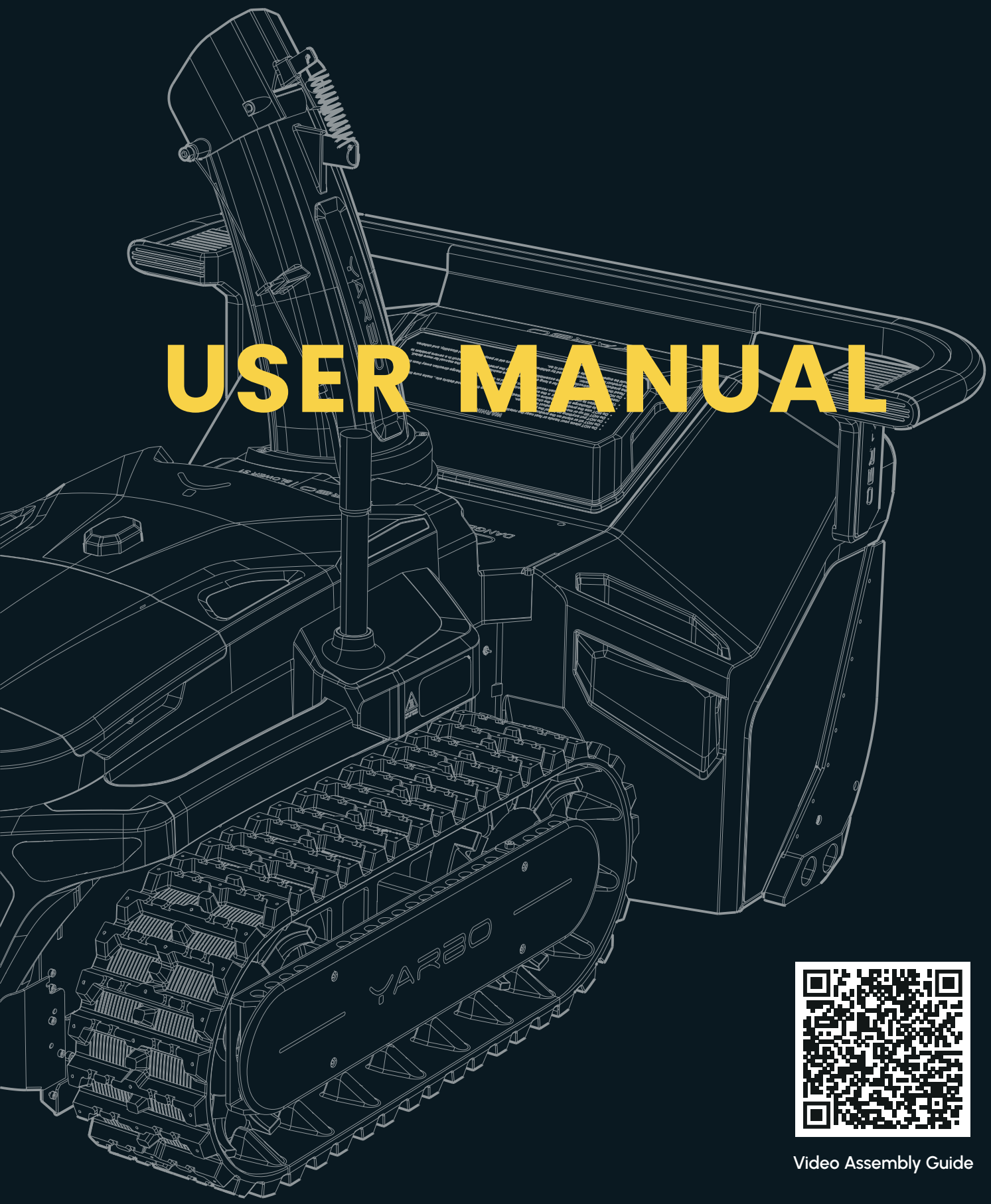
YARBO

USER MANUAL



Video Assembly Guide

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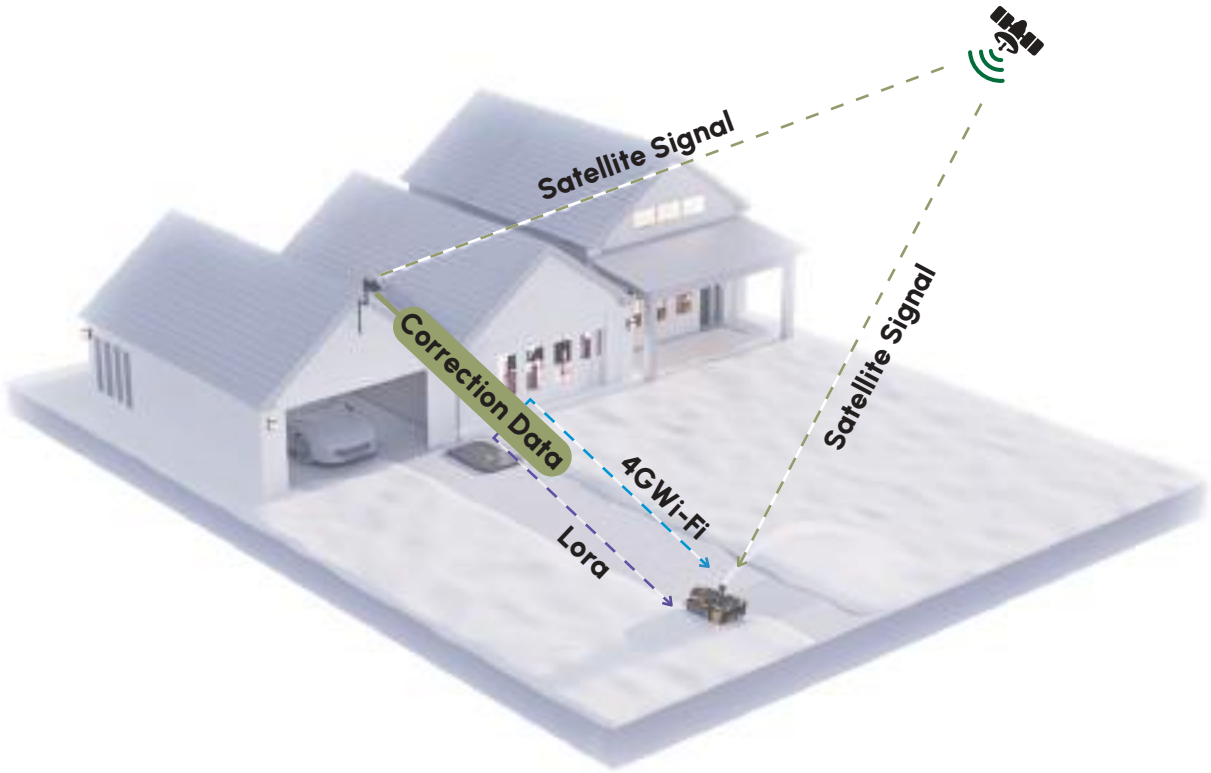


Welcome

Thank you for purchasing Yarbo S1. We are more than happy to welcome you to our user community. We understand your anticipation for this long-awaited yard robot to free yourself and your family members from the annoying cleaning routine. Before you start using our product, we ask you thoroughly read this user manual, especially the sections regarding how to use Yarbo safely and what Yarbo can and cannot do.

Safety Symbols

The purpose of safety symbols is to attract your attention to possible dangers. The safety symbols and the explanations with them deserve your careful attention and understanding. The symbol warnings do not, by themselves, eliminate any danger. The instructions and warnings they give are no substitutes for proper accident prevention measures.
The following signal symbols, words and meanings are intended to explain the levels of risk associated with this product.

