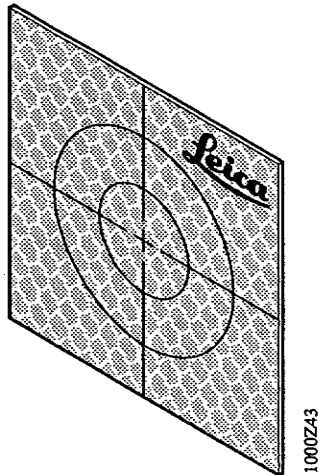
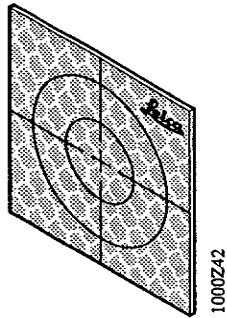
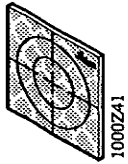




Pay attention to the correct setting: retro tape and prism have different prism constants. Switching from prism to retro tape will set the internal prism constant for Leica retro tapes automatically to 0.34mm, but the displayed prism constant shows "mm=0.000". Is the EDM switched from retro tape to prism, the last entered value for the prism constant is valid again.



The retro tapes should always be attached in the preferential direction (Leica logo readable acc. to fig.).



Retro tapes can be attached permanently to an object for the purposes of monitoring or for frequent repeat measurements. A retro tape may also be useful for the once-and-for-all marking of a point which is difficult to access.

Normally, measurements are still possible up to a horizontal or vertical inclination of +/-45°. Inclined measurement will reduce the range performance. Best performance is achieved when sighting perpendicular to the surface of the retro tape.

Special features

- No loss of accuracy when retro tape is perpendicular to the line of sight
- Measurement precision $\pm 3\text{mm}$ when retro tape is at 45°.
- For short ranges of up to 10m (33ft) the additional lens 632 364 is required. (Measuring error without additional lens > 10mm). It is important that the additional lens is placed to the instrument in the correct position (aperture vertically) !

Technical data for measurements to retro foils

Target-mark size [mm]	Range [metres]	Accuracy * (standard deviation)
20 x 20	2 to 40	3 mm
40 x 40	20 to 100	3 mm
60 x 60	60 to 180	3 mm

*Available retro tapes,
attached in the
preferential direction.*

* The accuracies quoted are valid when the retro tape is targeted at an angle of up to 45°.

Testing the instrument

Test functions are for displaying instrument parameters and status.

MENU

ALL
▼

```
^MENU
DATA MANAGER →
EDM CONF →
→TEST →
```

Battery and instrument temperature

After the submenu has been called, the instrument temperature and the battery status is displayed. Low battery charge also triggers (even during a measurement) an acoustic signal and the warning "Battery low".

With low battery charge, distances cannot be measured and the instrument switches off automatically.

REC
▶

```
√MENU*TEST
→INTENSITY →
BATTERY 9
TEMP °C 21
```

9 = Battery full
1 = Battery low

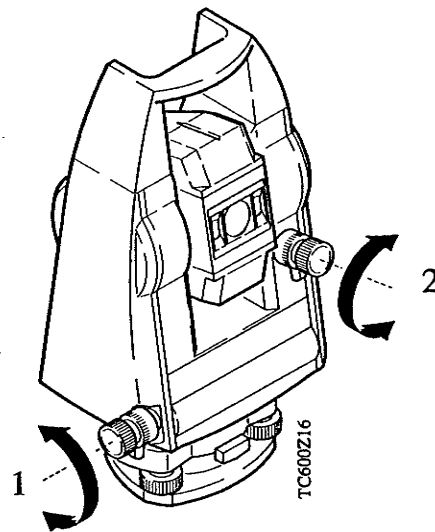


```
√MENU*TEST
→INTENSITY    →
  BATTERY      9
  TEMP °C      21
```

```
*TEST*INTENSITY
>■■■■■■<
  28%
```



Exit "INTENSITY" display.



Under difficult measuring conditions (e.g. fog) the TC600/TC800 unit can be optimised to the prism using this function.

- Align TC600/TC800
- Adjust the fine drives (1, 2) until the max. value (eg,.28%) is reached.
- Measure the distance.

Configuration

Under "Configuration", specific settings can be carried out with the TC600/TC800 unit so the instrument is optimally set to particular survey work.

MENU

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

√CONFIG MENU	
→PPM/MM	→
CALIB	→
CONTRAST>	2
REC DATA	→
UNITS	→
ON/OFF	→

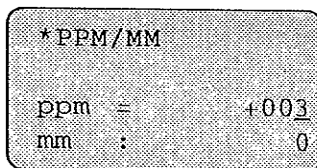
Distance corrections

Meteorological correction (ppm)

The distance measurement is affected by the meteorological conditions. The distance can be corrected with appropriate **ppm** values. The ppm values for temperature and atmospheric pressure are obtainable from the diagram in *section "Technical data"*. Instead of the atmospheric pressure the mean height above sea level of the survey site may be used for interpolation. For example, 10°C (18°F) temperature difference makes a difference of 1mm in a measured distance of 100 m = 10 ppm.

(2 secs) **MENU**

√CONFIG MENU	
→PPM/MM	→
CALIB	→
CONTRAST>	2



Activate input.



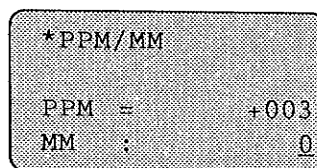
Enter value.



Confirm input and continue to enter the prism constant (mm).

Prism constant (MM)

The prism constant **MM** for Leica circular prisms is 0. It must be determined when using other types of prism. The prism constant must be always entered in units of (mm).



Confirm input. The value is stored and also available after switching off the total station. During a distance measurement the instrument displays both of the correction values (**PPM**) and (**MM**) for your information.

Manually set prism constants are automatically set to "0" when "RETTAP > ON" (under "MENU - EDM CONF).

The instrument automatically uses the Leica reflector tape constant (c = 0.34 mm) internally in this mode. When resetting to "RETTAP > OFF" the previously used prism constant for prisms is reactivated.

Determine instrument errors

(2 secs) **MENU**

ALL

```

V CONFIG MENU
PPM/MM      →
→ CALIB     →
CONTRAST>   2
    
```

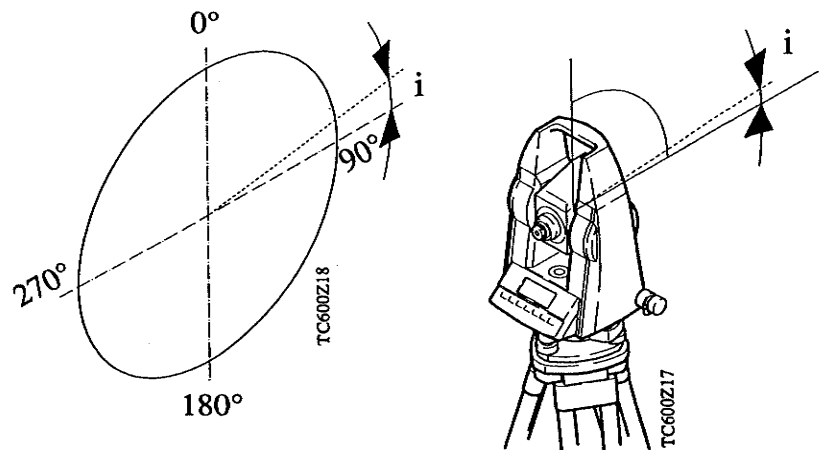
REC

```

V*CALIB
→ V-INDEX   →
Hz-COLLIM   →
    
```

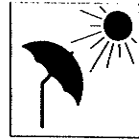
Vertical index error, V-Index (i)

The vertical circle should read exactly 90° (100 gon) when the line of sight is horizontal. Any deviation from this figure is termed vertical index error (i).

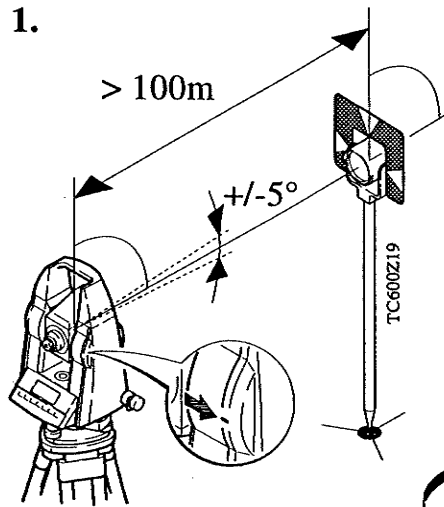


The stored vertical index error is displayed as an angular value in the units selected.

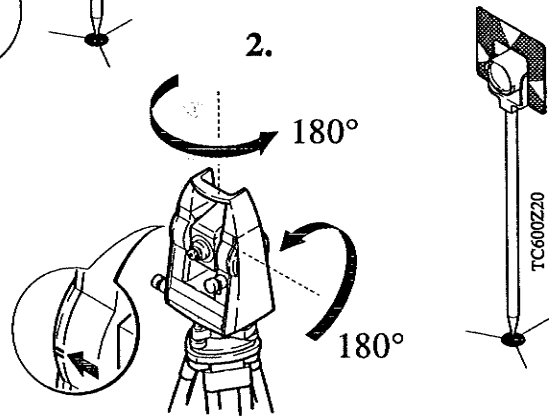
Before determining the vertical-index error use the electronic level to level up the instrument correctly.



1.



