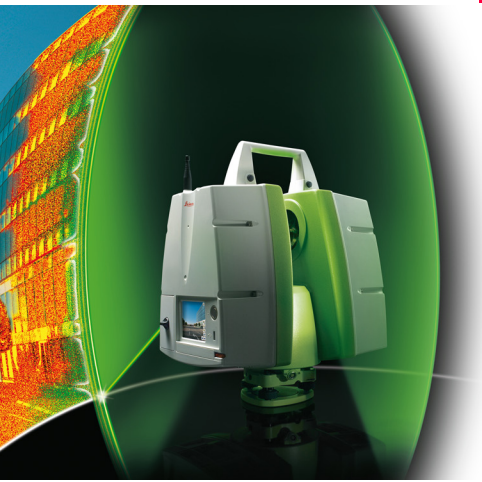


Leica ScanStation C10

User Manual

Version 2.0
English

- when it has to be **right**

Leica Geosystems

Introduction

Purchase

Congratulations on the purchase of a ScanStation C10 instrument.

This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "6 Safety Directions" for further information.
Read carefully through the User Manual before you switch on the product.

Product identification

The type and the serial number of your product are indicated on the type plate. Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorised service workshop.

Type: _____

Serial No.: _____

Symbols

The symbols used in this manual have the following meanings:

Type	Description
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.

Trademarks

- Windows is a registered trademark of Microsoft Corporation

All other trademarks are the property of their respective owners.

Table of Contents

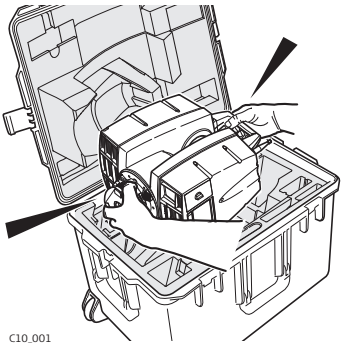
In this manual

1 Description of the System

1.1 Packing / Unpacking

Unpacking

When in its transport container, the ScanStation C10 can sit in either a face-up or face-down position.

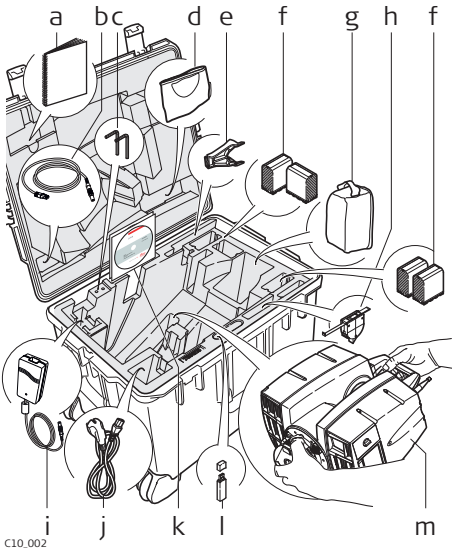


To take the instrument out of its container, grasp the handle and the base of the instrument, and lift.
Use caution due to the weight of the instrument (13 kg).

Pack the instrument the same way it is delivered.

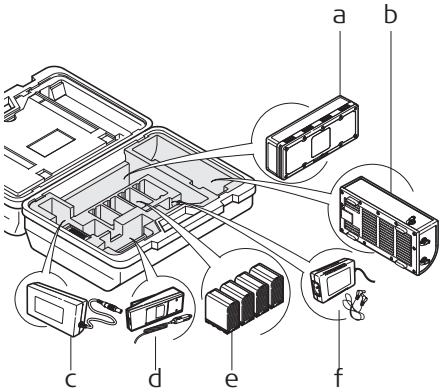
1.2 Container Contents

Transport container for ScanStation C10



a) ScanStation C10 User Manual
b) Ethernet cable
c) Allen keys
d) Protection cover
e) GHT196 distance holder for height meter
f) GEB241 internal batteries
g) Glass cleaning kit
h) GHM008 height meter
i) GEV230 AC power supply (not supplied with system)
j) Power cable, country specific
k) Cyclone DVD and C10 System CD-ROM
l) USB memory stick, not supplied with system
m) ScanStation C10

Transport container for ScanStation C10 accessories

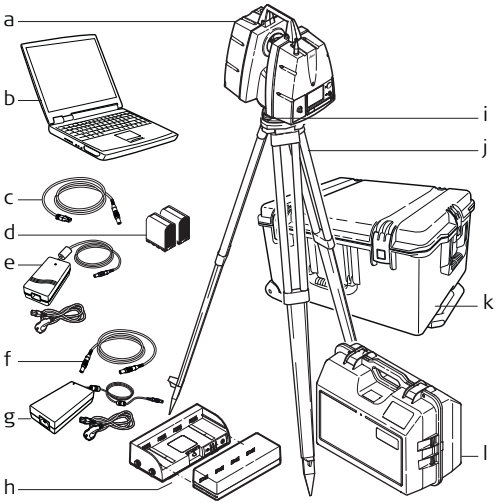


C10_003

a) GEB271 external battery pack
b) GKL271 charging station
c) GEV225 AC power supply for GKL271 charging station
d) GKL212 basic charger including car adapter cable
e) GEB241 internal batteries
f) AC/DC adapter for basic charger with daisy chain cable

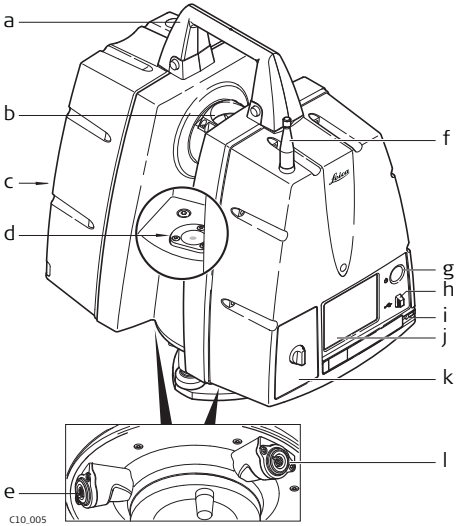
1.3 Instrument Components

Overall system



a) ScanStation C10
b) Laptop, not supplied with system
c) GEV228 ethernet cable
d) GEB241 internal batteries
e) GEV230 AC power adapter
f) GEV97 power cable
g) GEV225 AC power supply for GKL271
h) GKL271 charging station and GEB271 battery pack
i) Tribrach
j) Tripod
k) Transport container for ScanStation C10
l) Transport container for ScanStation C10 accessories

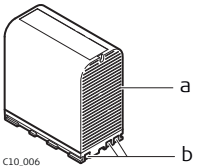
ScanStation C10



a) Removable handle
b) Rotating mirror (laser and camera aperture)
c) Battery compartment B
d) Circular level
e) Socket for power supply, 5 pin female
f) Antenna
g) ON/OFF button
h) USB socket
i) Stylus
j) Touchscreen user interface
k) Battery compartment A
l) Ethernet socket, 8 pin female

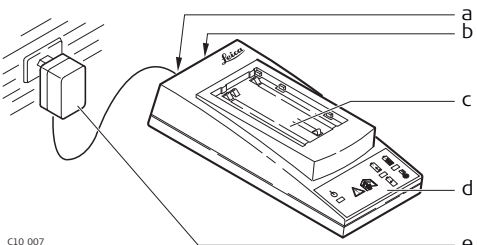
1.4 Power Supply

GEB241 Li-Ion internal battery



a) GEB241 internal battery
b) Electrical contacts

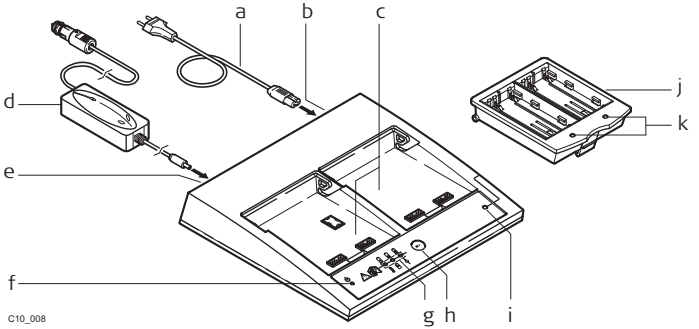
GKL212 basic charger



a) Mains cable socket on the charger
b) Socket for daisy chain cable
c) Charging bay for battery
d) Capacity and error indicators
e) Mains cable, country specific

For more details refer to the GKL212 User Manual.

GKL221 professional charger

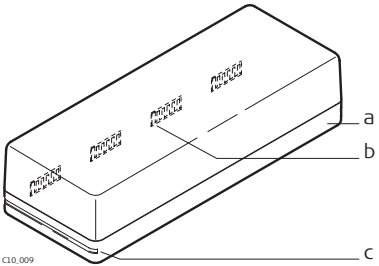


a) Mains cable, country specific
b) Mains cable socket on the charger
c) Adapter bays I and II for the GDI221 battery adapter
d) Vehicle adapter GDC221 - optional
e) Vehicle cable socket on the charger
f) Function indicator
g) Capacity and error indicators
h) Selection button
i) Status indicator for external battery connection
j) GDI 221 battery adapter
k) Battery status indicators

For more details refer to the GKL221 User Manual.

GEB271 battery pack

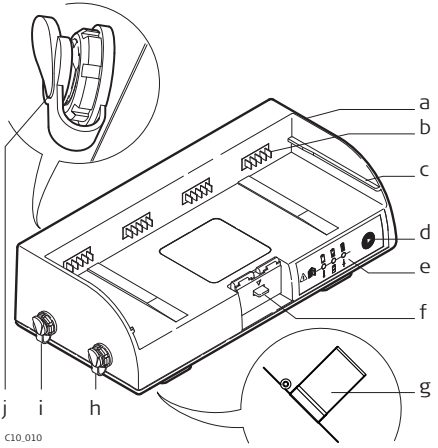
The GEB271 battery pack can only be used together with the GKL271 charging station.



a) Battery pack
b) Battery connector interface, female
c) Guide rail for fitting with charging station

GKL271 charging station

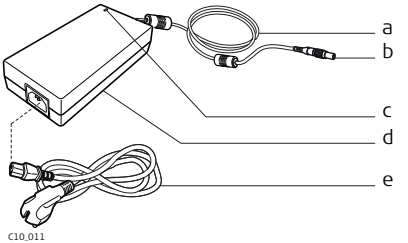
GKL271 charging station for the GEB271 battery pack.



a) Charging station
b) Battery connector interface, male
c) Guide rail for fitting with battery pack
d) Select button
e) Power and error indicators
f) Lock/unlock button
g) Clip for tripod mount
h) Port P2 for power output
i) Port P1 for power output
j) Port P3 for power input

GEV225 AC power supply

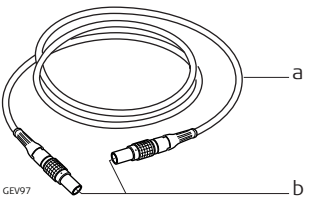
GEV225 AC power supply for the GKL271 charging station.



a) AC power supply cable
b) Connector 3 pin, male
c) Control LED; lights when the AC power supply is connected to a power plug.
d) AC power supply
e) Mains power cable, country specific

