

LASER SENSOR LS-B20W

Thank you for selecting Topcon product.

- The specifications and general appearance of the instrument, and the content of this manual are subject to change without notice.
- Some of the diagrams shown in this manual may be simplified for easier understanding.
- Always keep this manual in a convenient location and read it when necessary.
- Please read the Instruction manual of the paired instrument in conjunction with this manual.

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 herein by an exclamation point within a triangle used with WARNING and CAUTION statements in this manual.

The definitions of the indications are listed below. Be sure you understand them before reading the manual's main text.

Definition of Indication

	WARNING Ignoring this indication and making an operation error could possibly result in death or serious injury to the operator.
	CAUTION Ignoring this indication and making an operation error could possibly result in personal injury or property damage.

- 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.

WARNING

	Do not perform disassembly or rebuilding. Fire, electric shock or burns 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.
	Do not use dry batteries other than those designated. An explosion could occur, or abnormal heat generated, leading to fire.
	Do not use the dry batteries if its terminals are wet. Resultant poor contact or shorting could lead to fire or burns.
	Keep the magnet parts of the instrument away from persons using a pacemaker or other electronic medical devices. Malfunction of medical equipment could result.
	Do not use within the vicinity of hospitals. Malfunction of medical equipment could result.
	Do not use onboard aircraft. The aircraft instrumentation may malfunction as a result.
	Do not use within the vicinity of automatic doors, fire alarms and other devices with automatic controls as the electromagnetic waves produced may adversely affect operation resulting in an accident.
	Do not heat or throw dry batteries into fire. An explosion could occur, resulting in injury.
	To prevent shorting of the dry batteries in storage, apply insulating tape or equivalent to the terminals. Otherwise shorting could occur, resulting in fire or burns.
	Use the instrument at a distance of at least 22 cm (8 1/2") from anyone with a cardiac pacemaker. Otherwise, the pacemaker may be adversely affected by the electromagnetic waves produced and cease to operate as normal.

CAUTION

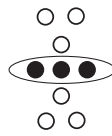
	Do not place fingers on the magnet parts of the instrument while mounting to equipment. Injury to fingers could result.
	Keep the magnet parts of the instrument away from any sensitive electronic devices or magnetic storage media such as computer disks. Malfunction of these devices or data corruption could result.
	Do not touch liquid leaking from dry batteries. Harmful chemicals could cause burns or blisters.

PRECAUTIONS

Before starting work or operation, be sure to check that the system is functioning properly.

- Remove the batteries from the instrument when you will not be using it for long period.
- Replace all 3 dry batteries with new ones at the same time. Do not mix used and new dry batteries, and do not mix different types of dry batteries together.
- Use alkaline dry batteries. Nickel hydrogen dry batteries and nickel cadmium dry batteries can be used too, but the operating time is different from the time of alkaline dry batteries.
- **Do not submerge the instrument in water.**
- Do not clean the instrument with a high pressure water stream. The inside of the instrument will be damaged.
- This instrument is designed based on the International Standard IPX 6, but it is not protected from a high pressure water stream or submergence.
- Radio waves can cause faulty operation of the instrument. Use care in the following locations.
 - Near an instrument emitting strong radio waves. (e.g. Transceiver)
 - Near radio wave towers such as television or radio.
- In addition to the laser beam emitted from the rotating laser, the laser sensor may be sensitive to smartphone screens, LED lamps, fluorescent lamps, construction safety light, and other modulated lights. In this case, turn off these modulated lights that may be the cause, or block them before performing measurement.
- Do not use the instrument near reflective objects (glass window, car windshield etc.) the laser sensor can malfunction. Block the laser beam in the direction of the reflective object.

Examples of malfunctions:

- The display shows "●●●●" even though the location is not a datum position.
 - Errors occur for the datum position.
 - The display does not show "●●●●" even though the location is a datum position.
- 
- Be sure that the laser emitting window of the rotating laser, and the beam receiving window of the laser sensor are free from dirt (oil, water droplets, etc.). The measurement result may be in error if these windows are dirty.
 - When the power is turned OFF, the indicator (LEDs) may light up for a second, but this is not a malfunction.

