



# USER GUIDE

Part 1

## Trimble® TS635 Construction Total Station





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# USER GUIDE

## **Trimble® TS635 Construction Total Station**

Version 1.00  
Revision A  
February 2009



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### Release Notice

This is the February 2009 release (Revision A) of the *Trimble TS635 Construction Total Station User Guide*. It applies to version 1.00 of the TS635 construction total station.

### Manufacturer

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### Product Limited Warranty Information

For applicable product Limited Warranty information, please refer to the Limited Warranty Card included with this Trimble product, or consult your local Trimble authorized dealer.

### Notices

Class B Statement – Notice to Users. 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 communication. 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.

Changes and modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission rules.



**WARNING** - This equipment has been certified to comply with the limits for a Class B personal computer and peripherals, pursuant to Subpart B of Part 15 of FCC Rules. Only peripherals (computer input/output devices, terminals, printers, etc.) certified to comply with the Class B limits may be attached to this equipment. Operation with non-certified personal computer and/or peripherals is likely to result in interference to radio and TV reception. The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. You are cautioned that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

### Canada

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus as set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le règlement sur le brouillage radioélectrique édicté par le Ministère des Communications du Canada.

## Europe

This product has been tested and found to comply with the requirements for a Class B device pursuant to European Council Directive 2004/108/EC on EMC, thereby satisfying the requirements for CE Marking and sale within the European Economic Area (EEA). These requirements are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential or commercial environment.



### Representative in Europe

Trimble GmbH  
Am Prime Parc 11  
65479 Raunheim, Germany

### Australia and New Zealand

This product conforms with the regulatory requirements of the Australian Communications Authority (ACA) EMC framework, thus satisfying the requirements for C-Tick Marking and sale within Australia and New Zealand.



### Taiwan Battery Recycling Requirements

The product contains a removable Ni-MH battery. Taiwanese regulations require that waste batteries are recycled.



## 涝措珍惠岔澗

### Notice to Our European Union Customers

For product recycling instructions and more information, please go to: [www.trimble.com/environment/summary.html](http://www.trimble.com/environment/summary.html).

### Recycling in Europe

To recycle Trimble WEEE, call: +31 497 53 2430, and ask for the "WEEE associate," or mail a request for recycling instructions to:

Trimble Europe BV  
c/o Menlo Worldwide Logistics  
Meerheide 45  
5521 DZ Eersel, NL

### For the Bluetooth unit

#### USA

FCC Part 15 Subpart/RSS-210, OET bulletin 65 supplement C satisfied

**CAUTION:** Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**NOTE:** *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 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.

#### Canada

RSS-210 Low Power Device

Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

### European Union countries, Iceland, Norway, Liechtenstein, Turkey, Switzerland

EN300 328v17.1, EN50360 satisfied

Hereby, Nikon-Trimble Co., Ltd., declares that this instrument is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Declaration of Conformity available at <http://www.nikon-trimble.com/>.

### RF exposure compliance

1. To comply with FCC/IC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.
2. This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

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# Safety

For your safety read the safety and warnings section and this manual carefully and thoroughly before using the Trimble® TS635 construction total station.

Although these products are designed for maximum safety, using them incorrectly or disregarding the instructions can cause personal injury or property damage.

You should also read the installation manual for the battery charger, and the documentation for any other equipment that you use with a Trimble TS635 construction total station.

*Note* – Always keep this user guide near the instrument for easy reference.

## Warnings and Cautions

The following conventions are used to indicate safety instructions:



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**WARNING** – Warnings alert you to situations that could cause death or serious injury.

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**CAUTION** – Cautions alert you to situations that could cause injury or property damage.

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Always read and follow the instructions carefully.

## Rechargeable Lithium-ion (Li-ion) batteries

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**WARNING** – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage.

To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
  - Do not expose the battery to fire, high temperature, or direct sunlight.
  - Do not immerse the battery in water.
  - Do not use or store the battery inside a vehicle during hot weather.
  - Do not drop or puncture the battery.
  - Do not open the battery or short-circuit its contacts.
- 



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**WARNING** – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage.

To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
  - If battery fluid gets into your eyes, immediately rinse your eyes with clean water and seek medical attention. Do not rub your eyes!
  - If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.
-



Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
- Charge the Lithium-ion battery only in a product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
- Discontinue charging a battery that gives off extreme heat or a burning odor.
- Use the battery only in equipment that is specified to use it.
- Use the battery only for its intended use and according to the instructions in the product documentation.

## Warnings

Before using the instrument, read the following warnings and follow the instructions that they provide.



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**WARNING** – Never look at the sun through the telescope. If you do, you may damage or lose your eyesight.

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**WARNING** – The TS635 construction total station is not designed to be explosion-proof. Do not use the instrument in coal mines, in areas contaminated with coal dust, or near other flammable substances.

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**WARNING** – Never disassemble, modify, or repair the instrument yourself. If you do, you may receive electric shocks or burns, or the instrument may catch fire. You may also impair the accuracy of the instrument.

---



---

**WARNING** – Use **only** the specified battery charger and AC adapter that is supplied with the instrument. Do **not** use any other charger or you may cause the battery pack to catch fire or rupture.

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**WARNING** – Do not cover the battery charger and AC adapter while the battery pack is being recharged. The charger must be able to dissipate heat adequately. Coverings such as blankets or clothing can cause the charger to overheat.

---



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**WARNING** – Avoid recharging the battery pack in humid or dusty places, in direct sunlight, or near heat sources. Do not recharge the battery pack when it is wet. If you do, you may receive electric shocks or burns, or the battery pack may overheat or catch fire.

---



---

**WARNING** – Although the battery pack has an auto-reset circuit breaker, you should take care not to short circuit the contacts. Short circuits can cause the battery pack to catch fire or burn you.

---



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**WARNING** – Never burn or heat the battery. Doing so may cause the battery to leak or rupture. A leaking or ruptured battery can cause serious injury.

---



---

**WARNING** – Before storing the battery pack or battery charger, cover the contact points with insulation tape. If you do not cover the contact points, the battery pack or charger may short circuit, causing fire, burns, or damage to the instrument.

---



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**WARNING** – The battery is not waterproof on its own. Do not get the battery wet when it is removed from the instrument. If water seeps into the battery, it may cause a fire or burns.

---

## Cautions

Before using the instrument, read the following cautions and follow the instructions that they provide:



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**CAUTION** – Use of controls, adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure.

---



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**CAUTION** – The tops of the tripod ferrules are very sharp. When handling or carrying the tripod, take care to avoid injuring yourself on the ferrules.

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**CAUTION** – Before carrying the tripod or the instrument in the carry case, check the shoulder strap and its clasp. If the strap is damaged or the clasp is not securely fastened, the carry case may fall, causing personal injury or instrument damage. The shoulder strap is available as an optional extra.

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**CAUTION** – Before setting up the tripod, make sure that no-one's hands or feet are underneath it. When the legs of the tripod are being driven into the ground, they could pierce hands or feet.

---



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**CAUTION** – After mounting the instrument on the tripod, securely fasten the thumb screws on the tripod legs. If the thumb screws are not securely fastened, the tripod may collapse, causing personal injury or instrument damage.

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**CAUTION** – After mounting the instrument on the tripod, securely fasten the clamp screw on the tripod. If the clamp screw is not securely fastened, the instrument may fall off the tripod, causing personal injury or instrument damage.

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**CAUTION** – Securely fasten the tribrach clamp knob. If the knob is not securely fastened, the tribrach may come loose or fall off when you lift the instrument, causing personal injury or instrument damage.

---



**CAUTION** – Do not stack objects on the plastic carry case, or use it as a stool. The plastic carry case is unstable and its surface is slippery. Stacking or sitting on the plastic carry case may cause personal injury or instrument damage.



**CAUTION** – The system in the instrument may stop functioning in order to avoid any errors in measurements when the instrument detects strong electromagnetic wave(s). If this happens, turn off the instrument and remove the source of the electromagnetic wave(s). Then turn on the instrument to resume the work.

## Laser safety

The TS635 is a Class 2 laser instrument, in accordance with IEC60825-1, Am2 (2001): *Safety of Laser Products*.

To counteract hazards, it is essential for all users to pay careful attention to the safety precautions and control measures specified in the standard IEC60825-1, (2001-08), particularly EN60825-1:1994, A11:1996, and A2:2001, as this refers to the hazard distance that is defined in this User Guide.

*Note* – The **hazard distance** is the distance from the laser at which beam irradiance or radiant exposure equals the maximum permissible value to which personnel may be exposed without being exposed to health risks.



**WARNING** – Only qualified and trained persons should be assigned to install, adjust, and operate the laser equipment.



**WARNING** – Precautions should be taken to ensure that persons do not look directly, with or without an optical instrument, into the beam.



**WARNING** – Wherever practicable, the laser beam path should be located well above or below eye level.

## Specifications for laser emission

### Laser pointer

Wave length	630-680 nm
Output power	CW: $P_o \leq 1.0$ mW

### Distance meter

Wave length	850-890 nm
Output power	Pulse: $P_o \leq 6.4$ mW
Pulse width	< 5 ns

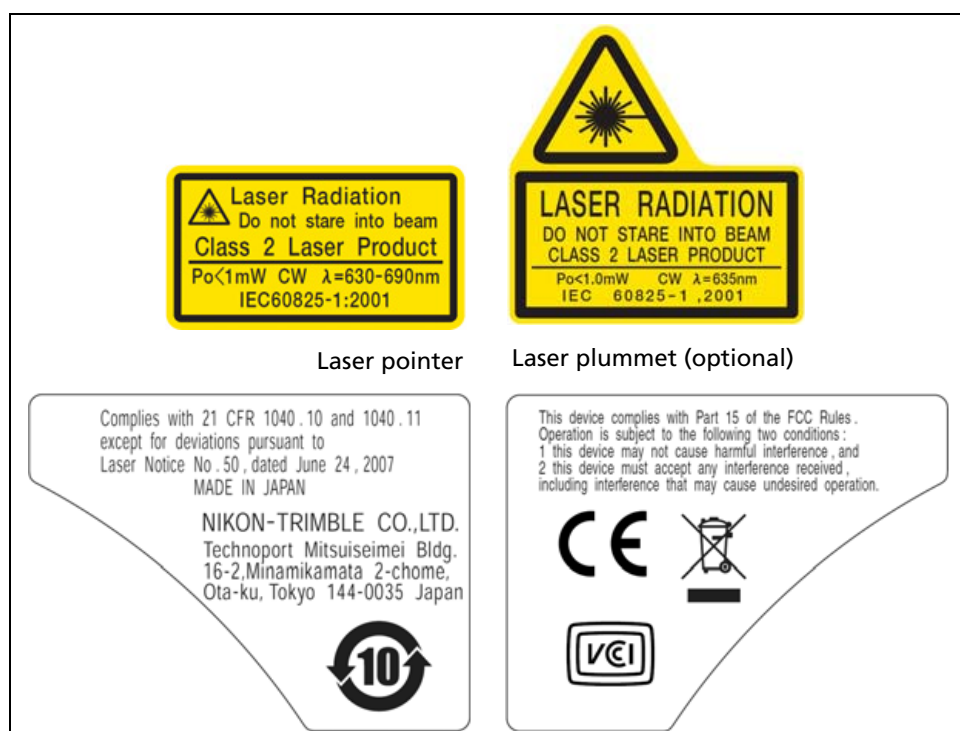
### Laser plummet (option)

Wave length	635 nm
Output power	CW: Po < 1.0 mW

## Conforming standards

EU	EN60825-1/Am.2 : 2001 (IEC60825-1/Am.2 : 2001) Laser pointer: Class 2 Distance meter: Class 1 Laser plummet: Class 2 (Option)
USA	FDA21CFR Part 1040 Sec.1040.10 and 1040.11 Except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.