GEV97 ScanStation C10 power cable

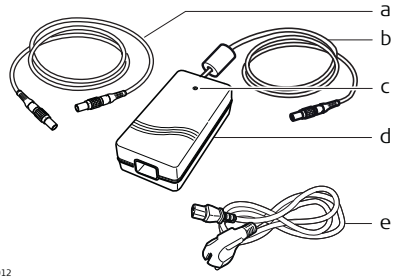
Connects ScanStation C10 scanner to GKL271 charging station.



a) Cable
b) Connector 5 pin, male

GEV230 AC power supply

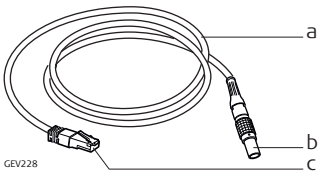
AC power supply for the ScanStation C10 scanner.



a) GEV97 ScanStation C10 power cable
b) Cable and connector, 5 pin female
c) Control LED; lights when the AC power supply unit is connected to an AC power supply.
d) GEV230 AC power supply unit
e) Mains power cable, country specific

1.5 Other Components

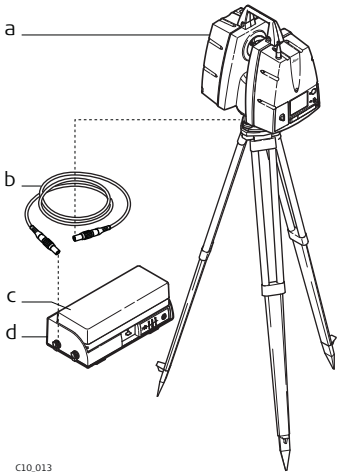
GEV228 ethernet cable



a) Cable
b) Connector, 8 pin male
c) Ethernet connector

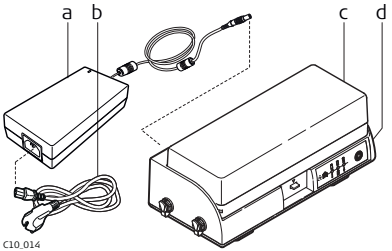
1.6 Cabling

Cabling for ScanStation C10 with GEB271 battery pack



a) ScanStation C10
b) GEV97 power cable
c) GEB271 battery pack
d) GKL271 charging station

Cabling for GEB271 battery pack with GKL271 charging station



a) GEV225 AC power supply
b) Mains power cable, country specific
c) GEB271 battery pack
d) GKL271 charging station

- The GEV225 AC power supply cannot be used as an AC power supply for the scanner. It is designed exclusively for powering the charging station and must not be connected to the instrument.
- The GEB271 battery pack can only be used together with the GKL271 charging station.

For GEV225 AC power supply:

Danger

The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.

Precautions:

Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used!

Danger

Death or serious injury can occur if unit is not connected to ground.

Precautions:

To avoid electric shock power cable and power outlet must be grounded.

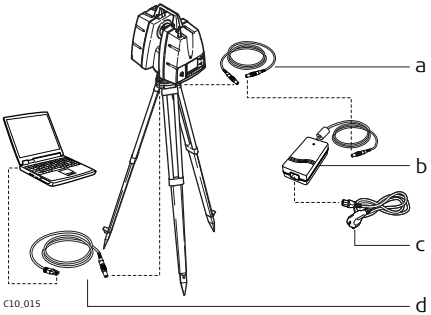
Warning

Batteries not recommended by Leica Geosystems may be damaged if charged or discharged. They may burn and explode.

Precautions:

Only charge and discharge batteries recommended by Leica Geosystems.

Cabling for ScanStation C10 with GEV230 AC power supply



a) GEV97 power cable
b) GEV230 AC power supply
c) Mains power cable, country specific
d) GEV228 ethernet cable

The GEV230 AC power supply cannot be used as an AC power supply for the battery charging station. It is designed exclusively for powering the scanner and must not be connected to any other device.

Danger

For GEV230 AC power supply:
The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.
Precautions:
Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used!

Danger

Death or serious injury can occur if unit is not connected to ground.
Precautions:
To avoid electric shock power cable and power outlet must be grounded.

Laptop

A dedicated laptop computer is an option with your ScanStation C10 system. This computer must be loaded with proprietary software from Leica Geosystems, and configured to operate with your instrument.

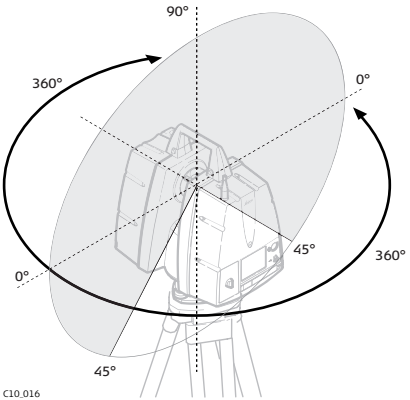
It is recommended that you **do not use your dedicated laptop computer for any purpose other than scanning** with your instrument or other Leica HDS software applications.

Using software, ethernet cards or modems that are not specifically designed to work with your dedicated laptop computer can corrupt the settings in your computer, and can adversely affect system performance.

1.7 Field of View (FoV)

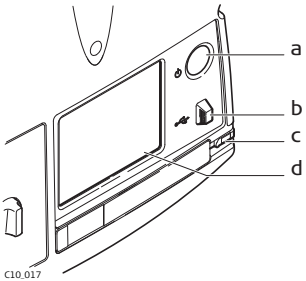
Field of view

The instrument has a rotating scanhead and a rotating mirror that covers a 360° x 270° field of view (FoV).



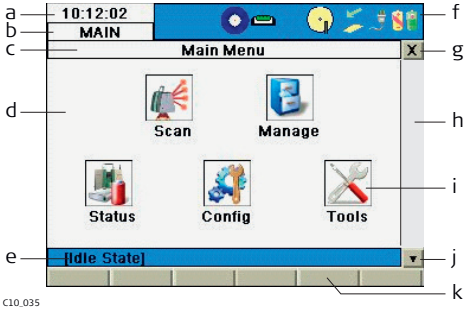
1.8 Description of the User Interface

Overview of face plate



a) ON/OFF button
b) USB socket
c) Stylus
d) Touchscreen user interface

Overview display



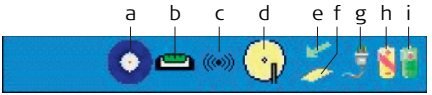
a) Time
b) Caption
c) Title bar
d) Screen area
e) Message bar
f) Status bar
g) Escape button
h) Scroll bar
i) Menu icon
j) SHIFT button
k) Softkeys

Element	Description
Time	The current local time is shown.
Caption	Shows location in menu system.
Title bar	Shows name of current screen.
Screen area	Working area of the screen.
Message bar	Shows messages.

Element	Description
Status bar	Shows current status information for the instrument.
Escape button	Returns to the previous screen.
Scroll bar	Scrolls the screen up and down.
Menu icon	Selecting menu icons opens submenus. Menu icons will change depending on which menu is displayed.
SHIFT button	Displays the second level of softkeys.
Softkeys	Commands can be executed with the softkeys. Commands assigned to the softkeys are menu dependent.

Overview status bar icons

The icons in the status bar display the current status information of the instrument. Clicking a status icon gives direct access to a detailed status description.



C10_036

a) Active target type
b) Dual-axis compensator
c) WiFi
d) Internal hard disc
e) Status of external memory
f) External memory
g) External battery / AC power supply
h) Internal battery A
i) Internal battery B

- **Internal battery A** indicates the status of the battery in compartment A which is located at the same side cover as the touchscreen.
- **Internal battery B** indicates the status of the battery in compartment B at the opposite side cover without a screen.

Icon		Status
Active target type		HDS target
		HDS black/white target
		HDS sphere target
		Twin target top
		Twin target top with extension
		Twin target bottom
		Twin target bottom with extension
Dual-axis compensator		On and levelled
		Off
		On but out of range

Icon		Status
WiFi		WiFi adapter connected to scanner and ready for communication.
Internal hard disc		Empty
		13% memory used
		25% memory used
		38% memory used
		50% memory used
		63% memory used
		75% memory used
		88% memory used
		Full

Icon		Status
Status of external memory		Ready to be removed.
		Do not remove!
External memory		Empty
		17% memory used
		33% memory used
		50% memory used
		67% memory used
		83% memory used
		Full
External battery / AC power supply		Empty
		20% capacity
		40% capacity
		60% capacity
		80% capacity

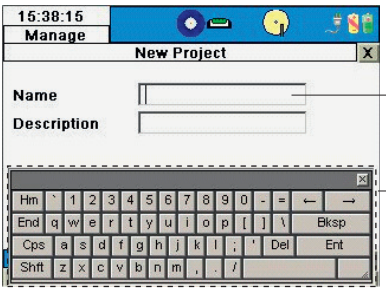
Icon		Status
		Full
		AC power supply
Internal battery A/B		Empty
		Currently in use - 20% capacity
		Currently in use - 40% capacity
		Currently in use - 60% capacity
		Currently in use - 80% capacity
		Currently in use - full
		Currently not in use - empty
		Currently not in use - 20% capacity
		Currently not in use - 40% capacity
		Currently not in use - 60% capacity
		Currently not in use - 80% capacity

Icon	Status
	Currently not in use - full

Overview user input

The system offers two different virtual keyboards for user input:

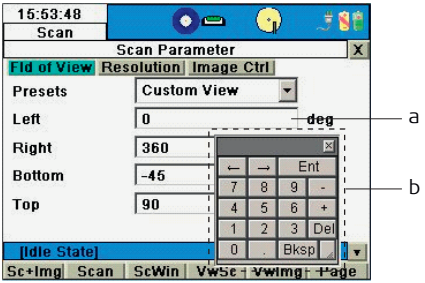
1. **User input for alphanumeric input fields:**
   When an alphanumeric input field is selected with the stylus, an alphanumeric keypad opens offering letters, numbers and special characters.



C10_037

a) Alphanumeric input field
b) Alphanumeric keypad

2. **User input for numeric input fields:**
   When a numeric input field is selected with the stylus, a numeric keypad opens offering numbers and some special characters.



C10_038

a) Numeric input field
b) Numeric keypad

1.9 HDS *Cyclone* Software Suite

General

Leica Geosystems HDS *Cyclone* software modules provide point cloud users with the widest set of work process options for 3D laser scanning projects in engineering, surveying, construction and related applications.
The software consist of five packages:

- *Cyclone* SCAN:
  allows the user to control the Scanner.
- *Cyclone* REGISTER:
  allows the user to register multiple Scans together or to Geo-reference point clouds.
- *Cyclone* SURVEY:
  gives the user basic functionality to extract and measure information from point clouds.
- *Cyclone* MODEL:
  gives the user the full functionality of *Cyclone*. The user is able to extract and measure features and to create a 3D Model from point clouds.
- *Cyclone* PUBLISHER:
  allows the user to publish point cloud data to a panoramic viewing format which can be posted to the web. The user can then view this data using the Internet Explorer plug-in Leica TruView.

