



turfRad

User Manual Toro Array Mount

Revision 1.0

Table of Contents

This manual will guide you step by step through the assembly and set-up of your turfRad Toro Array Mount. It is structured in 5 sections:

1. **Assembly Mount**
2. **Installation of the Sensors**
3. **Wiring to your Workman**
4. **Operations with Array Mounted Sensors**
5. **Live Path**

If any questions arise in the set-up process, feel free to contact your distributor or visit our turfRad Help Center under <https://support.turfrad.com/>.



turfRad Help Center

Introduction

This manual contains safety information and instructions for the assembly and installation of the turfRad Toro Array Mount and the connection of the turfRad sensor. For the latest version of this manual and other translations, please scan the QR code below or visit our website at www.terradtech.com/manual.



Please keep this manual in a safe place for future reference.

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Safety Precautions



- Wear **safety glasses** at all times during assembly. Sheet metal edges and cut tubing can produce sharp burrs.
- Wear **work gloves** when handling sheet metal components — edges may be sharp.
- Ensure the vehicle is **powered off, parked, and on level ground** before beginning any installation work.
- **DO NOT** work on the mount with anyone seated in the vehicle.
- Watch for **pinch points** between bracket components, frame tubes, and fasteners during assembly — keep hands clear when tightening U-bolts and clamps.
- When cutting the cross bar (GTX/LTX step 5), use appropriate **cutting tools and PPE**. TerraRad Tech assumes no liability for injury during cutting operations.
- **Re-check all fasteners** after the first few hours of operation — vibration can cause bolts to settle and loosen.
- DO NOT expose the sensor to any flammable sources.
- DO NOT open the sensor. Internal parts are not self-serviceable.
- DO NOT connect the sensor to any power source supplying more than **18V DC**.

Care and Maintenance

- Clean the powder coated sheet metal and L-profiles with a damp cloth or low-pressure hose. Avoid harsh chemicals and abrasive cleaners.
- **Touch up all scratches and chips in the powder coating immediately using metal primer.** Bare metal exposed by scratches will rust quickly, especially in outdoor and wet conditions.
- The sidebar pivot uses a bronze oil-embedded bearing – it is self-lubricating and requires no greasing under normal use. If the pivot becomes stiff or squeaky, apply a small amount of light machine oil.
- Inspect all screws and locknuts periodically and re-tighten as needed. Do not over-torque – tighten firmly by hand with the supplied allen key.
- In high-vibration environments, apply medium-strength thread-locking compound (e.g. Loctite 243) to prevent screws from loosening over time.
- If the sensor is malfunctioning, consult your local distributor or visit <https://support.turfrad.com/>.

Important Information

- Ensure that this product is fully assembled before use. Check that all screws and bolts are tightened and inspect them regularly.
- Models may vary depending on the country.
- The content of this document is subject to change without prior notice.
- The content of this document may not be duplicated or reproduced in whole or in part without prior permission.
- TerraRad Tech assumes no responsibility for damages caused by earthquakes, fire, other natural disasters, actions of third parties, intentional or negligent misuse by the user, or use of the sensor under special conditions.
- The company is not liable for damages (such as losses, missed business profits, lost revenue, business interruptions, or loss of communication means) resulting from the use or inability to use the sensor.

What's in the box



(1) 1x cross bar



(2) 2x side bar



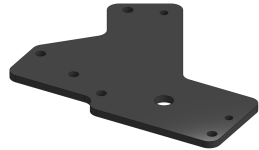
(6) 4x turfRad bar



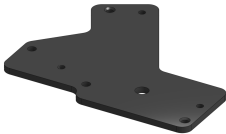
(22) 1x profile assembly L



(21) 1x profile assembly R



(3) 2x sheet metal front



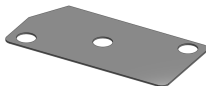
(4) 2x sheet metal back



8x 1" end cap back



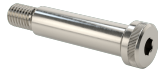
(5) 2x 2" end cap



(23) custom shim



(9) 4x 8x60mm
shoulder screw



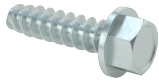
(11) 2x 5/8"
pivot
shoulder screw



(8) 2x T-handle
locking pin



(7) 4x U-bolt



(13) 4x hex
head
plastic screw



(14) 4x M8x75
socket head
screw



(16) 2x M8x90
socket head
screw



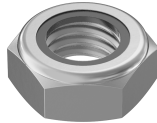
(19) 4x eye nut
(316 SS oval)



