



BeamRider™ User Manual

Version 1.0
English



Introduction

Purchase

Congratulations on the purchase of a BeamRider product.



This manual contains important safety directions as well as instructions for setting up the product and operating it. Refer to "9 Safety Directions" for further information. Read carefully through the User Manual before you switch on the product.



To ensure safety when using the system, please also observe the directions and instructions contained in the User Manual and Safety Handbook issued by the:

- Line Marker manufacturer.

Product identification

The type and serial number of your products are indicated on the label on the base of the unit. Enter the type and serial number in your manual and always refer to this information when you need to contact your agency or BeamRider authorized service workshop.





Type: Actuator Arm Serial No.: _____

Type: Single Laser Transmitter Serial No.: _____

Type: Double Laser Transmitter Serial No.: _____

Symbols used in this manual

The symbols used in this manual have the following meanings:

Type	Description
 Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
 Warning	Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.
 Caution	Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and/or appreciable material, financial and environmental damage.
	Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

Trademarks

- BeamRider is a registered trademark of BeamRider Ltd.. All other trademarks are the property of their respective owners.

**Available
documentation**

Name of documentation	Description
BeamRider User Manual	All instructions required in order to operate the product to a basic level are contained in this User Manual. Provides an overview of the product together with technical data and safety directions.

Table of Contents

In this manual	Chapter	Page
	1 Overview of System Components	8
	1.1 General	8
	2 Detailed Overview of Component Parts	14
	2.1 Using the Transmitter and Telescope	14
	2.2 Using the Transmitter and Reflector Base Plates	19
	2.2.1 Meaning of the Markings	19
	2.2.2 Setting Up and Aligning the Base Plates	20
	2.2.3 Levelling the Transmitter Base Plate	22
	2.3 Using the GAC's with Double Laser Transmitter	23
	2.4 Using the Control Panel	27
	2.5 Using the Spray Knib	32
	3 Marking Out Procedures	38
	3.1 General Operating Principles	38
	3.2 Marking Out a Straight Line	41
	3.3 Marking Out a Right-Angle with Double Laser Transmitter	42
	3.4 Marking Circles	47

4	Marking Out Examples	48
4.1	Setting Up a Pitch for Soccer Pitch Marking with Double Laser Transmitter	48
4.2	Marking Out Perfectly Rectangular Pitches with Double Laser Transmitter	52
5	Check and Adjust	58
5.1	Check the Right-Angle of the Double Laser Transmitter	58
5.2	Check Circular Level Accuracy	59
6	Batteries and Charging	60
6.1	Power Supply, Battery	60
7	Troubleshooting	62
8	Care and Transport	64
8.1	Transport	64
8.2	Storage	66
8.3	Cleaning and Drying	67
8.4	Maintenance	68

9	Safety Directions	70
9.1	General Introduction	70
9.2	Intended Use	71
9.3	Limits of Use	73
9.4	Responsibilities	74
9.5	International Warranty	76
9.6	Hazards of Use	77
9.7	Laser Classification	81
9.8	Electromagnetic Compatibility EMC	85
9.9	FCC Statement, Applicable in U.S.	87
10	Technical Data	92
10.1	System	92
10.2	Transmitter	94
10.3	Actuator Arm	96
10.4	Receiver	97
10.5	Control Panel	98
10.6	Knib / Knib Lift	99
10.7	Reflector	100
10.8	Goal Alignment Card	101

1 Overview of System Components

1.1 General

**Warning**

This product may be installed on recommended line marking devices only by an appropriately trained and qualified specialist.

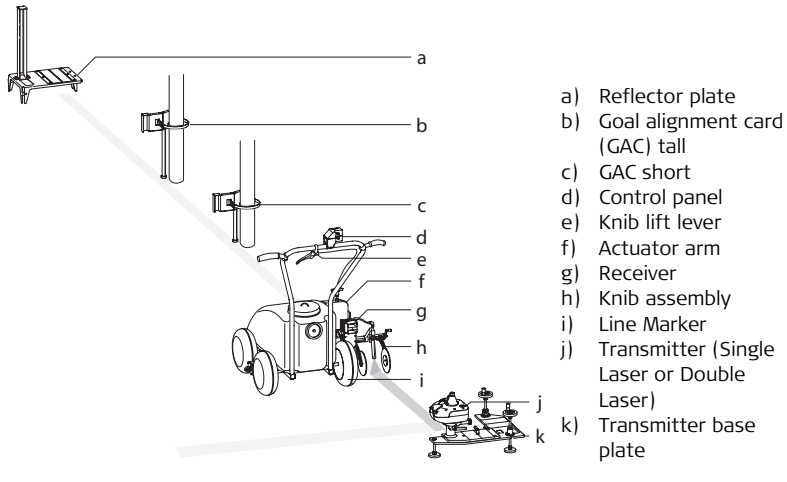
**Warning**

Unauthorized modification of the line marking device by mounting the product may alter the function and safety of the line marking device.

Precautions:

Follow the instructions of the Line Marker manufacturer. If no appropriate instruction is available, ask Line Marker manufacturer for instructions before mounting the product.

Overview of system components



Reflector plate

Used for setting the pitch dimensions and for the alignment of the laser.

GAC's

Goal Alignment Cards (hereafter referred to as GAC's) - enables the transmitter to be aligned with existing goal posts.

Control panel

Switches allow operation of the machine in manual and tracking modes. The LED's are used to inform the operator of the systems status.

Knib lift lever

A lockable lever that allows the knib wheel assembly to be lifted clear of the surface, preventing smearing of paint, and ease of marking.

Actuator arm

Contains the motors and hardware that drive the receiver and nozzle assembly inward and/or outward whilst tracking the laser beam.

Receiver



Detects and interprets laser light and relays this information to the actuator arm.

Knib assembly



Assembly where the paint spray is applied to the turf surface via a nozzle. The knib assembly has adjustable wheels and spray nozzle to allow the desired spray width to be achieved.

Line Marker

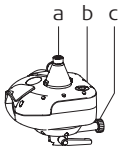


Contains and dispenses paint and water, also provides manoeuvrability for the system. For more information see separate Line Marker manual provided by the supplier.

Transmitter

There are two different types of the transmitter available:

- Single Laser Transmitter (one laser beam output)
- Double Laser Transmitter (two laser beams output)

**a) Telescope:**

Used for sighting then aligning the laser beam with reflector/s.

b) Transmitter:

The transmitter internally generates and directs the laser light. Within the double laser transmitter a beam-splitter automatically produces two beams set at 90° to each other.

The transmitter has two modes, on and off, which are operated by a button. The transmitter casing also houses the charging point.

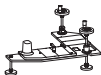
c) Turntable:

Used to direct the transmitter through horizontal planes when aligning the beam to the reflector.



This manual applies to both transmitter types. Differences between the models are marked and described.

Transmitter base plate



Used to provide a stable mounting point for the transmitter, to establish the pitch parameters and for aligning the laser with the reflector/s.

Power adapter

Connects the transmitter with a power supply to re-charge the battery.

Documentation

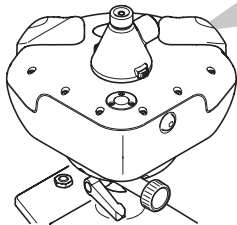
User Manual

2 Detailed Overview of Component Parts

2.1 Using the Transmitter and Telescope

The principles of the beam

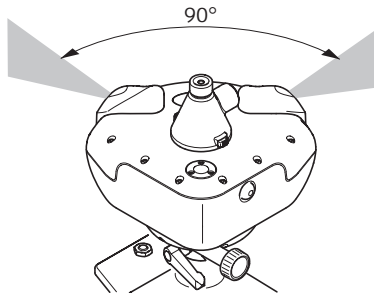
Single Laser Transmitter



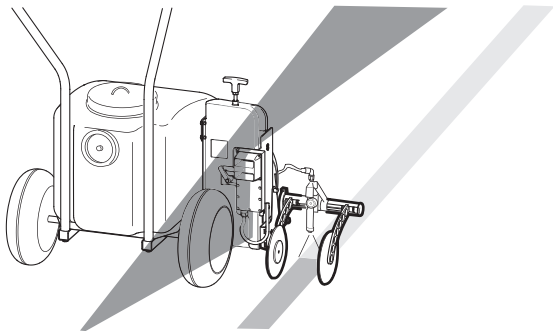
The transmitter produces one laser beam.

