Trimble® S3 Total Station

User Guide

Version 2.0
Part Number 57022010
January 2010

Corporate Office

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All other trademarks are the property of their respective owners.

This product is covered by the following patents: CH 465584, CH 466800, CH 885399, DE 69005105, DE 69005106, DE 69706653.3, EPO 465584, EPO 466800, EPO 885399, J 2846950, J 3039801, SE 0203830-5, SE 524329, SE 524655, SE 8901219-9, SE 8901221-5, US 5229828, US 5313409, US 6115112, US 7307710, DE 60319016.2, JP 4268135, US 7382444, US 7441340, US 7589313 and D 526588. Patents pending.

Release Notice

This is the January 2010 release version 2.0 of the Trimble S3 Total Station user guide, part number 57022010. It applies to the Trimble S3 Total Station.

The following limited warranties give you specific legal rights. You may have others, which vary from state/jurisdiction to state/jurisdiction.

Product Warranty Information

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

Registration

To receive information regarding updates and new products, please contact your local dealer or visit www.trimble.com/register. Upon registration you may select the newsletter, upgrade or new product information you desire.

Notices

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.

N 324

Canada

This Class B digital apparatus complies with Canadian ICES-003

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.

This device has been designed to operate with an antenna having a maximum gain of 2.0 dBi. Antennas having a higher gain are strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication. 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.

The Radio Side Cover 2.4 GHz Part Number: 58123010 contains radio module with IC: 4492A-2410G

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.

CE

For product recycling instructions and more information, please go to www.trimble.com/ev.shtml.

Recycling in Europe: To recycle Trimble WEEE (Waste Electrical and Electronic Equipment, products that run on electrical power.), Call +31 497 53 24 30, 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

Japan

The Radio Side Cover 2.4 GHz Part Number: 58123010 contains radio module with certificate number: 005NYCA0416.

USA

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.The antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operated in conjunction with any other antenna or transmitter.

The Radio Side Cover 2.4 GHz Part Number: 58123010 contains radio module with certificate number:

FCC ID: HSW- 2410G

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

Taiwan

The Radio Side Cover 2.4 GHz Part Number: 58123010 contains radio module with certificate number:

CCAB09LP4320T5

Battery Recycling Requirements

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

Important Information

Laser Safety

Before using the Trimble S3 Total Station, make sure that you understand this user guide, as well as all equipment and job site safety requirements.

This equipment has been tested and found to comply with IEC 60825-1:2007, 21 CFR 1040.10, and 1040.11 except for deviations persuant to Laser Notice No. 50, dated June 24, 2007.

Warning – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous LED or laser radiation exposure. As with any bright light source, such as the sun, electric welding arcs or arc lamps, common sense applies. DO NOT look into the laser aperture when the laser is on. For further information regarding safe use of lasers, refer to the IEC standard 60825-1:2007.

Queries

Address any questions you may have about laser safety to:

Trimble Navigation Limited

5475 Kellenburger Road

Dayton, OH USA 45424-1099

Attention: Laser Safety Officer, Quality Assurance Group

Phone (937) 233-8921 ext 824 or (800) 538-7800

Fax (937) 233-9661

Trimble S3 Servo Total Station

The Trimble S3 Servo Total Station is a CLASS 3R LASER PRODUCT:

The Trimble S3 Servo Total Station contains visible laser sources:

A laser diode for distance measuring in DR mode and laser pointer function operating at 660 nm (visible light), with a beam divergence of 0.4 x 0.4 mrad and an output power of <5 mW, while the emission is coaxial with the telescope. This mode operates in LASER CLASS 3R.

The laser diode for distance measuring in prism mode operates at 660 nm (visible light), with a beam divergence of 0.4 x 0.4 mrad and an output power of <0.017 mW, while the emission is coaxial with the telescope. This mode operates in LASER CLASS 1.

Trimble S3 Autolock/Robotic Total Station

The Trimble S3 Autolock®/Robotic Total Station is a CLASS 3R LASER PRODUCT:

The Trimble S3 Autolock/Robotic Total Station contains visible and invisible laser sources:

A laser diode for distance measuring in DR mode and laser pointer function operating at 660 nm (visible light), with a beam divergence of 0.4 x 0.4 mrad and an output power of <5 mW, while the emission is coaxial with the telescope. This mode operates in LASER CLASS 3R.

The laser diode for distance measuring in prism mode operates at 660 nm (visible light), with a beam divergence of 0.4 x 0.4 mrad and an output power of <0.017 mW, while the emission is coaxial with the telescope. This mode operates in LASER CLASS 1.

An Autolock laser diode operates at 785 nm (infrared, non-visible light), with a beam divergence of 38.5 mrad and an output power of < 0.35 mW, while the emission is coaxial with the telescope. This mode operates in LASER CLASS 1.

Battery Safety

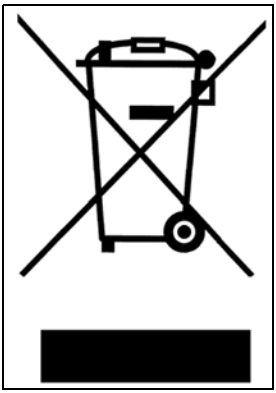
Warning – Do not damage the rechargeable Lithium-ion battery. A damaged battery can cause an explosion or fire, and can result in personal injury and/or property damage. To prevent injury or damage:
– Do not use or charge the battery if it appears to be damaged. Signs of damage include, but are not limited 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 Trimble 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 Trimble equipment that is specified to use it.
– Use the battery only for its intended use and according to the instructions in the product documentation.

Environmental Information

NOTICE FOR TRIMBLE'S EUROPEAN UNION CUSTOMERS



Trimble is pleased to announce a new recycling program for our European Union customers. At Trimble, we recognize the importance of minimizing the environmental impacts of our products. We endeavor to meet your needs, not only when you purchase and use our products, but also when you are ready to dispose of them. That is why Trimble is actively pursuing, and will continue to pursue, the expanded use of environmentally friendly materials in all its products, and why we have established a convenient and environmentally friendly recycling program.

As Trimble makes additional recycling facilities available for your use, we will post their locations and contact information to our Recycling Instructions web page.

For product recycling instructions and more information, please go to

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

Declaration of Conformity

Trimble S3 Servo/Autolock Total Station

Trimble

P/N 57007021

Declaration of Conformity (DoC)

CE

Issuer's name: **Trimble AB**
P.O. Box 64
SE-182 11 Danderyd
Sweden

Object of declaration: **Trimble® S3 Total Station**

Type/Model	*Part Number*
S3 X" DR	58410019
S3 X" DR	58410020

X = Code of accuracy

The object of declaration described above fulfils the requirements of the Low Voltage Directive 2006/95/EC (LVD) and is in conformity with the essential requirements of the EMC Directive 2004/108/EC (EMCD) based on the following European harmonised standards:

LVD: **IEC/EN 60825-1:2007** (Safety of laser products)

EMCD: **EN 61326-1:2006** (EMC for electrical equipment for measurement, control & laboratory use)
Emission: Group 1 / Class B ISM equipment.
Immunity: Requirements for equipment intended for use in industrial locations.

Signed for and on behalf of: Trimble AB

Date: December 3, 2009

Name and function: Peter Fredriksson, Director of Engineering

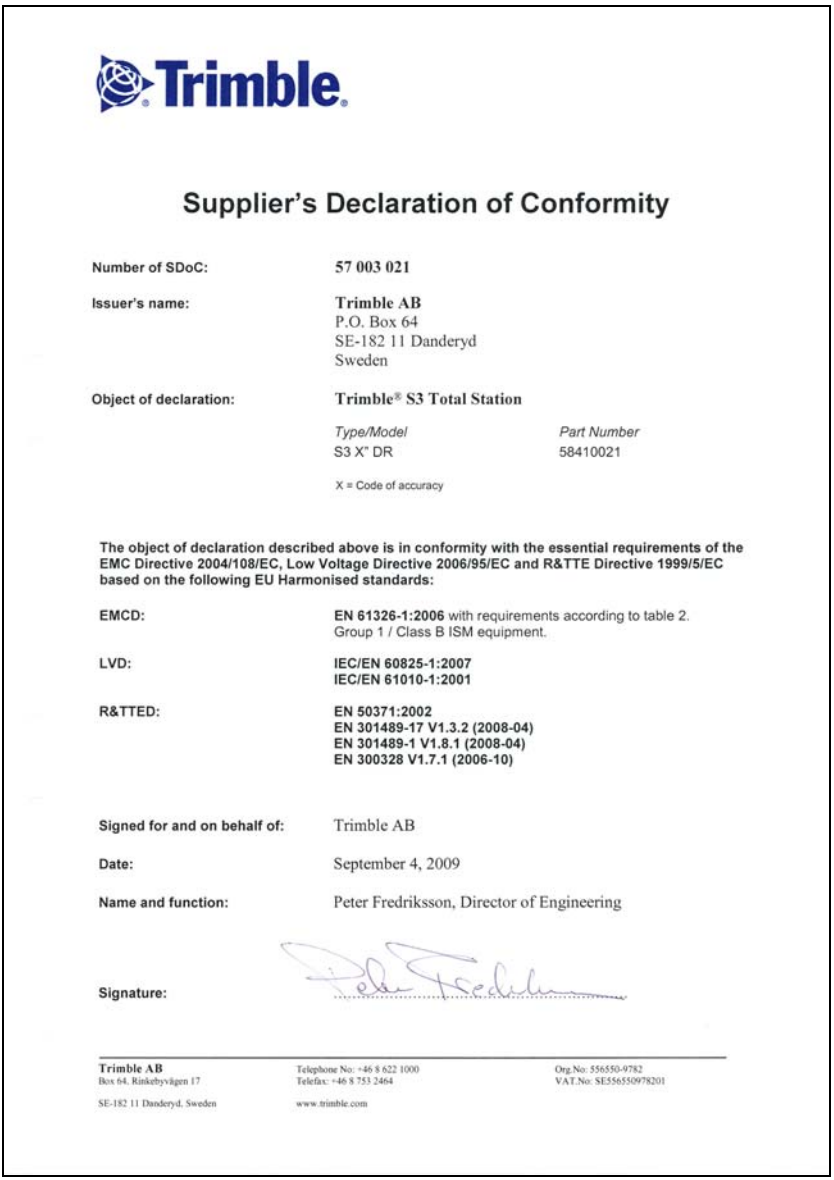
Signature:

Trimble AB
Box 64, Rinkebyvägen 17
SE-182 11 Danderyd, Sweden

Telephone No: +46 8 622 1000
Telefax: +46 8 753 2464
www.trimble.com

Org.No: 556550-9782
VAT.No: SE556550978201

Trimble S3 Robotic Total Station



Trimble

Supplier's Declaration of Conformity

Number of SDoC:	**57 003 021**
Issuer's name:	**Trimble AB** P.O. Box 64 SE-182 11 Danderyd Sweden
Object of declaration:	**Trimble® S3 Total Station**

Type/Model	*Part Number*
S3 X" DR	58410021

X = Code of accuracy

The object of declaration described above is in conformity with the essential requirements of the EMC Directive 2004/108/EC, Low Voltage Directive 2006/95/EC and R&TTE Directive 1999/5/EC based on the following EU Harmonised standards:

EMCD:	**EN 61326-1:2006** with requirements according to table 2. Group 1 / Class B ISM equipment.
LVD:	**IEC/EN 60825-1:2007** **IEC/EN 61010-1:2001**
R&TTED:	**EN 50371:2002** **EN 301489-17 V1.3.2 (2008-04)** **EN 301489-1 V1.8.1 (2008-04)** **EN 300328 V1.7.1 (2006-10)**
Signed for and on behalf of:	Trimble AB
Date:	September 4, 2009
Name and function:	Peter Fredriksson, Director of Engineering
Signature:	

Trimble AB
Box 64, Rinkebyvägen 17
SE-182 11 Danderyd, Sweden

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www.trimble.com

Org.No: 556550-9782
VAT.No: SE556550978201

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CHAPTER

1

Introduction

In this chapter:

- Welcome
- Related Information
- Technical Assistance
- Your Comments
- Registration

Welcome

Welcome to the Trimble S3 Total Station user guide. This manual describes how to setup and use the Trimble S3 Total Station. Even if you have used an optical total station before, Trimble recommends that you spend some time reading this manual to learn about the special features of this product.

In this user guide Trimble S3 Total Station refers to all three available models. When the description needs to be distinguished between the models they will be referred to as Trimble S3 Servo/Autolock/ Robotic Total Station.

Related Information

For more information about this product, please visit our web site at:

www.trimble.com

Technical Assistance

If you have a problem and cannot find the information you need in the product documentation, ***contact your local Distributor***. Alternatively, do one of the following:

- Request technical support using the Trimble web site at www.trimble.com/support/support.htm
- Send an e-mail to trimble_support@trimble.com

Your Comments

Your feedback about the supporting documentation helps us to improve it with each revision.

E-mail your comments to ReaderFeedback@trimble.com.

Registration

To receive information regarding updates and new products please register on the Trimble web site.

www.trimble.com/register

CHAPTER

2

Inspection, Care and Maintenance

In this chapter:

- Inspecting the Container
- Trimble S3 Total Station Case
- Care and Maintenance
- Transporting the Trimble S3 Total Station
- Servicing

Inspecting the Container

Inspect the shipping container. If the container arrives in poor condition, examine the equipment for visible damage. If damage is found, immediately notify the carrier and your Trimble sales representative. Keep the container and the packing material for the carrier to inspect.

Trimble S3 Total Station Case

When unpacking the Trimble S3 Total Station, check that all ordered items are received. Below is an example of where all items can be placed in the Trimble S3 Total Station case. See figure 2.1.