2.



```
*CALIB*V-INDEX
I      0°00'00
Inew :      ----
>Measure Index<
```

```
> Aim Point <
> Wait <
> Other Face <
> Wait <
> Set Value? <
```

```
*CALIB*V-INDEX
I      0°00'00
Inew :      ----
> Set Value? <
```



Adopt the calculated value or

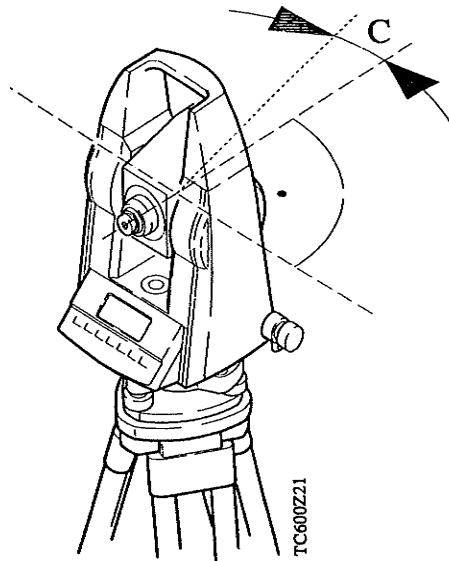


retain the old value and switch back to menu CALIB



When you determine the vertical index error the electronic level is adjusted at the same time.

**Line-of-sight error,
Hz-Collimation (c)**



The line-of-sight error or collimation error (C) is the deviation from the right-angle between the tilting axis and the line of sight. It is determined and stored in a similar manner to the vertical-index error and corrects the Hz-angle. The value for the correction depends on the vertical angle.

ALL
▼

```

v*CALIB
V-INDEX      →
→Hz-COLLIM   →
    
```

REC
▶

```

CALIB*Hz-Collim
C      0°00'00
Cnew : -----
>Measure Collim<
    
```

CONT
◀

```

> Aim Point <
> Other Face <
> Set Value? <
    
```

CONT
◀

Adopt the calculated value and return to the normal measuring mode.

CE
CODE

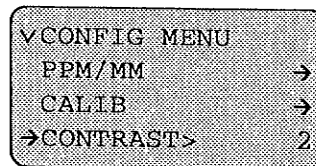
Retain the old value and return to the menu CALIB. By doing so, you can quit the menu at any time without saving the made corrections.



Index- and line-of-sight errors can change with time and temperature. They should, therefore be newly determined before the first use, before precision surveys, after long periods of transport, before and after long periods of work, and if the temperature changes by more than 10°C (18°F).

Contrast

Adjusting the display contrast or reading angle.



- 0 : Optimal contrast if the display is above the eye level of the user (reading from below)
- 1,2 : Ideal for reading at eye level
- 3: Ideal for reading at eye level below the display.

Data and recording parameter (REC DATA)

The **REC DATA** commands contain all relevant parameters and settings for data recording. Set these parameters as required and check the communication before starting recording for the first time.



```
◇ CONFIG MENU  
CALIB →  
CONTRAST > 2  
→ REC DATA →
```



```
√ * REC DATA  
→ DATout > MEM  
FORMAT > 8  
RS232 > MASK1
```

```
BAUD > 9600  
PARITY > EVEN  
ENDMARK > CR/LF
```



Setting the desired parameters.

Possible settings:

DATOUT MEM, RS232

FORMAT 8, 16

RS232 MASK1, MASK2

BAUD 300 \ 600 \ 1200 \ 2400 \ 4800 \ 9600

PARITY EVEN \ ODD \ NONE

ENDMARK CR/LF \ CR



Confirm the input.

DATOUT

To record measurements, a data recorder can be connected to the serial data port (RS232 interface). The parameters of the serial interface are already set for standard Leica parameters (9600, EVEN, CR/LF). They remain stored after switching off the total station.

To use other data recorders (e.g. IBM-compatible PCs, Handheld computers, etc.) the interfacing parameters may need to be changed. The communication via the RS232 interface requires a certain protocol containing the exact command structure (for more information refer to the handbook "Leica Instruments online").

Settings for data communication GPC1:

Call up "MAIN" in the menu of the GPC1. Set the transfer parameters (2400 baud, EVEN, CRLF) for the COM2 interface.

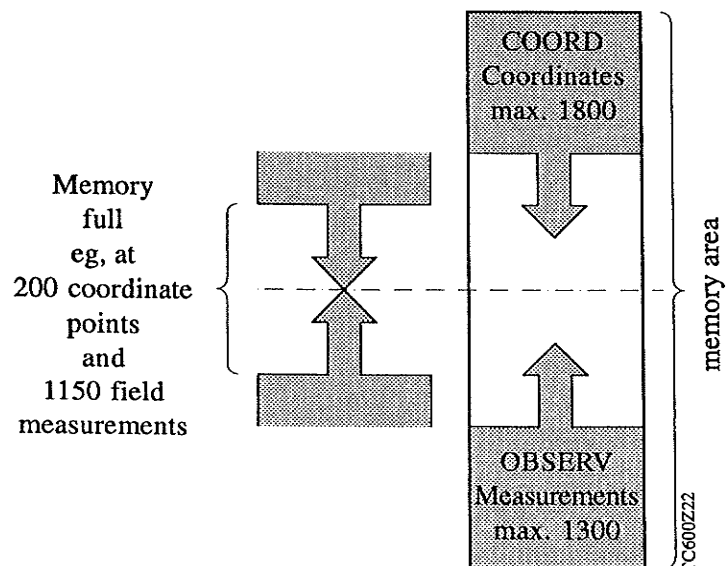


Do not turn the Total Station during measurements until data recording is finished. The current horizontal direction is always transmitted !

Internal data recording

The measured data (**OBSERV**) and the fixed-point coordinates (**COORDS**) are stored in the internal memory (refer to section "Data Management"). The internal memory can store information for a maximum of 1300 measurements or 1800 coordinate points. It is possible to store, for instance, 1150 field measurements and simultaneously 200 coordinate points in the internal memory.

New data are always appended to existing data.



FORMAT The Leica GSI-format can be output as a 8 or 16 digit string. However, this format setting is only relevant for the serial output of data and has no effect on the entries into the instrument. This setting is only responsible for the output string size. As an example, if a 12-digit point number in the 8-character-mode is output only the last 8 digits are transferred. Internally, however, always 16-digit strings are used, in order to guarantee a later output in another data format.

Using an entry of a 12-digit point number or station designation as an example the format generated by the instrument is described below:

(The 12-digit entry is always possible in both cases).

Pt.No. input: 123456789012

Setting 8 characters (**FORMAT 8**):

Display indication: 56789012

Output string: 110009+56789012 (Leica GSI format)

Setting 16 characters (**FORMAT 16**):

Display indication: 123456789012

Output string: *110001+0000123456789012 (Leica GSI-Format)

Int. stored. 123456789012

RS232 Two data templates are available for external recording:

MASK1 Pt Nr, Hz, V, slope distance, ppm/mm, hr, hi

MASK2 Pt Nr, Hz, V, slope distance, E, N, H, hr

Coordinate points are always stored in the format PtNr, E, N, H.



The settings of MASK1 and MASK2 have no affect to the data stored internally.

Selecting units (UNITS)



```
√CONFIG MENU
  CONTRAST>    2
  REC DATA    →
  →UNITS       →
```

Units for distance measurement (DIST)



```
√*UNITS
→DIST >      m
  ANGLE >    360s
  V-ANGL >   V
```

- m = meter
- US ft = feet (decimal)



Confirm selection.

Units for angle measurement (ANGLE)



```
◇*UNITS
  DIST >      m
→ANGLE >    360s
  V-ANGL >   V
```

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



Confirm selection.

V-Angle



◊*UNITS		
DIST	>	m
ANGLE	>	360s
→V-ANGL	>	V

Setting vertical-angle indication.

V = zenith angle (zenith = 0)

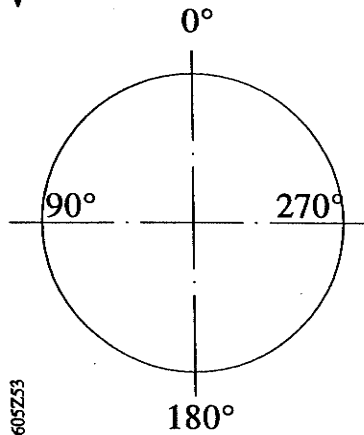
±V = vertical angle (horizontal = 0)

V% = slope: (horizontal = 0%), rise (+%); fall (-%)

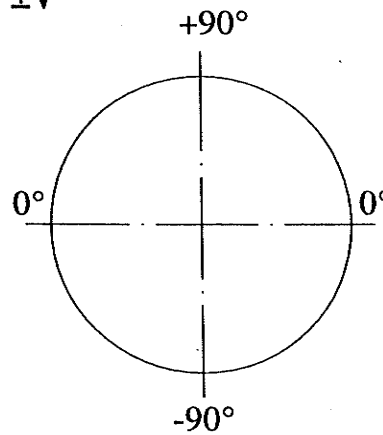


Confirm selection.

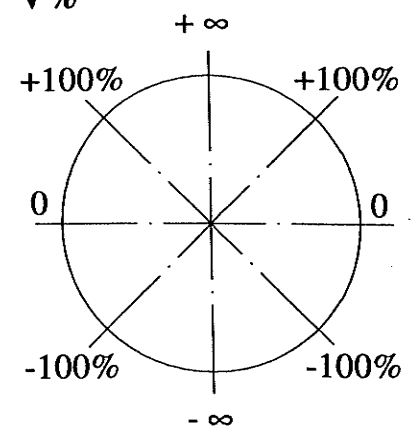
V



±V



V%



Display number of decimal places (ROUND)



^*UNITS		
ANGLE	>	360S
V-ANGL	>	V
→ROUND	>	low

- high = 81°45' 24" (1" Interval)

- med = 81°45' 25" (5" Interval)

- low = 81°45' 20" (10" Interval)



Confirm selection.