- For more information on *Cyclone* Software Suite, please visit: http://www.leica-geosystems.com/hds
- *Cyclone* Software has also online help available which can be accessed by pressing the F1 key on your keyboard.

General operating principles

- **Download:**
  Cyclone software, as well as important support documentation, can be downloaded from the Leica Geosystems HDS Website (http://www.leica-geosystems.com/hds/en/27054.htm).
  The user must create an account before the download section is accessible.
- **Installation:**
  You must use a Windows account with administrator privileges to install or upgrade *Cyclone*, CloudWorx for AutoCAD, CloudWorx for MicroStation, CloudWorx for PDMS or CloudWorx for Intergraph SmartPlant® Review.

  1. Download the *Cyclone* Installshield from the website shown above.
  2. Run the Installation file.
  3. Follow the onscreen instructions and select the software you wish to install.
  4. Go to the License Request Page.

- **Language:**
  Cyclone's operating language is English.

2 Setting Up the Instrument

2.1 General Information

Use the tripod

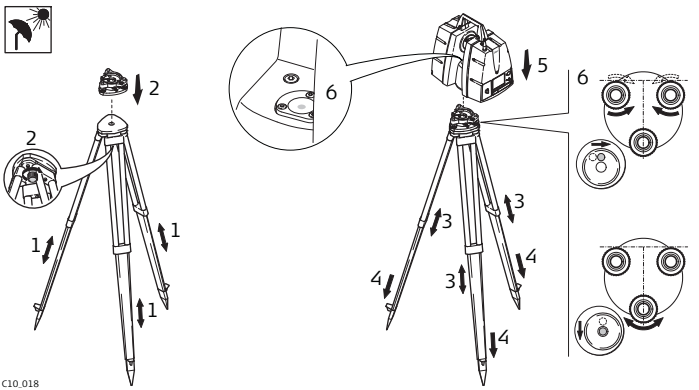
The instrument should always be set up on its tripod. Using the tripod specified for the scanning system guarantees maximum stability during scanning operations.

Always set up the instrument on its tripod. Do not set up the instrument directly on the ground for scanning operations.

It is always recommended to shield the instrument from direct sunlight and avoid uneven temperatures around the instrument.

2.2 Scanner Setup on Tripod

Setup step-by-step



Shield the instrument from direct sunlight and avoid uneven temperatures around the instrument.

1. Extend the tripod legs to allow for a comfortable working posture. Tighten the screws at the bottom of the legs.
2. Place the tribrach on the tripod and secure it with the central fixing screw.
3. Set up the tripod so that the tripod plate is as horizontal as possible.
4. Push the tripod legs firmly into the ground.
5. Place the instrument on the tribrach and secure it with the tribrach's locking knob.
6. Level up the instrument using the instrument's circular level. Turn two of the foot screws together in opposite directions. The index finger of your right hand indicates the direction in which the bubble should move. Now use the third foot screw to centre the bubble.

The instrument must be levelled before it is switched **ON**. If not levelled using the tribrach's or the instrument's circular level, it may not power up properly or scanning accuracy may not be achieved.

2.3 Setup Over a Benchmark with the Internal Laser Plummet

Description

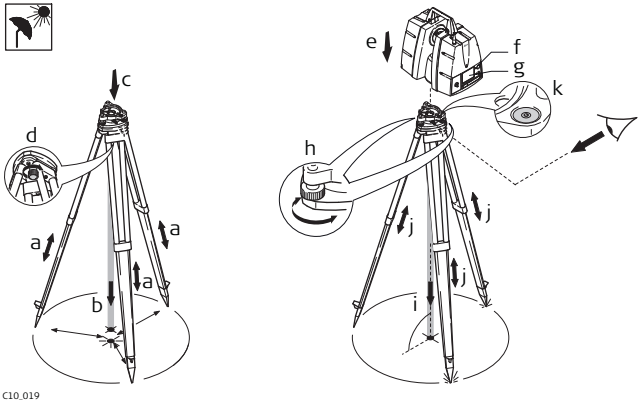
This topic describes an instrument setup over a marked ground point using the laser plummet. Geo-referencing of the ScanStation C10 is established by setting up over a known or assumed control point, with optional reference target measurement to set the azimuth direction, and establishing a local or global coordinate system.
The ScanStation C10 allows you to traverse, resect or free-station. Known azimuth or known backsight measurements can be observed.

It is always possible to set up the instrument without the need for a marked ground point.

The data scanned with ScanStation C10 is corrected by an internal dual-axis compensator, when the dual-axis compensator is enabled (via onboard control or *Cyclone*).

- The laser plummet described in this topic is built into the vertical axis of the instrument. It projects a red spot onto the ground, making it much easier to centre the instrument.
- The laser plummet cannot be used in conjunction with a tribrach equipped with an optical plummet.

Setup step-by-step



Shield the instrument from direct sunlight and avoid uneven temperatures around the instrument.

1. Extend the tripod legs to allow for a comfortable working posture (a). Position the tripod approximately over the marked ground point, centring it as well as possible (b).
2. Place the tribrach on the tripod (c) and secure it with the central fixing screw (d).

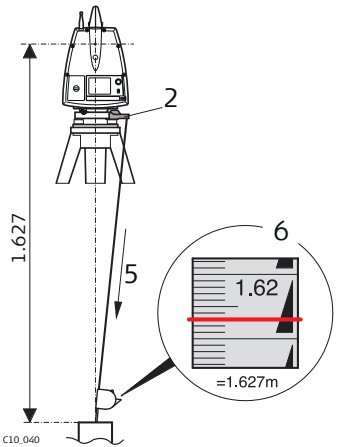
3. Place the instrument on the tribrach (e) and secure it with the tribrach's locking knob.
4. Turn on the instrument by pressing the ON/OFF button (f). Go to **Status**, **Level and Laser Plummet**, **Plummet** and activate the laser plummet (g).
5. Move the tripod legs (a) and use the tribrach footscrews (h) to centre the plummet (i) over the ground point.
6. Adjust the tripod legs (j) to level the circular level (k).
7. By using the electronic level (**Status**, **Level and Laser plummet**, **Level**) turn the tribrach footscrews (h) to precisely level the instrument.
8. Centre the instrument precisely over the ground point (i) by shifting the tribrach on the tripod plate.
9. Repeat steps 7. and 8. until the required accuracy is achieved.

☞ Please see also section "Scanning with ScanStation C10" in the *Cyclone* documentation for more information.

2.4 Instrument Height

Measure instrument height

To get an accurate height measurement use the GHM008 instrument height meter in conjunction with the GHT196 distance holder which are both included with the scanner.



1. Place tripod centrally over the ground point, level instrument.
2. Click GHT196 distance holder to tribrach. It must "snap" onto the cover over an adjusting screw.
3. Unfold measuring tongue, pull out tape measure a little.
4. Insert GHM008 instrument height meter in the distance holder and attach.
5. Swivel measure in the direction of the ground point, pull out until the tip of the measuring tongue touches the point on the ground, keep under tension and do not allow to sag, clamp if necessary.
6. Read height of the instrument (ground - tilt axis) in the reading window at the red marking (in the example 1.627 m).

- For detailed information about the GHM008 instrument height meter and GHT196 distance holder refer to the GHM008/GHT196 user manual which is delivered with these items.
- The tilt axis height of the ScanStation C10 is 250 mm. Take care to use the GHM008 which has a special scale to measure the height of instruments with a tilt axis height of 250 mm. Do not use a tape with any other scale.
- Alternatively the instrument height can be measured with a common, 1:1 scaled measuring tape from the point on the ground to the little notch under the red Leica logo at both side covers of the scanner. This distance will then be from the ground point to the tilt axis.

2.5 Power Supply and Charging

Primary use/charging

- The battery must be charged prior to using for the first time because it is delivered with an energy content as low as possible.
- The permissible temperature range for charging is between 0°C to +45°C / +32°F to +113°F. For optimal charging we recommend charging the battery at a low ambient temperature of +10°C to +20°C / +50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by Leica Geosystems, it is not possible to charge the battery if the temperature is too high or too low.
- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make only one charge/discharge cycle.
- For Li-Ion batteries, a single discharging and charging cycle is sufficient. We recommend carrying out the process when the battery capacity indicated on the charger or on a Leica Geosystems product deviates significantly from the actual battery capacity available.

Operation/Discharging

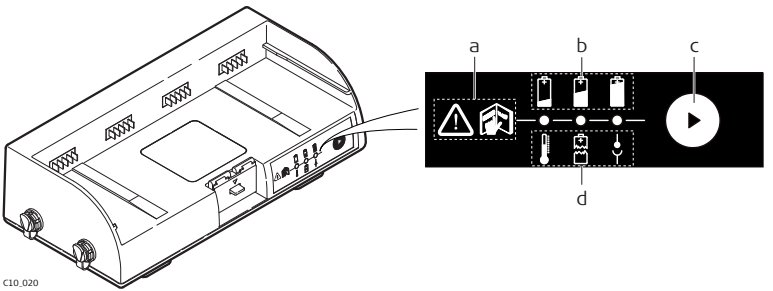
- The battery can be operated from -20°C to +55°C / -4°F to +131°F.
- Low operating temperatures reduce the capacity that can be drawn; very high operating temperatures reduce the service life of the battery.

As the battery pack contains rechargeable cells it is always recommended to handle the battery and charging station with care. Observe the LEDs on the charging station before and after the charging process, as well as during operation. For details please refer to section "Indicator panel" on page 50.

- When port P3 is connected for charging, both ports P1 and P2 cannot be used for operation: no simultaneous charging and discharging.
- When port P1 is connected for operation, port P2 cannot be used for operation and vice versa: no simultaneous operation of two ports.

Indicator panel

On the charging station's front side are the Select button and three LEDs for capacity and error indication.



a) Safety directions to read this manual
b) Capacity indication
c) Select button
d) Error indication

The LEDs show the actual charge/discharge status or indicate an error status.
During charging, the LEDs always show the current status.
While discharging or in standby, the status will only be shown for about 10 seconds after pressing the select button.

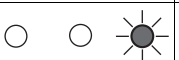
Explanation of the symbols used in this chapter

Symbol	Meaning
○	LED off.
☀	LED permanently on.
☀	LED flashing.

Capacity indicators, green LEDs

LED	Meaning
☀ ☀ ☀	Battery fully charged
☀ ☀ ☀	Battery capacity minimum 80%
☀ ☀ ○	Battery capacity minimum 50%
☀ ○ ○	Battery capacity minimum 10%
☀ ○ ○	Battery capacity < 10%

Error indicators, red LEDs

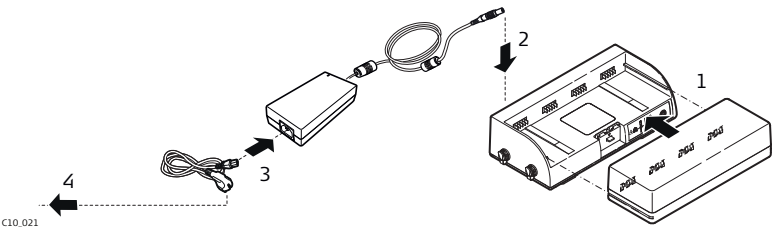
LED	Meaning	Measure to take
	Charging outside temperature range 0°C to 45°C	Use within specified temperature range only. LED keeps flashing until problem is resolved.
	Discharging outside temperature range -20°C to +55°C	Use within specified temperature range only.
	Battery defect	Disconnect all cables and other equipment, check contacts and reconnect. If problem persists, contact Leica Geosystems or your local agency.
	Charging error	Disconnect all cables and other equipment, check contacts and reconnect. If problem persists, contact Leica Geosystems or your local agency.