## Labels





# Introduction

## In this chapter:

- System diagram
- Care and maintenance
- Related information

This user guide describes the unique capabilities and features available in the Trimble® TS635 construction total station.

The TS635 construction total station is a reflectorless EDM instrument. Reflectorless operation enables you to take measurements to points that are inaccessible with a prism.

The software for the TS635 construction total station makes it easy for you to learn to operate one model of instrument and, with little additional training, to apply that knowledge to other models.

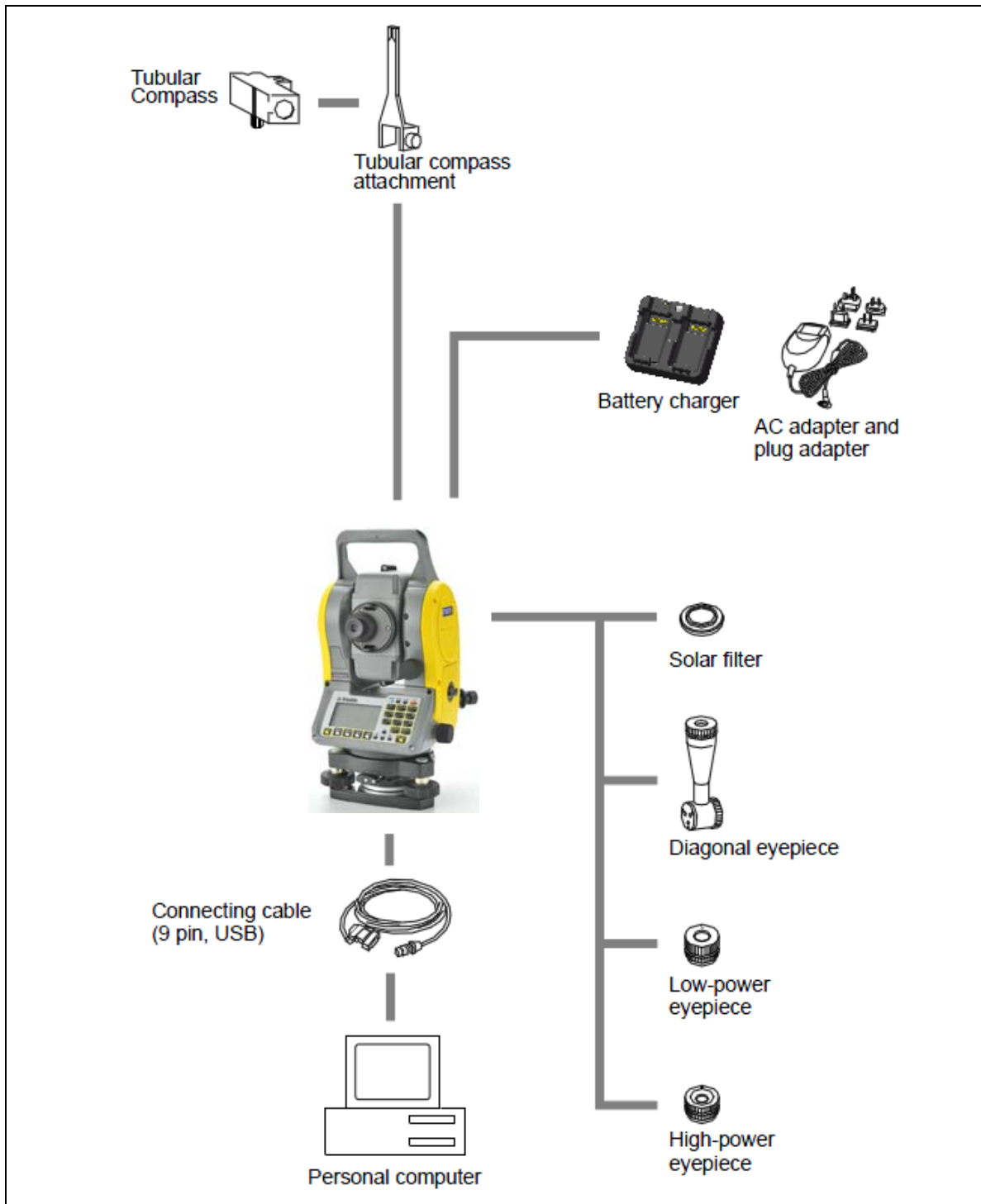
Before using the instrument, read this user guide carefully. In particular, pay attention to the warnings and cautions that appear in the [Safety](#) section.

Your comments and suggestions about the TS635 construction total station are welcome. Please contact us at the address given in the front of this manual.

In addition, your feedback about the supporting documentation helps us to improve it with each revision. E-mail your comments to [sales@trimble.com](mailto:sales@trimble.com).

## System diagram

The system diagram shows the hardware that is used with the TS635 construction total station.



**Note** – You must use the TS635 total station with tribrach W30 or W30b.



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## Care and maintenance



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**CAUTION** – The battery pack contains a Lithium-ion battery. When disposing of the battery pack, follow the environmental guidelines as determined by law and/or local regulations.

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The TS635 construction total station is a precision instrument that you should store, use, and clean in an appropriate way.

### Storage

- Do not store the total station in hot or humid locations. In particular, you must store the battery pack in a dry location at a temperature of less than 30 °C (86 °F). High temperature or excessive humidity can cause mold to grow on the lenses. It can also cause the electronic assemblies to deteriorate, and so lead to instrument failure.
- When storing the instrument in areas subject to extremely low temperatures, leave the carry case open.
- If you do not intend to use the tribach for an extended period, lock down the tribach clamp knob and tighten its safety screw.
- Store the battery pack with the battery discharged.

### Environmental conditions

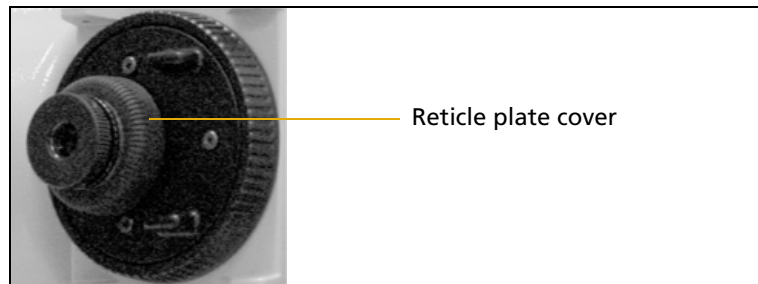
- Do not leave the instrument in direct sunlight or in a closed vehicle for prolonged periods. Overheating the instrument may reduce its efficiency.
- Sudden changes in temperature may cloud the lenses and drastically reduce the measurable distance, or cause an electrical system failure. If there has been a sudden change in temperature, leave the instrument in a closed carry case in a warm location until the temperature of the instrument returns to room temperature.
- If the total station has been used in wet conditions, immediately wipe off any moisture and dry the instrument completely before returning it to the carry case. The TS635 construction total station contains sensitive electronic assemblies which have been well protected against dust and moisture. However, if dust or moisture gets into it, severe damage could result.
- The carry case is designed to be watertight, but you should not leave it exposed to rain for an extended period. If exposure to rain is unavoidable, make sure that the carry case is placed with the Trimble nameplate facing upward.

## Cleaning

- Do not use organic solvents such as ether or print thinner to clean the non-metallic parts of the instrument, such as the keyboard, or the painted or printed surfaces. Doing so could result in discoloration of the surface or in peeling of printed characters. Clean these parts only with a soft cloth or tissue that is lightly moistened with water or a mild detergent.
- To clean the optical lenses, lightly wipe them with a soft cloth or a lens tissue that is moistened with alcohol.

## Adjusting and tightening

- When adjusting the leveling screws, stay as close as possible to the center of each screw's range. The center is indicated by a line on the screw.
- The reticle plate cover has been correctly mounted. Do not release it or subject it to excessive force, for example in an attempt to make it watertight.



- Before attaching the battery pack, make sure that the contact surfaces on the battery and TS635 construction total station are clean.
- Securely press the cap that covers the data output/external power input connector terminal. The instrument is only watertight if the cap is attached securely, or when the data output/external power input connector is used.
- The TS635 construction total station is not watertight when the data output/external power input connector is used.
- Static electricity from the human body, discharged through the data output/external power input connector, can damage the instrument. Before handling the instrument, touch any other conductive material once in order to remove static electricity.
- Be careful not to pinch your finger between the telescope and trunnion of the instrument.

## Related information

- Contact your local Trimble dealer for more information about the support agreement contracts for software and firmware, and an extended warranty program for hardware.
- Consider a training course to help you use your total station to its fullest potential. For more information, go to the Trimble website at [www.trimble.com](http://www.trimble.com). Alternatively, send an email to [trimble\\_support@trimble.com](mailto:trimble_support@trimble.com).



## Setting up the Instrument

### In this chapter:

- Unpacking and repacking the instrument
- Charging the battery pack
- Setting up the tripod
- Centering the instrument
- Leveling the instrument
- Focusing the telescope
- Setting the measurement mode and preparing the target
- Viewing and changing the measurement settings

This chapter describes how to prepare the TS635 construction total station before you use it in the field.

## Unpacking and repacking the instrument

*Note* – Handle the TS635 construction total station carefully to protect it from shocks and excessive vibration.

- To unpack the instrument, grip the carry handle and then carefully remove the instrument from the carry case.
- To repack the instrument, refer to the following figure.



## Charging the battery pack

Before charging the battery pack, read the following warnings, cautions, and notes.



---

**WARNING** – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:

- Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited to, discoloration, warping, and leaking battery fluid.
- Do not expose the battery to fire, high temperature, or direct sunlight.
- Do not immerse the battery in water.
- Do not use or store the battery inside a vehicle during hot weather.
- Do not drop or puncture the battery.
- Do not open the battery or short-circuit its contacts.

---



---

**WARNING** – Avoid contact with the rechargeable Lithium-ion battery if it appears to be leaking. Battery fluid is corrosive, and contact with it can result in personal injury and/or property damage. To prevent injury or damage:

- If the battery leaks, avoid contact with the battery fluid.
- If battery fluid gets into your eyes, immediately rinse your eyes with clean water and

- seek medical attention. Do not rub your eyes!
- If battery fluid gets onto your skin or clothing, immediately use clean water to wash off the battery fluid.
- 



**WARNING** – Charge and use the rechargeable Lithium-ion battery only in strict accordance with the instructions. Charging or using the battery in unauthorized equipment can cause an explosion or fire, and can result in personal injury and/or equipment damage.