Automatic switch-off (ON/OFF)



```

^CONFIG MENU
REC DATA   →
UNITS      →
→ON/OFF    →
    
```



```

√*ON/OFF
→BEEP >      ON
BEP90°>     OFF
COMP >       ON
    
```

```

HZcomp>     ON
HZcoll>     ON
AUToff>     ON
    
```



Scrolling menu items with arrow keys.



Selecting options.



Confirm settings and return to CONFIG MENU.

BEEP

After each key touch an acoustic signal indicates the successful data entry. The signal can be switched OFF but is active again after switching on the total station again (ON).

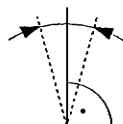
BEEP90°

Setting-out of right angles:

To simplify setting-out of right angles an acoustic signal (BEEP) can be activated.

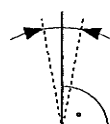
Set BEP90° to ON and confirm.

BEEP pulsating
+/- 4° (5gon)



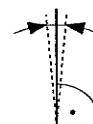
TC600Z23

BEEP continuous
+/- 30' (0.5gon)



TC600Z24

no signal
+/- 30" (10mgon)



TC600Z25

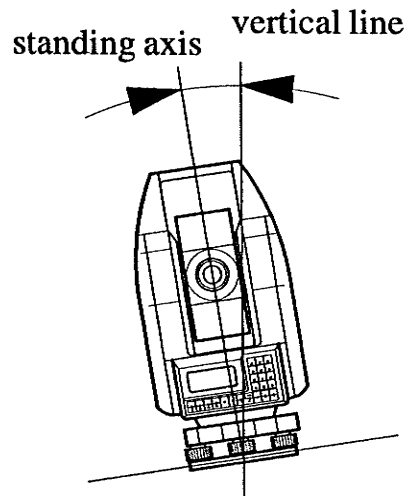
COMP

The acoustic warning signal and the error message (Error **58 TILT**) can be suppressed if the total station is not required to be properly levelled up (eg, on swaying platforms or ships).

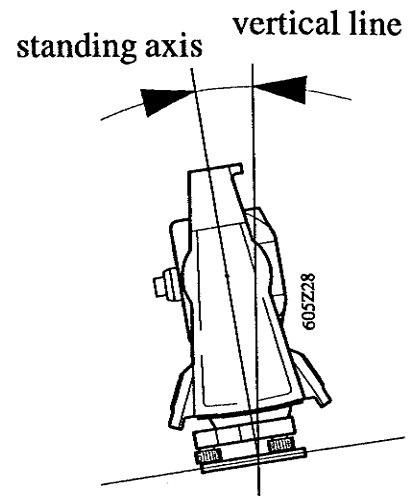
For normal use set **COMP = ON**.

When switching the total station on the function is automatically set to **COMP = ON**.

Transverse



Longitudinal



When the compensator is switched off (**COMP = OFF**) the vertical angle refers to the standing axis.

When the compensator is switched on (**COMP = ON**) the vertical angle refers to the vertical line (plumb line).

Hzcomp (dual axis compensation)

Function **HZCOMP = ON** corrects the Hz-angles for the tilt of the standing axis.

Switching the compensator (**COMP**) off also sets the function **HZCOMP** to **OFF**.

When switching the total station on the function is automatically set to **HZCOMP = ON**.

HZcoll

Corrects for the line-of-sight error:


If "HZcoll" is set to **ON** each measurement is corrected automatically for the line-of-sight error.

In case of setting **OFF** this correction is disabled.

AUToff

Automatic switch-off:

In case of longer breaks (> 10 minutes) the setting "AUToff = ON" switches the instrument automatically off to save battery capacity.

"AUToff = OFF" disables the automatic switch off and leaves the instrument permanently on until manually switched off with the  -key.

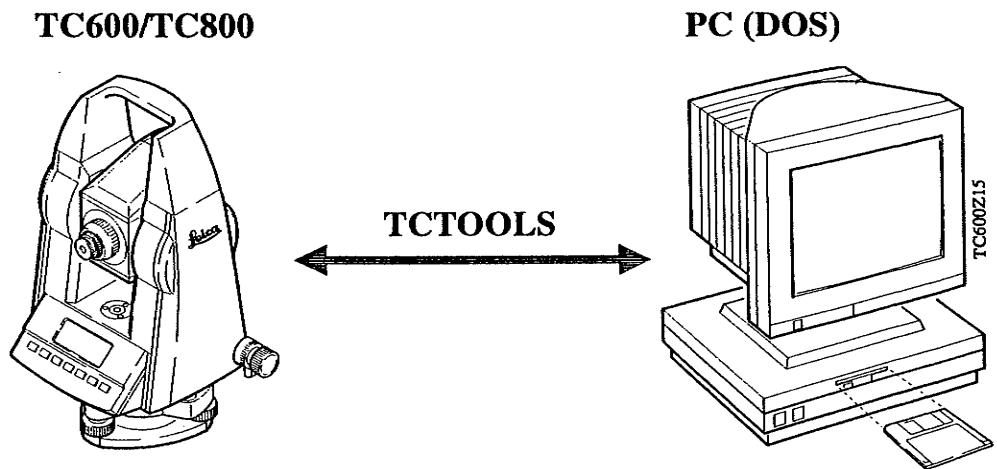
TCTOOLS

The program TCTOOLS has the function of an external data manager for the TC600/TC800.

This program runs under MS-DOS.

TCTOOLS provides for data exchange between a PC and the TC600/TC800 and also includes a codelist manager to create and edit codelists.

The bidirectional data transfer and the conversion of the Leica GSI-format to ASCII and vice versa is supported by the individual functions.



The program TCTOOLS consists of five main functions: **Codelist manager, Coordinate entry, Send data, Receive data, INFO/HELP**

1. Codelist manager

With this function it is possible to create and edit code lists and to transfer code lists between the PC and the TC600/TC800 fast and user-friendly.

The tabular input mask contains one CODE and five Info columns. Inputs are done likewise as in the Windows Excel program. Each code line must have a minimum of one entry in the code column else the complete code will not be accepted when saving the data.

Before a code is stored it must be packed, i.e. invalid and empty line will be eliminated.

Example

No	Code	Info1	Info2	Info3	Info4	Info5
1	101	PART1	CORN	CENTRE	1	.....
2	102	.....	CORN	BOTT	35	.....
3	103	PART2	.....	BOTT	.....	.....
...						
50	150	PART8	.....	TOP	.....	.....

On the PC code lists can be created, edited, merged with each other and deleted. Transfer to the instrument is carried out via DATA TRANSFER, which also provides for receiving a codelist from the TC600/TC800 and deletion of a codelist on the TC600/TC800.

2. Coordinate entry The menu item COORDINATE ENTRY offers the input for point number, Easting, Northing and Height.

3. Send data Transfer coordinates from text-files to the TC and user specific format-files.

Coordinates from text-files can be transferred using three different options.

1. ASCII files (Data in lines)

Sequential data structure with individual data elements separated by none numerical and none alphabetical characters. The complete data set contains one point number and the coordinates E (Easting), N (Northing) and H (Height), but at least data for E and N.

ASCII structure (data in lines):

```
PtNr      E          N          H
"100", "23456.678", "86543.456", "235.23"
-100*//23456.678*///-86543.456"" /235.2300
```

2. ASCII-Files (Data in columns)

Tabular data structure with individual data elements separated by spaces and none numerical and none alphabetical characters. One line must contain minimum values for E and N.

ASCII structure (data in columns):

PtNr	E	N	H
100	23456.678	86543.456	235.23
101	11025.025	45330.347	150.85

3. Leica GSI-Files

Extracts coordinates out of files in Leica format. These files can also contain measurements and coding information.

Only the point number and the related coordinates are extracted and transferred to the TC600/TC800.

4. Specific user formats

This option transfers user specific formats from the PC to the TC600/TC800. These specific formats are used to download data (please refer to *chapter "Other data formats"*).

4. Receive data Data can be transferred either in Leica GSI-format or in a user specific format.

1. Leica GSI-formats

Measurements:

Mask1 :	WI11	Pointnumber	(P)
	WI21	Horizontal angle	(Hz)
	WI22	Vertical angle	(V)
	WI31	Slopedistance	(sld)
	WI51	PPM+MM	(ppm+mm)
	WI87	Reflector height	(hr)
	WI88	Instrument height	(hi)

Mask2 :	WI11	Pointnumber	(P)
	WI21	Horizontal angle	(Hz)
	WI22	Vertical angle	(V)
	WI31	Slopedistance	(sld)
	WI81	Target Easting	(E)
	WI82	Target Northing	(N)
	WI83	Target Height	(H)
	WI87	Reflector height	(hr)

Coordinates (COORDS):

WI11	Pointnumber	(P)
WI81	Target Easting	(E)
WI82	Target Northing	(N)
WI83	Target Height	(H)

Example of a GSI-format

11.....+00000101	81...0+23456678	82...0+86543456	83...0+00023523
11.....+00000102	84...0+23456678	85...0+86543456	86...0+00023523
11.....+00000103	84...0+23456678	85...0+86543456	86...0+00023523

2. User specific formats (Other formats)

For data transmission from TC600/TC800 to the PC specially defined data formats can be used. These user specific output formats are created using specific software.

To download user specific formats, a format-file must be transferred to the TC600/TC800 first.

Once a user specific data format exists on the TC600/TC800, this format can be selected in TCTOOLS, which downloads the data from the data ranges COORDS, OBSERV in a specific defined format.