Additional status indicators

- When the GEB271 battery pack is inserted into the GKL271 charging station, the three LEDs light green for one second.
- When the GEV225 AC adapter is connected to the GKL271 charging station for charging, the three LEDs light green for one second and then show the actual battery level.

If the charger indicates an error when the battery is connected, try connecting a different battery to find out whether the fault lies with the battery or with the charging station.
If the problem persists, contact Leica Geosystems or your local agency.

Charging the battery



1. Slide the battery pack into the charging station.
   When connected, the three LEDs light up for 1 sec.
2. Plug the AC power supply cable of the AC power supply into port P3 of the charging station.
3. Plug the power cable into the AC port of the AC power supply.
4. Plug the power cable into a socket outlet.
   The charging process starts automatically when all parts are plugged in.
   The battery is fully charged when all three LEDs are flashing green.
5. After charging is completed, remove the power cable from the socket outlet.
6. Remove the battery pack from the charging station by moving the lock/unlock button.

Danger

For AC power supply:
The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.
Precautions:
Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used!

Period of use, life span of the power supply

Operation time for a fully charged external power supply is approximately six hours at room temperature.

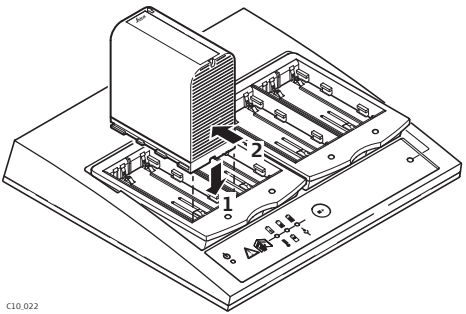
Before storing the power supply for a long period of time, recharge it to avoid shortening the life span.
Before storage, remove the battery from the charging station.

Handling advice

- After a maximum of six hours the charging process is terminated.
- Properly remove the wall plug first, before removing the Lemo connector.
- Do not tamper with the power supply or charger during charging or usage.
- Do not put flammable objects near the power supply during charging or usage.

Charging the GEB241 internal battery

Using the GKL221 professional charger:



C10_022

Inserting:

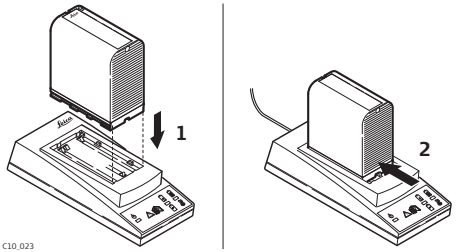
1. Insert the battery flush to the front edge of the GDI221 battery bay.
2. Push the battery to the back with only slight pressure to the stop position.

Removing:

- Pull the battery to the front stop and then remove it.

For more details refer to the GKL221 User Manual.

Using the GKL212 basic charger:



Inserting:

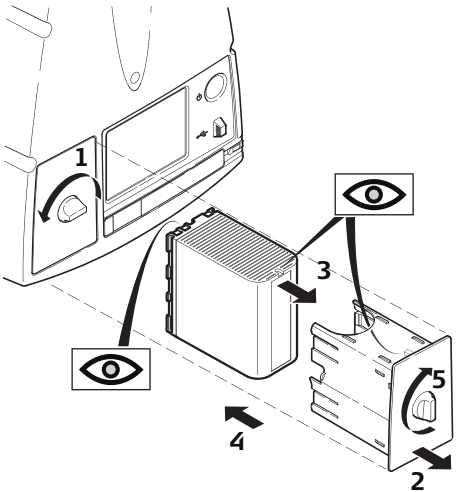
1. Insert the battery flush to the front edge of the battery bay.
2. Push the battery to the back with only slight pressure to the stop position.

Removing:

- Pull the battery to the front stop and then remove it.

For more details refer to the GKL212 User Manual.

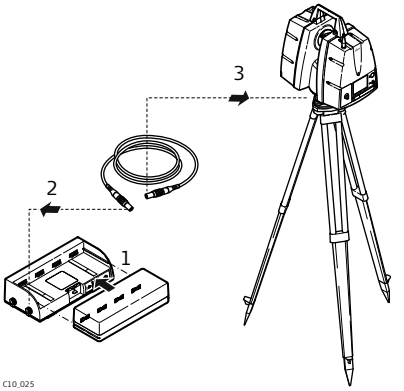
ScanStation C10 and internal battery GEB241



C10_024

1. Open the battery compartment.
2. Remove the battery holder.
3. Remove the battery from the battery holder.
   Insert the new battery into the battery holder, ensuring that the contacts are facing outward and that the tip on the holder fits into the slot of the battery.
   The battery should click into position.
4. Insert the battery holder back into the battery compartment.
5. Turn the knob to lock the battery holder in place.
6. Switch on the instrument to start the boot process.

ScanStation C10 and external battery pack GEB271



1. Slide the battery pack into the charging station.
   When connected, the three LEDs on the charging station light up for 1 sec.
2. Connect the GEV97 power cable to port P1 of the charging station.
3. Connect the other end of the GEV97 power cable to the power port of the instrument.
4. Press the ON/OFF button on the instrument to start the boot process.

Check the battery capacity indicator LEDs to ensure that remaining power is enough to operate the instrument and finish the scheduled scan process.

3 Scanning

3.1 Switching the System On/Off

Switch on procedure

1. Set up the instrument as desired. Refer to chapter "2 Setting Up the Instrument" for more information.
2. Press and hold the ON/OFF button until a beep is audible.
3. The instrument's fan starts.
4. The **Leica Geosystems** welcome screen starts.
5. Wait until the **Main Menu** appears on the display and the **Idle State** message is shown in the message bar.
6. Once in **Idle State** the scanner is ready for operation.

Switch off procedure

1. From the current menu return to the **Main Menu**.
2. In the **Main Menu** press the  button.
3. In the popup window confirm the question **Do you really want to power down the scanner?** with **Yes**.
4. Wait for the scanner to shut down.

Alternative switch off procedure

In the event of a system crash follow the alternative switch off procedure:

1. Press and hold the ON/OFF button for a minimum of 6 seconds.
2. After 3 seconds a single beep and after 6 seconds a double beep is audible.
3. After the double beep **release** the ON/OFF button.
4. Wait for the scanner to shut down.

3.2 Ambient Conditions

Unfavourable surfaces for scanning

- Highly reflective (polished metal, gloss paint)
- Highly absorbent (black)
- Translucent (clear glass)

Color or powder these surfaces before scanning if necessary.

Unfavourable weather conditions

- Rain, snow or fog cause poor measurements, so it is not possible to survey during these conditions!
- Surfaces that are directly illuminated by the sun cause an increased range noise and therefore a larger measurement uncertainty.
- If some objects are scanned against the sunlight or a bright spotlight, the optical receiver of the instrument can be dazzled so heavily that in this area no measured data is recorded. A "black hole" appears in the reflectance image.

Temperature changes

If the instrument is brought from a cold environment, for example from storage, into a warm and humid environment, the glass window at the mirror or in extreme cases even the interior optics can condensate. This may cause measurement errors.
Precaution: Avoid rapid temperature changes and give the instrument time to acclimatise.

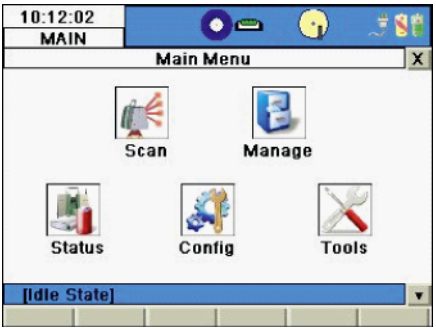
Dirt on the glass pane

Dirt on the glass pane of the mirror such as a layer of dust, condensation or fingerprints may cause considerable measuring errors.

3.3 Onboard Controls

Description

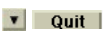
The **Main Menu** will be displayed after the system boot process. **Idle State** in the message bar indicates that the instrument is ready for scanning.



Icon	Function
Scan	Offers access to all commands for scanner operation control.

Icon	Function
Manage 	Offers access to all commands for project management.
Status 	Offers access to all commands for the scanner's status information.
Config 	Offers access to all commands for the configuration of the system.
Tools 	Offers access to all commands for disk formatting, data transfer, license management and display calibration.

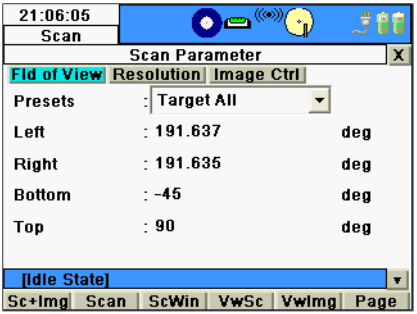
Menu independent commands:

Command	Function
Escape 	Return to previous menu in menu hierarchy.
Shift -> Quit 	Return to main menu.
Page 	Switch between pages in a menu.

3.3.1 Scan

Description

In the **Scan** menu, all commands for the scanner operation control are available.



Field of View

In the **Fld of View** tab, the horizontal (left/right) and vertical (bottom/top) limits of the field of view (FoV) can be selected. In the **Presets** field the following different predefined settings for the FoV are listed:

Preset	Horizontal FoV [°]	Vertical FoV [°]
Custom View	User defined	User defined
Quick Scan	Defined by Quick Scan aiming	User defined (default: -45 to +90)
Rectangle 60x60	60	60
Rectangle 90x90	90	90
Rectangle 360x60	360	60
Rectangle 360x90	360	90
Target All	360	270

Available commands:

Command	Function
Sc + Img	Start scan and image acquisition with selected FoV and resolution.
Scan	Start scan only with selected FoV and resolution, no images.

Command	Function
ScWin	Open scan window for scan area selection from video stream image.
VwSc	View point cloud of last scan with zoom, pan and show next/previous functionality.
VwImg	View last image and show next/previous functionality.
Shift -> Target	Open the **Target Definition** screen to select target ID, target height and target type.
Shift -> Image	Start image acquisition with selected FoV, exposure time and image resolution.
Shift -> ChkBS	Open **Check Backsight** menu to define a known backsight target for current setup control.

Resolution

In the **Resolution** tab, the horizontal and vertical point spacing for a specific range can be set. In the **Resolution** field different predefined settings for the point resolution are listed:

Preset	Horizontal spacing	Vertical spacing	Range
Custom Res	User defined (0.5 m default)	User defined (0.5 m default)	User defined (100 m default)
Low Res	0.2 m	0.2 m	100 m
Medium Res	0.1 m	0.1 m	100 m
High Res	0.05 m	0.05 m	100 m
Highest Res	0.02 m	0.02 m	100 m

☞ The resulting number of points is calculated based on the settings in the **Fld of View** tab and the **Resolution** tab.

