

# RoboScrub 20

## Operations Manual



# INTRODUCTION

This operational manual is provided with each new Minuteman® RoboScrub 20, powered by BrainOS, and contains information to allow for quick start-up of your new RoboScrub 20. This document may be periodically updated or revised. The RoboScrub 20 can be used in manual mode or as a self-driving, robotic scrubber. Use in robotic mode requires a subscription to Brain Corp's Autonomy Services.

Brain Operating System (BrainOS) is the name of Brain Corp's artificial intelligence (AI) and autonomous navigation software, and is what controls the Minuteman® RoboScrub 20.

## MINUTEMAN® ROBOSCRUB 20 DESCRIPTION

The Minuteman® RoboScrub 20 is a commercial floor scrubber that is powered by BrainOS software. The RoboScrub 20 is capable of functioning in either manual or robotic (autonomous, self-driving) modes. When in robotic mode, the RoboScrub 20 is driven by the BrainOS navigation software. This product may be covered by one or more patents or pending patent applications. See [www.braincorporation.com/patents](http://www.braincorporation.com/patents) for details. Discrete portions of this product were made possible by open source software. Please see [www.braincorp.com/open-source-attributions/](http://www.braincorp.com/open-source-attributions/) for details.

## OPERATOR RESPONSIBILITY

Operators must read and understand this manual before operating or servicing this RoboScrub 20. The operator is responsible for the use of each RoboScrub 20 in both manual and robotic mode, as well as the daily and periodic maintenance of the RoboScrub 20 to keep it in good working condition. Therefore, each operator must be mindful to use the RoboScrub 20 in accordance with its intended use and precautions at all times. Failure to adhere to directions could result in damage to the RoboScrub 20 and injury for the operator and public. Operators will not engage in any of the following conduct or activities with respect to the Autonomy Services or BrainOS:

- a) Transmission of any software or other materials that contain any viruses, worms, trojan horses, defects, spyware, spiders, screen-scrapers, or other items of a destructive or disruptive nature;
- b) Exploitation of the Autonomy Services, BrainOS, or the RoboScrub 20's hardware in any unauthorized manner, including by trespassing or burdening server or network capacity or infrastructure;
- c) Framing, mirroring, or reselling any part of the Autonomy Services or BrainOS without Brain's prior written authorization;
- d) Unauthorized collection of information about users; or
- e) Attempting to deliberately damage the Autonomy Services or BrainOS, or undermine the legitimate operation of the Autonomy Services or BrainOS.

## INTENDED USE AND PRECAUTIONS

The Minuteman® RoboScrub 20 is a collaborative robot that is intended for supervised commercial use. It is design exclusively to scrub hard floors in an indoor environment; any other use is prohibited. Only use recommended accessories. The Minuteman® RoboScrub 20, powered by BrainOS, should only be used by trained operators in controlled environments approved by Brain Corp.

Minuteman may provide additional training for the Minuteman® RoboScrub 20, and it should only be used in accordance with such training. Use the RoboScrub 20 in approved environments in accordance with the Autonomy Services Agreement (ASA) and Autonomous Navigation Software End User License Agreement (EULA). This operational manual uses the term robotic mode, which is equivalent to autonomous mode.

# TECHNICAL SPECIFICATIONS

MODEL	MINUTEMAN MAX RIDE 20 (A-MR20)
DIMENSIONS WITH SQUEEGEE	47.5 IN LENGTH X 29 IN WIDTH X 45 IN HEIGHT (120.65 CM X 73.66 CM X 114.3 CM)
WEIGHT	342 LBS (155.13 KG)
WEIGHT WITH BATTERIES AND FULL SOLUTION	691 LBS (313.43 KG)
SOLUTION TANK CAPACITY	18 GAL (68.14 L)
CLEANING PATH WIDTH	20 IN (50.8 CM)
SQUEEGEE WIDTH	26.75 IN (67.95 CM)
APPROXIMATE PRODUCTIVITY RATE (MANUAL OPERATION)	22,015 SQ FT/HR (2,045.26 SQ M/HR)
MAXIMUM PRODUCTIVITY RATE (MANUAL OPERATION)	27,200 SQ FT/HR (2,526.96 SQ M/HR)
MAXIMUM SPEED	2.0 MPH (3.2 KPH) ROBOTIC; 3.1 MPH (5 KPH) MANUAL
SCRUB HEAD TYPE	DISC
BRUSH PRESSURE	60 LBS (27.22 KG)
BRUSH MOTOR	400 – 600 WATTS
BRUSH SPEED	175 – 400 RPM
SOLUTION FLOW (LOW to HIGH)	0.07 – 0.38 GPM (0.27 – 1.44 LPM)
VACUUM MOTOR	24 VDC/450 WATTS
VACUUM AIRFLOW	69 CFM (32.56 L/SEC)
VACUUM WATERLIFT	68 IN H <sub>2</sub> O (172.72 CM H <sub>2</sub> O)
SOUND PRESSURE/DECIBEL RATING	68 DBA
BATTERIES	(2) 12 V AGM SEALED, MAINTENANCE-FREE
BATTERY CHARGER	ONBOARD
MAXIMUM RUN TIME	UP TO 3 – 3.5 HOURS
MACHINE VOLTAGE	24 VDC/450 WATTS
MAXIMUM INCLINE/DECLINE GRADE LEVEL	0% ROBOTIC; 2% MANUAL
APPROVALS	NONE

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# SAFETY PRECAUTIONS

## GENERAL SAFETY PRECAUTIONS

The Minuteman® RoboScrub 20 is designed solely for scrubbing dirt and dust in a commercial, indoor environment. Do not use this RoboScrub 20 in any other capacity. The following situations could cause injury to the operator and/or RoboScrub 20. Read this manual carefully and use caution when these conditions exist.

- Operators must be appropriately trained on the use of the RoboScrub 20.
- Operators must read and understand this manual before operating or maintain the RoboScrub 20.
- The RoboScrub 20 is not intended for users with reduced physical, sensory, or mental capabilities, nor by users lacking appropriate training.
- Do not use the RoboScrub 20 on soil, grass, artificial turf, or carpeted surfaces.
- The RoboScrub 20 is intended for indoor use only.
- Do not use the RoboScrub 20 on public paths or roads.
- Do not operate the RoboScrub 20 in flammable or explosive areas.
- The RoboScrub 20 should only be used to scrub flat, hard surfaces with little-to-no inclines (up to 2% incline when operating in manual mode; 0% incline when operating in robotic mode).
- All drops, stairs, escalators, moving platforms, or cliffs near the RoboScrub 20 during robotic operation must be guarded by a physical barrier.
- Do not use temporary elevated platforms (e.g. ladders or scaffolds) near the RoboScrub 20 during robotic operation.
- The RoboScrub 20 uses onboard cameras to see its surroundings. On occasion, these cameras may capture images of people who happen to be in its surrounding. There may be additional laws in your jurisdiction of operation relating to your use of technology with cameras. Please comply with all applicable laws, including using signage or obtaining consents, as required.
- Operating and storage temperature is 35°F – 100°F (2°C – 38°C). Usage, storage, or transport outside of this range could lead to damage or loss of function.
- Do not use the RoboScrub 20 in a manner other than what is described in the operations manual.
- Store the RoboScrub 20 indoors in a dry environment.
- Do not allow the power supply cord to come into contact with the rotating brush, squeegee, or tires.
- Do not leave electrical cords or low profile items (i.e. anything having a height of less than 4 inches [10 cm] from the ground) in the RoboScrub 20's area of operation.
- Report any RoboScrub 20 damage or faulty operation immediately. Do not use the RoboScrub 20 if it is not in proper operating condition.
- Place proper floor cleaning signage in areas where the RoboScrub 20 is operating and people are present, in accordance with standard floor cleaning practices. See the ASA and EULA for further uses and restrictions.
- Do not allow children to play with the RoboScrub 20.
- Train all personnel who will be operating the RoboScrub 20. The RoboScrub 20 is not to be used by persons (including children) with reduced physical, sensory, or mental capabilities, nor by users lacking experience and knowledge, unless they have been provided instruction or supervision.
- Do not clean the RoboScrub 20 with a pressure washer.

# SAFETY PRECAUTIONS

## FOR SAFETY DURING OPERATION

- Keep hands and feet clear of moving parts while the RoboScrub 20 is in operation.
- Locate and make sure all safety devices are in place and fully functional.
- All doors and covers must be positioned as indicated in the instruction manual before using the RoboScrub 20.
- Ensure that third parties, particularly children, are not endangered when operating the RoboScrub 20.
- The operator is responsible for supervising and monitoring safe operation of the RoboScrub 20.
- Do not ride the RoboScrub 20 when it is operating in robotic mode.
- All wheels/tires need to be in contact with the floor at all times. Avoid abrupt maneuvers while using in manual mode.
- Do not use flammable cleaning agents, or operate the RoboScrub 20 near flammable liquids.
- Use appropriate personal protective equipment, as recommended by the cleaning chemical safety data sheet, when adding cleaning chemicals or draining fluids.
- Observe the legal directives and local regulations for disposal of cleaning chemicals or detergents.
- In case of accidental contact or spillage of cleaning chemicals or detergents, follow guidelines provided by the manufacturer.
- Only use brushes/pads provided with the RoboScrub 20 or those specified in the manuals. Use of unauthorized brushes/pads may impair safety and potentially damage the RoboScrub 20.
- Keep sparks, flame, and smoking materials away from the batteries, as explosive gases are vented during normal operation.
- The RoboScrub 20 is not suitable for picking up hazardous dusts.
- Do not operate the RoboScrub 20 near flammable materials such as solvents, thinners, fuels, grain dust, etc. Electric motors and components can cause an explosion when operated near explosive materials or vapors.
- Do not use scarifier discs or grinding stones. Minuteman will not be held responsible for any damage to floor surfaces caused by scarifier discs or grinding stones.
- The RoboScrub 20 is designed for level operation. Only use on surfaces with an incline/decline gradient up to 2% in manual mode, and 0% in robotic mode.
- The RoboScrub 20 is not designed or intended for use in environments requiring fail-safe performance including, but not limited to any application in which failure of the RoboScrub 20 could lead directly to death, personal injury, or severe physical or property damage.
- Do not leave the RoboScrub 20 unattended without first turning the ignition off and removing the key. When the RoboScrub 20 is operating in robotic mode, you may remove the ignition key to prevent unauthorized use without disrupting the robotic route.
- Drain all tanks and hoses prior to storing the RoboScrub 20.
- Use caution when moving the RoboScrub 20 into or out of areas that are below freezing temperatures. Any water in the tanks or hoses can cause damage to the RoboScrub 20.
- Park and store the RoboScrub 20 on a level surface only.
- Prevent unauthorized use of the RoboScrub 20 by storing with the ignition key removed.
- Charging batteries generates explosive gases. Charge the batteries in a well-ventilated area with the battery cover completely removed.
- Do not charge batteries when open flames or sparks are present. Do not smoke.
- If the battery charger or power supply cord is damaged, it must be replaced. Do not use damaged parts.

