Matricole: **310000-01 onwards**

AIRCLEAN & SERVICE SRL

TOROBOT X
WWW.AIR-CLEAN.IT
MADE IN ITALY

Publication issued by: Airclean&Service S.r.l. - Corso Martiri, 162 41013 Castelfranco Emilia (MO) Italy

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Edition: 01/25
Revision: 00

This manual is an integral part of the supply and must be read carefully in order to ensure correct use, in accordance with the essential safety requirements; drawn up in accordance with the provisions of the Machinery Directive 2006/42/EC, it contains the technical information necessary to correctly carry out all the procedures in safe conditions; it must be carefully stored and must accompany the BRUSHING ROBOT TOROBOT X throughout its life, including any changes of ownership, it was made in Italian as the language of origin.

In case of loss or deterioration, it is possible to receive a copy by requesting the company Airclean&Service S.r.l. indicating the data shown on the identification plate.

Airclean&Service S.r.l. declines all responsibility for damage caused as a result of operations not covered in this manual.

Machines from serial number 310000-01 onwards

...Follow MACHINE USE

1. INTRODUCTION

1.1 Premise AIRCLEAN&SERVICE S.r.l. congratulates you for choosing the TOROBOT X BRUSHING ROBOT, the subject of this manual. Carefully read the manual and all the technical documentation supplied with the TOROBOT X BRUSHING ROBOT, to operate correctly and safely.

1.2 Symbology

Symbols that indicate risky situations or very important information.

Attention! 

It indicates situations of risk for people, recalls accident prevention regulations, suggests behavioral procedures.

Warning! 

Indicates the risk situations for the TOROBOT X BRUSHING ROBOT, and/or for the product being processed.

Please note! 

Indicates useful information for consulting the manual and for the proper functioning of the TOROBOT X BRUSHING ROBOT

1.2 Symbology > >> Symbols that indicate risky situations or very important information.

Specialized Operators ! 

Indicates the possible operating instructions for specialized operators

Qualified Technical Maintenance Technician ! 

Indicates the routine and scheduled maintenance procedures that are the responsibility of the maintenance technician

mechanical or electrical, with installation, commissioning and/or extraordinary maintenance procedures (electrical/mechanical)

1.3 Terminologies and abbreviations

- **Brushing robot:** TOROBOT X
- **Operator:** Staff dedicated to the use of the TOROBOT X brushing robot
- **Exposed Person:** Any person who is in the vicinity of a dangerous vehicle.
- **Protection:** Fixed guards (casings), safety gates and safety devices
- **Danger zone:** Any area or use of tools or machinery defined as risky by the SOP drawn up by the Company for that work site
- **P.P.E.** Personal Protective Equipment
- **T.A.C** Technical Assistance Center

1.4 List Of Attachments

1. **Declaration of Conformity CE**
2. **Manual Operator**
3. **Wiring diagram**

1.5 Personnel Qualification

Operators must be aware of the content of all the documents supplied with the TOROBOT X BRUSHING ROBOT, and possess the following requirements, or acquire them through appropriate training:

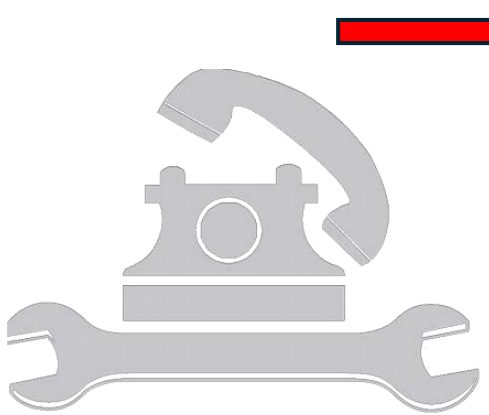
- sufficient general and technical preparation to understand the content of the documents containing the instructions for use and maintenance, and correctly interpret the drawings and diagrams contained therein;
- knowledge of the main hygiene, accident prevention and technological rules relating to the production process adopted; specific experience of the technology used;
- general knowledge of how it is composed, and of the equipment installed on the TOROBOT X BRUSHING ROBOT, in particular the position of the emergency stop devices and the isolation of energy sources;
- knowledge of what to do in an emergency, where to find personal protective equipment and how to use it correctly;
- sufficient training to perform their duties skillfully, especially in emergencies.

1.5 Personnel Qualification

In addition to the above, maintenance technicians must have basic technical knowledge adequate to the required interventions. In particular, they must know the main construction methods of the TOROBOT X BRUSHING ROBOT.

1.6 Technical Assistance

The AIRCLEAN & Service technical assistance service is available for clarifications, maintenance interventions to be agreed on a case-by-case basis or on specific request.