• **Exceptions from responsibility**

- The manufacturer, or its representatives, assumes no responsibility for any damage, or loss of profits (change of data, loss of data, loss of profits, an interruption of business etc.) caused by use of the product or an unusable product.
- The manufacturer, or its representatives, assumes no responsibility for any damage, or loss of profits caused by usage different to that explained in this manual.
- The manufacturer, or its representatives, assumes no responsibility for consequential damage, or loss of profits due to heavy rain, strong wind, high-temperature and humidity, or storing or use of the product under unusual conditions.
- Product failures caused by rebuilding are out of warranty.
- Cautions and warnings included in this manual do not cover all the possible events.

• **Bluetooth® Wireless Technology**



- *Bluetooth* function may not be built in depending on telecommunications regulations of the country or the area where the instrument is purchased. Contact your local dealer for the details.

- Use of this technology must be authorized according to telecommunications regulations of the country where the instrument is being used. Contact your local dealer in advance. (☞ "Regulatory information")
- TOPCON CORPORATION is not liable for the content of any transmission nor any content related thereto. When communicating important data, run tests beforehand to ascertain that communication is operating normally.
- Do not divulge the content of any transmission to any third party.

Radio interference when using **Bluetooth** technology

Bluetooth communication with the LS-B20W uses the 2.4 GHz frequency band. This is the same band used by the devices described below. As a result, using the LS-B20W within proximity to the below devices may result in interference causing communication failure or reduction of transmission speed.

- Industrial, scientific, and medical (ISM) equipment such as microwaves and pacemakers.
- portable premises radio equipment (license required) used in factory production lines etc.
- portable specified low-power radio equipment (license-exempt)
- IEEE802.11b/IEEE802.11g/IEEE802.11n/IEEE802.11ax standard wireless LAN devices.

Although a radio station license is not required for this instrument, bear in mind the following points when using **Bluetooth** technology for communication.

- **Do not use the LS-B20W in proximity to microwaves.**
 - Microwave ovens can cause significant interference resulting in communication failure. Perform communication at a distance of 3 m (10 ft) or more from microwave ovens.
- **Regarding portable premises radio equipment and portable specified low-power radio equipment:**
 - Before starting transmission, check that operation will not take place within the vicinity of portable premises radio equipment or specified low-power radio equipment.
 - In the case that the instrument causes radio interference with portable premises radio equipment, terminate the connection immediately and take measures to prevent further interference (e.g. connect using an interface cable).
 - In the case that the instrument causes radio interference with portable specified low-power radio equipment, contact your local dealer.
- **When using **Bluetooth** function in proximity to IEEE802.11b/IEEE802.11g/IEEE802.11n/IEEE802.11ax standard wireless LAN devices, turn off all devices not being used.**
 - Interference may result, causing transmission speed to slow or even disrupting the connection completely. Turn off all devices not being used.
- **Refrain from using the LS-B20W in proximity to televisions and radios.**
 - Televisions and radios use a different frequency band to **Bluetooth** communications. However, even if the LS-B20W is used within proximity to the above equipment with no adverse effects with regard to **Bluetooth** communication, moving a **Bluetooth** compatible device (including the LS-B20W) closer to said equipment may result in electronic noise in sound or images, adversely affecting the performance of televisions and radios.

Precautions regarding transmission

• For best results

- The usable range becomes shorter when obstacles block the line of sight, or devices such as PDAs or computers are used. Wood, glass and plastic will not impede communication but the usable range becomes shorter. Moreover, wood, glass and plastic containing metal frames, plates, foil and other heat shielding elements as well as coatings containing metallic powders may adversely affect wireless communication and concrete, reinforced concrete, and metal will render it impossible.
- Use a vinyl or plastic cover to protect the instrument from rain and moisture. Metallic materials should not be used.

• Reduced range due to atmospheric conditions

- The radio waves used by the LS-B20W may be absorbed or scattered by rain, fog, and moisture from the human body with the limit of usable range becoming lower as a result. Similarly, usable range may also shorten when performing communication in wooded areas. Moreover, as wireless devices lose signal strength when close to the ground, perform communication at as high a position as possible.



- TOPCON CORPORATION cannot guarantee full compatibility with all **Bluetooth** products on the market.