# SAFETY PRECAUTIONS

## FOR SAFETY WHEN PERFORMING MAINTENANCE OR SERVICE

- Authorized personnel must perform repairs and maintenance. Use Minuteman® supplied replacement parts.
- Read all instructions before performing any service or maintenance function.
- Avoid moving parts.
- Do not wear loose jackets, shirts, or sleeves when working on the RoboScrub 20.
- Remove all jewelry when working on the RoboScrub 20 or near electrical components.
- Stop the RoboScrub 20 on a level surface.
- Turn off the ignition and disconnect the batteries by unplugging the red battery connectors located under the recovery tank near the batteries.
- Do not lay tools or metal objects on top of batteries.
- Make sure the battery charger is turned off before disconnecting it from the RoboScrub 20.
- Never work under the RoboScrub 20 without the appropriate safety blocks or support stands.
- Batteries must be removed before the RoboScrub 20 is scrapped. Dispose of batteries in accordance with your local environment regulations.
- Used batteries labelled as recyclable contain reusable economic goods. Do not add these batteries to the normal waste. Follow the battery manufacturer's instructions regarding proper disposal.



***Minuteman***<sup>®</sup>  
*Excellence Meets Clean*



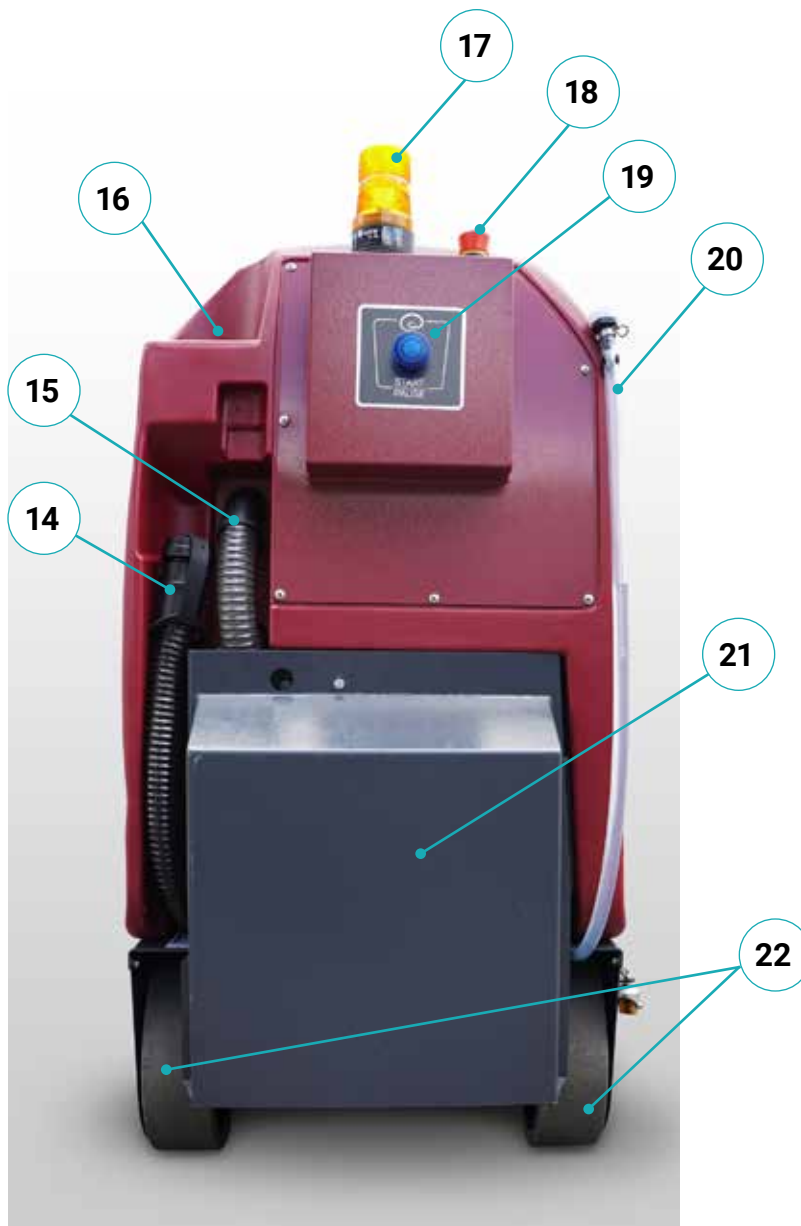


# ROBOSCRUB 20 OVERVIEW



- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1. Sensors: Side 2D Cameras | 8. Scrub Deck                       |
| 2. Sensors: Front 2D Camera | 9. Squeegee                         |
| 3. Sensors: Front 3D Camera | 10. Accelerator Pedal               |
| 4. Sensors: Side 3D Cameras | 11. Solution/Recovery Tank          |
| 5. Sensors: Lower LIDAR     | 12. Operator Seat/Recovery Tank Lid |
| 6. Front Bumper Skirt       | 13. Sensors: Upper LIDAR            |
| 7. Front Drive Wheel        |                                     |

# ROBOSCRUB 20 OVERVIEW



- 14. Recovery Tank Drain Hose
- 15. Vacuum Motor Muffler
- 16. Solution Fill Port
- 17. Warning Light
- 18. Rear Emergency Stop

- 19. Start/Pause Button
- 20. Solution Tank Site Gauge/Drain Hose
- 21. Battery Compartment
- 22. Rear Tires

# ROBOSCRUB 20 OVERVIEW



- |                                      |  |
|--------------------------------------|--|
| 23. Ignition Key Switch              | 29. Solution Tank Low Indicator          |
| 24. User Interface (UI) Touch Screen | 30. Solution Flow Control                |
| 25. Steering Wheel                   | 31. One-Touch Button                     |
| 26. Front Emergency Stop             | 32. Vacuum Button                        |
| 27. Horn Button                      | 33. Direction Buttons (Forward/Backward) |
| 28. Recovery Tank High Indicator     |  |

# COMPONENTS OVERVIEW

## COMPONENTS OVERVIEW

There are a number of physical components that play a vital role in floor scrubbing, as well as robotic operation. Familiarize yourself with all components and controls before using the RoboScrub 20.

### SOLUTION FILL PORT AND FILTER



The solution fill port is where you pour a premixed solution of an approved cleaning chemical and clean water. The solution tank can hold up to 18 gallons (68 liters). Use appropriate personal protective equipment and pour the premixed solution into the solution fill port. Use the solution tank site gauge to guide you as you pour. Do not overfill.

### SOLUTION TANK SITE GAUGE/DRAIN HOSE



The solution tank site gauge/drain hose serves two purposes: as a visual indicator of the solution tank volume and is used to drain the solution tank. Using appropriate personal protective equipment, drain the solution tank by removing the hose from the clip, removing the cap at the top of the hose, and lowering the hose to drain.

### WARNING LIGHT



The warning light flashes when the RoboScrub 20 is operating in robotic mode. This serves as an indicator to passersby that the RoboScrub 20 is currently in operation.

# COMPONENTS OVERVIEW

## EMERGENCY STOP



The RoboScrub 20 is equipped with two emergency stop buttons, one on the rear and one on the control console. The emergency stop buttons should only be used in emergency situations, as this potentially releases all fluids onto the floor causing a slipping hazard. When one of the emergency stop buttons is pressed, all scrubber functions are immediately stopped and the in-process robotic route is terminated.

## START/PAUSE



The RoboScrub 20 is equipped with a blue start/pause button on the back that is used to begin running a saved route in robotic mode, or to pause an in-process robotic route. When pressed, the scrub brush raises. The squeegee stays down and the vacuum remains on for approximately 20 seconds, after which the vacuum turns off and the squeegee raises. Always use the start/pause button to pause a robotic route for standard, non-emergency situations.

## BATTERY COMPARTMENT



The battery compartment houses the batteries, battery connections, and the onboard charger. See UNPACK ROBOSCRUB 20 on page 19 and BATTERY CHARGING on page 35 for details.

# COMPONENTS OVERVIEW

## RECOVERY TANK DRAIN HOSE



The recovery tank drain hose is used to drain the recovery tank. Use appropriate personal protective equipment to drain the recovery tank by removing the hose from the clip, removing the cap at the top of the hose, and lowering the hose to drain.

## RECOVERY TANK SCREENED FLOAT



Inside the recovery tank is a screened float. When the recovery tank is overfilled or a large amount of foaming is present, the screened float blocks the vacuum intake inside the tank protecting the vacuum motor and internal electronics from water damage. It is essential to keep the screened float clean and functioning properly.

## OPERATOR SEAT/TANK LID

The operator seat is equipped with two sensors: a pressure switch under the seat cushion to prevent joyriding during robotic operation, and two contact switches located on the back of the seat and the body of the RoboScrub 20. It also serves as the recovery tank lid.



# COMPONENTS OVERVIEW

## ACCELERATOR PEDAL



Pressing the accelerator pedal moves the RoboScrub 20 forward or backwards, depending on which direction switch is selected on the control console. The amount of pressure placed on the accelerator pedal controls the speed. When pressure is completely removed, the electromagnetic brake automatically engages, stopping the RoboScrub 20.

## SENSORS



The RoboScrub 20 is equipped with LIDAR, 3D and 2D cameras, all of which allow machine visions for the robotic software. All sensors and cameras constantly surveille the robot's surroundings for both stationary and moving obstacles. When an obstacle is detected, the RoboScrub 20 will attempt to navigate around it and continue on its robotic map.



# CONTROL CONSOLE OVERVIEW

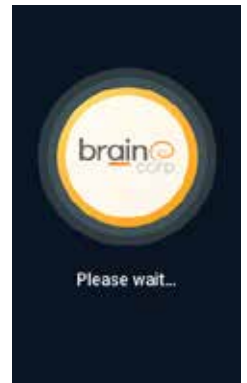
## CONTROL CONSOLE OVERVIEW

The Minuteman® RoboScrub 20, powered by BrainOS, was designed with total operator ease of use in mind. All controls and components have been designed as a total system to efficiently clean dirty floors. The control console consists of the User Interface (UI) Touch Screen, also referred to as the UI or touch screen, and a number of manual controls.