AIRCLEAN&SERVICE S.R.L

Registered office: Corso Martiri, 162/a – 41013

Castelfranco Emilia (MO) ITALY

Headquarters: Caduti sul lavoro, 2 – 41013

Piumazzo -Castelfranco Emilia (MO) ITALY

Tel. +39 059/5801486

info@air-clean.it

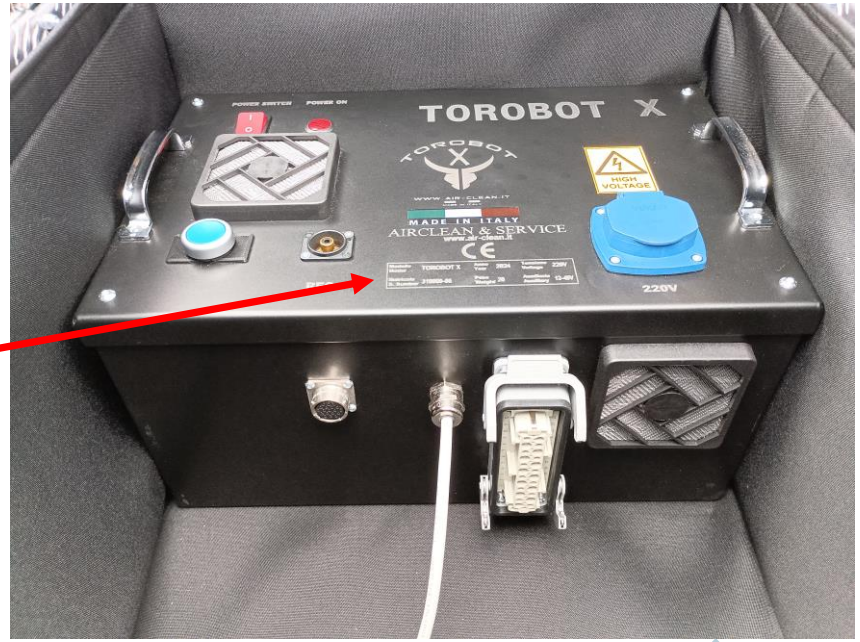
2. TECHNICAL SPECIFICATIONS

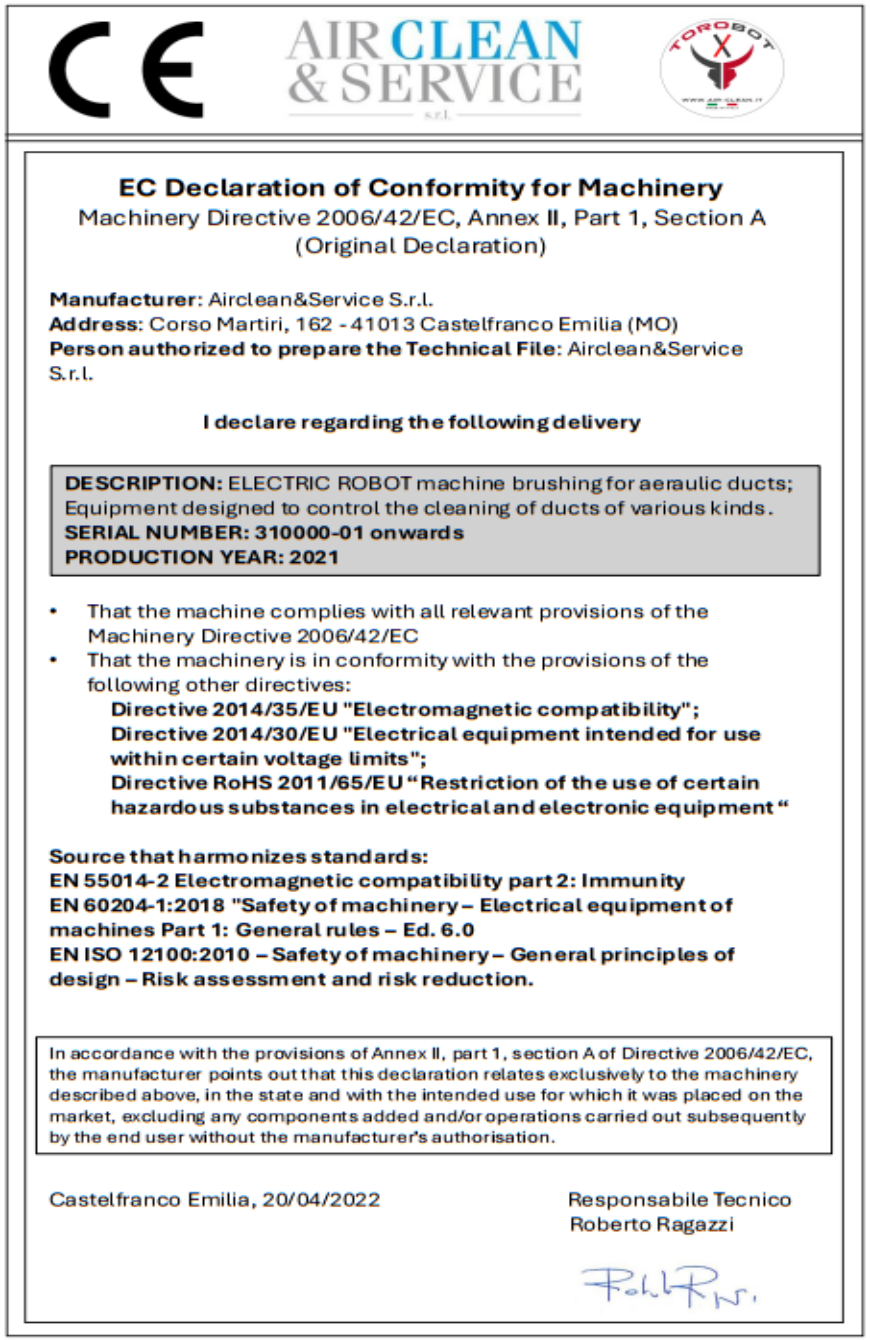
2.1 CE marking

The identification and compliance of the requirements of the Machinery Directive are shown on the plate shown in the figure and by the Declaration of Conformity at the beginning of the manual.

It is forbidden to remove, damage or modify the data on the nameplate.

CE plate fixing point





EC Declaration of Conformity for Machinery
Machinery Directive 2006/42/EC, Annex II, Part 1, Section A
(Original Declaration)

Manufacturer: Airclean&Service S.r.l.
Address: Corso Martiri, 162 - 41013 Castelfranco Emilia (MO)
Person authorized to prepare the Technical File: Airclean&Service S.r.l.

I declare regarding the following delivery

DESCRIPTION: ELECTRIC ROBOT machine brushing for aeraulic ducts; Equipment designed to control the cleaning of ducts of various kinds.
SERIAL NUMBER: 310000-01 onwards
PRODUCTION YEAR: 2021

- That the machine complies with all relevant provisions of the Machinery Directive 2006/42/EC
- That the machinery is in conformity with the provisions of the following other directives:
  Directive 2014/35/EU "Electromagnetic compatibility";
  Directive 2014/30/EU "Electrical equipment intended for use within certain voltage limits";
  Directive RoHS 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment "

Source that harmonizes standards:
EN 55014-2 Electromagnetic compatibility part 2: Immunity
EN 60204-1:2018 "Safety of machinery – Electrical equipment of machines Part 1: General rules – Ed. 6.0
EN ISO 12100:2010 – Safety of machinery – General principles of design – Risk assessment and risk reduction.

In accordance with the provisions of Annex II, part 1, section A of Directive 2006/42/EC, the manufacturer points out that this declaration relates exclusively to the machinery described above, in the state and with the intended use for which it was placed on the market, excluding any components added and/or operations carried out subsequently by the end user without the manufacturer's authorisation.

Castelfranco Emilia, 20/04/2022

Responsabile Tecnico
Roberto Ragazzi

2.2 Declaration of Conformity

The **TOROBOT X** BRUSHING ROBOT has been made of compliance with EU Directive 2006/42/EC
Below is the FAC SIMILE of the Declaration of Conformity
The original will be delivered separately as an attachment to this manual .

2.3 Intended use

The **TOROBOT X** BRUSHING ROBOT is a powerful single-phase electric robot, **TOROBOT X** has been designed and built for the **INTERNAL CLEANING OF VENTILATION DUCTS both with rectangular section**

any other use of the machine is considered improper.