SYMBOL	SIGNAL	MEANING
⚠	DANGER	Indicates a hazardous situation, which, if not avoided, will result in death or serious injury.
⚠	WARNING	Indicates a hazardous situation, which, if not avoided, could result in death or serious injury.
⚠	CAUTION	Indicates a hazardous situation, that, if not avoided, may result in minor or moderate injury.
⚠	NOTICE	Indicates important information that is not safety related.

Product Usage

⚠ WARNING

- NEVER allow childrens to operate the product.
- NEVER allow adults to operate the product without proper instruction or training.
- ONLY use the charger provided in the product to charge.
- NEVER use the product against its intended purpose.
- An authorized and trained person must be present and supervise the operation when Yarbo is working.

⚠ CAUTION

- DO NOT let the product operate autonomously without supervision.
- Make sure the operator reads and understands everything in the manual.

Before and After Every Operation

⚠ WARNING

- DO NOT plan to operate Yarbo on anywhere you cannot visually supervise its operation. Make sure you have a good vision of Yarbo and its working area.
- Remove all obstacles in the working area that may damage the product.
- Remove all objects such as rocks, broken glass, nails, wire, or string which can be thrown or become entangled in the machine.
- Make sure the working area is suitable for the product to operate.
- Wear suitable clothes, do not operate barefoot.
- Use personal protective equipment, especially safety goggles.
- Check and test if the product is functioning well, especially the cameras.
- DO NOT use the product if broken parts and malfunctions are detected.
- DO NOT modify the product.
- DO NOT place the controller (physical and mobile application) in the reach of children or pets.

⚠ CAUTION

- Perform proper maintenance according to this User Manual's instruction.
- Understand your local area's regulations on snow-removing devices.
- Maintain or replace safety and instruction labels, as necessary.
- DO NOT operate Yarbo on gravel or uneven surfaces.
- DO NOT clean Yarbo with corrosive cleaning liquid, or coarse fabrics, take extra care when cleaning the cameras.
- DO NOT step on or place heavy objects the Docking Station.
- DO NOT touch Yarbo with barehands in extreme cold weather.

During Every Operation

⚠ DANGER

- Shut down Yarbo before cleaning a clogged discharge chute.
- Clean a clogged discharge by the tool provided in the package, NEVER use your hand or foot.
- Always keep hands away from the Auger and Impeller, no matter if it's running or not, always treat the product as it has been connected to power and ready to work.

