∅ FREE STATION 2
Get DATA> IntMem
→Pt : 45
hr : 1.200
```

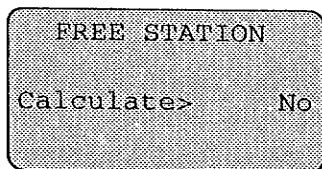
— second point

Continue likewise with the second point.  
 Enter point number and reflector height and confirm with .

Measuring and recording additional points is carried out in the same way.

After 2 measurements the results can be computed or the measurements can be continued with additional points (max. 5 points).

When using more than 2 points, the option to compute the position is made for each additional point used.

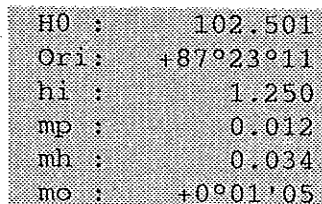
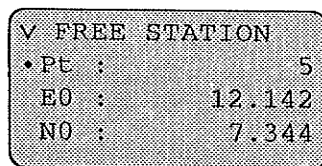


Selection: Yes/No  
**No:** Continue with more measurements  
**Yes:** Compute results



Confirming selection.

### Result indication



Ori : Orientation correction  
 hi : Instrument height  
 mp : Standard deviation of position  
 mh : Standard deviation station point height  
 mo : Standard deviation orientation



Scrolling line by line.

## Indication of residuals:



```
RESIDUALS 1/3
Pt : 00000023
ΔHZ : -0°00'27
ΔDis: 0.021

ΔH : 0.015
```

No. of points measured

For each measured point the relevant residuals can be displayed.



Scrolling the measured points.



Page the elements of the residuals (e.g. to display ΔH).

If a distance was not measured the residual for ΔDist is zero.



```
FREE STATION
Record > Yes
```



Stores the station coordinates and orientates the horizontal circle. Returns to the PROG menu.

If the program is exit with **CE CODE** during "RESIDUALS" display the following message appears:

```
FREE STATION
Station not set
Exit > No
```



Selection: Yes/No

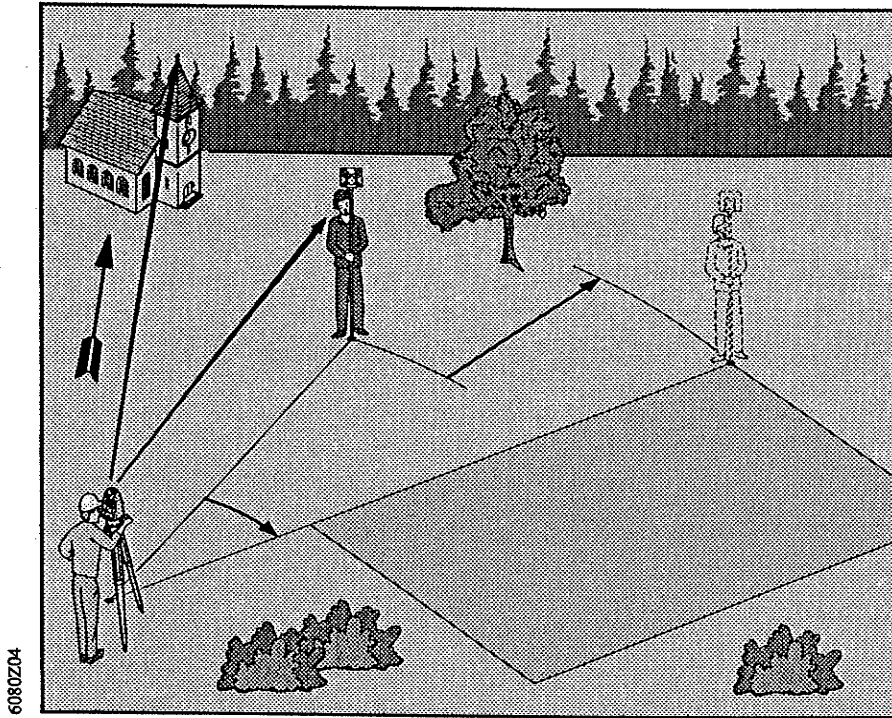


Confirming the selection.

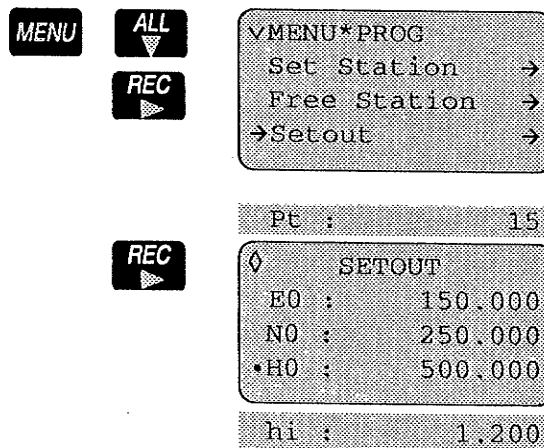
## Setting out (Setout)

The setting-out technique can be based on the coordinate system of the points to be set out. The program calculates setting-out elements from manually entered or stored coordinates and station data. The option to enter angle and horizontal distance also exists.

Before you start setting out, make sure that the correct station point is set and the instrument has been oriented, when using coordinates.



The "Setout" program supports the polar setting out technique. The divergence between the computed direction and the measured direction is displayed first.



The present station coordinates are displayed for inspection, but cannot be changed here.



Changes line by line. The corresponding point number can be viewed by scrolling to the top of the display.