The composition of the **TOROBOT X** brushing robot is indicated in section 2.5

The use of the **TOROBOT X** brushing robot is only possible by mounting a suitable brush and proportionate to the ventilation duct to be cleaned, WITHOUT the brush the machine cannot be used.

Choice of brushes with respect to the duct to be cleaned:

Brushes in rectangular duct and proportional sizing of the brushes.

There are mainly 2 families of brushes:

- SOFT. The bristle is thin, max 0.5 mm, bends easily on itself and offers no resistance in the duct to be cleaned;
- RIGID/AGGRESSIVE. The bristle can reach thicknesses from 0.5 to 1.5 mm, does NOT bend easily and offers a lot of resistance in the duct to be cleaned.

The dimensional ratio of the brush to the rectangular/square duct should not normally exceed 20%-25% of the height of the duct.

Indicative examples

RECTANGULAR/SQUARE DUCTS

Duct mm. 500 x 700 > MAX size soft brush 600 mm

Duct mm. 500 x 700 > MAX size rigid brush 500/550 mm

2.3 Intended use

CIRCULAR/OVAL DUCTS

Duct Diameter mm. 500 > MAX size soft brush 600 mm

Duct Diameter mm. 500 > MAX size Rigid brush 530/550 mm

The choice of the hardness/abrasiveness of the brush is made according to the type of dirt to be removed.

The BRUSHING ROBOT can use brushes up to 1300/1500 mm in size.

Any other USE of the BRUSHING ROBOT is considered improper, unintended, and therefore dangerous. The use of the TOROBOT X BRUSHING ROBOT for other purposes, described in par. 2.3, is considered "IMPROPER USE". Therefore, the company AIRCLEAN&SERVICE S.r.l. is exempt from liability derived from non-compliance with these requirements.

2.3.1 Environment of use

The **TOROBOT X** BRUSHING ROBOT has not been designed to operate in open environments (not protected from atmospheric agents) or for environments where there is a danger of explosion or fire (it is NOT made in explosion-proof configuration).

The ROBOT is not water resistant, it is not waterproof, never use the robot with accessories for liquid sprays or in the presence of water on surfaces

2.4 Prohibited uses

Failure to comply with the followings, relieves the manufacturer of any liability.

It is FORBIDDEN to use the **TOROBOT X** BRUSHING ROBOT in one or more of the following conditions:

- in explosive atmospheres;
- as a system for moving things or people;
- in dangerous conditions or in the presence of malfunctions;
- after modifications or interventions not authorized by the manufacturer;
- to use it other than intended by the manufacturer (improper use);
- by untrained personnel;
- in the event of partial or total non-compliance with the instructions;
- performing operations that are not reasonably foreseeable;
- in the event of a lack of maintenance;

2.4 Prohibited uses

IMPORTANT!

DO NOT use for transporting things or people. It is not allowed to stand with your feet on the BRUSHING ROBOT

TOROBOT X. DO NOT use to transport products other than those approved and defined in agreement with the MANUFACTURER.

These conditions apply to the use of the TOROBOT X BRUSHING ROBOT.

The definition of limits for the presence of personnel is the responsibility of the person in charge of the workstation(s) and may involve more restrictive limitations.

For exceptions to what is reported herein, a specific written declaration by the manufacturer is required.

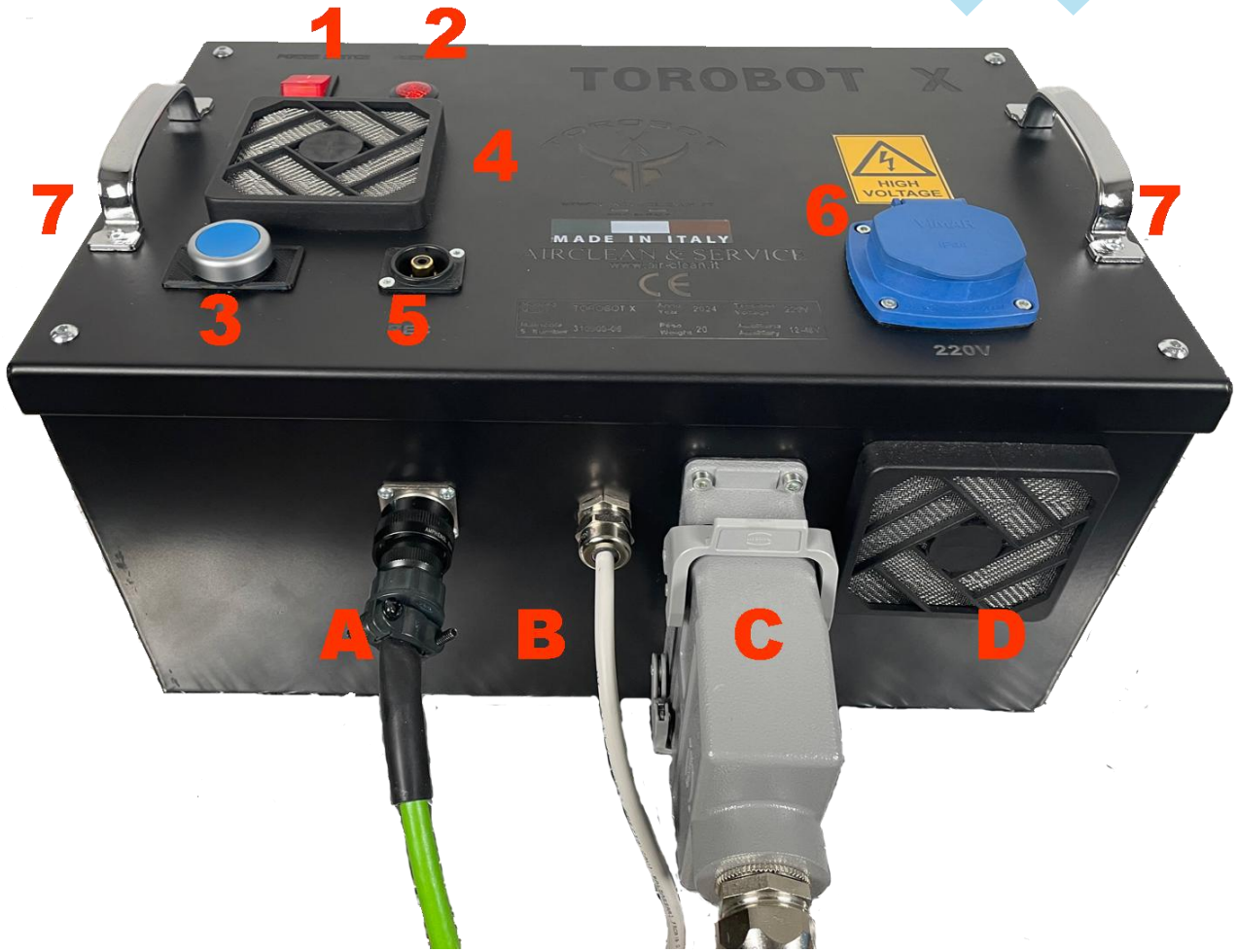
It is not permitted to carry out modifications to parts of the BRUSHING ROBOT that impair its function or add additional risks not considered by the manufacturer.