Before using the RoboScrub 20, familiarize yourself with all components and controls.

## USER INTERFACE (UI) TOUCH SCREEN

The RoboScrub 20 is equipped with BrainOS software that is accessible via the User Interface (UI) Touch Screen, located on the left side of the control console. BrainOS technology offers a robotic mode feature that provides the ability for the RoboScrub 20 to perform floor cleaning by following one of the saved navigation routes without direct, real-time operator control. When the Minuteman® RoboScrub 20 is turned on, the BrainOS software will automatically initialize (as shown to the right).



Once the BrainOS software has initialized, it is ready for use. The top of the touch screen displays the current time, battery life, and ROC connection status. In addition, the touch screen allows an operator to run an existing cleaning route robotically, teach a new cleaning route, and access to a variety of settings. See ROBOTIC OPERATION on page 26 for details.



# CONTROL CONSOLE OVERVIEW

## IGNITION KEY SWITCH



Just below the steering wheel is the ignition key switch. The ignition key switch turns the RoboScrub 20 on and off. Turn the key to the right (clockwise) to turn on the RoboScrub 20. Turn the key to the left (counter-clockwise) to turn it off. In addition, the ignition key is used to unload the scrub brush when the key is turned to the left (counter-clockwise), past the off position. See UNLOAD SCRUB BRUSH/PAD on page 21 for details.

## HORN BUTTON



Pressing this button sounds the RoboScrub 20's horn.

## SOLUTION TANK LOW INDICATOR



When illuminated, indicates that the solution tank is low and needs to be refilled.

## RECOVERY TANK HIGH INDICATOR



When illuminated, indicates that the recovery tank level is high and needs to be emptied.

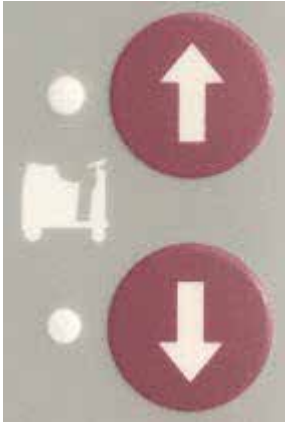
## SOLUTION FLOW CONTROL



The solution flow control regulates the amount of solution that is discharged during cleaning. This control returns to default factory settings (lowest setting) every time the RoboScrub 20 is turned on, as cleaning needs may change from day-to-day. Before using, manually adjust the solution flow control to the desired setting for optimum cleaning performance.

# CONTROL CONSOLE OVERVIEW

## DIRECTION BUTTONS (FORWARD/BACKWARD)



The direction buttons control whether the RoboScrub 20 drives forward or backward when the accelerator pedal is pressed. The upward arrow instructs the RoboScrub 20 to drive forward. The downward arrow instructs it to drive backward. When driving backward, the squeegee will automatically raise to prevent damage. Be sure to inspect the floor for any residual water after driving backward.

## VACUUM BUTTON



Pressing the vacuum button turns the vacuum on. When the vacuum is turned on, the squeegee automatically lowers when driving forward. When the vacuum is turned off, the squeegee will stay down for approximately 8 seconds and then raise. The vacuum motor will run for approximately 15 seconds and then turn off.

## ONE-TOUCH BUTTON



The one-touch button engages the scrub brush, vacuum, and squeegee, allowing for immediate operation of the RoboScrub 20. When pressed, the scrub brush and squeegee are lowered, and the vacuum turns on. When scrubbing is complete, press the one-touch button again to disengage cleaning operations. The scrub brush will rise off the floor. The squeegee will remain down for a few seconds and then rise as well. After the squeegee has risen, the vacuum will remain on for a few additional seconds to clear any remaining water in the hose and then turn off.

# ROBOSCRUB 20 SETUP

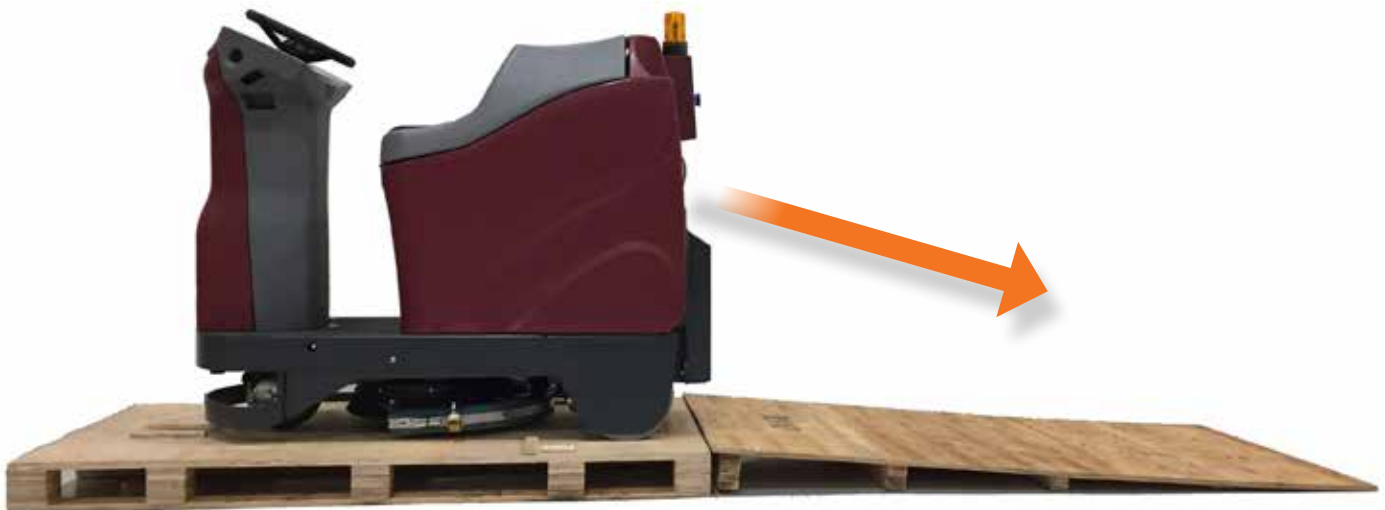
## UNPACK ROBOSCRUB 20

Check the packing crate for any damage, and immediately report any damage to the delivery carrier. To unpack the crate:

1. Remove plastic.
2. Remove box containing all robotic (autonomous) equipment and review contents to ensure all items are included.
3. Remove the walls from the pallet.
4. Remove the battery cover located on the back of the RoboScrub 20.
5. The RoboScrub 20 is battery-operated and designed to operate on 24 volts DC; (2) 12 volt batteries. If necessary, insert both batteries.
  - a. Recommended Battery Specifications: (2) 12 V, Discover Dry Cell Traction Valve Regulated Battery, Model EV185A-A

**NOTE:** MINUTEMAN RECOMMENDS THAT ONLY TRAINED FIELD TECHNICIANS OR MAINTENANCE STAFF INSTALL OR REPLACE BATTERIES. IMPROPER BATTERY INSTALLATION CAN CAUSE RISK TO USERS AND THE MACHINE.

6. Remove the tape from the two red battery connectors and attach them together.
7. Place the battery compartment cover back in position.
8. Remove the chock strips, squeegee straps, and straps needed to secure the ramp.
9. Remove the ramp attached to the back of the pallet.
10. Use the supplied straps to secure the ramp to the rear of the pallet.
11. Make sure the area behind the pallet is clear.
12. Remove the key that is strapped to the steering wheel.
13. Sit on the operator seat, insert the ignition key and turn to the right (clockwise) to start the RoboScrub 20.
14. Make sure the squeegee and scrub deck are raised.
15. Press the downward direction button arrow.
16. Slowly drive the machine backwards off the ramp.



# ROBOSCRUB 20 SETUP

## SCRUB BRUSH/PAD OPTIONS

The following scrub brush or pad options are available with the Minuteman® RoboScrub 20, powered by BrainOS:

PART #	DESCRIPTION
<b>172520-1</b>	BRUSH-DISC, 20" NYLON, BLACK
<b>172520-3</b>	BRUSH-DISC, 20" NYLO-GRIT 80GR, BLACK
<b>172520-6</b>	BRUSH-DISC, 20" SCRUB GRIT 2, 120GR RED
<b>172588</b>	PAD DRIVER, ASSY, AQUASTOP, 20" ( <b>STANDARD</b> )
<b>762370</b>	PAD RETAINER-REMOVABLE-NOT SHOWN
<b>762394</b>	PAD RETAINER-FIXED-NOT SHOWN
<b>AQUASTOP BRUSHES</b>	
<b>7951-01</b>	BRUSH, 20" LIGHT-MEDIUM PP.5 A/S, WHITE
<b>7951-02</b>	BRUSH, 20" LIGHT-MEDIUM A/S, K901, BLACK
<b>7951-03</b>	BRUSH, 20" MEDIUM NYLON 600GR A/S, GREY
<b>7951-04</b>	BRUSH, 20" MEDIUM-HEAVY PP.8 A/S, WHITE
<b>7951-05</b>	BRUSH, 20" HEAVY NYLON 180 GR A/S, GREY
<b>7951-06</b>	BRUSH, 20" HEAVY-2 NYLON 120GR A/S, GREEN

## INSTALL SCRUB BRUSH/PAD

The Minuteman® RoboScrub 20, powered by BrainOS, is typically shipped with a scrub brush attached.

## UNLOAD SCRUB BRUSH/PAD

If there is a brush currently attached, perform the following steps to unload the scrub brush/pad:

1. Turn the ignition key to the left (counter-clockwise) to turn the RoboScrub 20 off, if necessary.
2. Turn the ignition key to the left (counter-clockwise) past the off position and hold.
  - a. The scrub brush/pad will spin for a moment and then release.
  - b. Remove the scrub brush/pad from underneath the RoboScrub 20.
3. Turn the ignition key back to center position.