```

SETOUT
Get DATA> IntMem
Pt  : +00001234
hr  :      1.550

Off :      0.000

```

Input of point number, reflector height and height offset **Off**. The amount of **Off** is added to or subtracted from the height to be set out, in accordance with its sign. This takes account of infill, etc...

The entered point number is local within the application "Setout" and does not overwrite the system point number.

The options exist to search for coordinates in the COORD and MEAS data range (**IntMem**), for manual entries after switching to **Keyb** or for manual entries of angle and horizontal distance (**Angle**). It is possible to use "Wildcards" (refer to section "Data management" / "Searching for point numbers and multiple recordings").




```

Pt  : 00001234
ΔHz : 0°21'31
Δ $\triangle$  : 0.482
Δ $\triangle$  : 0.131

```

Turn instrument until  $\Delta Hz = 0^{\circ}00'00''$  (0.0000gon).


Repeat the measurements of the distance with  until the displayed difference in distance is within the required accuracy, i.e., close enough to "zero".



```

HZ  : 75°57'35
V   : 92°08'59
 $\triangle$  : 82.325
H   : 410.800

```

You can use the  key to switch between the upper and lower displays.



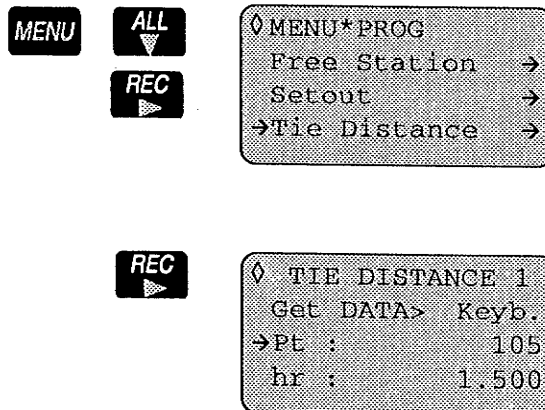
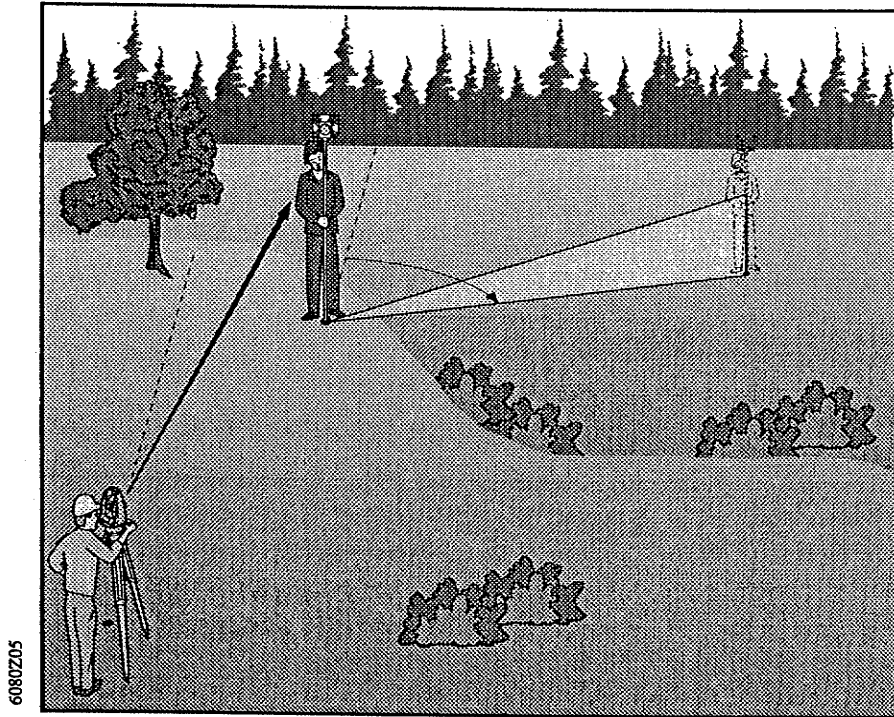
Continue with the next point.



Records the measurements and continues the program to enter the next point.

## ***Tie Distance (Missing line)***

With the program "Tie distance" the slope distance, horizontal distance, height difference and azimuth between two points is computed.



Start display:

- select desired method (**Keyb.**, IntMem, OnLine)
- Input of point number
- Input of reflector height (*for alphanumeric point entry see chapter "Settings" / "Entering point number and reflector height"*).



The points can be determined using three different methods:

**OnLine:** measurements to target points

**IntMem:** from coordinates read in the internal memory

**Keyb:** from coordinates entered manually

It is possible to combine all three methods.

The program supports the polygonal technique, i.e. the calculation of the tie distance between the two last points which were measured, entered or selected.



Confirming selection.