Any change in operation must be communicated and approved by the manufacturer in writing. Any variation that modifies the risks, if carried out without the manufacturer's authorization, will void all forms of warranty and the EC declaration of conformity.

2.5 Composition of brushing robot

1. Power switch
2. Power LED (red light on with main plug connected)
3. Reset switch
4. Cooling fan (24V)
5. REC, any recording device can be plugged into this socket
6. Auxiliary socket (220 V) to connect accessories as needed (camera, smartphone or video devices)
7. Lifting handles

A. Panel socket joystick connection
B. Main power cable
C. Industrial Panel Socket Robot Connection
D. Ventilation grid for cooling fan



2.5 Composition of brushing robot

1. Robot drive
2. Emergency button
3. Brush motor management (left/right/stop)
4. Camera management (front/rear/top)
5. Brush speed management
6. LCD screen
7. Protective joystick pocket

2.5 Composition of brushing robot

1. Upper case containing electric box, joystick control, this manual and accessories.
2. Lower case containing the brushing robot with its power cable.
3. N°2 doors of the upper case.
4. N°4 rotating wheels, 2 with brake and 2 without brake.

2.5.1 Electrical parts

The electrical parts provided to manage the TOROBOT X are:

- An electrical box (p. 16) with a civil plug
- A control joystick (p. 17)
- An emergency button "2" (p. 17)
- A reset button "3" (p. 16) for starting and restarting the machine after the emergency has been activated.
- At the top there is also the ON/OFF switch for turning the machine on and off.
- A terminal block inside the robot

All cables have a plate with the code to which they belong, the same identifiable on the wiring diagram.

All electrical components and their connections can be found in the enclosed wiring diagrams.

BEFORE OPERATING ON ANY ELECTRICAL COMPONENTS (ELECTRICAL BOX, TERMINAL BLOCK IN THE JOYSTICK, ETC.) DISCONNECT POWER FROM THE MAIN SWITCH SUPPLYING THEM AND DISCONNECT THE MAINS POWER SOCKET

2.5.2 Protections and safety devices

IMPORTANT!

The lack of protections and safety devices does not lead to malfunctions or production defects, it can however, involve situations DANGEROUS FOR OPERATORS, consequently the user must check that they are in good state of efficiency, such as to guarantee their function.

IMPORTANT!

The guards listed below can be removed using dedicated tools (hexagonal keys, Allen keys, etc.), as a result, access to hazardous areas is only possible through intentional procedures. These protections have dimensions and different shapes. Their function is to isolate and contain mechanical or electrical parts, which can create situations of danger to operators.

Fixed covers

Electrical box cover pag. 16

Cover that prevents reaching the electrical panel, avoiding the risk of electric shock.

Protection system

Brake rotating wheels "4" fig. 2.5

The brakes of the rotating wheels have been provided to prevent the movement of the transport case while stationary.

2.5.2 Protections and safety devices

ACCESS TO THE ELECTRICAL PANEL BOX IS CARRIED OUT BY REMOVING THE PROTECTIVE COVER, BY SPECIALIZED AND AUTHORIZED TECHNICAL PERSONNEL, AS THERE ARE LIVE COMPONENTS INSIDE (230 VOLTS) RESIDUAL RISK.

Emergency button "2" pag.17

The emergency button, located on the control joystick of the TOROBOT X BRUSHING ROBOT, is a mushroom button with mechanical locking which, if activated, causes all movements to stop immediately. Resetting is only permitted after the TOROBOT X BRUSHING ROBOT has been correctly restored to optimal condition. The circuit is designed so that, in the event of a connection breakdown, the TOROBOT X BRUSHING ROBOT will be safely stopped.

2.5.3 Controls – Signalling devices

The location of the control and signalling equipment is indicated in paragraph 2.5, their operation is described in chapter 5, while the operation of the software is described in the OPERATOR's MANUAL.

2.6 Machine technical data

General technical characteristics

• Model:	**TOROBOT X**
• Material:	Aluminum/Plastic
• Weight and dimensions:	see Figure 2.6-1
• Noise:	see section 2.7

Electrical system features

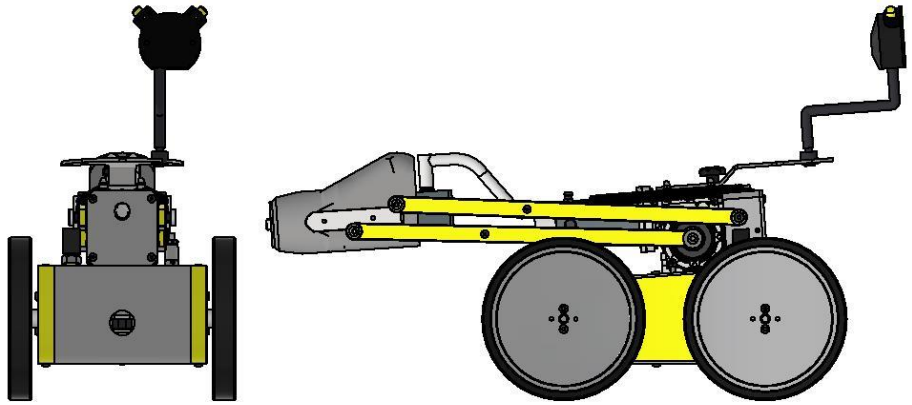
• Voltage:	240V
• Frequency:	50 Hz
• Traction and arm motor voltage:	24V
• Cameras and lights voltage:	12V
• **Brush motor voltage:**	**48V**
• **Brush motor power:**	**290W**
• **Brush Motor torque:**	**8.2Nm**
• Fuses:	Lights+camera 1.25A Traction motors 10A Arm motor 4A Brush motor 10A Main 10A

Do not deviate from the values or processing limits described in the Technical Data of this manual.