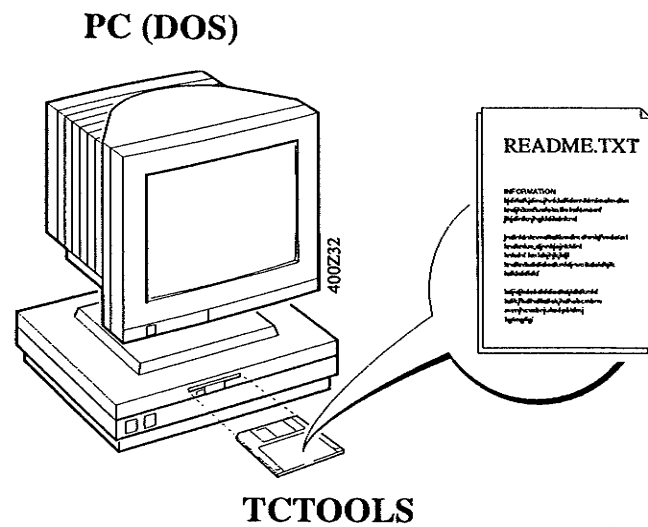
The user specific formats can be created as such, to suit the requirements for data processing best or to read the data out in a more readable format, such as a fieldbook format, etc.

For more information about other formats please refer to your nearest Leica representative.

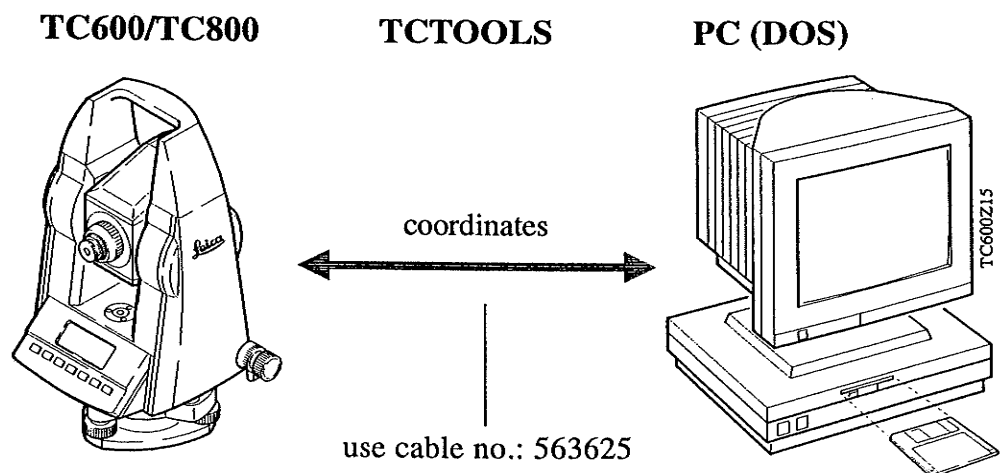
5. INFO/HELP (On-line Help)

A complete On-line Help function is directly integrated into the TCTOOLS program and should be carefully read before using the TCTOOLS. All the possible functions of the program are described in detail by the Help texts of the TCTOOLS.

The file README.TXT on the diskette is supplied with each instrument.



For data transfer the data cable (Part no. 563625) is needed. This cable is supplied with each instrument.



Other data formats

The instrument is designed to have flexibility in data output formats.

If you require specific data output formats, please consult your nearest Leica representative.

Communication PC-TC600/TC800

For more detail information of command and data structures refer to the handbook 'Leica Instruments On-Line' which is available from your Leica representative.

Set station coordinates

Station coordinates can be transmitted from an external data recorder via RS232 interface at any time without having to reset the instrument. However, the instrument must be in the highest level (measuring mode).

Command structure:

(_ = space char.)

Point number (PtNr)	PUT/11...+12345678_CRLF
Easting (Eo)	PUT/84...0+12345678_CRLF
Northing (No)	PUT/85...0+12345678_CRLF
Height (Ho)	PUT/86...0+12345678_CRLF
Instrument height (hi)	PUT/88...0+12345678_CRLF

Set orientation

A new direction can be transmitted at any time provided that the instrument is in the measuring display mode.

Command structure: (_ = space char.)

Hz PUT/21...2+12345678_CRLF

Setting-out

	Command structure (- = space char.)
Call the function	'SETOUT' (setting-out)
Point number (PtNr)	PUT/11....+12345678_CRLF
Hz-angle to be set out:	PUT/24...2+12345678_CRLF
Horizontal distance to be set out:	PUT/34...0+12345678_CRLF
Height to be set out:	PUT/83...0+12345678_CRLF

Return to data transfer (c for a new point)

Terminates program function "setting-out" x

After the required 4 data lines are transmitted to the TC600/TC800 unit, the display changes automatically to the mode showing the divergence between specified direction and present instrument direction.

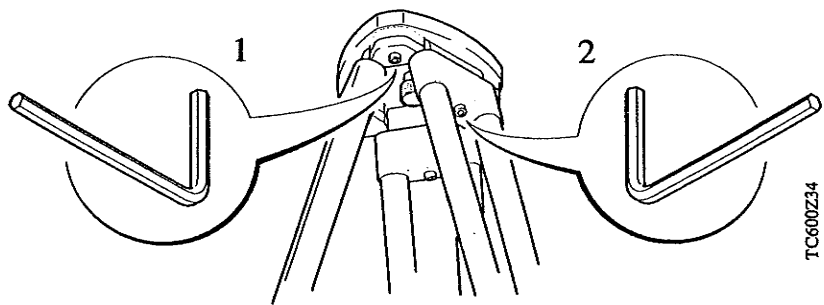
After distance measurement (**DIST**) the difference between the computed and measured horizontal distance as well as the difference in height between the instrument position and the setting-out point are displayed. At the same time, the keys **ALL** and **REC** are active to send data to an external data recorder. Measurements and data recordings can also be activated from an external data recorder.

Checking and adjusting

Tripod

The connections between metal and timber components must always be firm and tight.

- Tighten the Allen screws (2) moderately from time to time, as necessary.
- The same key is also suitable for adjusting the articulated joints on the tripod head (1). Tighten these just enough to keep the tripod legs open when you lift it off the ground.

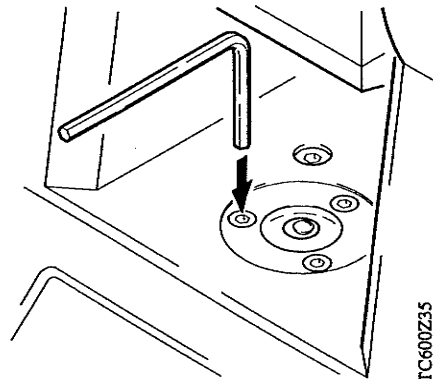


TC600Z34

Circular level

Level-up the instrument in advance with the electronic level. The bubble must be centered. If it extends beyond the circle, use the allen key supplied to center it with the adjustment screws.

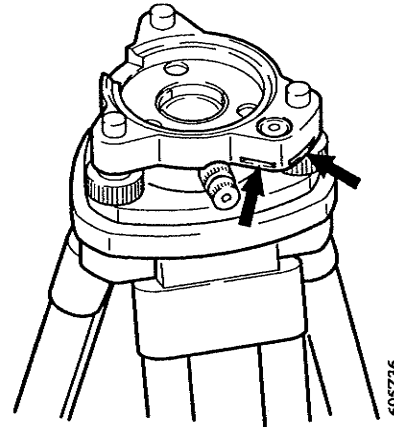
After adjustment no screw must be loose.



TC600Z35

***Circular level on the
tribrach***

Level the instrument and then remove it from the tribrach. If the bubble is not centred, adjust it using the adjusting pin in connection with the two cross-headed adjustment screws.



Turning the adjustment screws:

- to the left: the bubble approaches the screw
- to the right: the bubble goes in the other direction.

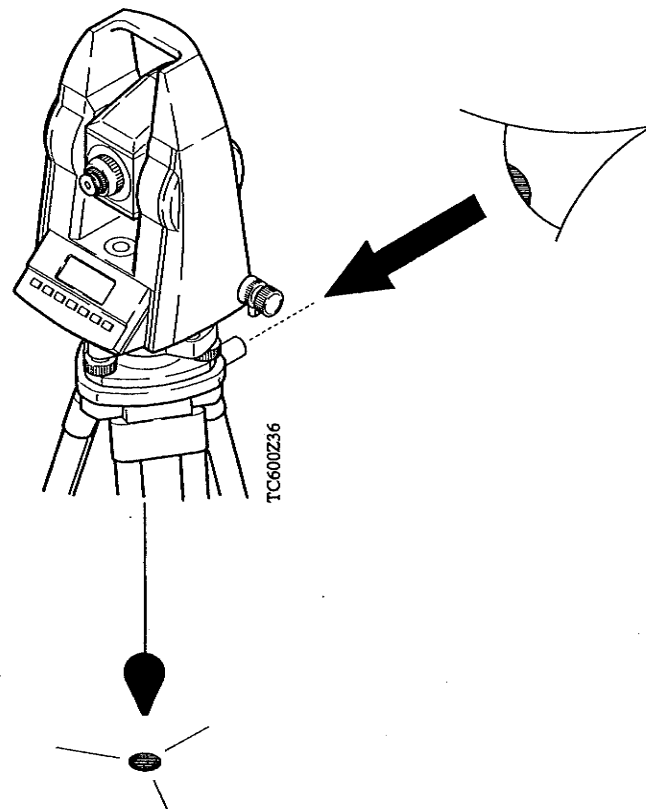
After adjustment no screw must be loose.

Optical plummet

Check the optical plummet of the tribrach at regular intervals. Any deviation of the line-of-sight from the vertical axis of the instrument causes a centering error.