The beams are projected as a thin fan shape that will increase in size the further away from the transmitter they get.

Double Laser Transmitter

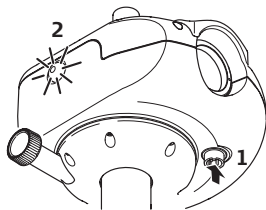


The transmitter produces two laser beams set at a 90° angle to each other.



The fan shaped beam allows the Line Marker to operate over contoured ground conditions and allows the receiver to detect the beam as it moves up and down over contours.

Charging transmitter's battery



1. Connect the power adapter with the transmitter and an A/C plug.
2. The LED on the transmitter switches on. When transmitter's battery is fully charged the LED switches off again.

Typical charging time for a completely empty battery:
<3h

Danger

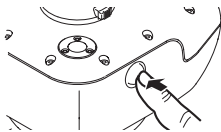
To avoid electrical shock, outdoor use of the power adapter is not permitted.

Precautions:

Use the power adapter in dry indoor environments only.



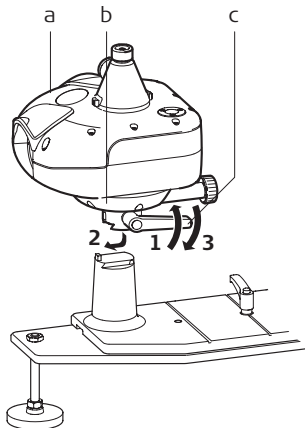
Turning on the beam



Push the switch once for on and once again for off.

Fixing transmitter to base plate

Set the transmitter and turn table on top of the base plate tower.

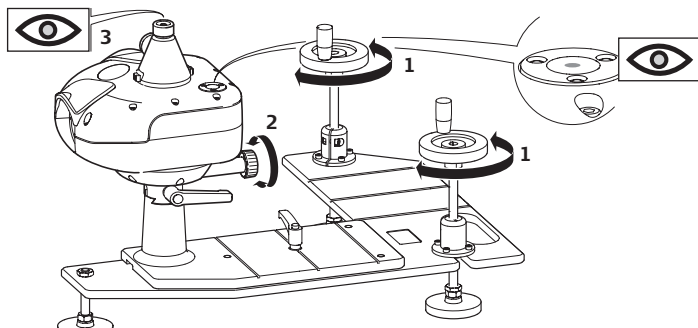


- a) Transmitter
- b) Turn table
- c) Locking screw

1. Push the locking screw upward.
2. Fits into the female connector found on the bottom of the turntable.
3. Once this is located, turn the locking screw clockwise to tighten and secure.

Alignment

Initial alignment of the transmitter to the reflector or GAC's is achieved by initially placing the transmitter in the required starting or reference point.



1. To level the transmitter rotate the handles of the adjuster arm screw threads left or right until the level bubble is centred.
2. Final alignment of the transmitter is achieved by rotating the turntable adjustment knob either forward or backward while viewing through the telescope.
3. Once you can clearly see the red reflection alignment has been achieved.

Sighting the beam

The telescope is adjusted so the laser beam will always be located to the dead centre of the telescopes field of vision.

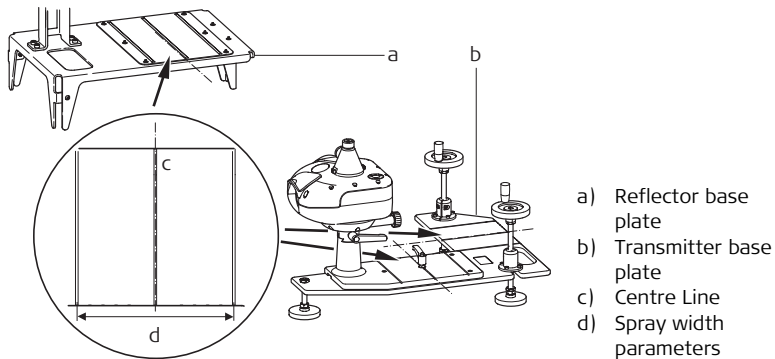
2.2

Using the Transmitter and Reflector Base Plates

2.2.1

Meaning of the Markings

What the markings mean



The inset measurement indicators found on both the reflectors and the transmitter base plate are placed to act as a guide for alignment. The centre line indicates dead centre of the proposed line to be marked and the outside lines indicate the edges. The pre-marked lines on all plates are set to 10 cm/4 " in width.

2.2.2

Setting Up and Aligning the Base Plates

With existing markings

Setting up and aligning the base plates using existing markings:



a) **Reflector base plate**

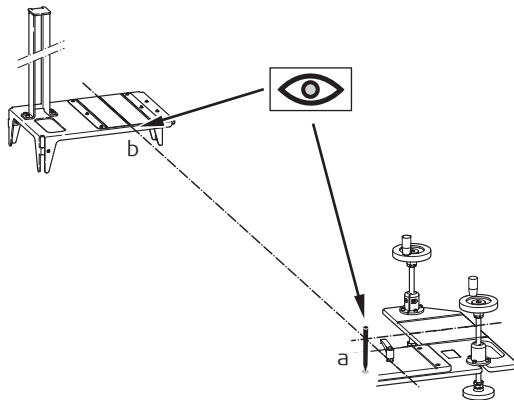
Align the centre scored-in mark to the existing line. The reflector should face the transmitter or down the line aligned with.

b) **Transmitter base plate**

The corner of the pitch is essentially indicated by an imaginary line. When setting the Transmitter base plate, align the centre scored-in mark with the existing marked lines until the plate is correctly located.

With no existing markings

For an area with no existing markings, use another form of indication to mark the corner, such as an aerosol mark or a peg.



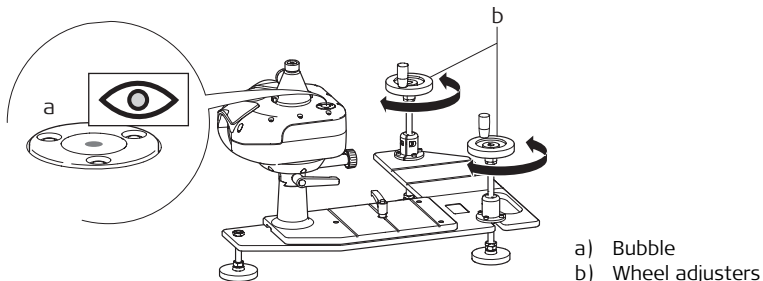
- a) Once the transmitter base plate has been set, level or adjust beam trajectory with the adjusting arms.
- b) The reflectors are leveled by eye.

2.2.3

Levelling the Transmitter Base Plate

Levelling the transmitter base plate

In order to ensure continuity of marking and/or over-marking procedures and achieve a mirrored finish consistently, the transmitter base plate should be levelled once set in position.



The level bubble is found on the top of the transmitter. Adjustment of the bubble is achieved by either adjusting (rotate left or right) the wheel adjusters on the legs. When the bubble is at a dead centre, true level has been achieved.