To prevent injury or damage:

- Do not charge or use the battery if it appears to be damaged or leaking.
  - Charge the Lithium-ion battery only in a product that is specified to charge it. Be sure to follow all instructions that are provided with the battery charger.
  - Discontinue charging a battery that gives off extreme heat or a burning odor.
  - Use the battery only in equipment that is specified to use it.
  - Use the battery only for its intended use and according to the instructions in the product documentation.
- 



**WARNING** – To charge the battery pack, use **only** the battery charger and AC adapter that are supplied with the instrument. **Do not** use any other charger or you may cause the battery pack to catch fire or rupture. The enclosed battery pack cannot be used with other chargers.

---



**WARNING** – Do not cover the battery charger and AC adapter while the battery pack is being recharged. The charger must be able to dissipate heat adequately. Coverings such as blankets or clothing can cause the charger to overheat.

---



**WARNING** – Avoid recharging the battery pack in humid or dusty places, in direct sunlight, or near heat sources. Do not recharge the battery pack when it is wet. If you do, you may receive electric shocks or burns, or the battery pack may overheat or catch fire.

---



**WARNING** – Although the battery pack has an auto-reset circuit breaker, you should take care not to short circuit the contacts. Short circuits can cause the battery pack to catch fire or burn you.

---



**WARNING** – Never burn or heat the battery. Doing so may cause the battery to leak or rupture. A leaking or ruptured battery can cause serious injury.

---



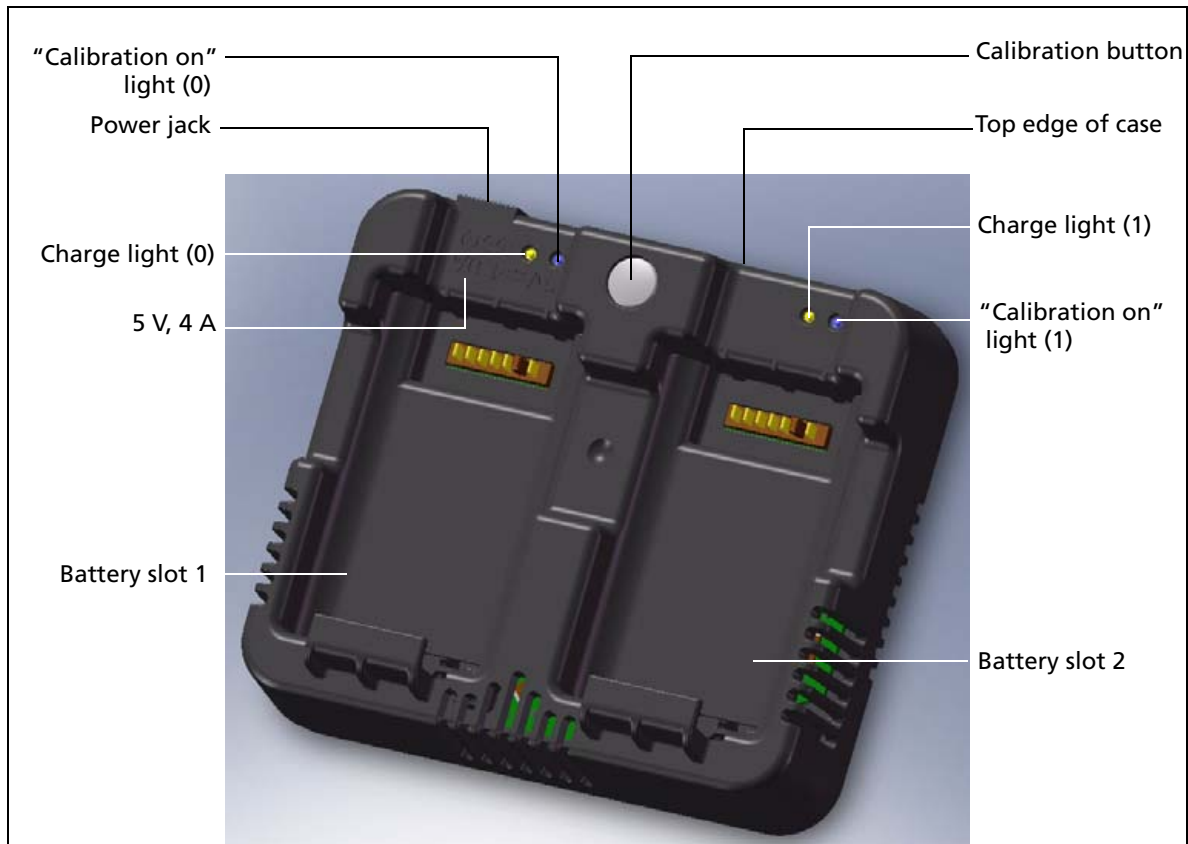
**WARNING** – Before storing the battery pack or battery charger, cover the contact points with insulation tape. If you do not cover the contact points, the battery pack or charger may short circuit, causing fire, burns, or damage to the instrument.

---



**WARNING** – The battery is not waterproof on its own. Do not get the battery wet when it is removed from the instrument. If water seeps into the battery, it may cause a fire or burns.

---



### Applying power

Plug in the charger to the supplied AC adapter to turn the unit on. The power input must be 5 V with at least 4 A of current capability. Each battery may take up to 2 A while charging.

### Charging the battery

Slide a battery into either battery slot to begin charging. The adjacent charge indicator will illuminate yellow when charging is in progress. The charge indicator will change to green when charging is complete.

Take note of the following:

- Charger slots are completely independent so a battery may be inserted regardless of what is occurring in the other battery slot.
- Charging may take 2-4 hours if the battery was normally discharged.
- Charging may take up to 5 hours with a completely drained battery which has been stored for several months without use.



- If the charge indicator(s) are blinking, there is a problem with the battery or with the charger.
- Lithium-ion batteries should not be charged above 40 °C to 45 °C (104 °F to 113 °F). A blinking charge light may mean that the batteries are too hot for charging. Charging will resume after the batteries cool down.

### Conditioning / calibrating a battery

You must calibrate the battery (“condition it”) once every 6 months or more often if required. Calibration ensures that the reported remaining battery charge is accurate.

To start calibrating a battery, hold down the calibration button on the unit and then insert a battery. Only the battery that was inserted while the button is pressed begins calibration.

During battery calibration, the battery will be charged, discharged completely, and then recharged again. Calibration should complete in approximately 17 hours. Do not cover the charger vents during a calibration cycle.

- The blue calibration indicator light(s) blink slowly (on 1.5 sec, off 2 sec) while calibration is in progress. The charge light(s) may be on or off during the calibration cycle if the case temperature does not get too high.
- When a calibration cycle is completed, the calibration light stops blinking but remains on until the corresponding battery is removed.
- Case temperature:
  - The temperature of the bottom case may continue to climb to approximately 43 °C before temperature regulation is enabled to keep the case from becoming warmer. As the battery voltage drops, the case cools down and the automatic temperature limiting is no longer necessary. This minimizes the time required to discharge a battery.
  - If the case temperature continues to become too hot internally, even after temperature regulation is enabled, there is a secondary failsafe that aborts the calibration completely. If an abort occurs, the calibration light(s) blink rapidly and battery charging is re-enabled.

### Detaching the battery pack




---

**CAUTION** – To avoid problems with the electricity supply, do not touch the contacts on the battery pack.

---

1. If the instrument is turned on, press **[PWR]** to turn it off.
2. Turn the battery box release knob counterclockwise, open the battery box cover and then pull the battery pack out of the battery box.

### Attaching the battery pack

1. Clear any dust or other foreign particles from the battery socket.
2. Turn the battery box release knob counterclockwise and then open the battery box cover.
3. Put the battery pack into the battery box. Connect the battery pack at the bottom with the connecting direction faced inside.
4. Close the battery box cover and then turn the knob clockwise until you hear a click sound.



---

**CAUTION** – If the battery pack is not attached securely, this could adversely affect the watertightness of the instrument.

---

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## Setting up the tripod



---

**CAUTION** – The tips of the tripod ferrules are very sharp. When handling or carrying the tripod, take care to avoid injuring yourself on the ferrules.

---

*Note* – Do not carry the instrument while it is attached to a tripod.


1. Open the tripod legs far enough for the instrument to be stable.
2. Locate the tripod directly over the station point. To check the position of the tripod, look through the center hole in the tripod head.
3. Firmly press the tripod ferrules into the ground.
4. Level the top surface of the tripod head.
5. Securely fasten the thumb screws on the tripod legs.
6. Place the instrument on the tripod head.
7. Insert the tripod mounting screw into the center hole of the base plate of the instrument.
8. Tighten the tripod mounting screw.

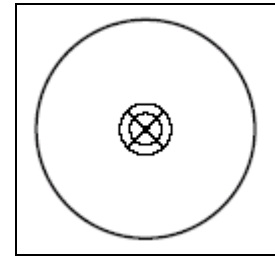
## Centering the instrument

When you center the instrument, you align its central axis precisely over the station point. To center the instrument, you can use the optical plummet, the laser plummet, or a plumb bob. The plumb bob is sold separately.

### Centering with the optical plummet

**Note** – For high accuracy, check and adjust the optical plummet before you center the instrument.

1. Set up the instrument on the tripod. See above.
2. Look through the optical plummet and align the reticle with the station point. To do this, turn the leveling screws until the center mark  of the reticle is directly over the image of the station point.
3. While supporting the tripod head with one hand, loosen the tripod leg clamps and adjust the lengths of the legs until the air bubble is in the center of the circular level.
4. Tighten the tripod leg clamps.
5. Use the electronic level to level the instrument. See also [Leveling the instrument, page 28](#).
6. Look through the optical plummet to make sure that the image of the station point is still in the center of the reticle mark.
7. If the station point is off-center, do one of the following:
  - If the station point is slightly off-center, loosen the tripod mounting screw and then center the instrument on the tripod. Use only direct movement to center the instrument. Do not rotate it.  
When the instrument is centered, tighten the mounting screw.
  - If there is major displacement of the station point, repeat this procedure starting with Step 2.



### Centering with the laser plummet



**CAUTION** – Do **not** see the laser directly.

**Note** – For high accuracy, check and adjust the laser plummet before you center the instrument.

1. Set up the instrument on the tripod. See [page 25](#).
2. Turn on the laser plummet.

3. Align the laser pointer to the station point. To do this, turn the leveling screws until the laser pointer is over the station point.
4. While supporting the tripod head with one hand, loosen the tripod leg clamps and adjust the lengths or the legs until the air bubble is the center of the circular level.
5. Tighten the tripod leg clamps.
6. Use the electronic level to level the instrument. See [Leveling the instrument, page 28](#).
7. Check that the laser pointer is over the station point.
8. If the station point is off-center, do one of the following:
  - If the station point is slightly off-center, loosen the tripod mounting screw and then center the instrument on the tripod. Use only direct movement to center the instrument. Do not rotate it.  
  