STANDARD PACKAGE COMPONENTS

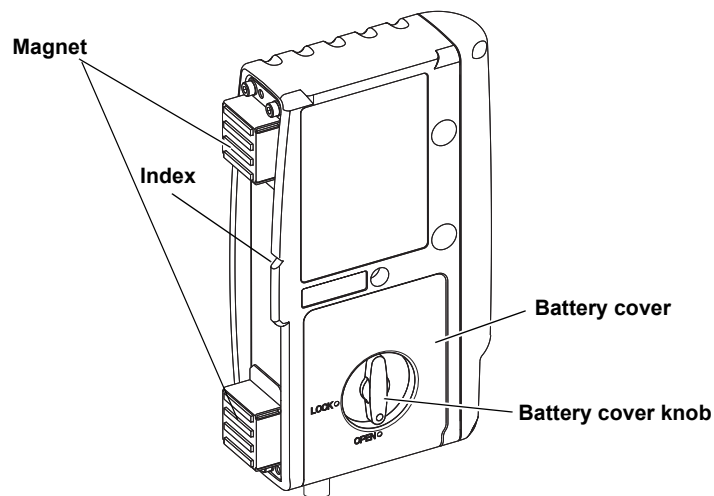
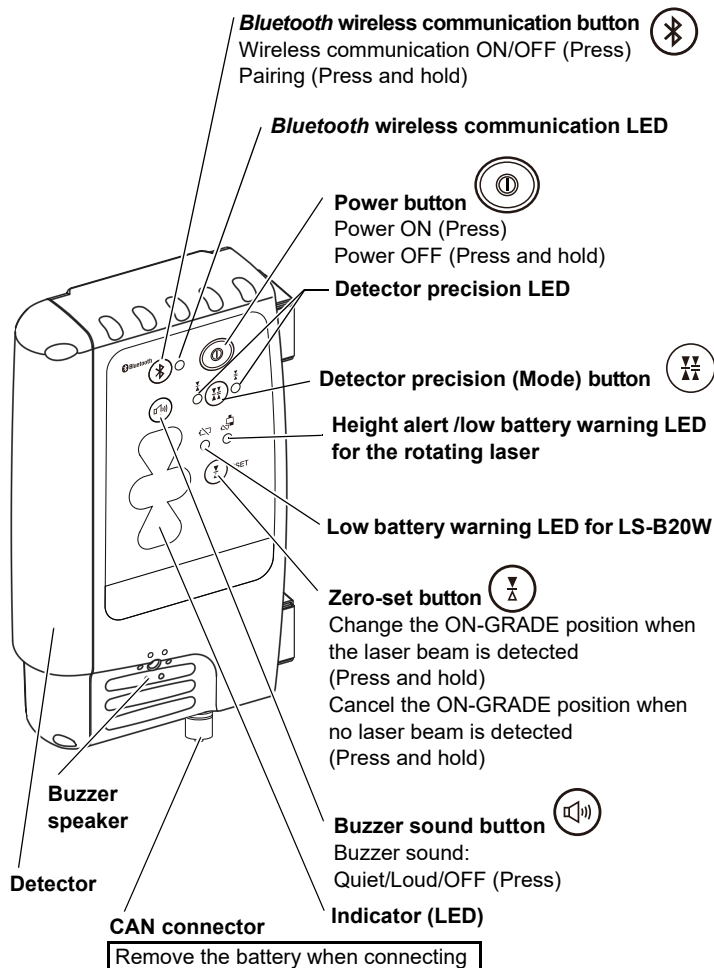
- LS-B20W Instrument.....1 pc.
- Instruction manual.....1 pc.
- Regulatory information1 pc.
- Laser Manager Guide1 pc.
- Export restrictions card (Be sure to read)1 pc.

Dry batteries (3 x AA) are sold separately.

REPLACE THE DRY BATTERY

- 1 Open the battery cover by turning the battery cover knob to "OPEN".
- 2 Remove the old batteries and replace with new ones.

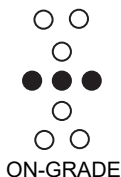
PARTS OF THE INSTRUMENT AND FUNCTIONS



- Risk of damage to installation surface of machine, because it uses a strong magnet.
- See "Laser beam positions and display patterns" in the Instruction manual for the display area and display pattern.
- This instrument is mounted with a CAN communication function. Contact your local dealer for details.

OPERATION

- 1 Position a rotating laser and turn on the power.
- 2 Raise or lower the machine blade or arm to position the cutting edge or bucket at the desired grade elevation.
- 3 Mount the LS-B20W onto the machine and turn on the power.
- 4 Keep the machine blade or arm motionless and raise or lower the LS-B20W and adjust until ON-GRADE position are flashing. This is the ON-GRADE position. The reference position has been set.