```
√ TIE DISTANCE 1
E :      15.200
N :      85.000
H :      512.500
```

Input of Easting

Input of Northing

Input of Height



```
◊ TIE DISTANCE 2
Get DATA> IntMem
→Pt :      106
hr :      1.400
```

Input of point data for tie distance 2:

- Select desired method (**Keyb.**, IntMem, OnLine)
- Input of point number
- Input of reflector height (*for alphanumeric point entry see chapter "Settings" / "Entering point number and reflector height"*).

```
◊ TIE DISTANCE
Az :      -0°05'30
Δ/ :      15.241
•Δ/ :      11.025
```



```

◇ TIE DISTANCE
Pt :      105
Pt :      106
Az :    -0°05'30

```



```

◇ TIE DISTANCE
Δ/∠ :    15.241
Δ/∠ :    11.025
Δ/∠ :     1.725

```

- Az : Display of azimuth
- Δ/∠ : Display of slope tie distance
- Δ/∠ : Display of horiz. tie distance
- Δ/∠ : Display of height difference



```

◇ TIE DISTANCE 2
Get DATA> Keyb.
→Pt :    00000006
hr :      0.000

```



Continue to next point/tie distance. Point two is now set as point one and the following measurement or the following data entry is used for the second point and so on.



Starts a new measurement sequence.



Press twice to cancel the program. Direct canceling is only possible when the input display is active.

```

TIE DISTANCE 2

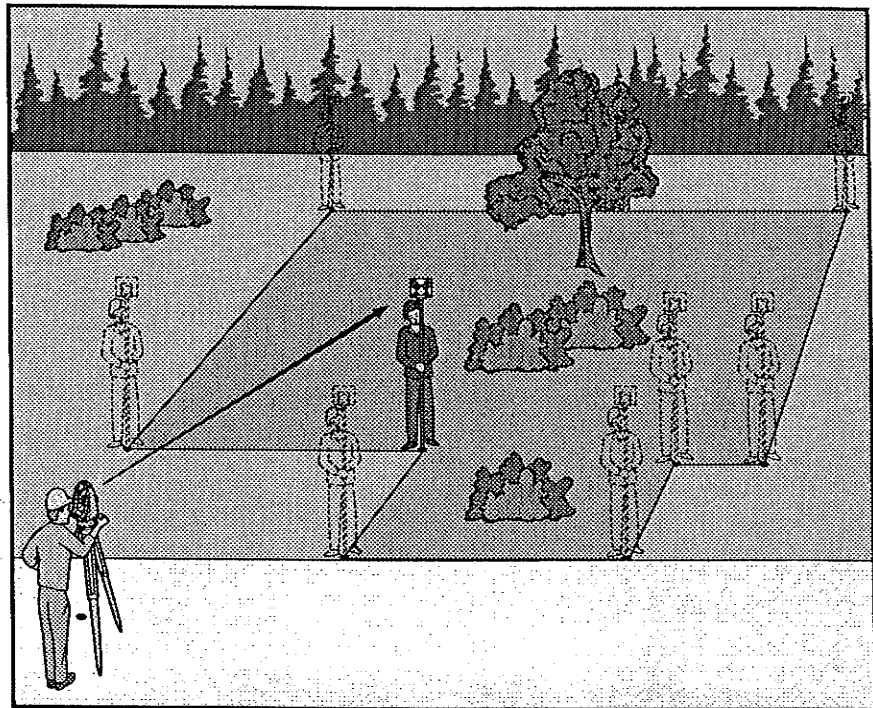
Program End

```

After about two seconds the display returns to the PROG menu.

## Area computation (Calc Area)

This program computes an area from points which are connected by straight lines (eg, points 1...8). The number of points is unlimited. Points can be defined from continuous measurements (**OnLine**), from manual coordinate entries (**Keyb.**) or from existing point coordinates in memory (**IntMem**). Each time a new point is defined the user can select one of these three options.



MENU

ALL  
▼

REC  
▼

```

◇ MENU*PROG
  Setout          →
  Tie Distance    →
  →Calc Area      →
  
```

REC  
▼

```

v CALC AREA      1
Get DATA> OnLine
→Pt :           00000001
hr :             1.400
  
```

Choose between "**OnLine**", "**Keyb.**" or "**IntMem**" and enter the pointnumber using the **DIST** **ALL** -keys.