When the instrument is centered, tighten the mounting screw.
  - If there is major displacement of the station point, repeat this procedure starting with Step 2.

### Centering with a plumb bob

1. Set up the instrument on the tripod. See [page 25](#).
2. Hang the plumb line on the hook of the tripod mounting screw.
3. Adjust the length of the plumb line so that the tip of the plumb bob is at the height of the station point.
4. Loosen the tripod mounting screw slightly.
5. Using both hands to support the outer side of the tribrach, carefully slide the instrument about on the tripod head until the tip of the plumb bob is positioned over the exact center of the station point.

**Note** – To confirm that the instrument is precisely aligned, check its position from two directions at right-angles to each other.

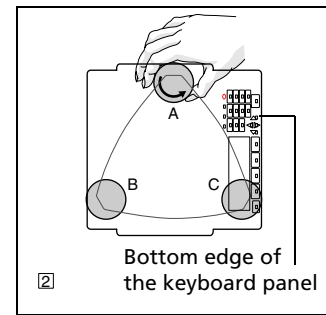
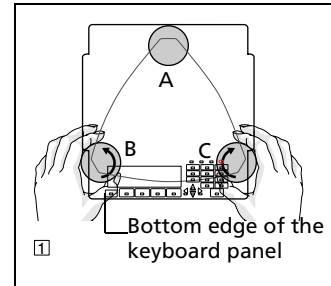
## Leveling the instrument

When you level the instrument, use the electronic level to make the vertical axis of the instrument exactly vertical. During leveling, always set the instrument in the Face 1 direction. See [Figure 3.1, page 34](#).

To level the instrument:

1. Move the bubble into the circle on the circular level and then turn on the power.
2. Rotate the alidade until the bottom edge of the keyboard panel is parallel to the two of the leveling screws (B and C).
3. Use leveling screws B and C to move the bubble into the center of the electronic level.
4. Rotate the alidade approximately 90°.
5. Use leveling screw A to move the bubble into the center of the electronic level.
6. Repeat Step 1 through Step 5 to center the bubble in both positions.
7. Rotate the alidade 180°.

If the bubble in the electronic level remains centered, the instrument is level. If the bubble moves off center, adjust the electronic level. For detailed instructions, see [Adjusting the electronic level, page 118](#).

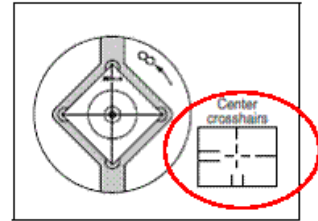


## Focusing the telescope



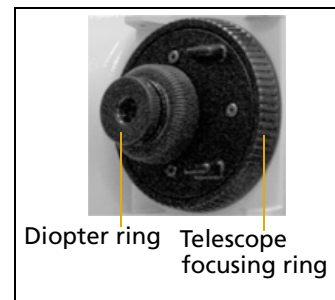
**WARNING** – Never look at the sun through the telescope. If you do, you may damage or lose your eyesight.

When you sight the instrument, you aim the telescope at the target, bring the target image into focus, and align the image with the center cross-hairs of the reticle.



To sight the instrument:


1. Adjust the diopter:
  - a. Aim the telescope at a blank area, such as the sky or a piece of paper.
  - b. Looking through the eyepiece, rotate the diopter ring until the reticle cross-hairs are in sharp focus.
2. Eliminate parallax:
  - a. Aim the telescope at the target image.
  - b. Rotate the focusing ring until the target image is in sharp focus on the reticle cross-hairs.
  - c. Move your eye vertically and laterally to check whether the target image moves relative to the reticle cross-hairs.
    - If the target image does not move, there is no parallax.
    - If the target image does move, rotate the telescope focusing ring and repeat [Step 2c](#).
3. Rotate the tangent screw. The final turn of the tangent screw should be in a clockwise direction, to align the target accurately on the center cross-hairs.



## Setting the measurement mode and preparing the target

The TS635 construction total station has two measurement modes: Prism mode (P*r*i*s*m) and Reflectorless mode (N-P*r*i*s*m). To change the mode at any time from any observation screen, hold down **[MSR1]** or **[MSR2]**.

Set the measurement mode depending on the target you want to measure, as shown here.

Target	Target settings	Indicator on status bar
Prism, reflector sheet	Prism mode	No sign
Other, reflective materials	Reflectorless mode	

In some cases, you can measure to another target that is not appropriate to the set measurement mode.

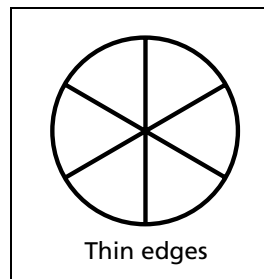
**Note** – The TS635 Total Station is Laser Class 1 in the measurement function, and Laser Class 2 in the Laser Pointer function. Do not sight the prism when the Laser Pointer is on.

### Measurement with a prism

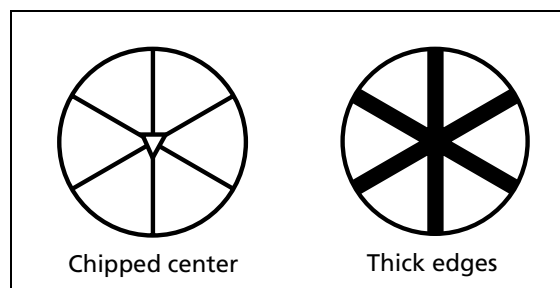
As the TS635 construction total station is extremely sensitive, multiple reflections on the prism surface can sometimes cause a significant loss in accuracy.

To maintain the accuracy of your measurements:

- Use a prism with thin edges.

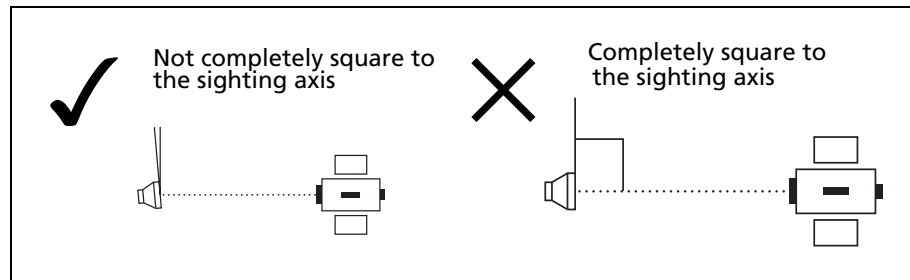


Do not use a prism with scratches, a dirty surface, a chipped center, or thick edges.





- When measuring a short distance, incline the prism slightly so that the EDM can ignore unnecessary reflections on the prism surface, as shown below.



- Hold the prism securely in place and do not move while taking measurements.

In Prism mode, to avoid false measurements on objects other than the prism or reflector-sheet, targets that are less reflective than the prism or reflector sheet are not measured. Even if you start a measurement, measured values are not displayed. To measure less reflective objects, use the N-Prism (Reflectorless) mode.

### Measurement in reflectorless (N-Prism) mode

The TS635 Construction Total Station enables reflectorless measurements up to 300 m (984 feet).

The intensity of the reflection from the target determines the distance the TS635 can measure in this mode. The color and condition of the target surface also affect the measurable distance, even if the targeted objects are the same. Some less-reflective targets may not be measured.

The following table describes some examples of targets and approximate measuring distances:

Target	You can measure approximately ...
Traffic signs, reflectors	500 meters (1640 feet)
Paper (white), veneer (new)	300 meters (990 feet)
Wall (brightly painted), brick	100 to 200 meters (330 to 660 feet)

Measurable distances may be shorter or measurement intervals may be longer if either of the following conditions apply:

- the angle of the laser against the target is small
- the surface of the target is wet

In direct sunlight, the measurable distance may be shorter. In this case, try to throw a shadow on the target.

Targets with completely flat surfaces, such as mirrors, cannot be measured unless the beam and the target are perpendicular to each other.

Make sure there are no obstacles between the instrument and the target when taking measurements. When you need to take measurements across a road or a place where vehicles or other objects are frequently moving, take several measurements to a target for the best result.

## Viewing and changing the measurement settings

Hold down **[MSR1]** or **[MSR2]** for one second.

- To move the cursor between the fields, press **[↑]** or **[↓]**.
- To change the value in the selected field, press **[←]** or **[→]**.



The available values are:

Field	Values
Target	Prism mode N-Prism mode
Constant (prism constant)	-999 mm through 999 mm
Mode	Precise Normal
Track	Track (continuous MSR) ON Track (continuous MSR) OFF

### Target field

If the measurement is started with the *Target* field set to Prism mode, there is a dash in front of the prism constant, for example **-18 mm**.

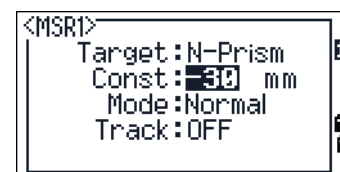
If the measurement is started with the *Target* field set to N-Prism (Reflectorless) mode, there is square bracket in front of the prism constant, for example **]18 mm**.

The displayed symbol will continuously move from left to right over the prism constant in the display.

### Prism constant

The factory default of the prism constant value of the TS635 construction total station is **-30 mm**.

Change the prism constant to match the constant value of the prism you are using.



Once you have set up the instrument, you can turn on the TS635 construction total station, change the instrument settings, and start a job. See also [Getting Started](#), page 33.

# Getting Started

## In this chapter:

- Parts of the instrument
- Instrument keyboard and display
- Turning on the instrument
- Turning off the instrument
- Regional configuration
- List available jobs or data
- Entering data
- Creating or opening a job
- Measuring distances

After you set up the instrument, see [page 19](#), you can start using the TS635 Construction Total Station.

This chapter describes the basic features of the instrument, how to turn it on, change the instrument settings, and start a job.

## Parts of the instrument

Figure 3.1 and Figure 3.2 show the main parts of the TS635 Construction Total Station.