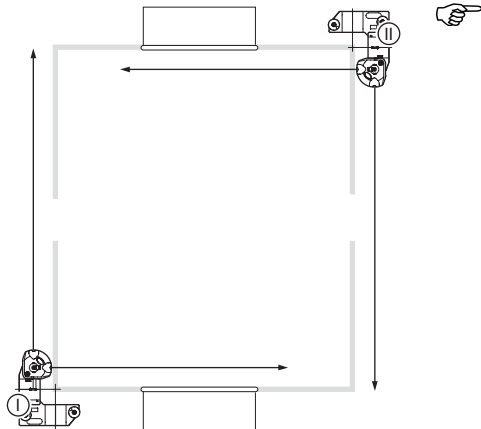
2.3

Using the GAC's with Double Laser Transmitter

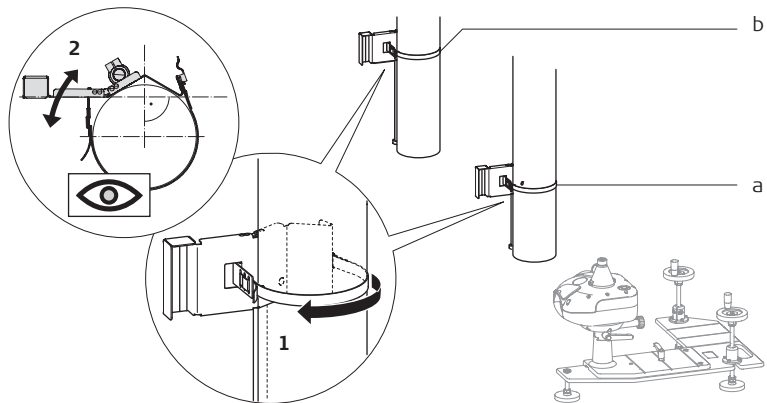


GAC's allow a right angle to be marked out using existing pre-set posts or using wheeled transportable sets of posts. This feature is only applicable with a double laser transmitter.

Position the transmitter



Set the transmitter either in the lower left (I) or upper right (II) corner of the pitch.

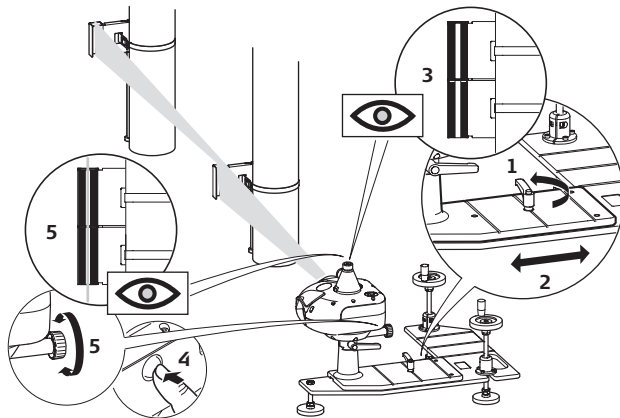
Set the GAC's on the post**a) Short GAC (front)**

The short GAC should be the first set, with the reflective side facing the transmitter on the nearest post.

b) Tall GAC (rear)

The tall GAC should be positioned on the post behind this, again, once the second GAC is fitted to the post ensure that the reflective side is facing and in-line with the transmitter.

Align the GAC's step by step



1. Unlock the sliding adjustment sledge with the locking screw on the transmitter base plate.
2. Use the telescope and the sliding adjustment sledge to initially align the twin black markings on both GAC's.
3. Once the black markings can be seen to be aligned lock the sliding adjustment sledge with the locking screw.
4. Turn on the transmitter.

5. Using the the telescope and the turntable adjustment knob align the beam so that it splits the twin black markings on the GAC's.



Once the black markings on the GAC's are in-line and the laser beam splits these, a 90° angle has been achieved and the lines may be marked out.

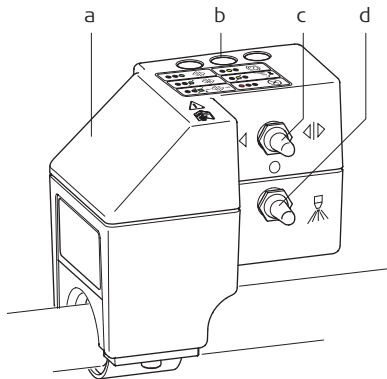
2.4

Using the Control Panel

General



The switches on the control panel function to set the system for:

- automatic tracking and locking to the laser beam.
 - manual spraying operations (spraying without the laser beam).
 - turning the spray knib on/off.
 - a series of three LED lights indicate system status (see chapter "Meaning of the LEDs, page 29").
-


Overview

- a) Control panel
- b) LED display
- c) Top switch (mode switch)
- d) Bottom switch (pump switch)

Top switch

- Flick to the right () to track and lock onto the laser beam.
- Flick to the left () to set the system in manual marking mode (operation without laser beam)

Bottom switch

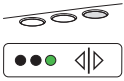
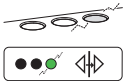
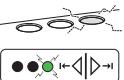
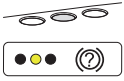
- Flick to the right () to turn on the spray knob.
- Left position on this switch has no function.

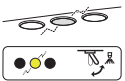
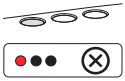


Always use the top switch to either track the beam (flick right) or spray manually (flick left) before turning the bottom switch to the on/spray position.

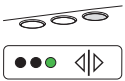
Meaning of the LEDs

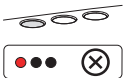
Tracking mode

Symbol on the label	LED Colour	Description of Line Marker status	Action
	Constant green	Actuator arm is active and within working range.	Switch on pump and mark out.
	Slow flashing green	Power mode on / Searching for beam.	Searching the beam.
	Fast flashing green	Beam lost / Beam not found.	Move Line Marker into a more suitable position to find the beam.
	Constant yellow	Actuator arm is blocked.	Remove blockage / Release actuator arm from transport position.

Symbol on the label	LED Colour	Description of Line Marker status	Action
	Slow flashing yellow	Beam found but pump switch in on position.	Switch the pump switch off to track the beam. Turn back on once beam has been found.
	Constant red	Service mode.	Contact dealer.

Manual mode

Active LED + symbol on the label	LED Colour	Description of Line Marker status	Action
	Constant green	Power mode on, actuator arm is fixed.	Turn on pump switch and mark out manually and fix it in the park position.

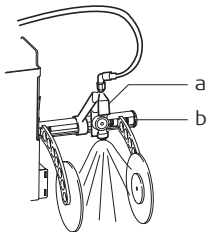
Active LED + symbol on the label	LED Colour	Description of Line Marker status	Action
	Constant red	Service mode.	Contact dealer.

2.5

Using the Spray Knib

Functions of the spray knib

The spray knib is the area where the paint exits the Line Marker and marks the surface. The wheels are designed to follow ground contours and also set the desired width of finish.

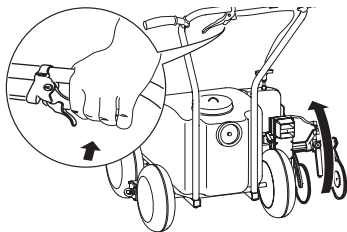


- a) Nozzle assembly
- b) Nozzle holder bar

The nozzle height and spray position can be modified through loosening the black knob on either the nozzle holder bar or on the nozzle assembly.

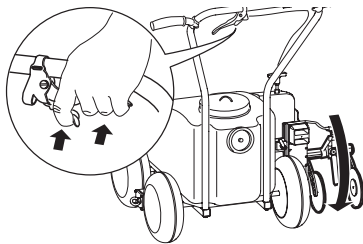
Lifting and lowering the knib

Lift the knib:



Pull the lever toward the handle bar to lift. The small locking lever will engage by itself to lock the knib in the upright position.

Lower the knib:



To lower the knib, pull the lever towards the handlebar and release the small locking lever with your finger. Release the lever in a controlled manner with your hand until the knib wheels are once again touching the surface.