Checking by plumb-bob:

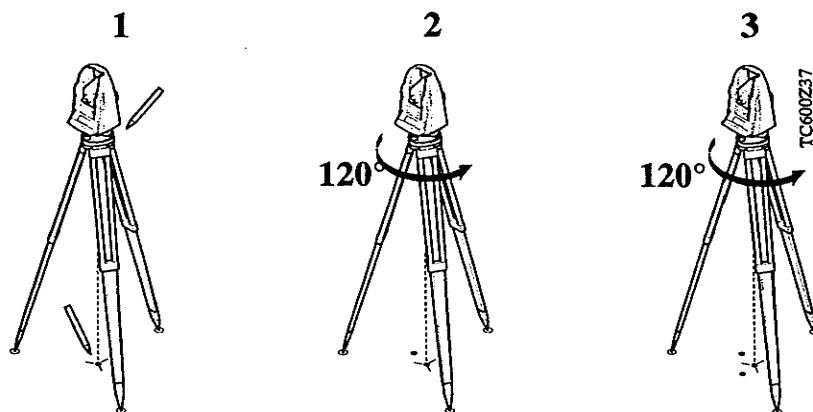
Set up and level up the instrument (with plumb-bob) on the tripod. Mark the ground point. Remove the plumb-bob. Check that the crosshairs of the optical plummet intersect at the ground point. The accuracy achievable is about 1mm.



Checking by turning the tribrach:

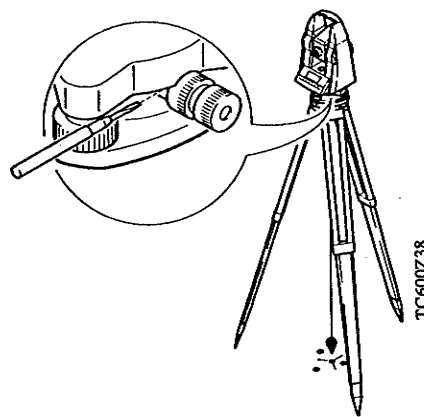
1. Level up the instrument using the electronic level.
Mark the ground point. Using a pencil, mark the outline of the tribrach on the tripod plate.
2. Turn the tribrach 120° , fit it into the outline, level up the instrument, and again mark the ground point.
3. Repeat this procedure in the third position.

If the three points do not coincide, adjust the crosshairs of the tribrach to the center of the triangle formed by the three ground points.



Adjustments:

Use a screwdriver to turn the two set screws alternately by the same small amount in order to center the crosshairs on the marked ground point.



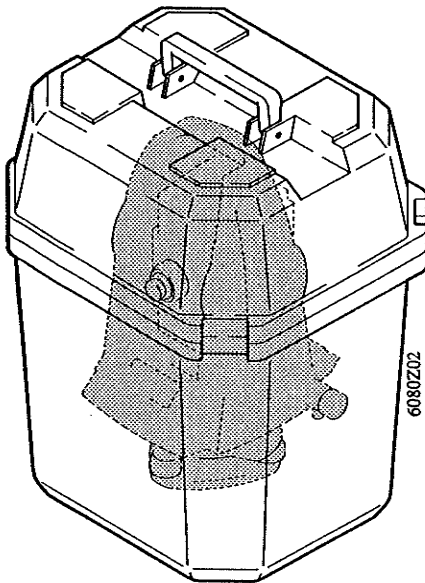
Care and transport

Transport:

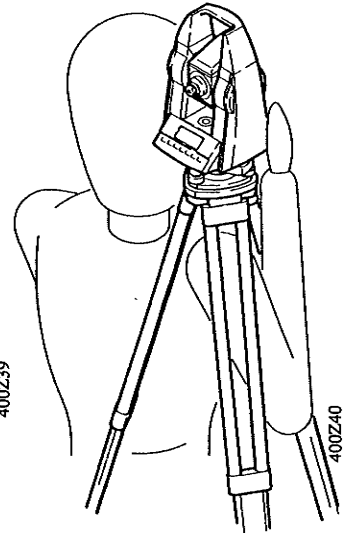
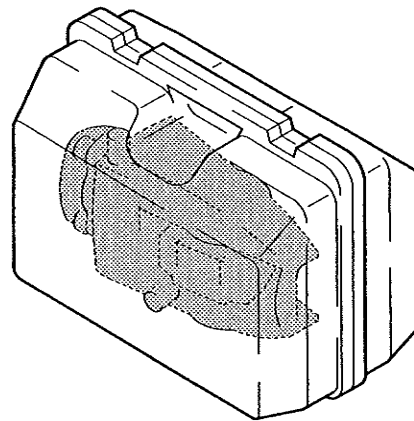
When dispatching the equipment, always use the complete original Leica packaging (case and cardboard box). When transporting the equipment in the field, always make sure to:

- either carry the instrument in its original transport case or
- carry the tripod with its legs splayed across your shoulder, keeping the **attached instrument upright**.

TC800



TC600



Cleaning and drying:

Objective, eyepiece and prisms

- blow dust off lenses and prisms
- Never touch the glass with fingers
- Use only a clean, soft and lint-free cloth for cleaning.
If necessary, moisten the cloth with pure alcohol.

Use no other liquids; these may attack polymer components.



When storing the equipment, particularly in summer and inside a vehicle, take the storage temperature limits (-40°C to +70°C / -40°F to +158°F) into account.

Cables and plugs:

Keep plugs clean and dry. Blow out any dirt lodged in the plugs of the connecting cables.

If you unplug connecting cables during the measurement, you may lose data.

Always switch off the instrument before removing the connecting cables.

Fogging of prisms:

Reflector prisms that are cooler than the ambient temperature tend to fog. It is not enough to simply wipe them. Keep them for some time inside your jacket or in the vehicle to allow them to adjust to the ambient temperature.

Storage:

If the instrument becomes wet, leave it unpacked. Wipe down, clean, and dry the instrument (at not more than 40 °C/ 108°F), transport case, foam inserts, and accessories. Pack up the equipment only when it is perfectly dry.

Battery charging



WARNING:

Use a battery charger in a dry room only, never outdoors. Charge batteries only at an ambient temperature between 10°C and 30°C (50°F to 86°F). We recommend a temperature of 0°C to +20°C (32°F to 68°F) for storing the batteries.

Battery chargers GKL22 and GKL23

Charger GKL22:

The charger outputs constant current and charges a NiCd battery within 14 hours. The charging procedure starts automatically whenever a battery is connected to the charger and a red control lamp indicates a fully charged battery.

Charging batteries with 2 pole plug requires an adapter cable.

Fast charger GKL23:

Fast charging with the GLK23 is possible with Leica NiCd-batteries equipped with a 5-pole plug. Fast charging requires 1.5 to 5 hours depending on the battery capacity.

Leica batteries with 2-pole plugs can be charged using an adapter cable - this charging procedure will take 14 hours.

Connecting 2 batteries at the same time, will charge the batteries sequentially. Batteries with fast charging capabilities are priority.

Charging modes and status of the GKL23 is shown by three color-LEDs.

For more information about use, functions and displays refer to the user manual of the GKL23.

Battery chargers GKL12 and GKL14

If you already own one of these battery chargers, we recommend:

- the charger GKL12 for charging the total station's battery insert (2-pole charging plug) and the GEB70 compact battery.
- For the GEB71 universal battery, use a GKL14 charger.

Before you use new batteries for the first time, charge them for 20 to 24 hours. This also applies to batteries that have not been used for several months. NiCd batteries reach full capacity after two or three normal cycles each of a 14-hour charge followed by a full discharge

If battery performance drops noticeably, run one or two full cycles, i.e. charge for 14 hours and allow to discharge until the instrument displays "Battery low".

Leave flat batteries to charge for fourteen hours. If you do not know a battery's state of charge, also leave it to charge for fourteen hours.

Set the battery charger's voltage selector to your AC mains voltage, **115V** or **230V**. Plug in the charger to the mains. The green indicator lamp should light. If it does not light, there is a power cut or the mains cable or charger is faulty.

Connect the battery to the charger. The red charging indicator should light. If it does not, the battery is not charging, i.e. the battery cable is faulty or the battery fuse has blown and should be replaced. On the GKL12, you may not have started the timer or it may have stopped at the end of the charging period.

Safety directions

The following directions should enable the person responsible for the TC600/TC800, and the person who actually uses the instrument, to anticipate and avoid operational hazards.

The person responsible for the instrument must ensure that all users understand these directions and adhere to them.

Intended use of instrument

Permitted uses

The TC600/TC800 electronic total stations are intended to the following applications:

- Measuring horizontal and vertical angles
- Measuring distances
- Recording measurements
- Computing by means of application software
- Visualising the aiming direction (with EGL1 Guide Light)

Adverse uses

- Use of the total station without previous instruction
- Use outside of the intended limits
- Disabling safety systems and removal of hazard notices
- Opening the instrument using tools (screwdriver, etc.), unless this is specifically permitted for certain functions
- Modification or conversion of the instrument
- Use after misappropriation

- Use with accessories from other manufacturers without the prior express approval of Leica
- Aiming directly into the sun
- Inadequate safeguards at the measuring station (e.g. when measuring on roads, etc.)



WARNING:

Adverse use can lead to injury, malfunction, and damage.

It is the task of the person responsible for the instrument to inform the user about hazards and how to counteract them. The TC600/TC800 total stations are not to be used until the user has been properly instructed how to use them.

Limits of use

Environment:

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments. Use in rain is permissible for limited periods.

Refer to section "Technical data".

Responsibilities

Area of responsibility for the manufacturer of the original equipment Leica Geosystems AG, CH-9435 Heerbrugg (hereinafter referred to as Leica): Leica is responsible for supplying the product, including the user manual and original accessories, in a completely-safe condition.

Responsibilities of the manufacturers of non-Leica accessories:

The manufacturers of non-Leica accessories for the TC600/TC800 electronic total station are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica product.

Responsibilities of the person in charge of the instrument:



WARNING:

The person responsible for the instrument must ensure that it is used in accordance with the instructions. This person is also accountable for the training and deployment of personnel who use the instrument and for the safety of the equipment when in use.

The person in charge of the instrument has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to accident prevention
- To inform Leica immediately if the equipment becomes unsafe.