(15) 6x M8 hex
nut



(17) 4x M6 thin
locknut



(12) 2x 1/2"-13
thin locknut



(18) 8x M8
0.5mm
shim



(20) M6x16
flat head screw



8x M5x35
socket head
screw



8x M5
locknut



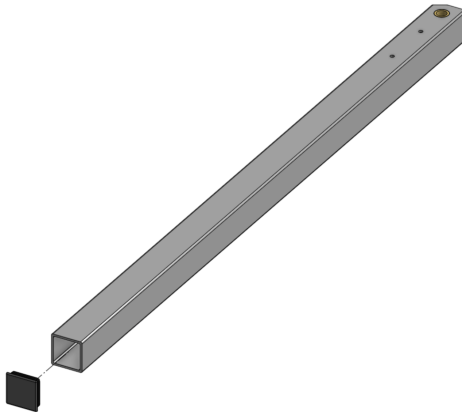
16x M5
washer

1 Assembly Mount



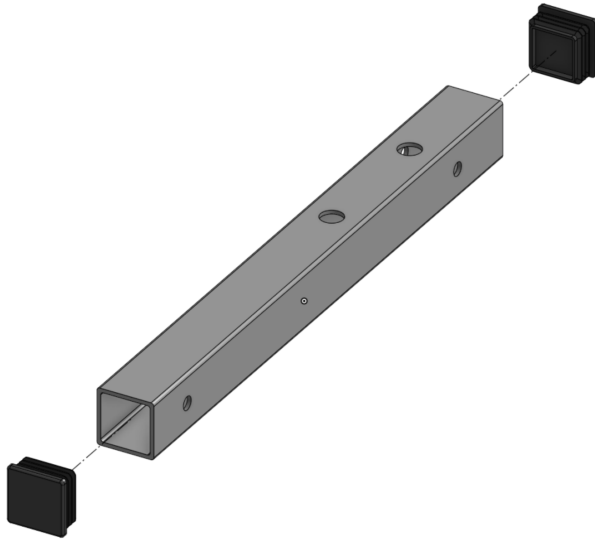
Assembled turfRad Array Mount

1.



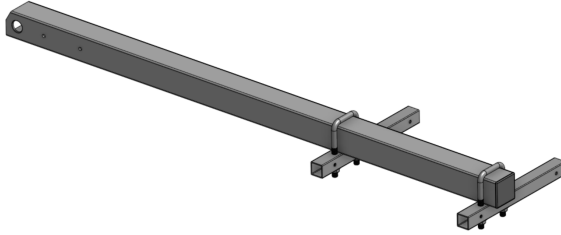
Insert the 2" end cap **(5)** into each end of both sidebars **(2)**. Press firmly until each cap seats flush. The cap should sit level with the tube end with no gap.

2.



Insert a 1" end cap into each open end of all four turfRad bars **(6)**. Press firmly until each cap seats flush. A rubber mallet can help if the fit is tight – do not use a metal hammer directly on the cap.

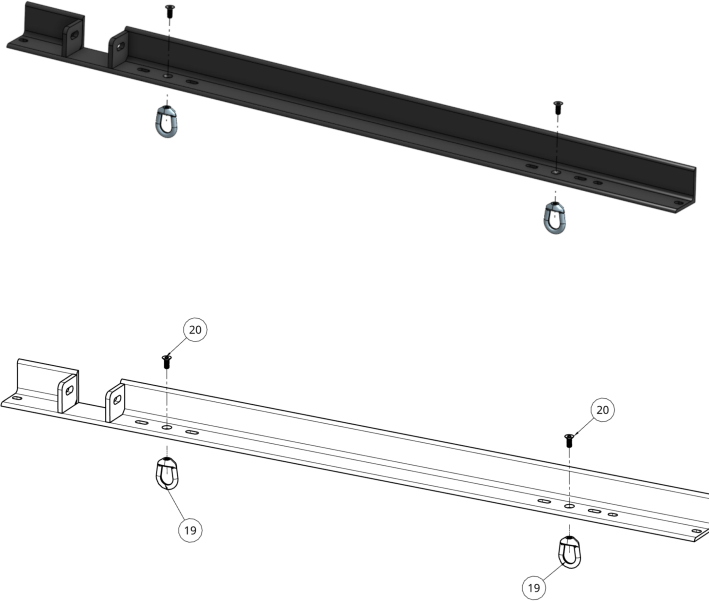
3.



Slide each turfRad bar **(6)** into position on the sidebar and secure with a U-bolt **(7)**. Do not fully tighten at this stage – bars will be aligned and tightened in a later step. Ensure the U-bolt saddle sits flat against the tube before snugging.