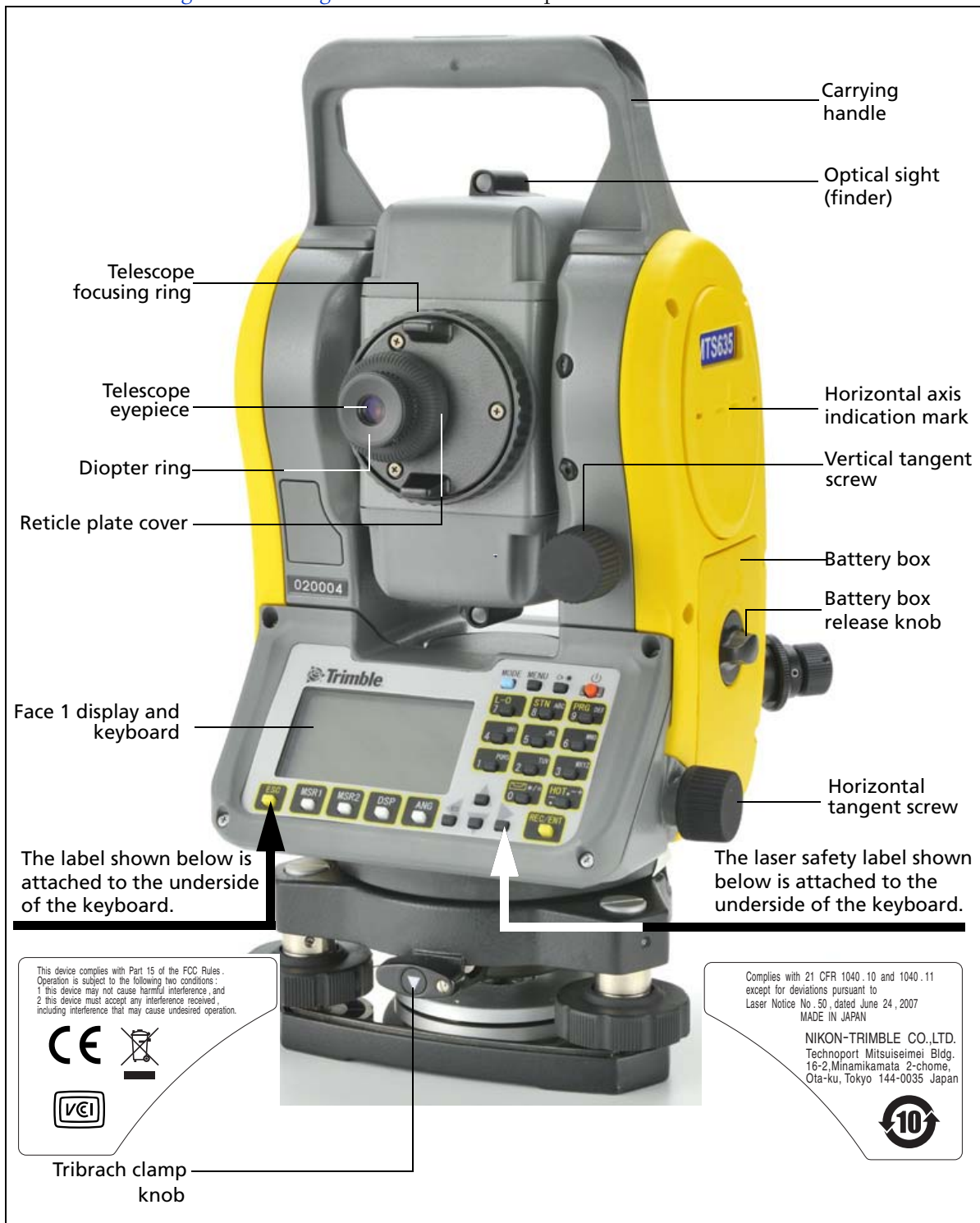


Figure 3.1 Back view of the TS635 Construction Total Station

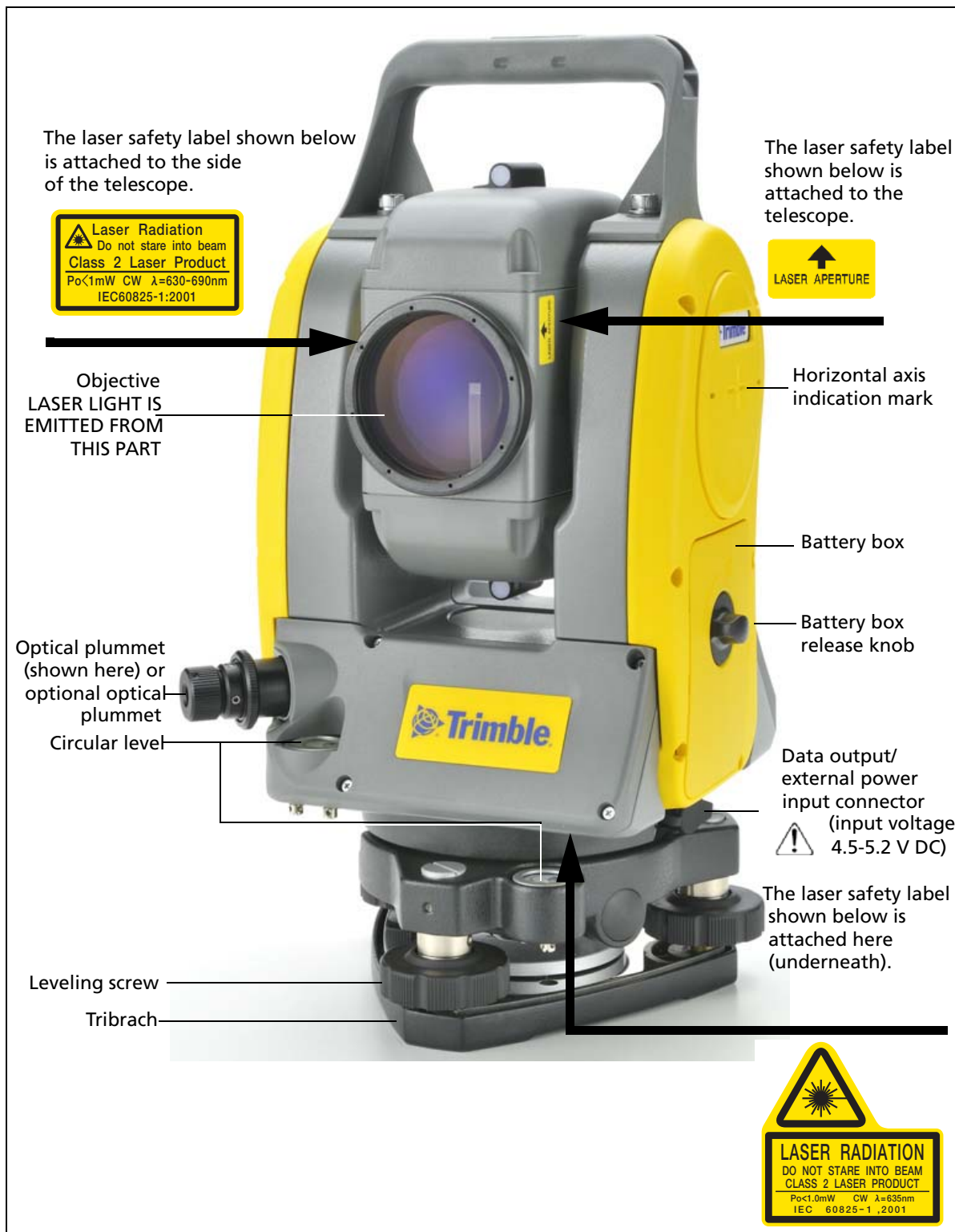
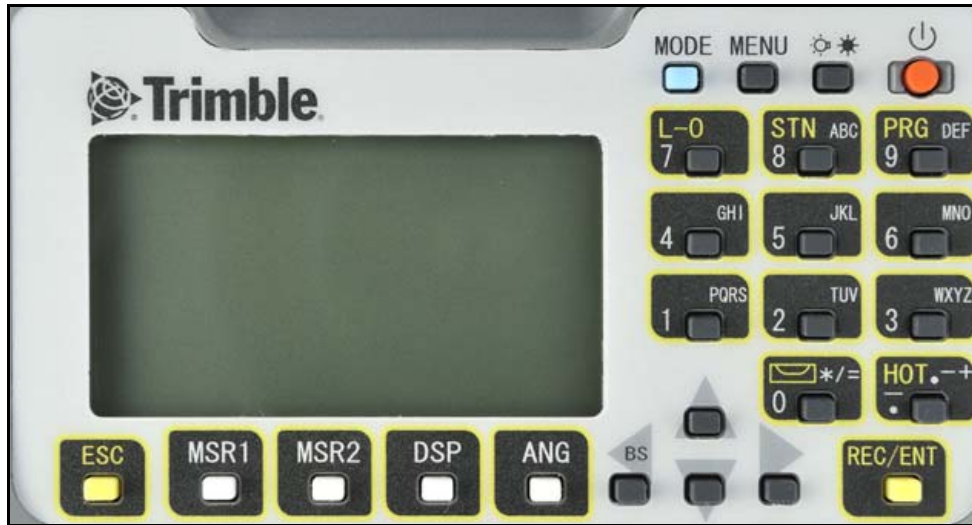










Figure 3.2 Front view of the TS635 Construction Total Station








## Instrument keyboard and display



### Instrument keyboard

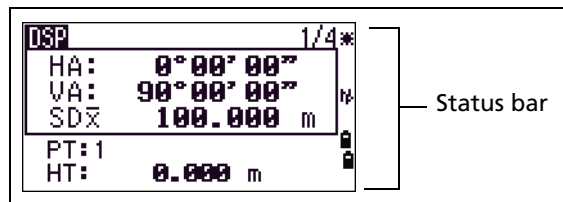
Use the buttons on the instrument keyboard to carry out the following functions:

Button	Function	See ...
	Turns the instrument on or off.	<a href="#">page 44</a>
	Illumination button. Turns the backlight on or off. Provides access to the switch window if held down for one second.	<a href="#">page 39</a>
	Displays the MENU screen.	<a href="#">page 91</a>
	Changes the button input mode between alphanumeric and numeric if pressed when you are in a PT or CD field.	<a href="#">page 41</a>
	Records measured data, moves on to the next screen, or confirms and accepts the entered data in input mode.	<a href="#">page 89</a>
	Returns to the previous screen. In numeric or alphanumeric mode, deletes input.	
	Starts distance measurement, using the measure mode settings for the <b>MSR1</b> button. Displays measurement mode settings, if held down for one second.	<a href="#">page 53</a>
	Starts distance measurement, using the measure mode settings for the <b>MSR2</b> button. Displays measurement mode settings, if held down for one second.	<a href="#">page 53</a>

Button	Function	See ...
	Moves to the next available display screen. Changes the fields that appear on the DSP1, DSP2, and DSP3 screens, if held down for one second.	<a href="#">page 40</a>
	Displays the Angle menu.	<a href="#">page 60</a>
	Displays the Layout function menu. In numeric mode, enters 7.	<a href="#">page 60</a>
	Displays the Station Setup menu. In numeric mode, enters 8. In alphanumeric mode, enters A, B, C, or 8.	<a href="#">page 60</a>
	Displays the Programs menu. In numeric mode, enters 9. In alphanumeric mode, enters D, E, F, or 9.	<a href="#">page 75</a>
	Displays the (HOT) menu, which includes Height of Target and Temp-Press settings. In numeric mode, enters – (minus). In alphanumeric mode, enters . (period), – (minus), or + (plus).	<a href="#">page 42</a>
	Displays the Bubble indicator. In numeric mode, enters 0. In alphanumeric mode, enters *, /, =, or 0.	<a href="#">page 42</a>


## Status bar

The status bar appears on the right of every screen. It contains icons that indicate the status of various system functions.



## Laser pointer indicator




The icon appears as you turn on the laser pointer. When the icon appears on the screen, the emitting power is laser class 2:

 Laser pointer ON.

If there is no icon, the laser pointer is off.



