CLASS 2 Laser Product
OPERATOR’S MANUAL
This is the mark of the Japan Surveying Instruments Manufacturers Association.
Thank you for selecting the DT240/540/740/940/540L/740L/940L.

- Please read this operator’s manual carefully before using this instrument.
- Verify that all equipment is included.
- “STANDARD EQUIPMENT”
- The specifications and general appearance of the instrument are subject to change without prior notice and without obligation by Sokkia Topcon Co., Ltd. and may differ from those appearing in this manual.
- The content of this manual may be altered at any time.
- Some of the diagrams shown in this manual may be simplified for easier understanding.
HOW TO READ THIS MANUAL

Symbols

The following conventions are used in this manual.

- : Indicates precautions and important items which should be read before operations.
- : Indicates the chapter title to refer to for additional information.
- : Indicates supplementary explanation.
- {HOLD} etc. : Indicates operation keys.

Notes regarding manual style


- All other company and product names featured in this manual are trademarks or registered trademarks of each respective organization.
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STANDARD EQUIPMENT

The numerical value in parentheses shows the quantity.

<table>
<thead>
<tr>
<th>DT main unit (1) (with lens cap)</th>
<th>Carrying case (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plumb bob (1)</td>
<td>Tool pouch (1)</td>
</tr>
<tr>
<td>Cleaning brush, Screwdriver, Rod pins, Plumb bob hook (Hexagonal wrench: Only for models with laser-pointer)</td>
<td></td>
</tr>
<tr>
<td>AA batteries (4)</td>
<td>Vinyl cover (1)</td>
</tr>
<tr>
<td>Cleaning cloth (1)</td>
<td>Operator’s manual (1)</td>
</tr>
</tbody>
</table>

- Please verify that all equipment is included.
- Guarantee card, Laser use card, Caution sticker are supplied for certain markets.
vi
1. PRECAUTIONS FOR SAFE OPERATION

For the safe use of the product and prevention of injury to operators and other persons as well as prevention of property damage, items which should be observed are indicated by an exclamation point within a triangle used with WARNING and CAUTION statements in this instruction manual. The definitions of the indications are listed below. Be sure you understand them before reading the manual's main text.

Definition of Indication

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="WARNING" /></td>
<td>Ignoring this indication and making an operation error could possibly result in death or serious injury to the operator.</td>
</tr>
<tr>
<td><img src="image" alt="CAUTION" /></td>
<td>Ignoring this indication and making an operation error could possibly result in minor injury or property damage.</td>
</tr>
</tbody>
</table>

This symbol indicates items for which caution (hazard warnings inclusive) is urged. Specific details are printed in or near the symbol.

This symbol indicates items which are prohibited. Specific details are printed in or near the symbol.

This symbol indicates items which must always be performed. Specific details are printed in or near the symbol.

General

**Warning**

- Do not perform disassembly or rebuilding. Fire, electric shock, burns or hazardous radiation exposure could result.
- Do not use the unit in areas exposed to high amounts of dust or ash, in areas where there is inadequate ventilation, or near combustible materials. An explosion could occur.
- Never look at the sun through the telescope. Loss of eyesight could result.
1. PRECAUTIONS FOR SAFE OPERATION

Do not look at reflected sunlight from a prism or other reflecting object through the telescope. Loss of eyesight could result.

When securing the instrument in the carrying case make sure that all catches, including the side catches, are closed. Failure to do so could result in the instrument falling out while being carried, causing injury.

Caution

Do not use the carrying case as a footstool. The case is slippery and unstable so a person could slip and fall off it.

Do not place the instrument in a case with a damaged catch, belt or handle. The case or instrument could be dropped and cause injury.

Do not wield or throw the plumb bob. A person could be injured if struck.

Secure handle to main unit with securing screws. Failure to properly secure the handle could result in the unit falling off while being carried, causing injury.

Power Supply

Warning

Do not short circuit. Heat or ignition could result.

Do not use voltage other than the specified power supply voltage. Fire or electrical shock could result.

Do not heat or throw batteries into fire. An explosion could occur, resulting in injury.

Do not use batteries if wet. Resultant shorting could lead to fire or burns.

Do not use batteries other than those designated. An explosion could occur, or abnormal heat generated, leading to fire.
1. PRECAUTIONS FOR SAFE OPERATION

⚠️ **Caution**

Do not touch liquid leaking from batteries. Harmful chemicals could cause burns or blisters.

**Tripod**

⚠️ **Caution**

When mounting the instrument to the tripod, tighten the centering screw securely. Failure to tighten the screw properly could result in the instrument falling off the tripod, causing injury.

Tighten securely the leg fixing screws of the tripod on which the instrument is mounted. Failure to tighten the screws could result in the tripod collapsing, causing injury.

Keep hands and feet away from the tripod shoes when fixing the tripod in the ground. A hand or foot stab wound could result.

Tighten the leg fixing screws securely before carrying the tripod. Failure to tighten the screws could lead to the tripod legs extending, causing injury.

Do not carry the tripod with the tripod shoes pointed at other persons. A person could be injured if struck by the tripod shoes.
2. PRECAUTIONS

Before starting work or operation, be sure to check that the instrument is functioning correctly with normal performance.

Do not submerge the instrument in water

- The instrument can not be submerged underwater.
- The instrument is designed based on the International Standard IP66, therefore it is protected from normal rainfall.

Setting the instrument on a tripod

When mounting the instrument on a tripod, use a wooden tripod when possible. The vibrations that may occur when using a metallic tripod can effect the measuring precision.

Installing the tribrach

If the tribrach is installed incorrectly, the measuring precision could be effected. Occasionally check the adjusting screws on the tribrach. Make sure the tribrach clamp is locked and the locking screws are tightened.

Guarding the instrument against shocks

When transporting the instrument, provide some protection to minimize risk of shocks. Heavy shocks may cause the measurement to be faulty.

Carrying the instrument

Always carry the instrument by its handle.

