

User Manual

TinyLineMarker Pro X

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1. Introduction

Welcome to the user manual for TinyMobileRobots' TinyLineMarker Pro X.

1.1. What it can do

Congratulations on your purchase of TinyLineMarker Pro X. With this machine, marking fields will be easier than ever before!

TinyLineMarker Pro X is an automotive robot that performs the same job as an old-fashioned line marker; but with new position technology and smart integrated software, it makes marking autonomous!

TinyLineMarker Pro X can perform first-time field markings easily and quickly—and when a field needs to be repainted, the saved fields can be found in the TinyLineMarker app and marking can begin right away.

1.2. Reading instructions

Knowing the features of TinyLineMarker Pro X can help you obtain the best marking result and the most effective use of TinyLineMarker Pro X. We recommend that you thoroughly read this user manual to gain a better understanding of TinyLineMarker Pro X's capabilities.

For more information and FAQ about TinyLineMarker Pro X, visit the TinyLineMarker Pro X website.

www.tinylinemarker.com

IMPORTANT INFORMATION

Be aware that the user is responsible for any accidents or risks involving other people or their property.

At TinyMobileRobots, we are constantly working to improve and develop our products; hence, TinyMobileRobots reserves the right without notice to change the appearance and/or features of the device and/or software.

To make this user manual easier to use, we are employing the following system.

- Text with *Italic* font is used when referring to names in the TinyLineMarker app or referring to other sections in the manual.



Indicates useful information and tips about the use of the product.



Indicates a warning that must be understood and followed.

Safety

For the safety of the user, the listed safety instructions must be followed:

IMPORTANT INFORMATION

Read the user manual thoroughly before using TinyLineMarker Pro X in order to understand the content and the way in which TinyLineMarker Pro X operates.

WARNINGS

Incorrect operation and misuse of TinyLineMarker Pro X can create dangerous situations!

The battery must be fully charged when stored.

The battery must be charged every third month if stored for a longer period.



TinyMobileRobots can never be held responsible for any harm or damage done by TinyLineMarker Pro X.

TinyLineMarker Pro X must be fully stopped if children, animals or objects enter the workspace.

Never use TinyLineMarker Pro X to transport people, animals or objects. Never place any objects on TinyLineMarker Pro X. Doing so could lead to the fatal damage of TinyLineMarker Pro X, people, animals or other objects.

A STOP button is placed on the top of TinyLineMarker Pro X. This button will stop all TinyLineMarker Pro X driving activity. Push the STOP button if a dangerous situation is about to occur.

Whenever TinyLineMarker Pro X is in automatic driving mode, a STOP button will appear in the TinyLineMarker app. Use this STOP button to stop TinyLineMarker Pro X if a dangerous situation is about to occur.

Both the STOP button on the robot and the STOP button on the tablet will force TinyLineMarker Pro X into manual mode, and the user must ensure that the situation is safe before restarting operation.

The TinyLineMarker app enables the remote control of TinyLineMarker Pro X. The app must never be let out of the user's sight. The user is always responsible for the safety of all persons, animals and objects within TinyLineMarker Pro X's workspace.

TinyLineMarker Pro X must only be used outside in open areas, e.g., a football field. Ensure that no obstacles are nearby when operating TinyLineMarker Pro X in manual or automatic mode.

Always turn off TinyLineMarker Pro X when performing inspections or maintenance. To turn off TinyLineMarker Pro X, turn the battery key counterclockwise.

Only authorized technicians are allowed to open and conduct service inside TinyLineMarker Pro X's electronic box.

TinyLineMarker must be turned off when not in use and during transportation.

TinyLineMarker Pro X is designed to be water resistant to rain and other weather conditions. Never cover the entire robot, or parts of the robot, with water, as this may cause fatal damage to the device.

WARNINGS

Do not use high-pressure cleaning devices on the robot, as this will damage the robot.



1 - STOP button



2 - STOP button in
TinyLineMarker app



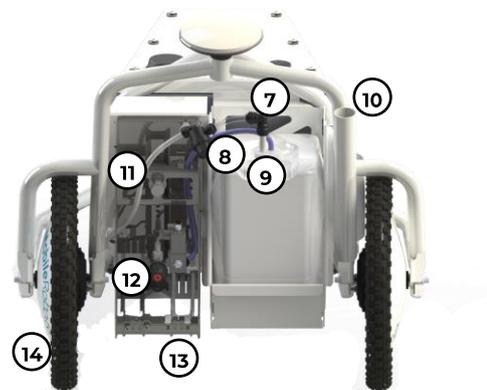
2. Robot Overview

2.1. Components

- 1) GPS receiver
- 2) Red STOP button
- 3) Status light
- 4) Safety bumper
- 5) Battery rack
- 6) Caster wheel



- 7) Suction hose (transparent)
- 8) Return hose (blue)
- 9) Paint container
- 10) Holder for suction hose and return hose
- 11) Grips for spray tool height adjustment
- 12) Nozzle
- 13) Plates for adjusting line width
- 14) Motor wheels