⚠ WARNING

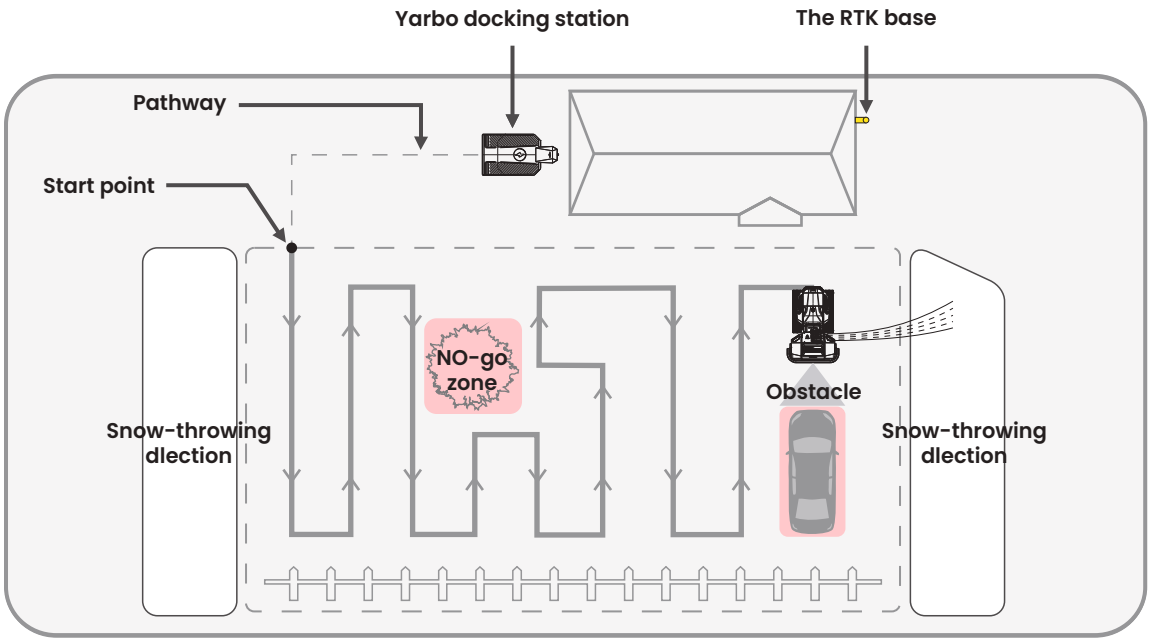
- Make sure all adults, children and pets keep a safe distance of at least 100 feet away from the working area.
- An authorized and trained person must be present and supervise the operation at all times when Yarbo is working.
- DO NOT operate Yarbo if the operator is under the effects of alcohol, medicine or illness.
- DO NOT put any part of your body under the robot.
- DO NOT throw show towards vehicles and building as the auger may pick up and throw foreign objects while operating.
- DO NOT throw snow towards areas, roads and other places where people and pets are likely to appear.
- DO NOT stack the snow thrown on to weak surfaces like wooden roofs and bushes. The snow thrown adds extra weight to such areas.
- Never use Yarbo near fires, fireplaces, hot ashes, barbecue pits, etc. Using Yarbo near fires or ashes can spread fires and result in serious injury and/or property damage.
- If Yarbo start to vibrate abnormally, stop the operation, wait until all moving parts comes to a complete stop, press down the emergency stop button and check immediately for the cause. Vibration is generally a warning of trouble.
- DO NOT step or sit on Yarbo.
- DO NOT operate Yarbo, and it's controller at ambient temperature higher than 40°C.
- DO NOT activate Auger and Impeller when Yarbo is not in snow.
- DO NOT touch any part of the Docking Station while it is charging Yarbo.

⚠ CAUTION

- DO NOT user Yarbo to push/pull any kind of items.
- DO NOT use Yarbo to transit any kind of payload, unless using the tow hitch provided in the package. Please note, the tow hitch's maximum towing capacity is 3,500lbs.

UNDERSTANDING HOW YARBO WORKS

Yarbo is powered by a high-performance lithium-ion battery and seamlessly integrates with the Precise Positioning Vision System (PPVS) to achieve efficient and accurate task execution. With advanced sensors and sophisticated vision algorithms utilizing three wide-angle, wide dynamic range, and high-definition cameras, as well as front bumpers, Yarbo skilfully handles unexpected obstacles, including animals or pedestrians, ensuring optimal safety during operation. Its Terrain Record feature allows precise mapping of small irregularities in various areas, further enhancing its performance.
The algorithm-driven systematic working routine intelligently adapts to the unique shape of the designated area, maximizing operational efficiency. Once Yarbo completes its tasks or detects a low battery level, it autonomously returns to the docking station for recharging, ensuring uninterrupted operation.
The figure shown below is just for illustration purposes, the setting in your yard will vary from the figure.



⚠ WARNING

- The safe use of this product requires an understanding of the information on the product and in this instruction manual, as well as knowledge of the project you are attempting. Before using this product, familiarize yourself with all operating features and safety rules.

Obstacle and Pedestrian Avoidance

Front Bumper

The collision sensors, located at the front bumper of Yarbo, play a crucial role in ensuring safety during operation. In case of any failure in the millimeter-wave radar and visual algorithms, the collision sensors act as the primary defence mechanism. They are responsible for detecting obstacles in the machine's path, preventing the auger from making contact with them. This function effectively reduces the risk of damage to obstacles and minimizes potential harm to individuals, vehicles, and Yarbo itself. The collision sensors serve as a proactive safety feature, providing reliable obstacle detection and avoidance capability, especially in manual control mode when the Real-Time Kinematic (RTK) system is not utilized.