- 5 While operating, use the LED display to continually check grade, moving the blade or cutting/filling according to the direction of the LS-B20W display.

INDICATOR

Laser beam positions and display patterns

Indicator (LED)	Detector precision
	Mode 1: ± 2 mm (0.08 in) Mode 2: ± 6 mm (0.24 in) Mode 3: ± 12 mm (0.47 in) Mode 4: ± 30 mm (1.18 in)
	± 35 mm (70 mm wide) (± 1.38 in (2.75 in))
	± 60 mm (120 mm wide) (± 2.36 in (4.72 in))
	When the laser beam is off to the top or to the bottom

Change the detector precision (Mode)

Precision mode **Detector precision (Mode) button**

Mode 1 It is possible to change the detector precision of the instrument.

Mode 2 Please select Mode 1 to 4 according to the objective of the operation.

Mode 3 (See "Laser beam positions and display patterns")

Mode 4 (Flashing) Pressing the detector precision (Mode) button will change the mode and the corresponding LED lamp will light up/flash.

Battery remaining display for LS-B20W

Low battery warning LED for LS-B20W

Battery remaining for the LS-B20W will be displayed.

Flashing/Lit: Flashing: Low battery power. Sensor is still useable.
Lit: Dead battery. Replace the dry battery with new one.

Height alert display for the rotating laser

Height alert warning LED for the rotating laser

A flashing LED and a buzzer sound indicate the height alert function of the rotating laser is operating. (This function is not usable to the rotating laser which does not have the height alert and the function to output alarm signal.)

Flashing

Flashing slowly

Low battery display for the rotating laser

Low battery warning LED for the rotating laser

The LED flashes when the battery level of the rotating laser is low. (This function is not usable to the rotating laser which does not have the function to output alarm signal.)

Flashing

Power-save function (Effective only when using the dry batteries)

This instrument will enter the power-save mode when no operation is performed or no laser beam is received for approximately five minutes while the *Bluetooth* wireless communication is OFF. The center LED (1 green) will flash, when in power-save mode. (Power-save mode will automatically turn off when a laser beam is received, or the power button is pressed.)

Auto-cut off function (Effective only when using the dry batteries)

This instrument will automatically power off when no operation is performed or no laser beam is received for approximately 30 minutes after entering the power-save mode.
(Press the power button to turn on the instrument.)

CHANGE THE ON-GRADE POSITION FUNCTION

The ON-GRADE position can be changed to the position where laser beam is detected. Using this function when installing the LS-B20W on the machine allows easy setting of the height at which the ON-GRADE will be displayed on the LS-B20W. The range in which the ON-GRADE position can be changed is ± 20 mm (0.79 in) (total of 40 mm (1.57 in)) from the center of the detector range.

In order to set the ON-GRADE position at high precision, set it while the laser beam is stable. When setting the ON-GRADE position while the laser beam is unstable (when using at a long-distance - more than 150 m (492 ft) - or when atmospheric condition is unstable due to air shimmering or other conditions), the sensor will automatically detect it and the LED indicating the failure will be displayed while changing the ON-GRADE position.

Setting the ON-GRADE position change

- 1 Press and hold the zero-set button while detecting the laser beam.

When setting the ON-GRADE position change, the center LEDs light up for three seconds, as shown in the figure. The current position where the laser beam is detected is the new ON-GRADE position.

The LEDs flash as shown in the figure for three seconds when you have failed to change the ON-GRADE position. Be careful not to change the position at which the laser beam is detected and try setting once again.

Flashing

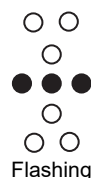
The LED display when the ON-GRADE position change function is used

The LED display indicating beam position and the center LED (1 green) flashes.

Flashing

Canceling the ON-GRADE position change

- 1 Press and hold the zero-set button when no laser beam is detected. The ON-GRADE position will be canceled.



When the ON-GRADE position change is canceled, the center LEDs (3 green) flash for three seconds.

CONTROLLING REMOTELY WITH LASER MANAGER

Laser Manager is software to remotely control and support Topcon laser products. Install the software on your controller (iPhone or a device with Android™) to use it.