Exposing the instrument to extreme heat

Do not leave the instrument in extreme heat for longer than necessary. It could adversely affect performance.
2. PRECAUTIONS

Sudden changes of temperature

Any sudden change of temperature to the instrument or prism may result in a reduction of measuring distance range, e.g. when taking the instrument out from a heated vehicle. Let instrument acclimate itself to ambient temperature. When a high degree of precision is required for measurement, provide shade against direct sunlight for the instrument and tripod.

Battery level check

Confirm battery level remaining before operating.
Store with the batteries removed when operation is halted for more than a month. Leaving the batteries installed for an extended period of time can result in battery leakage, which may lead to malfunction.

Notice on Transceiver

Do not use a high output transceiver etc. near the instrument.

Maintenance

• For cleaning the instrument after use, remove dust using a cleaning brush, then wipe off with a cloth.
• For cleaning the lens surface, use a cleaning brush to remove the dust, then use the cleaning cloth or a clean lintless cotton cloth. Moisten it with alcohol (or mixture with ether) to wipe gently in a rotational motion from the center out.
• Never use thinner or benzine to clean the case. Use a clean cloth moistened with neutral detergent.
• Check each part of the tripod after extended use. Parts (screws or clamps) may work themselves free.
2. PRECAUTIONS

User

• This product is for professional use only! The user is required to be a qualified surveyor or have a good knowledge of surveying, in order to understand the user and safety instructions, before operating, inspecting or adjusting.

• Wear the required protectors (safety shoes, helmet, etc.) when operating.

Exceptions from Responsibility

• The user of this product is expected to follow all operating instructions and make periodic checks (hardware only) of the product’s performance.

• The manufacturer, or its representatives, assumes no responsibility for results of a faulty or intentional usage or misuse including any direct, indirect, consequential damage, and loss of profits.

• The manufacturer, or its representatives, assumes no responsibility for consequential damage, and loss of profits by any disaster, (an earthquake, storms, floods etc.). A fire, accident, or an act of a third party and/or a usage any other usual conditions.

• The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits due to a change of data, loss of data, an interruption of business etc., caused by using the product or an unusable product.

• The manufacturer, or its representatives, assumes no responsibility for any damage, and loss of profits caused by usage except for explained in the user manual.

• The manufacturer, or its representatives, assumes no responsibility for damage caused by wrong movement, or action due to connecting with other products.
The DT540L/740L/940L is classified as the following class of Laser Product according to IEC Standard Publication 60825-1 Ed. 2.0: 2007 and United States Government Code of Federal Regulation FDA CDRH 21CFR Part1040.10 and 1040.11 (Complies with FDA performance standards for laser products except for deviations pursuant to Laser Notice No.50, dated June 24, 2007.)

- Laser-pointer (visible) in objective lens: Class 2 Laser Product

Depending on the country where the instrument is sold, some of these labels may not be found on the instrument.

⚠️ Warning

- Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.
- Follow the safety instructions on the labels attached to the instrument as well as in this manual to ensure safe use of this laser product.
- Never point the laser beam at another person. If the laser beam strikes skin or an eye, it could cause serious injury.
  If an eye injury is caused by exposure to the laser beam, seek immediate medical attention from a licensed ophthalmologist.
- Do not look directly into the laser beam source. Doing so could cause permanent eye damage.
3. LASER SAFETY INFORMATION

- Do not stare at the laser beam. Doing so could cause permanent eye damage.
- Never look at the laser beam through a telescope, binoculars or other optical instruments. Doing so could cause permanent eye damage.

⚠️ Caution

- Perform checks at start of work and periodic checks and adjustments with the laser beam emitted under normal conditions.
- When the instrument is not being used, turn off the power and replace the lens cap.
- When disposing of the instrument, destroy the battery connector so that the laser beam cannot be emitted.
- Operate the instrument with due caution to avoid injuries that may be caused by the laser beam unintentionally striking a person in the eye. Avoid setting the instrument at heights at which the path of the laser beam may strike pedestrians or drivers at head height.
- Never point the laser beam at mirrors, windows or surfaces that are highly reflective. The reflected laser beam could cause serious injury.
4. PRODUCT OUTLINE

4.1 Parts of the Instrument

**DT240/540/740/940**

- Tribrach clamp (DT240/540/740/940 only)
- Circular level
- Display *1)
- Objective lens
- Peep sight
- Instrument height mark
- Optical plummet
- Horizontal fine motion screw
- Horizontal clamp
- Leveling foot screw

*1) DT940 has one side display only.
4. PRODUCT OUTLINE

- Data input/output connector (DT240/540 only)
- Handle
- Handle securing screw
- Telescope focusing ring
- Cross-hair adjustment section cover
- Telescope eyepiece
- Battery case
- Vertical clamp
- Vertical fine motion screw
- Plate level
- Operation keys

Base plate

Tribrach type
DT240/540/740: Detachable
DT940: Fixed
4. PRODUCT OUTLINE

**DT540L/740L/940L**

- Leveling foot screw
- Gun sight
- Instrument height mark
- Tribrach clamp (DT540L/740L only)
- Circular level
- Objective lens
- Horizontal clamp
- Optical plummet
- Horizontal fine motion screw
- Display *1)

*1) DT940L has one side display only.
4. PRODUCT OUTLINE

- **Base plate**
  - Tribrach type
  - DT540L/740L: Detachable
  - DT940L: Fixed

- **Telescope eyepiece**

- **Operation keys**

- **Laser axis adjusting screw (with cap)**

- **Vertical clamp**

- **Battery case**

- **Vertical fine motion screw**

- **Telescope focusing ring**

- **Cross-hair adjustment section cover**

- **Handle**

- **Handle securing screw**

- **Plate level**

- **Data input/output connector**
  - (DT540L only)