```

CALC AREA      1
Hz   : 78°46'55
V    : 102°53'55
△   : -----

```

Starts to retrieve the coordinates for the entered point from internal memory.

Or:

Manual input of coordinates.



```

√ CALC AREA      1
Get DATA>      Keyb.
→Pt : 00000001
hr  : 1.400

```



```

√ CALC AREA      1
→E : 15.200
N  : 85.000
H  : 512.500

```

After recording manually entered points, the instrument is automatically ready to measure the next point.



```

◇ CALC AREA      2
Get DATA>      Keyb.
→Pt : 00000005
hr  : 1.000

```

After recording you have the opportunity to change the selection when entering coordinates manually.

To view calculated area:



```
√ CALC AREA
m^2   :
Area  :   473.211
PtCnt :      6
```


The polygonal area is closed to the start point.  
Display of area in m<sup>2</sup> (ft<sup>2</sup>) or hectares (acres) and  
number of used points.

For entering data using "Online" mode:



for code entry



for Pt/hr entry press 2 seconds; press  again to  
display computed area.



For computing an area minimum three points must be  
used.



Continue with further points, or



```
CALC AREA
Program End
```

Short display for confirming the termination. Back to  
menu PROG.

### Conversion factors used

1 ft<sup>2</sup> = 0.092903 m<sup>2</sup>

1 acre = 0.404686 ha

## **Rapid measurement and recording (Rapid Meas)**

This program enables quick measurements and data recording. It is designed for fast and easy data logging using a minimum of keyboard interaction.

This program is ideal for high density tacheometry with limited coding requirements (e.g. tacheometry for volume determination, contours in open field, etc. ...).

MENU

ALL  
▼

REC  
▶

```
^MENU*PROG
Tie Distance  →
Calc Area     →
→Rapid Meas   →
```

REC  
▶

```
◇RAPID MEAS
E0 :      100.000
NO :      200.000
*H0 :      300.000
hi :      1.300
```

The present station coordinates are displayed for inspection, but cannot be changed here.

ALL  
▼

DIST  
▲

Scrolls line by line. The corresponding point number can be viewed by scrolling to the top of the display.

### **Measurement procedure**

Switches to tracking mode; it is now permanently active. Distances are measured with 0.5-second interval (TC600) or 0.3-second interval (TC800). The measurements are recorded in the measurement-data range .

The reflector must be sighted so that the Hz- or V-drive is continuously in motion until the reflector has been targeted with the accuracy required. The data are recorded as soon as the change between the Hz- or V-angle amounts to less than 16" ( 50<sup>cc</sup> ) between two valid distance measurements.

If, after this recording, the instrument remains in the rest position, no additional data are recorded even though the distance continuous being measured.

The recording mode is reactivated after there has been a change of at least 5' 24" (= 0.1 gon) to the last recorded horizontal direction.



```

v RAPID MEAS
->Pt : 1
hr : 1.200

```

Enter pointnumber and reflector height.



```


DIST*TRACKING
ppm : 0
mm : 0

```

Above display appears for a moment.

The program activates the Tracking Mode automatically.

```

Pt : 1
Hz : 13.672
V : 100.261
 : 2.803

```

Display of measured values depending on selected display mask.




```

REC :
Pt : 1

```

Measurement is accepted and stored. Data recording is confirmed by a double Beep.

Subsequently, the point number is automatically incremented by 1.

The -key can be used at any time during the program to select or enter coding.



```

List : 0000/0004
Code : ?
In1 : CodeInp?
In2 : ?