Available commands:

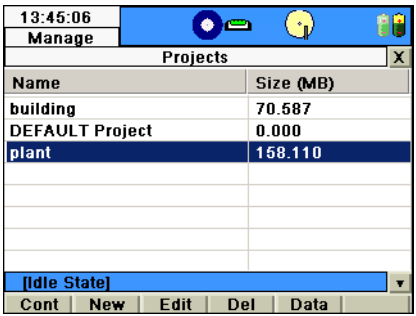
Command	Function
Sc + Img	Start scan and image acquisition with selected FoV and resolution.

Command	Function
Scan	Start scan only with selected FoV and resolution, no images.
ScWin	Open scan window for scan area selection from video stream image.
Dist	Open video camera window to measure the distance to the object to be scanned.
Shift -> Target	Open the **Target Definition** screen to select target ID, target height and target type.
Shift -> Image	Start image acquisition with selected FoV, exposure time and image resolution.
Shift -> ChkBS	Open **Check Backsight** menu to define a known backsight target for current setup control.

3.3.2 Manage

Description

In the **Manage** menu all commands for project management on the scanner are available.



Available commands:

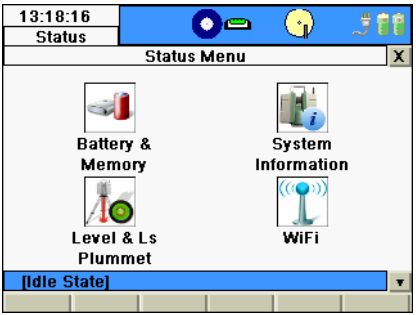
Command	Function
Cont	Confirm selection and return to previous screen.

Command	Function
New	Create new scan project with project name, description and name of creator.
Edit	Edit description and creator of existing scan project. Also show name, date and size of existing project.
Del	Selected project will be deleted after confirmation.
Data	Show list of ScanWorlds and Stations of selected project. In the list select a station to get access to station information and to view scans, targets and images.
Shift -> Trans	Transfer selected project or all projects to USB memory storage.

3.3.3 Status

Description

In the **Status** menu all commands for the scanner's status information are available.



Icon	Command	Description
Battery & Memory 	**Battery**	Status information about internal battery, external battery and AC power supply.

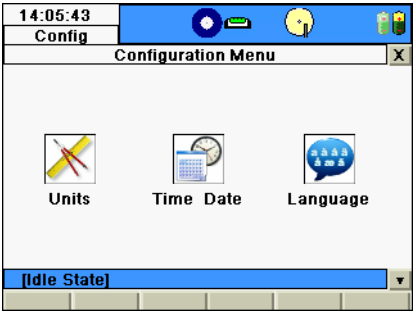
Icon	Command	Description
	Memory	Status information about size and free space of internal hard disk's data partition.
System Information 	**Instrument**	Status information about instrument type, serial number, equipment number and system language.
	Firmware	Status information about installed firmware version and firmware maintenance expiry date.
Level & Ls Plummet 	**Level**	Numerical and graphical display of instrument's tilt.
	Plummet	Switch laser plummet on/off.
	Compens	Switch dual-axis compensator on/off. Define how scanner should react when compensator goes out of range.

Icon	Command	Description
WiFi 	WiFi	Define region code and TX power for external WiFi communication device. The WiFi device should be connected to the scanner before this function is selected.

3.3.4 Configuration

Description

In the **Config** menu all commands for the configuration of the system are available.



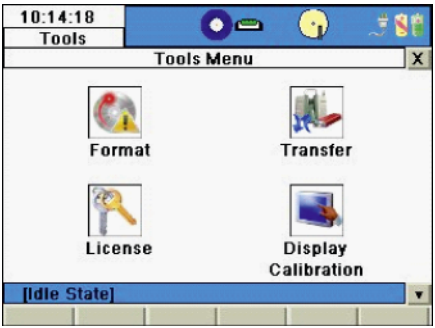
Icon	Command	Description
Units 	**Distance Unit**	Select unit for distances (Metre, Int Ft, Us Ft).

Icon	Command	Description
	Distance Dec	Select number of decimal digits for distance display.
Time & Date 	**Local Time**	Set local time.
	Local Date	Set local date.
Language 	**Language**	Select language for the user interface or delete a language from the list.

3.3.5 Tools

Description

In the **Tools** menu all commands for disk formatting, data transfer, license management and display calibration are available.



Icon	Command	Description
Format 		Format the complete data partition of the internal hard disk. ☞ **All project data will be erased.**
Transfer 	**Projects**	Transfer selected project or all projects to USB memory storage device.
	System Files	Upload new firmware to the instrument.
License 	**Manual**	Enter license key manually.
	Upload	Upload license key file from USB memory storage device.
Display Calibration 		Recalibrate the touch screen by clicking three points on the display.

3.4 *Cyclone* SCAN

Scanning with Cyclone SCAN

In addition to the onboard control the ScanStation C10 can be controlled via the *Cyclone* SCAN interface.

1. Connect one end of the ethernet cable to the ScanStation C10 ethernet connector and the other end to a computer which has *Cyclone* SCAN installed.
2. Start *Cyclone* SCAN.
3. In the *Cyclone* Navigator select **Configure**, **Scanners**.
4. In the **Configure Scanners** window press the **Add** button.
5. In the **Add Scanner** window select **ScanStation C10** for the scanner model and add a descriptive scanner name (for example "ScanStation C10 (xxxx)" with xxxx being the scanner's serial number). No IP address is needed for the ScanStation C10.
   Close the **Add Scanner window** to return to the *Cyclone* Navigator.
6. In the *Cyclone* Navigator expand the **Scanners** folder and double click the new scanner name to open the **Scan Control** window.
7. The initial **Scan Control** window prompts to select a project folder in the **Select Project** window.
8. In the **Select Project** window select an existing project folder or create a new one. Close this window by confirming with the **OK** button.
9. In the **Scan Control** window select **Scanner**, **Connect** to connect your computer to the scanner. After connection has been established the **Scan Control** window

will show the status **Connected and ready** at the bottom of the window. ScanStation C10 and *Cyclone* are now ready to start a scan.

- Retain enough free disk space on the computer: depending on your project, up to 50% of your hard disk.
- Do not additionally overload the computer with additional tasks and applications while scanning.
- It is not recommended to perform other *Cyclone* tasks while scanning.
- For details about the ScanStation C10 scan operation with *Cyclone* SCAN refer to the *Cyclone* help system or your local support team.

4 Troubleshooting

ScanStation C10

Problem	Possible Cause(s)	Suggested Remedies
Instrument does not boot.		Disconnect from AC power supply or external battery. Disconnect all cables and remove all internal batteries. Wait for 1 minute. Reconnect cables and external power sources, insert all internal batteries and switch on again.
Black gap of missing points in overhead scans.	Handle not removed.	Remove handle and scan area again.
Display elements cannot be hit exactly with the stylus.	Touch screen not calibrated.	Recalibrate touch screen via **Tools**, **Calibration**.
Missing points in scan.	Dust, debris or fingerprints on optics of rotating mirror.	Use glass cleaning kit to clean the specific areas.

ScanStation C10 Battery

Problem	Possible Cause(s)	Suggested Remedies
When switching on the instrument or starting a scan, the system switches off automatically.	Capacity of battery is too low.	Recharge or change battery.
When switching on the instrument or starting a scan, the system switches off automatically even though it was totally recharged.	Battery charger is defective.	Check the function of the battery charger. Please note the charging status displayed on the battery charger.
	Damaged cable.	Examine the cabling and pay attention to damages, which for example can cause loose contacts or shirt circuits. Defective circuits need to be replaced. Only use supplied power cables.

Problem	Possible Cause(s)	Suggested Remedies
	Internal battery is no longer charging.	At the end of its life time the internal battery has lost most of its capacity. The battery needs to be replaced.
	External battery no longer charging.	At the end of its life time the external battery has lost most of its capacity. The battery needs to be replaced.

Diagnostic procedure

The diagnostic procedure explains how to create log files with the user interface of your ScanStation C10 instrument in case of problems with the scanner.
To create log files, follow the steps described below:

1. From the **Main Menu** go to **Tools**, **Transfer**, **Transfer Project**.
2. Connect an external USB memory device to the scanner's USB connector.
3. Press the **Logs** button.
4. In the USB memory devices's main directory a folder named **Logs** will be created containing log files:
   - C10_1234.log: log file of current scan day with 1234 being the last four digits of the scanner serial number,
   - C10_1234.20100829.log: older log file with scanner serial number and scan date embedded in the file name (year, month, day),
   - UpgraderLog.txt,
   - svclog.txt,
   - XenaService.log.
5. Send the content of the **Logs** folder together with details about scanner type, scanner serial number and a short description of the problem to your local support team.

Summary

If you experience problems with your instrument:

- Email the scanner's log files to your local support:
  - For Americas support: us-support@hds.leica-geosystems.com
  - For Europe, Middle East and Africa support: euro-support@hds.leica-geosystems.com
  - For Asia support: asia-support@hds.leica-geosystems.com
- Log files are stored on the USB memory stick in the folder **Logs**.

5 Care and Transport

5.1 Check & Adjust

Caution

Units that are exposed to high mechanical forces, e.g. through frequent transport or rough handling, it is recommended to carry out a check and adjust once a year by the manufacturer respectively just after such a high stress exposure.

5.2 Transport

Transport in the field

When transporting the equipment in the field, always make sure that you

- either carry the product in its original transport container,
- or carry the tripod with its legs splayed across your shoulder, keeping the attached product upright,
- or remove product from tripod and carry it by its handle.

Transport in a road vehicle

Never carry the product loose in a road vehicle, as it can be affected by shock and vibration. Always carry the product in its transport container and secure it.

Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging, transport container and cardboard box, or its equivalent, to protect against shock and vibration.

Shipping, transport of batteries

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

5.3 Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "7 Technical Data" for information about temperature limits.

Field adjustment

After long periods of storage, inspect the field adjustment parameters given in this user manual before using the product.

Batteries

- Refer to "7.5 Environmental" for information about storage temperature range.
- A storage temperature range of +5°C to +35C / +41°F to +95°F in a dry environment is recommended to minimize self-discharging of the battery.
- At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
- Remove batteries from the product and the charger before storing.
- After storage, recharge batteries before using.
- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.

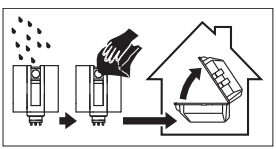
5.4 Cleaning and Drying

Windows and targets

- Blow dust off scanner windows.
- Never touch the glass with your fingers.
- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol.
- Do not use other liquids; these may attack the polymer components.
- Charger:
  Use only a clean, soft, lint-free cloth for cleaning.

Damp products

Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C / 104°F and clean them. Do not repack until everything is completely dry.



Cables and plugs

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

5.5 Glass Cleaning Procedure

General

The ScanStation C10 scanning mirror must be kept clean. The instructions must be followed as described in this chapter to clean the scanner mirror.

Warning

Direct intrabeam viewing is always hazardous.
Precautions:
Before cleaning glass, ensure the instrument is switched off.