## LOAD SCRUB BRUSH/PAD

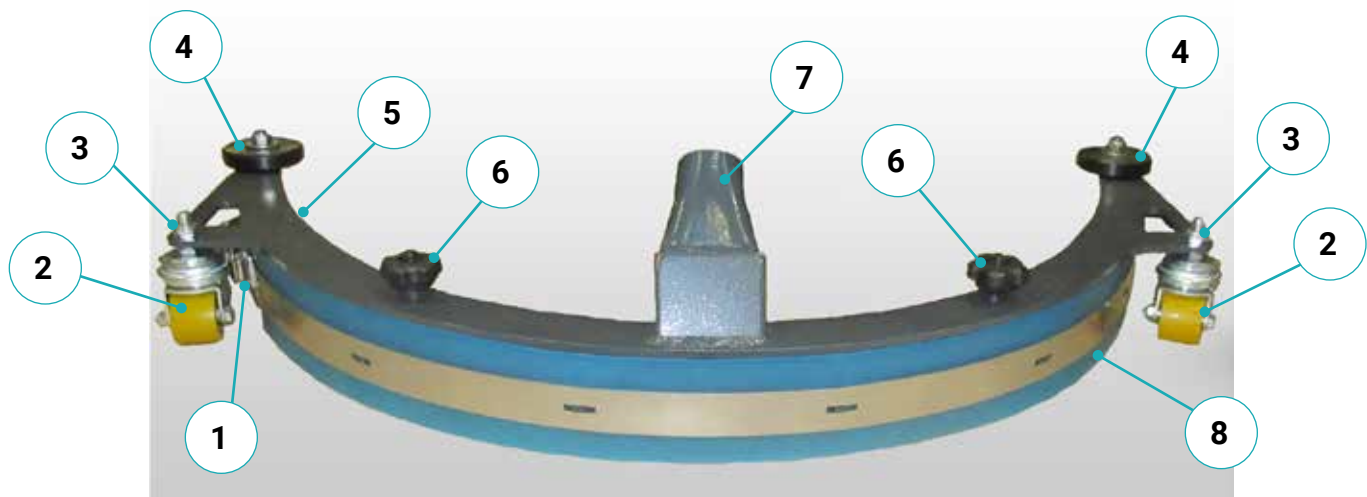
Perform the following steps to load a scrub brush or pad:

1. Turn the ignition key to the right (clockwise) to turn on the RoboScrub 20.
2. Press the one-touch button to raise the scrub deck, if necessary.
3. Position the scrub brush or pad under the scrub deck.
4. Press the one-touch button to lower the scrub deck.
5. Once the scrub deck is completely lowered into position, lightly tap the accelerator pedal.
  - a. The scrub brush or pad will automatically load and lock into position.

# ROBOSCRUB 20 SETUP

## SQUEEGEE ASSEMBLY

The Minuteman® RoboScrub 20, powered by BrainOS, is equipped with a squeegee assembly that houses the squeegee blade. Familiarize yourself with all aspects of the squeegee assembly:



- |                                       |                                 |
|---------------------------------------|---------------------------------|
| 1. Outside Blade Fastening Latch      | 5. Inside Blade Fastening Latch |
| 2. Caster Wheel                       | 6. 3-Sided Knob                 |
| 3. Nut for Squeegee Height Adjustment | 7. Vacuum Connector             |
| 4. Roller                             | 8. Squeegee Blade               |

## INSTALL AND ADJUST SQUEEGEE

The Minuteman® RoboScrub 20, powered by BrainOS, is typically shipped with the squeegee assembly attached.

### INSTALL/REPLACE SQUEEGEE BLADE

If necessary, perform the following steps to install or replace a squeegee blade into the squeegee assembly:

1. Remove the squeegee assembly by pulling off the vacuum suction hose from the squeegee's vacuum connector.
2. Loosen both 3-sided knobs on the top of the assembly.
3. Remove the lower half of the squeegee assembly.
4. Unlock the inside and outside blade fastening latches of the squeegee blade.
5. Remove the squeegee blade, if present.
6. Insert the new squeegee blade.
7. Return and lock the inside and outside blade fastening latches.
8. Re-affix the lower half of the squeegee assembly to the upper half by tightening both 3-sided knobs on the top of the assembly.
9. Place the squeegee assembly underneath the RoboScrub 20.
10. Reattach the squeegee vacuum connector on the squeegee assembly to the vacuum suction hose underneath the RoboScrub 20.

### ADJUST SQUEEGEE HEIGHT

The height of the squeegee is a direct result of the clearance between the caster wheels and the floor. If streaks are present, this clearance must be adjusted. To adjust the height of the squeegee, perform the following steps:

1. Locate the nut above the bracket that holds the caster wheel.
2. Adjust to the desired height by tightening or loosening this nut on both sides of the squeegee assembly.
  - a. The bottom of the squeegee blade should flare out slightly when the machine is moving forward.

## PRE-OPERATION CHECKS

The RoboScrub 20 is capable of both manual and robotic operation, thanks to BrainOS technology. A subscription to Brain Corp's Autonomy Services is required to use the RoboScrub 20's robotic functions. Robotic mode means that the RoboScrub 20 performs floor cleaning without direct, real-time operator control, which allows janitorial staff to focus on other tasks.

**NOTE:** THE ROBOSCRUB 20 IS A HARD SURFACE FLOOR SCRUBBER ONLY, WITH NO SWEEP FUNCTIONALITY.

Always perform the following steps before using the RoboScrub 20 to ensure proper operation:

- Be sure you understand the functions of all components and controls.
- Check under the RoboScrub 20 for leaks.
- Check the squeegee for wear and damage. Rotate or replace, if necessary.
- Adjust the squeegee height, if necessary.
- Make sure the batteries are fully charged and free of damage.
  - Disconnect the battery charger cord from the outlet.
  - Wind the battery charger cord in the designated area to the right of the batteries.
  - Attach the battery compartment cover to the rear.
- Make sure the solution and recovery tanks are empty and clean.
- Clear all obstacles from the areas to be cleaned, so the RoboScrub 20 can provide maximum floor coverage.





## MANUAL OPERATION

Before turning on the RoboScrub 20, make sure it is fully charged and free of damage. Perform the following steps to use the Minuteman® RoboScrub 20 manually:

1. Fill the solution tank via the solution fill port located on the top left corner of the back of the RoboScrub 20.



2. Ensure the operator seat is securely lowered with the two contact switches connected.

3. Sit on the operator seat, insert the ignition key and turn to the right (clockwise) to start the RoboScrub 20. Wait for the User Interface (UI) Touch Screen to display options to Run Route, Teach Route, and Settings.



4. Press the up or down direction button to determine whether you will be driving forward or backward.

5. Select the desired solution flow control setting.



6. Press the one-touch button to engage the cleaning components (scrub brush and squeegee are lowered, and vacuum turns on). When cleaning is complete, press the one-touch button again to disengage the cleaning components.

7. Press the accelerator pedal to drive the RoboScrub 20 along the desired cleaning route. You can adjust your speed via the force applied to the pedal — light is slow, heavy is fast. Remove pressure completely from the accelerator pedal to stop.



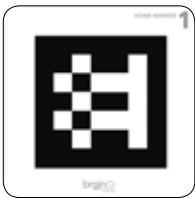
# ROBOTIC OPERATION

## ROBOTIC OPERATION (BrainOS Software)

The RoboScrub 20 is equipped with BrainOS software that is accessible via the User Interface (UI) Touch Screen. BrainOS technology offers a robotic mode feature that provides the ability for the RoboScrub 20 to perform floor cleaning by following one of the saved navigation routes without direct, real-time operator control. The RoboScrub 20 can only operate in robotic mode in areas where cleaning routes have been taught and saved. The touch screen allows an operator to teach a new cleaning route, run an existing cleaning route robotically, access system alert messages, and more. It also provides constant visibility to the number of hours the RoboScrub 20 has operated and ROC connection status.

A few simple setup steps must be performed before you can begin using the RoboScrub 20 in robotic mode.

## HOME LOCATION CODES



Home location codes must be permanently installed before you can begin using the RoboScrub 20 in robotic mode. A home location code is a unique barcode identifier that the RoboScrub 20 scans to determine its current location, as well as any routes that have been saved to that specific home location code. The RoboScrub 20 is designed to work with up to 10 home locations codes. Each home location code can store up to 6 routes for a total of 60 routes.

## ESTABLISH HOME LOCATION CODES

Home location codes are used to establish the starting and ending point of a cleaning route in a particular area. The number of home location codes needed may vary depending on the size of the space where the RoboScrub 20 will be operating. Use the following tips to help you establish your home location codes:

- Large cleaning spaces may require more than one home location code if more than 6 cleaning routes are needed.
- In a multi-level building, establish a unique home location code for each floor.
- Home location codes should be placed on an open wall or column near commonly cleaned areas that do not change from day-to-day.
- Home location codes should be installed in a well-lit wall location where there are no shadows or other obstructions.
- Use a nail, hook, or tape to securely affix the home location code to the wall. The entire home location code must be clearly visible, and not hidden behind furniture or shelving.
- A home location code must be affixed at a height of 40 inches (100 centimeters) from the ground.
- The RoboScrub 20 can scan a home location code from a distance of approximately 24 inches (61 centimeters).
- There must be easy, unobstructed access for the RoboScrub 20 to scan the home location from its right side.
- If a home location code is lost or damaged, contact customer service for a replacement.

## ROC: ROBOT OPERATIONS CENTER (BrainOS Software)

The BrainOS software provides access to Brain Corp's Robot Operations Center (ROC). The ROC is a cloud-based robot operations center, managed by Brain Corp technicians, that augments the RoboScrub 20's capabilities by providing monitoring and analytics. The ROC is connected via a 4G LTE modem, and does not require user interaction to connect. New versions of the software are automatically uploaded to the RoboScrub 20 without disrupting service or requiring operator interaction.

Before running a cleaning route in robotic mode, you can pair your phone to the ROC to receive text messages whenever the RoboScrub 20 encounters an alert and/or when the route is complete. The alerts can be sent to any phone that is able to receive SMS and MMS messages.

Only one phone can be paired to the ROC to receive status alerts. The phone number is automatically discarded when the RoboScrub 20 is turned off or a new phone is paired.

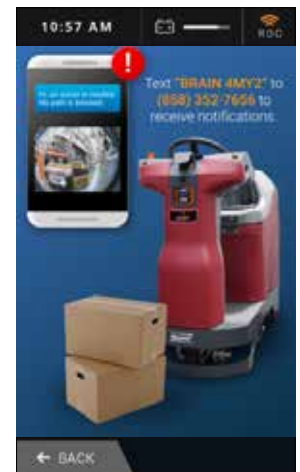
To pair your phone, first check the ROC indicator on the top right corner of the touch screen's status bar. When the indicator is orange, the RoboScrub 20 is successfully connected to the ROC. If the indicator is gray, the ROC is not connected and cannot be paired with your phone.

**NOTE:** THE ROBOSCRUB 20 CAN BE USED IN ROBOTIC MODE WITH OR WITHOUT ROC CONNECTIVITY.

### PAIR YOUR PHONE TO THE ROC

Perform the following steps on the touch screen to pair your phone to the ROC:

1. Select SETTINGS.
2. Select NOTIFICATIONS.
3. Follow the instructions on the touch screen.
4. Pairing is successful when you receive a confirmation text message on your phone.