WARNING:

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the instrument.



WARNING:

The charger must not be used in damp or inclement conditions. If moisture penetrates the charger, the user may receive an electric shock.

Precautions:

Use the charger only indoors, in dry rooms. Protect it from damp. If the charger is damp, do not use it.



WARNING:

If you open the charger, either of the following actions may cause you to receive an electric shock:

- Touching live components
- Using the charger after incorrect attempts to carry out repairs

Precautions:

Do not open the charger yourself. Only a Leica-approved service technician is entitled to repair it.

**CAUTION:**

Watch out for erroneous distance measurements if the instrument is defective or if it has been dropped or has been misused or modified.

Precautions:

Periodically carry out test measurements and perform the field adjustments indicated in the user manual (*refer to section "Determine instrument errors" and "Checking and adjusting"*), particularly after the instrument has been subjected to abnormal use and before and after important measurements.

**DANGER:**

Because of the risk of electrocution, it is very dangerous to use reflector poles and extensions in the vicinity of electrical installations such as power cables or electrical railways.

Precautions:

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

**WARNING:**

By surveying during a thunderstorm you are at risk from lightning.

Precautions:

Do not carry out field surveys during thunderstorms.

**CAUTION:**

Be careful not to point the instrument directly towards the sun, because the telescope functions as a magnifying lens and can injure your eyes or damage the internal components of the EDM and EGL1 Guide Light.

Precautions:

Avoid pointing the telescope directly at the sun.

**WARNING:**

During target recognition or set out procedures there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around or between the instrument and the target (e.g. obstacles, excavations or traffic).

Precautions:

The person responsible for the instrument must make all users fully aware of the existing dangers.

**WARNING:**

Inadequate securing of the surveying site can lead to dangerous situations, for example in traffic, on building sites and at industrial installations.

Precautions:

Always ensure that the survey site is adequately secured. Adhere to the regulations governing accident prevention and road traffic.

**CAUTION:**

If a target lamp accessory is used with the instrument the lamp's surface temperature may be extreme after a long working period. It may cause pain if touched. Replacing the halogen bulb before the lamp has been allowed to cool down may cause burning to the skin or fingers.

Precautions:

Use appropriate heat protection such as gloves or woollen cloth before touching the lamp, or allow the lamp to cool down first.

**WARNING:**

If computers intended for use indoors are used in the field, there is a danger of electric shock.

Precautions:

Adhere to the instructions given by the computer manufacturer with regard to field use in conjunction with Leica instruments.

**CAUTION:**

During the transport or disposal of charged batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

Precautions:

Before transporting or disposing of equipment, discharge the battery (e.g. by running the instrument in tracking mode until the batteries are exhausted or discharging with the GKL23 battery charger).

**CAUTION:**

If the accessories used with the instrument are not properly secured, and the equipment is subjected to mechanical shock (e.g. blows, falling etc.), the equipment may be damaged or people may sustain injury.

Precautions:

When setting-up the instrument, make sure that the accessories (e.g. tripod, tribrach, connecting cables, etc.) are correctly adapted, fitted, secured and locked in position.

Avoid subjecting the equipment to mechanical shock. Never position the instrument on the tripod baseplate without securely tightening the central fixing screw. If the screw is loosened always remove the instrument immediately from the tripod.

**WARNING:**

If the equipment is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the equipment irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.
- Leakage of silicone oil from the compensator can damage the optical and electronic subassemblies.

Precautions:

Dispose of the equipment appropriately in accordance with the regulations in force in your country. Always prevent access to the equipment by unauthorized personnel.

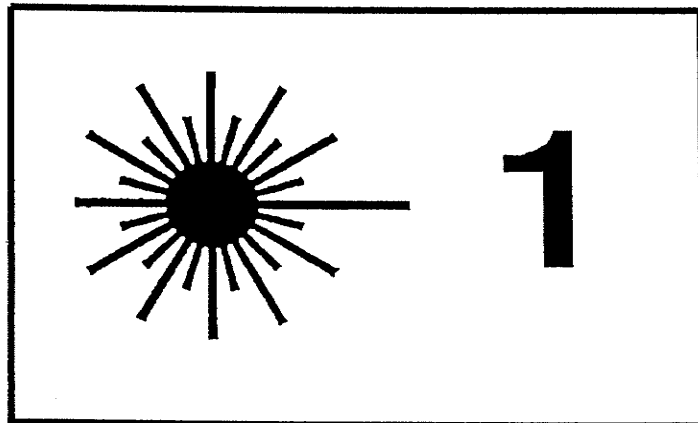
Laser classification

Integrated distancer (EDM)

The EDM module built into the total station produces an invisible infrared beam which emerges from the telescope objective (*refer section "Technical data"*). The product is a Class 1 LED product in accordance with:

- IEC 825-1 : 1993 "Radiation safety of laser products".
- EN 60825-1 : 1994 "Radiation safety of laser products".

Class 1 LED products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with the instructions.

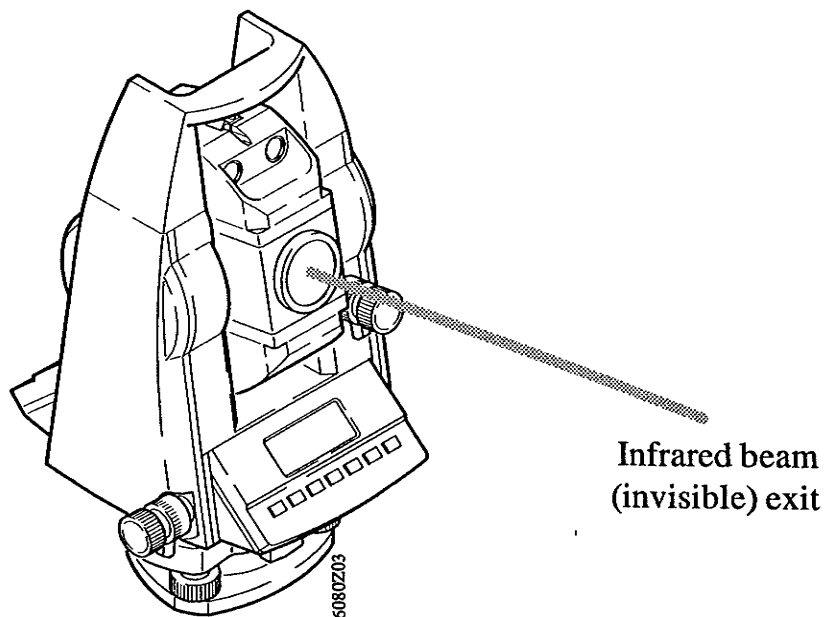


TC600

Beam divergence:	2.5 mrad
Impulse duration:	10 ns
Maximum power output:	200 μ W peak
Measurement uncertainty:	$\pm 5\%$

TC800

Beam divergence:	2.02 mrad
Impulse duration:	10 ns
Maximum power output:	360 μ W peak
Measurement uncertainty:	$\pm 5\%$



Guide Light EGLI

The integrated Guide Light option (for TC800 series) produces an visible LED light beam from the upper front side of the telescope.

The product is a Class 1 LED product *) in accordance with:

- IEC 825-1 : 1993 "Radiation safety of laser products".
- EN 60825-1 : 1994 "Radiation safety of laser products".

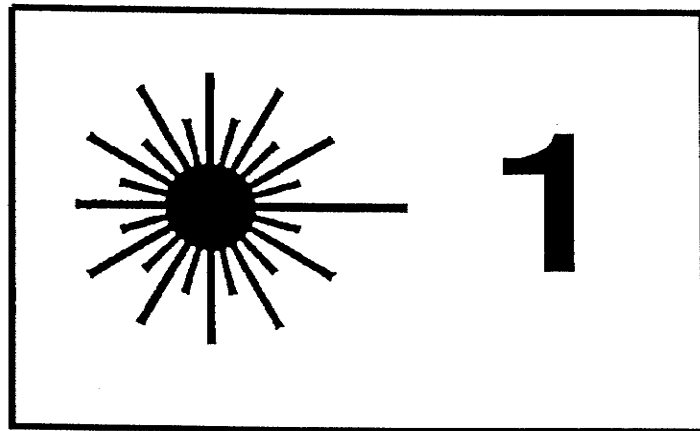
*) within the specified working range > 5 m (> 16 ft).

Class 1 LED products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with the instructions.

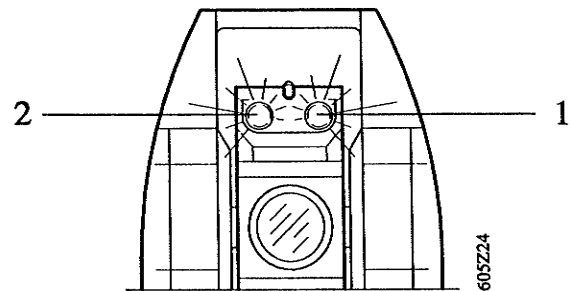


CAUTION:

Use the Guide Light option within the specified range (at a distance of > 5 m (> 16 ft) from the telescope).



Flashing LED	Yellow	Red
Beam divergence	2.4 °	2.4 °
Impulse duration	2 x 35 ms	35 ms
Maximum power output	0.55 mW	1.2 mW
Measurement uncertainty	± 5 %	± 5 %



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

Electromagnetic acceptability

The term "electromagnetic acceptability" is taken to mean the capability of the instrument to function correctly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances in other equipment.



WARNING:

Electromagnetic radiation can cause disturbances in other equipment.

Although the total station meets the strict regulations and standards which are in force in this respect, Leica cannot completely exclude the possibility that other equipment may be disturbed.



CAUTION:

There is a risk that disturbances may be caused in other equipment if the total station is used in conjunction with accessories from other manufacturers (e.g. field computers, personal computers, portable radios, non-standard cables, external batteries etc.).