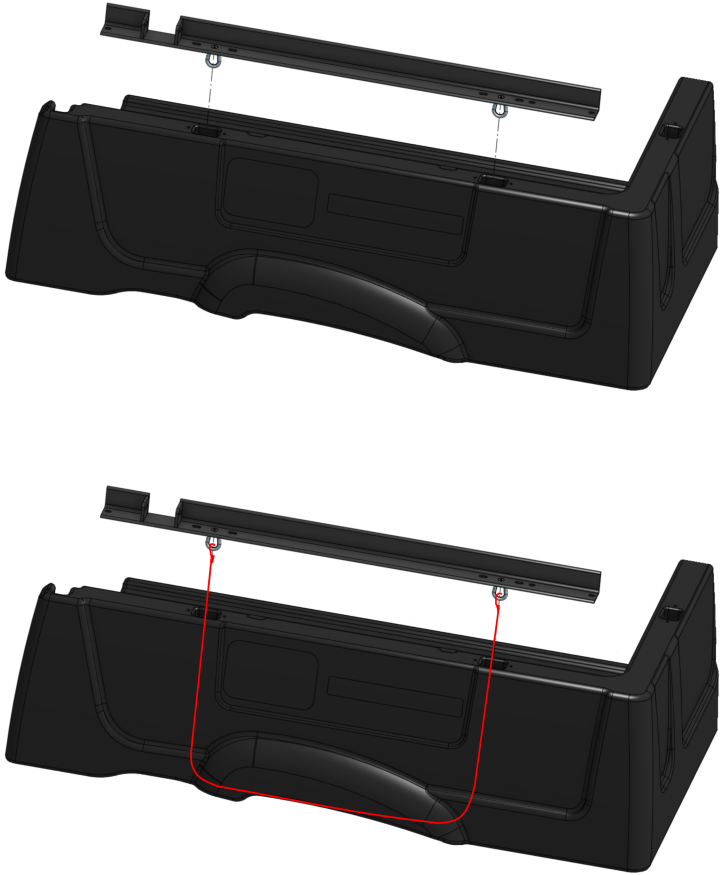
Workman MDX

3.



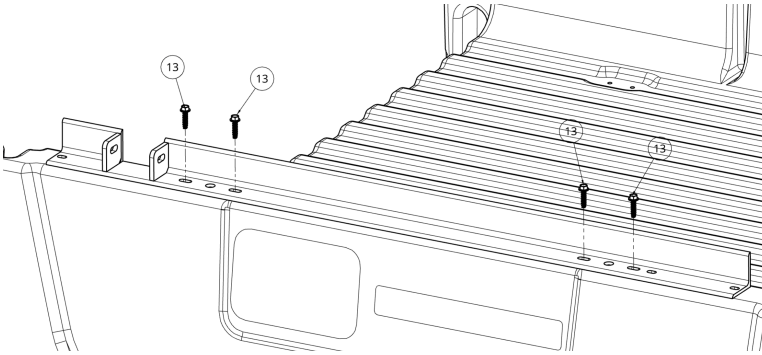
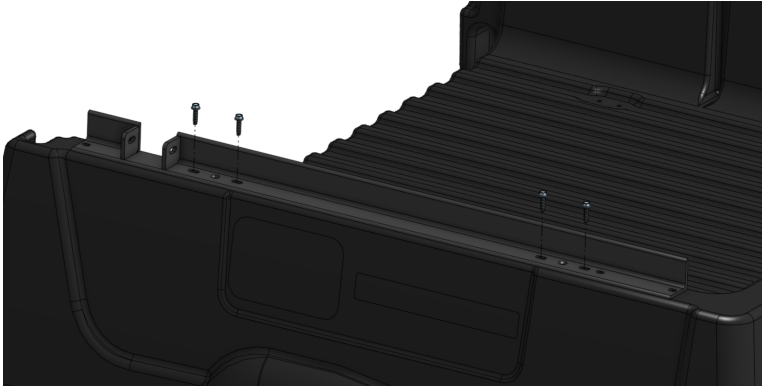
Install an M6x16 screw and an oval eye nut **(19)** onto each L-profile assembly **(21, 22)**, one on the left side and one on the right side. Orient the eye nut with the oval opening facing outward as shown. Tighten securely with the supplied allen key.

4.



Place the ratchet strap hooks onto the eye nuts. Insert each hook from below the MDX bed and fish it up through the hole, then hook it onto the eye nut. Tighten the loose strap ends below the bed using the ratchet until the mount sits firm and level. Do this for both sides.