- **Plate level**
  - (DT740L only)
4.2 Display Functions

<table>
<thead>
<tr>
<th>Display</th>
<th>Contents</th>
<th>Display</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Vertical angle</td>
<td>TILT</td>
<td>Tilt correction mode (DT240/540/540L only)</td>
</tr>
<tr>
<td>HR</td>
<td>Horizontal angle right</td>
<td>F</td>
<td>Function key selection mode</td>
</tr>
<tr>
<td>HL</td>
<td>Horizontal angle left</td>
<td>%</td>
<td>Percent grade</td>
</tr>
<tr>
<td>Ht</td>
<td>Repetition angle measurement</td>
<td>G</td>
<td>Unit display GON</td>
</tr>
<tr>
<td>8AVG</td>
<td>The number of repetition/</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Average of angle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4. PRODUCT OUTLINE

4.3 Basic Key Operation

<table>
<thead>
<tr>
<th>Key</th>
<th>Function</th>
<th>Key</th>
<th>Function (Function mode)</th>
</tr>
</thead>
<tbody>
<tr>
<td>⌧</td>
<td>Power switch</td>
<td>⭈</td>
<td>Repetition angle measurement</td>
</tr>
<tr>
<td>{R/L}</td>
<td>Selection for horizontal angle right/left measurement</td>
<td>{ }</td>
<td>Illumination of display and reticle ON/OFF (Reticle illumination: DT240/540L/740L only)</td>
</tr>
<tr>
<td>{V/%}</td>
<td>Vertical angle display</td>
<td>⭈</td>
<td>Moving the blinking digit to the left</td>
</tr>
<tr>
<td></td>
<td>Selection for vertical angle/percent display</td>
<td>⭈</td>
<td>Moving the blinking the digit to the right</td>
</tr>
<tr>
<td>{HOLD}</td>
<td>Holding the horizontal angle</td>
<td>{ ▲ }</td>
<td>Increment the blinking numeral</td>
</tr>
<tr>
<td>{0 SET}</td>
<td>Horizontal angle 0° set</td>
<td></td>
<td></td>
</tr>
<tr>
<td>{FUNC}</td>
<td>Upper function selection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Adjustment mode and Selecting mode

<table>
<thead>
<tr>
<th>Mode</th>
<th>Key</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjustment mode of vertical angle 0 datum</td>
<td>Turn the power ON while pressing {0 SET}.</td>
</tr>
<tr>
<td>Selecting mode 1</td>
<td>Turn the power ON while pressing {R/L}.</td>
</tr>
<tr>
<td>Selecting mode 2</td>
<td>Turn the power ON while pressing {V/%}.</td>
</tr>
</tbody>
</table>
5. PREPARATION FOR MEASUREMENT

5.1 Setting Instrument Up for Measurement

Setting up the Tripod
First, extend the extension legs to suitable lengths and tighten the screws on their midsections.

Attaching the Instrument on the Tripod Head
Place the instrument carefully on the tripod head and slide the instrument by loosening the centering screw. If the plumb bob is positioned right over the center of the point, slightly tighten the centering screw.

Roughly Leveling the Instrument Using the Circular Level

1. Turn leveling foot screws A and B to move the bubble in the circular level. The bubble is now located on a line perpendicular to a line running through the centers of the two leveling foot screws being adjusted.

2. Turn leveling foot screw C to bring the bubble to the center of the circular level.

Centering Using the Plate Level

1. Rotate the instrument horizontally using the Horizontal fine motion screw and place the plate level parallel with the line connecting leveling foot screws A and B, and then bring the bubble to the center of the plate level by turning leveling foot screws A and B.
5. PREPARATION FOR MEASUREMENT

2 Rotate the instrument 90° (100 gon) around its vertical axis and turn the remaining leveling foot screw or C to center the bubble once more.

3 Repeat procedures 1 and 2 for each 90° (100 gon) rotation of the instrument and check whether the bubble is correctly centered at all four points.

Centering Using the Optical Plummet
Adjust the eyepiece of the optical plummet to your eyesight. Slide the instrument by loosening the centering screw, place the point on the center mark, and then tighten the centering screw. Slide the instrument carefully so as to prevent unintentional rotation that may shift the bubble.

Centering with a Shifting Tribrach
Slide the instrument by loosening the shifting clamp. Place the point on the center mark, and then tighten the shifting clamp.
5. PREPARATION FOR MEASUREMENT

Completely Leveling the Instrument
Level the instrument precisely in a similar way to 4. Rotate the instrument and check that the bubble is in the center of the plate level regardless of telescope direction, then tighten the centering screw hard.
5. PREPARATION FOR MEASUREMENT

5.2 Power Switch Key ON

1  Confirm the instrument is leveled.

2  Turn the power switch ON.  
   Every segment turns on for about 1 second.

3  Press {V/\%}.  The vertical angle is displayed.

   ! Confirm the battery power remaining on the display. Insert new batteries when battery level is low.

   "5.3 Battery Level Indicator" (p. 19)
5. PREPARATION FOR MEASUREMENT

5.3 Battery Level Indicator

The battery power indicator shows remaining battery power.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10’20”</th>
<th>TILT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>123°40’50”</td>
<td></td>
</tr>
</tbody>
</table>

Measurement is possible.

Battery Power Remaining Display

Measurement is impossible. Replace batteries.

- The battery operating time will vary depending on the environmental conditions, such as ambient temperature etc. Prepare spare batteries in advance to minimize disruption to measurement.

"10. HANDLING POWER SOURCE" (p. 37)

5.4 Vertical Angle Tilt Correction

(DT240/540/540L only)

When the tilt sensor is activated, automatic correction of vertical angle tilt is displayed. To ensure precise angle measurement, tilt sensors must be turned on. If the "b" display appears the instrument is out of automatic compensation range and must be leveled manually.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10’20”</th>
<th>TILT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>123°40’50”</td>
<td></td>
</tr>
</tbody>
</table>

Out of the tilt correction range

<table>
<thead>
<tr>
<th>b</th>
<th>TILT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>123°40’50”</td>
</tr>
</tbody>
</table>

When the instrument is used in an unstable situation, constant indexing of vertical angle may be impossible. In this event, the function of tilt correction can be cancelled.

To cancel tilt correction, refer to "9. SELECTING MODE" (p. 31).
5. PREPARATION FOR MEASUREMENT

5.5 Data Input/Output Connector

(DT240/540/540L only)
This RS232C connector is used for connecting the DT240/540/540L with a computer, which enables the computer to receive measurement data from the DT240/540/540L.