Precautions: Use the equipment only with accessories from Leica. When combined with total stations, the strict requirements stipulated by the guidelines and standards are assured. When using computers and portable radios, pay attention to the information provided by the manufacturer., regarding electromagnetic acceptability.

**CAUTION:**

Disturbances caused by electromagnetic radiation can result in the tolerance limits for measurements being exceeded.

Although the total station meets the strict regulations and standards which are in force in this connection. Leica cannot completely exclude the possibility that the total station may be disturbed by very intense electromagnetic radiation, for instance near radio transmitters, portable radios, diesel generators etc.

Precautions: Check the plausibility of results obtained under these conditions.

**WARNING:**

If the total station is operated with cables attached at only one of their two ends (e.g. external power supply cables, interface cables, etc.), the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other instruments may be impaired.

Precautions: While the total station is in use, cables (e.g. instrument to external battery, instrument to computer, etc.) must be connected at both ends.

***FCC statement
(applicable in U.S.)***

**WARNING:**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



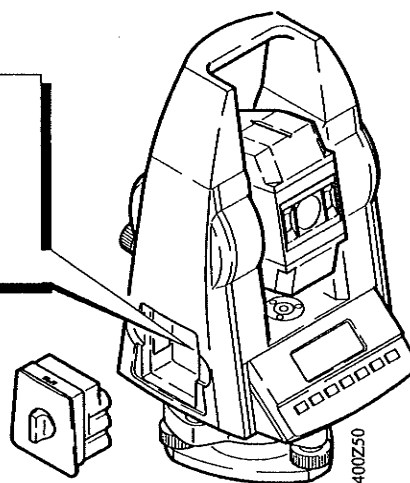
WARNING:

Changes or modifications not expressly approved by Leica for compliance could void the user's authority to operate the equipment.

Product labeling


This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*



Error reports and warnings

	Error report	Cause	Remedy
02	Full	Internal memory is full	Clear internal memory
03	Invalid Value	Non-valid value was entered	Enter a valid value
12	Battery Empty	Battery exhausted	Change battery
19	Temperature	The inside of the instrument is too hot or too cold	Cool or warm the instrument
21	Parity Error	Parity error at interface	Inspect cables and interface parameters
22	RS232 Timeout	The system is receiving no response from the interface	Inspect cables, and functionality of external recording device. Inspect baud rate
24	RS232 Overflow	The data are being transmitted too quickly	Repeat using a lower baud rate
44	Value >1 gon	V-index measured, or line-of-sight error, is > 54' (> 1 gon)	Redetermine value, or contact service department
50	Angle Error	Measuring error angle scanning	Contact service department
51	System error	System error in compensator	If fault re-occurs, contact service department
55	EDM Signal	EDM signal faint, absent or distorted	Inspect pointing. Check that distance is not too great

	Error report	Cause	Remedy
56	EDM System	System error in EDM	If error occurs repeatedly, contact service department
58	TILT	Total station not levelled	Level the instrument or re-adjust the V-index, which adjusts also the electronic level
	Invalid Data	Invalid data for transfer to TC600/TC800	Press  - key
82	Out of Range	For determination of index- or collimation error, V-angle is more than $\pm 6^\circ$ (6.6666 gon) off the horizontal plane	Bring target point within tolerance range
9x		System defective	Contact service department

	Warning	Cause	Remedy
09	PtNr Overflow	PtNr outside the upper and lower limits	Enter a new PtNr max. 8 digits
10	PtNr.Not Incr.	PtNr. cannot be incremented	Change PtNr. manually
12	Battery Low	The battery is practically flat (Level=0)	Change battery or connect an external battery

Technical data

Distance measurement

RANGE [m] (ft)	TC600	TC800
Atmospheric conditions	1 prism / 3 prisms	1 prism / 3 prisms
poor 1)	800 (2600) / 1000 (3300)	1200 (3900) / 1500 (4900)
fair 2)	1100 (3600) / 1600 (5200)	2500 (8200) / 3500 (11500)
excellent 3)	1300 (4300) / 2000 (6500)	3500 (11500) / 5000 (16400)

- 1) very hazy, visibility 3 km, or strong sunlight and heavy heat shimmer
- 2) light haze, or some clouds and slight heat shimmer
- 3) overcast, no haze, visibility 30 km, no heat shimmer

Standard deviation	TC600	TC800
Fine mode	3mm + 3ppm	2mm + 2ppm
Rapid mode	---	3mm + 2ppm
Tracking	10mm + 3ppm	5mm + 2ppm

Measurement time [sec]	TC600	TC800
Fine mode	4	2.5
Rapid mode	---	0.9
Tracking	0.5	0.3

Angle measurement

	TC600	TC800
Standard deviation ["] (mgon)	5 (1.5)	3 (1)
Display resolution ["] (mgon)	10", 5", 1" (2, 1, 0.2)	10", 5", 1" (2, 1, 0.2)

- absolute, continuous, updates each 0.3 sec
- Units selectable:
400 gon; 360° decimal; 360° sexagesimal;
V%, ±V, V

Telescope

	TC600	TC800
Objectiv lens-Ø [mm] (in)	28 (1.1)	42 (1.7)
Shortest focusing distance [m] (ft)	2 (6.5)	1.7 (5.6)
Field of view	1°30' (26 m/km)	1°30' (26 m/km)
Magnification	28x	30x

- Topics**
- Level sensitivity : Circular level: 4'2mm
Electronic level: 5" (1.5 mgon)
- Optical plummet: In tribrach, focusable,
Magnification 2x
Accuracy: 0.5mm/1.5m
- Compensator : liquid, dual axes
Working range: ±5' (±0.1 gon)
Accuracy: ±2" (±0.6 mgon)
- Display : Liquid crystal
4 lines of 16 characters
- Keyboard : TC600: 1 Keyboard, alphanumerical
TC800: 2 Keyboards,
alphanumerical
- EGL1 (optional): working range: 150m (500 ft)
divergence: 12m (40ft) at 100m (330ft)

Automatic corrections : • Hz-collimation
• vertical index
• earth curvature and refraction
• standing axis tilt

Features Built-in programs : • Station set, Orientation set
• Free station
• Set out
• Tie distance
• Calculate Area
• Rapid measurement

Special Data manager : powerful data management system "Input, find, view, delete points or complete data ranges"

Data memory Internal storage : 1300 data sets for measurements or 1800 points with coordinates
External interface : RS232

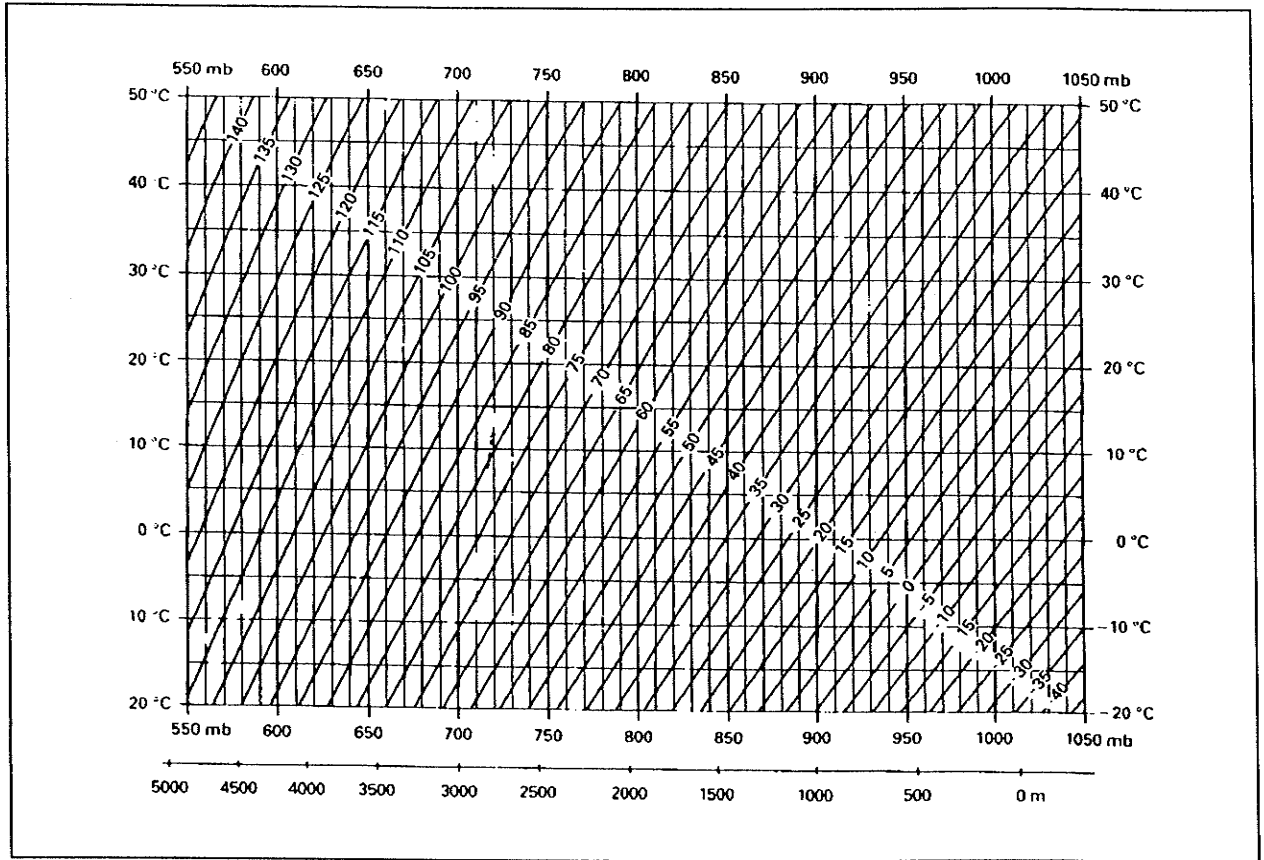
Dimensions Height, length, width : TC600: 344 x 180 x 194 mm
TC800: 344 x 225 x 194 mm
Instrument weight (incl. battery) : TC600: 4.3 kg (9.5 lbs)
TC800: 5.6 kg (12.3 lbs)
Tribrach weight : GDF11: 0.6 kg (1.3 lbs)
GDF12: 0.7 kg (1.5 lbs)
GDF21: 0.77 kg (1.7 lbs)
GDF22: 0.85 kg (1.9 lbs)