Any other use not envisaged, as it does not comply with the design and technical specifications, is to be considered "NOT ALLOWED".

2.6 Machine technical data

Robot weights 20KG.



2.7 Noise

The measured continuous sound pressure level emitted by the TOROBOT X BRUSHING ROBOT is less than 75 dB(A). The measurement was carried out on a typical brushing robot operating near the operators' workstations.

The value shown refers only to the TOROBOT X BRUSHING ROBOT. It is therefore not a value to be taken into consideration as the level of exposure to which operators are EXPOSED IN THE WORK ENVIRONMENT IS HIGHER. Consequently, investigations will have to be carried out to define the sound pressure level and evaluate whether to use hearing protection devices.

3. Safety

3.1 General Safety Warnings

1) Do not allow UNTRAINED personnel to work on the TOROBOT X BRUSHING ROBOT.

2) DO NOT START THE TOROBOT X BRUSHING ROBOT IN FAILURE.

3) Before using the TOROBOT X BRUSHING ROBOT, make sure that any conditions that are hazardous to safety have been properly eliminated. Check that all covers (guards, safety devices) are in place and fully efficient.

4) All maintenance operations must be carried out with the TOROBOT X BRUSHING ROBOT isolated from the energy distribution networks (electrical, pneumatic or other) and with the circuits without pressure.

5) When there is a possibility of being hit by projections or falling solid parts, use goggles with side blinders and, if necessary, hard hats or gloves.

6) Before any manual work on the TOROBOT X BRUSHING ROBOT or on the material being processed, the TOROBOT X BRUSHING ROBOT must be deactivated by performing the "SAFE MAINTENANCE PROCEDURE".

7) ELECTRICAL EQUIPMENT
Connection, commissioning, maintenance, measurements and adjustments to the electrical equipment or its components may only be carried out by qualified personnel.

8) For work to be carried out with live parts, the relevant regulations must be complied with.

3.1 General Safety Warnings

IT IS FORBIDDEN:

- *start the work cycle without first checking that there are no people nearby and that there are no foreign objects on the TOROBOT X BRUSHING ROBOT.*
- *ensure that the commissioning is not dangerous to personnel;*
- *remove or deactivate covers (guards and safety devices). Temporary deactivation of the covers is only permitted for maintenance work;*
- *carry out adjustment or maintenance operations with TOROBOT X BRUSHING ROBOT switched on;*
- *operate on moving parts or electrical parts without first having removed electrical voltage;*
- *tamper with or remove the safety plates placed on the TOROBOT X BRUSHING ROBOT;*
- *carry out modifications to the TOROBOT X BRUSHING ROBOT without the authorization of the manufacturer;*
- *operate or deregulate control apparatus without possessing the appropriate skills;*
- *make inoperative or misuse the safety devices of the TOROBOT X BRUSHING ROBOT or the operating area;*
- *throw water on electrical components;*
- *make holes in conduits or in the passages of electrical cables.*

IT IS MANDATORY:

- *read all the documentation supplied with the TOROBOT X BRUSHING ROBOT before operating;*
- *wear protective equipment suitable for the operations to be performed;*
- *maintain efficient safety systems and emergency buttons;*
- *keep the control instruments efficient and legible, providing for their replacement when they are damaged;*
- *interrupt the process as soon as an anomaly occurs;*
- *keep the safety plates on board the TOROBOT X BRUSHING ROBOT and the joystick controls in good condition and ensure that they remain legible.*

3.2 Residual risks and important recommendations

The covers used in the TOROBOT X BRUSHING ROBOT are such as to reduce or limit accessibility to danger areas. However, the following recommendations should be respected:

- *The TOROBOT X BRUSHING ROBOT is equipped with a powerful twisting force. It is forbidden to rotate the brush freely outside the duct, which could dangerously catch clothing, hair and objects, thus causing potential damage to people or property.*
- *If there are no suitable openings in the duct to be cleaned, it is a good idea to create them in order to correctly access the internal part of the duct, minimum opening for the BRUSHING ROBOT is 500x400mm in rectangular ducts, diameter 500mm for circular ducts.*
- *The opening in the duct must be such that it can allow you to work easily and safely. The sizing of the openings with respect to the duct is regulated by UNI EN 12097.*
- *Avoid working on ladders, use special scaffolding with wheels, which are more stable, safe and spacious than a ladder.*
- *Make at least two openings: from one, connect, through a hose, a negative air machine equipped with special filters that creates a capture current for dust; on the opposite side, insert the BRUSHING ROBOT.*
- *Do not operate the TOROBOT X BRUSHING ROBOT in internally insulated ducts. Do not use TOROBOT X BRUSHING ROBOT with brushes that are not approved by Air-clean.*
- *Do not use the TOROBOT X BRUSHING ROBOT without having prepared the connection of a negative air machine to collect dust, the cooling of the brush motor is obtained with the air flow generated by both the rotating brush and the negative air machine.*

500x400mm

3.2 Residual risks and important recommendations

- ***Never use the TOROBOT X BRUSHING ROBOT with chemicals, liquids of any kind, or wet cleaning methods, the machine is not resistant to liquids.***

- ***Do not use the TOROBOT X BRUSHING ROBOT to spray encapsulating products or other liquids for lining rock wool pipes or other insulation inside.***

Avoiding cross contamination

During the cleaning phase, contaminants such as dust, mold, bacteria can come into contact with the machine and settle on its surface, even the power cable can become covered with dirt and polluting sediments.

Clean the cable well as you retrieve it by moving backwards with the robot, to do this use a microfiber cloth and a disinfectant detergent.

Ask your supplier for the most suitable system to keep the Torobot X clean

After using the robot, before repositioning it in its transport case or transporting it to other areas that need to be cleaned, sanitize its surface and cable, taking care not to get the machine too wet.

Also clean the transport wheels on the metal case well.

DANGER HIGH VOLTAGES (230 VOLTS)

Risk of electric shock

When operating inside the electrical panel box or inside the terminal board of the control joystick, it is necessary to disconnect the voltage from the main switch that supplies them or disconnect the plug, otherwise voltage remains in the power supply terminal blocks.

3.2 Residual risks and important recommendations

IMPORTANT!