Operation position

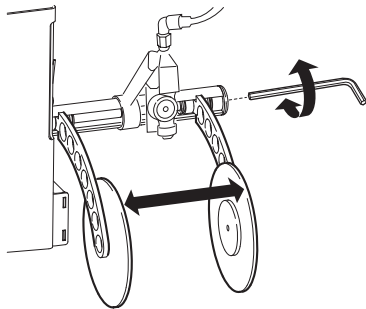
The operating position for the spray knib is the down position (wheels touching the surface).

This allows the wheels to follow the ground and sets the nozzle to the correct height. Ensure the locking switch on the knib lift lever is released and the handle fully extended.

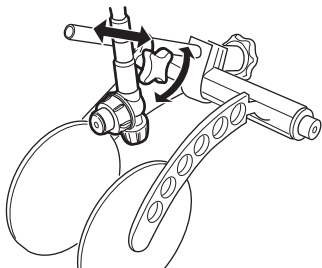
When marking out the knib can be lifted and lowered using the handlebar lever to ensure that knib wheels clear the ground and prevent any paint smudging or tram-lines appearing.

Adjusting the knib

The knib can be adjusted in a number of ways:

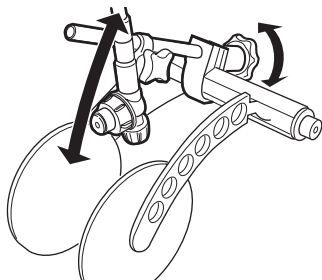
**1. Width of wheels**

Changed by inserting an allen key into the end and turning either clockwise or anti-clockwise to adjust the width.



2. Nozzle height

Changed by loosening the screw on the nozzle height bar and either lifting or lowering this to the desired height. Tighten the screw to finish.



3. Nozzle position on the nozzle height bar

Adjusted by loosening the screw on the nozzle assembly and moving the assembly forward or backward to the desired position. Tighten the screw to finish.

Removing and replacing the knib assembly

The knib assembly can be removed from the actuator arm by forcefully pulling the assembly backward toward the rear of the Line Marker. A simple locking mechanism will be released.

To re-connect knib assembly to the actuator arm locate knib assembly into the hinge and push firmly into the actuator arm.

Transport mode

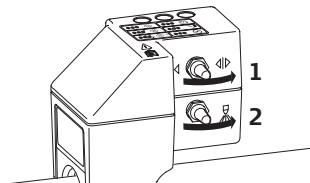
For transport the knib can be :

- a) lifted and locked using
 - the lever and locking mechanism on the handlebar (see "Lifting and lowering the knib")
 - and/or the locking mechanism on the actuator arm or
 - b) removed from the actuator arm completely (see "Removing and replacing the knib assembly").
-

3 Marking Out Procedures

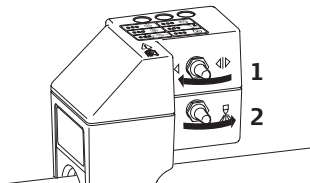
3.1 General Operating Principles

Laser marking



Turn system on for laser tracking.

Manual marking



Turn system on for manual spraying.

Keeping locked on beam

The control panel features a row of LED's coloured red, yellow and green.

- Once the receiver is locked onto the beam the green LED will be lit.
- When operating the machine within the actuator arm limits the green LED will stay lit.
- If the receiver moves out of range of the laser beam (too far left or right), the spray will automatically switch off and the green LED will begin to flash quickly.

To continue spraying operations after beam loss has occurred see the following paragraph.

To track beam once it has been lost

Option 1

1. Lift the nozzle assembly with the knib lever.
2. Turn the spray switch to the off position.
3. Position the machine back towards the sprayed line.
4. Manoeuvre the knib to a position on or near the line.
5. Turn off the tracking switch then turn this on again. The arm will track outward, then inward and source the beam once more.
6. Lower the nozzle assembly and set the spray switch to on.

Option 2

1. Lift and lock the nozzle assembly.
2. Pull the machine backward towards the pre-sprayed line.

3. Manoeuvre the machine to the left and right until the receiver once again picks up the laser beam.
4. Once the receiver has locked onto the beam, lower the knib and set the spray switch to on.

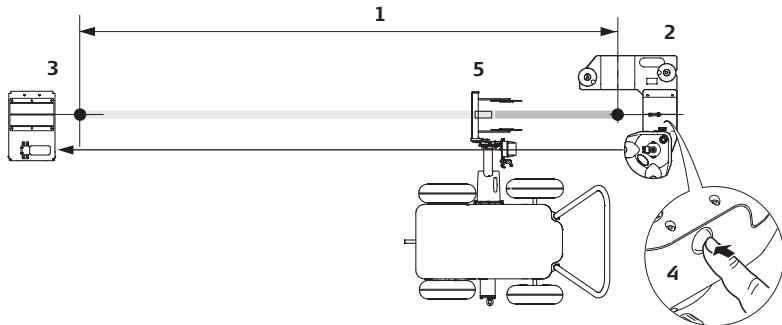
Possible causes of beam loss:

- Physical obstruction of beam, for example machinery, tools or equipment
 - Receiver drops below or rises above laser beam
 - Batteries running extremely low
 - Receiver out of range, for example too far left or too far right
 - Operator blocking beam whilst marking
 - Receiver lenses dirty
 - Transmitter lens/s dirty
-

3.2

Marking Out a Straight Line

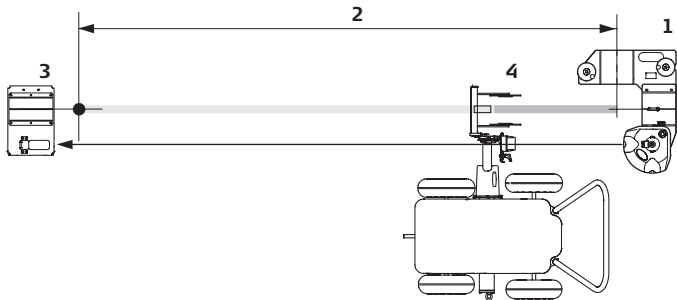
General



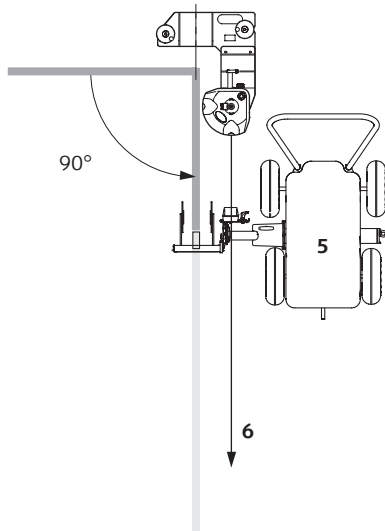
1. Measure the desired distance of the line and indicate the desired start and finish points.
2. Set the transmitter base plate at one end.
3. Set the reflector base plate at the opposite end.
4. Turn the transmitter on and using the telescope and turntable align the beam to the reflector.
5. Mark out the line.