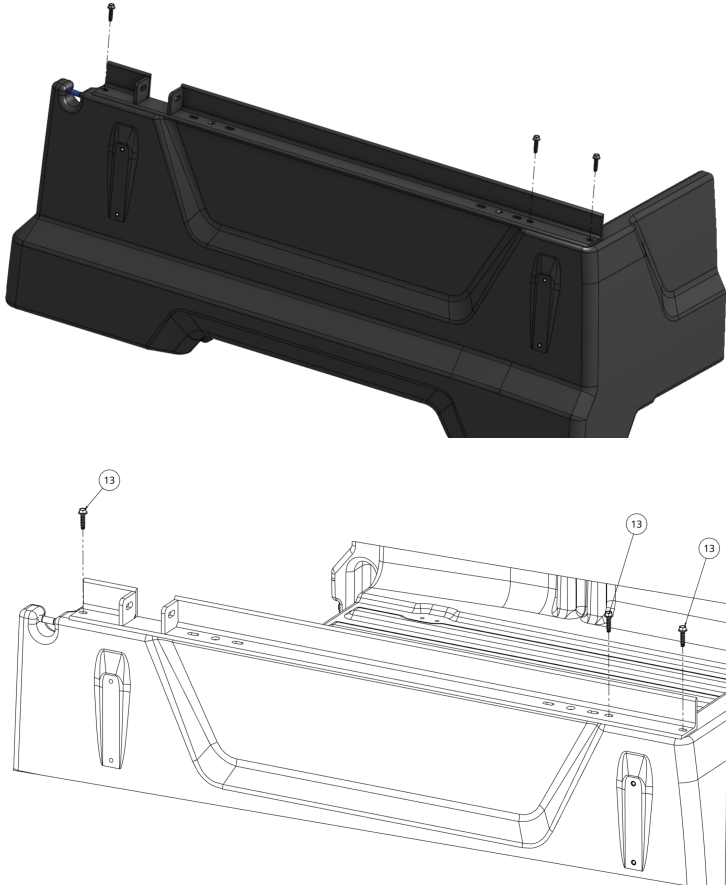
5.



Attach a ratchet strap to the eye nuts on both L-profiles and route it along the side of the MDX as shown. Then insert the plastic hex screws (13) at the locations shown. **Do not over-torque – tighten firmly by hand only.** Over-tightening will strip the plastic threads and the hole can no longer be used with this screw.

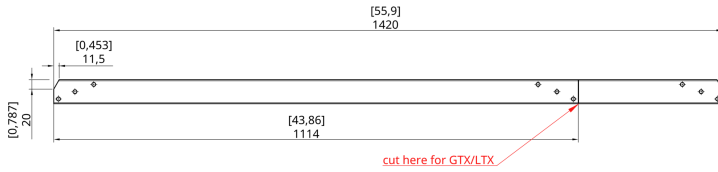
Workman GTX / LTX

3.



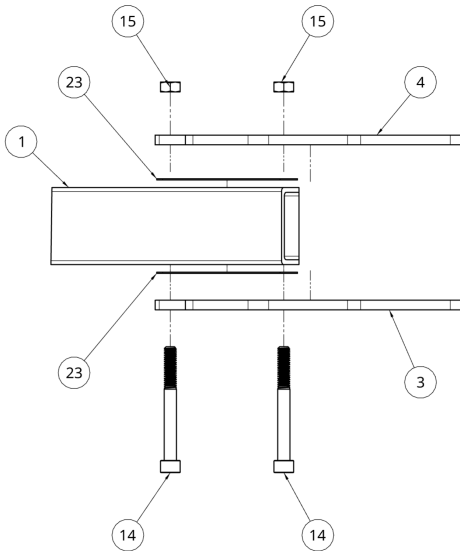
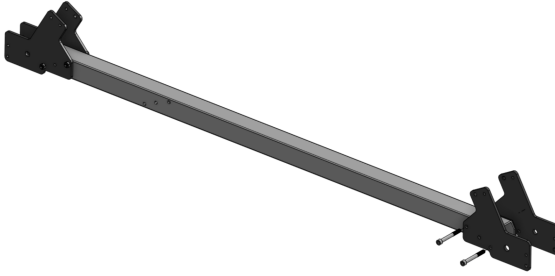
Position the mount structure on the GTX/LTX bed and secure it using the provided screws at the locations shown. Ensure the mount sits flat on the bed surface before tightening. **Do not over-torque – tighten firmly by hand only.**

4.