IT IS FORBIDDEN:

- *TOUCHING MOVING OR ELECTRICALLY POWERED PARTS. ONLY SPECIALIZED AND AUTHORIZED OPERATORS CAN WORK ON POWERED PARTS;*
- *TOUCH THE MOVING BRUSH;*
- *EVADE THE OPERATION OF THE EMERGENCY BUTTON;*
- *CARRY OUT ADJUSTMENT OR MAINTENANCE WORK WITHOUT FIRST CARRYING OUT THE MAINTENANCE PROCEDURE SAFELY.*
- *LEAVE THE TOROBOT X BRUSHING ROBOT UNATTENDED WITHOUT THE ROTATING WHEEL BRAKE OF THE TRANSPORT CASE ENGAGED.*

3.3 Safety signs

Keep the signs in good condition and legible conditions. If they are worn or removed from the TOROBOT X BRUSHING ROBOT, it will be necessary to apply identical ones to the previous ones in the points described below.

Label	Description
	**Danger voltage 230 Volt** **Adhesive plate attached to the Electrical Panel Box to indicate the risk of electric shock to the components inside the Electrical Panel Box. Do not approach live components with tools such as screwdrivers, etc.**

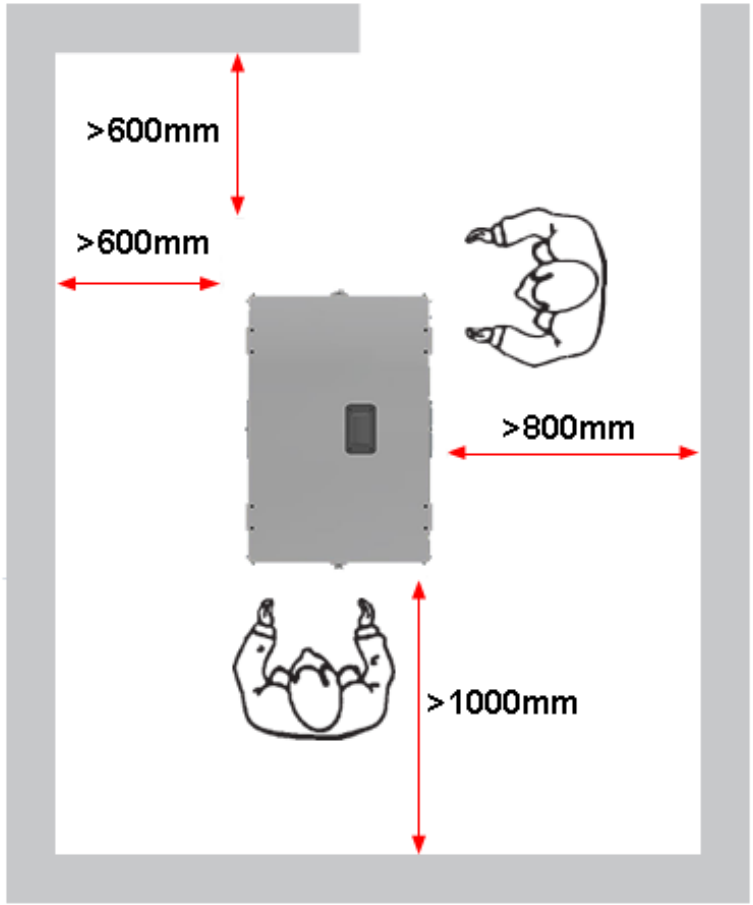
4. HANDLING AND INSTALLATION

4.1 Work environment requirements

The correct preparation and control of the conditions of the working environment in which the TOROBOT X BRUSHING ROBOT operates is certainly a fundamental requirement for its correct and safe operation.

It is the user's responsibility to prepare:

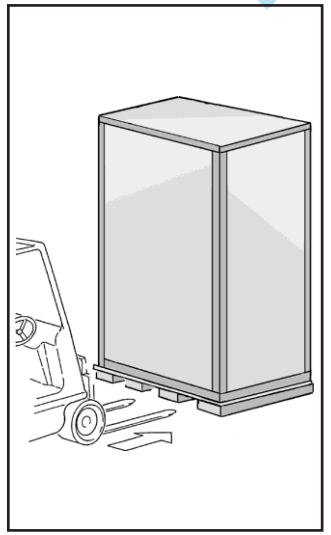
- the room with the spaces necessary for the use of the TOROBOT X BRUSHING ROBOT;
- the lanes for the circulation of lifting equipment (forklifts, cranes, etc.) must be clearly identifiable by operators;
- the spaces intended for the stationing of the operators necessary for use and maintenance;
- the arrival line must be connected to a main switch, having a breaking capacity equal to the adequate load; The value is shown on the wiring diagram. Arrange for the correct conduct of the earth connection.



4.2 Unloading from the means of transport

The TOROBOT X BRUSHING ROBOT is unloaded from the means of transport using a suitable lifting vehicle.

- Unloading operations from the means of transport and handling must be carried out by qualified personnel.
- During unloading and handling operations, the presence of a helper is necessary for any signals during transport.
- The capacity of the lifting equipment must be greater (with a safety margin) than the self-weight of the components to be transported.
- Lifting must be carried out continuously, without jerking or sudden movements.
- It is forbidden to pass and stop under suspended loads.



4.3 Moving the transport case

The transport case of the TOROBOT X BRUSHING ROBOT is equipped with four wheels that make it easy to move. If the surfaces on which it must pass are uneven, it must be lifted by means of a lifting device.

It is also possible to move only with the upper part by removing it from the lower part by means of hooks located on the sides of the case.

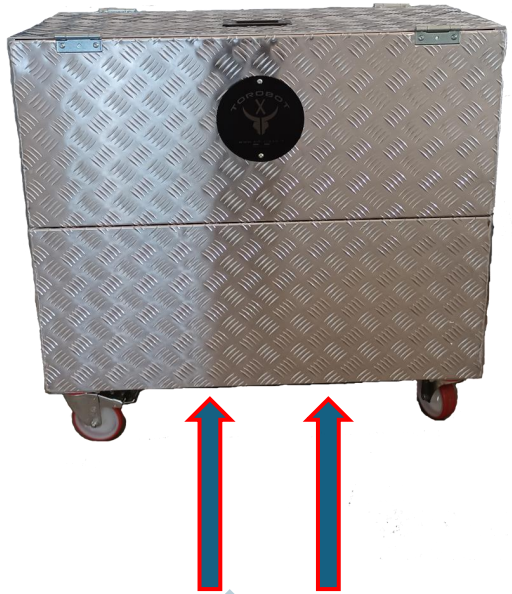
4.3.1 Manual moving

The TOROBOT X BRUSHING ROBOT is handled using the two hand slots on the sides of the transport box

Before moving the transport case of the TOROBOT X BRUSHING ROBOT, release the brake of the two rotating wheels. Once the movement is complete, apply the brake again to the two rotating wheels.