- 15) Tablet with TinyLineMarker app



- 16) Battery with key
- 17) Battery charger



3 - Components overview

2.2. Specifications

Specification	Value	
Dimensions		
Weight (without battery)	35 kg	77 lbs
Height	720 mm	28.0 in
Length	920 mm	36.0 in
Width	740 mm	29.0 in
Electrical components		
Battery type	Li-ion	
Battery weight	4 kg	8.8 lbs
Capacity	36 V, 17.4 Ah, 620 Wh	
Charger voltage	Input: 100-240 VAC, 50/60 Hz, Output: +42 VDC, 2A	
Charging time	Appr. 5 hours	
Battery operation time*	5 hours	
Voltage range inside robot	12-24 VDC	
Performance		
Maximum driving speed	8 km/h	5.0 mph
Maximum spraying speed	4 km/h	2.5 mph
Pump capacity	4,1 bar	60 psi
Pump application capacity	3,8 l/min	128 fl. oz./min
Spray equipment		
Line width	6 to 12 cm	2.3 to 4.7 in
Paint container volume	10 l	2.6 gal
Container support height	370 mm	14.6 in
Container support depth	240 mm	9.4 in
Container support width	200 mm	7.9 in
Certifications		
TinyLineMarker Pro X	FC, CE	
Battery	UN38.3 Approved	
Supported field templates		
Please contact your distributor.		

*Operation time is determined by regular use of TinyLineMarker Pro X and may vary depending on operation and battery wear.

3. Using TinyLineMarker Pro X

3.1. Preparing the robot

Be sure to correctly prepare TinyLineMarker Pro X and its components; otherwise, the robot may not function as desired, or at all. Failure to comply with the following instructions may cause serious injury to the robot and/or personnel.

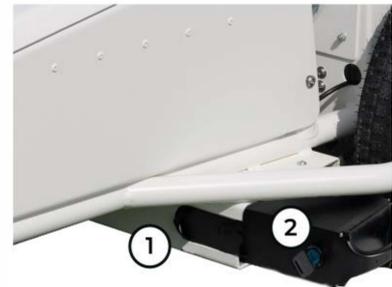
Battery

Two batteries are necessary to operate TinyLineMarker Pro X: one removable battery for the robot and one internal battery in the tablet.

Robot battery

Components involved with the robot battery:

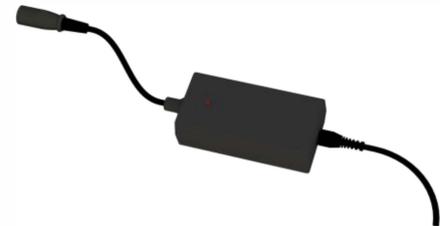
- 1) Battery rack
- 2) Battery key



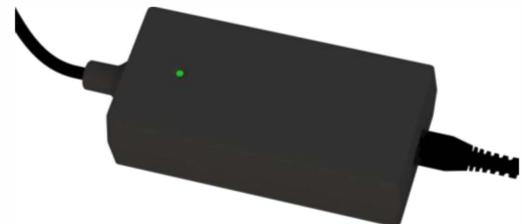
4 - Battery overview

Charging the robot battery

1. Plug the power cable into the power adaptor. Then, plug the round charging cable into the battery. The connector is located next to the battery handle.
2. Plug the power cable into an electrical socket.
3. When fully charged, the battery light will turn green.
4. Disconnect the battery. First remove the power jack from the electrical socket; then, remove the round charging jack from the battery.



5 - Charging jack and battery connector



6 - Light indicator on charger

WARNINGS

Only charge the battery with the supplied charger. The charger must be connected to 100–240 VAC, 50-60 Hz.

The battery must not be charged while it is connected to the robot.

The battery must only be charged indoors at normal room temperature, and it should always be supervised while recharging. Do not charge the battery unattended or overnight.

Do not charge batteries that have been exposed to blows, shocks and other forms of external damage. There is a risk that the battery could explode if this safety measure is not obeyed.

The battery must be fully charged when stored.

The battery must be charged every third month if stored for a longer period.



INFO

The battery charger shows red when the battery is charging and green when the battery is fully charged.

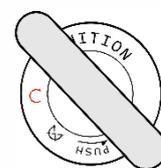
Please contact your distributor if you need a spare battery.

Please contact your distributor for information about safe disposal of the battery.



Attaching the robot battery

1. Place the battery inside the battery rack. The rails of the battery must face downwards.
2. Slide the battery into the rack and insert the key in the battery.
3. Lock the battery by turning the key 90 degrees clockwise. The battery is locked when it makes a “click” sound.



7 - Battery key in unlocked position



8 - Battery key in locked position

INFO

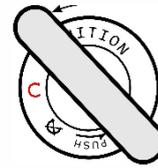
Make sure the battery rack is cleared, i.e. no grass, dirt or objects are blocking inside the rack.

If the battery is not pushed sufficiently into the battery rack, the key cannot lock the battery correctly.



Detaching robot battery

1. Turn off TinyLineMarker Pro X.
2. Unlock the battery by pushing the key inwards while turning it 90 degrees counterclockwise.
3. Pull out the battery. The key can stay in, while it is charging/stored.