Protection Fence

The Yarbo snow removal robot's protection fence serves as a vital defense mechanism, primarily dedicated to ensuring pedestrian safety by acting as a protective barrier for critical machine components, including blades, augers, or brushes. It safeguards these components from potential damage during the snow clearing process, effectively preventing any danger to pedestrians. Crafted with resilient materials and robust construction, the protection fence is specifically engineered to withstand severe impact and abrasion, ensuring Yarbo's longevity and reliable performance even in the most challenging winter conditions. While its rugged design guarantees the machine's durability, the protection fence's main objective is to enhance safety by minimizing potential risks to pedestrians or nearby objects during operation. The sturdy construction and thoughtful design of the front guard make it an indispensable feature for the Yarbo snow removal robot, ensuring efficient and safe snow removal operations and prioritizing the well-being of those nearby.

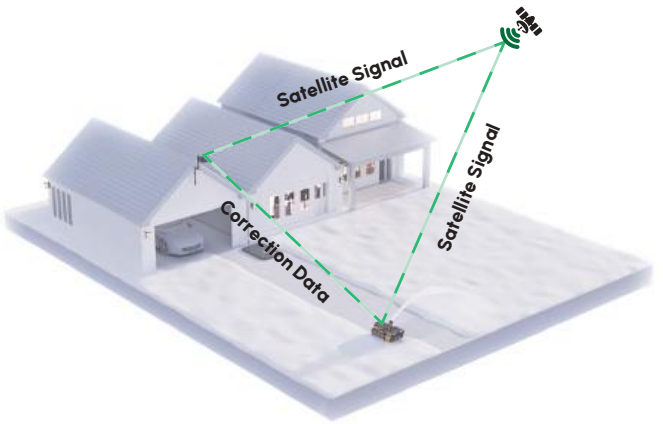
Visual Algorithm

The advanced camera on Yarbo utilizes neural network and deep learning, allowing for quick identification of pedestrians and obstacles. Depending on whether the obstacles are dynamic or static, the camera aids in obstacle avoidance and evasion behaviors during the automated planning process. Furthermore, the camera's high-quality wide dynamic range ensures adaptability to challenging scenarios, reducing the impact of complex lighting conditions on the recognition algorithms.

Obstacle and Pedestrian Avoidance

⚠ WARNING

- Even though Yarbo is equipped with multiple methods to ensure your safety, never fully rely on any kind of obstacle avoidance mechanism. A trained and authorized person must be present and supervise when Yarbo is in operation.



Precise Positioning Vision System

PPVS (Precise Positioning Vision System) is Yarbo's advanced fusion technology designed to achieve highly accurate positioning. This system combines RTK-GPS, computer vision, and various other sensors to enhance stability, especially in changing scenarios, through algorithm fusion.
Yarbo S1 uses satellite signals for self-location, which are also utilized by the RTK base to calculate errors by comparing signals sent to both the RTK base and the robot. These real-time error corrections are then transmitted to Yarbo S1, enabling the robot to improve its positioning and achieve centimeter-level precision.

Yarbo Docking Station

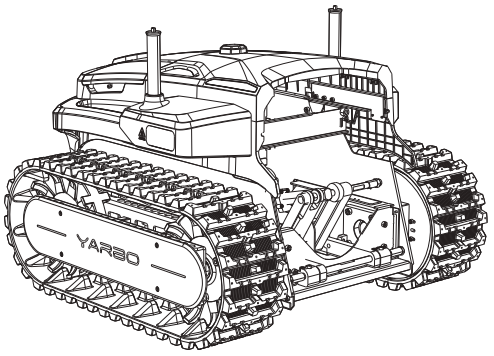
The Docking Station serves as a convenient, totally wireless charger and standby facility for Yarbo. Its primary function is to recharge Yarbo and ensure it remains ready for operation whenever needed. With the PPVS, Yarbo automati cally returns to the Docking Station after completing its tasks or when the battery level becomes low. This smart system ensures that Yarbo is always charged and ready to perform efficiently. During the installation process, proper coordination between Yarbo and the Docking Station is established, and the system records and stores the Docking Station's location for future reference.