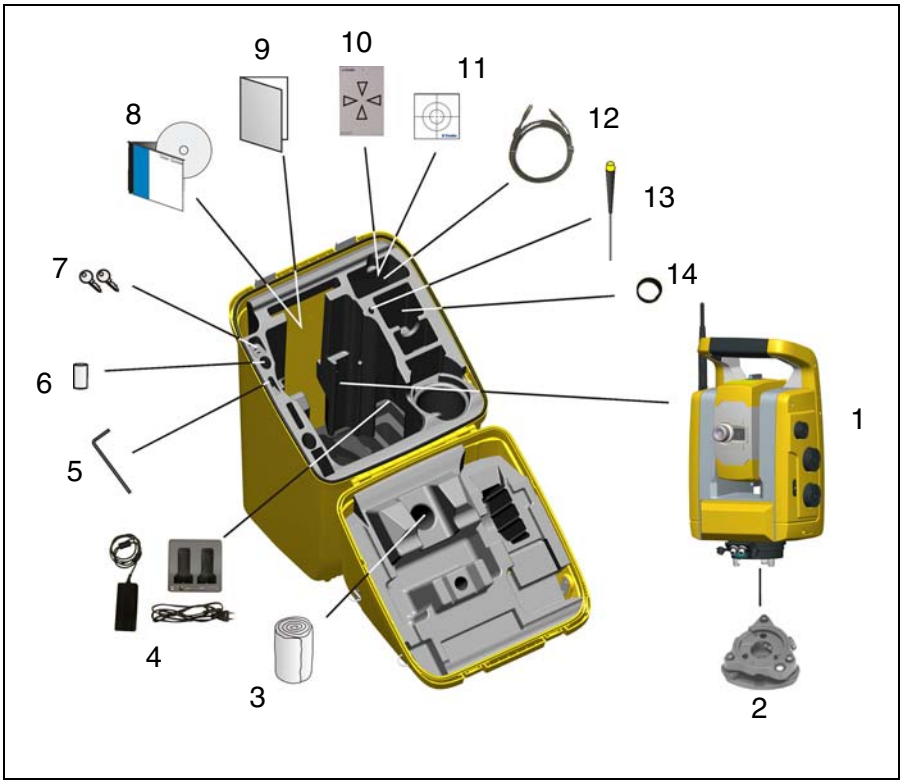


Figure 2.1 Position of items in the Trimble S3 Total Station case

Item	Description
1	Trimble S3 Total Station
2	Tribrach (Mounted on Trimble S3 Total Station)
3	Rain cover
4	Dual slot battery charger, power supply and power cable
5	Tool for handle
6	Tool kit for tribrach
7	Trimble S3 Total Station case keys (2x)
8	Trimble S3 Total Station user guide CD
9	Getting started guide, Warranty activation card, Extended warranty activation card, Trimble S3 Total Station test certificate
10	Laser adjustment plate
11	Reflective foils
12	Cable 2.5m USB to Hirose
13	Laser adjustment tool
14	Rain lens cover

Caution – If the Trimble S3 Total Station is equipped with the optional DIN adapter for DIN tribrach, then the DIN tribrach must be removed before the Trimble S3 Total Station is placed in the Trimble S3 Total Station case. The DIN standard is mostly used in the German market.

Care and Maintenance

Warning – Do not remove the cover from the Trimble S3 Total Station. A Trimble S3 Total Station is designed to withstand normal electromagnetic disturbance from the environment but it contains circuits that are sensitive to static electricity. If an unauthorized person opens the cover of the Trimble S3 Total Station, the function of the Trimble S3 Total Station is not guaranteed and the warranty is invalidated.

The Trimble S3 Total Station is designed and tested to withstand field conditions, but like all precision instruments, it requires care and maintenance. Take the following steps to get the best results from the Trimble S3 Total Station:

- Do not subject the equipment to rough jolts or careless treatment.
- Keep the lenses and reflectors clean. Use only lens paper or other material that is designed for cleaning optical equipment.
- Keep the Trimble S3 Total Station protected and in an upright position, preferably in the Trimble S3 Total Station case.
- Do not carry the Trimble S3 Total Station while mounted on a tripod. Doing so can damage the tribrach screws.
- Do not carry the Trimble S3 Total Station by the telescope barrel. Use the handle.
- Do not use the Trimble S3 Servo/Autolock Total Station control panel as a handle when lifting the instrument,

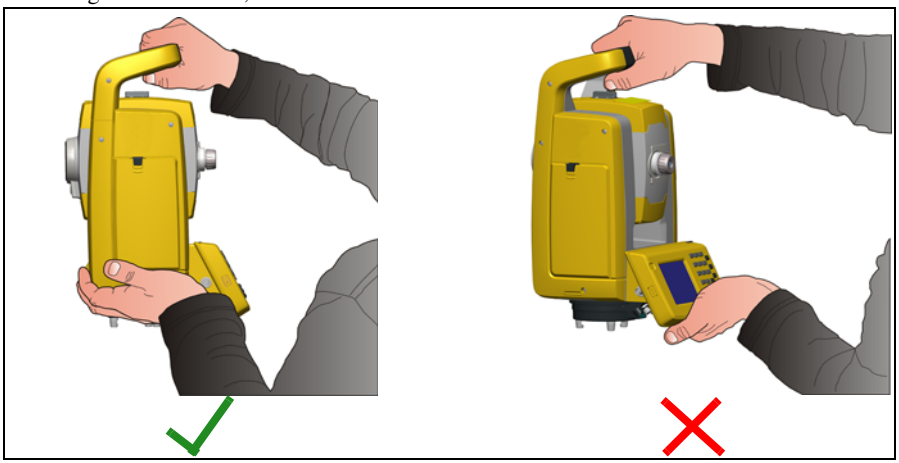


Figure 2.2 Lifting the Trimble S3 Servo/Autolock Total Station.

- When you need extremely precise measurements, make sure that the Trimble S3 Total Station has adapted to the surrounding temperature. Significant variations in temperature can affect precision.

Cleaning

Caution – Never use strong detergents such as benzine or thinners on the Trimble S3 Total Station or the Trimble S3 Total Station case.

Be very careful when cleaning the Trimble S3 Total Station, especially when removing sand or dust from lenses and reflectors. Never use coarse or dirty cloth or hard paper. Trimble recommends that you use anti-static lens paper, a cotton wad, or a lens brush.

Getting Rid of Moisture

If the Trimble S3 Total Station has been used in damp weather, take the Trimble S3 Total Station indoors and remove the Trimble S3 Total Station from the Trimble S3 Total Station case. Leave the Trimble S3 Total Station to dry naturally. If condensation forms on the lenses, allow the moisture to evaporate naturally. Leave the carrying case open until all moisture has evaporated.

Transporting the Trimble S3 Total Station

Always transport the Trimble S3 Total Station in a locked Trimble S3 Total Station case. For longer trips, transport the Trimble S3 Total Station in the Trimble S3 Total Station case and inside the original shipping container.

Servicing

Note – *There are no user-serviceable parts on the Trimble S3 Total Station.*

Trimble recommends that you take the Trimble S3 Total Station to an authorized Trimble service workshop for service and calibration once a year. This is to guarantee that the specified accuracies are maintained.

When you send the Trimble S3 Total Station to a service center, clearly write the name of the sender and the receiver on the Trimble S3 Total Station case. If repairs are required, enclose a note in the Trimble S3 Total Station case. The note should clearly describe any fault or symptoms, and indicate that servicing is required.

CHAPTER

3

Getting Started

In this chapter:

- Laser and LED Information
- Trimble S3 Total Station Description
- Battery
- Turning Instrument On/Off

Laser and LED Information

For more information, See Laser Safety on page v.

Trimble S3 Total Station

The Trimble S3 Total Station, figure 3.3, has been tested, and complies with the regulations for a Class 3R Laser product.

Figure 3.3 The Trimble S3 Total Station

The laser warning label on top of the distance measuring unit. See figure 3.4

Figure 3.4 Location of laser warning label on a Trimble S3 Total Station

Figure 3.5 Laser warning label

Figure 3.6 Location of laser aperture warning label on a Trimble S3 Total Station

Figure 3.7 Laser aperture warning label

Trimble S3 Total Station Description

This section describes the Trimble S3 Total Station controls. Trimble recommends that you take some time to familiarize yourself with the names and the locations of the controls. For Trimble S3 Robotic Total Station see figure 3.8 and figure 3.9, for Trimble S3 Servo/Autolock Total Station see figure 3.10 and figure 3.11.

Trimble S3 Robotic Total Station

Figure 3.8 Operator's view of the Trimble S3 Robotic Total Station

Figure 3.9 Front view of the Trimble S3 Robotic Total Station

Trimble S3 Servo/Autolock Total Station

Figure 3.10 Operator's view of the Trimble S3 Servo/Autolock Total Station

Figure 3.11 Front view of the Trimble S3 Total Station

Trimble S3 Servo/Autolock Total Station Control Panel

The Trimble S3 Servo/Autolock Total Station has a fixed control panel. The control panel runs the Microsoft® Windows® CE.net operating system and has a 128 MB flash memory.

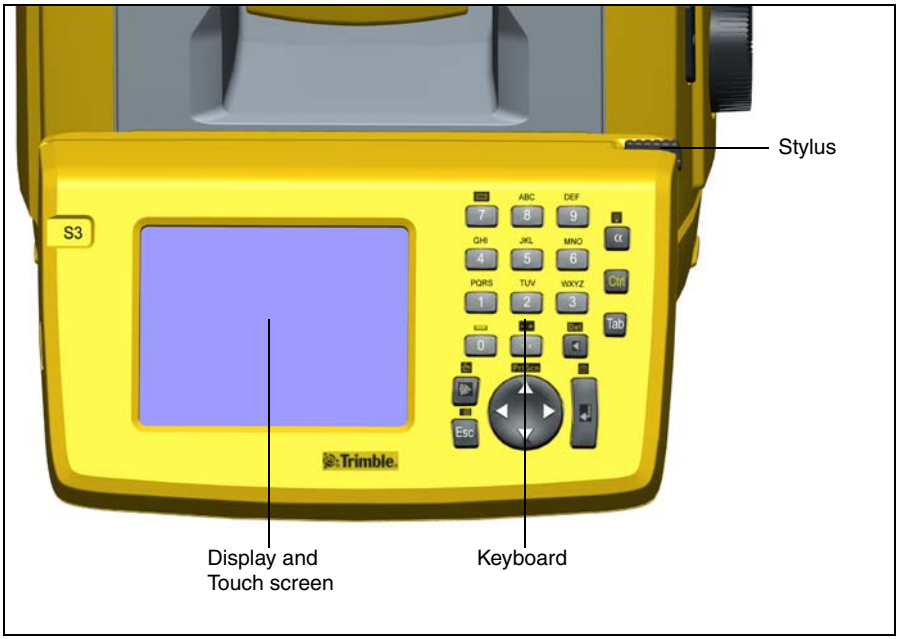


Figure 3.12 Trimble S3 Servo/Autolock Total Station control panel.

Keyboard

Data entry on the control panel keyboard is similar to that of a cell phone. The "α" button scrolls between three different states of data entry: 123, ABC, and abc. Multiple presses on a key scrolls through the letters on that key.

The control panel also offers the standard Microsoft® Windows® functions of cut (Ctrl+X), copy (Ctrl+C), and paste (Ctrl+V).

In addition to data entry and the standard Window functions, the control panel has a number of control functions that are Trimble specific. These functions are described in the table below.

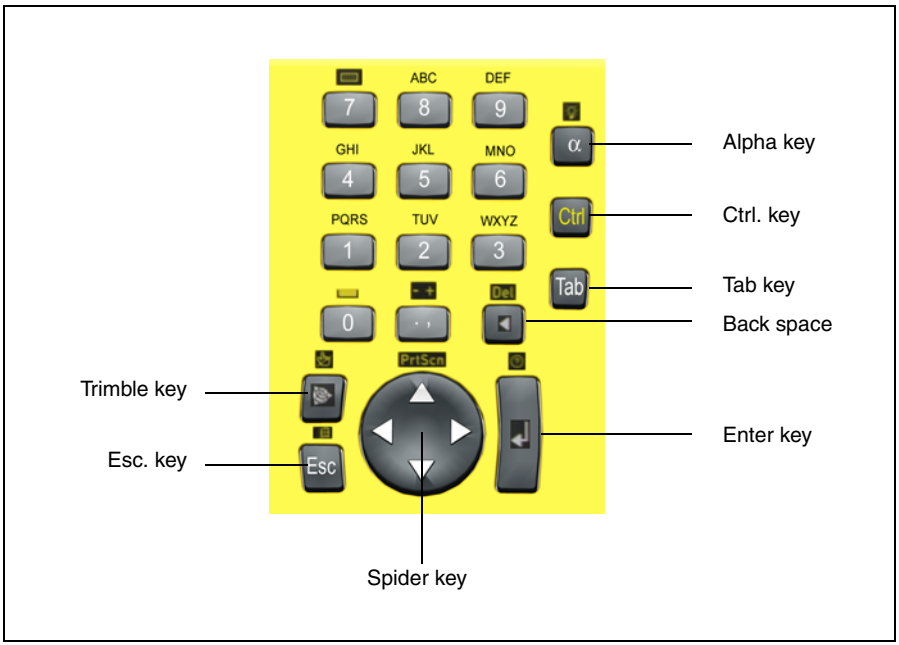


Figure 3.13 Trimble S3 Servo/Autolock Total Station control panel keyboard.

Key	Control function
Ctrl + α	Toggle the display backlight on/off
Ctrl + Trimble	Disable the touch screen
Ctrl + 7	Toggle the touch screen keyboard on/off
Ctrl + Enter	Display help. Corresponds to F1 on a computer.
Ctrl + ESC	Pop up the Widows taskbar
Ctrl +.,	Enter a “-” or a “+” symbol
Ctrl + Back space	Delete
Ctrl + Spider key	Print screen
Ctrl + 0	Space

Display and Touch screen

The control panel display can be viewed easily both in direct sunlight and in overcast conditions. It also incorporates a touch screen for navigation. Tap elements on the screen with a stylus or your finger.

The display light is active by default and can be toggled on/off by pressing Ctrl + α. To change the default display light settings:

1. Tap the Start menu and then select Settings/ Control Panel/ Display.
2. Select Display light and then make your changes.
3. Tap OK.

If the touch screen does not respond properly when you tap it, recalibrate it as follows:

1. Tap the Start menu and select Settings/Control Panel/Stylus.
2. The Stylus Properties appears.
3. To recalibrate, tap Recalibrate in the Calibration tab.
4. Follow the prompts on the screen.

To clean the touch screen during a survey, press [Ctrl] + [Trimble] to disable it. To enable the touch screen again, press [Ctrl] + [Trimble].

Setting Time and Date

To set the correct time and date in the control panel:

1. Tap the Start menu and then select Settings/Control Panel/Date/Time.
   The Date/Time properties dialogue appears.
2. Change the date and time as required.
3. To accept the new settings, tap OK. To cancel, tap ESC.

Battery

Before charging or using a battery it is important that you read and understand the battery safety and environment information.

Battery Safety and Environment Information

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 Trimble 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 Trimble equipment that is specified to use it.
– Use the battery only for its intended use and according to the instructions in the product documentation.

Disposal

- Before disposal, discharge the battery.

- Dispose of the used battery in an environmentally sensitive manner, according to local and national regulations, see also Environmental Information page ix.

Charging the Lithium-Ion Battery

The battery is supplied partially charged. Charge the battery completely before using it for the first time.