3.3 Marking Out a Right-Angle with Double Laser Transmitter

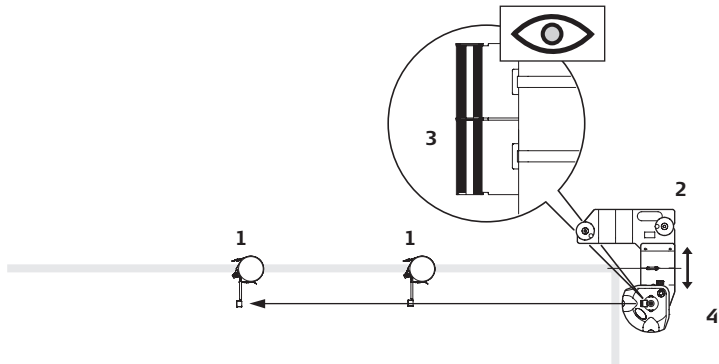
Option 1:
without GAC's



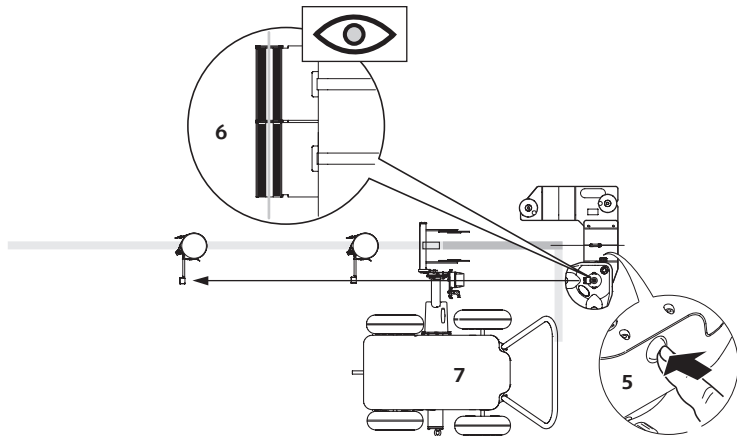
1. Set the transmitter into the desired corner in which the marking operation is to begin.
2. Measure out the desired length of run and indicate the end of this with a spray can or other marker.
3. Set one reflector at this point.
4. Align the laser to the reflector and mark out the first line.



5. Return to the transmitter.
6. Track the second beam (90° to the first line) and mark out this line to the desired length.
7. Once the 90° angle has been marked, remove the transmitter and complete the corner in manual mode.

**Option 2:
with GAC's**

1. Set the goal alignment cards on the posts.
2. Set the transmitter base plate at the point where the angle should start. You should calculate and indicate the total length desired for this line.
3. Use the telescope to check the alignment of the transmitter to the GAC's.
4. Move the slide plate on the transmitter base plate either to the left or right, focus on the double black marks on the GAC's until they are perfectly in line. At this point lock the slide bar.



5. Turn the laser on.
6. Using the turntable align the beam with the GAC's until the laser beam splits the double black markings. You have now set a 90° angle to these posts.
7. Bring the Line Marker over to the transmitter and commence marking operations.

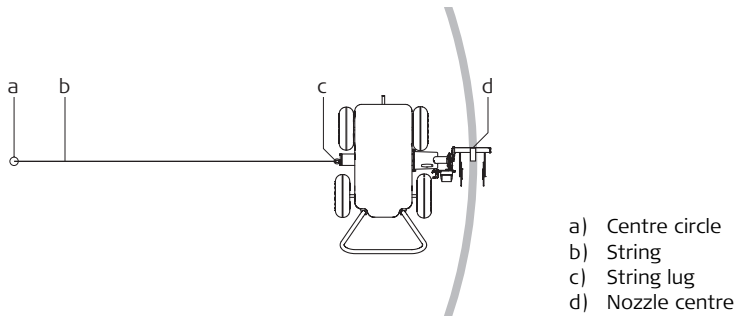
**Using this system you can also mark out between posts:**

1. Spray and mark out right up to the first post.
 2. Turn the spray switch off.
 3. Manoeuvre the actuator arm around the post (at this point the actuator arm will be fully extended). Once on the other side of the first post, bring the arm in towards where the line should be until the receiver once again locks on the beam.
 4. Once the receiver has found the beam, move the machine backwards towards the inside of the post and again commence spraying operations.
 5. At the next post repeat steps 2. to 4.
-

3.4

Marking Circles

Where to tie the string



- There is a pre-set lug for tying string, situated on the left hand side of the actuator arm.
- When marking circles, the system must be used in manual mode and the actuator arm locked as for transport mode.

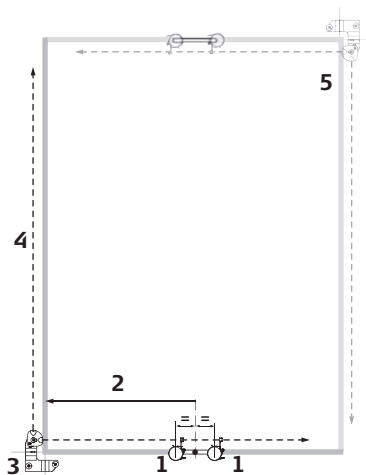
Dimensions

The distance from the nozzle centre to the string lug is 0.868 m/2.85 ft. Therefore to achieve a circle radius of 9.15 m/30 ft (soccer centre circle) the string length should be 8.28 m/27.15 ft.

4 Marking Out Examples

4.1 Setting Up a Pitch for Soccer Pitch Marking with Double Laser Transmitter

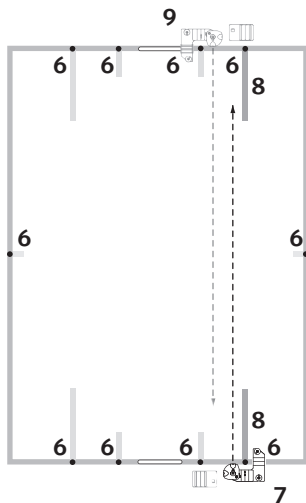
Procedure, using pre-fixed posts



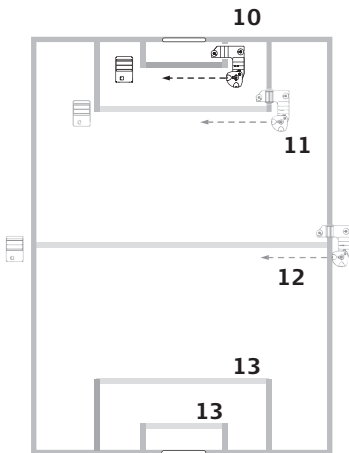
1. Set up the goal alignment cards (GAC's) to one set of posts.
2. Measure the halfway point between the posts and mark. From this mark measure back half the total required distance for the total length of goal line and mark.
3. Align the transmitter to the GAC's, level the transmitter and make a final alignment check for correct alignment.
4. Mark out the 90° angle to the required distances (= goal and touch line).
5. Repeat the procedure on the opposite set of posts.



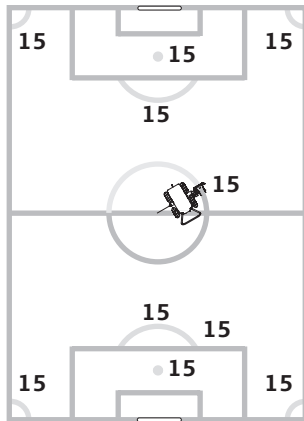
A trundle wheel is a useful accessory for measuring distances.



6. Measure and indicate the 16.5 m / 18 yard and 5.5 m / 6 yard box lines along each goal line and the half way line along the side lines.
7. Set the transmitter(s) and reflector(s) to these reference points. Align each transmitter to its corresponding reflector.
8. Mark out the distance required for each line. Work across the entire width of the field.
9. At the end of each run move the transmitter and reflector to the next position, level and align. Continue to mark out all the vertical linework.



10. At one end, move the transmitter and reflector to the edges of the 5.5 m / 6 yard box vertical lines and align to each other. Mark out this line.
11. Move the transmitter and reflector to the edges of the 16.5 m / 18 yard box vertical lines, align to each other and mark out this line.
12. Move the transmitter and reflector to the half-way mark indicators and mark out this line.
13. Repeat steps 10. and 11. for the opposite 16.5 m / 18 yard and 5.5 m / 6 yard boxes.