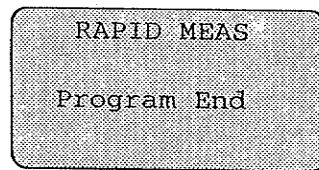
```



Press for about two seconds to enter a new point number or reflector height.



Press twice to exit the rapid measurement program.



The program is terminated.  
Back into menu PROG.

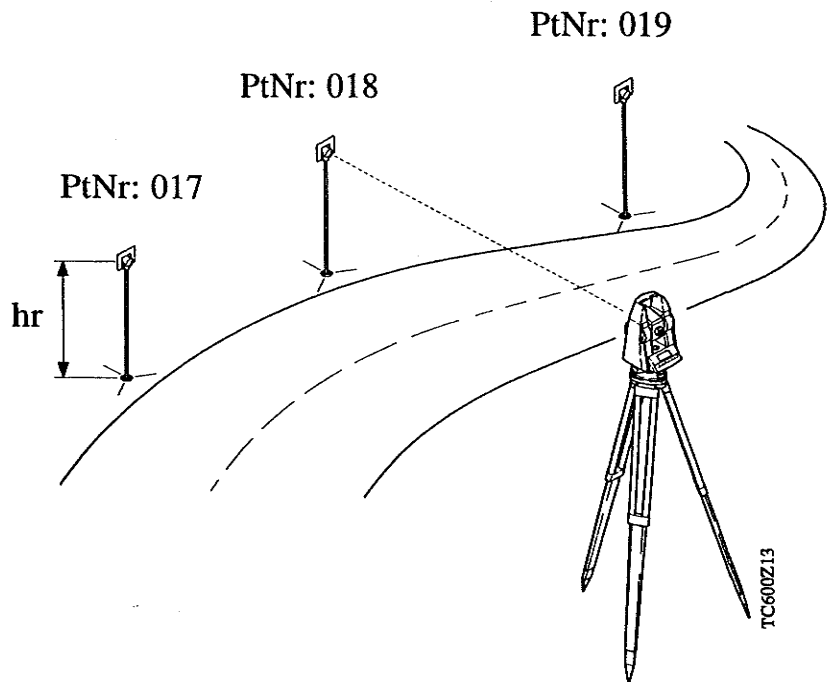


This program requires the prisms to be sighted quickly and a good experience in observations techniques. The EDM is permanently switched on, and therefore power consumption is greater than usual.



## Settings (SET)

**Entering point number  
and reflector height  
(SET PtNr/hr)**



**MENU**

```
MENU*SET  
→PtNr/hr  
Hz  
DSP
```

**REC**

**REC**

```
MENU*SET*PtNr/hr  
  
Pt : +00000017  
hr : 0.000
```

This point number is recorded with the measurements and is always automatically incremented by "+1" after recording.

The point number can also be transferred to the instrument from an externally connected PC.

Command structure :

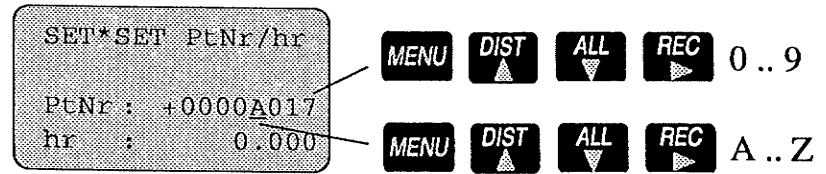
(\_ = space char.)

PUT/11....+12345678\_CRLF

---

***Alphanumeric entry of  
point number***

Use the **MENU** key to toggle between numeric or alphanumeric entry mode.



**Point number search**

*Refer to section "Searching for point numbers and multiple recordings (FIND)".*

---

***Entering reflector height***

The reflector height is entered under **hr:** and stored with each recorded measurement.

## Setting the horizontal circle (Hz)

### Ist variant

= sets Hz to 0°00'00" by entering the Hz-value directly from the keyboard.

MENU

REC

ALL

```
MENU*SET
PtNr/hr
→Hz
DSP
```

REC

```
MENU*SET*Hz
Hz : 0°00'00
Hz input or
CONT to hold
```

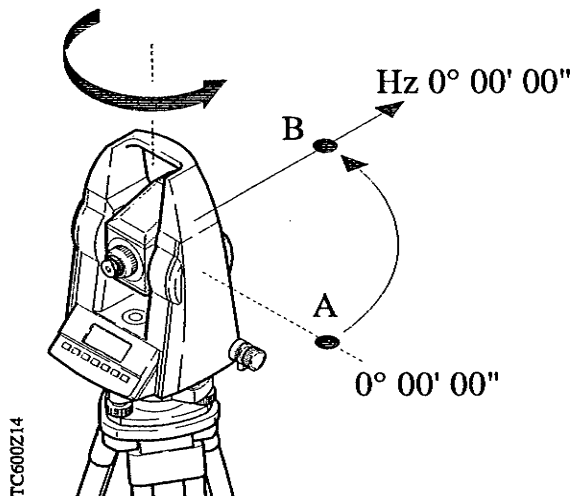
Type in: 0°00'00

CONT

Hz - direction is held on 0° 00' 00" (0.0000 gon).

REC

Changes the Hz value. Changing the sign will turn the Hz counting.



Aim at point B.

CONT

```
MENU*SET*Hz
Hz* : 0°00'00
CONT to release
```

The Hz-angle to the new point (B) is now 0° 00' 00" (0.0000 gon).

Return to measuring display.

*2nd variant*

= sets Hz to a specified value by turning the instrument

MENU

REC  
▶

ALL  
▼

```
MENU*SET
SET PtNr/hr
→Hz
DSP
```

REC  
▶

```
MENU*SET*Hz
Hz : 0°00'00
Hz input or
CONT to hold
```

Turn instrument until required angle (e.g. 45°00'00" , 50.0000 gon) is indicated.

CONT  
◀

Hold value.

Aim at the corresponding point.