- To charge the battery, use only a charger that is recommended by Trimble for charging the Lithium-ion battery.
- Charge the battery before using the total station if the equipment has been stored for longer than six months.

For more information refer to the Trimble Charger kit dual slot user guide.

Inserting the Internal Battery

The Trimble S3 Total Station internal battery fits into the battery compartment on the side of the Trimble S3 Total Station. This battery can easily be removed and replaced. To insert the battery:

1. Unclip the battery compartment door
2. Slide the battery into the battery compartment with the battery connectors positioned towards the top of the Trimble S3 Total Station. See figure 3.14

Figure 3.14 Removing and replacing the internal battery

Trimble Multi Battery Adapter

Warning – Use only the specified battery and cable with the Multi Battery Adapter. Use the adapter only to provide power to the specified Trimble product. Never attempt to charge batteries while they are in the adapter. Observe the warnings in the battery section of the manual.

The Multi Battery Adapter is an external battery adapter that holds and connects up to three Trimble S3 Total Station batteries. The Multi Battery Adapter has a hook so that the adapter can be attached to the tripod. See figure 3.15

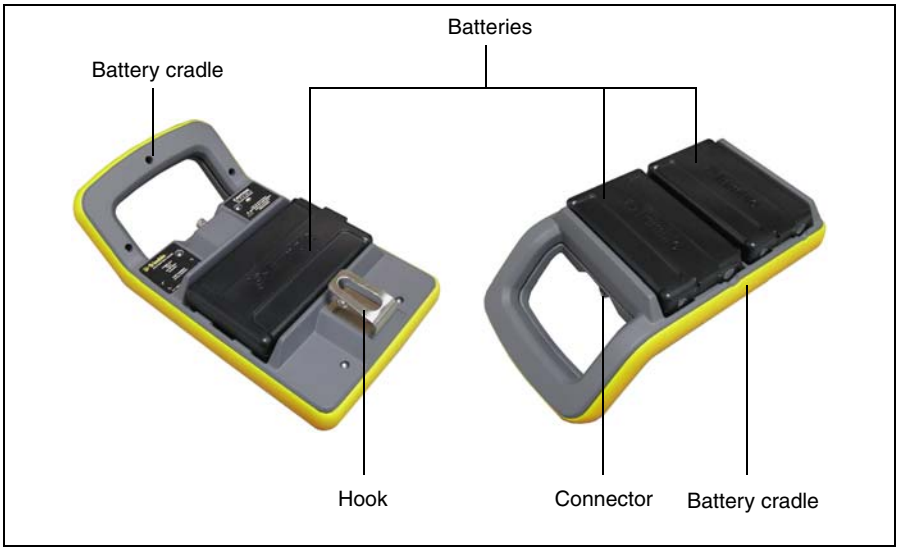


Figure 3.15 Multi Battery Adapter

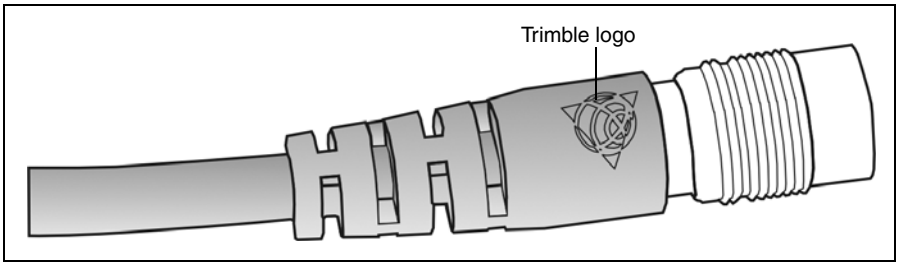
Connecting the Trimble Multi Battery Adapter

The Trimble Multi Battery Adapter can be connected to the Trimble S3 Total Station with a standard Trimble 6-pin Hirose battery cable. See figure 3.16

Caution – Use only the gray cables with 6-pin Hirose connectors from Trimble when connecting a cable to the Trimble S3 Total Station and Multi Battery Adapter.

Figure 3.16 Connecting the Multi battery Adapter

Tip – When connecting the cable to the Trimble S3 Total Station, keep the Trimble logo on the connector upward.



Turning Instrument On/Off

The instrument is turned on/off with the On/Off and Trigger key, an LED in the key will indicate the instrument status.

Trimble S3 Robotic Total Station

Turn Instrument On

Press the Trigger key to turn on the Trimble S3 Robotic Total Station. The Trimble S3 Robotic Total Station will also turn on if you connect a 12 V power supply to the 12 V power connector and a TSC2 (or PC) to the communication (COM) connector.

The LED will be on solid.

Turn Instrument Off

To turn off the Trimble S3 Robotic Total Station press and hold the Trigger key until the LED is off.

The LED will be off.

Trimble S3 Servo/Autolock Total Station

Turn Instrument On

Press the Trigger key to turn on the Trimble S3 Servo/Autolock Total Station. The Trimble S3 Servo/Autolock Total Station will also turn on if you connect a 12 V power supply to the 12 V power connector and a TSC2 (or PC) to the communication (COM) connector.

The LED will be on solid.

Turn Instrument Off

To turn off the Trimble S3 Servo/Autolock Total Station press the Trigger key.

The power key window will be displayed in the control panel.

Figure 3.17 Power key window

To turn off the Trimble S3 Servo/Autolock Total Station select Shutdown.

Suspend Mode

To go to suspend mode press the trigger key. The power key window will be displayed in the control panel, select Suspend.

In the suspend mode the Trigger key LED will flash once every other second, the display will be off.

To turn the Trimble S3 Servo/Autolock Total Station on press the Trigger key.

To turn the Trimble S3 Servo/Autolock Total Station off press and hold the Trigger key until the LED is off.

Restart Instrument

To restart the instrument press the trigger key. The power key window will be displayed in the control panel, select Options.

The power option window will be displayed.

Figure 3.18 Power option window

Select Reset.

Figure 3.19 Restart Trimble S3 Servo/Autolock Total Station.

Select Yes to restart the Trimble S3 Servo/Autolock Total Station.

CHAPTER

4

Setup

In this chapter:

Setup

A setup with good measuring stability will increase the precision in the measurement result and allow you to utilize the measurement precision of the Trimble S3 Total Station to its full extent.

Setup Stability

When performing a setup it is important to consider the following:

1. Set tripod legs wide apart to increase the stability of the setup. A setup where one leg is placed on e.g asphalt and the other two on soil will still be a stable setup provided that the tripod legs are set wide enough. If it is not possible to set the tripod legs wide apart due to obstacles, then the tripod can be lowered to increase stability.

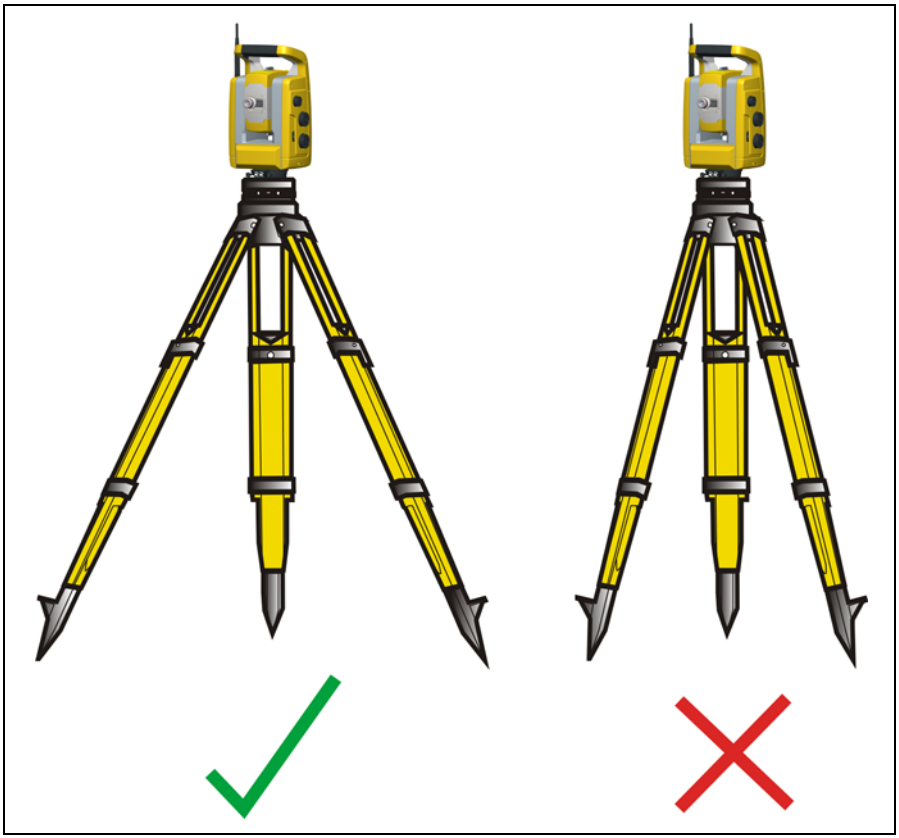


Figure 4.20 Correct set up

2. Make sure that all the screws on the tripod and/or tribrach are tightened to avoid any play.
3. Any high quality tripod and tribrach can be used. However, Trimble strongly recommends the use of tripod heads made of steel, aluminium or similar material. Tripod heads of fiberglass or other composite materials are not recommended.

See Servo Technology on page 56 for more information.

Measurement Stability

Take into account that precision instruments require sufficient time to adjust to the ambient temperature. The following rule-of-thumb for a high precision measurement applies: Temperature difference in degree Celsius (°C) x 2 = duration in minutes required for the Trimble S3 Total Station to adjust to the new temperature.

Avoid sighting across fields with intense heat shimmer by sun light, e.g. at noon.

The Laser Pointer

The Trimble S3 Total Station uses a red laser beam to measure and as a laser pointer.The laser pointer is coaxial with the line of sight of the telescope. If the Trimble S3 Total Station is well adjusted, the red laser pointer coincides with the line of sight. External influences such as shock or large temperature fluctuations can displace the red laser pointer relative to the line of sight.

Checking the Laser Pointer Alignment

Caution – Viewing the laser spot on the Laser adjustment plate through the telescope is safe. Do not try to make the adjustment using a prism, the reflected light from a prism can be dazing.

Caution – Do not use the laser pointer as an aid when searching for prisms, the reflected light can daze your eyes. The reflected light will not damage your eyes, but might be uncomfortable.

To avoid faulty measurements using the laser pointer, use the supplied Laser adjustment plate to check the laser alignment regularly and before you attempt precise distance measurements:

1. Setup the Laser adjustment plate 25–50 meter away, facing the Trimble S3 Total Station, see Figure 4.21.
2. Activate the laser pointer function to switch on the red laser beam.
3. Aim the Trimble S3 Total Station to the center of the Laser adjustment plate and then inspect the position of the red laser spot in relation to the telescope cross-hairs.
4. If the red laser spot lies outside the cross-hairs, the Laser Pointer needs to be adjusted, See Adjusting the Laser Pointer on page 32

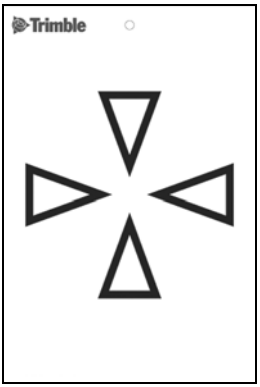


Figure 4.21 Laser adjustment plate

Adjusting the Laser Pointer

The following steps describes how to adjust the Laser Pointer.

1. Pull out the two plugs from the adjustment ports on top of the telescope housing. Figure 4.22

Figure 4.22 Laser pointer adjustment ports

2. To correct the vertical position of the laser spot, insert the allen key into the vertical adjustment port and turn it as shown in figure 4.23.

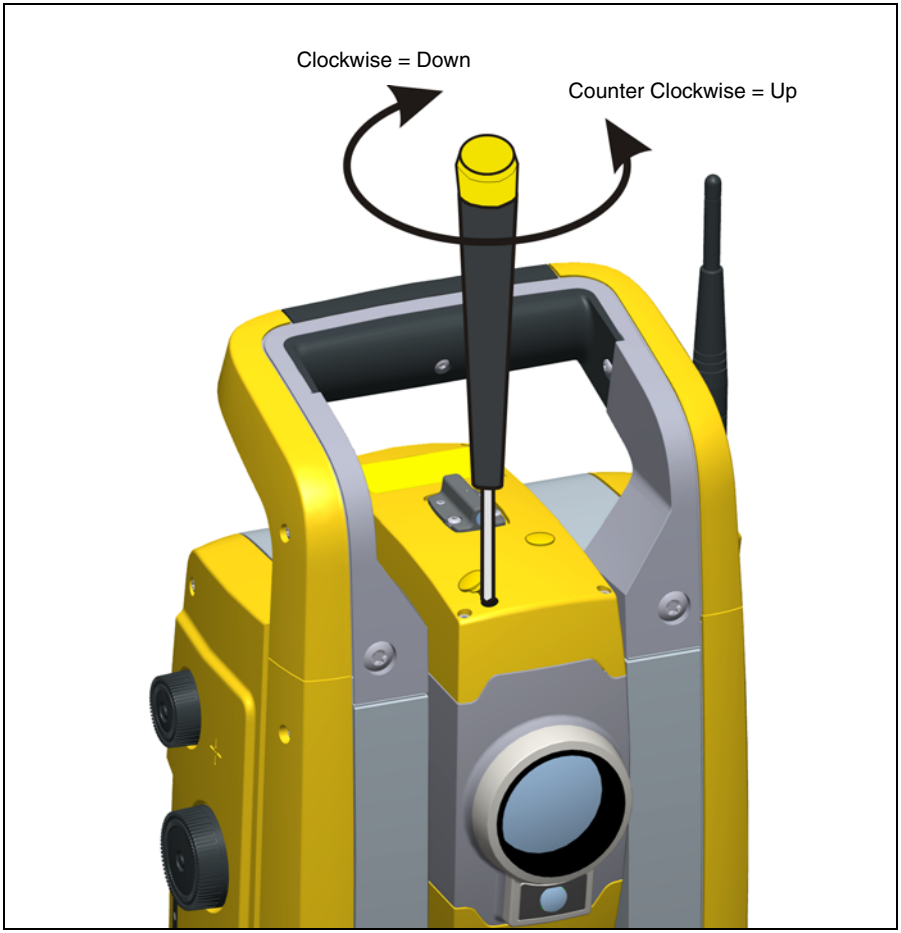


Figure 4.23 Vertical position adjustment

3. To correct the horizontal position of the laser spot, insert the allen key into the horizontal adjustment port and turn it as shown in Figure 4.24.