A glass cleaning kit can be ordered through your local Leica Geosystems dealer.

Dust and debris removal

Using a compressed gas duster (e.g., UltraJet ®2000 Gas Duster or UltraJet® Compressed CO2 Duster), remove dust and debris from surface of scanner glass.

Never rub off dust or debris as this will scratch the glass and so possibly cause permanent damage to the special optical coatings.

Cleaning of the optics

Soiling of the glass pane can cause extreme measurement errors and therefore useless data!

Precautions:

⚠ Caution

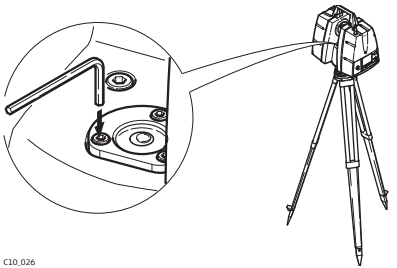
All soiling that is visible on the glass pane has to be removed, except for single small dust particles that adhere inevitably.

☞ **Clean the glass pane regularly with the provided glass cleaning kit:**

- Switch off instrument.
- Washing hands is necessary in order to avoid grease on the cleaning tissue.
- Better, use gloves to avoid finger oil on the glass.
- Then use the lens tissue for wiping circularly from the center to the edge until there is only a thin film of detergent visible.
- Use a new lens tissue for drying the pane, wipe in circles.
- If any smears from cleaning are visible against back light, repeat the procedure.
- Do not touch the side of the paper that is used for cleaning with your fingers.
- Do not reuse tissues that have been used before.
- Only use non-fuzzy lens tissues.
- Do not use air from the pneumatic power system as this is always slightly oily!

5.6 Adjustment of the Circular Level

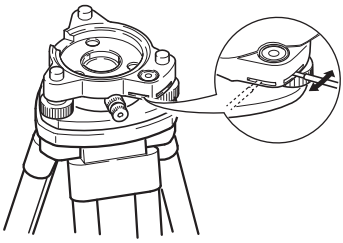
On the instrument step-by-step



1. Level up the instrument in advance with the electronic level, assuming that the instrument is correctly adjusted. In the **Main Menu** go to **Status**, **Level and Laser plummet**, **Level** to access the electronic bubble.
2. The bubble must be centered. If it extends beyond the circle, use an allen key to center it with the adjustment screws. Turn the instrument slowly 200 gon (180°). Repeat the adjustment procedure if the bubble does not stay centered.

After the adjustment, no screw shall be loose.

On the tribrach step-by-step

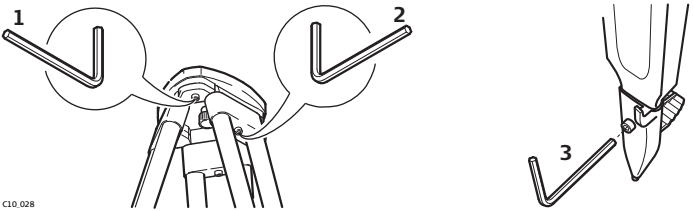

C10_027

1. Level up the instrument with the electronic level, assuming that the instrument is correctly adjusted. Remove the instrument from the tribrach. In the **Main Menu** go to **Status**, **Level and Laser plummet**, **Level** to access the electronic bubble.
2. The bubble of the tribrach must be centered. If it extends beyond the circle, use the adjusting pin in conjunction with the two cross-headed adjustment screws to centre it.

☞ After the adjustment, no screw shall be loose.

5.7 Service of the Tripod

Service tripod step-by-step



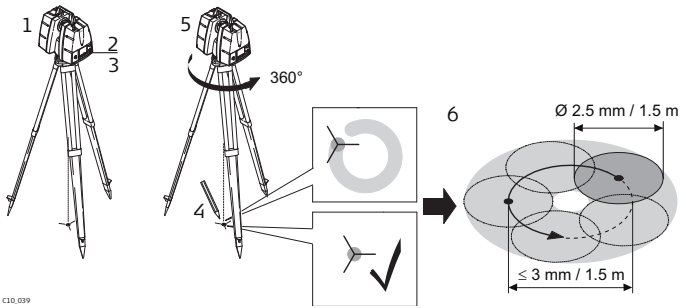
The connections between timber and metal must be firm and tight.

1. Moderately tighten the allen screws with the allen key supplied with the tripod.
2. Tighten articulated joints just enough to keep the tripod legs open when lifting the tripod off the ground.
3. Tighten the allen screws of the tripod legs.

5.8 Adjustment of the Laser Plummet

The laser plummet is located in the vertical axis of the instrument. Under normal conditions of use, the laser plummet does not need adjusting. If an adjustment is necessary due to external influences, the instrument has to be returned to any Leica Geosystems authorised service workshop.

Inspecting the laser plummet step-by-step



1. Place and secure the instrument into the tribrach and onto a tripod.
2. Using the tribrach footscrews, level the instrument with the electronic level. In the **Main Menu** go to **Status**, **Level and Laser plummet**, **Level**.

3. Press **Page** to access the **Laser Plummet** page. Switch on the laser plummet. Inspection of the laser plummet should be carried out on a bright, smooth and horizontal surface, like a sheet of paper.
4. Mark the centre of the red dot on the ground.
5. Turn the instrument through 360° slowly, carefully observing the movement of the red laser dot.

☞ The maximum diameter of the circular movement described by the centre of the laser point should not exceed 3 mm at a distance of 1.5 m.

6. If the centre of the laser dot describes a perceptible circular movement or moves more than 3 mm away from the point which was first marked, an adjustment may be required. Inform your nearest Leica Geosystems authorised service workshop. Depending on brightness and surface, the diameter of the laser dot can vary. At 1.5 m it is about 2.5 mm.

6 Safety Directions

6.1 General

Description

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

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

6.2 Intended Use

Permitted use

- Measuring horizontal and vertical angles.
- Measuring distances.
- Scanning objects.
- Capturing and recording images.
- Recording measurements.
- Computing by means of software.
- Remote control of product.
- Data communication with external appliances.
- Visualising the aiming direction and vertical axis.

Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.
- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognisable damages or defects.

- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the surveying site, for example when measuring on roads.
- Deliberate dazzling of third parties.
- Controlling of machines, moving objects or similar monitoring application without additional control- and safety installations.

Warning

Adverse use can lead to injury, malfunction and damage.
It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be operated until the user has been instructed on how to work with it.

6.3 Limits of Use

Environment

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.

Danger

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

Environment

For GEV225 / GEV230

Suitable for use in dry environment only and not under adverse conditions.

6.4 Responsibilities

Manufacturer of the product

Leica Geosystems AG, CH-9435 Heerbrugg, Switzerland, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.

Manufacturers of non Leica Geosystems accessories

The manufacturers of non Leica Geosystems accessories for the product 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 Geosystems product.

Person in charge of the product

The person in charge of the product 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 safety and accident prevention.
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.
- To ensure that the national laws, regulations and conditions for the operation of radio transmitters are respected.

Warning

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

6.5 Hazards of Use

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 product.

Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.
Precautions:
Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

Caution

During the operation of the product there is a hazard of squeezing extremities or entanglement of hairs and/or clothes by rotating parts.
Precautions:
Keep a safe distance of the rotating parts.

Danger

Because of the risk of electrocution, it is very dangerous to use 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

If the product is used with accessories, for example masts, staffs, poles, you may increase the risk of being struck by lightning.
Precautions:
Do not use the product in a thunderstorm.

Warning

During dynamic applications, for example stakeout procedures, there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.
Precautions:
The person responsible for the product 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 safety and accident prevention and road traffic.

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 Geosystems products.

Caution

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

Precautions:

When setting-up the product, make sure that the accessories, for example tripod, tribrach, connecting cables, are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the product to mechanical stress.

Warning Only Leica Geosystems authorised service workshops are entitled to repair these products.

Caution With the remote control of products, it is possible that extraneous targets will be picked out and measured.
Precautions:
When measuring in remote control mode, always check your results for plausibility.

Warning Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.
Precautions:
Only use chargers recommended by Leica Geosystems to charge the batteries.

Warning High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.
Precautions:
Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.

Warning

Short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets if battery terminals come in contact with jewellery, keys, metallised paper or other metals.

Precautions:

Make sure that the battery terminals do not come into contact with metallic objects.

Caution

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

Precautions:

When transporting shipping, or disposing batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.

For Power Supply:

Danger

Death or serious injury can occur if unit is not connected to ground.
To avoid electric shock power cable and outlet must be grounded.

Danger

The product is not designed for use under wet and severe conditions. If unit becomes wet it may cause you to receive an electric shock.

Precautions:

Use the product only in dry environments, for example in buildings or vehicles. Protect the product against humidity. If the product becomes humid, it must not be used!

Warning

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

- Touching live components.
- Using the product after incorrect attempts were made to carry out repairs.

Precautions:

Do not open the product. Only Leica Geosystems authorised service workshops are entitled to repair these products.

Warning

Batteries not recommended by Leica Geosystems may be damaged if charged or discharged. They may burn and explode.

Precautions:

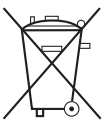
Only charge and discharge batteries recommended by Leica Geosystems.

Warning

If the product 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 product irresponsibly you may enable unauthorised 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.
- Improper disposal of silicone oil may cause environmental contamination.

Precautions:



The product must not be disposed of with household waste.
Dispose of the product appropriately in accordance with the national regulations in force in your country.
Always prevent access to the product by unauthorised personnel.

Product specific treatment and waste management information can be downloaded from the Leica Geosystems home page at http://www.leica-geosystems.com/treatment or received from your Leica Geosystems dealer.

6.6 Laser Classification, Visible Laser

6.6.1 General

General

The following directions (in accordance with the state of the art - international standard IEC 60825-1 (2007-03) and IEC TR 60825-14 (2004-02)) provide instruction and training information to the person responsible for the product and the person who actually uses the equipment, to anticipate and avoid operational hazards.

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

Products classified as laser class 1, class 2 and class 3R do not require:

- laser safety officer involvement,
- protective clothes and eyewear,
- special warning signs in the laser working area

if used and operated as defined in this user manual due to the low eye hazard level.

Products classified as laser class 2 or class 3R may cause dazzle, flash-blindness and after-images, particularly under low ambient light conditions.

6.6.2 Distance Laser

General

The laser incorporated into the product produces a visible green laser beam which emerges from the rotating mirror.

The laser product described in this section, is classified as laser class 3R in accordance with:

- IEC 60825-1 (2007-03): "Safety of laser products".
- EN 60825-1 (2007-10): "Safety of laser products".

Class 3R laser products:
Direct intrabeam viewing may be hazardous (low-level eye hazard), in particular for deliberate ocular exposure. The risk of injury for laser class 3R products is limited because of:

a) unintentional exposure would rarely reflect worst case conditions of (e.g.) beam alignment with the pupil, worst case accommodation,
b) inherent safety margin in the maximum permissible exposure to laser radiation (MPE),
c) natural aversion behaviour for exposure to bright light for the case of visible radiation.