Bluetooth wireless technology is used to connect the controller and a laser product. To use Laser Manager, connect the controller with Laser Manager installed and the laser product via **Bluetooth**. When making a connection via **Bluetooth** for the first time, pair the controller with the laser product. After pairing, operate the controller to connect to LS-B20W.



- When connected with a controller, the connection is held until the time mentioned below.
 - When canceling the connection from the controller; or
 - When pairing is performed with any other controller.
- If LS-B20W is not displayed during the pairing search in Laser Manager, please complete pairing on the OS of the controller. After that, please do pairing again by Laser Manager.
- When pairing with some instruments on Laser Manager, **Bluetooth** connection between instrument and Laser Manager may take some time. Please remove unnecessary instruments from **Bluetooth** connection history list on Laser Manager.
- After disconnecting **Bluetooth** by Laser Manager, the instrument icon may not be displayed on the search screen. Please wait for a while and re-enter the **Bluetooth** connection screen again.

Installing Laser Manager

There are two ways to install Laser Manager:

- Scan the QR code according to the instructions of the included "Laser Manager Guide".
- Search for "Laser Manager" on the App Store or Google Play.

For details on App Store and how to install this application, see the Apple support home page.

 <https://support.apple.com>

For details on Google Play and how to install this application, see the Google support home page.

 <https://support.google.com>

Pairing

- 1 Turn on the LS-B20W.
- 2 Press and hold the **Bluetooth** wireless communication button; the **Bluetooth** wireless communication LED will light up/flash as follows.

Lit	Communication initialization in progress
Flashing quickly	While LS-B20W is communicating
Flashing slowly	Communication is in preparation

- 3 With the LED lit, start Laser Manager installed on the controller and search for the **Bluetooth** device.
- 4 Select the LS-B20W you want to do pairing from the **Bluetooth** devices displayed. A buzzer (beep) will sound and the LED will flash rapidly to suggest pairing is completed.

Connecting the paired controller and the LS-B20W via Bluetooth

- 1 Turn on the LS-B20W.
- 2 Press the **Bluetooth** wireless communication button to turn on wireless communication.
- 3 Start Laser Manager, and select the LS-B20W you want to connect via **Bluetooth**.

Once the **Bluetooth** connection between the controller and the LS-B20W is established, the LS-B20W can be remotely controlled from Laser Manager.

RESET FUNCTION

While holding down the detector precision (Mode) button, the zero-set button, and the buzzer sound button, press the power button. The settings stored in the LS-B20W are reset to the factory settings.

Factory settings

Detector precision (Mode)	: Mode 2
Buzzer sound	: Quiet
CAN baud rate	: 500kbps
ON-GRADE position	: Center of detector range

SPECIFICATIONS

Detector range	: 120 mm (4.72 in) (The range in which the ON-GRADE position can be changed: 40 mm (1.57 in))
Detector angle	: 270°
Detector precision	: Mode 1: ±2 mm (0.08 in) Mode 2: ±6 mm (0.24 in) Mode 3: ±12 mm (0.47 in) Mode 4: ±30 mm (1.18 in)
Detectable laser wave length	: 633 to 780 nm
Laser detecting range (diameter)	: 300 m (984 ft) (using RL-H5A Class3R/IIIa) : 700 m (2,297 ft) (using RL-200 1S/2S)
Bluetooth wireless communication	: Bluetooth 5.0 (Low Energy /Classic)
Transmission method	: FHSS
Modulation	: GFSK [Classic (1Mbps) or BLE] : 4-DQPSK [Classic (2Mbps)] : 8-DPSK [Classic (3Mbps)]
Frequency band	: 2.402 to 2.480 GHz
Bluetooth profile	: SPP, GATT (TOPCON Transfer Service)
Power class	: Class 1
Usable range	: 20 m (66 ft) (May vary depending on obstacles between the two instruments as well as other conditions)
Power source	: 3 x AA size dry batteries (sold separately)
Continuous operating time (at 20 °C/68 °F)	: Approximately 30 hours (using alkaline dry batteries)
Operating temperature	: -20 to 50 °C (-4 to 122 °F)
Dust and water resistance	: IP66 (Based on the standard IEC60529)
Size (W x D x H)	: 111 x 36 x 200 mm (4.37 x 1.41 x 7.87 in)
Weight	: 0.58 kg (1.28 lb) (without dry batteries)

- Detector angle, Detector precision and Laser detecting range will vary depending on rotating laser being used and atmospheric conditions.

Note

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