9 - Push key inwards and turn it counterclockwise to unlock

3.2. Charging the tablet

Use the included charger to charge the tablet.

1. Connect the USB cable to the USB power adaptor.
2. Plug the micro USB into the connector.
3. Plug the USB power adapter into an electrical socket.
4. Disconnect the tablet from the charger when fully charged. First, unplug the micro USB from the tablet. Then, unplug the USB power adaptor from the electrical socket.

WARNINGS

The cap covering the micro USB connector must be closed correctly to guarantee water resistance.

Always use chargers, cables and batteries approved by TinyMobileRobots when charging the robot battery and tablet. Unapproved chargers may cause the battery to explode or damage the devices.



3.3. Spray mechanism

The spray mechanism consists of several parts. These are the main parts employed in daily use:

- 1) Nozzle Holder
- 2) Nozzle Filter
- 3) Gasket
- 4) Nozzle
- 5) Nozzle cap

To obtain the best spraying results, the nozzle and nozzle cap must always be clean so that dry paint does not interfere when spraying.



10 – Spray mechanism components

Attaching the nozzle cap

1. Assemble the nozzle, nozzle cap, nozzle holder, nozzle filter, and gasket.
2. Place the assembled nozzle parts correctly on the nozzle holder. Push up. Twist the nozzle cap clockwise (seen from beneath) until it is locked properly.

Detaching the nozzle cap

1. Twist the nozzle cap counterclockwise (seen from below) until it is loose.
2. Pull the nozzle cap downwards to remove the parts. Make sure to also remove the nozzle filter.

3.4. Spray System

The container support fits numerous sizes of containers. See the Specifications section 2.2 for the largest container size.

You can use several types of turf paint with the TinyLineMarker Pro X. Please contact your distributor for information about the most suitable paint suppliers in your area.

Prepare the turf paint according to the supplier's instructions.

- 1) Suction hose
- 2) Return hose (blue)
- 3) Lump filter
- 4) Rubber plug
- 5) Holder for return hose and suction hose

Attaching the paint container

1. It is recommended to place the container with the opening pointing backwards.
2. Take the rubber plug, return hose, and suction hose from the holder located on the side of TinyLineMarker Pro X.
3. Push the rubber plug into the container opening.
4. Make sure that the return hose is sufficiently secured in the container to avoid it slipping out while driving.
5. Make sure that the suction filter is placed at the bottom of the container.



11 - Overview of spray system

Detaching the paint container

1. Remove the return hose, suction hose and rubber plug from the paint container.
2. Remove the paint container.
3. Clean the tubes and hoses after use. See section 5 for further cleaning instructions.
4. Place the clean suction hose and return hose in the holder.

WARNING

Remember to always conduct the cleaning procedure when a marking job is finished. See the Cleaning section 5 for further instructions.

Failure to clean effectively and correctly after use will result in faulty spraying.



3.5. Adjusting nozzle height and line width

The TinyLineMarker Pro X user can adjust the width of the line using the adjustable plates. This allows the user to design lines as desired and obtain a perfect result.

Width adjustment plates are used to set the desired width of the marked line.

Range: See Specifications section 2.2.

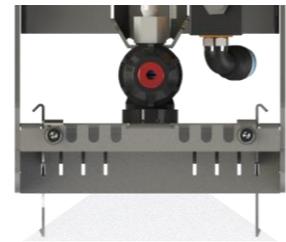
For best results:

- The plates should lightly be touching the grass.
- The paint should lightly be touching the plates.

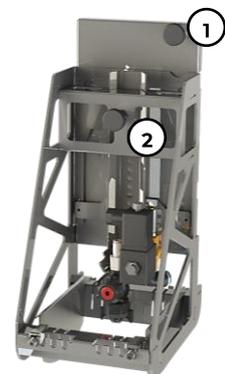
Grip 1: Adjust the position of the entire spray tool. You can use Grip 1 to set the distance between the width adjustment plates and the grass/ground.

Grip 2: Adjust the position of the nozzle. Use Grip 2 to fit the nozzle height to the width adjustment plates. A correct fit ensures that the line is painted evenly.

Range: 50-120 mm/2-5 in.



13 - Width adjustment plates



14 - Adjustment of nozzle height

INFO

Use the *Test spray* function found in the TinyLineMarker app to test the line settings.

Best spraying result is obtained by adjusting the plates so that they lightly touch the grass and the paint lightly touches the plates.



4. Operating the Robot

4.1. Turning on and off

Turning on the robot and tablet

When the battery is attached and locked, you can turn on TinyLineMarker Pro X by turning the battery key clockwise from the locked position. The Status light will light up when the TinyLineMarker Pro X starts. It can take up to several minutes from turning on TinyLineMarker Pro X to navigate in automatic mode, as the robot must retrieve sufficient position data.

Turn on the supplied tablet by pressing and holding the power key until the tablet briefly vibrates. The TinyLineMarker app automatically starts when the tablet is turned on.