4.3.2 Moving with lifting equipment

Insert the forks of the lifting device as shown in the figure and lift the TOROBOT X BRUSHING ROBOT.



4.4 Installation and commissioning

1. Move the transport case like a normal trolley, using the wheels provided and bring it to the desired position.

2. Apply the brake of the rotating wheels.

3. Connect the electrical plug "B" to the electrical outlet at the installation site.

4. Connect the male plug of the green cable of the joystick to the female socket "A" of the electrical box.

5. Connect the male plug of the 21 meters cable to the female socket "C" of the electrical box, the opposite side of the cable is fixed directly inside the robot.

For the green cable of the joystick, the connection must be corresponding with the two large notches on each part, once inserted simply turn the ring clockwise until the "click".

5. Handling and installation

5.1 Control equipment

5.1.1 Control panel

Main switch

Switching the operation of the TOROBOT X BRUSHING ROBOT on and off.

Power light

If the red light is on, the electrical box has power.

BLUE "EMERGENCY RESET " button

Enables the TOROBOT X BRUSHING ROBOT at start-up.

Mushroom button "EMERGENCY"

Causes the TOROBOT X BRUSHING ROBOT to stop immediately by removing the voltage.

REC socket

It allows video recording via external device.

Auxiliary socket 220 volts

Socket to connect accessories as needed.

Robot drive

Manages robot movement (forward, backward, right, left)

Touch screen control panel

Manages the commands of the TOROBOT X BRUSHING ROBOT.

To find out about its functions, see point 5.5 Use operating functions (how to work with the machine).

Arm switch

It manages the ascent and descent of the arm of the TOROBOT X BRUSHING ROBOT.

5.2 Start-up

Press the main switch to the "I" (ON) BUTTON 1 position to turn on the TOROBOT X BRUSHING ROBOT.

5.3 Emergency stop

The emergency stop is carried out:

- by pressing the emergency button BUTTON 4;
- pressing the main switch to OFF "0" BUTTON 1

Following one of these operations, the TOROBOT X BRUSHING ROBOT stops instantly;

5.3.1 Restoration of operation due to activation of the emergency button

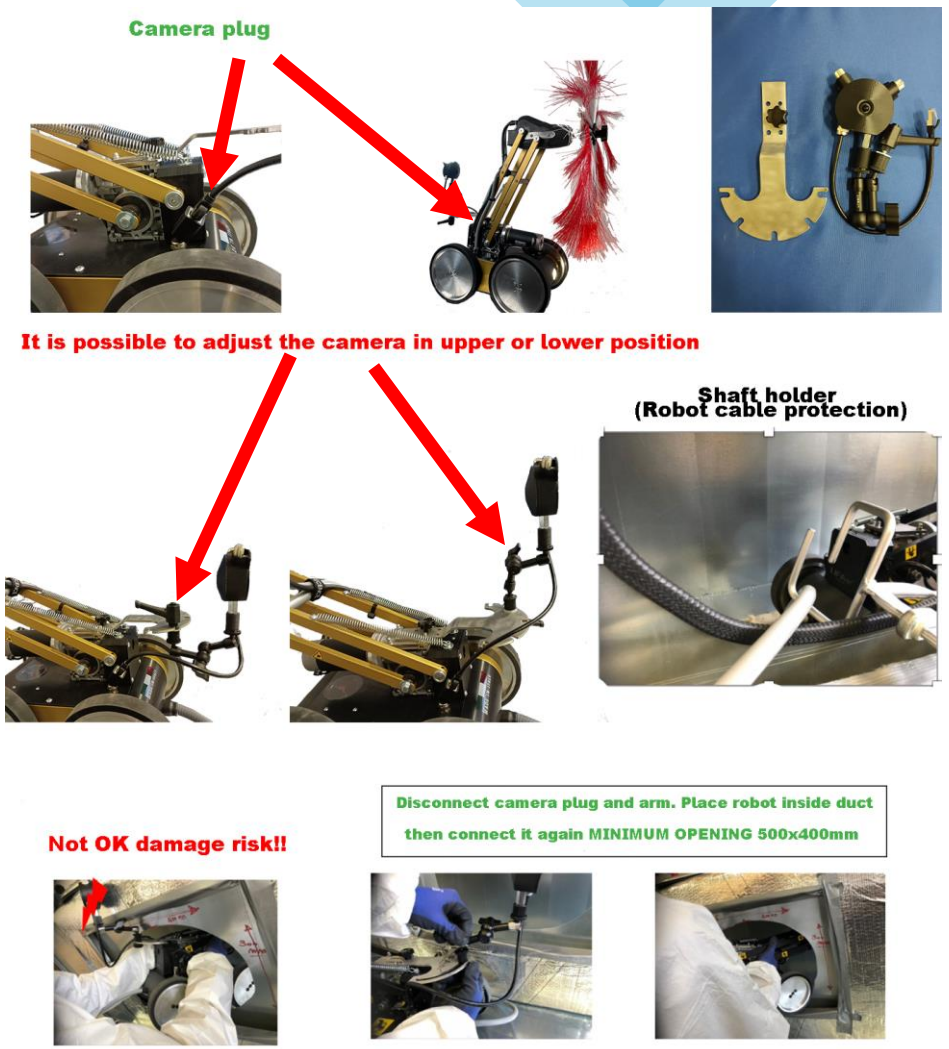
To restore the working condition, it is necessary to:

- remove the cause of the alarm;
- unlock the emergency button by turning it clockwise.
- press the EMERGENCY RESET BUTTON 3 setting the TOROBOT X BRUSHING ROBOT to work condition.

5.4 Camera Setup

In order to facilitate the management of the front camera for the operator, we have applied a quick connection via RJ45 plug, to be disconnected with a "click" of the camera accessory.

In fact, many times it can be inconvenient to insert a heavy machine inside an air duct through the opening, so it is recommended to detach the camera mount, unscrewing the plastic knob and the cable plug before introducing the TOROBOT X BRUSHING ROBOT; then, when the machine is safely inside, reassemble the camera mount and adjust it by looking at the correct view with the LCD display on the joystick panel.