Figure 4.24 Horizontal position adjustment

4. Check the alignment of the laser spot and the cross-hairs. Throughout the adjustment procedure, keep the telescope pointing to the adjustment target. The adjusting screws are of a high tension because they are self locking. The screws tighten automatically after you adjust them.

5. Refit the plugs in the adjustment holes. Make sure that the plugs are correctly fitted for proper sealing against the cover.

Caution – To keep out moisture and dust, make sure that the plugs are correctly fitted in the adjustment ports.

Measuring the Instrument Height

There are two measurement marks on the side of the Trimble S3 Total Station. The top mark corresponds to the trunnion axis of the Trimble S3 Total Station. The bottom mark is 0.158 m (0.518 ft.) below the top mark. Measure the bottom mark to the top ridge of the mark. Figure 4.25

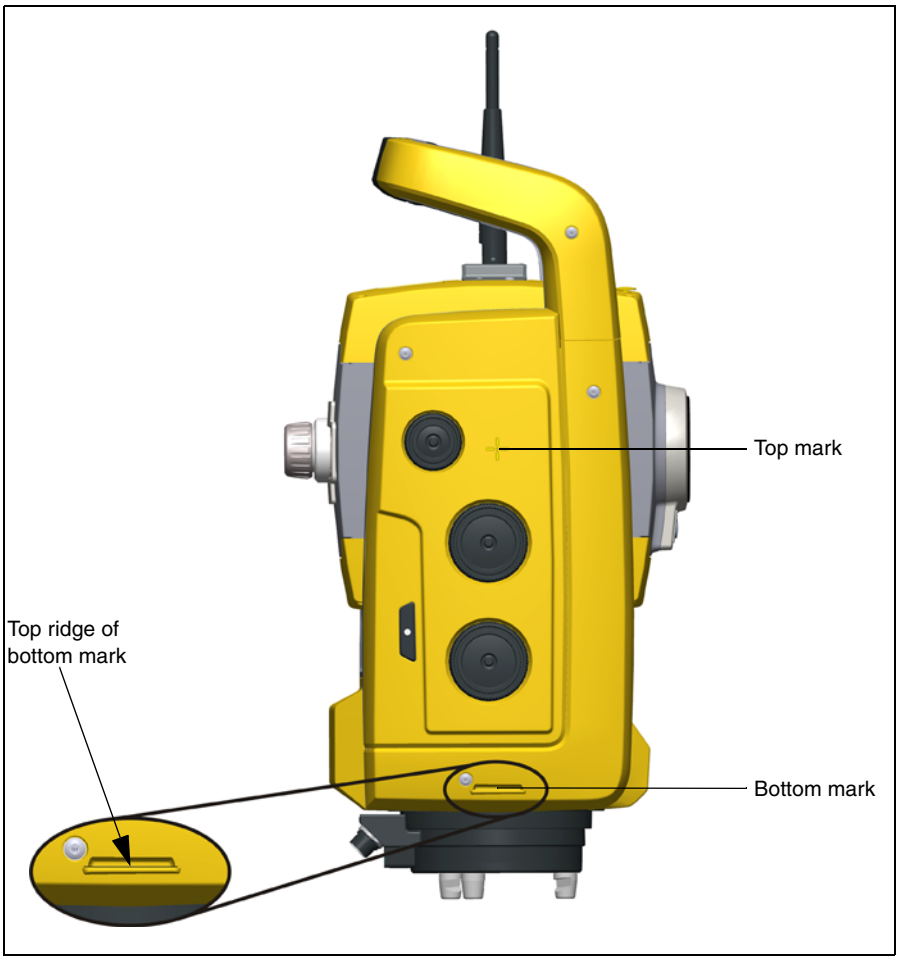


Figure 4.25 Instrument height marks

When there is a TSC2 attached running a field application software, the software has additional functions that reduce the bottom mark measurement to the required vertical instrument height to the trunnion axis, see Figure 4.26 and the following paragraph.

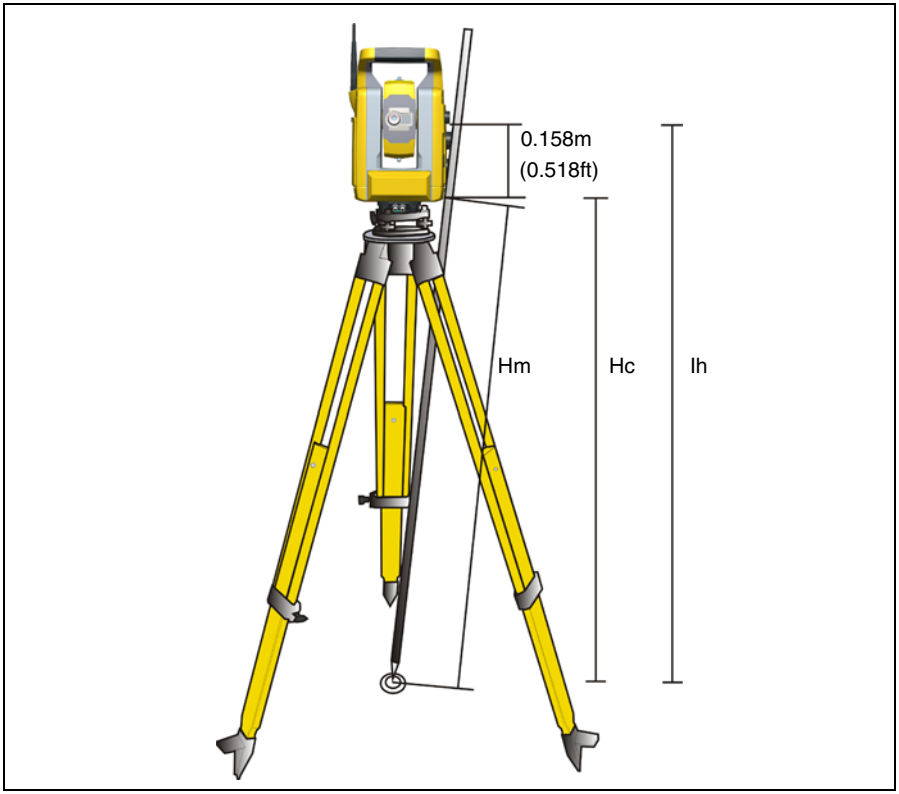


Figure 4.26 Instrument height measurement

The measured distance (Hm) is corrected for the slope of the measurement to obtain a vertical measurement to the bottom mark (Hc). The constant from the bottom mark to the top mark (0.158 m/0.518 ft.) is added to the Hc to obtain the vertical instrument height from the ground mark to the trunnion axis (Ih). For more information, refer to the field software documentation.

Alternatively, to obtain an accurate measurement to the top mark (Ih), you can manually measure the slope distance from the ground to the bottom mark (Hm). To calculate the total instrument height (Ih), insert the measured slope distance (Hm) into the formula below:

$$Ih = 0,158 + \sqrt{Hm^2 - 0,091^2}$$

Connecting the TSC2 Controller

The TSC2 is used as a controller for the Trimble S3 Robotic Total Station.

Connecting With Cable

The TSC2 is connected from the Trimble S3 Robotic Total Station Communication (COM) connector to the TSC2 USB connector using cable part number 73840001.

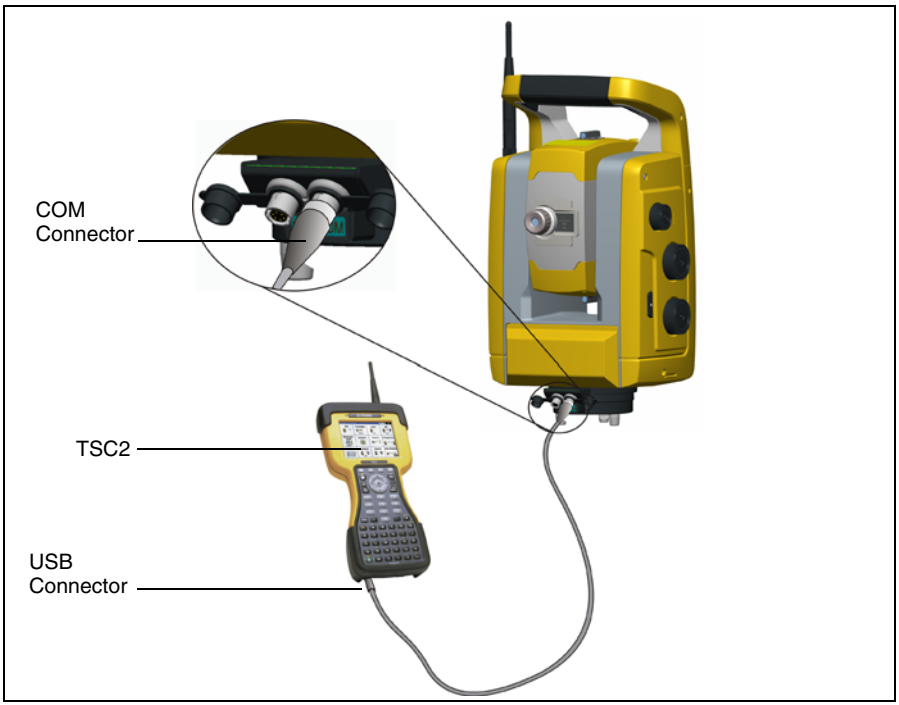


Figure 4.27 TSC2 connected to the Trimble S3 Robotic Total Station with cable for servo and Autolock measurements.

Connecting in Robotic Mode

The TSC2 is connected directly to the Trimble S3 Robotic Total Station via the integrated radio.

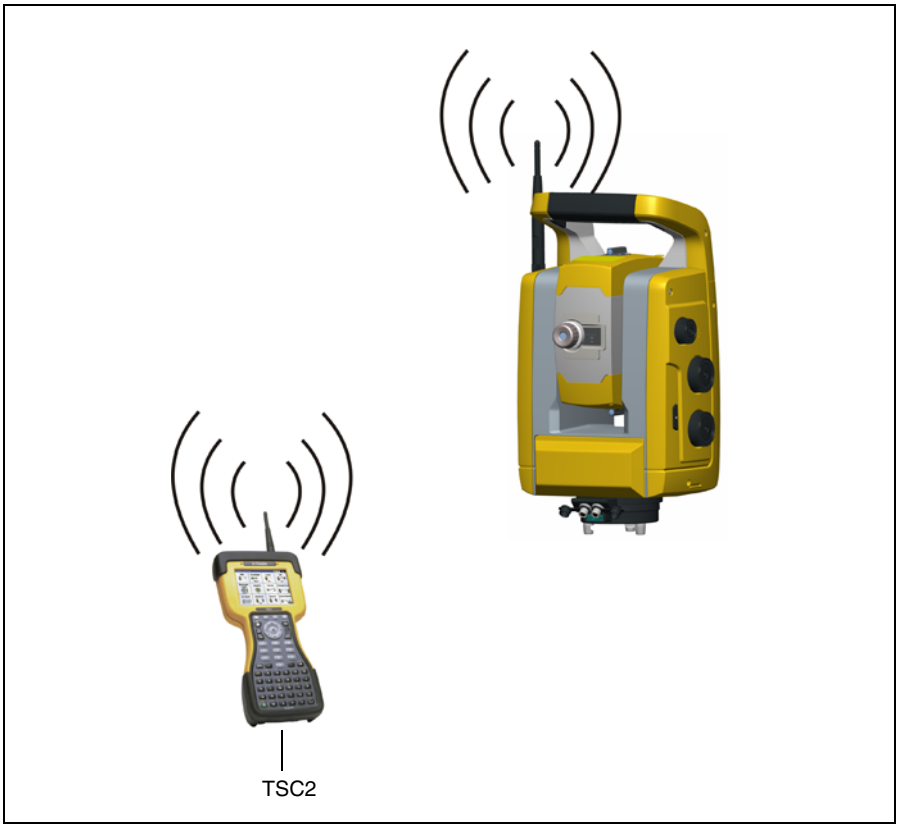


Figure 4.28 TSC2 connected to the S3 Robotic Total Station using the integrated radio for robotic measurements

Connecting a USB Memory

To extend the memory in a Trimble S3 Servo/Autolock Total Station control panel a USB memory can be connected to the USB connector via an adapter cable.

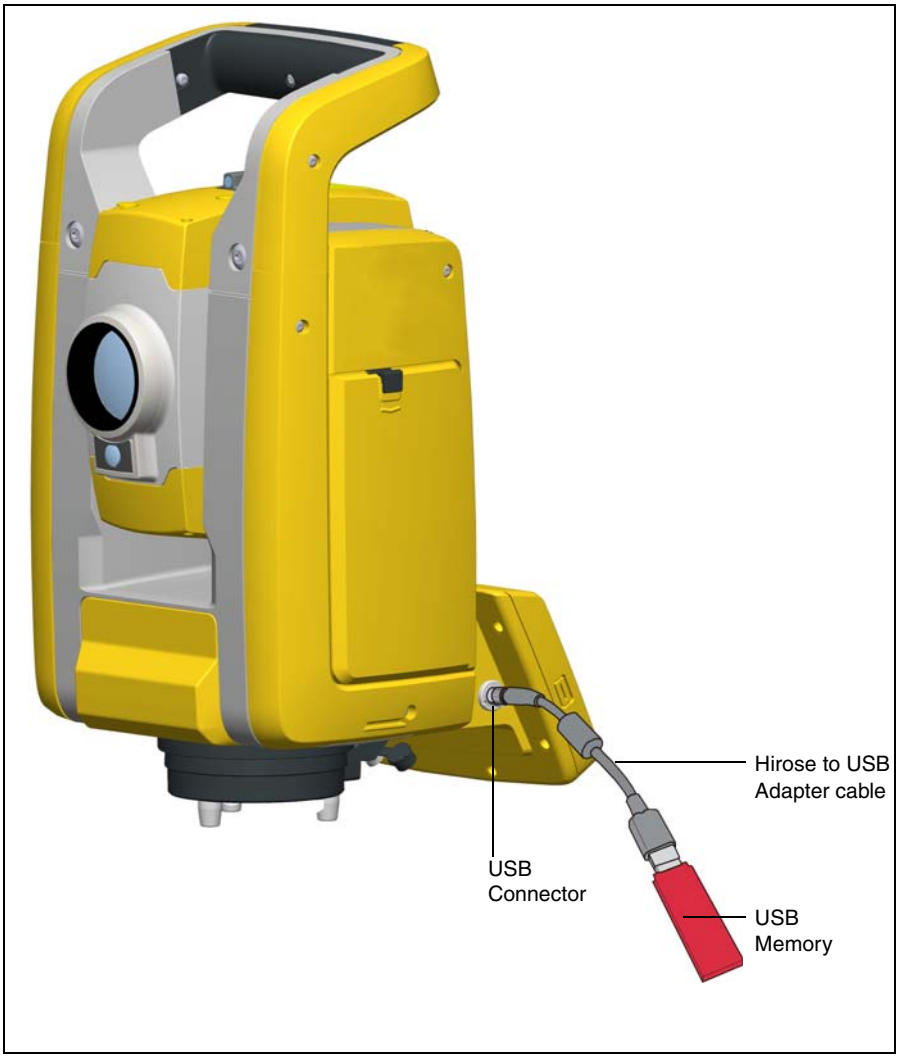


Figure 4.29 USB Memory connected to the Trimble S3 Servo/Autolock Total Station

Pre Measurement Check List

Before you begin measurement or stake out operations, check the following items:

- Lenses are clean
- Trimble S3 Total Station is correctly leveled
- Collimation error
- Tracker collimation error
- Trunnion axis tilt
- Correct radio channel is selected (robotic measurements only)
- Laser Pointer beam alignment
- Measure instrument height
- Allow sufficient time for the Trimble S3 Total Station to adjust to the ambient temperature, see page 29

CHAPTER

5

Trimble S3 Total Station Technology

In this chapter:

- Angle Measuring Technology
- Distance Measuring Technology
- Tracker Technology
- Radio
- Tracklight
- Servo Technology
- Power Management
- Power Supply
- External Communication
- Removable Handle

Angle Measuring Technology

The principles of angle measurement are based on reading an integrated signal over two opposite areas of the angle sensor and producing a mean angular value. This eliminates inaccuracies caused by eccentricity and graduation.