```
MENU*SET*Hz
Hz : 45°00'00
CONT to release
```

CONT  
◀

The target point Hz is now 45°00'00" (50.0000 gon).

## Setting the display mask (DSP)



```
VMENU*SET
SET PtNr/hr
Hz
→DSP
```

Depending on desired use, 3 different display masks can be selected on the TC600/TC800 unit.

## Display-masks



### Display of mask 1 :

```
PtNr : +00000005
Hz   : 341°17'10
V    : 87°55'10
△    : 3.782
```

Point number  
Horizontal angle ( Hz )  
Vertical angle ( V )  
Slope distance



### Display of mask 2 :

```
PtNr : +00000005
E    : -----
N    : -----
H    : -----
```

Point number  
Easting  
Northing  
Height



### Display of mask 3 :

```
Hz   : 341°17'10
V    : 87°55'10
△    : -----
△h   : -----
```

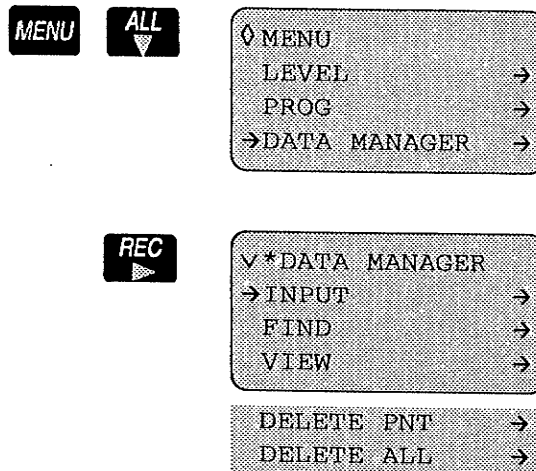
Horizontal angle ( Hz )  
Vertical angle ( V )  
Horizontal distance  
Height difference



Confirm selected display mask within 5 seconds.

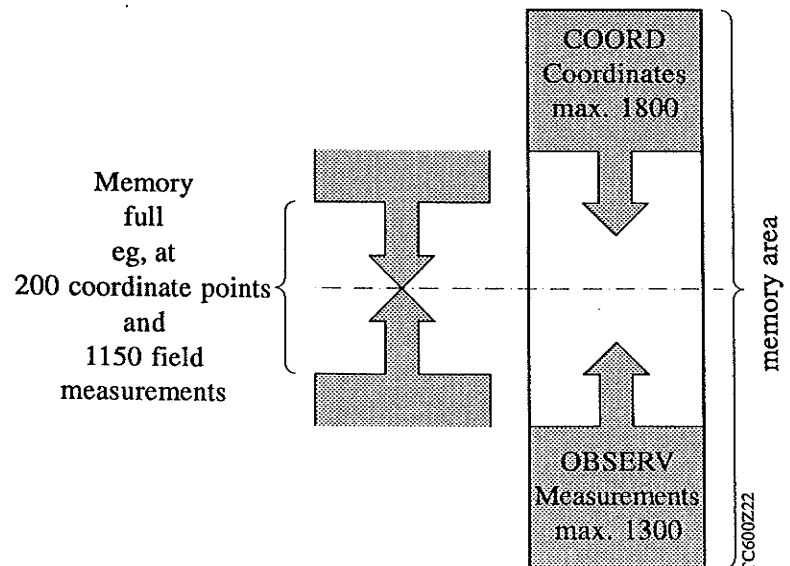
## Data management (DATA MANAGER)

**DATA MANAGER** contains additional functions enabling the input and check of data in the field.



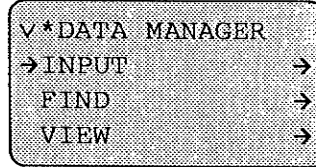
**The following additional functions are available:**

- Input of codes and coordinates (**INPUT**)
- Searching for point numbers and multiple recordings of identical point numbers (**FIND**)
- Display of stored data (**VIEW**)
- Erasing measured data, coordinates and codes in the codelist (**DELETE PNT**)
- Erasing the complete range of the selected file (**DELETE ALL**)



---

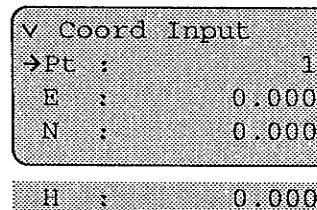
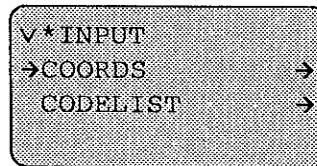
***Input of coordinates  
and codes (INPUT)***



Coordinates can be entered via the keyboard and appended to the existing coordinates (fixpoints) and codes can be appended to the codelist.

---

***Coordinate entry  
(COORDS)***



Confirm data entries.



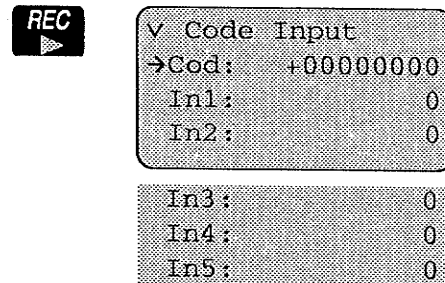
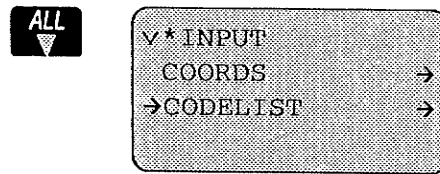
Confirm the display and store the coordinates.



Quit the function.

---

## Code input (CODES)

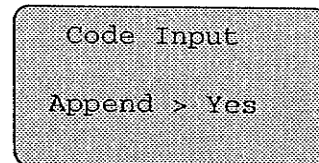


Input for a new code.

Up to 100 code blocks each with 6 elements can be specified. The newly entered code is appended to the existing list.



Confirm the inputs in each individual line.



Toggles between Yes/No.



Confirm **Yes** : The codes append to the code list.  
**No** : Returns to input mode without recording.



Quit the function.



## Searching for point numbers and multiple recordings (FIND)

This function enables display of data blocks, searches for point numbers and multiple recordings of the same point numbers, including the use of "Wildcards".