Turning off the robot and tablet

Turn off TinyLineMarker Pro X by turning the battery key counterclockwise.

Shut down the tablet by pressing and holding the *Power* button until the shutdown screen appears. Then press *Shut down* on the tablet screen. Shutting down the tablet while TinyLineMarker Pro X is not in use will preserve the battery.

WARNING

The tablet must always be turned on when TinyLineMarker Pro X is operating in automatic mode.

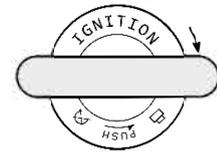


Restarting the robot and tablet

If an unexpected error occurs, it may be resolved by restarting the software. In order to restart the software, restart the robot. Restarting the tablet may also resolve the error.

Restart the robot by turning it off using the battery key. Wait two seconds, and then turn the robot on again.

Restart the tablet by pressing and holding the *Power* button for three seconds. Then press *Restart* on the tablet screen when the option appears.



15 - Battery key in power on position

4.2. Automatic and manual mode

TinyLineMarker Pro X has two operation modes:

Manual mode: TinyLineMarker Pro X will always start in manual mode when it is first turned on. In manual mode, the user can manually drive the robot and control its action (e.g., *Test spray* and *Test pump*).

Automatic mode: TinyLineMarker Pro X switches to automatic mode when it is programmed to do an action autonomously (e.g., using the *Drive to*, *Test field* and *Start* functions in the TinyLineMarker app). The user can stop the robot at any time in automatic mode by using either the TinyLineMarker app or the STOP button placed on top of the robot.

WARNING No people, animals or objects must be within the workspace when TinyLineMarker Pro X is being operated in manual or automatic mode.



4.3. Status light

The status light on the top of TinyLineMarker Pro X provides the robot's status information.

Color	Description
	TinyLineMarker Pro X is operating without any errors and the GPS signal is good.
	TinyLineMarker Pro X is operating without any errors, but the GPS signal is weaker. TinyLineMarker Pro X can still be used for marking.
	Operation stopped because of an error (the error message is shown in the TinyLineMarker app) or an overly weak GPS signal. The GPS signal can often be retrieved and automatic driving will continue.
	The robot has received a command from the user and has begun executing it. The light also briefly turns blue when the robot has finished a job.

The robot's driving mode (automatic or manual) is also indicated via the following patterns. The color of the status light has the same meaning in automatic and manual mode.

Mode	Pattern	Description
Automatic mode	Flashing light	Only STOP buttons (on robot and in app) are available.
Manual mode	Constant light	Robot can be navigated using the joystick in the TinyLineMarker app

4.4. TinyLineMarker app and tablet

All maneuvering and controlling of TinyLineMarker Pro X is done using the TinyLineMarker app, which is preinstalled on the included tablet. In this section, you'll learn how to use the app.

Tablet

This user manual only addresses features important for the use of the tablet with the TinyLineMarker app.

For a detailed explanation of the individual keys on the tablet, please refer to the manufacturer's user manual.

TinyLineMarker App

- 1) Top bar of tablet
- 2) Top bar of app
- 3) Navigation map
- 4) Bottom bar of app

When the tablet is connected to the robot, you can see the name of the robot in the lower left corner. You can access all features and information from this screen.

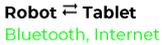


16 - Screenshot of TinyLineMarker app

1) Tablet information icons

Function	Symbol
Tablet GPS activated	
Tablet Bluetooth activated	
Tablet internet service activated	LTE Can also be H+, H, 3G, E or G, depending on the internet speed.
Mobile network signal strength	
Tablet battery power level	

2) Top bar icons

Function	Symbol	Explanation
Settings		Opens the Settings menu.
Robot Tablet Connection		Robot and tablet are connected via Bluetooth. Other possible status icons include Bluetooth: Robot and tablet are only connected via Bluetooth. Internet: Robot and tablet are only connected via internet.
Robot Internet	 	The robot is connected to the internet. Other possible status icons include: No connection: No data is received via internet. Connecting: Trying to establish internet connection. Weak signal: Internet provider name will be shown in yellow. The robot is connected to WiFi. Other possible status icons include: WiFi connecting WiFi connected, but no internet connection
Satellite Signal		Shows the status of the satellite signal. Other possible status icons include: No input Invalid input No satellites RTK Server (No RTK server is available) RTK User (RTK Login not working) RTK Multi User (RTK service already in use) DGPS Fix (RTK is working) Float Fix (RTK is working)
Battery status		Shows the battery status of TinyLineMarker Pro X.

3) Navigation map icons

Function	Symbol	Explanation
Locate tablet		Pressing this option will locate the position of the tablet.
Fit map		Pressing this option will fit the map to display the connected robot and tablet in one view.
Locate robot		Pressing this option will center the view on the connected robot.
Robot position		Appears on the map and shows where the connected robot is located.
Tablet position		Appears on the map and shows where the tablet is located.
Joystick		When in manual mode, the joystick is available and can be used to maneuver the TinyLineMarker Pro X.
STOP		When in automatic mode, the joystick is replaced with a STOP button. Press this button to make TinyLineMarker Pro X stop driving and exit automatic mode.