Internet Connectivity

Yarbo uses three different technologies to secure the internet connectivity: Wi-Fi, 4G cellular network and LoRa (Long Range). The system will automatically choose the most stable internet connection methods to adapt the changing network environments. The most prioritized connection method is the LoRa technology: it can maintain a stable connection for over 100 meters in harsh outdoor environments, navigating Yarbo to perform its precise movement at centimeter level in the field.

Unboxing Yarbo

Yarbo Box Contents



Universal Body

Controller

Charging Cable for Controller

x2

RTK Antenna for Universal Body

Socket #1

Socket #2

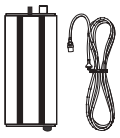
Socket #3

Allen Key #1

Allen Key #2

Allen Key #3

Allen Key #4



Wired Charger

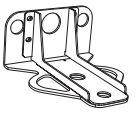
x2

Anti-theft Bolts of Battery Cover

Spare Bolts

x100

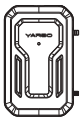
Anti-slip Studs



Tow Hitch

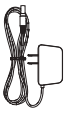
x4

Bolts and Nuts for Tow Hitch

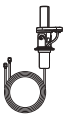


RTK Base

RTK Base Holder



RTK Base Charger



RTK Assembly

LoRa Antenna

x20

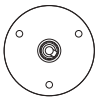
Wall Clips for RTK Cable

x20

Connection Bolts for RTK Set

x3

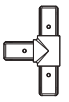
Grass Pegs for RTK Mount



Mount for RTK Set

x3

Expansion Bolts for RTK Mount

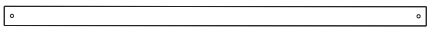


x2

T-joint for RTK Set

x2

Cap for RTK T-joint



x3

Pole for RTK Set

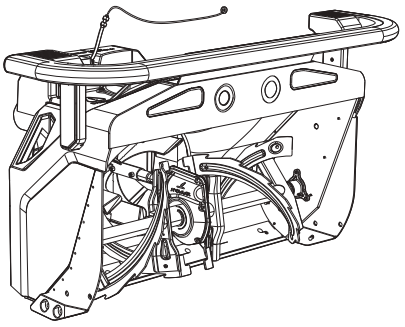
User Manual

Quick Start Guide

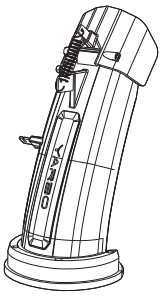
⚠ WARNING

- Keep plastic bags and tiny items (Allen Keys, Bolts, etc.) away from the reach of children, to avoid accidental suffocation or swallowing.

Snow Blower Module Box Contents



Snow Blower S1 Module



Discharge Chute

x4

Shear Pins

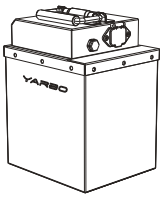
x4

Cotter Pins

Skid Shoes and Fasteners

Clean-out Tool

Yarbo Battery Box Contents



Yarbo Battery

⚠ WARNING

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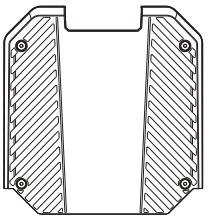
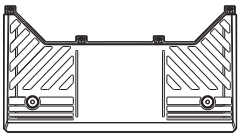
Docking Station Box Contents