Contact your local dealer regarding interface cables and output formats used when connecting to a computer.
6. MEASUREMENT

6.1 Measuring Horizontal Angle Right and Vertical Angle

1 Sight the first target “A”.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V</strong></td>
<td>90°10′20″</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>120°30′40″</td>
</tr>
</tbody>
</table>

2 Press {0 SET} twice to set the horizontal angle of target “A” to 0°00′00″.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V</strong></td>
<td>90°10′20″</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>0°00′00″</td>
</tr>
</tbody>
</table>

• Horizontal angle can be set to 0 with one press of {0 SET}. "9. SELECTING MODE" (p. 31)

3 Sight the second target “B”.
The required H/V angle to target B will be displayed.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V</strong></td>
<td>90°10′20″</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>160°40′20″</td>
</tr>
</tbody>
</table>

6.2 Switching Horizontal Angle Right/Left

1 Sight the first target “A”.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>V</strong></td>
<td>90°10′20″</td>
</tr>
<tr>
<td><strong>HR</strong></td>
<td>120°30′40″</td>
</tr>
</tbody>
</table>
2 Press \{R/L\}.
The mode switches from Horizontal angle right (HR) to Horizontal angle left (HL).

\[
\begin{array}{|c|c|}
\hline
V & 90°10’20” \\
H & 239°29’20” \\
\hline
\end{array}
\]

- HR/HL mode switches every time \{R/L\} is pressed.

3 Measure as HR mode.

**Note** Sighting

1 Point the telescope toward the light. Turn the diopter ring and adjust the diopter so that the cross hairs are in focus.

(Turn the diopter ring toward you first and then backward to focus.)

2 Aim the peak of the triangle mark of the peep sight at the target. Allow a certain space between the peep sight and yourself for sighting.

3 Focus on the target with the focusing ring.

* If parallax is created between the cross hairs and the target when viewing vertically or horizontally through the telescope, focusing is incorrect or diopter adjustment is insufficient.

This adversely affects precision in measurement or survey. Eliminate the parallax by focusing carefully and using diopter adjustment.
6.3 Measuring from the Required Horizontal Angle

1 Display the required horizontal angle using the horizontal fine motion screw and horizontal clamp.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10′20″</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>130°40′20″</td>
</tr>
</tbody>
</table>

2 Press {HOLD}. Horizontal angle display blinks and the horizontal angle will be held.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10′20″</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>130°40′20″</td>
</tr>
</tbody>
</table>

• To return to the angle status before the data is held, press any key except {HOLD}.

3 Sight the target to set.

4 Press {HOLD}. Angle measurement will start from the held angle.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10′20″</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>130°40′20″</td>
</tr>
</tbody>
</table>
6. MEASUREMENT

6.4 Vertical Angle % display

<table>
<thead>
<tr>
<th>V</th>
<th>66°23′10″</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>120°30′40″</td>
</tr>
</tbody>
</table>

1 Press {V/%}.

<table>
<thead>
<tr>
<th>V</th>
<th>43.719%</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>120°30′40″</td>
</tr>
</tbody>
</table>

• The mode switches every time {V/%} is pressed. [--------] is displayed when a point is sighted at 45° or more from the horizontal.

6.5 Repetition Angle Measurement

1 Press {FUNC}.

<table>
<thead>
<tr>
<th>V</th>
<th>90°10′20″</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR</td>
<td>120°30′40″</td>
</tr>
</tbody>
</table>

2 Press {REP}.

<table>
<thead>
<tr>
<th>Ht</th>
<th>0°00′00″</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

3 Sight the target “A”, and press {0SET} twice.

<table>
<thead>
<tr>
<th>Ht</th>
<th>0°00′00″</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>
6. MEASUREMENT

4 Sight the target “B”, and press \{HOLD\}.

\[
\begin{array}{|c|c|}
\hline
& \text{Ht} & 45^\circ10'00'' \\
\text{1AVG} & \text{H} & 45^\circ10'00'' \\
\hline
\end{array}
\]

5 Sight the target “A” again and press \{R/L\}.

6 Sight the target “B” again, and press \{HOLD\}.

\[
\begin{array}{|c|c|}
\hline
& \text{Ht} & 90^\circ20'00'' \\
\text{2AVG} & \text{H} & 45^\circ10'00'' \\
\hline
\end{array}
\]

7 Repeat procedures 5 and 6 for the desired number of repetitions.

\[
\begin{array}{|c|c|}
\hline
& \text{Ht} & 180^\circ40'00'' \\
\text{4AVG} & \text{H} & 45^\circ10'00'' \\
\hline
\end{array}
\]

Example: 4 measurements

8 To finish repetition measurement, press \{FUNC\} then press \{HOLD\}.

- Horizontal angle can be accumulated up to 2000°00'00" – minimum reading (horizontal angle right). In case of 5" reading, horizontal angle can be accumulated up to +1999°59'55".
- When the discrepancy value of each measurement is more than ±30", error code “E04” is displayed. Press \{0SET\}, and start measurement again.
- Up to 19 measurements can be made. The first digit "1" will be omitted from the measurement number for the 10th measurement onwards.
6.6 Stadia Surveying

This instrument can be used for stadia surveying. Measurement by stadia is a convenient method for measuring distances with the stadia hairs of the instrument, in combination with a graduated rod, such as a leveling rod or stadia rod, which is preferable for long distances. The distance from the center of the instrument to the rod is found by sighting through the instrument on the rod and multiplying the stadia interval by 100. The stadia interval is the distance between the top stadia hair reading and the bottom stadia hair reading.