### Input mode indicator

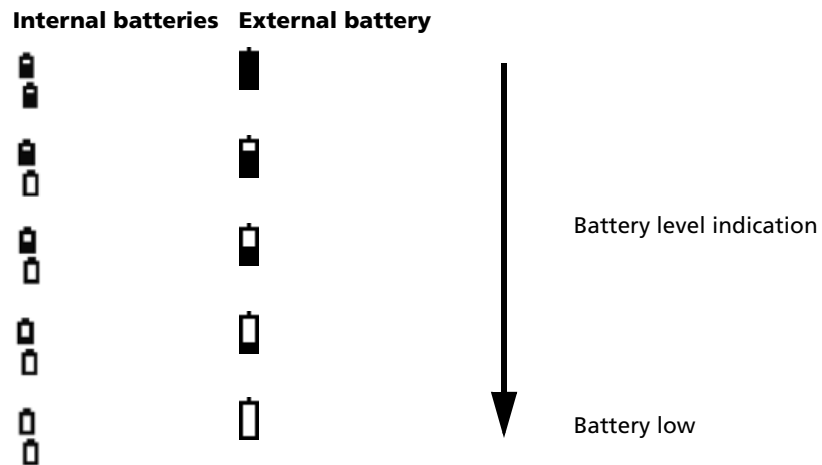
The input mode indicator appears only when you are entering points or coordinates. It shows the data input mode:

-  Input mode is numeric. Press a button on the number pad to enter the number printed on the button.
-  Input mode is alphabetic. Press a button on the number pad to enter the first letter printed beside the button. Press the button repeatedly to cycle through all the letters assigned to that button.  
For example, to enter the letter O in alphabetic mode, press  three times.

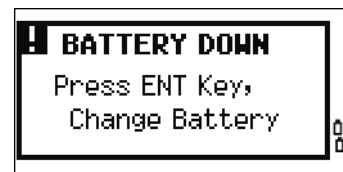
### Battery indicator

Shows each voltage level of the right and left internal batteries individually. When the external battery is connected with the instrument, its voltage is shown.

-  Internal batteries:
  - Top: left battery
  - Bottom: right battery
-  External battery



If the battery level is critically low, a message appears.






## EDM measurement status

When you are taking measurements, the EDM measurement status shows the mode that is being used.

When you display observation data, the EDM measurement status shows the mode that was used when the data was collected.:

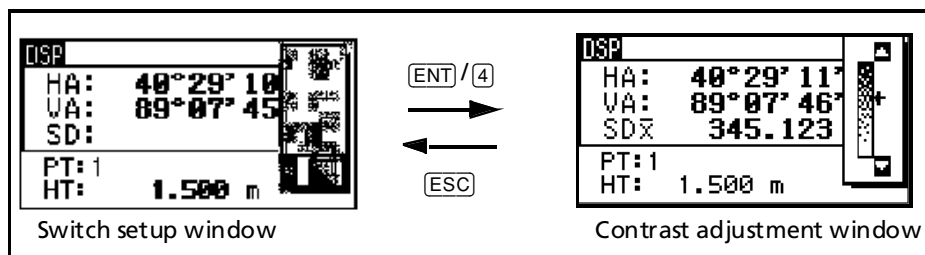
 Reflectorless mode

If there is no icon, Prism mode is being used.

## LCD backlight, laser pointer, beep sound, and contrast adjustment

Press the illumination key to open the the 4-switch window and then press:

- ① to turn the LCD backlight on/off
- ② to turn the laser pointer on /off
- ③ to turn the beep sound on /off
- ④ to open the contrast adjustment window.





Do the following:



- To turn on/off each function, press **(ENT)** when the option 1, 2, 3 or 4 is selected or directly press the ①, ②, ③, or ④ key. Holding down the illumination key for one second also turns on/off the LCD backlight.
- To move the cursor up and down, press **(▲)** or **(▼)**.
- To adjust the contrast, in the contrast adjustment window, press **(▶)** or **(◀)**.

To close the window, press **(ESC)**.

### Switch 1: Turning on/off the LCD backlight



-  LCD backlight is on
-  LCD backlight is off

### Switch 2: Turning on/off the laser pointer

-  Laser pointer is on
-  Laser pointer is off

The icon appears while turning on the laser pointer. When the icon is on the screen, the emitting power is Laser Class 2.

### Switch 3: Turning on/off the sound

-  Sound is on
-  Sound is off

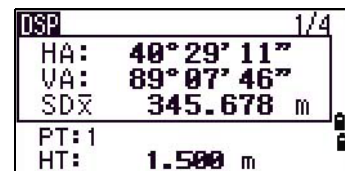
### **DSP** button

Use the **DSP** button to change the current display screen or to change display settings.

### Switching between display screens

When several display screens are available:

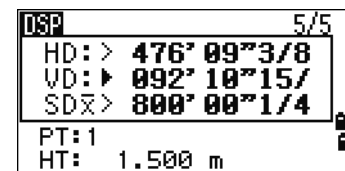
- the **DSP** indicator appears at the top left of the screen
- the screen indicator (for example, 1/4) appears at the top right



To move to the next available screen, press **DSP**.

For example, if you are currently in the second display screen, press **DSP** to move to the third display screen. The screen indicator changes from 2/4 to 3/4.

When the secondary distance unit is set, an additional screen is available. It shows the HD, VD, and SD values. See also [Other settings, page 94](#).



The smallest unit of display for distances measured in feet-and-inches is 1/16 in. Smaller units are impractical in the field.

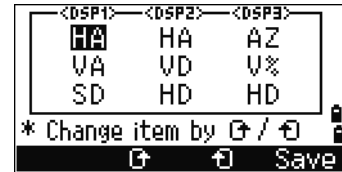
When the actual value is greater than 9999'11"15/16, the > symbol appears. If the actual distance is less than -9999'11"15/16, the ▶ (solid triangle) symbol appears. This does not affect calculations. The precise value is used internally in all cases.

## Customizing items in the Basic Measurement Screen (BMS)

To customize the items that are displayed on the DSP1, DSP2, and DSP3 screens:

1. Hold down **[DSP]** for one second.
2. Use the arrow buttons **[↑]**, **[↓]**, **[←]**, and **[→]** to highlight the item that you want to change:
3. Press the **[↵]** or **[⇐]** softkey to scroll through the list of items that can be displayed for this item.

The items that you can choose from are HA, AZ, HL, VA, V%, SD, VD, HD, Z, and (none).



4. To save your changes, press the **Save** softkey.

Alternatively, highlight the last item for DSP3 and press **[ENT]**. The DSP screens show the items you have selected.

Except for the (none) item, you cannot display the same item on more than one line of the same screen.

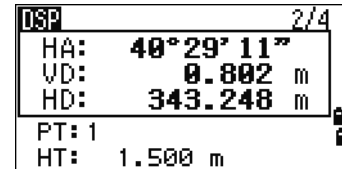
The items displayed in the DSP1, DSP2, DSP3, and DSP4 screens are also used in the corresponding Layout screens (LO2, LO3, LO4, and LO5).

You can also customize the displayed items in Layout.

## Header characters

The following header characters appear in DSP screens:

- Colon (:) indicates that tilt correction is applied to the value.
- Hash symbol (#) indicates that tilt correction is off.
- Underscore ( \_ ) under the tilt correction character indicates that Sea Level Correction or Scale factor is applied.



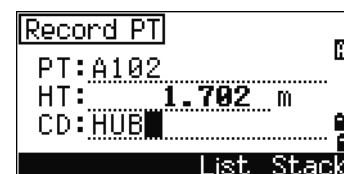
## **[MODE]** button

The **[MODE]** button is on the top row of the TS635 keypad. Use it to change the keyboard mode for the current screen.

## Changing the input mode while entering points or codes

When the cursor is in a point (PT) or code (CD) field, press **[MODE]** to change the input mode between alphanumeric (A) and numeric (1).

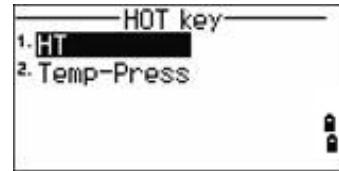
The input mode indicator in the status bar changes to show the current input mode.



When the cursor is in a height (HT) field, only numeric input mode is available. Pressing **[MODE]** has no effect when the cursor is in a HT field.

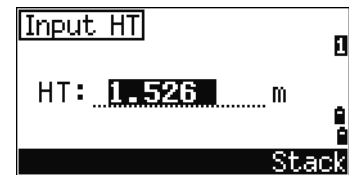
### **[HOT]** key

The HOT key menu is available from any observation screen. To display the HOT key menu, press **[HOT]**.



### Changing the height of the target

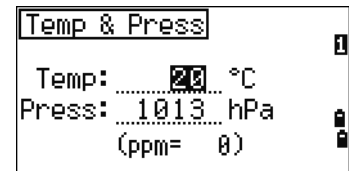
1. Press **[HOT]** to display the HOT menu.
2. Do one of the following:
  - Press **[1]**.
  - Select HT.
3. Press **[ENT]**.
4. Enter the target height or select the height from the HT stack.



**Note** – To display the HT stack, press the **Stack** softkey. The HT stack stores the last 20 HT values entered.

### Setting the current temperature and pressure

1. Press **[HOT]** to display the HOT menu.
2. Do one of the following:
  - Press **[2]**.
  - Select **TEMP-PRESS**.
3. Press **[ENT]**.
4. Enter the ambient temperature and pressure.  
The ppm value is updated automatically.



### Bubble indicator

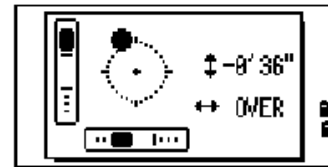
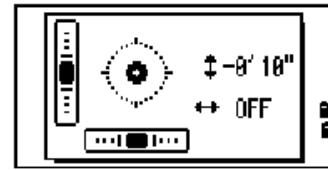
The bubble indicator appears if the instrument goes out of level while the compensator is turned on. It also appears directly after the start up screen.

To display the bubble indicator in an observation screen at any other time, press **[Envelope]**.

The TS635 Construction Total Station has a two-axis level compensation. To turn the leveling compensators on or off, press  $\leftarrow$  or  $\rightarrow$ . When the levelling compensators are turned off, the text OFF appears on the screen.

If the instrument is more than  $\pm 3'30''$  out of level, the text OVER appears on the screen.

To return to the observation screen, press  $\text{ESC}$  or  $\text{ENT}$ .

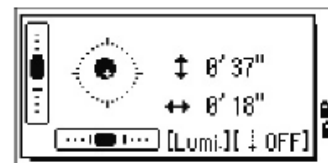
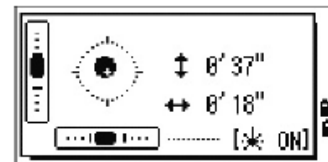


## Laser plummet

### Laser plummet on / off

Do one of the following:

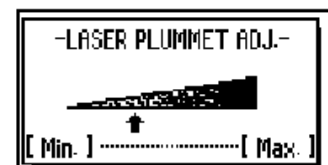
- To turn the laser plummet switch on, press  $[\ast \text{ ON}]$ .
- To close the bubble indicator window, press  $\text{ESC}$ .
- To turn the laser plummet switch off, press  $[\downarrow \text{ OFF}]$ .
- To open the luminance adjustment window, press  $\text{Lumi.}$
- To turn the laser plummet switch off and close the bubble indicator window, press  $\text{ESC}$ .