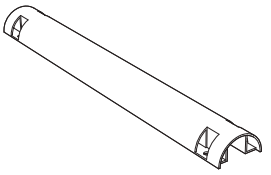
Docking Station
Control Unit



Docking Station
Charging Unit



Docking Station Slope



Power Station Cable Ramp

x12
Bolts for
Docking Station

x6
Expansion Bolts
for Docking Station

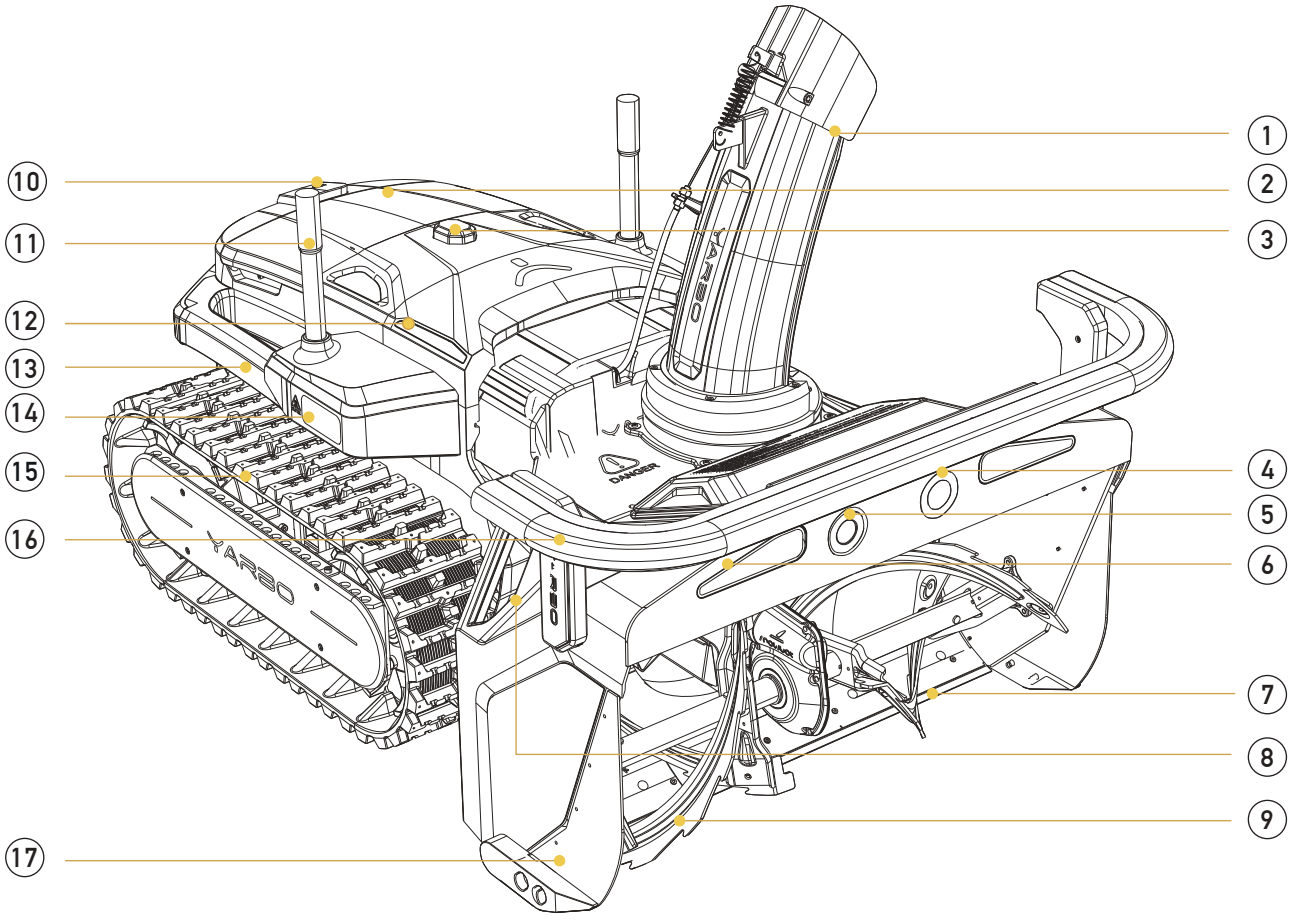
x6
Grass Pegs

Power Cable for
Docking Station

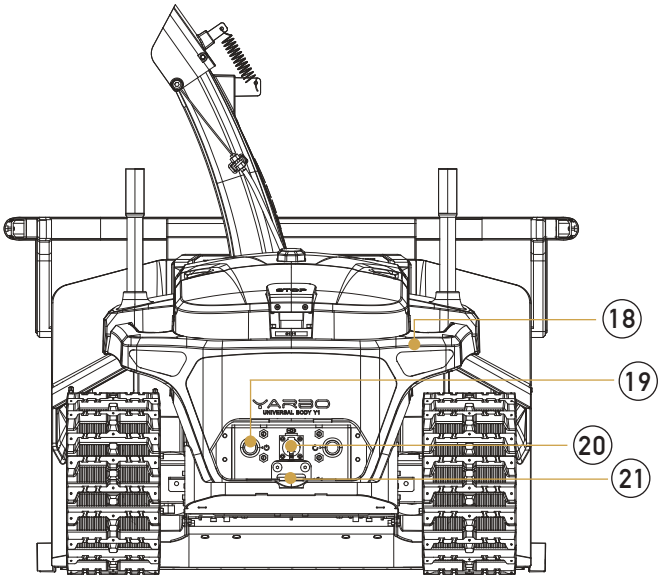
⚠ WARNING

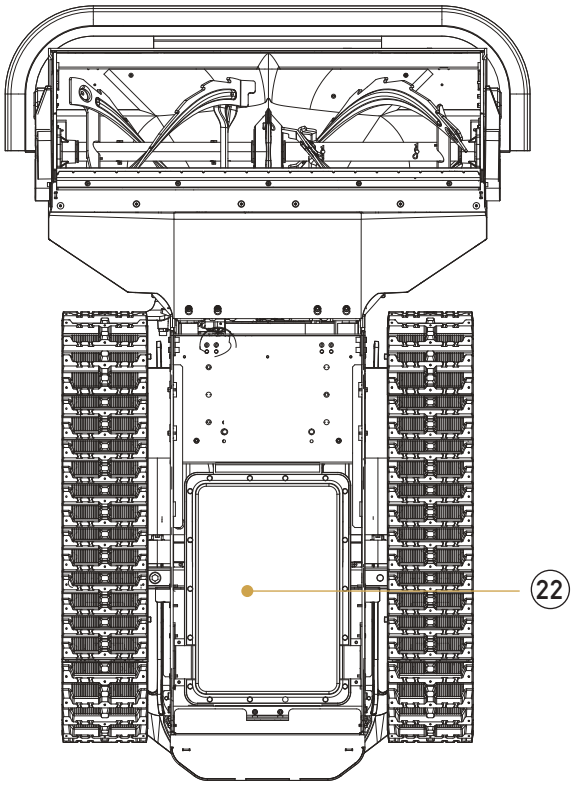
- Keep plastic bags and tiny items (Allen Keys, Bolts, etc.) away from the reach of children, to avoid accidental suffocation or swallowing.

Product Overview



1. Discharge Chute
2. Battery Cabin
3. Warning Light
4. Millimeter-wave Radar
5. Front Camera
6. Front Light
7. Scraper Bar
8. Lifting Handle of Snow Blower Module
9. Auger
10. Emergency Stop Button
11. RTK Antennas for Universal Body
12. Battery Indicator Light
13. Lifting Handle of Universal Body
14. Side Camera
15. Rubber Track of Universal Body
16. Side Bumper
17. Skid Shoe





⑱ Rear Light

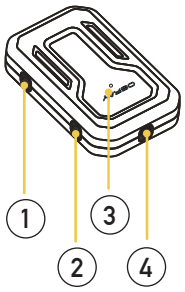
⑲ Power Switch

⑳ Wired Charging Port

㉑ Tow Hitch

㉒ Wireless Charging Receiver

RTK Base



① LoRa Antenna Port

② RTK Antenna Port

③ Indicator LED

④ Power Connector