When your phone is successfully paired to the ROC, you will receive a text message any time an alert is triggered during robotic operation. Some alert type examples include, but are not limited to:

- Path is Blocked
- Emergency Stop Pressed
- Low Battery
- Route Complete

# ROBOTIC OPERATION

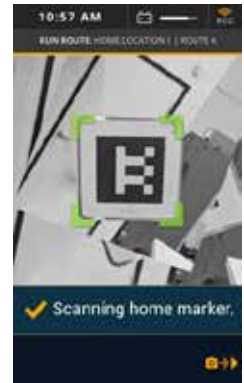
## TEACH A NEW CLEANING ROUTE (BrainOS Software)

The RoboScrub 20 must be taught one or more cleaning navigation routes before it can run robotically.

**NOTE:** DO NOT TEACH ROUTES THAT INCLUDE DRIVING INTO AN ELEVATOR. THE MACHINE SHOULD ALWAYS BE MANUALLY OPERATED WHEN IN AN ELEVATOR OR AROUND AUTOMATIC DOORS.

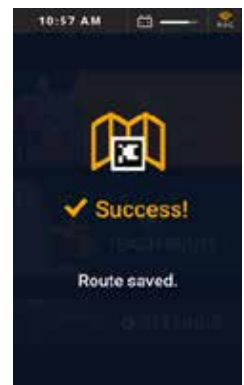
Perform the following steps to teach a new cleaning route:

1. Select TEACH ROUTE on the touch screen.
2. Drive to the desired home location code with the code to the right of the RoboScrub 20.
  - a. The RoboScrub 20 automatically begins scanning the home location code.
  - b. An alert will appear on the touch screen if the RoboScrub 20 is unable to scan the home location code.
3. Upon successful scan of the home location code, the touch screen displays all existing and available routes for that home location code.
  - a. For your convenience, the next available route is automatically highlighted.



4. Touch one of the available routes to select. The touch screen states *Ready. I will learn as you drive.*
5. Press the one-touch button to activate the cleaning components (scrub brush, squeegee, vacuum, and cleaning solution).
  - a. If you do not press the one-touch button, the route will be saved with no cleaning components engaged.
6. Begin driving along the cleaning route you wish to teach. As soon as you start driving, the touch screen states *Learning...* When teaching a route:
  - a. Avoid tight spaces: The RoboScrub 20 requires a width of at least 3½ feet when driving a straight line and 4½ feet to make turns around a corner or when turning into an aisle.
  - b. Avoid U-turns: The RoboScrub 20 requires a width of at least 8½ feet to perform a U-turn. Avoid making U-turns as much as possible.

7. Once you've driven along the entire cleaning route, select SAVE and drive to the initial home location code to be scanned again.
  - a. Always start and stop at the same home location code. The RoboScrub 20 completes its cleaning route by scanning the home location code a second time. A route cannot be saved unless the home location code is scanned a second time in the same physical location.
8. Confirm saving of the cleaning route.
9. The saved cleaning route is now available for selection.



## RUN A ROUTE IN ROBOTIC MODE (BrainOS Software)

Once one or more cleaning routes have been taught and saved, you can use the RoboScrub 20 in robotic mode. When running a route in robotic mode, pairing your phone to the ROC can be a valuable tool. See ROC: ROBOT OPERATIONS CENTER on page 27 for details.

Before operating the RoboScrub 20 in robotic mode:

- Make sure all safety devices are in place and operational.
- Check that the brakes and steering are fully functional.
- Prepare the area to be cleaned by clearing the area of any debris and obstacles to ensure maximum floor coverage.
- Check that you can hear the RoboScrub 20's audible cues.
- Control and monitor the area being cleaned.
- Place proper floor cleaning signage in areas where the RoboScrub 20 is operating and people are present, in accordance with standard floor cleaning practices.

Perform the following steps to run a route in robotic mode:

1. Select RUN ROUTE.
2. Drive the RoboScrub 20 to the desired home location code, as instructed.
  - a. Be sure to position the RoboScrub 20 so that the home location code is on the right.
3. The RoboScrub 20 will automatically begin scanning the home location code, as displayed on the touch screen.
  - a. If the RoboScrub 20 is unable to scan the home location code, the touch screen will provide instructions on the issue.
  - b. When the home location is successfully scanned, a *Success! Select a route to clean* message is briefly displayed followed by a list of all existing routes for the scanned code.
4. Select which route to run in robotic mode.
5. Adjust the solution flow control for today's cleaning needs.



6. Step off the RoboScrub 20, and either remove the operator seat cushion or tuck the top half under the bottom half to display the yellow STAY CLEAR warning. This alerts passersby of robotic operation.



7. Press the blue start/pause button on the back of the RoboScrub 20 to start the robotic cleaning route.
8. As the RoboScrub 20 begins operating in robotic mode, check to ensure all components are functioning properly:
  - a. Scrub brush lowered.
  - b. Squeegee lowered and wiping appropriately.
  - c. Vacuum is picking up water.

# ROBOTIC OPERATION



- \* Remove the operator seat cushion or tuck the top half under the bottom half to display the yellow STAY CLEAR warning. This provides a visual cue to passersby that the RoboScrub 20 is operating in robotic mode.
- \* There are **3** basic steps to remember: Drive to the home location code, select your route, and press the blue start button. ***It's as easy at 1-2-3!***
- \* When a route is selected and the blue start button is pressed, the RoboScrub 20 flashes the yellow warning light and sounds the horn to signal that it's about to start.

## FOR SAFETY

### BEFORE OPERATING THE ROBOSCRUB 20:

- MAKE SURE ALL SAFETY DEVICES ARE IN PLACE AND OPERATIONAL.
- CHECK THAT THE BRAKES AND STEERING ARE FULLY FUNCTIONAL.
- PREPARE THE AREA TO BE CLEANED BY CLEARING THE AREA OF DEBRIS AND OBSTACLES TO ENSURE MAXIMUM FLOOR COVERAGE.
- CHECK THAT YOU CAN HEAR THE MACHINE'S AUDIBLE CUES.
- CONTROL AND MONITOR THE AREA BEING CLEANED.

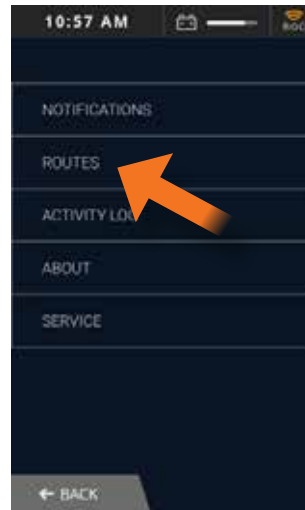


## DELETE A ROUTE (BrainOS Software)

An existing route can be deleted using the touch screen. If you delete an existing route, it cannot be retrieved; you will have to re-teach the route. To delete an existing route:



1. Select SETTINGS.



2. Select ROUTES.

3. Drive the RoboScrub 20 to the desired home location code. The RoboScrub 20 will automatically begin scanning the home location code, as displayed on the touch screen.
  - a. The RoboScrub 20 retrieves all existing routes for the scanned home location code.
4. Touch the route to be deleted and select DELETE on the bottom right of the screen.
5. Select DELETE again to confirm.
  - a. The route is deleted from the home location code.

## AFTER USE DAILY TASKS

When you are finished using your RoboScrub 20, perform the following recommended daily tasks to clean and store the RoboScrub 20.

### DRAIN AND CLEAN TANKS, HOSES, AND FILTERS

1. Disengage all cleaning components by pressing the one-touch button, if needed. Doing so will raise the scrub brush and squeegee, as well as turn off the vacuum motor.
2. Using appropriate personal protective equipment, drain the recovery tank using the recovery tank drain hose located on the rear left of the RoboScrub 20.
3. Using appropriate personal protective equipment, clean out the recovery tank and its internal screened float of any remaining debris by flushing with water and/or wiping clean.
4. Using appropriate personal protective equipment, drain the solution tank using the solution tank site gauge/drain hose located on the rear right of the RoboScrub 20.
5. Rinse the solution tank with clean water to prevent chemical buildup and clogging of water lines.
6. Remove the solution fill filter from the solution fill port on the rear, top left side of the RoboScrub 20 and rinse with clean water.

### CLEAN SCRUB BRUSH/PAD

1. Unload and remove the scrub brush or pad. See INSTALL SCRUB BRUSH/PAD on page 21 for details.
2. Remove any wire, string, or twine wrapped around the brush/pad.
3. Rinse with warm water.
4. Hang to dry.

### CLEAN SQUEEGEE

Check the squeegee daily, and clean as necessary. Perform the following steps to clean:

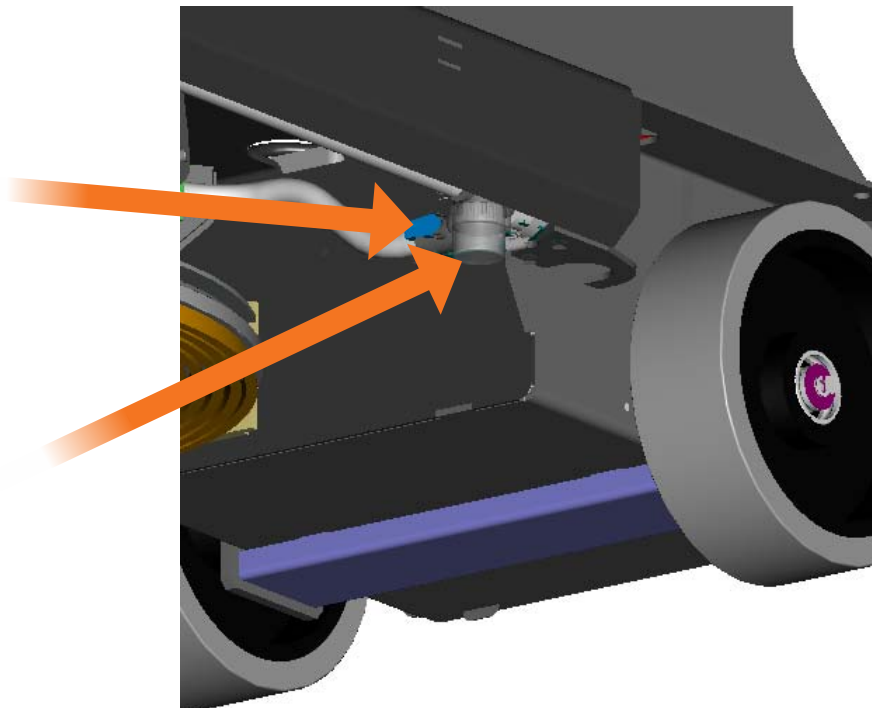
1. Remove the squeegee: See INSTALL AND ADJUST SQUEEGEE on page 22 for details.
2. Rinse with warm water.
3. Wipe clean.
4. Reinstall.