1. Set the rod on the point to be surveyed.
2. Sight through the telescope of the leveled instrument and determine the distance or interval, “d”, between the top stadia hair reading and bottom stadia hair reading of the rod.
3. The horizontal distance “D” from the center of the instrument to the rod is equal to 100 times the stadia interval, “d”.

\[ D = 100 \times d \]
7. HOW TO OPERATE THE LASER

(DT540L/740L/940L only)

7.1 Laser Power Switch Key ON

1 Sight a target.

2 Press the laser power switch. The laser beam will emit and the green lamp will illuminate.

Note

DT540L/740L/940L are so designed as to provide the telescope and laser beam with simultaneous focussing to give the minimum spot.
8. OTHER FUNCTIONS

8.1 Buzzer for Horizontal Angle 90° Increments

When the horizontal angle falls below ± 1° of 0°, 90°, 180° or 270°, the buzzer sounds. Buzzer stops only when the horizontal angle is adjusted to 0°00'00", 90°00'00", 180°00'00" or 270°00'00".

Settings: 📃 "9. SELECTING MODE" (p. 31)

8.2 Compasses (vertical angle)

Vertical angle scale is displayed as shown below.

Settings: 📃 "9. SELECTING MODE" (p. 31)

![Diagram showing compasses (vertical angle)]

8.3 Power-saving Automatic Cut-Off

If no key operation is given for more than 10 or 30 minutes, the power turns off automatically.

Settings: 📃 "9. SELECTING MODE" (p. 31)
8. OTHER FUNCTIONS

8.4 Setting Minimum Display

Select minimum display unit for angle measurement from the options shown below.
Settings: "9. SELECTING MODE" (p. 31)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DT240</td>
<td>1&quot;/5&quot; (0.2 mgon/1 mgon)</td>
</tr>
<tr>
<td>DT540/540L</td>
<td>1&quot;/5&quot; (0.5 mgon/1 mgon)</td>
</tr>
<tr>
<td>DT740/740L</td>
<td>5&quot;/10&quot; (1 mgon/2 mgon)</td>
</tr>
<tr>
<td>DT940/940L</td>
<td>10&quot;/20&quot; (2 mgon/5 mgon)</td>
</tr>
</tbody>
</table>
8. OTHER FUNCTIONS

8.5 Detaching/Attaching the Tribrach

Only for detachable tribrach type

The instrument is easily detached from/attached to the tribrach by releasing/engaging the tribrach clamp.

• **Detaching**
  1. Release the tribrach clamp by revolving it 180° or 200 gon in the counterclockwise direction (which will point the triangle mark upwards).
  2. Grip the handle firmly with one hand while holding the tribrach with the other. Then lift the instrument straight upwards and off.

• **Attaching**
  1. Hold the instrument by the handle, with one hand, and carefully lower it on top of the tribrach while, at the same time, aligning the alignment piece with the tribrach alignment groove on the instrument and tribrach respectively.
  2. When fully seated, revolve the tribrach locking lever 180° or 200 gon clockwise (which will point the triangle mark downwards again).

• **Locking the Tribrach Clamp**

The tribrach clamp can be locked, to prevent it being accidentally released, especially if the upper instrument section is not detached very often. Simply tighten the locking screw on the tribrach clamp with the screwdriver provided.
9. SELECTING MODE

The following modes are available

9.1 Selecting Mode Options

Selecting mode 1

To set the instrument to selecting mode 1, turn the power ON while pressing \{R/L\}.

<table>
<thead>
<tr>
<th>Digit No.</th>
<th>Items</th>
<th>Contents</th>
<th>Setting value = 0</th>
<th>Setting value = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Minimum angle unit</td>
<td>Select the minimum angle unit.</td>
<td>5&quot; (DT240/540/540L)</td>
<td>1&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>10&quot; (DT740/740L)</td>
<td>5&quot;</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20&quot; (DT940/940L)</td>
<td>10&quot;</td>
</tr>
<tr>
<td>2</td>
<td>V angle Z0/H0</td>
<td>Select the vertical angle reading from zenith or from horizontal.</td>
<td>Horizontal 0</td>
<td>Zenith 0</td>
</tr>
<tr>
<td>3</td>
<td>Power-saving automatic cut-off ON/OFF</td>
<td>Set whether or not to power off when no key operation performed for 10 or 30 minutes.</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>4</td>
<td>Auto cut off time 10 min./30 min.</td>
<td>Set the interval time of power off automatically.</td>
<td>10 min.</td>
<td>30 min.</td>
</tr>
<tr>
<td>5</td>
<td>Angle unit DEG/GON</td>
<td>Select degree (DEG) or gon (GON).</td>
<td>DEG</td>
<td>GON</td>
</tr>
<tr>
<td>6</td>
<td>90° buzzer ON/OFF</td>
<td>Specify whether the buzzer sounds or not for every horizontal 90°</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>7</td>
<td>Angle unit MIL</td>
<td>Select angle unit MIL.</td>
<td>DEG/GON</td>
<td>MIL</td>
</tr>
</tbody>
</table>
9. SELECTING MODE

■ Selecting mode 2

To set the instrument to selecting mode 2, turn the power ON while pressing {V/\%}.

Selecting mode 2
{V/\%} + Power on

<table>
<thead>
<tr>
<th>Digit No.</th>
<th>Items</th>
<th>Contents</th>
<th>Setting value = 0</th>
<th>Setting value = 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Press {0 SET} once/twice</td>
<td>Select number of times {0SET} is pressed to set horizontal angle to 0.</td>
<td>Twice</td>
<td>Once</td>
</tr>
<tr>
<td>2</td>
<td>Compass ON/OFF</td>
<td>Set the compass to ON or OFF (Vertical angle scale).</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>3</td>
<td>RS-232 Output *1</td>
<td>Set data input/output function to ON or OFF.</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>4</td>
<td>H Angle Memory</td>
<td>Horizontal angle set can be retained after the power is turned off.</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>5</td>
<td>Tilt correction ON/OFF *1</td>
<td>Set tilt correction to ON or OFF.</td>
<td>OFF</td>
<td>ON</td>
</tr>
<tr>
<td>6</td>
<td>Unused</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>7</td>
<td>Unused</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

* Do not change the setting value (0) of unused items.
* *1) DT240/540/540L only
9. SELECTING MODE

9.2 How to Set the Selecting Modes

Selecting Mode 1

Sample setting: Auto cut off: OFF, 90° buzzer: OFF

1. Turn the power ON while pressing \{R/L\}.
The instrument will be in selecting mode 1, and the digit No.1 will blink.

2. Press \{\} until digit No.3 blinks.

• Pressing \{\} moves the blinking digit to the right.