Description	Value
Maximum average radiant power	1.5 mW
Maximum peak radiant power	120 W
Pulse duration	250 ps
Pulse repetition frequency	$\leq$ 50 kHz
Beam divergence (full angle)	0.1 mrad
Beam waist location	20 m
Beam waist diameter (1/e)	2.5 mm
NOHD (Nominal Ocular Hazard Distance) @ 0.25s	6 m / 19.7 ft.

Warning

From a safety perspective class 3R laser products should be treated as potentially hazardous.

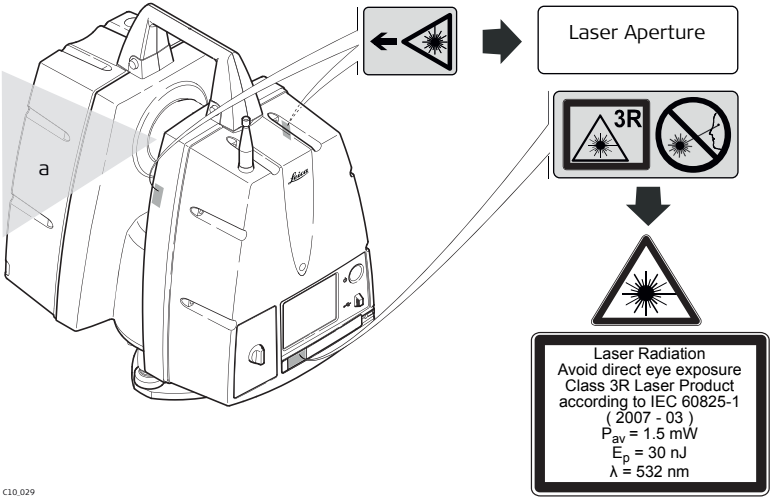
Precautions:

Prevent direct eye exposure to the beam. Do not direct the beam at other people.

Warning

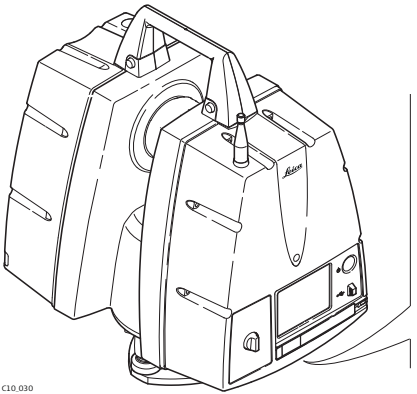
Potential hazards are not only related to direct beams but also to reflected beams aimed at reflecting surfaces such as prisms, windows, mirrors, metallic surfaces etc.
Precautions:
Do not aim at areas that are essentially reflective, such as a mirror, or which could emit unwanted reflections. Do not look through or beside the optical sight at prisms or reflecting objects when the laser is switched on, in laserpointer or distance measurement mode.

Labelling



C10_029

a) Laser beam



C10_030

Type: ScanStation....
Art.No.: . . . . . .
Equip.No.: . . . . . .
S.No.: . . . . . .
Power: . . . . .
Leica Geosystems AG
CH-9435 Heerbrugg
Manufactured: . . . .
Made in Switzerland

Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007.
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.

6.6.3 Laser Plummet

General

The laser plummet built into the product produces a visible red laser beam which emerges from the bottom of the product.

The laser product described in this section, is classified as laser class 2 in accordance with:

- IEC 60825-1 (2007-03): "Safety of laser products"
- EN 60825-1 (2007-10): "Safety of laser products"

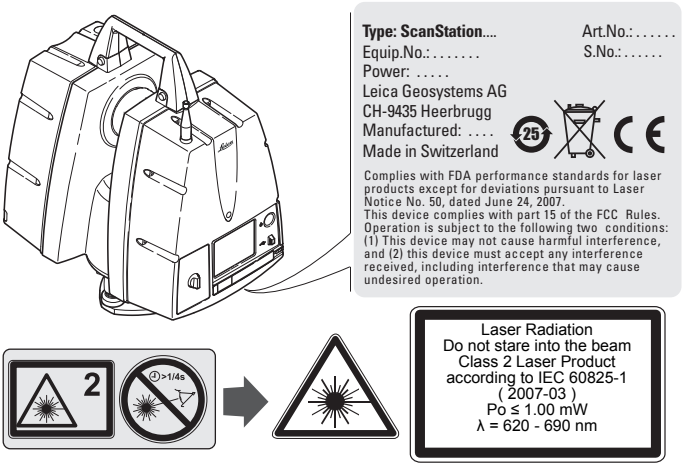
Class 2 laser products:
These products are safe for momentary exposures but can be hazardous for deliberate staring into the beam.

Description	Value
Maximum radiant power	1.00 mW
Pulse duration	0 - 100%
Pulse repetition frequency	1 kHz
Wavelength	620 nm - 690 nm

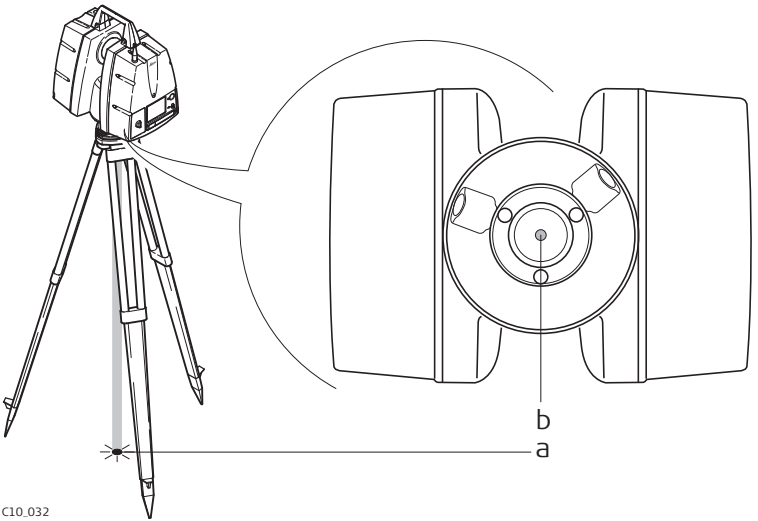
Warning

From a safety perspective class 2 laser products are not inherently safe for the eyes.
Precautions:
Avoid staring into the beam or pointing the beam at other people.

Labelling



a) Class 2 laser warning label is not applied because distance laser is of a higher laser class.



C10_032

a) Laser beam
b) Exit for laser beam

6.7 Electromagnetic Compatibility EMC

Description

The term Electromagnetic Compatibility is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.

Warning

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems 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 product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about electromagnetic compatibility provided by the manufacturer.

Caution

Disturbances caused by electromagnetic radiation can result in erroneous measurements.
Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.
Precautions:
Check the plausibility of results obtained under these conditions.

Warning

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.
Precautions:
While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

Warning

Electromagnetic fields can cause disturbances in other equipment, in installations, in medical devices, for example pacemakers or hearing aids and in aircraft. It can also affect humans and animals.

Precautions:

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed or that humans or animals may be affected.

- Do not operate the product with radio or digital cellular phone devices in the vicinity of filling stations or chemical installations, or in other areas where an explosion hazard exists.
- Do not operate the product with radio or digital cellular phone devices near to medical equipment.
- Do not operate the product with radio or digital cellular phone devices in aircraft.

6.8 FCC Statement, Applicable in U.S.

Applicability

The greyed paragraph below is only applicable for products of the ScanStation C10 System without radio, digital cellular phone devices or Bluetooth.

Warning

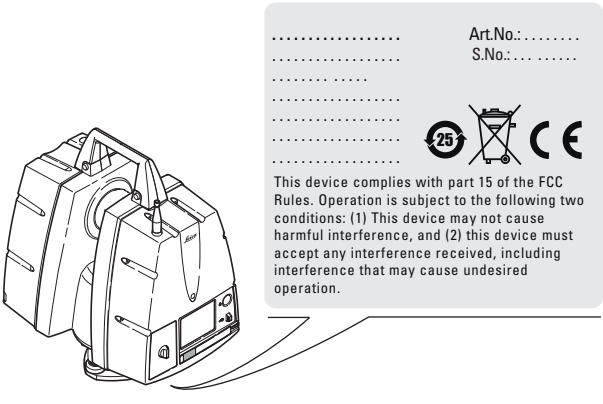
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.
These limits are designed to provide reasonable protection against harmful interference in a residential installation.
This equipment generates, uses and can radiate radio 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:

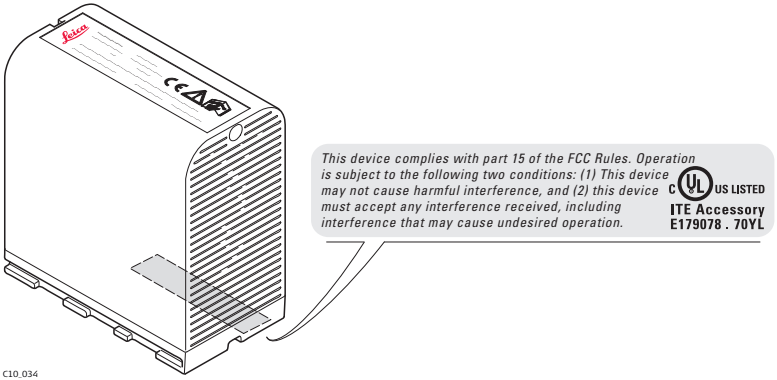
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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

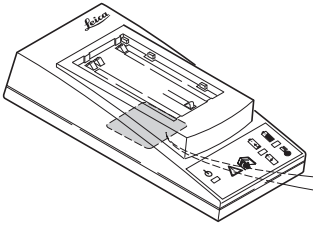
Labelling ScanStation C10



Labelling GEB241



Labelling GKL212



Type: GKL212 ***Art.No.: .....***

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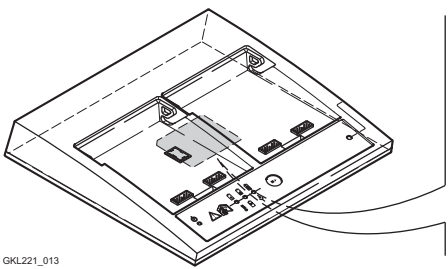
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Labelling GKL221



GKL221_013

Type: GKL221 ***Art.No.: .....***

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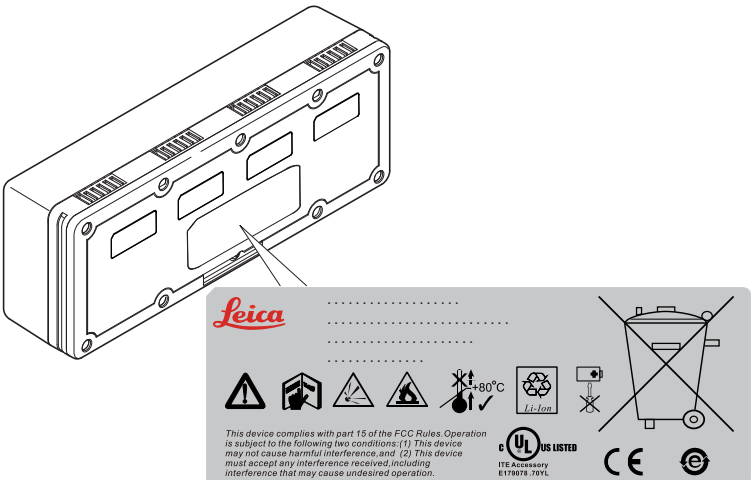
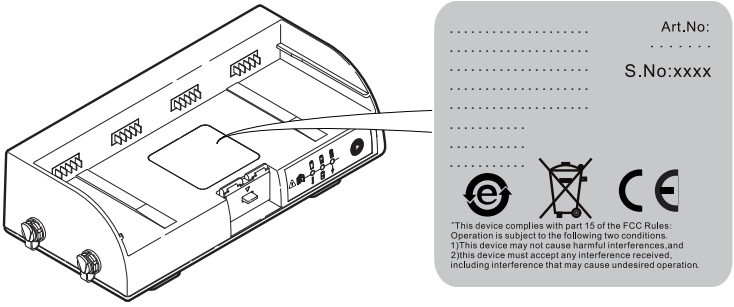
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Labelling GEB271