```

DATA MANAGER
INPUT      →
→FIND→
VIEW →
    
```



```

*FIND
→OBSERV  →
COORDS   →
    
```



```

PtNr Obs/Find
Pt    = +XXXXXXXXXX
    
```

Enter the point number to be searched for directly or use wildcard search to choose within the data area.



Starts the search for the point number. Always the last stored point within the data range is found.

```

Obs : 0003/0047
Pt   : +xxx1xxx5
Type: Meas.
    
```



View of single elements.



Step through the list of measurements, referring to the search criteria.



Quit submenu.

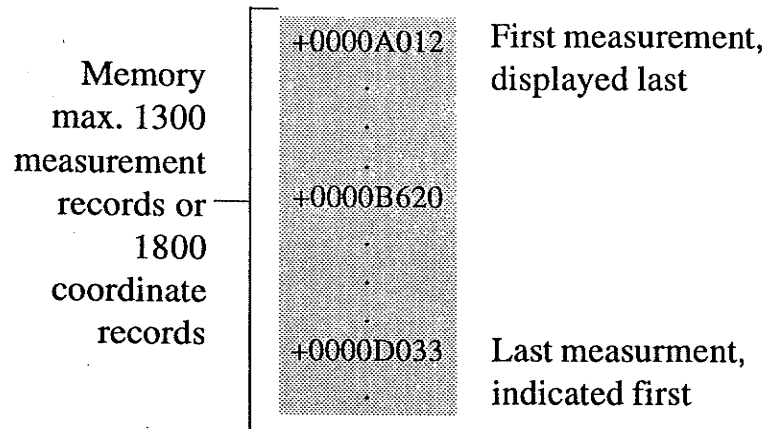
```

PtNr Obs/Find
Pt    = +xxx1xxx5
PtNr not found
    
```

Error message if point number was not found.

Delete error message with .

This searching procedure applies for both, the OBSERV and for the COORDS data range.



### Wildcard search for point numbers

Point numbers can be searched in application programs or in the data display using "Wildcards". They can be used to search for specific character groups or character sequences.

#### Example:

**+xAxx9xxx** This example searches for all point numbers counting from left to right with an "A" at the 2nd place and a "9" at the 5th place and presents the points in a list. The character "x" is selected when scrolling between "9" and "0".

The following character set exists for numeric entries:  
0 1 2 3 4 5 6 7 8 9 x 0 1 2 ... etc.

---

***Searching for several data blocks with the same point number***

If a specific point number is shown, the cursor keys can be used to scroll further points fulfilling the wildcard search criteria. The direction of search is always from the last stored point towards the first point.

**Display of stored data  
(VIEW)**

Measuring data ( **OBSERV** ), fixed-points ( **COORDS** ) and code lists ( **CODELIST** ) can be selected individually.