### Laser luminance adjustment

Laser luminance can be set to 4 levels.

- To set the luminance brighter by one level, press  $\text{Light}$  once.
- To set the luminance darker by one level, press  $\text{Dark}$  once.



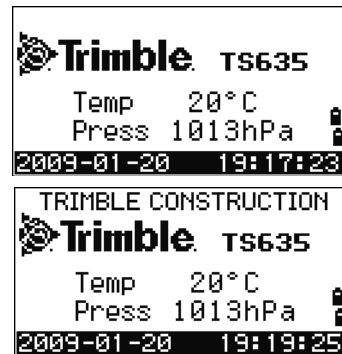
To return to the bubble indicator window, press  $\text{ESC}$  or  $\text{ENT}$ .

The current setting of leveling compensators is indicated by header characters (:, #, ., and #) after field labels (such as HA, VA, SD, and HD) in observation screens. For more information, see [Header characters, page 41](#).

## Turning on the instrument

Press the **[PWR]** button. The start-up screen appears. It shows the model name, current temperature, pressure, date, and time. The display automatically changes to the electronic level after two seconds.

If you entered your name or your company's name in the Owner's detail field, the text from this field appears on the start-up screen. To set the Owner's detail field, press **[MENU]** and then select **Settings / Other**. See also [Other settings, page 94](#).



## Turning off the instrument

1. Press **[PWR]** and **[ENT]**.
2. Do one of the following:

Press...	To...
<b>[ENT]</b> again	turn off the instrument
the <b>Reset</b> softkey	reboot the software and re-start the instrument
the <b>Sleep</b> softkey	access the Basic Measurement Screen (BMS) without an open job.
the <b>Sleep</b> softkey	put the instrument into power-saving mode
<b>[ESC]</b>	cancel the power-off process and return to the previous screen

## Sleep mode

To put the instrument into sleep mode, do one of the following:

- In the Press **[ENT]** → OFF screen, press the **Sleep** softkey.
- Enable the Power Save setting. See also [Power saving, page 94](#).

The instrument wakes up if any of the following events occur:

- You press a button
- The instrument receives a remote control command
- You rotate the alidade
- You tilt the telescope

## Regional configuration

To provide easier configuration for common regional settings, you can quickly configure the TS635 Construction Total Station to a pre-set combination of default regional settings. The *Regional Configuration* screen appears only after the language configuration is complete and the instrument has rebooted.

1. Follow the steps in the language section on [page 95](#).

Once the instrument reboots, the *Regional Configuration* screen appears.



2. Press  $\uparrow$  or  $\downarrow$  to highlight the required regional settings and then press  $\text{ENT}$ .
3. If you do not want to change the current settings, press  $\text{ESC}$  and quit. The instrument will continue to use the last settings that were configured.

The settings affected by the *Regional Configuration* screen are:

Category	Setting	Europe	International	United States
Angle	VA zero	Zenith	Zenith	Zenith
	Resolution	5"	5"	5"
Distance	Scale	1.000000	1.000000	1.000000
	T-P Corr.	On	On	On
	Sea Level	Off	Off	Off
	C&R corr.	0.132	0.132	0.132
Coordinates	Order	ENZ	ENZ	NEZ
	Label	ENZ	ENZ	NEZ
Power Save	Main Unit	Off	Off	Off
	EDM Unit	Off	Off	Off
	Sleep	5 minutes	5 minutes	5 minutes
Communication	Ext. Comm	Nikon	Nikon	Nikon
	Baud	4800	4800	4800
	Length	8	8	8
	Parity	None	None	None
	Stop bit	1	1	1
Units	Angle	GON	DEG	DEG
	Distance	meters	meters	US-ft
	Temp	°C	°C	°F
	Press	mm Hg	mm Hg	In Hg
Rec	Rec Data	ON	ON	ON
	CD Field	ON	ON	ON
	Add Const	1000	1000	1000
Others	XYZ disp	Fast	Fast	Fast
	2nd Unit	None	None	None
	CD Input	<ABC>	<ABC>	<ABC>

The default regional configuration pre-set is “Europe” settings. See also [Settings \(basic job settings\)](#), page 90.

## List available jobs or data

The TS635 Construction Total Station lists available jobs or data when you do any of the following:

- view or edit data (Press **MENU** then select **Data**)
- open the Job Manager (Press **MENU** then select **Job**)
- search for points or codes

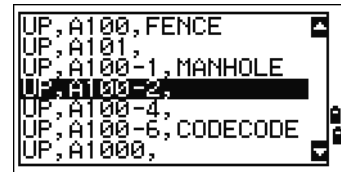
The current cursor position is shown in inverted colors (it appears as white text on a black background).

Press **▲** to move the cursor one line up, or press **▼** to move the cursor one line down.

If the Page Up icon **▲** appears, there are more pages before the current page. Press **◀** to move up one page.

If the Page Down icon **▼** appears, there are more pages after the current page. Press **▶** to move down one page.

To select an item from the list, move the cursor onto the item and press **ENT**.



## Entering data

You can enter the following into the TS635 Construction Total Station:

- A point name or number, see [page 46](#)
- A code, see [page 49](#)

### Entering a point name or number

You can use numeric or alphanumeric names up to 20 characters long to identify points.

The default name for a new point is the last point name entered, with the last digit incremented. For example, if the last point name was A100, the default name for the next point is A101.

If the last character of the previous point name is alphabetic, the default point name is identical to the last point name.

When the cursor is in a PT (point) field, there are several ways to specify a point, or to enter coordinates. You can:

- Enter an existing point, see [page 47](#)



- Enter a new point, see [page 47](#)
- Press **[ENT]** without a point name, see [page 47](#)
- Specify a wildcard, see [page 48](#)
- Record an instant measurement, see [page 48](#)
- Enter a point from a point stack, see [page 49](#)
- Enter a point from the point list, see [page 49](#)

### Entering an existing point

When you enter a known point name or number, the coordinates of that point are briefly displayed. A short beep sounds before the next screen appears or the next field is selected.

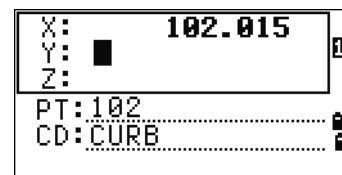
To adjust the duration of the coordinate window display, press **[MENU]** then select `Settings` / `Others`. To leave the window open until you press **[ENT]**, set the *XYZ disp* field to +ENT. See also [page 94](#).



### Entering a new point

When you enter a new point name or number, a coordinate input screen appears. Enter the coordinates for the point in NE, NEZ, or elevation-only (Z) format.

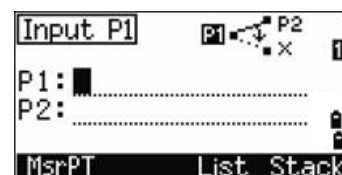
To store the point in the current job, press **[ENT]** on the last line (the CD field).



### Pressing **[ENT]** without a point name

To use a point without recording the coordinates, press **[ENT]** in a PT field, without entering a point name.

The input coordinates are used in the calculation but they are not saved in the database. The message `This PT will not be recorded` appears.



### Specifying a wildcard (\*)

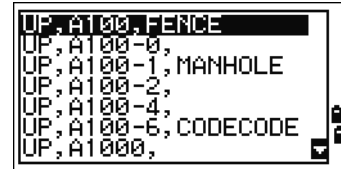
If you include an asterisk ( for example, A100\*) when you enter a point or code name, a list of points that match the entered text appears.

Use  $\uparrow$  or  $\downarrow$  to move the cursor to the point that you want to use. Then press  $\text{ENT}$ .

If the Page Up  $\uparrow$  icon appears, you can use it to move up one page on the list. You can also use  $\uparrow$ .

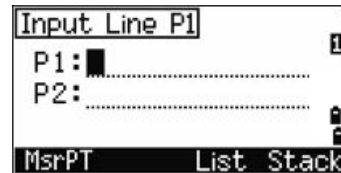
If the Page Down  $\downarrow$  icon appears, you can use it to move down one page. You can also use  $\downarrow$ .

When you select a point from the list, its coordinates are displayed and a beep sounds.

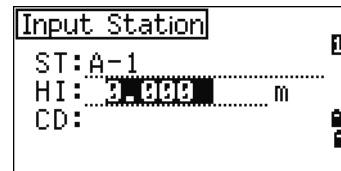


### Entering a point by recording an instant measurement

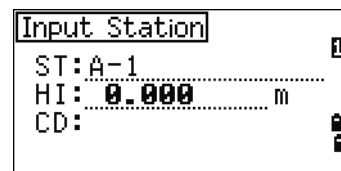
1. Press the MSR softkey:  
An observation screen appears.
2. To start a measurement, press  $\text{MSR1}$  or  $\text{MSR2}$ .
3. To change the height of the target, select the HT softkey.
4. When you have finished the measurement, press  $\text{ENT}$  to go to the point recording screen.
5. Enter the point or code name and then press  $\text{ENT}$ .



When you move the cursor to a field, the current or default value appears in inverted colors. (It appears as white text on a black background). This is the default Replace All input mode.



To change the input mode to Overwrite and highlight the first character, press  $\leftarrow$ . To move the cursor to the end of the string, press  $\rightarrow$ .

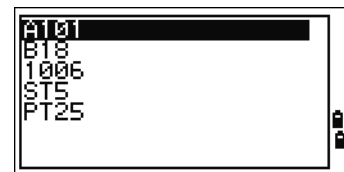
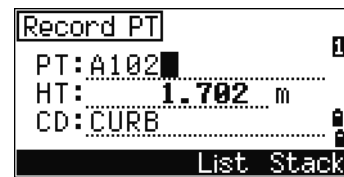


### Entering a point from the point stack

The point stack is a list of the last 20 point names used, in chronological order from last used to first used. To enter a point from the point stack:

1. Select the **Stack** softkey when the cursor is in the PT field. The stack appears.
2. Press **▲** or **▼** to move the cursor to the point that you want to use.
3. Press **ENT**.

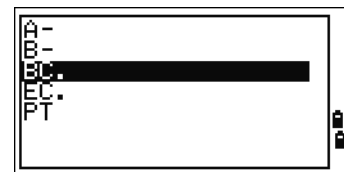
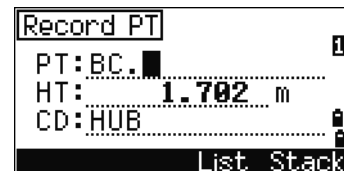
When you return to the point input screen, the selected point name is entered in the PT field, incremented by one. For example, if you selected the A101 point, A102 appears in the PT field.