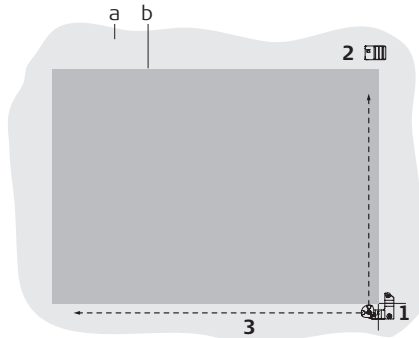
14. Set the Line Marker to "manual mode".
15. Mark out all semi-circles, circles, corners and penalty spots. Use the lug located on the end of the actuator to tie your string line to.

4.2 Marking Out Perfectly Rectangular Pitches with Double Laser Transmitter



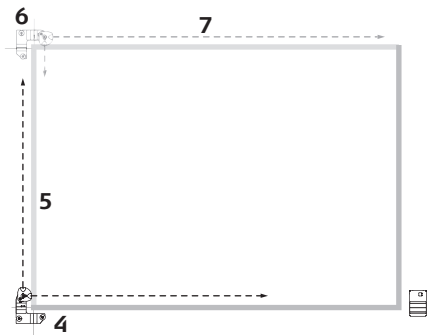
This procedure should only need carrying out once per year. It can also be used to allow setting goal post sockets to be placed correctly and squarely.

Procedure

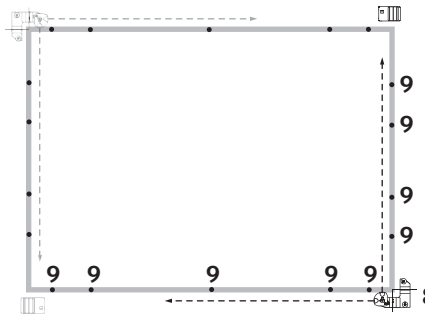


- a) Area
- b) Proposed playing surface

1. Establish where the goal line should start and place the laser in the bottom right hand or top left hand corner. Level the transmitter.
2. Establish where the opposite corner is to be and set the reflector at this point. The reflective material should face the transmitter. Align the transmitter and reflector.
3. Mark out this 90° angle, remembering to measure the required distance for the side line.



4. Replace the transmitter with a reflector and move the transmitter to the very end of the marked side line. Align and level both at once.
5. Using the 90° angle of the transmitter, mark out the opposite goal line to the required distance.
6. Replace the transmitter with a reflector once more. Move the transmitter to the very end of the second goal line and align with the reflector.
7. Using the 90° angle of the transmitter, mark out the second side line.

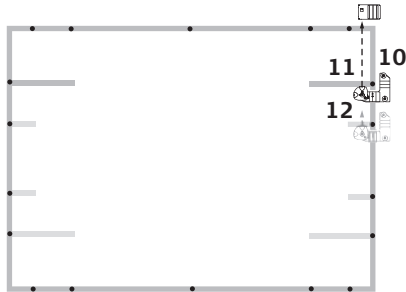


- Align and place a reflector in the bottom left and top right corner of the marked perimeter.

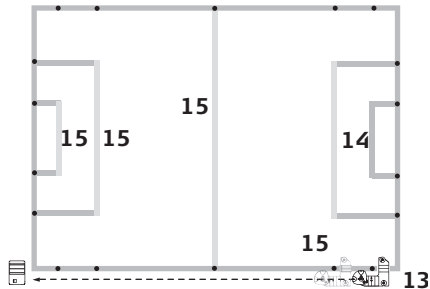


The top right reflector should have the reflective material facing toward the (planned) goal posts and the bottom left reflector should have the reflective material facing down the side line.

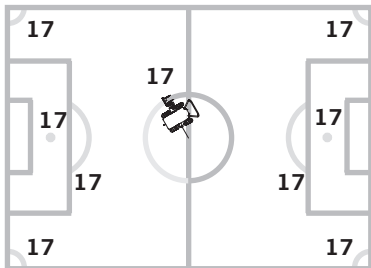
- Measure and indicate all distances along the reflector goal and side lines.



10. Starting at the nearest point to the reflector on the goal line begin to align the transmitter to both the distance indicator and the reflector.
11. Mark out the horizontal lines using the 90° angle of the transmitter.
12. Repeat this process by moving the transmitter and aligning with the reflector until all horizontal pitch markings are complete.



13. Move the transmitter to the nearest distance indicator to the side line reflector. Align the transmitter to both the distance indicator and the reflector.
14. Mark out the vertical line using the 90° angle of the transmitter.
15. Repeat this process by moving the transmitter and aligning with the reflector until all vertical pitch markings are complete.

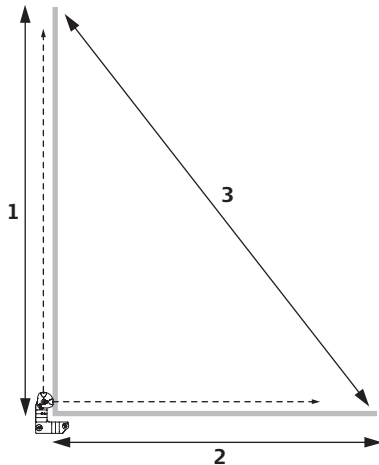


16. Set the Line Marker to "manual mode".
17. Mark out all semi-circles, circles, corners and penalty spots. Use the lug located on the end of the actuator to tie your string line to.

5 Check and Adjust

5.1 Check the Right-Angle of the Double Laser Transmitter

Procedure



1. Measure the length of the marked line and times this number by itself. Note the answer.
2. Measure the length of the 2nd marked line and times this number by itself. Note the answer.
3. Measure the distance from one line end to the opposite one. Note the answer.
4. Add result 1 and 2 together and work out the square root of this number on a calculator. This result should equal result 3.

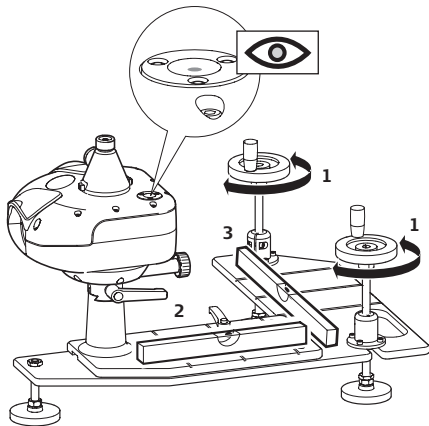


For adjustment contact
BeamRider Ltd.

5.2

Check Circular Level Accuracy

Procedure



1. Setup and align the the transmitter according to "2.1 Using the Transmitter and Telescope".
2. Use a spirit level to check the horizontal of the transmitter base.
3. Repeat step 2. to check the base plate in the right-angled direction too.
4. Both results must be at least as good as shown by the circular level.



For adjustment contact
BeamRider Ltd.

6 Batteries and Charging

6.1 Power Supply, Battery

Primary use/charging

- The batteries must be charged prior to using it for the first time because it is delivered with an energy content as low as possible.
- For new batteries or batteries that have been stored for a long time (> three months), it is effectual to make 2 - 5 charge/discharge cycles.
- The permissible temperature range for charging is between 0°C to +35°C/+32°F to +95°F. For optimal charging we recommend charging the batteries at a low ambient temperature of +10°C to +20°C/+50°F to +68°F if possible.
- It is normal for the battery to become warm during charging. Using the chargers recommended by BeamRider Ltd., it is not possible to charge the battery if the temperature is too high.

Operation /Discharging

- The batteries can be operated from -20°C to +50°C/-4°F to +122°F.
 - Low operating temperatures reduce the capacity that can be drawn; very high operating temperatures reduce the service life of the battery.
-

7

Troubleshooting

Error	Possible cause
Loss of beam	Beam broken between transmitter and machine or severe undulations affecting beam projection.
Receiver cannot locate beam	The receiver may be set too high or too low. Receiver/Transmitter lens dirty.
Laser switches off intermittently	Laser battery low in charge.
Laser will not switch on	Laser battery low in charge.
Actuator arm locks in extended position	Beam loss, knib not lifted, cabling preventing full extension.
Actuator arm does not extend	Locked or blocked, knib not lifted.
Over-marked lines do not match	Alignment of laser, alignment of reflectors.
Kinks and wobbles in the line	Beam broken.