4) Bottom bar icons

Function	Symbol	Explanation
Drive to		<i>Drive to</i> function allows the user to easily move TinyLineMarker Pro X in a straight line without using the joystick. Press  and then press the desired position on the map. TinyLineMarker Pro X will start automatic drive mode when the user presses  .
Test spray		<i>Test spray</i> function allows the user to spray manually to inspect the nozzle performance and line settings. Press  to turn on the pump and start spraying. Press  to turn off the pump and stop spraying.
Cleaning		<i>Cleaning</i> function is a guide for cleaning the hose system correctly in order to avoid dry paint clogging the system. A step-by-step guide will open when  is pressed. The guide screen contains all functions necessary for the cleaning procedure.
New field		<i>New field</i> function allows the user to create and design new fields. Press  to start the design procedure. See section 4.5 for further information about tablet usage.

4.5. How to . . .

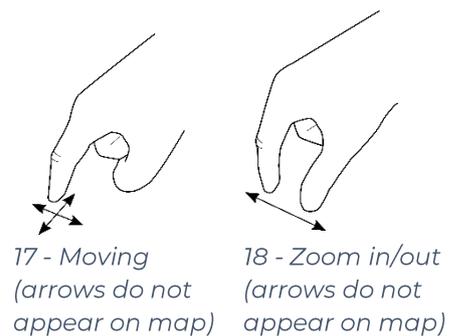
This section explains some of the commonly used features in the TinyLineMarker app. You'll also find user tips for TinyLineMarker Pro X and the TinyLineMarker app.

How to navigate on the map

Use one or two fingers to navigate on the map in the TinyLineMarker app.

Use one finger to drag the map around.

Use two fingers to zoom in and out on the map.



How to use the joystick

Use the joystick by pressing and holding one finger in the middle of the joystick. Move the finger in the desired driving direction.

How to use the tablet keyboard and input values

When creating a new field, you must name it to make it recognizable for later use. Press one finger inside the name field and the keyboard will appear.

After typing the name, you can make the keyboard disappear by pressing ↵ on the tablet.

The keyboard is used similarly when inputting values while designing new fields.

How to create a new field by collecting points

One way of creating a new field is by collecting 2-4 points using TinyLineMarker Pro X. This is useful if you already know some points of the field.

- 1) Press  and a pop-up window will appear allowing you to pick the desired field type. Remember to name the new field.
- 2) Press *With robot*. A new window will appear and you can choose how many points are to be collected. The number of points and their positions depend on the knowledge available about the new field. Select the number of points and press .
- 3) You can now use the joystick to navigate TinyLineMarker Pro X. Follow the instructions on the screen to collect the points in the correct order. When you press  the position beneath the nozzle is collected.
- 4) When all points have been collected, the new field will appear on the map and can be marked.

WARNING

Do not lift or push TinyLineMarker Pro X when collecting points as that would disturb the position sensors and could make the collected position incorrect.

INFO

When collecting points, the user can press . This feature slows down the driving speed and allows more precise point collection.



How to create a new field using the map

You can create a new field by using the map. This can be helpful when the field must be aligned with existing fields.

- 1) Press  and a pop-up window will appear allowing you to pick the desired field type. Remember to name the new field.
- 2) Press *With map* and then press *Create field*. The pop-up window will disappear and a new field will appear on the map. The new field is equipped with handles to rotate, move and adjust the field dimensions.
- 3) Press one of the side-line handles . You can now enter the field width in the bottom bar.
- 4) Press one of the end-line handles . You can now enter the field length in the bottom bar.
- 5) Press  and input rotation angle in the bottom bar.
- 6) Press  and input values in the bottom bar to move the transversal and longitudinal lines.
- 7) Alternatively, press and drag the handles to move, rotate or adjust the field dimensions. You can interchange the order of the described adjustments.

INFO

A snap feature is available for easy alignment of new fields. When the new field is close to an existing field, it will snap to the existing field when the user rotates, moves or adjusts dimensions using the handles.

Distance between fields can be adjusted. Place a line of the new field on top of a line of the existing field. Press  and input the desired distance between the two lines at the bottom of the screen.



How to create a new field by copying an existing field

You can create a field by copying an existing field. This may be helpful when fields are placed next to each other.

- 1) Select the field you'd like to copy. You can select a field by pressing anywhere inside the field. When the field is selected, other features will appear at the bottom of the screen.
- 2) First press **Modify**, then press **Copy**. Four new fields will appear next to the existing one.
- 3) Press on the field closest to the final position. Only one copy will now be visible. The new field will keep its alignment and size during copy mode.
- 4) Press . Now you can enter the distance between the existing field and the new field in the bottom bar.

Alternatively, press and drag  to adjust the distance.

INFO

The field is not selected when white.
The field is selected when it turns yellow.

How to select an existing field on the map

You can select a previously designed field by pressing anywhere inside the desired field. Additional options will appear when the field is selected.

A selected field will appear with yellow lines on the map.