Cut the cross bar **(1)** to a length of **1114mm** at the marked location. Then cut the chamfer as shown: **20x11mm**. **Warning:** TerraRad Tech assumes no liability for injury during this step. Use proper safety equipment and appropriate cutting tools at all times.

MDX 6. / LTX 5.



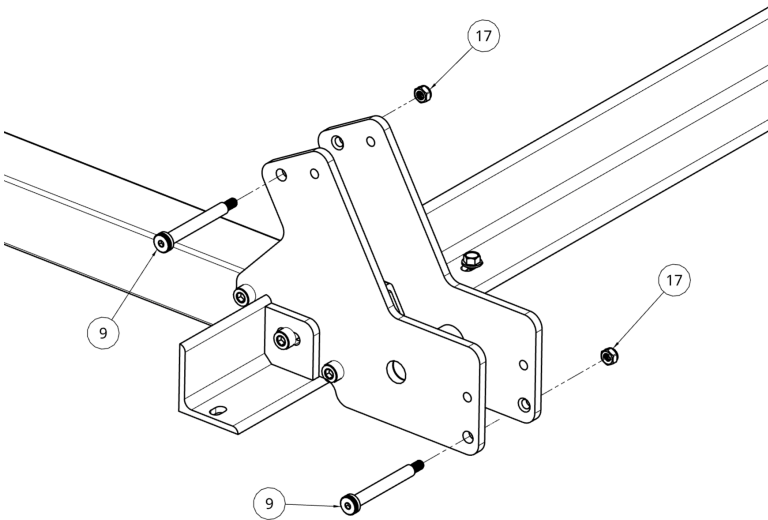
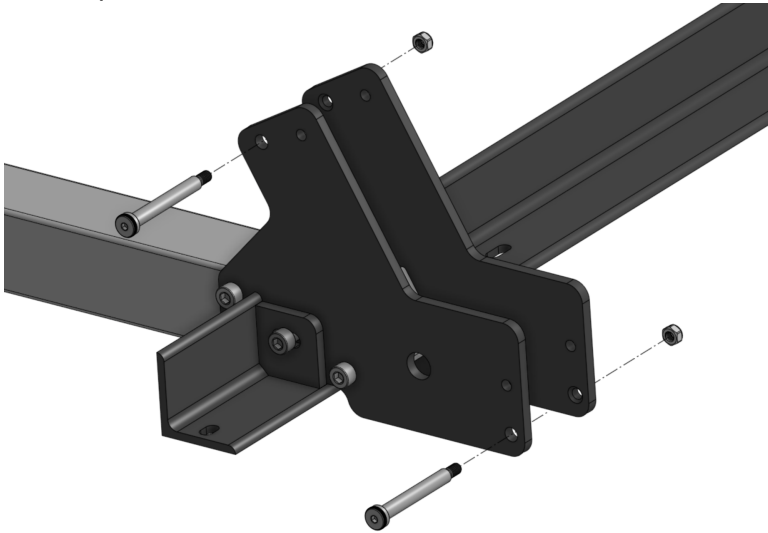
Assemble the cross bar (1) with a sheet metal front (3) and sheet metal back (4) on both ends. Secure each end with two M8x75 socket head screws (14) and M8 hex nuts (15). **Important: Do not forget to place the custom shims (18) between the sheet metal and the cross bar as shown.** Tighten in a cross pattern so both sheet metal pieces clamp evenly. Do this for both sides. Make sure the countersink holes of the sheet metal back are on the inside facing the cross bar.

MDX 7. / LTX 6.