In addition, the angle measurement system compensates for the following automatic corrections:

- Mislevelment (deviation of the plumb axis).
- Horizontal and vertical collimation error.
- Trunnion axis tilt. See page 46

Correction for Mislevelment

The Trimble S3 Total Station automatically corrects for mislevelments up to ±6 ’. The Trimble S3 Total Station warns the operator immediately of any mislevelments in excess of ±6 ’(±0.11 grads).

Corrections for the horizontal angle, vertical angle, and slope distance are calculated in the field application software and applied to all measurements.

Correction for Collimation Errors

The horizontal collimation error is the deviation of the sighting axis from its required position at right angles to trunnion axis.

The vertical collimation error is the difference between the vertical circle zero and the plumb axis of the Trimble S3 Total Station.

Traditionally, collimation errors were eliminated by observing angles in both faces. In the Trimble S3 Total Station, a pre-measurement collimation test is performed to determine the collimation errors. Angular measurements are observed in both faces, the collimation errors are calculated, and the respective correction values are stored in the Trimble S3 Total Station. The collimation correction values are then applied to all subsequent angle measurements. Angles observed in a single face are corrected for collimation errors, which eliminates the need to measure in both faces.

Carry out a collimation test in the following situations:

- Whenever the Trimble S3 Total Station may have been roughly handled during transport.
- When the ambient temperature differs by more than 10°C (18°F) from the previous collimation test.
- Immediately prior to high precision angle measurements in one face.

Trimble S3 Autolock/Robotic Total Station Tracker Collimation

A Trimble S3 Autolock/Robotic Total Station can automatically lock and track a prism target. Pointing errors caused by slight misalignment of the Trimble S3 Autolock/Robotic Total Stations tracker have a similar effect to the HA and VA Collimation errors detailed above.

To correct for the tracker collimation errors, carry out a tracker collimation test. The tracker collimation test automatically observes angular measurements to a target in both faces, the tracker collimation errors are calculated and the respective correction values are stored in the Trimble S3 Autolock/Robotic Total Station. The tracker collimation correction values are then applied to all subsequent angle measurements observed. Angles observed in a single face are corrected for collimation errors, which removes the need to measure in both faces.

Carry out a tracker collimation test in the following situations:

- Whenever the Trimble S3 Autolock/Robotic Total Station may have been roughly handled during transport.
- When the ambient temperature differs by more than 10°C (18°F) from the previous collimation test.
- Immediately prior to high precision angle measurements using Autolock in a single face.

Correction for Trunnion Axis Tilt

The trunnion axis tilt error is the deviation of the trunnion axis of the telescope from its required position at right angles to the plumb axis of the Trimble S3 Total Station. See figure 5.30

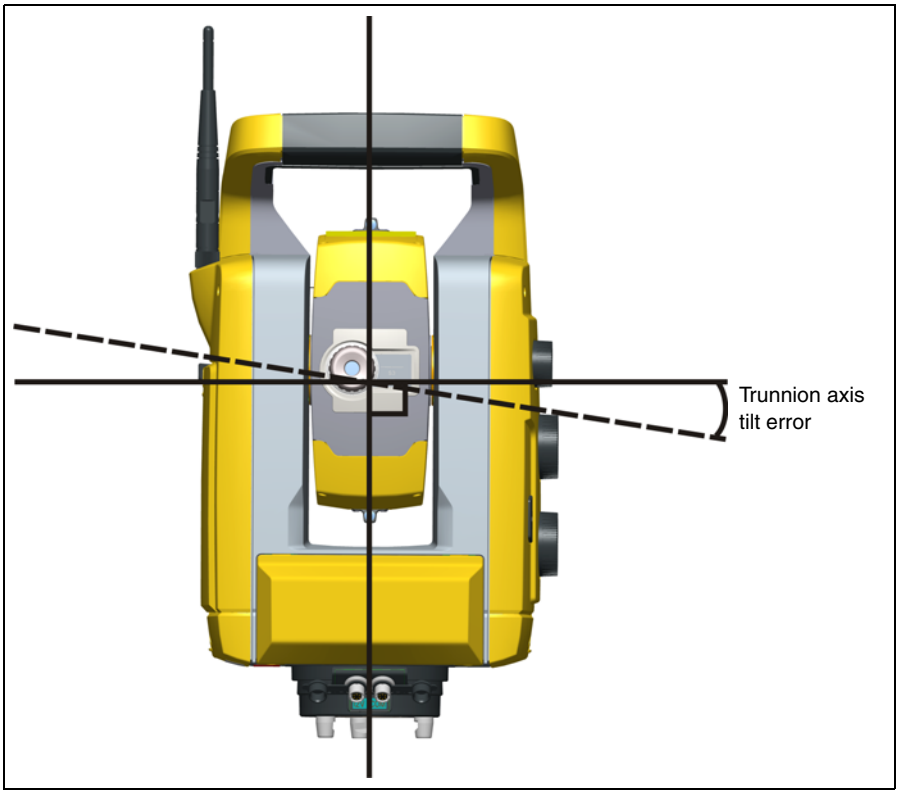


Figure 5.30 Trunnion axis tilt error

In the Trimble S3 Total Station, perform a pre-measurement trunnion axis tilt test to determine the trunnion axis tilt error. Angular measurements are observed in both faces, the trunnion axis tilt error is calculated, and the respective correction value is stored in the Trimble S3 Total Station. The trunnion axis tilt correction value is then applied to a correction to the horizontal angle value.

Carry out a trunnion axis tilt test in the following situations:

- Whenever the Trimble S3 Total Station may have been roughly handled during transport.
- When the ambient temperature differs by more than 10°C (18°F) from the previous collimation test.

- Immediately prior to high precision angle measurements in one face, especially where the vertical angles significantly deviate from the horizontal plane.

Averaging Measurements to Reduce Sighting Errors

The Trimble S3 Total Station automatically reduces sighting errors caused by the misalignment of the Trimble S3 Total Station to the target or by pole movement during measurement. The following techniques can be used:

- Use Autolock. When Autolock is enabled, the Trimble S3 Total Station automatically locks onto and tracks the target. Manual sighting errors are reduced.
- Automatically average angles during distance measurement. When measuring in Standard mode, the Trimble S3 Total Station takes approximately 1.2seconds to measure the distance. Angles returned to the Trimble S3 Total Station at 1000 Hz, are averaged over the 1.2-second period to obtain an averaged angle measurement. The resultant angle measurement is an average of over 1200 observations.
- Use average measurement methods in the field software.

Distance Measuring Technology

Trimble S3 Total Station are equipped with a combined distance unit. This means that the Trimble S3 Total Station can measure to a prism or to normal surfaces (direct reflex (DR) mode). The following sections describes the system.

DR

The DR is a laser distance unit based on the phase comparison method. The distance unit is coaxial with the line of sight and transmits an intensity modulated optical measuring beam that is reflected by a prism or scattered by a natural surface on which the beam is directed. The phase difference between the transmitted light and the reflected received light is detected and represents the distance.

In prism-mode, the distance unit operates as a fast and precise long-range distance meter. In DR-mode, the DR unit transmits a collimated visible red laser beam to the target point and then calculates the distance between the transmitted and the received light.

The DR distance unit software will detect erroneous single distance measurements such as those caused by an obstruction passing through the measurement beam, and will ignore such readings in the computation of the final distance.

Beam Divergence

All distance meter measurement beams diverge as the range from the instrument increases. The divergence of the distance meter beam relates to an increase in the size of the area being sampled, not to a degradation of the measurement precision. See figure 5.31

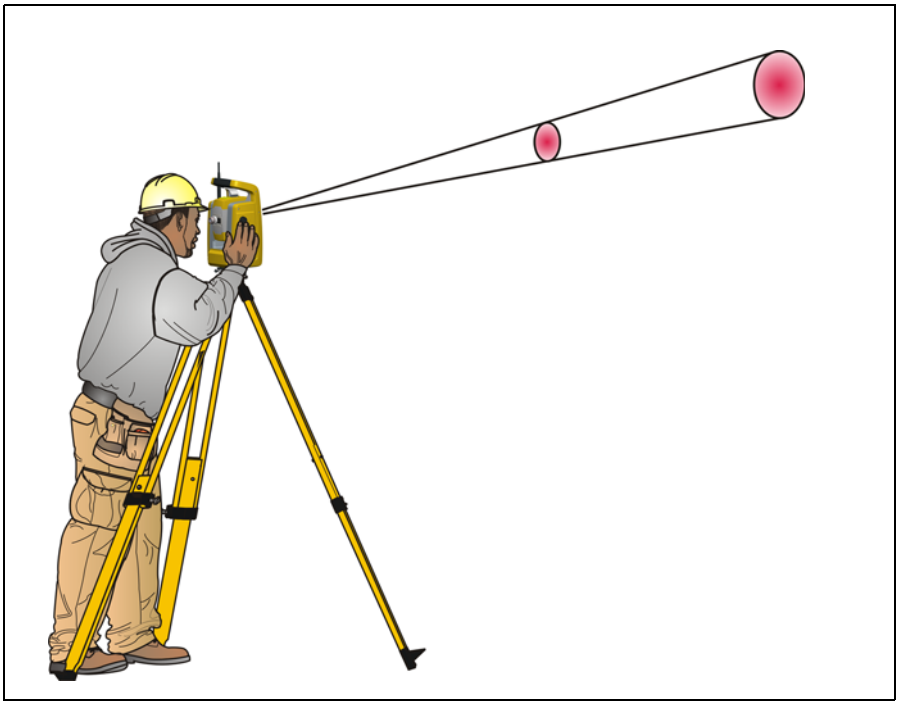


Figure 5.31 Beam divergence.

A larger measuring area at longer range is generally better because it enables smaller objects, such as power lines and antennas, to be detected and accurately measured. With a smaller measuring area, these small objects can be easily missed. A smaller measuring area has advantages when measuring tight corners and vertices at close range. When observing measurements to a tight corner, the distance meter beam divergence introduces a range error caused by the size of the sampling area. See figure 5.32

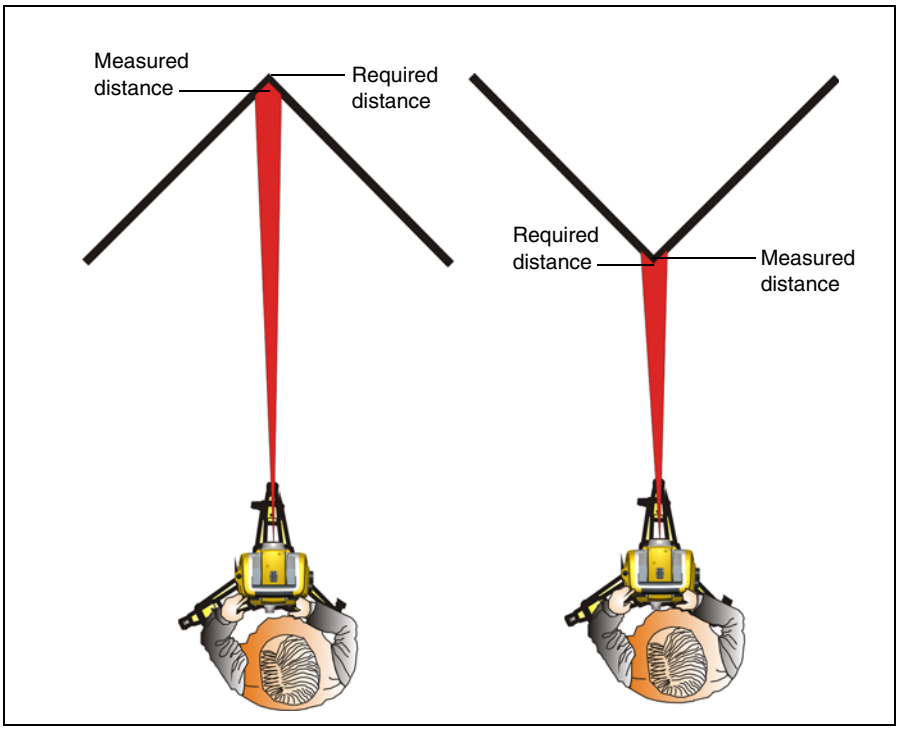


Figure 5.32 Measuring to an inner and an outer corner

Although the problem is reduced with a beam that uses a smaller measuring area, the error can not be completely eliminated. The most accurate solution to measure to tight corners and eliminates errors caused by beam divergence, is to use an offset measurement method such as that used in the field application software:

1. Measure two points on the face of the building.
2. Aim the Trimble S3 Total Station at the corner to store the correct horizontal and vertical angle. See figure 5.33