If multiple fields are stacked on top of each other you will be able to choose, which field you wish to select from a list of fields.

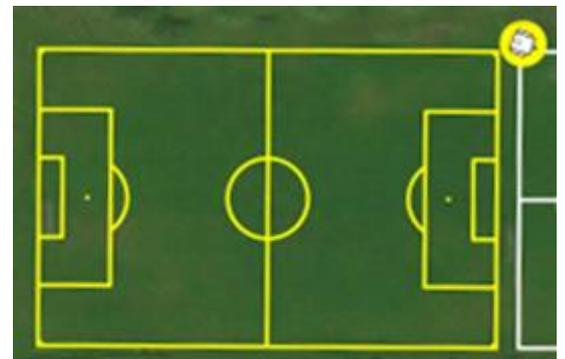
How to deselect a field on the map

You can deselect a field by pressing anywhere outside the selected field area. Press another field to select it.

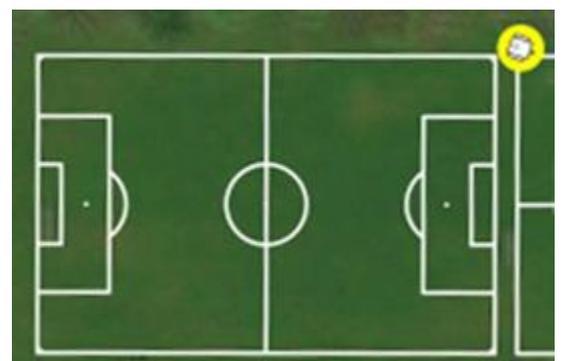
An unselected field will appear with white lines on the map.

How to begin marking an existing field

You can select and mark all previously designed fields appearing on the map.



19 - Selected field appears yellow on tablet screen



20 - No field is selected if all fields are white

To mark an existing field, you must first select the field. When selected, you can press  and TinyLineMarker Pro X will begin to mark the selected field.

How to edit an existing field

You can edit the position and dimensions of an existing or copied field.

Select the field you'd like to change. Press  and then  will appear in the bottom bar. Press . Handles will now appear on the selected field. To adjust the field, use the handles or input values in the bottom bar.

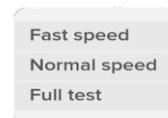
See "How to create a new field using the map" for more information on using handles and inputting values.

How to test drive a field

You can test drive your field to ensure it is located in the right position.

Select the field you'd like to test. Press .

There are three ways to test your field.



21 - Test options

1: Fast speed

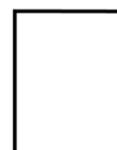
- Will test drive the outline of the field in fast speed following the points. This is a fast way to test if any objects are in the robot's path.



22 - Fast speed test

2: Normal speed

- Will also test drive the outline of the field, however it will drive as if it was painting the outline in order to ensure that the GPS signal is strong enough.



23 - Normal speed test

3: Full test



- Will test drive the entire field as if the robot was painting it.

24 – Full test

5. Cleaning After Use

TinyLineMarker Pro X must be cleaned shortly after the marking job is finished. This is done to avoid paint drying inside the spray system, thus keeping the system unblocked for subsequent uses.

You can find a cleaning guide in the TinyLineMarker app, and you can access all needed functions by using the cleaning guide. Press *Cleaning* to start the guide (see section 0 for further information). You will need the TinyLineMarker app to control the pump:

- 1) **Empty the paint system** – Remove the hoses and rubber plug from the paint container, take out the blue return hose and place it back into the container. Press the yellow button to empty the system of paint. When paint is no longer flowing back into the container, press the yellow button again.
- 2) **Clean the paint system with clean water** – Place the transparent suction hose in water and the blue return hose in a residual container. Press the yellow button to rinse the system.
- 3) **Clean the nozzle with water** – When clean water is coming out of the blue return hose, press and hold the blue button. This will activate and rinse the nozzle. When clean water is coming out of the blue return hose and nozzle, release the blue button and press the yellow button.
- 4) **Clean nozzle parts, lump filter and suction hose** – Remove and rinse the nozzle parts and the lump filter by hand (see sections 3.3 and 3.4 for illustrations). First, loosen the nozzle cap and rinse the nozzle parts in warm, clean water. Then, loosen the lump filter placed between the suction hose and the pump and rinse it in clean water. Rinse the outside of the suction hose with clean water. For best results, use a dish brush or similar item when cleaning.



25 – Buttons for cleaning



26 – Cleaning with water



WARNING

Do not use corrosive and dissolving liquids to clean the hose system, as they will damage the pump and hoses.



- 5) **Assemble before storage** – Assemble the filter and nozzle parts after they've been cleaned. Place the return hose and suction hose in the holder located on TinyLineMarker Pro X.

TinyLineMarker Pro X is now ready to be stored until its next job.

INFO

Paint disposal must be done according to the paint supplier's instructions.

6. Maintenance

6.1. Main components

You must regularly maintain some of TinyLineMarker Pro X's components to maintain performance. You'll find maintenance guidelines in this section.

Use original spare parts when replacing any components. For information about, and the purchase of, spare parts, please contact your local TinyLineMarker Pro X distributor.