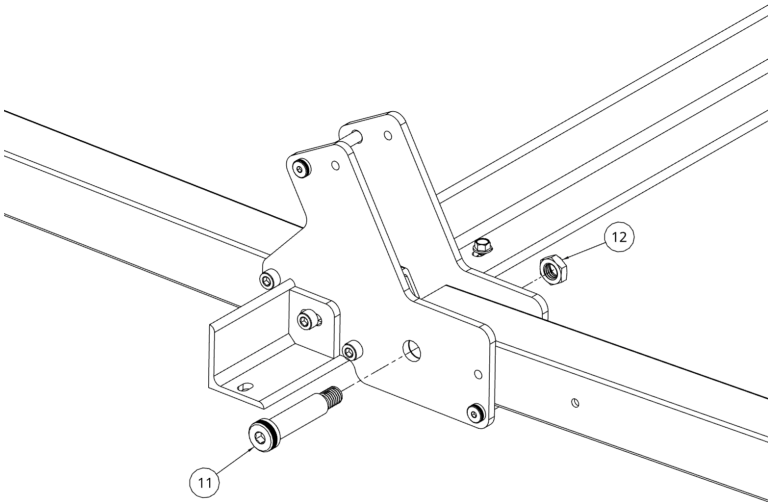
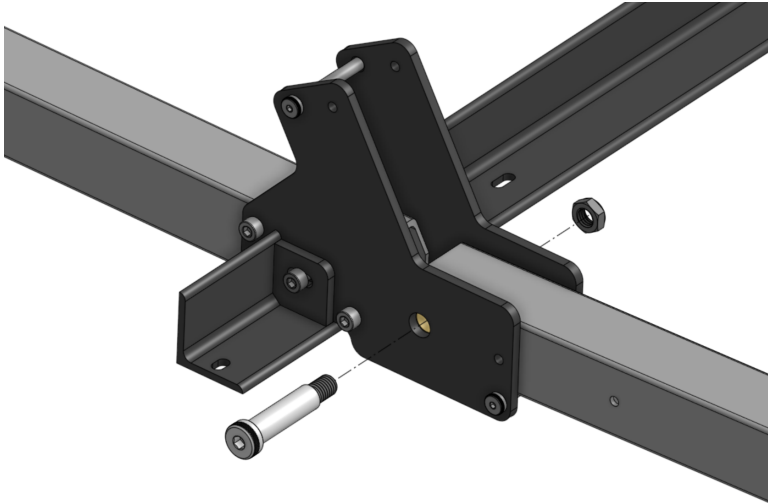
Lower the assembled cross bar onto the installed L-profiles on the Workman and align the mounting holes. Secure with M8x90 socket head screws **(16)** and M8 hex nuts **(15)**. Use additional shims **(18)** if needed to ensure the cross bar sits level. Visually check from the front that the cross bar is parallel to the ground before fully tightening.

MDX 8. / LTX 7.



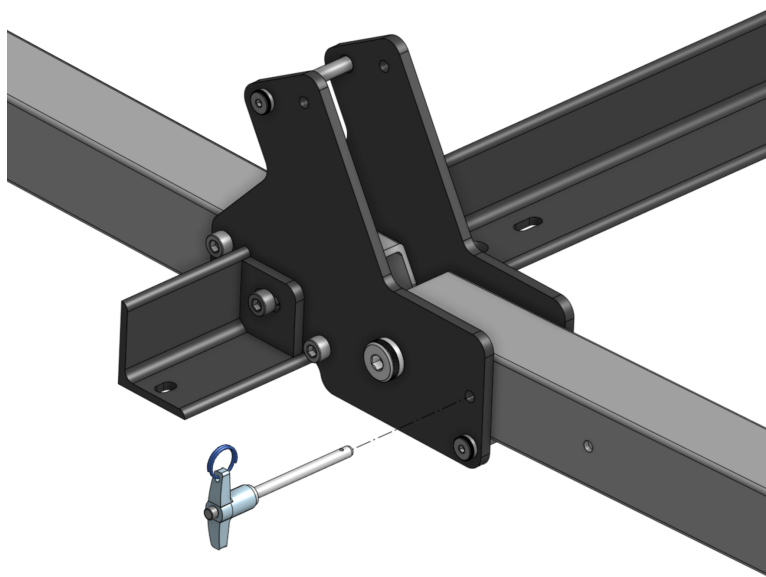
Insert the 8x60mm shoulder screws **(9)** into the designated holes as shown. Tighten securely. The shoulder (unthreaded section) must pass fully through the bracket so the screw seats on its shoulder, not the thread.

MDX 9. / LTX 8.



Attach the sidebar assembly using the 5/8" pivot shoulder screw **(11)** and 1/2"-13 thin locknut **(12)**. Tighten firmly, but confirm the sidebar still pivots freely – this screw acts as the rotation axis.

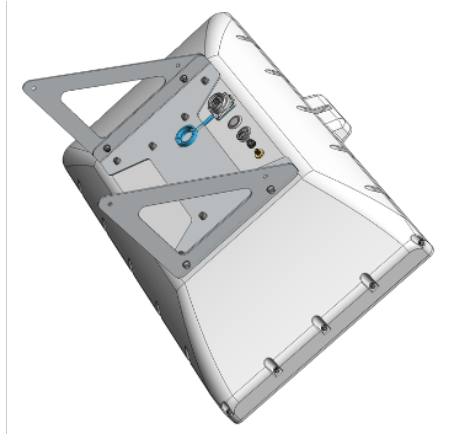
MDX 10. / LTX 9.