## CLEAN IN-LINE SOLUTION FILTER

The solution solenoid, which shuts off solution flow, is protected from debris by the in-line filter assembly located on the under-carriage of the RoboScrub 20 on the left-hand side, just under the solution tank. It is important to check and clean the screened washer inside the assembly regularly to ensure proper solution flow. Perform these steps to access and clean the screened washer:

1. Lift the scrub deck, if necessary.
2. On the under-carriage of the RoboScrub 20, pull the blue shut-off handle (shown below) to the closed position.
3. Unscrew the screen assembly (shown below).
4. Remove the screen and rinse.
5. Once clean, reinsert the screen.
6. Screw the assembly together, tightening by hand.
  - a. Over-tightening with tools may damage the plastic threads.



## PARK AND POWER DOWN

When not in use, the RoboScrub 20 should be stored in a designated parking station. Turning off and securing the RoboScrub 20 is vital. Turn the ignition key to the left (counter-clockwise) to turn off the RoboScrub 20. Remove the key to prevent unauthorized use.

**NOTE:** ALWAYS PARK THE ROBOSCRUB 20 AWAY FROM STAIRWAYS, FIRE DOORS, AND FIRE EQUIPMENT.

## ROBOSCRUB 20 STORAGE

1. Always store in a designated parking station that is secured from public access.
2. Always store indoors.
3. Always store in a dry area.
4. Always store in its upright position.
5. Always store with the pad driver/brush raised off the floor.
6. Always store with the rear and side squeegee assemblies raised off the floor.
7. Drain all fluids from the clean water tank, recovery tank, and solution bottle; especially if storing in an area which may reach freezing temperatures. Any damage caused by freezing temperatures will not be covered by the warranty.



## BATTERY CHARGING

The RoboScrub 20's battery is designed to last up to 3 – 3.5 hours on the lowest solution flow control setting when using the recommended AGM batteries. Charge the batteries when the RoboScrub 20 is not in operation.

Dispose of components such as batteries, hazardous fluids such as antifreeze, and oil in an environmentally safe way according to local waste disposal regulations.

**NOTE:** THE MACHINE CANNOT OPERATE WHEN CHARGING.

Perform the following steps to charge the batteries:

1. Place the RoboScrub 20 in a well-ventilated area.
2. Turn off the RoboScrub 20.
3. Remove the battery compartment cover.
4. Unwind the power supply cord and insert into a properly grounded receptacle.
5. The battery charge Indicator will turn red to indicate charging. Once charging is complete, this indicator turns green.
6. When charging is complete, disconnect the power supply cord and wind up to the right of the batteries accordingly.
7. Place the battery compartment cover back into position.



# BEST PRACTICES

## TIPS FOR BEST OPERATION

Follow these best practices to keep the RoboScrub 20 operating at peak performance levels.

## ESTABLISH PERMANENT HOME LOCATION(S)

Home location codes must be permanently affixed to the exact same location each time you use the RoboScrub 20. If the home location code is moved even slightly, the route will not be performed correctly.

- Affix home location codes to an open wall or column, 40 inches from the ground.
- Home location codes must be easily accessible from the right side of the RoboScrub 20.
- Place home location codes in a well-lit area. A flashlight may be used in a lights-out building.
- Do not photocopy, laminate, or place home location codes in a glossy sleeve or cover, as this may prevent the RoboScrub 20 from being able to scan it.

## INSPECT THE ROBOSCRUB 20

1

### Inspect Sensors Before Use & Clean If Necessary:

- Dirty sensors can affect the RoboScrub 20's performance. Inspect the 2D and 3D cameras, as well as the upper and lower LIDARs to ensure they are clean and free of smudges. Clean off any dirt and dust off using the microfiber cloth provided.
- Do not apply water to the sensors OR the microfiber cloth!

2

### Inspect Brush/Pad & Squeegee:

- As the scrub brush wears down, the scrub deck gets lower. Make sure the squeegee is adjusted properly and raise it as the brush wears down.
- Replace worn brushes/pads as needed.
- Flip or replace worn or damaged squeegees as needed.

3

### Inspect Batteries:

- Make sure batteries are fully charged before each use. A green light indicates a successful charge.
- Unplug and wind the power supply cord appropriately.
- Visually inspect the condition of the batteries and their components.

4

### Inspect Filters, Tanks, and Hoses:

- Check to make sure the solution and recovery tanks are empty.
- Inspect the solution fill filter and clean as needed.
- Fill the solution tank.
- Visually inspect the hoses to ensure there are no obstructions.

## TEACH A ROUTE (BrainOS Software)

As a general rule, avoid narrow areas when teaching the RoboScrub 20 a new cleaning route and follow these guidelines:

- **Avoid Tight Spaces:** The RoboScrub 20 requires a width of 3½ feet when driving a straight line and 4½ feet to make turns around a corner or when turning into an aisle.
- **Avoid U-Turns:** The RoboScrub 20 requires a width of at least 8½ feet to perform a U-turn. Avoid making U-turns as much as possible.
- **Avoid Teaching Routes Over 45 Minutes Long:** When operating in robotic mode, the runs at approximately half speed. A 45 minute manual route can take up to 1½ hours robotically.
- **Do Not Teach Routes on and Incline or Decline:** You must manually drive the RoboScrub 20 when transporting and when cleaning on an incline or decline.
- **Non-Scrubable Areas:** When teaching a new route with a non-scrubbable area, press the one-touch button approximately 10 feet prior to reaching the non-scrubbable area to lift the cleaning components. The BrainOS navigation software will remember where you lifted and lowered the cleaning components when operating in robotic mode.

## RUN A ROUTE (BrainOS Software)

1

### Clear the Area and Establish Cleaning Settings:

- Remove debris and obstructions from the area to be cleaned.
- Set the solution flow control based on the day's cleaning needs.

2

### Stay Clear of the Front and Sensors:

- Do not crowd or stand in front of the RoboScrub 20, especially when choosing a route at the home location.
- Keep people behind the RoboScrub 20.

3

### Pair Your Phone to the ROC:

- Remember to pair your phone to the ROC to receive alerts and status updates from the RoboScrub 20.

4

### Optimize Power Usage:

- For daily floor maintenance, optimize power usage by using a lower solution flow setting for a longer battery life.

# BEST PRACTICES

## DURING OPERATION

When using the RoboScrub 20 (regardless of manual or robotic operation), inspect the floor for any residual liquid left behind. If there is an excessive amount left behind:

- Mop up or vacuum excess liquid.
- Place warning signs alerting passersby of slippery surfaces.
- Examine the scrub brush/pad, squeegee, hoses, tanks, and solution flow settings and adjust accordingly.
- Inspect the squeegee blade and make sure it is free of tears, rips, and excessive wear.

## AFTER OPERATION

Complete the following steps after each use (regardless of manual or robotic mode):

- Drain and rinse the solution and recovery tanks. Leave the tank lid open for ventilation to prevent odor buildup.
- Clean the solution fill filter.
- Clean and inspect the scrub brush/pad and squeegee for damage or excessive wear.
- Clean all sensors using the microfiber cloth provided to maintain optimal robotic performance of the RoboScrub 20. Do not spray any kind of liquid on the sensors or the microfiber cloth. Only use a dry microfiber cloth.
- Clean the screened washer inside the in-line filter assembly.
- Drive the RoboScrub 20 to its designated parking station, raise the scrub deck off the floor, and turn it off. The parking station should be indoors in a dry area away from fire doors, stairways, and fire equipment.
- Remove the ignition key to prevent unauthorized use.
- Plug the RoboScrub 20 into a grounded 120 volt outlet to charge the batteries. Make sure the battery charger indicator lights up to ensure the batteries are being charged. When the batteries are fully charged, the light will turn green.
- Inspect the battery tops and terminals to make sure they are free from corrosion, appropriately connected, and free of excessive wear.

## BRAKE RELEASE PROCEDURE

The RoboScrub 20 is stopped via an electromagnetic brake, located on the front drive wheel assembly. When the accelerator pedal is pressed the electromagnetic brake releases, which allows the RoboScrub 20 to move forward or backward. When pressure is removed from the accelerator pedal, the electromagnetic brake presses against the front drive wheel to stop the RoboScrub 20.

If the RoboScrub 20 is inoperable or immobile, it can be manually moved by releasing the electromagnetic brake by performing the following steps:

1. Turn the RoboScrub 20 off using the ignition key.
2. Locate the electromagnetic brake on the front drive wheel assembly.
3. Place a small, flathead screwdriver between the wheel and the brake release lever. This will bypass the electromagnetic brake.
4. Slowly push the RoboScrub 20 to a safe location where it can remain until a service technician arrives to perform repairs.
5. Once you have moved the RoboScrub 20 to a safe place, remove the screwdriver from the front drive wheel assembly to activate the electromagnetic brake.



## FOR SAFETY

- DO NOT PERFORM THE BRAKE RELEASE PROCEDURE ON AN INCLINE/DECLINE. IT IS UNSAFE TO PUSH THE ROBOSCRUB 20 ON AN INCLINE/DECLINE, AS IT'S DIFFICULT TO STOP.
- CHECK FOR AND CLEAN UP ANY RESIDUAL WATER OR LIQUIDS ON THE FLOOR BEFORE PERFORMING THE BRAKE RELEASE PROCEDURE.
- TWO PEOPLE ARE REQUIRED TO MOVE THE ROBOSCRUB 20 ONCE THE BRAKE IS RELEASED, ONE PERSON TO STEER AND ONE TO PUSH.
- THE BRAKE RELEASE PROCEDURE REQUIRES YOU TO ACCESS THE UNDERSIDE OF THE ROBOSCRUB 20 AND PHYSICALLY PUSH. USE PRECAUTION WHEN PERFORMING THIS TASK TO AVOID INJURY.
- DO NOT RUSH WHEN PUSHING THE ROBOSCRUB 20. THE FASTER YOU TRY TO PUSH, THE SLOWER THE MACHINE WILL MOVE.
- PUSH SLOWLY AND BE CAUTIOUS NOT TO SLIP ON WET FLOORS.
- DO NOT ATTEMPT TO PERFORM THIS BRAKE RELEASE PROCEDURE IF YOU HAVE ANY HEALTH ISSUES OR PHYSICAL LIMITATIONS.

# MAINTENANCE & SAFETY

## DAILY MAINTENANCE

Perform the following maintenance tasks daily to keep the RoboScrub 20 operating at peak performance.