Error	Possible cause
Consistent loss of beam while near laser unit	Undulations in ground too severe.
System not functioning but laser working and receiver tracked beam	Blocked nozzle, flat battery on Line Marker, no paint left in machine.
Laser on and receiver tracking but no spray output	Blocked nozzle, no paint in Line Marker, incorrect position of pump switch on Line Marker.
Actuator arm resistant to track	Knib not lifted, flat battery on Line Marker.

8 Care and Transport

8.1 Transport

Transport in the field

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

- carry the product in its original transport container,
- carry the reflection set, by the handles provided in the plates.
- lock the spraying mechanism into a secure position

Transport in a road vehicle

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

Shipping

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

Shipping, transport of batteries

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

Field adjustment

After transport inspect the field adjustment parameters given in this user manual before using the product.

8.2

Storage

Product

Respect the temperature limits when storing the equipment, particularly in summer if the equipment is inside a vehicle. Refer to "10 Technical Data" for information about temperature limits.

Field adjustment

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

Batteries

- Refer to "10.1 System" for information about storage temperature range.
 - The permissible temperature range for storing is -40°C to +55°C / -40°F to +131°F. We recommend a storage temperature range of 0°C to 20°C / +32°F to 68°F in dry environment to minimize self-discharging
 - At the recommended storage temperature range, batteries containing a 10% to 50% charge can be stored for up to one year. After this storage period the batteries must be recharged.
 - After storage recharge batteries before using.
-

8.3

Cleaning and Drying

Telescope, Reflector, Receiver and GAC's

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

Fogging of Lenses

Lenses that are cooler than the ambient temperature tend to fog. It is not enough simply to wipe them. Keep them for some time inside your jacket or in the vehicle to allow them to adjust to the ambient temperature.

Damp products

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

Cables and plugs

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

Connectors with dust caps

Wet connectors must be completely dry before attaching the dust cap.

8.4

Maintenance

Motorisation

Maintenance of the motorisation in motorised products must be done in a BeamRider Ltd. authorized service workshop.

Following conditions:

- After about 1500 hours operation
 - Twice a year in case of permanent use of the product
-

9 Safety Directions

9.1 General Introduction

Description

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

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

9.2

Intended Use

Permitted use

- Marking lines at various sport fields;
 - Marking out "turf type" paint lines on turf or artificial turf areas;
 - Guidance of line marking equipment by means of laser guided positioning signals;
-

Adverse use

- Use of the product without instruction.
 - Use outside of the intended limits.
 - Disabling safety systems.
 - Removal of hazard notices.
 - Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
 - Modification or conversion of the product.
 - Use after misappropriation.
 - Use of products with obviously recognizable damages or defects.
 - Use with accessories from other manufacturers without the prior explicit approval of BeamRider Ltd..
 - Aiming directly into the sun.
 - Inadequate safeguards at the marking site.
 - Deliberate dazzling of third parties.
-

 **Warning**

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

9.3

Limits of Use

Environment

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

Danger

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

Danger

To avoid electrical shock, outdoor use of the power adapter is not permitted.

Precautions:

Use the power adapter in dry indoor environments only.



9.4

Responsibilities

Manufacturer of the product

BeamRider Ltd., Unit 2, Spring lane, Malvern Worcestershire, UK. WR14 1AT, herein-after referred to as BeamRider Ltd., is responsible for supplying the product, including the user manual and original accessories, in a completely safe condition.



Manufacturers of non BeamRider Ltd. accessories

The manufacturers of non BeamRider Ltd. accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the BeamRider Ltd. product.

Person in charge of the product

The person in charge of the product has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual.
- To be familiar with local regulations relating to safety and accident prevention.
- To inform BeamRider Ltd. immediately if the product and the application becomes unsafe.



Warning

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

 **Warning**

Unauthorized modification of the line marking device by mounting the product may alter the function and safety of the line marking device

Precautions:

Follow the instructions of the Line Marker manufacturer. If no appropriate instruction is available, ask Line Marker manufacturer for instructions before mounting the product.

 **Warning**

This product may be installed on recommended line marking devices only by an appropriately trained and qualified specialist.

9.5

International Warranty

International Warranty

The International Warranty can be downloaded from the BeamRider Ltd. home page at <http://www.beamrider.org.uk/internationalwarranty> or received from your BeamRider Ltd. dealer.

9.6

Hazards of Use

Warning

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial and environmental consequences.

Precautions:

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.

Caution

Watch out for erroneous measurement results if the product has been dropped or has been misused, modified, stored for long periods or transported.

Precautions:




Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the product has been subjected to abnormal use and before and after important measurements.

Warning

Automatic moving System Components can lead to injuries and product damages.

Precautions:

Exercise caution in operation in the marked danger range striking any objects or persons.

-
-  **Caution** Beware of inadequate steering if the product is defective like after a crash or other damaging events or alterations.
Precautions:
Periodically perform control measurements and field adjustments on the product as specified in the User Manual. While working, line should be checked by appropriate means, for example measuring tape, triangle, before and after marking tasks.
-
-  **Caution** Be careful when pointing the product towards the sun, because the telescope functions as a magnifying glass and can injure your eyes and/or cause damage inside the product.
Precautions:
Do not point the product directly at the sun.
-
-  **Warning** During dynamic applications there is a danger of accidents occurring if the user does not pay attention to the environmental conditions around, for example obstacles, excavations or traffic.
Precautions:
The person responsible for the product must make all users fully aware of the existing dangers.
-

 **Caution**

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

Precautions:

When setting-up the product, make sure that the accessories, for example connecting cables, are correctly adapted, fitted, secured, and locked in position. Avoid subjecting the product to mechanical stress.

 **Warning**

Using a battery charger not recommended by BeamRider Ltd. can destroy the batteries. This can cause fire or explosions.

Precautions:

Only use chargers recommended by BeamRider Ltd. to charge the batteries.

 **Caution**

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

Precautions:

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

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

 **Warning**

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

Precautions:

The product must not be disposed with household waste.

Dispose of the product appropriately in accordance with the national regulations in force in your country.

Always prevent access to the product by unauthorized personnel.

Product specific treatment and waste management information can be downloaded from the BeamRider Ltd. home page at <http://www.beamrider.org.uk/treatment> or received from your BeamRider Ltd. dealer.

 **Warning**

Only BeamRider Ltd. authorized service workshops are entitled to repair these products.

9.7

Laser Classification

Double laser transmitter

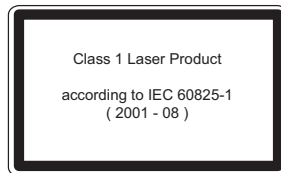
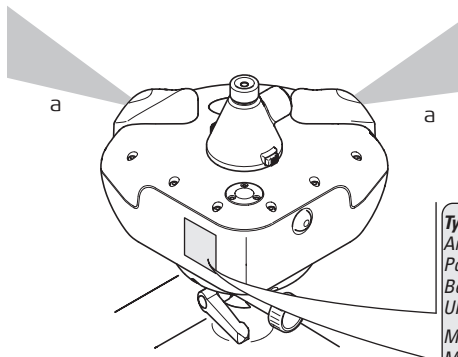
The double laser transmitter module built into the product produces a visible laser beam which emerges from the two objectives.

The product is a Class 1 Laser Product in accordance with:

- IEC 60825-1 (2001-08): "Safety of Laser Products"
- EN 60825-1:1994 + A11:1996 + A2:2001: "Safety of Laser Products"

Class 1 Laser Products are safe under reasonably foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with the instructions.