3. Press \{\} to set this digit to "1".

• Pressing \{\} switches the blinking digit value between "0" and "1".

4. Press \{\} until digit No.6 (90° buzzer) blinks.
9. SELECTING MODE

5 Press {▲} to set this digit to "1".

```
  0 1 0 0 1 0 0
```

6 Press {0 SET} to set.

```
      SET

  0 1 0 0 1 0 0
```

7 Turn the power off.
9. SELECTING MODE

■ Selecting mode 2

Sample setting: {0 SET} operation: Once, Tilt correction: OFF

1 Turn the power ON while pressing {V/\%}.
The instrument will be in selecting mode 2, and the digit No.1 (0set operation) will blink.

2 Press {▲} to set this digit to "1".

3 Press {◄} until digit No.4 (Tilt correction) blinks.

4 Press {▲} to set this digit to "0".
9. SELECTING MODE

5  Press {0 SET} to set.

6  Turn the power off.
10. HANDLING POWER SOURCE

10.1 Removing

1 Push the battery release button downward and detach the battery case.

2 Remove the old batteries and insert new batteries as shown in the illustration above making sure plus/minus directions are correct.

3 Insert the guide into the slot. Close the cover until a click is heard.

10.2 Replacing the batteries (BDC69)

1 Push the catch downward and remove the cover.

2 Remove the old batteries and insert new batteries as shown in the illustration above making sure plus/minus directions are correct.

3 Insert the guide into the slot. Close the cover until a click is heard.

Note

• Replace all four batteries at the same time.
• Do not mix old and new batteries.
10.3 For Installing

Place the base of the battery case into the main body, push the battery case toward the instrument until the battery clicks into position.
### 11. ERROR MESSAGES

<table>
<thead>
<tr>
<th>Display</th>
<th>Contents</th>
<th>Countermeasure</th>
</tr>
</thead>
<tbody>
<tr>
<td>AnGLE Error</td>
<td>Displayed when the instrument or the telescope rotated too quickly.</td>
<td>This is not a malfunction. However, repair is required when &quot;AnGLE Error&quot; is displayed frequently.</td>
</tr>
<tr>
<td>E04</td>
<td>Displayed when the discrepancy value of each measurement is more than ±30&quot; while repetition angle measurement is operated.</td>
<td>Press {0SET} and measure again from the beginning.</td>
</tr>
<tr>
<td>E70</td>
<td>When &quot;Adjustment of Vertical Angle 0 datum&quot; is performed in wrong procedure. or When &quot;Adjustment of Vertical Angle 0 datum&quot; is sighting a target at ±45° or more from the horizontal.</td>
<td>Switch off the power, then on again. Confirm the procedure and adjust again.</td>
</tr>
<tr>
<td>E99</td>
<td>Abnormality in internal memory system during &quot;Adjustment of Vertical Angle 0 Datum&quot;, or when horizontal angle is being set to zero or hold status.</td>
<td>Switch off the power, then on again. Confirm the procedure and adjust again.</td>
</tr>
</tbody>
</table>

If errors still persist after attempting to clear them, contact your local dealer.
Precautions when Adjusting

- Adjust the eyepiece of the telescope properly prior to any checking operation which involves sighting through the telescope. Remember to focus properly, with parallax completely eliminated.
- Carry out the adjustments in the order of item numbers, as the adjustments are dependent one upon another. Adjustments carried out in the wrong sequence may nullify previous adjustment.
- Always conclude adjustments by tightening the adjustment screws securely (but do not tighten them more than necessary, as you may strip the threads, twist off the screw or place undue stress on the parts). Furthermore, always tighten by turning in the direction of tightening tension.
- The set screw must also be tightened sufficiently, upon completion of adjustments.
- Always repeat checking operations after adjustments are made, in order to confirm results.

Notes on the Tribrach

1. If any leveling foot screw becomes loose and slack or if sighting is unstable due to the looseness of leveling foot screws, adjust by tightening the adjusting screws (in 2 places) installed over each leveling screw with a screwdriver.

2. If there is any slack between the leveling foot screws and the base, loosen the set screw of the holding ring and tighten the holding ring with an adjusting pin, until it is properly adjusted. Re-tighten the set screw on completing the adjustment.
12. CHECKS AND ADJUSTMENTS

12.1 Checking/Adjusting the Plate Level

Adjustment is required if the axis of the plate level is not perpendicular to the vertical axis.

**Checks**

1. Place the plate level parallel to a line running through the centers of two leveling foot screws, say, A and B. Use these two leveling foot screws only and place the bubble in the center of the plate level.

2. Rotate the instrument 180° or 200 gon around the vertical axis and check bubble movement of the plate level. If the bubble has been displaced, proceed with the following adjustment.

**Adjustment**

1. Adjust the plate level adjusting screws, with the adjusting pin provided and return the bubble towards the center of the plate level. Correct only one-half of the displacement by this method.

2. Correct the remaining amount of the bubble displacement with the leveling foot screws.
12. CHECKS AND ADJUSTMENTS

3  Rotate the instrument 180° or 200 gon around the vertical axis once more and check bubble movement. If the bubble is still displaced, repeat the adjustment.

Plate level adjusting screws

Half amount of displacement
12. CHECKS AND ADJUSTMENTS

12.2 Checking/Adjusting the Circular Level

■ Checks

1 Carefully level the instrument with the plate level only. If the bubble of the circular level is centered properly, adjustment is not required. Otherwise, proceed with the following adjustment.

■ Adjustment

1 Shift the bubble to the center of the circular level by adjusting the three circular level adjusting screws on the bottom surface of the circular level, with the adjusting pin provided.
12. CHECKS AND ADJUSTMENTS

12.3 Adjustment of the Vertical Cross-hair

Adjustment is required if the vertical cross-hair is not perpendicular to the horizontal axis of the telescope (since it must be possible to use any point on the hair for measuring horizontal angles or running lines).