Power supply

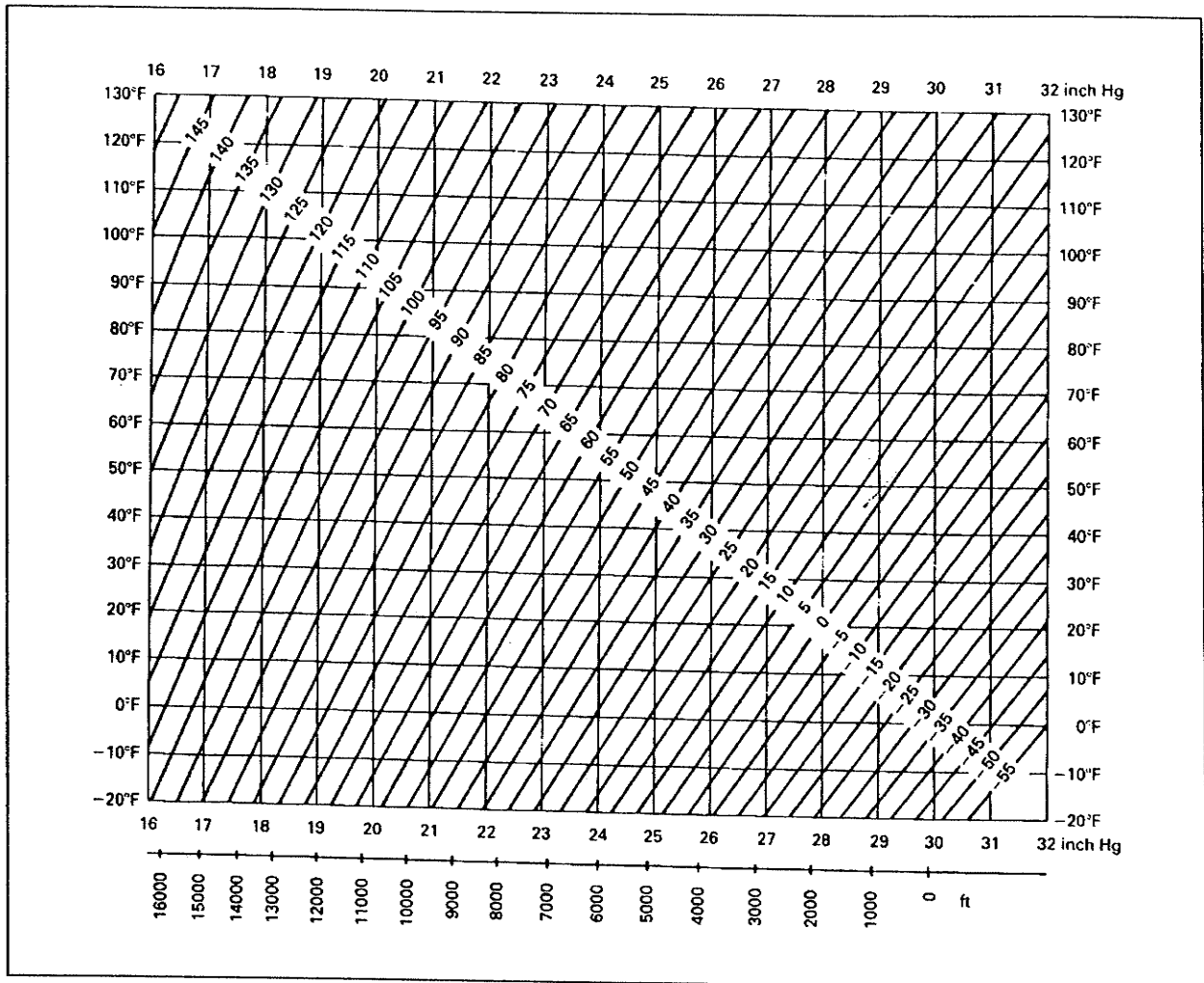
Operating life of batteries	GEB77 battery module	GEB70 compact battery
Voltage / capacity	12V / 0.6A	12V / 2.0A
No. of measurements with distance	approx.	approx.
TC600	700	1400
TC800	800	2000
Operating time [h]		
- angle meas. only	10	30
- angle and distance	5	12
Recharging time [h]	1	1.5
Weight [kg]	0.2	0.9

Temperature range Operation : -20°C(-4°F) to +50°C(122°F)
 Storage : -40°C(-40°F) to +70°C(158°F)

**Atmospheric correction in ppm with °C, mb, H (meter)
at 60% relative humidity**



**Atmospheric correction in ppm with °F, inch Hg, H (Feet)
at 60% relative humidity**



Index

A	AC mains voltage	105
	Adjustments	101
	Adverse uses	106
	Alphanumeric entry mode	58
	Alphanumeric entry of point number	58
	ANGLE	84
	Angle measurement	124
	Area computation	51
	ASCII	89, 90
	Atmospheric correction	127, 128
	Atmospheric pressure	75
	Automatic corrections	125
	Azimuth	48

B	Battery	73
	Battery chargers	104, 105
	Battery status	73

C	Cables	103
	Calc Area	51
	Charger	104
	Charging	13
	Checking	98
	Circular level	98
	Cleaning	102
	Code input	64
	Codelist	89
	Codes	63
	Columns	91
	Communication	96
	Compensator	124
	Configuration	75
	Contrast	80
	Coordinate entry	63
	Coordinates	90
Cursor	18	

D	Data and recording parameter	81
	Data management	62
	Data manager	125
	Data transfer	89
	DATOUT	81
	Delete	68, 69
	Dimensions	125
	Display	18, 124
	Display contrast	80
	Display number of decimal places	85
	Display of stored data	67
	Display symbols	23
	Display-masks	61
	Displaying instrument parameters	73
	DIST	84
	Distance measurement	24, 123
	Download	93
	Drying	102
	DSP	61

E	EDM	70, 114
	EDM Signal	74
	EGL1	124
	Electromagnetic acceptability	118
	Electronic level	16, 78
	Entering point number	57
	Entering reflector height	58
	Error reports	121
	External batteries	13

F	Fast charger	104
	FIND	65
	Fogging of prisms	103
	FORMAT	83
	Free Station	41

G	GSI-format	89
	Guide Light	71, 116

<hr/>		
H	Hazards of use	109
	Height difference	48
	Height offset	47
	Hidden points	25
	Horizontal circle	59
	Hz	59, 60
<hr/>		
I	Indication	44
	INPUT	63
	Input of coordinates	63
	Instrument errors	77
	Instrument temperature	73
	Intended use of instrument	106
	Interface	18
	Internal battery	13
	Internal memory	82
	Internal storage	125
	IntMem	39, 49
	Introduction	8
	<hr/>	
K	Key functions	19
	Keyb	37, 39, 47, 49
	Keyboard	18, 124
<hr/>		
L	Laser classification	114
	Level sensitivity	124
	Level up	16
	Limits of use	107
	Line-of-sight error	79
<hr/>		
M	MASK	83
	Mean height above sea level	75
	Measure and record	23
	Menu tree	20, 21
	Meteorological correction	75

O	Offset	25
	On-Line commands	96
	OnLine	49
	Operating concept	17
	Optical plummet	100, 124
	Orange keys	18
	ORIENTATION	39
	Orientation by PC	96
	Orientation correction	44
	Orientation of horizontal circle	39

P	Permitted uses	106
	Plugs	103
	Plumb-bob	100
	Pointing	24
	Power supply	126
	ppm values	75
	Prism constant	76

R	Rapid measurement	54
	REC DATA	81
	Recording	82
	Reflector height	57
	Relative humidity	127, 128
	Responsibilities	108
	Retro tapes	72
	ROUND	85
	RS232	83

S	Safety directions	106
	Searching	65
	SET	57
	SET PtNr/hr	57
	Set station coordinates by PC	96
	Set-up	14
	Setout	46
	Setting out	46
	Setting-out by PC	97
	Setting-out of right angles	86
	Settings	57
	Slope	85
	Station Coord	36
	Station coordinates	36
	Status	73
	Storage	103
	Storage temperature limits	103
	Switch-off	86

T	Target points	43
	TCTOOLS	89
	Technical data	123
	Telescope	124
	Temperature	75
	Temperature range	126
	Testing the instrument	73
	Tie Distance	48
	Tracking mode	26, 54
	Tribrach	99
	Tripod	98
	Turning the tribrach	101

U	UNITS	84
	Units for distance measurement	84
	Unpacking	11
	User Programs	34

V	V-Angle	85
	Vertical angle	85
	Vertical index error	77
	Vertical-angle indication	85
	VIEW	67

W	Warning	122
	White keys	18
	WI-codes	92

Z	Zenith angle	85
----------	--------------	----

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



***Total Quality Management-
Our commitment to total
customer satisfaction***

***Ask your local Leica agent for
more information about our
TQM program***

664904-2.1.0en

Printed in switzerland - Copyright Leica Geosystems AG,
Heerbrugg, Switzerland 1997
Original text

Leica

*Leica Geosystems AG
Geodesy
CH-9435 Heerbrugg
(Switzerland)*

Phone +41 71 727 31 31

Fax +41 71 727 46 73

www.leica.com