Insert the T-handle locking pin **(8)** to lock the sidebar in position. The mount is now fully assembled. Proceed to install the turfRad sensors and wiring.

2 Installation of the Sensors

1.



Mount the turfRad sensors onto the turfRad bars using the triangular brackets included with each sensor. First attach the brackets to the sensor with the provided M5x12mm screws, washers and M5 locknuts. Then mount the sensor assembly onto the turfRad bars using the M5x35mm socket head screws with the corresponding washers and locknuts. Adjust the U-bolts so that the edge of the sensor sits flush with the end of the sidebar – this positions the sidebar as a protective guard for the sensor.

2.



Attach the GPS antennas to the sidebar at the locations shown using zip ties. Ensure each antenna faces upward. Route the zip tie around the black antenna body – **not** around the cable.

Warning:

- The GPS cable is very delicate. If it is pinched or kinked it will break and must be replaced.

3.



Place the GPS antenna as shown in step 2 above. Then connect the black wire to the gold GPS connector.

4.



Choose the desired power cable for your setup. **We recommend using the direct wiring dongle for maximum reliability.** Alternatively, you can use the cigarette lighter plug or the USB Dongle. Be aware that when using the USB dongle, the USB port must be rated for **5V 2A**. **If using the cigarette lighter plug, ensure it works reliably and doesn't easily lose power from vibrations (check green LED on the plug).** Note: We do not recommend using the cigarette lighter plug in non-locking receptacles.

5.



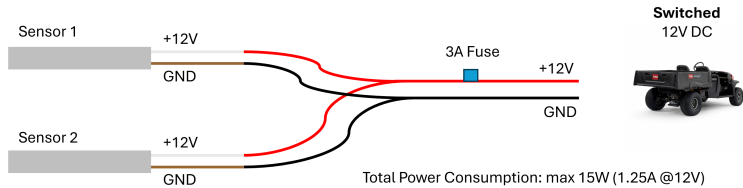
First, make sure the vehicle is powered off and it is safe to connect the power cable. Next, connect the power cable to your vehicle. Now connect the other end to the 11-15V DC port of the turfRad sensor. Make sure the plug is fully inserted and screwed on tightly.

6.



The image above shows the connected power cable and GPS antenna. When you power on your vehicle, the LED on the RESTART button should now turn on. As soon as the GPS signal is found, the blue LED on the FUNCTION button will start to blink slowly (once per second). Note that this can take several minutes and requires a clear view of the sky.

3 Wiring to your Workman



Wire both sensors directly to a switched 12V DC power port on the Workman. Depending on your model, this port is typically found under the seat or behind the console (e.g. behind the USB outlet or the wireless hour meter). If you are unsure of the location, ask your distributor.

Make sure the machine is powered off before starting. Connect the wiring harness to the 12V power port and install a **3A fuse** on the positive line. Ensure you connect the **+12V** and **GND** terminals correctly as shown. Then split the power for both sensors using the provided wiring harness or a suitable connector (e.g. Wago lever-nut). Each sensor draws a maximum of **7.5W**, so the total maximum power consumption is **15W (1.25A @ 12V)**.

Note: The sensor power cable has two leads: the **white** wire is **+12V** and the **brown** wire is **GND**.

Warning:



- **DO NOT connect the sensors directly to the battery of Li-ion powered Workmans.** These machines run on **48V** and will permanently damage the sensors.
- **DO NOT connect the sensors directly to the 12V lead-acid battery.** This will drain the battery continuously when the machine is parked.
- After wiring, verify that the sensors power off when the ignition is switched off, and that pressing the RESTART button on a sensor turns that sensor off.

4 Operations with Array Mounted Sensors



With two turfRad sensors mounted in an array configuration, the Toro Array Mount covers a combined swath of approximately **3.6 meters (12 ft)** (two footprints of 1.2m (4 ft) each plus the calculated center area). The image above shows the three measurement zones: the two direct sensor footprints and the interpolated center area between them.

Each sensor takes **10 measurements per second**. At a typical driving speed, this produces a dense grid of readings along each pass. The center area between the two sensors is not measured directly – instead, turfRad calculates moisture values there by interpolating from both sensors' readings. This produces smooth, continuous moisture maps without a hard boundary in the middle of the swath.