```
Ø *DATA MANAGER
  INPUT      →
  FIND       →
  →VIEW      →
```



```
√ *VIEW
  →OBSERV   →
  COORDS    →
  CODELIST  →
```



```
Obs :   0004/0047
Pt      45
Type:      Meas.
```



Scrolls data block by block upwards and downwards. Always starts with the last data block (eg, **0047**) within the selected data range (**OBSERV**; **COORD**; **CODELIST**).




Viewing the single elements.



Quit sub-program.

If the file **OBSERV** was deleted or if this data range contains no data the following display appears:

```
*VIEW *OBSERV
no data found
```

Delete warning with 

**Delete measurements,  
coordinates and codes  
(DELETE PNT)**

In all three options, the blocks stored in the total station are indicated:

- Measurements ( **OBSERV** ) from measuring range
- Coordinates ( **COORDS** ) from coordinate range
- Code blocks ( **CODELIST** ) from code list



```

◇ *DATA MANAGER
  FIND           →
  VIEW           →
→DELETE PNT     →
    
```



```

√ *DELETE PNT
→OBSERV         →
  COORDS        →
  CODELIST      →
    
```



```

Obs :    0004/0047
Pt   :           45

Type:           Meas.
    
```



Scrolling to the point to be deleted.



Viewing the single elements.



```

PtNr Obs/Del.
Delete >      No
    
```



Toggles between Yes/No.



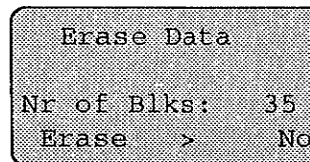
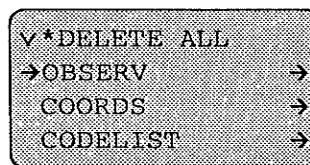
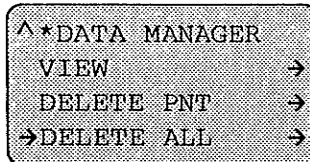
Confirm selection. Yes will delete the selected block.



Quit the function.

**Delete the complete  
range of measurements,  
coordinates and codes  
(DELETE ALL)**

All points in the data range OBSERV (measured data), COORDS (coordinates) und CODELIST (code lists) can be deleted. Each data range can be deleted individually.



Toggles between YES/NO.



Confirm selection.



Quit the function.



Confirming selection "Yes" will delete all data stored in the corresponding data range.

## EDM Configuration (EDM CONF)

MENU

ALL

```

◇ MENU
LEVEL →
DATA MANAGER →
→ EDM CONF →
    
```

REC

```

√ MENU * EDM CONF
→ EDMmod> FINE
EGL > OFF
INTENS> 0
RETTAP> OFF
    
```



The EDM configuration is only possible with the TC800 instruments.

### EDM mode

Selecting measuring mode FINE or RAPID.

Mode	Accuracy	Meas.time
FINE	2 mm + 2 ppm	2.5 sec.
RAPID	3 mm + 2 ppm	0.9 sec.

### EGL (Guide Light)

All TC800 instruments can optionally be equipped with Guide Light EGL1. The person at the prism can be guided by two blinking lights directly to the line of sight. The lights can be sighted up to 150 m away from the instrument. Stake out will be much easier with EGL1.

MENU

ALL

```

◇ MENU
LEVEL →
DATA MANAGER →
→ EDM CONF →
    
```



```

√MENU*EDM_CONF
→EDMmod>      FINE
EGL  >        OFF
INTENS>        0

```

Turns the Guide Light (EGL) ON or OFF.  
To achieve best performance, when using the Guide Light, the intensity should be adjusted for different light conditions (*see chapter "INTENS"*).



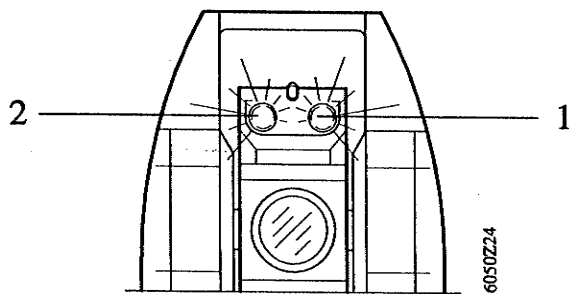
Select value.



Confirm the selected value.



Possible with TC800 equipped with EGL1.



- 1 Exit for blinking red LED
- 2 Exit for blinking yellow LED

---

## **INTENS**

Using the Guide Light EGL a corresponding value for the intensity can be set.

Settings "0", "1", or "2" are possible.

---

## **RETTAP**

Sets the EDM into a mode to measure to prisms or reflector tapes (= retro tape; only possible with the TC800 instrument).

One of two different reflector types can be selected:

ON: Set the retro tape target as reflector

OFF: Set the prism as reflector