■ Checks

1 Set the instrument up on the tripod and carefully level it.

2 Sight the cross-hairs on a well defined Point A at a distance of at least 50 meters (160ft.) and clamp horizontal motion.

3 Next swing the telescope vertically using the vertical fine motion screw, and check whether the point travels along the length of the vertical cross-hair.

4 If the point appears to move continuously on the hair, the vertical cross-hair lies in a plane perpendicular to the horizontal axis (and adjustment is not required).

5 However, if the point appears to be displaced from the vertical cross-hair, as the telescope is swung vertically, proceed with the following adjustment.

![Diagram of cross-hair adjustment](image)

■ Adjustment

1 Unscrew the cross-hair adjustment section cover by turning it in the counterclockwise direction, and remove. This will expose four eyepiece section attachment screws.

2 Loosen all four attachment screws slightly with the screwdriver provided (while taking note of the number of revolutions). Then turn the eyepiece section so that the vertical cross-hair is aligned with Point A'. Finally, re-tighten the four screws by the amount that they were loosened.
3 Check once more and if the point travels the entire length of the vertical cross-hair, further adjustment is not required.

Perform "12.4 Collimation of the Instrument" (p. 46), "12.6 Adjustment of Vertical Angle 0 Datum" (p. 49) after completing the above adjustment.
12. CHECKS AND ADJUSTMENTS

12.4 Collimation of the Instrument

Collimation is required to make the line of sight of the telescope perpendicular to the horizontal axis of the instrument. Otherwise, it will not be possible to extend a straight line by direct means.

■ Checks

1 Set the instrument up with clear sights of about 50 to 60 meters (160 to 200 ft.) on both sides of the instrument.

2 Level the instrument properly with the plate level.

3 Sight Point A at approximately 50 meters (160 ft.) distance.

4 Loosen the vertical clamp only, and rotate the telescope 180° or 200 gon around the horizontal axis, so that the telescope is pointed in the opposite direction.

5 Sight Point B, at equal distance as Point A and tighten the vertical clamp.

6 Release the horizontal clamp and rotate the instrument 180° or 200 gon around the vertical axis. Fix a sight on Point A once more and tighten the horizontal clamp.

7 Release the vertical motion clamp only and rotate the telescope 180° or 200 gon around the horizontal axis once more and fix a sight on Point C, which should coincide with previous Point B.

8 If Points B and C do not coincide, adjust in the following manner.
### Adjustment

1. Unscrew the cross-hair adjustment section cover.

2. Find Point D at a point between Points C and B, which should be equal to 1/4th the distance between Points B and C as measured from Point C. This is because the apparent error between Points B and C is four times the actual error since the telescope has been reversed twice during the checking operation.

3. Shift the vertical cross-hair line and align it with Point D, by revolving the left and right capstan adjustment screws with the hexagonal wrench* (or adjusting pin). Upon completing the adjustment, repeat the checking operation once more.
   - If Points B and C coincide, further adjustment is not required. Otherwise, repeat the adjustment.

* DT240/540/740/940: Hexagonal wrench
* DT540L/740L/940L: Adjusting pin

---

**Note**

- First, loosen the capstan adjustment screw on the side to which the vertical cross-hair line must be moved. Then tighten the adjustment screw on the opposite side by an equal amount which will leave the tension of the adjustment screws unchanged. Revolve in the counterclockwise direction to loosen and in the clockwise direction to tighten, but revolve as little as possible.
- Perform "12.6 Adjustment of Vertical Angle 0 Datum" (p. 49) after completing above adjustment.
12. Checks and Adjustments

12.5 Checking and Adjusting the Optical Plummet

Adjustment is required to make the line of sight of the optical plummet coincide with the vertical axis (otherwise the vertical axis will not be in the true vertical when the instrument is optically plumbed).

■ Checks

1. Align the center mark and the point. ("5. PREPARATION FOR MEASUREMENT" (p. 15).)
2. Rotate the instrument 180° or 200 gon around the vertical axis and check the center mark.
   If the point is properly centered in the center mark, adjustment is not required. Otherwise, adjust in the following manner.

■ Adjustment

1. Take off the adjustment section cover of the optical plummet eyepiece. This will expose four adjusting screws which should be adjusted with the adjusting pin provided to shift the center mark to the point. However, correct only one-half of the displacement in this manner.

   ![Diagram of adjusting screws and eyepiece](image)

2. Use the leveling foot screws to align the point and center mark.
3. Rotate the instrument 180° or 200 gon around the vertical axis once more and check the center mark. If it coincides with the point, then further adjustment is not required. Otherwise, repeat the adjustment.
12. CHECKS AND ADJUSTMENTS

First, loosen the adjusting screw on the side to which the center mark must be moved. Then tighten the adjusting screw on the opposite side by an equal amount which will leave the tension of the adjusting screws unchanged.
Revolve in the counterclockwise direction to loosen and in the clockwise direction to tighten, but revolve as little as possible.

12.6 Adjustment of Vertical Angle 0 Datum

If when measuring the vertical angle of target A in both faces, the total of combined face left and face right measurements is other than 360° (ZENITH-0), half of the difference from 360° is the error amount from corrected 0 setting. Carry out adjustment. As adjustment for vertical angle 0 determines instrument coordinate origin, use special care for adjustment.

1 Level the instrument properly with the plate level.

2 While pressing \{0SET\}, turn power switch ON.

3 Sight target A from the telescope properly in face left.

4 Press \{0SET\}.

5 Sight target A in face right.
6 Press {0SET}. Correction values are calculated and stored.

7 Turn the power switch off.

**Note**

- Any misoperating and error code display appears. Repeat the above procedure from the start.
- Check that the total amount of face left and face right angular travel is 360° when sighting the target A.

### 12.7 Adjustment of Laser Beam

This adjustment must be done after completing "12.3 Adjustment of the Vertical Cross-hair" (p. 44), "12.4 Collimation of the Instrument" (p. 46).