Description	Value
Maximum average radiant power	0.62 mW \pm 5%
Maximum peak radiant power	1.24 mW \pm 5%
Pulse duration	16.625 μ s (32kHz with 50% duty cycle)
Pulse repetition frequency	32 kHz
Beam divergence	0.5 mrad x 25 mrad

**Labelling
Double Laser
Transmitter****Type: Double Laser Trasmitter**

Art.No.:

S.No.:

Power: 3.6V \approx nominal, 40mA max.

Beamrider Ltd

UK-WR14 1AT Malvern

Manufactured: 2006

Made in



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated July 26,2001.

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.

a) Laser Beam

Single laser transmitter

The single laser transmitter module built into the product produces a visible laser beam which emerges from the objective.

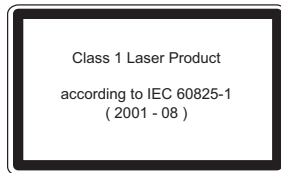
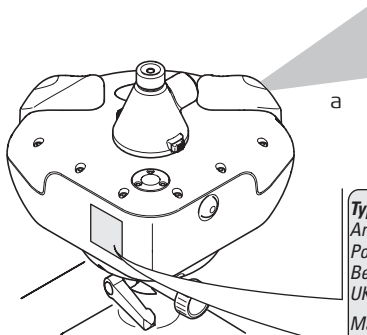
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Description	Value
Maximum average radiant power	0.62 mW \pm 5%
Maximum peak radiant power	1.24 mW \pm 5%
Pulse duration	16.625 μ s (32kHz with 50% duty cycle)
Pulse repetition frequency	32 kHz
Beam divergence	0.5 mrad x 25 mrad

Labelling Single Laser Trans- mitter

**Type: Single Laser Transmitter**

Art.No.: S.No.:

Power: 3.6V \approx nominal, 40mA max.

Beamrider Ltd

UK-WR14 1AT Malvern

Manufactured: 2006

Made in



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated July 26,2001.

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.

a) Laser Beam

9.8

Electromagnetic Compatibility EMC

Description

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



Warning

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, BeamRider Ltd. cannot completely exclude the possibility that other equipment may be disturbed.



Caution

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

Precautions:

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

**Caution**

Disturbances caused by electromagnetic radiation can result in erroneous measurements. Although the product meets the strict regulations and standards which are in force in this respect, BeamRider Ltd. cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example, near radio transmitters, two-way radios or diesel generators.

Precautions:

Check the plausibility of results obtained under these conditions.

**Warning**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

Precautions:

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

9.9 FCC Statement, Applicable in U.S.

Warning

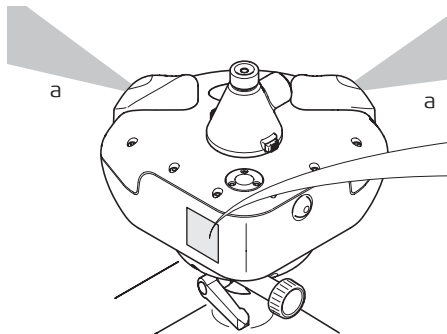
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate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

Warning

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

**Labelling
Double Laser
Transmitter**

a) Laser Beam

Type: Double Laser Transmitter

Art.No.:

S.No.:

Power: 3.6V \approx nominal, 40mA max.

Beamrider Ltd

UK-WR14 1AT Malvern

Manufactured: 2006

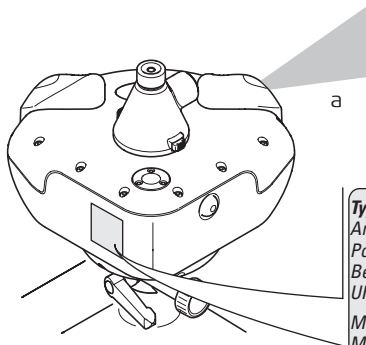
Made in



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Labelling Single Laser Trans- mitter



Type: Single Laser Transmitter

Art.No.:

S.No.:

Power: 3.6V \approx nominal, 40mA max.

Beamrider Ltd

UK-WR14 1AT Malvern

Manufactured: 2006

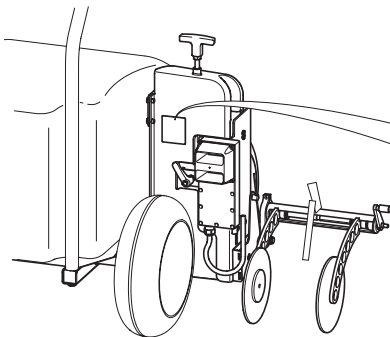
Made in



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated July 26,2001.

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.

a) Laser Beam

Labelling
Actuator arm

Type: Actuator Arm

Art.No.:

Power: 3.6V $\overline{\text{---}}$ nominal, 1.5A max.

Beamrider Ltd

UK-WR14 1AT Malvern

Manufactured: 2006

Made in Switzerland



S.No.:

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.

10

Technical Data

10.1

System

Environmental specifications

Temperature

Operating temperature	Storage temperature
-10 to +50°C / 14 to 122°F	-40 to +70°C / -40 to +158°F

Protection against water, dust and sand

Protection
IP55 (IEC 60529)

Humidity

Protection
Up to 95 % The effects of condensation are to be effectively counteracted by periodically drying out the product.

Accuracy of the line

max. $\pm 3\text{mm}$ to the regression line (ideal line)

Weight

Component	Weight [kg]
Single Laser Transmitter	3.0
Double Laser Transmitter	3.2
Actuator arm incl. Receiver	9.5
Transmitter base plate	5.3
Control Panel	0.3
Reflector unit	1.9
GAC (1 unit)	≤ 0.7
Knib / Knib lift	1.8

10.2

Transmitter

Dimensions

Length: 210 mm
Width: 210 mm
Height: 150 mm

Power

Internal battery

Type: NiMH
Voltage: 3.6 V
Capacity: 0.7 Ah
Typical operating time: 6 - 8 h

Level

Circular level sensitivity: 17'/2 mm

Optics

Double Laser Transmitter

Angle between laser fans: $90^\circ \pm 0.1$ mrad (10 mm at 100 m)
Width of beam up to 100 m: 4 mm to 40 mm

Single Laser Transmitter

Width of beam up to 100 m: 4 mm to 40 mm

Telescope

Magnification:	6.5 x \pm 5%
Clear objective diameter:	20 mm
Focusing:	5 m/16.4 ft to infinity
Field of view:	\pm 0.75°

10.3**Actuator Arm****Range of regulation**

200 mm

Power

External supply voltage: Nominal voltage 12V DC, Max. 5A, Range 11V-13V DC

Operating time

Depends on the external power supply system.

MotorisationMaximum Acceleration: 2 m /s²

10.4

Receiver

Dimensions

	without sun protector	with sun protector
Length:	165 mm	70 mm
Width:	70 mm	70 mm
Height:	27 mm	38 mm

10.5**Control Panel**

Power supply

Power supply from Actuator arm

Dimensions

Length: 100 mm

Width: 70 mm

Height: 100 mm

10.6

Knib / Knib Lift

**Line width
adjustment**

50 mm - 150 mm

**Line width
tolerance**

Typical tolerance on hard surfaces: ± 2 mm (± 1 mm for each guide disc)

**Nozzle height
adjustable**

0-200 mm above ground

Range of travel

110 mm (adjustable to user / pitch preference)

Guide discs

140 mm OD x 4 mm thick PVC plastic

10.7**Reflector****Dimensions**

Length:	300 mm
Width:	200 mm
Height:	500 mm

10.8

Goal Alignment Card

Goal posts

Min. / Max. goal post width: 50-150 mm

Forces

Min. / Max. possible clamping force: 10 N / 100 N

Accuracy of mounting

Alignment accuracy of reference target mark: 155 mm \pm 1 mm

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