Info

Turn off the TinyLineMarker Pro X, using the battery key, before maintenance or component replacement.



6.2. Motor and caster wheels

TinyLineMarker Pro X has three wheels: one caster wheel at the front and two motor wheels at the rear. Make sure that these wheels fulfil the requirements listed here at all times.

The caster wheel is fixed in place with two bolts. One bolt fixes the wheel to the aluminum frame, and one fixes the wheel itself. Make sure that you tighten both bolts with a torque of 30 N m before operating TinyLineMarker Pro X.

The air pressure of the caster wheel must be 36 PSI/250 kPa/2.5 bar.

Each motor wheel is fixed using two M10x1mm nuts. Make sure that you tighten all four nuts with 30 Nm before operating TinyLineMarker Pro X. Both motor wheels must be aligned with the vertical plane.

The air pressure of the motor wheels must be 35 PSI/240 kPa/2.4 bar.

INFO

The left motor wheel is easier to access if you remove the spray tool (see section 6.4).



6.3. Spray system

The spray system consists of the following components:

- 1) Suction hose
- 2) Return hose
- 3) Lump filter
- 4) Rubber plug
- 5) Nozzle and spray tool

See section 3.4 for a detailed illustration.

Clean the spray and nozzle system after every use according to the cleaning guide in section 5 Cleaning After Use.

Hoses must never be bent. Bent hoses can limit marking performance.

The spray system is pressure equipment. Therefore, it is important to ensure that all connections are correctly assembled. Leakage could result in unsatisfactory line painting.

WARNING

Ensure that no hoses hang loose, as they could damage TinyLineMarker Pro X and its environment.



INFO

Clean the lump filter after each marked field to avoid blocking the filter.

Avoid lumps in the paint container to keep a satisfactory flow in the hose system.



6.4. Spray tool

During maintenance or cleaning, you may need to remove the spray tool.

Attaching the spray tool

1. Slide Grip 1 to its lowest height using the top adjustment grip.
2. Slide the spray tool onto the rails placed between the container support and the left motor wheel.
3. Ensure that all hoses are connected correctly.

Detaching the spray tool

1. Slide Grip 1 to its lowest height using the top adjustment grip.
2. Lift the spray tool upwards to detach it.



27 - Grip 1 and 2 on spray tool

WARNING

Be careful not to pull or squeeze any cables and hoses while attaching or detaching the spray tool.



6.5. Battery

The battery is TinyLineMarker Pro X's only energy source. Consequently, careful maintenance is crucial for prolonged performance. The battery will drop capacity over time and depending on the way it's used. After two years, the battery will have 70% capacity or greater if users abide by the listed guidelines.

- The battery must be fully charged when stored.
- The battery must be charged every third month if stored for a longer period.
- The battery must be stored at room temperature (20-27°C / 68-80°F).
- If the battery has not been used for a long period of time, recharge it completely before connecting it to the robot.

6.6. GPS receiver

The GPS receiver is attached to the top of TinyLineMarker Pro X. The GPS receiver is essential for marking precision and it must be handled with care.

Ensure that the plug is always firmly connected to the GPS receiver.

The cable from the GPS must always be sufficiently tightened along the aluminum frame to avoid dangerous situations.

WARNING

Do not put any load on the GPS receiver (e.g., when tilting TinyLineMarker Pro X), as it could damage the GPS receiver.



INFO

Do not cover the GPS receiver while operating TinyLineMarker Pro X.

Keep a distance from tall objects (e.g., trees, buildings) while operating TinyLineMarker Pro X.

Do not drive the robot underneath roofs or indoors.



7. Cleaning the Robot

In addition to the cleaning procedure that must be performed after the end of each marking job, you must regularly make sure that the robot is clean of paint, grass and dirt. Paint, grass and dirt may reduce TinyLineMarker Pro X's performance and the lifetime of spare parts.

For best results, use a soft dish brush and clean water to clean TinyLineMarker Pro X.

WARNING

Never clean TinyLineMarker Pro X with a high-pressure cleaner.



During use, grass and dirt can accumulate inside the battery rack. This can make battery attachment difficult or impossible. Regularly empty the battery rack of grass and dirt to ensure easy battery attachment.

Always clean the wheels to ensure the best grip between wheels and ground. Remove any grass and dirt that is sticking to the wheels.

Regularly clean off any paint, grass and dirt accumulated around the spray tool (for best results, clean right after use). Detach the spray tool if necessary and use a soft dish brush to remove grass and dirt.