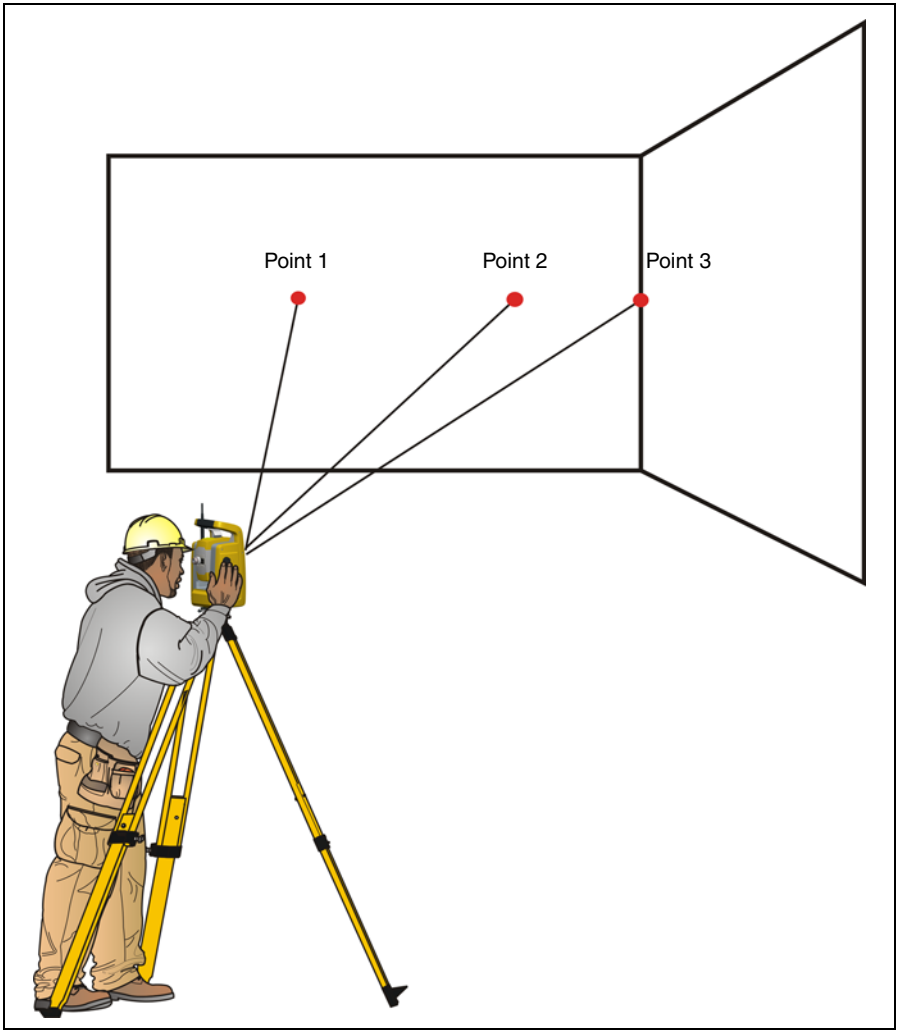


Figure 5.33 Offset measurement

With offset measurements, you can accurately measure difficult locations with DR instruments, and eliminate beam divergence errors. For more information, refer to the field application software documentation.

Tracker Technology

The Trimble S3 Autolock/Robotic Total Station is equipped with Tracker technology, which is used for Autolock and robotic measurements.

Tracker technology controls the Trimble S3 Autolock/Robotic Total Station servos and aims the Trimble S3 Autolock/Robotic Total Station correctly towards the target. See figure 5.34

Tip – To assure maximum performance from the Tracker technology keep the lens clean and dry.

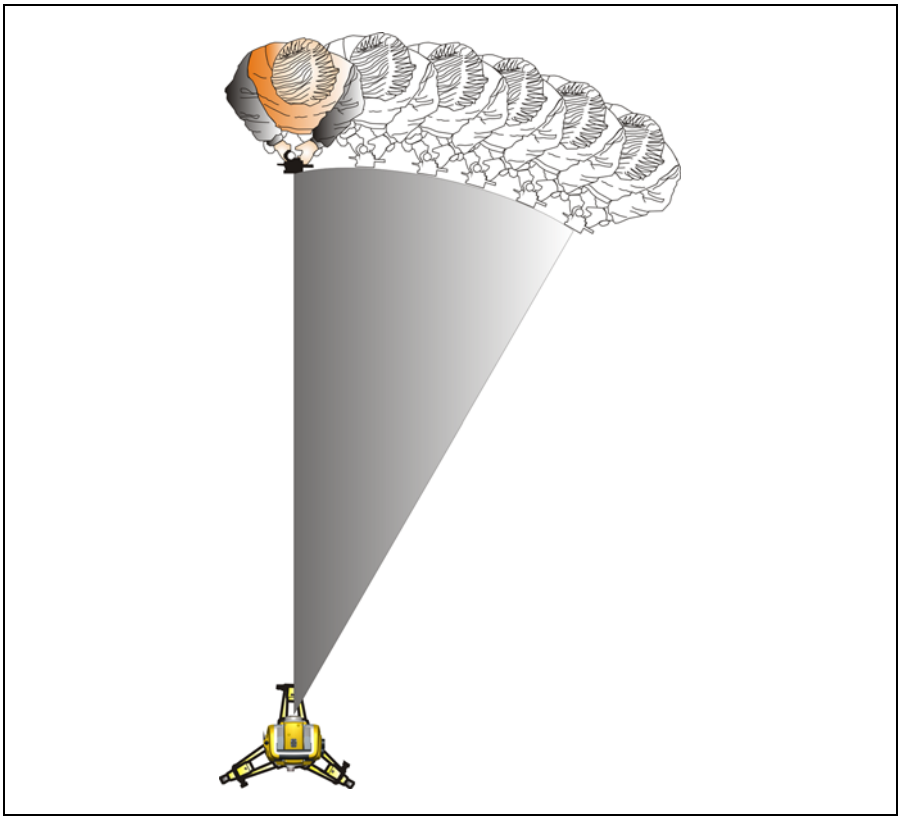


Figure 5.34 The Trimble S3 Autolock/Robotic Total Station Tracker function.

Aiming

The adjustment between the two optical axes, the telescope and the tracker, may differ. The difference will make it seem like the Trimble S3 Autolock/Robotic Total Station does not point towards the center of the prism, when using tracker, figure 5.35. This is not a problem since the two axis have their own separate collimation data. It is however important to make collimation test for both axes.

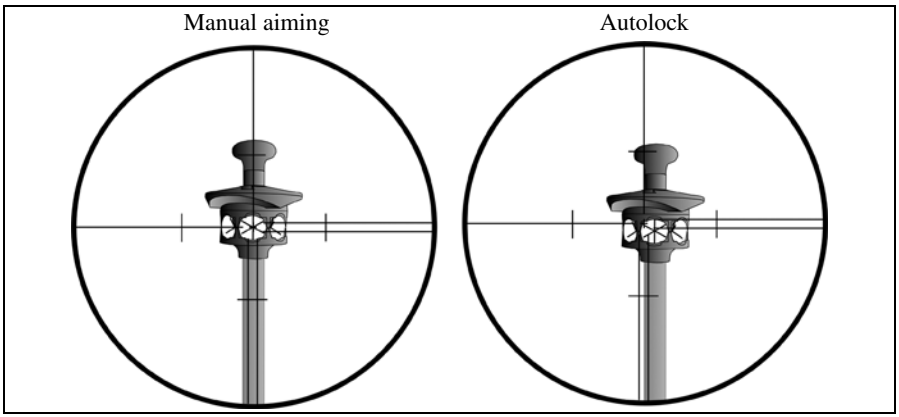


Figure 5.35 Difference between aiming manually and Autolock

How to Check Aiming

You can check how well the Trimble S3 Autolock/Robotic Total Station is calibrated by measuring toward the prism with and without tracker and compare the measured angles:

1. Aim manually at a prism and read out the horizontal and vertical angles.
2. Turn on tracker and let the Trimble S3 Autolock/Robotic Total Station lock on to the same prism automatically, read out the horizontal and vertical angles.
3. Compare the angles between manual and tracker aiming.

If the difference between the read out angles is significant, you should carry out both a horizontal and vertical angle collimation adjustment, and a tracker collimation adjustment.

Radio

Internal Radio

The Trimble S3 Robotic Total Station has an internal radio to support robotic operations.

The internal radio is a 10 mW radio that operates in the public free 2.4 GHz band. The radio uses frequency hopping technology to reduce radio interference and maintain radio communications in even the harshest RF environment.

The Trimble S3 Robotic Total Station radio baud rate is 115200 bps. This high baud rate reduces the measurement latency, which ensures that a measurement viewed at the pole is received 100 msec after the measurement is sent from the Trimble S3 Robotic Total Station.

To maintain radio communication with the Trimble S3 Robotic Total Station, the Controller at the pole must also be connected to a 2.4 GHz external radio. The TSC2 is equipped with an integrated 2.4 GHz radio module.

Tracklight

Tracklight® is a visible guide light that enables the rod holder to position themselves into the Trimble S3 Total Stations current line of sight. The Tracklight can be used during stakeout in all operational modes, and is also of great benefit when operating in robotic mode as a means of checking that the Trimble S3 Total Station is tracking, or when trying to reacquire lock by walking into the sight line of the tracker, or using the remote joystick control in robotic mode. Tracklight consists of a flashing two-colored light, with each color lying in its own lateral projection sector. If the rod holder is to the left of the measuring beam, they will see a red flashing light; if they are to the right, they will see a green flashing light. See figure 5.36

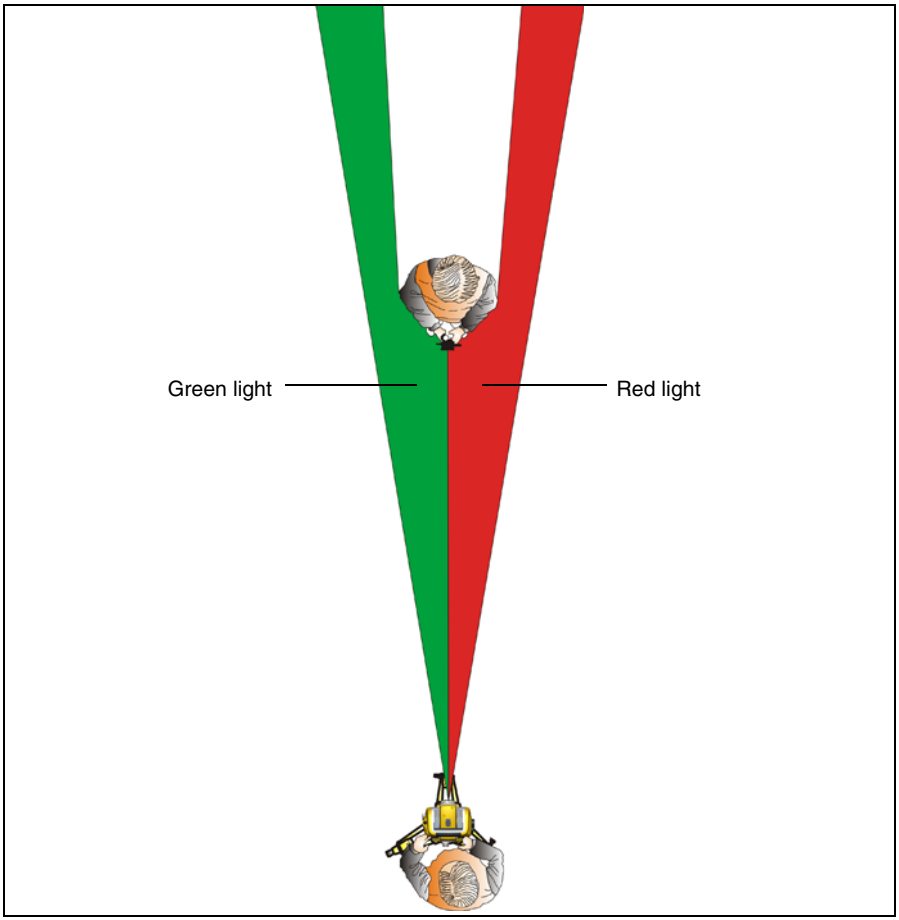


Figure 5.36 Tracklight

Tip – You can use the Tracklight for clearing sight lines and as an aid to find prisms in the dark or unfavorable sighting conditions.

Caution – Do not use the laser pointer as an aid when searching for prisms, the reflected light can dazzle your eyes. The reflected light will not damage your eyes, but might be uncomfortable.

Servo Technology

The Trimble S3 Total Station is equipped with servo controlled motors to position the Trimble S3 Total Station and to focus the telescope.

Due to the high speed position servo used in the Trimble S3 Total Station it is important to use a high quality tripod and tribrach. It is also important to set up the tripod in a position for best stability, see figure Figure 5.37. If the setup, tripod and/or tribrach is/are unstable the Trimble S3 Total Station servos might oscillate slightly in an effort to compensate for that instability. An unstable setup that could negatively influence the resulting measurement precision. See Setup on page 28

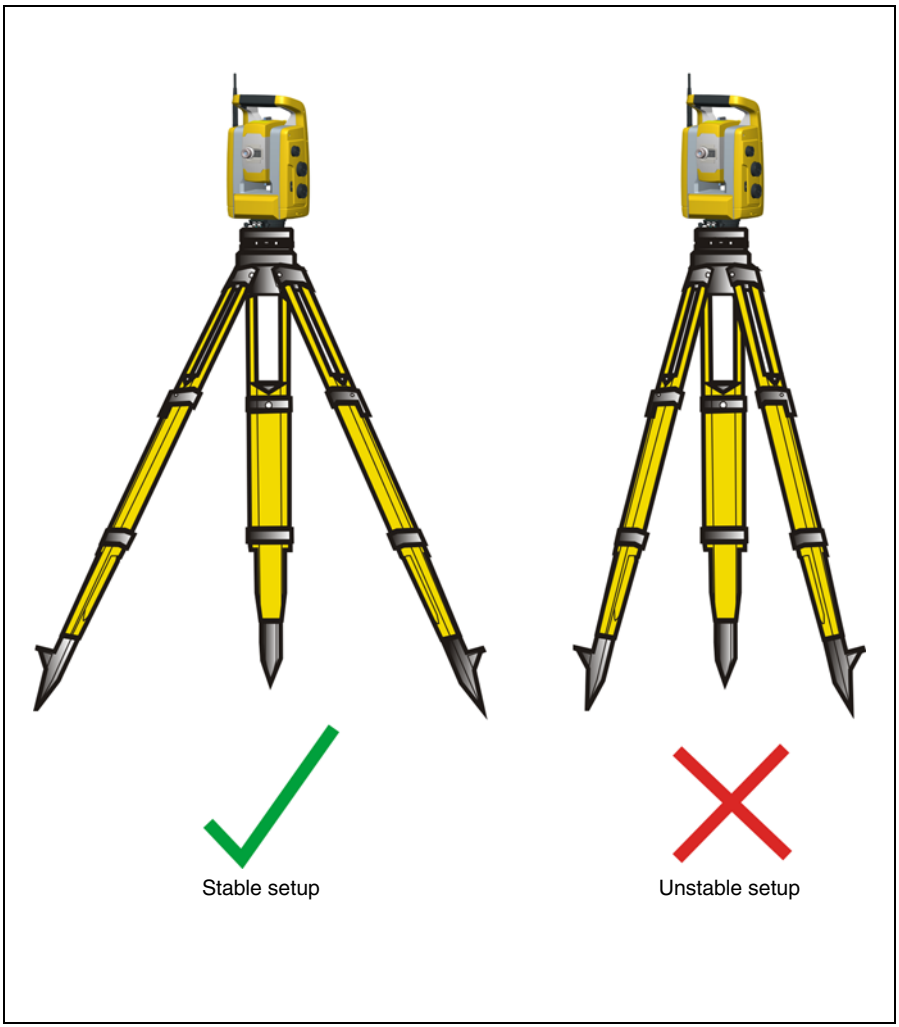


Figure 5.37 Tripod setup

Position Servo

The servo system is an electromagnetic Magdrive™, direct drive system, which gives high turning speeds and accuracy. The frictionless motion removes servo noise and reduces instrument wear. The system provides endless horizontal and vertical motion, including endless fine adjustment. The Trimble S3 Total Station uses servo when performing a number of different operations such as turning the horizontal and vertical motion knobs, for automatic test and calibration, or when using Autolock technology for robotic surveying. See figure 5.38

Note – *Due to the high speed servo it is important to use a high quality tripod and tribrach.*

Figure 5.38 Position servo

Focus Servo

The Trimble S3 Total Station is equipped with a focus servo. The focus motion knob is on the side of the Trimble S3 Total Station for easy access.