Labelling GKL271



7 Technical Data

7.1 General Technical Data of the Instrument

Instrument type	Compact, pulsed, dual-axis compensated, very high-speed laser scanner, with survey-grade accuracy, range, and field of view; integrated camera and laser plummet
User interface	Onboard control, notebook or Tablet PC
Data storage	Integrated 80 GB solid state drive or external PC
Camera	Auto-adjusting, integrated high-resolution digital camera with zoom video

7.2 System Performance

Accuracy of single measurement	Position[1]:	6 mm
	Distance[1]:	4 mm
	Angle (horizontal/vertical):	12" / 12" (60 µrad / 60 µrad)
Modeled surface precision[2]/noise	2 mm	
Target acquisition[3]	2 mm standard deviation	
Dual-axis compensator	Selectable on/off; Setting accuracy: 1.5" / 7.275 µrad, resolution 1", dynamic range ±5'	

All ± accuracy specifications are one sigma (1 σ) unless otherwise noted.

1 At 1 m - 50 m range, 1 σ

2 Subject to modeling methodology for modeled surface

3 Algorithmic fit to planar HDS targets

7.3 Laser Scanning System

Type	Pulsed; proprietary microchip	
Color	Green; visible (wavelength = 532 nm)	
Range	300 m @ 90%; 134 m @ 18% albedo (minimum range 0.1 m)	
Scan rate	up to 50'000 points/sec, maximum instantaneous rate	
Scan resolution	Spot size:	≤ 7 mm from 0 - 50 m (based on Gaussian definition) ≤ 4.5 mm from 0 -50 m (based on FWHH definition)
	Selectability:	Independently, fully selectable vertical and horizontal point-to-point measurement spacing
	Point spacing:	Fully selectable horizontal & vertical; through full range
Field-of-View (per scan)	Horizontal:	360° (maximum)
	Vertical:	270° (maximum)
	Aiming/Sighting:	Parallax-free, integrated zoom video

Scanning Optics	Vertically rotating mirror on horizontally rotating base; Smart X-Mirror™ automatically spins or oscillates for minimum scan time
Scan motors	Direct drive, brushless
Communication	Dynamic Internet Protocol (IP) address, ethernet
Integrated digital color camera with zoom video	• Single 17° x 17° image: 1920 x 1920 pixels (4 megapixel) • Full 360° x 270° dome: 230 images, automatically spatially rectified
Onboard display	Touchscreen control with stylus, full color graphic display, QVGA (320 x 240 pixels)
Level indicator	External bubble, electronic bubble in onboard control and *Cyclone* software
Laser plummet	Type: Visible red laser class 2 Location: In standing axis of instrument Accuracy: Deviation from plumbline: 1.5 mm at 1.5 m instrument height Diameter of laser point: 2.5 mm at 1.5 m instrument height

7.4 Electrical

Power supply	15 V DC, 90 - 260 V AC; Four internal batteries provided with system.	
Power consumption	‹ 50 W, average	
GEV230 AC power supply for ScanStation C10	Input voltage: Output voltage:	100-240 V AC, 50-60 Hz 15 V
Power ports	Internal: 2, External: 1 (simultaneous use, hot swappable)	
GEV225 AC power supply for GKL271	Input voltage: Output voltage:	100-240 V AC, 50-60 Hz 24 V
GKL271 charging station	Input voltage: Output voltage:	Port P3: 24 V DC Port P1: 14.4 V DC Port P2: 24 V DC / 36 V DC

GEB271 battery pack	Type: Voltage: Capacity:	Li-Ion 14.4 V 16.8 Ah
GEB241 battery	Type: Voltage: Capacity:	Li-Ion 14.8 V 4.8 Ah
Operating time	Internal batteries: External battery:	>3.5 hours, typical continuous use (room temperature), using both batteries simultaneously >6 hours, typical continous use (room temperature)
Charging time	Internal batteries: External batteries:	Typical charging time with Professional Charger GKL221 is <3.5 h at room temperature (2 batteries). Typical charging time is 3.5 h at room temperature.

7.5 Environmental

7.5.1 Scanner

Environmental specifications

Temperature

Type	Operating temperature [°C]	Storage temperature [°C]
ScanStation C10	0 to +40	-25 to +65
A/C power supply	0 to +40	-25 to +65

Protection against water, dust and sand
IP54 (IEC 60529)

Humidity
Max 95 % non condensing

Lighting

Fully operational from bright sunlight to complete darkness.

7.5.2 GEB271 / GKL271 / GEB241

Environmental specifications

Temperature

Operating temperature [°C]	Mode
0 to +45	Charging
-20 to +55	Discharging

Storage temperature [°C]	Mode	Recharging needed after
-40 to +70	Standard	6 months

Protection against water and dust
IP54 (IEC 60529)

Humidity
Max 95% non-condensing

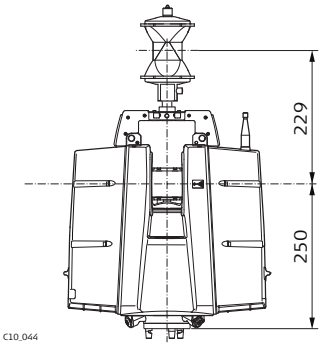
7.6 Physical

Dimensions

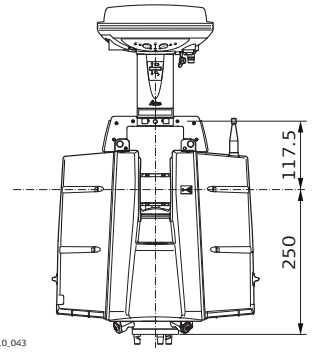
Instrument	Dimensions [mm] (D x W x H)	Dimensions ["] (D x W x H)
ScanStation C10	238 x 358 x 395	9.4 x 14.1 x 15.6
GEV230 AC power supply for ScanStation C10	76 x 146 x 43 Cable length: 1000	3.0 x 5.7 x 1.7 Cable length: 39
GEV225 AC power supply for GKL271	85 x 170 x 41 Cable length: 1800	3.4 x 6.7 x 1.6 Cable length: 70
GKL271 charging station	127 x 264 x 82	5 x 10.4 x 3.2
GEB271 battery pack	95 x 248 x 60	3.7 x 9.8 x 2.4
GEB241 battery	40 x 72 x 77	1.6 x 2.8 x 3.0
GVP645 ScanStation C10 transport container	500 x 625 x 366	19.7 x 24.6 x 14.4

Tilt axis height and offset to TPS/GNSS accessories

ScanStation C10 with GRZ122 prism (with handle GAD110 and adapter GAD112)

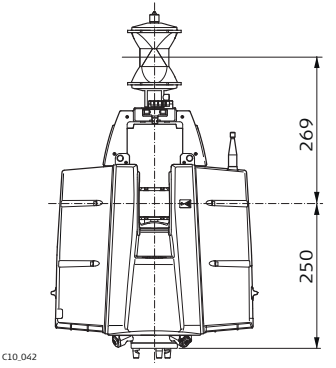


ScanStation C10 with GS15 antenna (with handle GAD110)

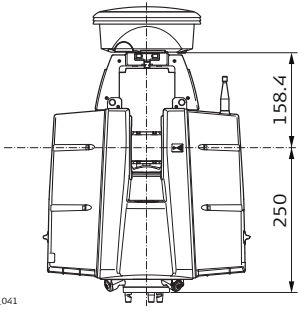


Type	GRZ122 / GAD110 / GAD112	GS15 / GAD110
Tilt axis height	250 mm	250 mm
Offset tilt axis	229 mm to prism center. Valid for all Leica standard prisms with an height offset of 86 mm.	117.5 mm to GS15 antenna MRP (**M**echanical **R**eference **P**lane).

ScanStation C10 with GRZ122 prism (with handle GAD104 and adapter GAD111)



ScanStation C10 with ATX1230+ antenna (with handle GAD104)



Type	GRZ122 / GAD104	ATX1230+ / GAD104
Tilt axis height	250 mm	250 mm
Offset tilt axis	269 mm to prism center. Valid for all Leica standard prisms with an height offset of 86 mm.	158.4 mm to ATX1230+ antenna MRP (**M**echanical **R**eference **P**lane).

Weight

Instrument	Weight [kg]	Weight [lbs]
ScanStation C10	13, nominal	28.7, nominal
GEV230 AC power supply for ScanStation C10	0.7	1.5
GEV225 AC power supply for GKL271	0.860	1.9
GKL271 charging station	1	2.2
GEB271 battery pack	1.9	4.2
GEB241 battery	0.4	0.9
GVP645 ScanStation C10 transport container (without scanner and accessories)	10.4	22.9
GVP645 ScanStation C10 transport container (with scanner and standard deliverables)	28	61.7

7.7 Accessories

Standard Accessories, included

- Transport container for scanner
- Tribrach (Leica Professional Series)
- Internal battery (4x)
- Battery charger with AC power cable, car adapter, daisy chain cable
- Ethernet cable
- Height meter and distance holder for height meter
- Glass cleaning kit
- *Cyclone*™ SCAN software
- 1 year CCP Basic support agreement

Additional accessories

- HDS scan targets and target accessories
- Service agreement for Leica ScanStation C10
- Extended warranty for Leica ScanStation C10
- External battery with charging station, AC power supply and power cable
- Professional charger for internal batteries
- AC power supply for scanner
- Tripod, tripod star, rolling base

Notebook PC for scanning

Component	Minimum requirements
Processor	1.7 GHz Pentium M or higher
System memory RAM	1 GB (2 GB for Windows Vista)
Hard Disk	40GB or greater, (5'400RPM or faster)
Network connection	Ethernet
Display	SVGA or OpenGL accelerated graphics card (with latest drivers)
Operating system	• Microsoft Vista* (32 or 64) • Microsoft Windows XP (SP2 or higher) (32 or 64)
File System	NTFS

* Some systems may not support Windows Vista's Desktop Windows Manager (DWM) with Leica *Cyclone* and must be operated in Windows Classic Look.

☞ Minimum requirements for modeling operations are different. Please refer to *Cyclone* datasheet for specifications, available at your Leica Geosystems dealer.

8 International Limited Warranty, Software License Agreement

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- when it has to be **right**

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