If intersection of the cross-hair does not coincide with the laser spot, turn the laser axis adjusting screws to align the laser spot with intersection of the cross-hair.

1 Remove the caps of the laser axis adjusting screws A and B with a coin.

![Diagram of laser axis adjusting screws A and B]
2 The following shows the moving direction of the laser spot when the laser adjusting screws are turned.

- Turn screw A clockwise
- Turn screw B clockwise
- Turn screw A counterclockwise
- Turn screw B counterclockwise

3 Attach the caps of the laser axis adjusting screws.
Diagonal Eyepiece, Model 13
The diagonal eyepiece is used in place of the telescope eyepiece for making observations up to the zenith.

Trough Compass model 5
The trough compass is simply mounted on top of the handle.

Aluminum extension leg tripod

Wide frame extension leg tripod (wood)
# 14. SPECIFICATIONS (DT240/540/740/940)

<table>
<thead>
<tr>
<th>Telescope</th>
<th>Model</th>
<th>DT240</th>
<th>DT540</th>
<th>DT740</th>
<th>DT940</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>149 mm</td>
<td>149 mm</td>
<td>149 mm</td>
<td>149 mm</td>
<td></td>
</tr>
<tr>
<td>Aperture</td>
<td>45 mm</td>
<td>45 mm</td>
<td>45 mm</td>
<td>40 mm</td>
<td></td>
</tr>
<tr>
<td>Magnification</td>
<td>30×</td>
<td>30×</td>
<td>30×</td>
<td>26×</td>
<td></td>
</tr>
<tr>
<td>Image</td>
<td>Erect</td>
<td>Erect</td>
<td>Erect</td>
<td>Erect</td>
<td></td>
</tr>
<tr>
<td>Field of view</td>
<td>1°30’</td>
<td>1°30’</td>
<td>1°30’</td>
<td>1°30’</td>
<td></td>
</tr>
<tr>
<td>Resolving power</td>
<td>2.5&quot;</td>
<td>2.5&quot;</td>
<td>2.5&quot;</td>
<td>3&quot;</td>
<td></td>
</tr>
<tr>
<td>Minimum focus</td>
<td>0.9 m</td>
<td>0.9 m</td>
<td>0.9 m</td>
<td>0.9 m</td>
<td></td>
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<tr>
<td>Stadia ratio</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Additive constant</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electronic Angle Measurement</th>
<th>Method</th>
<th>Absolute</th>
<th>Absolute</th>
<th>Absolute</th>
<th>Absolute</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detecting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Horizontal:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 sides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vertical:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 sides</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minimum display</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1°/5&quot; (0.2 mgon/1 mgon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1°/5&quot; (0.5 mgon/1 mgon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5°/10&quot; (1 mgon/2 mgon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10°/20&quot; (2 mgon/5 mgon)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>No</td>
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<td>No</td>
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<td></td>
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<td>3°</td>
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<td>IP 66</td>
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<td>IP 66</td>
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## 14. SPECIFICATIONS

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<th>Working duration (Alkaline manganese dry batteries), (+20°C [+68°F])</th>
<th>Theodolite only</th>
<th>DT240</th>
<th>DT540</th>
<th>DT740</th>
<th>DT940</th>
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<td>149×188×313 (5.87×7.1×12.3 in)</td>
<td>149×188×313 (5.87×7.1×12.3 in)</td>
<td>149×188×313 (5.87×7.1×12.3 in)</td>
<td>149×188×305 (5.87×7.1×12.0 in)</td>
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<td>Weight (Including batteries)</td>
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<td>176 mm (6.93 in)</td>
<td>176 mm (6.93 in)</td>
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<td>Data input/ output connector</td>
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*1) Standard deviation based on DIN 18723

### (DT540L/740L/940L)

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<th>DT540L</th>
<th>DT740L</th>
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<td>Method</td>
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<td>Horizontal: 2 sides</td>
<td>Horizontal: 1 sides</td>
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<tr>
<td></td>
<td>Vertical: 1 side</td>
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<td>Vertical: 1 side</td>
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<td>Minimum display</td>
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<td>10”/20” (2 mgon/5 mgon)</td>
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<td>1 sides</td>
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<td>Illumination</td>
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### 14. SPECIFICATIONS

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<th>Model</th>
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<th>DT940L</th>
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<td>Tilt sensor</td>
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<td>Compensation range</td>
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<tr>
<td>Battery</td>
<td>4 AA batteries</td>
<td>4 AA batteries</td>
<td>4 AA batteries</td>
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<tr>
<td><strong>Working duration (Alkaline manganese dry batteries), (+20°C [+68°F])</strong></td>
<td></td>
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<tr>
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<td><strong>Tribrach</strong></td>
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<td>Size D×W×H (mm)</td>
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<td>152×188×313 (5.97×7.1×12.3 in)</td>
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<td>Class 2</td>
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<td>Maximum output</td>
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*1) Standard deviation based on DIN 18723

---

**Laser beam**

Laser class : Class 2
Wave length : 633nm
Maximum output : 0.6mW
Laser beam range : 50m
Condition Weather : Fine
Time : The daylight hours
14. SPECIFICATIONS

Laser beam diameter (When focused) *2)

<table>
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<th>Distance (m)</th>
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<th>10</th>
<th>20</th>
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<tr>
<td>30×</td>
<td>Beam diameter (m)</td>
<td>0.1×0.2</td>
<td>0.2×0.4</td>
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<td>26×</td>
<td>Beam diameter (m)</td>
<td>0.1×0.2</td>
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*2) The laser beam diameters are theoretical values
The visible laser beam diameter will vary with ambient brightness.
Users must ensure that their instrument is compliant with the relevant regulations and legal restrictions in place in the country of use.

For users in the US

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.

WARNING: Changes or modifications to this unit 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 A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For users in Canada

This Class A digital apparatus meets all requirements of Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la Class A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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 this device.
EMC NOTICE
In industrial locations or in proximity to industrial power installations, this instrument might be affected by electromagnetic noise. Under such conditions, please test the instrument performance before use.