The focus knob is connected to a servo motor that is built into the telescope. When you turn the focus motion knob, the servo motor adjusts the focusing lens. See figure 5.39

Figure 5.39 Focus servo

Power Management

The power management in the Trimble S3 Total Station can set the instrument to one of three different modes.

- Off mode
- On mode
- Suspend mode

Trimble S3 Robotic Total Station

Off Mode

In the off mode the Trigger key LED is off.

Press the Trigger key to turn on the Trimble S3 Robotic Total Station. The Trimble S3 Robotic Total Station will also turn on if you connect a 12 V power supply to the 12 V power connector and a TSC2 (or PC) to the communication (COM) connector.

Note – *During startup the Trigger key LED will flash once every second.*

On Mode

In the on mode the Trigger key LED will be on solid.

To turn off the Trimble S3 Robotic Total Station press and hold the Trigger key until the LED is off.

The Trimble S3 Robotic Total Station will go to off mode if the battery is very low (battery capacity less than 2%).

Suspend Mode

In the suspend mode the Trigger key LED will flash once every other second,

To turn the Trimble S3 Robotic Total Station on press the Trigger key or turn on the Trimble S3 Robotic Total Station from a remote application.

To turn the Trimble S3 Robotic Total Station off press and hold the Trigger key until the LED is off.

In Suspend mode the Trimble S3 Robotic Total Station will turn off automatically after 2 hours.

Trimble S3 Servo/Autolock Total Station

Off Mode

In the off mode the Trigger key LED and display are off.

Press the Trigger key to turn on the Trimble S3 Servo/Autolock Total Station. The Trimble S3 Servo/Autolock Total Station will also turn on if you connect a 12 V power supply to the 12 V power connector and a TSC2 (or PC) to the communication (COM) connector.

Note – *During startup the Trigger key LED will flash once every second.*

On Mode

In the on mode the Trigger key LED will be on solid.

To turn off the Trimble S3 Servo/Autolock Total Station press the Trigger key.

The power key window will be displayed in the control panel.

Figure 5.40 Power key window

To turn off the Trimble S3 Servo/Autolock Total Station select Shutdown.

To go to suspend mode select Suspend.

The Trimble S3 Servo/Autolock Total Station will go to off mode if the battery is very low (battery capacity less than 2%).

If not used for a pre set period of time the Trimble S3 Servo/Autolock Total Station will go to Suspend mode. The time is set in the operating system, select /settings/control panel/power/power off.

Suspend Mode

In the suspend mode the Trigger key LED will flash once every other second, the display will be off.

To turn the Trimble S3 Servo/Autolock Total Station on press the Trigger key.

To turn the Trimble S3 Servo/Autolock Total Station off press and hold the Trigger key until the LED is off.

In Suspend mode the Trimble S3 Servo/Autolock Total Station will turn off automatically after 2 hours.

Power Supply

The power management in the Trimble S3 Total Station has been designed to deliver the most operating time in the field. The power management system includes the internal battery, optional external battery pack and the Trimble battery charger.

Internal Power Supply

The primary power supply for the Trimble S3 Total Station is a rechargable, removable Lithium-ion battery. The supplied battery is designed for use in the Trimble S3 Total Station and features:

- Battery gauge to easily check power supply
- Rugged design
- One battery type for Trimble S3 Total Station and accessories.

The Trimble S3 Total Station battery is on the side of the Trimble S3 Total Station and is easily removed and replaced. See figure 5.41

Figure 5.41 Removing and replacing the internal battery

To check the power supply in the Trimble S3 Total Station battery using the built in battery gauge, press the button on the side of the battery. See figure 5.42

Figure 5.42 Internal battery power gauge and button

When you press the button, four LEDs on the Trimble S3 Total Station battery show the power level. Each LED corresponds to a power level of 25% so that when the power level is at 100%, all four LEDs are lit. If the battery is completely discharged, all LEDs are unlit.

When the button is pushed and all the LEDs flash, the battery needs to be reconditioned in the battery charger.

When the battery capacity is between 0 and 10% one LED is flashing. A battery with a flashing LED might not be able to start a Trimble S3 Total Station. If started, with a battery with a flashing LED, the operating time will be between 5 and 15 minutes.

The capacity of the battery is 4.4 Ah.

External Power Supply

The Trimble S3 Total Station has two external connectors in the base of the Trimble S3 Total Station; one for communication and one for an external power supply. External power can be provided by one of the following:

- Multi Battery Adapter
- Car battery

With the Trimble S3 Total Station Multi Battery Adapter, you can connect up to three Trimble S3 Total Station batteries. Connect the Multi Battery Adapter to the external power connector on the Trimble S3 Total Station using a grey Trimble cable with 6-pin Hirose connector. The Trimble S3 Total Station Multi Battery Adapter can be attached to a tripod or placed on the ground, and has a carrying handle.

As an alternative to the Multi Battery Adapter, An external 12 V car battery can be used. Use one of the following cables:

- The Cable - 3.0m, Car battery (croc clips) to Hirose 6 pin.
- The Cable - 3.0m, Cigarette lighter to Hirose 6 pin

Caution – Use only the gray cables with 6-pin Hirose connectors from Trimble when connecting a cable to the Trimble S3 Total Station and Multi Battery Adapter.

Charging the Battery

See Trimble charger user guide for information.

Battery Low Message

If the battery capacity drops too low the Trimble S3 Total Station shuts down. You must then change the battery within two hours to prevent losing instrument parameters and functions such as instrument height, target height, coordinates, bearing, and dual axis compensation. After that time, the system resets all parameters and functions to default values.

Note – *This safety backup of the instrument parameters and functions will work only when* Bat low *appears on the display: it will not function if you remove the battery during operation.*

External Communication

Communication (COM) Connector

The communication (COM) connector on the base of the Trimble S3 Total Station can be used for:

- Communication to a desktop computer.
- Communication between a controller and the Trimble S3 Total Station.
- Installing firmware upgrades to the Trimble S3 Total Station.

Caution – Use only the gray cables with 6-pin Hirose connectors from Trimble when connecting a cable to the instrument.

USB Connector

The USB Connector on the Trimble S3 Servo/Autolock Total Station can be used for:

- Copying data between the control panel and a desktop computer using Microsoft® ActiveSync® technology.
- Copying data between the control panel and a USB memory stick, see page 4-40.
- Installing field application software upgrades and language packs.

Removable Handle

The handle of the Trimble S3 Total Station is removable for measurements in confined spaces, or for instances where the handle obstructs the sighting line.

The Trimble S3 Total Station handle is placed so that it will not obscure measurements in the face 1 position, or restrict plumbing vertically beneath an overhead marker or sighting up a vertical shaft.

The handle can be removed by:

1. Unscrew the two Torx screws securing the handle to the Trimble S3 Total Station, use a T30 Torx key.
2. Slide the handle horizontally away from the front of the Trimble S3 Total Station. See figure 5.43 and figure 5.44

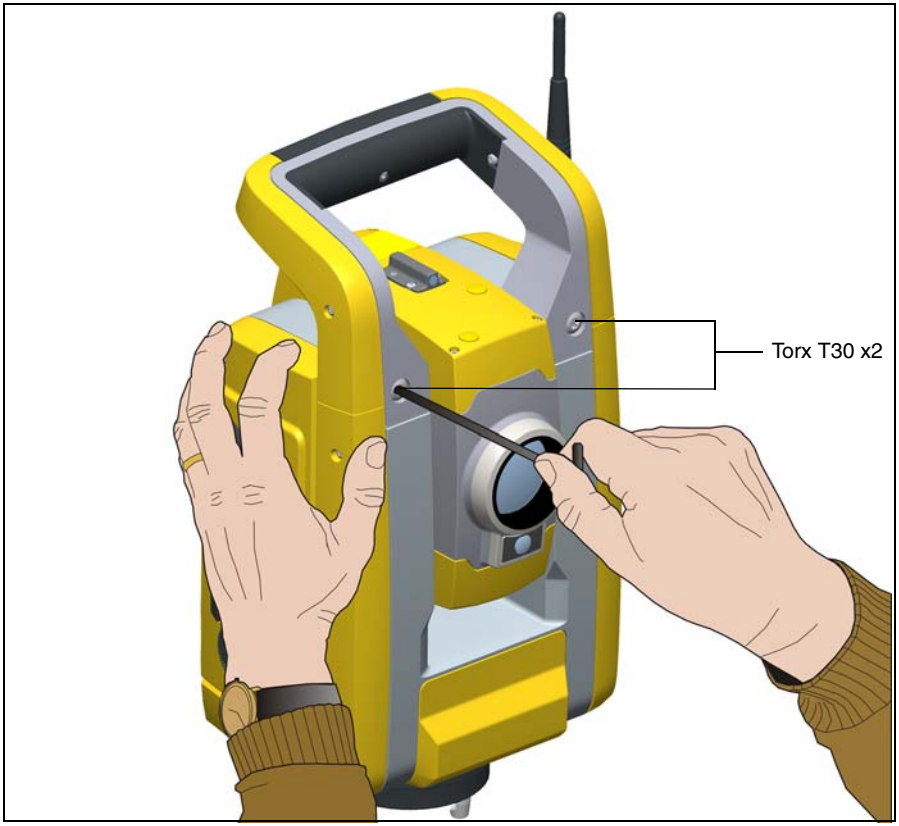


Figure 5.43 Removing the Trimble S3 Total Station handle

Figure 5.44 Detaching the Trimble S3 Total Station handle

Attaching the handle:

Attaching the handle is completed by reversing the above operations.

Caution – Make sure that the handle is firmly attached before you lift the Trimble S3 Total Station.

CHAPTER

6

Options & Accessories

In this chapter:

- Trimble Standard Rod
- Traverse Target

Trimble Standard Rod

The Trimble standard rod is available with the Trimble S3 Total Station. The rod contains the following features:

- Graduated scale in meters and feet.
- Fixed target height positions
- Leveling bubble

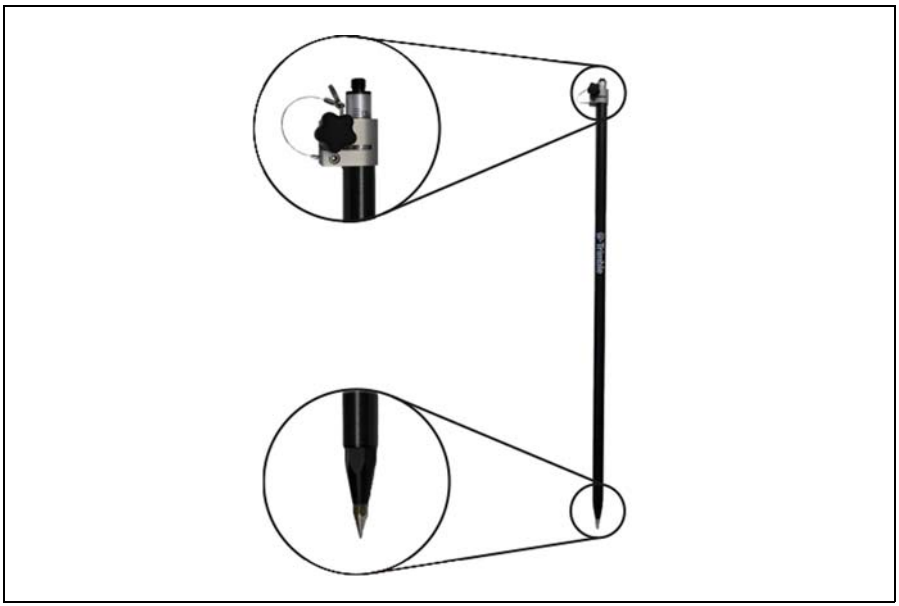


Figure 6.45 Trimble Standard Rod

Traverse Target

Traverse Kit 1 Accessory Case

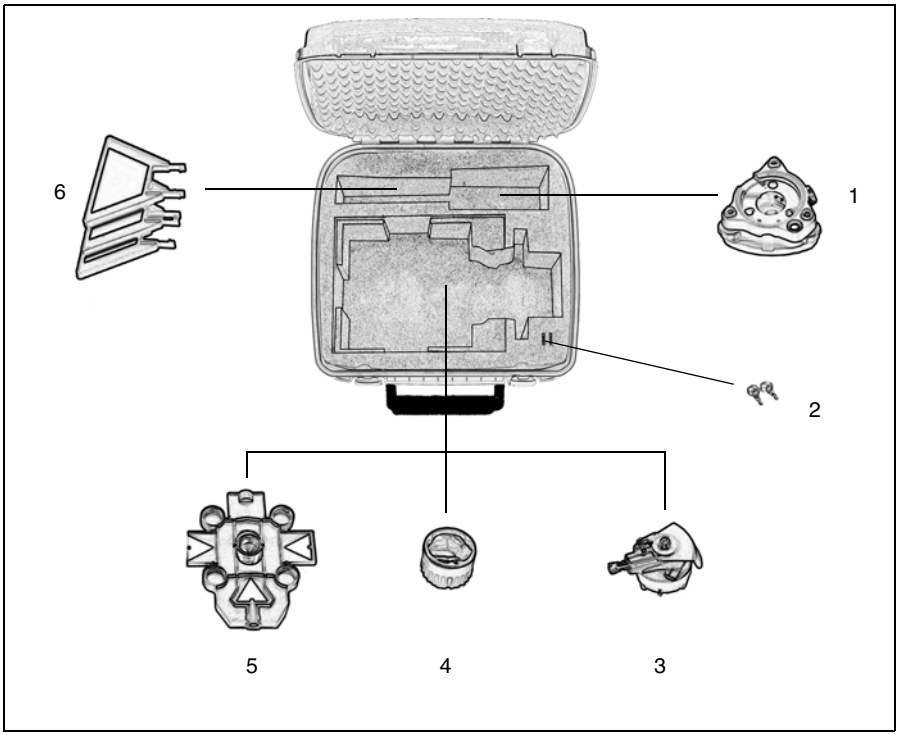


Figure 6.46 Contents of the traverse kit 1 accessory case

Item	Description
1	Tribrach
2	Accessory case keys (2x)
3	Prism base with level and optical plumb
4	Prism
5	Sighting target
6	Extra sighting targets (3x)

Traverse Kit 1 Assembly

When assembling the Traverse target from the Traverse target kit 1 to the Prism base it is important to fit the supplied adapter to get a correct assembly.