### FOR SAFETY

TURN OFF THE ROBOSCRUB 20 AND DISCONNECT THE BATTERIES BEFORE PERFORMING ANY MAINTENANCE!

REPAIRS ARE TO BE COMPLETED BY AUTHORIZED TECHNICIANS ONLY.

## DRAIN AND CLEAN TANKS, HOSES, AND FILTERS

1. Disengage all cleaning components by pressing the one-touch button, if needed. Doing so will raise the scrub brush and squeegee, as well as turn off the vacuum motor.
2. Drain the recovery tank using the recovery tank drain hose located on the rear left of the RoboScrub 20.
3. Using appropriate personal protective equipment, clean out the recovery tank and its internal screened float of any remaining debris by flushing with water and/or wiping clean.
4. Using appropriate personal protective equipment, drain the solution tank using the solution tank site gauge/drain hose located on the rear right of the RoboScrub 20.
5. Rinse the solution tank with clean water to prevent chemical buildup and clogging of water lines.
6. Remove the solution fill filter from the solution fill port on the rear, top left side of the RoboScrub 20 and rinse with clean water.

### FOR SAFETY

USE APPROPRIATE PROTECTIVE EQUIPMENT WHEN HANDLING CLEANING CHEMICALS.

## CLEAN SENSORS

Clean all of the RoboScrub 20's sensors using the provided microfiber cloth.

**NOTE:** DO NOT SPRAY ANY KIND OF LIQUID ON THE SENSORS OR THE MICROFIBER CLOTH. ONLY USE A DRY MICROFIBER CLOTH.



## CLEAN SCRUB BRUSH/PAD

Check the scrub brush/pad daily, and clean as necessary. Perform the following steps to clean:

1. Unload and remove the scrub brush or pad. See INSTALL SCRUB BRUSH/PAD on page 21 for details.
2. Remove any wire, string, or twine wrapped around the brush/pad.
3. Rinse with warm water.
4. Hang to dry.

## CLEAN SQUEEGEE

Check the squeegee daily, and clean as necessary. Perform the following steps to clean:

1. Remove the squeegee. See INSTALL AND ADJUST SQUEEGEE on page 23 for details.
2. Rinse with warm water.
3. Wipe clean.
4. Reinstall.

## PARK AND STORE RoboScrub 20

Park the RoboScrub 20 in a designated parking station, turn it off, and remove the ignition key to prevent unauthorized use. Make sure the designated parking station meets the following criteria:

1. Indoors.
2. Well-ventilated dry environment.
3. Away from stairways, fire doors, and fire equipment.

# MAINTENANCE & SAFETY

## CHARGE BATTERIES

Charge the batteries when the RoboScrub 20 is not in operation by performing these steps:

1. Place the RoboScrub 20 in a well-ventilated area.
2. Turn off the RoboScrub 20.
3. Remove the battery compartment cover.
4. Unwind the power supply cord and insert into a properly grounded receptacle.
5. The battery charge indicator will turn red to indicate charging. Once charging is complete, this indicator turns green.
6. When charging is complete, disconnect the power supply cord and wind up to the right of the batteries accordingly.
7. Place the battery compartment cover back into position.

## WEEKLY MAINTENANCE

Perform the following maintenance tasks on a weekly basis:

1. Check the scrub deck skirt and clean as needed.
2. Check the solution fill filter and clean as needed.
3. Check the squeegee blade for signs of wear.
  - a. The squeegee blade can be reused by flipping them.
  - b. A squeegee blade can be flipped up to 4 times. Replace after the 4th time.

## MONTHLY MAINTENANCE

Perform the following maintenance tasks on a monthly basis:

1. Lubricate grease fittings.

## YEARLY MAINTENANCE

Perform the following maintenance tasks on a yearly basis:

1. Check vacuum motor carbon brushes once a year or every 300 operating hours, whichever comes first.
2. Check brush motor and transaxle motor carbon brushes once a year or every 500 hours, whichever comes first.

# MAINTENANCE & SAFETY

## PERIODIC MAINTENANCE

Inspect all mechanical functions of the RoboScrub 20 prior to each use, and perform the following tasks as needed:

1. Check all tank cover seals for damage.
2. Drain and clean the recovery tank, if necessary.
3. Check vacuum hose for debris or blockage. Flush the vacuum hose to remove buildup, as necessary.
4. Check the battery connections for wear and loose terminals.
5. Check the scrub brush/pad for damage, wear, and proper installation. Replace if needed.
6. Check squeegee for damage, wear, and proper installation. Replace if needed.
7. Check the brakes and steering for proper operation.
8. Make sure all sensors are clean and unobstructed.

# TROUBLESHOOTING & SUPPORT

## ROBOSCRUB 20 FAQs

### FREQUENTLY ASKED QUESTIONS AND ANSWERS

**Q: HOW LONG OF A ROUTE CAN I TEACH?**

**A:** As a general rule, it's recommended to teach 45 minute routes due to the water tank capacity, environment, and difference in run-time when running in robotic mode. A route that takes 45 minutes to teach can take the **RoboScrub 20** about 1½ hours to run in robotic mode.

**Q: HOW MANY ROUTES CAN I TEACH?**

**A:** You can teach up to 6 routes per home location code. 10 home location codes are provided, so you can teach up to 60 routes total.

**Q: WHAT SHOULD I KEEP IN MIND WHEN TEACHING A ROUTE?**

**A:** When teaching a new route, try to make wide graceful turns versus sharp turns or U-turns. Avoid U-turns as much as possible by circling around an aisle or alternating aisles.

**Q: WHEN THE RoboScrub 20 REACHES A POINT WHERE IT IS SUPPOSED TO TURN (OR TURN AROUND), IT STOPS AND ASKS FOR HELP. IS THERE A MINIMUM SPACE NEEDED TO OPERATE OR TURN AROUND?**

**A:** Think of "3½ - 4½ - 8½". When your **RoboScrub 20** is on a straight path, it can go through spaces as narrow as 3½ feet wide (between two displays for example). When making a turn or going around a corner, it requires a minimum width of 4½ feet. To make a U-turn, it requires a width of at least 8½ feet.

**Q: MY RoboScrub 20 GETS STUCK IN THE SAME PLACE EVERY DAY. THERE IS NOTHING THERE, BUT IT ALWAYS STOPS AND ASKS FOR HELP. WHAT'S GOING ON?**

**A:** There could be an environmental factor such as a reflection causing the **RoboScrub 20** to think something is blocking its path. For safety reasons, it errs on the side of caution. If this is a recurrent issue, contact customer service and provide the home location code number, route letter, area of concern, and pictures of what the **RoboScrub 20** sees. In some cases, customer service may be able to remotely adjust the route to improve performance.

**Q: HOW DO I PAIR MY PHONE?**

**A:** On the touch screen, select **SETTINGS** and then **NOTIFICATIONS**. Use your phone to text the code to the phone number, as the screen instructs. When successfully paired, you will receive a text message stating that you have been successfully registered.

**Q: I PAIRED MY PHONE YESTERDAY, BUT TODAY I'M NOT RECEIVING ANY ALERTS. WHY?**

**A:** When the **RoboScrub 20** is turned off or a different phone is paired, your phone number will no longer receive alerts. You must pair your phone each day to receive alerts from the **RoboScrub 20**. This is to ensure that only an on-site operator will receive alerts.

# TROUBLESHOOTING & SUPPORT

## PAUSE THE ROBOSCRUB 20

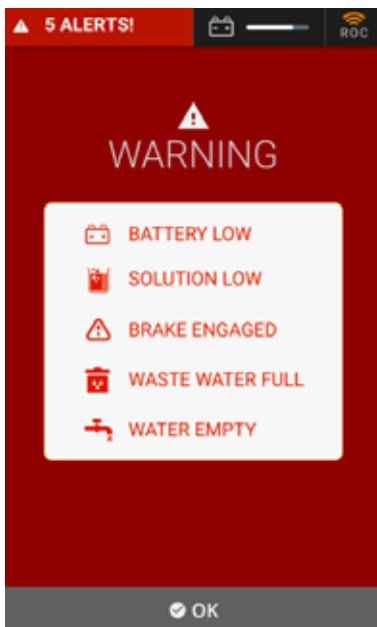
If you need to stop or pause your RoboScrub 20 during robotic operation, approach it from behind and press the blue start/pause button on the back. If necessary, you can manually drive the RoboScrub 20 when an in-process robotic route is paused. This may be needed if there is an obstacle that cannot be moved that the RoboScrub 20 is unable to navigate around on its own. The BrainOS navigation software will keep track of the RoboScrub 20's current course, allowing you to resume the route. To resume robotic operation of the route, simply press the blue start/pause button again.

## EMERGENCY STOP

If there is an emergency and you need stop your RoboScrub 20 immediately, press the red emergency stop button to the right of the steering wheel or on the back. Stopping the RoboScrub 20 with the emergency stop may result in water leakage, and will terminate the in-process robotic route.

**NOTE:** TO RELEASE THE EMERGENCY STOP, TWIST THE EMERGENCY STOP BUTTON AND RESTART THE ROBOSCRUB 20.

## ALERT MESSAGES



The RoboScrub 20 is equipped with a touch screen that displays warning messages when an alert occurs.


When an alert occurs, discontinue operation until the alert is resolved. Alerts occur regardless of manual or robotic operation.

If a particular alert occurs frequently or the alert cannot be resolved, please contact customer service.

Refer to the Alert Messages table for details on all alert messages and how to resolve them.