Pass spacing and coverage gaps:

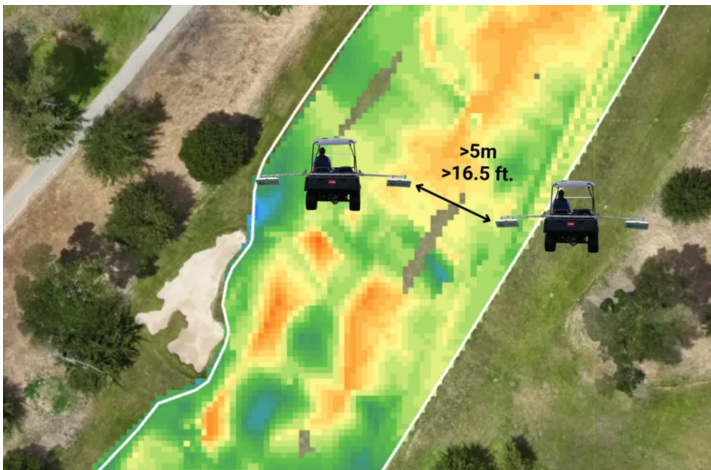
- Keep your pass spacing within **5 meters (16 ft)** between adjacent passes to ensure complete coverage.
- If the gap between two passes exceeds approximately 5 meters (16 ft), turfRad will display a visible gap on the moisture map. This is intentional – it signals that the area was not adequately scanned and should be re-driven.
- Smaller gaps within that threshold are filled automatically through interpolation of the surrounding measurements.

Sensor spacing and GPS accuracy:

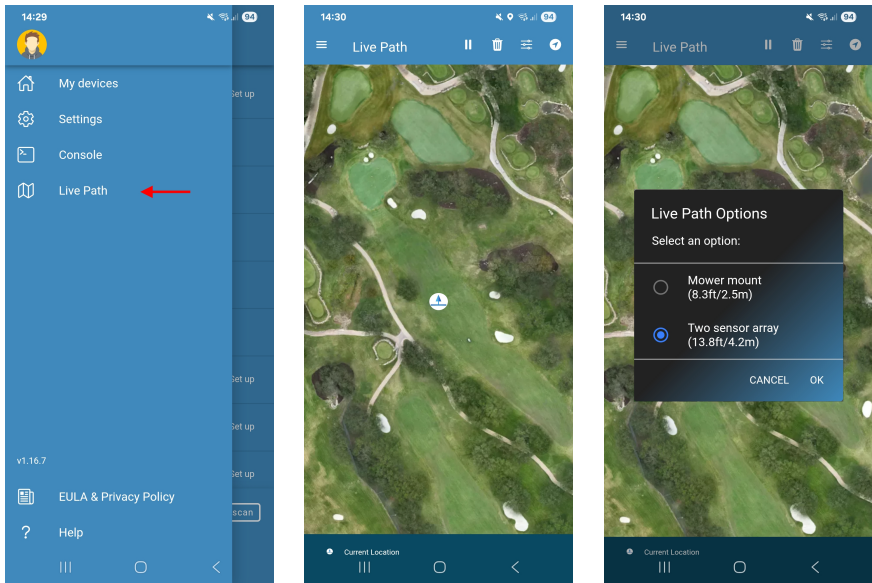
- Maintain at least **3 meters (10 ft)** between the two sensors on the mount. This ensures that GPS positioning error (approximately 1.5m (5 ft) per sensor) does not cause the two sensors' tracks to overlap or be misassigned on the map.
- Position each GPS antenna as close as possible to its respective sensor for the most accurate measurement placement.

Driving tips:

- Two-sensor arrays are the recommended configuration – three sensors require significantly wider booms and are harder to manage on most greens and fairways.
- Drive at a consistent speed. Because the sensor records 10 measurements per second, faster speeds produce wider spacing between individual readings along the direction of travel.
- Overlap passes slightly to avoid visible gaps, especially on sloped areas where GPS accuracy may vary.



5 Live Path



The turfRad mobile app (available on the App Store and Google Play) includes a **Live Path** feature that shows your scan coverage in real time as you drive.

How to use Live Path:

1. Open the turfRad app and tap the **hamburger menu** (top left) to open the sidebar.
2. Tap **Live Path** to open the map view.
3. The **white icon** on the map shows your current position. As you drive, the app paints the scanned area **green** — giving you a live view of which areas have already been covered.
4. Tap the **options icon** (top right of the map bar) and select **Two sensor array (13.8 ft / 4.2 m)** to match the wider swath of the Toro Array Mount.
5. Use the controls in the top bar to **pause** or **clear** the path, or to switch the map to a **heading-up** orientation.

Note:

- Live Path is currently in **BETA**.
- Enable **GPS** and grant the app **Precise Location** permission before use.
- This feature can drain the battery significantly.
- A phone holder mounted on the Workman is recommended so you can keep the screen visible while driving.



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