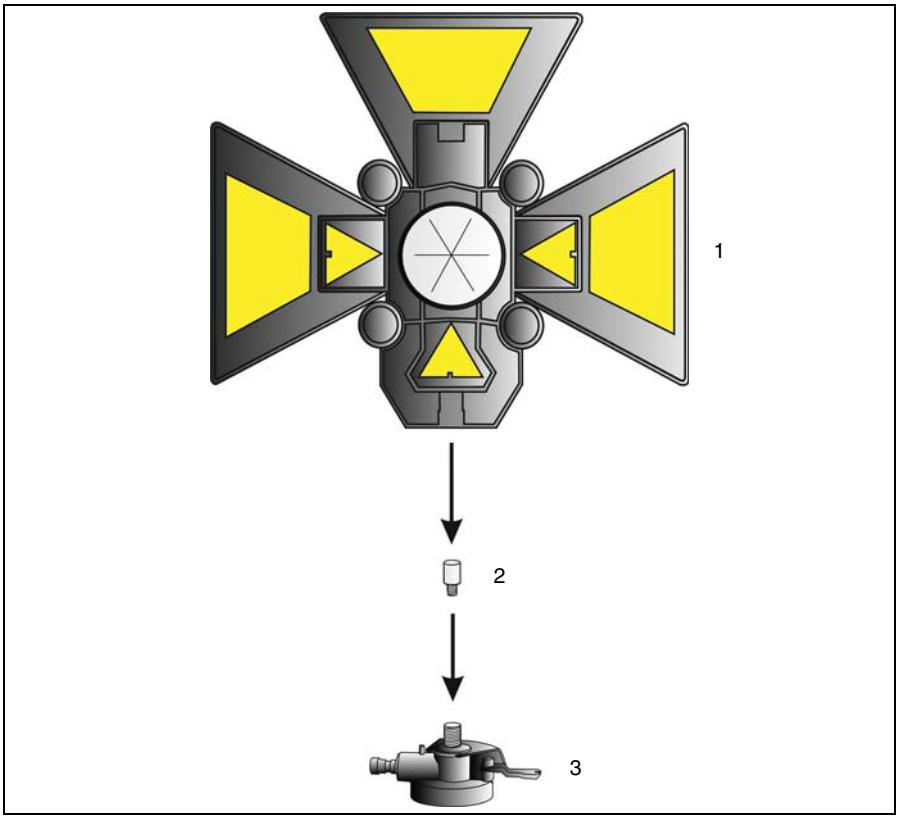


Figure 6.47 Assembling the traverse target

1. Screw the adapter (2) on to the prism base (3) and tighten.
2. Screw the target (1) on to the prism base (3)

Traverse Kit 2 Accessory Case

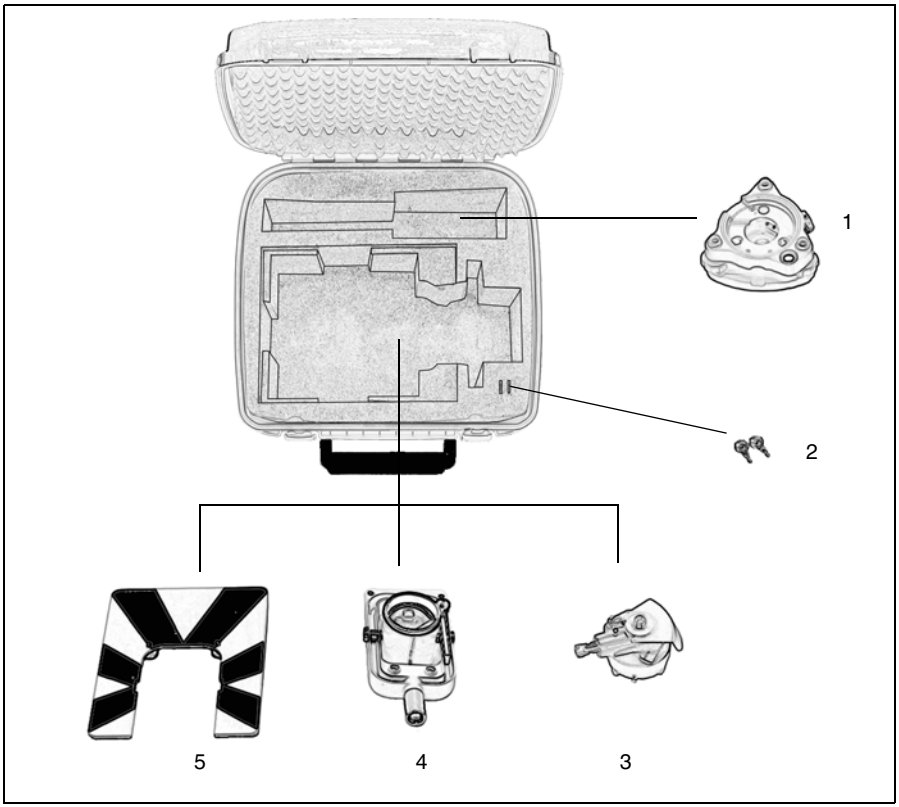


Figure 6.48 Contents of the traverse kit 2 accessory case

Item	Description
1	Tribrach
2	Accessory case keys (2x)
3	Prism base with level and optical plumb
4	Prism
5	Sighting target

Measuring the Target Height

There is a height measurement mark on the side of the prism base that can be turned out for easier reading of the height. The height measurement mark is 0.158 m (0.518 ft.) below the target (signal) height. Measure to the top ridge of the mark. See figure 6.49

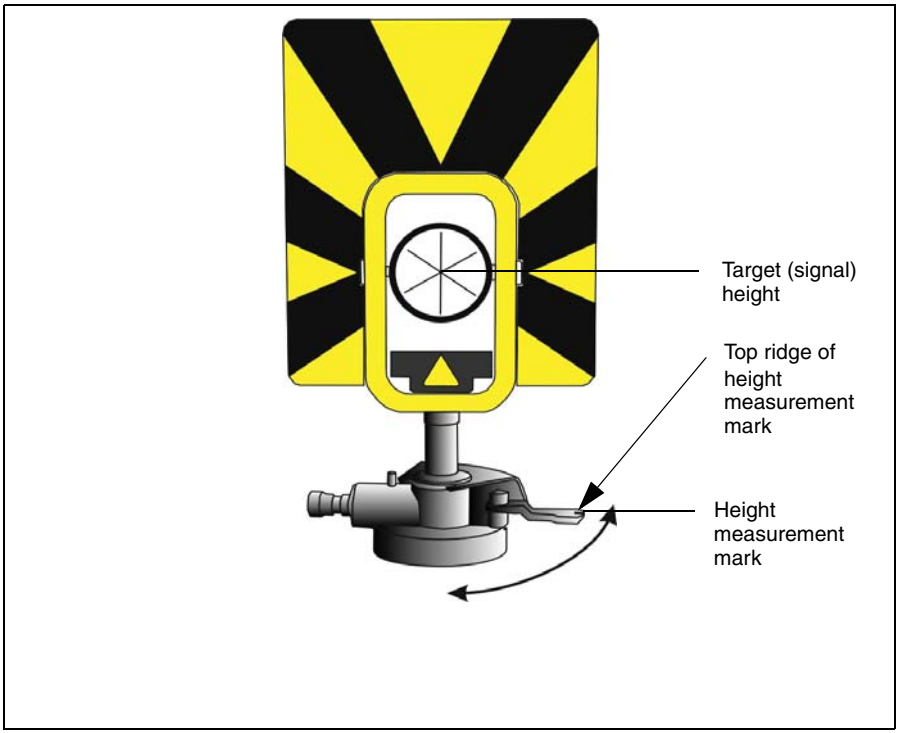


Figure 6.49 Target height marks

When there is a controller attached running a field application software, the software has additional functions that reduce the bottom mark measurement to the required vertical target (signal) height. See figure 6.50 and the following paragraph.

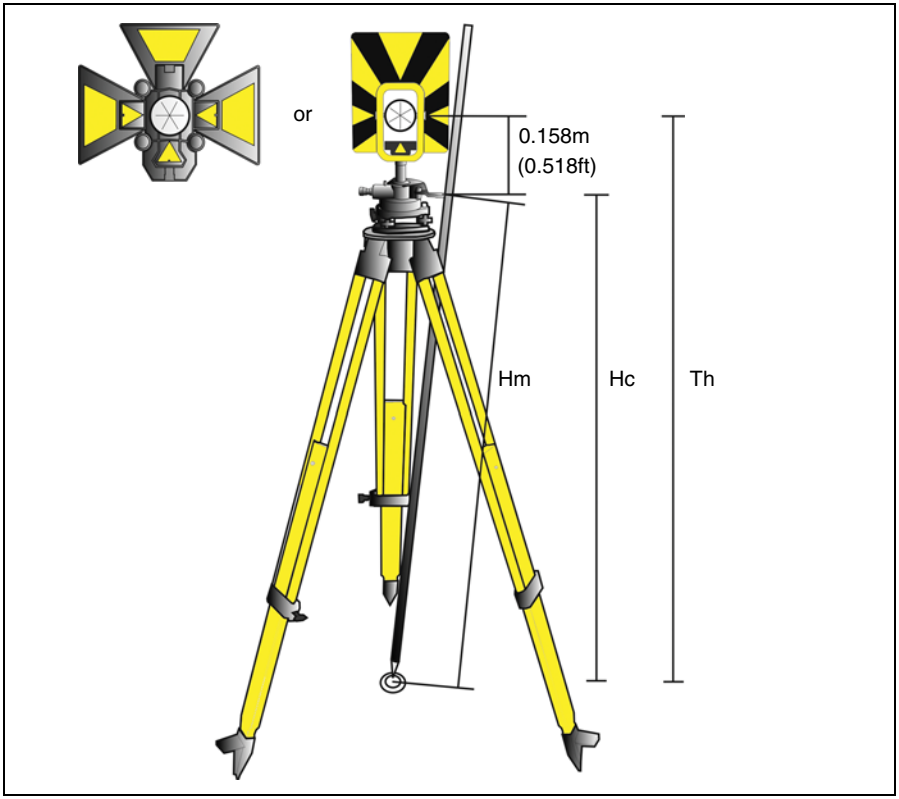


Figure 6.50 Target height measurement

The measured distance (Hm) is corrected for the slope of the measurement to obtain a vertical measurement to the bottom mark (Hc). The constant from the target height measurement mark to the target (signal) height (0.158 m/0.518 ft.) is added to the Hc to obtain the vertical target height from the ground mark to the target (signal) height (Th). For more information, refer to the field software documentation.

Alternatively, to obtain an accurate measurements to the target (signal) height (Th), you can manually measure the slope distance from the ground to the bottom mark (Hm). To calculate the total target height (Th), insert the measured slope distance (Hm) into the formula below:

$$Th = 0,158 + \sqrt{Hm^2 - 0,091^2}$$

Attaching the Accessory Case to the Trimble S3 Total Station Case

The accessory case can be fitted on top of the Trimble S3 Total Station case for transport to a job site. Use straps (not included) as shown in figure 6.51.

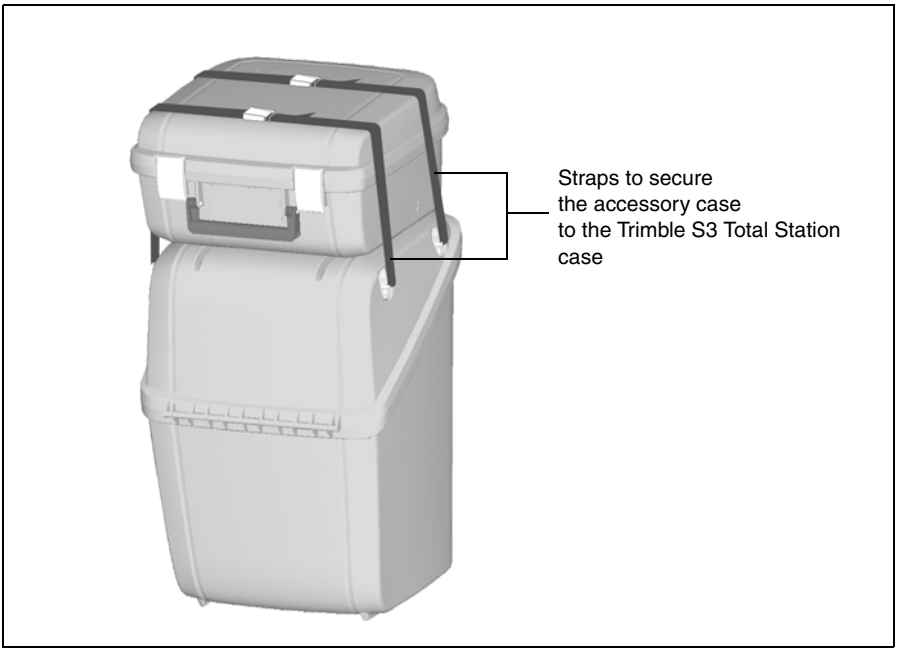


Figure 6.51 Accessory case fitted to the top of the Trimble S3 Total Station case

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