# TROUBLESHOOTING & SUPPORT




## ALERT MESSAGES

ALERT	INSTRUCTION	IMAGE
RECOVERY TANK FULL	<ol style="list-style-type: none"> <li>1. Drain recovery tank.</li> <li>2. Return to cleaning path.</li> <li>3. Press rear blue button to start.</li> </ol>	
WATER TANK EMPTY	<ol style="list-style-type: none"> <li>1. Fill water tank.</li> <li>2. Return to cleaning path.</li> <li>3. Press rear blue button to start.</li> </ol>	
BATTERY IS TOO LOW	<ol style="list-style-type: none"> <li>1. Drive to charging station.</li> <li>2. Inspect and charge batteries.</li> </ol>	






# TROUBLESHOOTING & SUPPORT

## ALERT MESSAGES (continued)

ALERT	INSTRUCTION	IMAGE
PATH IS BLOCKED	<ol style="list-style-type: none"> <li>1. Make sure the robot's path is clear or drive past any obstacles.</li> <li>2. Press rear blue button to start.</li> </ol>	
IMPACT DETECTED	<ol style="list-style-type: none"> <li>1. Make sure the robot's path is clear or drive past any obstacles.</li> <li>2. Inspect the robot.</li> <li>3. If everything is clear, press rear blue button to start.</li> </ol>	
ROBOT IS OFF PATH	<ol style="list-style-type: none"> <li>1. Follow the blue arrow and drive to the red path.</li> <li>2. When correct, the path will turn white.</li> <li>3. Press rear blue button to start.</li> </ol>	




# TROUBLESHOOTING & SUPPORT

## ALERT MESSAGES (continued)

ALERT	INSTRUCTION	IMAGE
SENSOR ERROR	<ol style="list-style-type: none"> <li>1. Inspect/clean robot's sensors for damage or debris.</li> <li>2. Wipe the sensors with microfiber cloth.</li> <li>3. If there are no issues, press the BLUE button in the back to resume.</li> </ol>	
MACHINE ERROR	<ol style="list-style-type: none"> <li>1. Make sure that the steering wheel is free and clear.</li> <li>2. Press the BLUE button in the back to resume.</li> </ol>	
TRACTION MOTOR ERROR	<ol style="list-style-type: none"> <li>1. Power off robot</li> <li>2. Disconnect then reconnect the battery.</li> <li>3. Power the robot back on.</li> <li>4. If issue persists, contact customer service.</li> </ol>	




# TROUBLESHOOTING & SUPPORT

## ALERT MESSAGES (continued)

ALERT	INSTRUCTION	IMAGE
BRUSH ERROR	<ol style="list-style-type: none"> <li>1. Inspect brushes/pads for damage or debris. Adjust or replace as needed.</li> <li>2. If there are no issues, press the BLUE button in the back to resume.</li> <li>3. If issue persists, contact customer service.</li> </ol>	
VACUUM ERROR	<ol style="list-style-type: none"> <li>1. Inspect vacuum and hose for damage or debris.</li> <li>2. If the hose is clear, press the blue button to resume. If the hose is broken, call customer service.</li> </ol>	
SQUEEGEE ERROR	<ol style="list-style-type: none"> <li>1. Inspect squeegee for damage or debris. Adjust or replace as needed.</li> <li>2. If there are no issues, press the BLUE button in the back to resume.</li> <li>3. If issue persists, contact customer service.</li> </ol>	


# TROUBLESHOOTING & SUPPORT

## ALERT MESSAGES (continued)

ALERT	INSTRUCTION	IMAGE
SCRUB DECK ERROR	<ol style="list-style-type: none"> <li>1. Turn off and inspect machine.</li> <li>2. If there are no issues, press the BLUE button in the back to resume.</li> <li>3. For damage or persistent problems, contact customer service.</li> </ol>	
NO BRUSH ERROR	<ol style="list-style-type: none"> <li>1. Make sure brushes or pads are properly installed.</li> <li>2. If there are no issues, press the BLUE button in the back to resume.</li> <li>3. If issue persists, contact customer service.</li> </ol>	
SEAT SENSOR TRIGGERED	<ol style="list-style-type: none"> <li>1. Check that the seat is clear.</li> <li>2. Press rear blue button to start.</li> </ol>	

# TROUBLESHOOTING & SUPPORT

## ALERT MESSAGES (continued)

ALERT	INSTRUCTION	IMAGE
UNKNOWN ERROR	<div>1. Turn off and inspect machine.</div> <div>2. Reboot and attempt to operate.</div> <div>3. If issue persists, contact customer service.</div>	

# TROUBLESHOOTING & SUPPORT

## TROUBLESHOOTING TIPS

PROBLEM	CAUSE	RESOLUTION
<b>POOR OR NO WATER PICK-UP</b>	Worn or torn squeegee blade	Rotate or replace blade
	Recovery tank full	Empty recovery tank
	Recovery tank drain hose leak	Secure drain hose cap or replace
	Recovery tank lid gasket leak	Replace gasket lid cover properly
	Debris caught in squeegee	Clean squeegee
	Vacuum hose or squeegee outlet clogged	Remove debris and flush hose
	Using too much solution	Adjust solution flow setting
	Recovery hose to squeegee or recovery tank disconnected or damaged	Reconnect or replace recovery hose
<b>POOR SCRUBBING PERFORMANCE</b>	Worn brushes	Rotate or replace brushes
	Wrong brush or cleaning chemical	Consult Minuteman
	Debris caught on scrub brushes	Remove debris
	Moving machine too fast	Slow down
	Not using enough solution	Adjust solution flow setting
	Low battery charge	Recharge batteries
<b>INADEQUATE SOLUTION FLOW OR NO SOLUTION TO THE FLOOR</b>	Solution tank empty	Fill solution tank
	Solution lines, valves, filter, or spray jets clogged	Flush lines and clean solution filter and spray jets
	Scrub deck raised	Press the one-touch button to lower scrub deck
<b>MACHINE NOT OPERATIONAL</b>	Tripped Control Power circuit breaker	Reset breaker
	Low battery charge	Recharge batteries
	Battery charger operating	Unplug battery charger when charge is complete
<b>VACUUM MOTOR DOES NOT TURN ON</b>	Recovery tank full	Empty recovery tank
	Excessive foaming in recovery tank	Empty recovery tank Use a different cleaning chemical Use a lesser amount of the cleaning chemical Use a defoaming agent
	Carbon brushes worn	Replace carbon brushes
	Vacuum switch disconnected	Connect wiring
	Vacuum not turned on	Press vacuum button

# TROUBLESHOOTING & SUPPORT

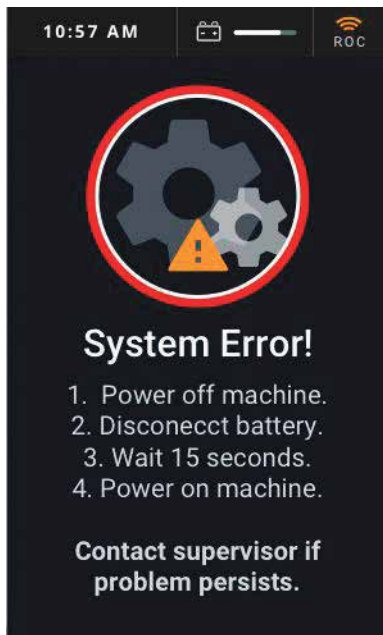
## TROUBLESHOOTING TIPS (continued)

PROBLEM	CAUSE	RESOLUTION
<b>NO POWER TO MACHINE</b>	Battery Disconnected	Check All Battery Cable Connections
	Emergency Shut-Off Activated	Reset
	Battery Terminals Corroded	Clean Connections
	Faulty Main Connector	Replace Connector
	Faulty Key Switch	Replace Switch
<b>BRUSH DOES NOT UNLOAD</b>	Broken brush motor switch	Replace switch
	Damaged brush block or drive hub	Replace
	Scrub deck not all the way up	Push the one-touch button and wait for the scrub deck to completely raise
<b>NO ROC CONNECTION</b>	Poor cellular signal	Turn the machine off, wait 10 seconds, and turn back on

# TROUBLESHOOTING & SUPPORT

## WHERE TO GET MAINTENANCE AND SUPPORT

If the touch screen displays the following error, reboot the RoboScrub 20. If the problem persists, please contact customer service.



### CUSTOMER SUPPORT

(800) 323 - 9420

[techsupport@minutemanintl.com](mailto:techsupport@minutemanintl.com)

***Minuteman***<sup>®</sup>  
*Excellence Meets Clean*



# WARRANTY

## Minuteman International Made Simple Commercial Limited Warranty

### REVISION P

EFFECTIVE 5/1/2017

Minuteman International, Inc. warrants to the original purchaser/user that the product is free from defects in workmanship and materials under normal use. Minuteman will, at its option, repair or replace without charge, parts that fail under normal use and service when operated and maintained in accordance with the applicable operation and instruction manuals. All warranty claims must be submitted through and approved by factory authorized repair stations.

This warranty does not apply to normal wear, or to items whose life is dependent on their use and care, such as belts, cords, switches, hoses, rubber parts, brushes, electrical motor components or adjustments. Parts manufactured by Minuteman are covered by and subject to the warranties and/or guarantees of their manufacturers. Please contact Minuteman for procedures in warranty claims against these manufacturers.

**Special warning to purchaser** -- Use of replacement filters and/or pre-filters not manufactured by Minuteman or its designated licensees, will void all warranties expressed or implied. A potential health hazard exists without original equipment replacement.

All warranted items become the sole property of Minuteman or its original manufacturer, whichever the case may be.

Minuteman disclaims any implied warranty, including the warranty of merchantability and the warranty of fitness for a particular purpose. Minuteman assumes no responsibility for any special, incidental or consequential damages.

This limited warranty is applicable only in the U.S.A. and Canada, and is extended only to the original user/purchaser of this product. Customers outside the U.S.A. and Canada should contact their local distributor for export warranty policies. Minuteman is not responsible for costs or repairs performed by persons other than those specifically authorized by Minuteman. This warranty does not apply to damage from transportation, alterations by unauthorized persons, misuse or abuse of the equipment, use of non-compatible chemicals, or damage to property, or loss of income due to malfunctions of the product.

If a difficulty develops with this machine, you should contact the dealer from whom it was purchased.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state. Some states do not allow the exclusion or limitation of special, incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions and limitations may not apply to you.

# WARRANTY

Model	Parts	Labor	Poly	Travel**
Cord Electric Group	5yrs	3yrs	12yrs	90 days
Battery Auto Scrubbers (incl. on board charger)	5yrs	3yrs	12yrs	90 days
Battery and Manual Sweepers	3yrs	3yrs	12yrs	90 days

## ***Exceptions.....***

Model	Parts	Labor	Poly	Travel**
Port A Scrub, all models (incl. on board charger)	1yr	6months	12yrs	90 days
A3S Blower	1yr	1yr	0	0
Phenom Dual Motor Upright Vacuums	2yrs	2yrs	0	0
Explosion Proof Vacuum	1yr	1yr	0	0
Propane Burnisher	1yr	1yr	0	90 days
E14BQP and E14115 scrubber	1yr	1yr	12yrs	90 days
**Travel, 2 hours max				

<i>Stand-alone Battery Chargers:</i>	One year
<i>Replacement Parts:</i>	Ninety days
<i>Batteries:</i>	0-3 months full replacement, 4-12 months pro-rate
<i>Polypropylene Plastic Tanks:</i>	12yr warranty, no additional labor



# ***Minuteman***<sup>®</sup>

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14N845 U.S. Route 20  
Pingree Grove, Illinois 60140 USA

(800) 323-9420

[www.minutemanintl.com](http://www.minutemanintl.com)

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