### Entering a point from the point list

1. Select the **List** softkey when the cursor is in the PT field. A list of existing points appears.
2. Press **▲** or **▼** to move the cursor to the point that you want to use.
3. Press **ENT**.

When you return to the point input screen, the selected point name is entered in the PT field. Add numeric or alphabetic characters if required.



### Entering a code

The CD (Code) field defaults to the last code used. You can select a different code in the input point screen.

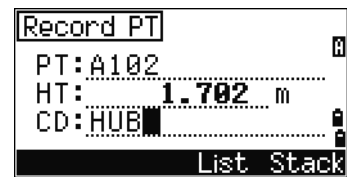
Codenames can be numeric or alphanumeric, and up to 16 characters long.

There are several ways to enter a code:

- Enter a code directly, see [page 50](#)
- Enter a code from the code stack, see [page 50](#)
- Enter a code from the code list, see [page 50](#)

### Entering a code directly

1. To change the input mode to alphanumeric or numeric, press **MODE**.
2. Use the keypad to enter the code.

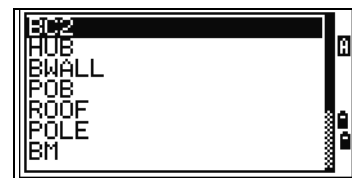
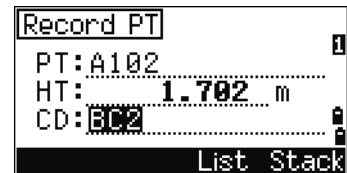


### Entering a code from the code stack

The code stack is a list of up to 20 recently used codes. When you reboot the TS635 Construction Total Station, the code stack is cleared.

To enter a code from the code stack:

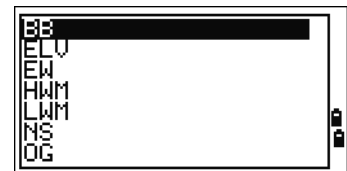
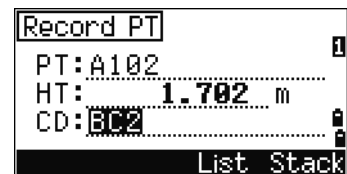
1. Select the **Stack** softkey when the cursor is in the CD field. The stack appears.
2. To move the cursor to the code that you want to use, press **▲** or **▼**.
3. Press **ENT**.



The selected code is copied to the CD field.

### Entering a code from the code list

1. Select the **List** softkey when the cursor is in the CD field. A list of existing codes appear.
2. Press **▲** or **▼** to highlight the feature code that you want to use.
3. Press **ENT**.



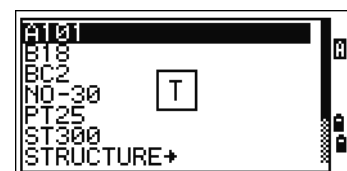
A layer has an arrow at the end of the code label. If you highlight a layer in the list and then press **ENT**, the codes and layers in that layer are displayed.

When you return to the input screen, the selected code is entered in the CD field.

### Advanced feature: Searching for a code using the first character

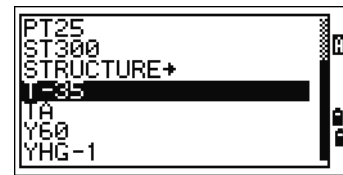
Items are shown in alphabetic order. To find a code quickly when the code list appears, use the first-character search. For example, to see feature codes that begin with T, use the keypad to enter the letter T (press **T** twice).

After each button press, the input mode field displays the selected letter. For example, if you press **T**, **S** appears. If you quickly press **T** again, **T** appears. If you do not press the **T** button again, the letter T is selected.



Once you select a letter, the cursor moves to the feature code beginning with that letter.

If there is no code beginning with that letter, the cursor moves to the next available letter.



## Entering values in feet and inches

If US Survey Feet (US-Ft) or International Feet (I-Ft) is selected as the distance unit, you can enter and display distances, HIs, HTs, and coordinate values in decimal feet or in feet and inches. See also [Unit, page 93](#), and [Other settings, page 94](#).

To enter values in feet and inches in an input screen, enter the elements, separated by periods (.), in the following format:

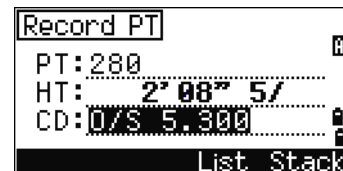
<Feet> [ ] <Inches> [ ] <Numerator> [ ] <Denominator> [ ] **ENT**  
                   (0–11)           (0–15)           (0–99)

The default denominator is 16. If the denominator is 16, you do not have to enter it, and it is not displayed on the screen.

For example, if you enter

[2][0][8].[5].[ENT], it appears as 2' 08" 5/ (2 feet, 8 and 5/16ths inches).

The following examples show how to enter various values:



To enter...	Key in...
65' 5 3/8"	[6][5].[5].[3].[8] <b>ENT</b>
65'	[6][5] <b>ENT</b>
65' 5"	[6][5].[5] <b>ENT</b>
65' 5 3/8"	[6][5].[5].[6] <b>ENT</b>
5 3/8"	[0].[5].[3].[8] <b>ENT</b> or [0].[5].[6] <b>ENT</b>

The numerator and denominator that you enter are automatically converted to the closest value from the following list: 0, 1/8, 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1/16, 3/16, 5/16, 7/16, 9/16, 11/16, 13/16, 15/16.

If the denominator is 16, it is not shown on the screen.

## Creating or opening a job

To record data on the TS635 Construction Total Station, you must create or open a job.

**Note** – Before using the TS635 Construction Total Station for the first time, check that you are using the required job settings.

## Creating a new job

1. Press **[MENU]**. The MENU screen appears.
2. Press **[1]**. The Job Manager appears.
3. Select the **Cr eat** softkey. The Create Job screen appears.
4. Enter the job name.
5. To check the job settings, select the **Set t** softkey. You cannot change the settings for a job once you have created the job.
6. Press **[ENT]** in the last field of the Job Sett screen. The new job is created.



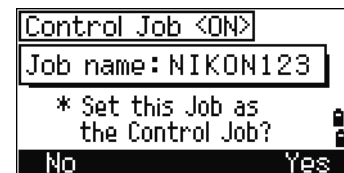
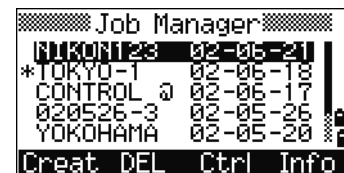
*Note – You can only have a maximum of 32 jobs.*

## Creating a control job

A control job, or common file, stores coordinate data that is used by several field jobs. To create a control job in the office:

1. Press **[MENU]**. The MENU screen appears.
2. Press **[1]** or select **Job**. The Job Manager appears.
3. Move the cursor to the job to use as the control job.
4. Select the **Ctrl** softkey.
5. Select the **Yes** softkey.

When you enter a point name or number, the system searches in the current job first. If the point is not found in the current job, the search is automatically extended to the control job. If the point is found in the control job, the selected point is copied to the current job as a UP record.



## Measuring distances



**WARNING** – Never look at the sun through the telescope. If you do, you may damage or lose your eyesight.



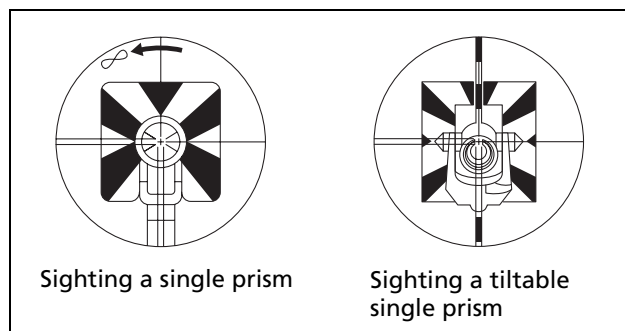
**WARNING** – Precautions should be taken to ensure that persons do not look directly, with or without an optical instrument, into the beam.



**WARNING** – Laser beam path should be located well above or below eye level wherever practicable.

### Sighting a prism reflector

Sight the telescope until you see cross-hairs at the center of the prism reflector.

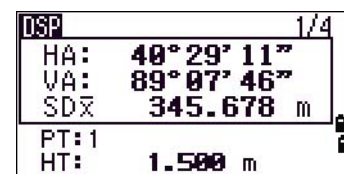


### Taking a distance measurement

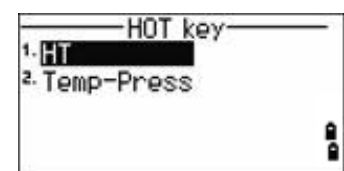
To take a distance measurement, press **[MSR1]** or **[MSR2]** in the Basic Measurement Screen (BMS) or in any observation screen.

While the instrument is taking a measurement, the prism constant appears in a smaller font.

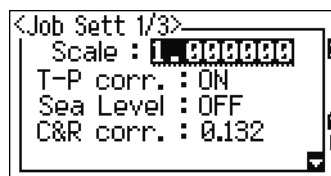
If tracking is set to ON, measurements are taken continuously until you press **[MSR1]**, **[MSR2]**, or **[ESC]**. Each time a measurement is taken, the distance is updated.



To change the height of target (HT), temperature, or pressure, press **[HOT]**. See also **[HOT]** button, [page 42](#).

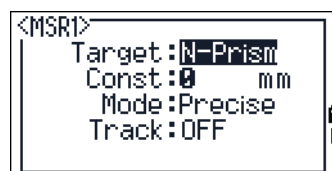


Settings that relate to corrections (T-P corr, Sea Level, C&R corr., and Map projection) are included in the job settings and are job-specific. To change any of these settings, you must create a new job. See also [Job](#), page 86, and [Settings \(basic job settings\)](#), page 90.



### Viewing and changing the measurement settings

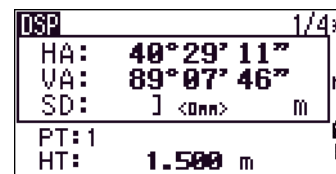
1. Hold down **[MSR1]** or **[MSR2]** for one second.
2. To move the cursor between the fields, press **[^]** or **[v]**.
3. To change the value in the selected field, press **[<]** or **[>]**.



Field	Values
Target	Prism N-Prism
Const (prism constant)	-999 mm through 999 mm
Mode	Precise Normal
Track	Track (continuous MSR) ON Track (continuous MSR) OFF

### Target field

- If the measurement is started with the Target field set to Prism, there is a dash “-” in front of the prism constant.
- If the measurement is started with the Target field set to N-Prism, there is a right square bracket “]” in front of the prism constant.



The symbol then continuously moves from left to right over the prism constant in the display.

The Target setting is used by the TS635 Construction Total Station to apply better cyclic-error adjustment in distance measurement. The target setting efficiently eliminates multipath reflection.

An incorrect Target setting may result in measurements outside the precision and intervals specified for the instrument.

If you aim a prism target in the N-prism mode, the warning message **Signal High! → Try Prism Mode** appears because of the excessive light reflection. A measurement made immediately after changing the target setting may take a longer time than usual.