8. Trouble shooting

Symptoms	Possible cause	Possible solution
During a marking job, TinyLineMarker Pro X stops and the status light turns red.	The GPS/correction signal is weak in the area in which the field is placed.	Wait a few minutes to see if the signal is retrieved and the marking job continues. On a field with poor position signal, TinyLineMarker Pro X might stop several times and the marking job may take longer than usual.
TinyLineMarker Pro X stops driving and the error message <i>Right/Left motor amp error</i> appears on the tablet screen.	A mechanical issue is making TinyLineMarker Pro X use more energy than needed, resulting in a faulty error message.	Check that the caster wheel and motor wheels are sufficiently tightened with a torque of 30 N m and use of mild Locktite. Also, check for other loose components that are incorrectly placed.
The marking has a small continuous and regular wave.	The grass field is cut perpendicular to the wave-shaped line, meaning that the grass alternately lies to the right and the left of the line. This causes the marked line to alternate with the grass.	Cut the grass to a shorter length or wait a few days after cutting the grass to mark the lines.
The line is unevenly sprayed or is not as clearly visible as desired.	The nozzle height may not correspond to the width of the nozzle. The nozzle may be inappropriate for the desired line or the driven speed.	Adjust the nozzle's height and width so the settings correspond and paint is not sprayed on the width adjustment plates. Try using another nozzle spraying more or less paint per second.
Nozzle does not spray correctly.	Dry paint inside the nozzle could be blocking the opening. Nozzle could be broken. Paint lumps could be stuck inside the hose system or pump, making the flow uneven.	Try to rinse the nozzle with a small dish brush and clean water. Clean the hose system with clean water to rinse out paint lumps. If the nozzle still sprays incorrectly, it may be broken and must be replaced.

<p>The battery cannot lock. The key cannot be turned clockwise.</p>	<p>Grass, dirt or objects inside the battery rack may be blocking the battery.</p> <p>Battery is not being pushed far enough into the battery rack.</p>	<p>Check for grass, dirt and objects inside the battery rack. Regularly empty grass, dirt and objects from the battery rack.</p> <p>Make sure the battery is correctly inserted into the battery rack.</p>
<p>Connection between the battery and the socket is loose.</p>	<p>The battery clamps may have come loose during use.</p>	<p>Use an appropriate tool to tighten the clamp grip.</p>
<p>The TinyLineMarker app is not open on the tablet.</p>	<p>A button may have been pressed that leads the user to the tablet home screen.</p> <p>Application may have unexpectedly shut down.</p>	<p>Open the TinyLineMarker app by pressing once on the app icon.</p> <p>Alternatively, restart the tablet and the TinyLineMarker app will open automatically after the tablet starts.</p>
<p>The joystick appears on the tablet but TinyLineMarker does not move when the user tries to navigate.</p>	<p>An unexpected software error could be affecting the joystick.</p>	<p>Restart TinyLineMarker Pro X and the tablet.</p>
<p>While marking a straight line, TinyLineMarker Pro X suddenly deviates from the desired path.</p>	<p>The GPS signal may have temporarily become imprecise or unstable, which may be caused by tall tree(s) or building(s) close to the marked line.</p>	<p>Move the field further away from the tall tree(s) or building(s).</p>
<p>The symptoms listed above do not correspond to the problems I'm experiencing.</p>	<p>The symptom may be yet unknown or uncommon.</p>	<p>Restart TinyLineMarker Pro X using the battery key and restart the tablet. If the problem still persists after restart or is experienced multiple times, please contact your local distributor .</p>

9. Warranty

TinyMobileRobots ApS guarantees that this product will work correctly for one year from the day of purchase. The warranty covers serious errors in components and manufacturing errors. During the time covered by the warranty, we will repair or replace the product if the following is fulfilled:

- The product has been handled according to the instructions described in this manual.
- The user or any unauthorized technician must not attempt to repair the product.
- In case of a claim regarding the robot battery, TinyMobileRobots' support team will connect to the battery and analyze its use history. Warranty is not applicable for the battery if instructions provided in this user manual were not followed.

Examples of situations where the warranty would not apply:

- Damage due to large amounts of water, e.g. the use of high-pressure cleaner, a prolonged stay in rain, or other exposure to large amounts of water.
- Damage caused by lightning.
- Damage due to misuse or incorrect use of product. Instructions provided in this user manual must be followed.
- Use of spare parts not approved by TinyMobileRobots ApS.
- Use of battery and adaptors not approved by TinyMobileRobots ApS.
- Faults due to wear or wearing of parts caused by a failure to replace in time.
- Lack of cleaning of spray parts after usage.

Please contact your local TinyLineMarker Pro X distributor to make use of the warranty. Remember to provide the distributor with the serial number (found on the robot) and documentation of the purchase date.

10. Environmental Information

TinyLineMarker Pro X consists of a robot, a removable battery and a tablet. Recycle all product parts according to the laws applicable in your region.

Detach the removable robot battery and recycle it separately according to the laws applicable in your region.

The robot contains electronic components. Recycle them according to the applicable laws in your region.

The tablet contains electronic components and a removable battery. Recycle them according to the laws applicable in your region.

The owner is responsible for recycling the product correctly. Proper recycling will ensure that negative impact on the environment is minimized. Incorrect recycling may have negative environmental impact.

11. Other Information

Serial number:	Can be found on the label attached to TinyLineMarker Pro X
Manufacturer details:	TinyMobileRobots ApS Sofienlystvej 9 8340 Malling Denmark
Support:	Please contact your local distributor.

Tiny**Mobile**Robots[®]

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