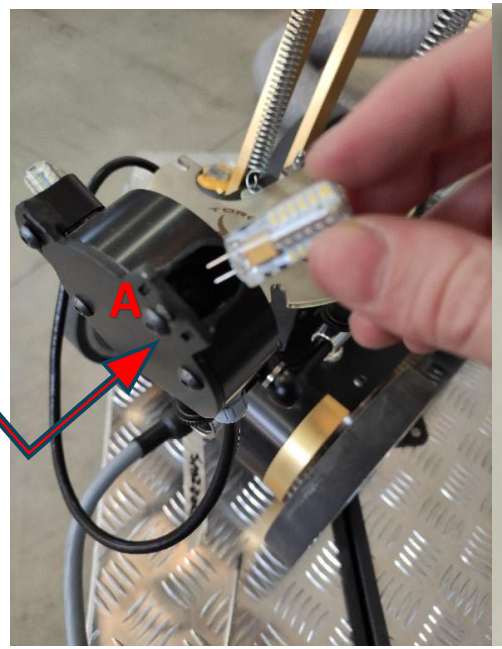
5.4 Camera Setup

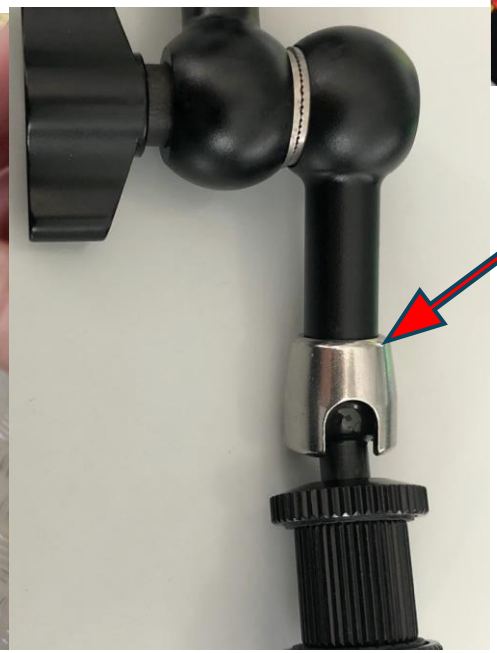
The front camera can be manually adjusted to the size of the duct very easily, simply by (gently) unscrewing the black knob on the camera arm.

By releasing it, the arm will be completely loosened and you can rotate and secure it in any position you need.

Once the position is reached, gently lock the knob and all arm positions will be locked at the same time.

The bulbs are replaceable, by unscrewing the screw (A) on the back of the cover, the bulb comes off being mounted on its lamp holder





Attention!!

When setting the camera arm, remember to find this opening before turning the arm to the correct position, then 1) release the plastic knob, when it is loose, turn the arm to this opening, then find the position and lock it again

5.5 Use of OPERATING functions

- Operation phase: Place the robot inside the duct, be careful when lifting it not to exert excessive effort, the robot weighs 20 kg, use your legs to lift it without stressing your back excessively.
- **Overheating:** **Always keep in mind that the rotation of the motor creates overheating, the cooling of the motor comes by the rotation of the brush but above all by the air flow generated by the negative air machine.**
- Types of power supply: The robot can operate with voltage from 100 to 230 V, so it is also possible to use it in countries such as the UK or the USA without making any modifications.

Drive the robot via joystick (button 1), on the right side of the joystick it is placed the arm up/down switch (button 2), control the brush rotation with SX (left) and DX (right) and STOP buttons to stop the rotation (buttons 3) and you can adjust the speed via – and + buttons (buttons 5).

The TOROBOT X BRUSHING ROBOT has three cameras: front (CAM FRONT), rear (CAM POST) and upper for wide visibility (CAM SUP) (buttons 4) to have maximum control of the cleaning work carried out via the LCD screen "8"; any cleaning job carried out can be recorded via SD card with the built-in recorder "9" by pressing the REC button (the red indicator light will start flashing).

5.5.1 Cleaning phase

Once the various cables have been connected, connect the main plug to the main grid (the red light next to it will light up indicating that there is voltage) and turn on the ON switch.

At this point it is possible to start testing the robot outside the duct by verifying all the operating functions, at this stage do not use the machine with the brush, it could be dangerous for people or property.

After achieving practical handling with the machine, it is possible to introduce it inside the duct with the negative air machine on, mount the right brush and start the cleaning session considering that:

The brush should not force too much into the ducts, a brush that is too large for the size of the duct can cause overloading for the machine.

To work properly with the machine, the brush arm should be kept high in the center of the duct and, when necessary, increase the arm pressure for the time necessary to brush away any dust or debris.

Do not use Tynex brushes or antistatic brushes or other brushes that are too aggressive on pre-insulated ducts (the internal part is made of aluminum and can be damaged by strong mechanical action).

When guiding the robot to the negative air machine, make sure that the robot's cable is completely unwound and free to move inside the duct, be careful of the sharp edges of the metal of the access door opening, use the SHAFT HOLDER TO SLIDE THE CABLE WITHOUT ANY RISK OF CUTTING.

When bringing the robot back, use the rear camera to bring it back safely, at the same time gently pull the cable back, and use a damp microfiber cloth to wipe it as it exits the duct.

Always use the LCD screen to see the progress of the work and do not go with your head inside the duct to see "how it works".

The clamp must be locked on the opening of the duct, inside the special passage welded on the clamp the cable must be inserted

5.5.1 Cleaning phase

Do not use the robot if there is water or high humidity inside the air duct or with chemicals or grease cleaning products (kitchen or other ducts with liquid or muddy grease).

Do not use the robot for any other purpose but for cleaning air ducts.

5.6 Brush Examples and Maximum Usable Size

Soft nylon brush	Combined nylon brush	Aggressive brush M12
		
Nylon center brush	**Abrasive tynex brush**	**Nylon and antistatic nylon brush**
		

The TOROBOT X BRUSHING ROBOT can use any type of brush up to a diameter of 1500mm.

To use non-center Nylon brushes, they must be fixed with a cotter pin once the M12 thread has been screwed into the appropriate hole in the accessory on the brush motor.

For information on the correct instructions for use of the brushing machine and its accessories, please contact:

AIR CLEAN&SERVICE S.r.l.

Registered office: Corso Martiri, 162 - 41013 Castelfranco Emilia (MO)
Tel. +39 059/923266 - Fax: +39 059/9536184

Headquarters: Caduti sul lavoro, 2 – 41013 Piumazzo – Castelfranco Emilia (MO)Tel. +39 059/5801486

5.6 Video recording

There are multiple ways to make video recordings

1) MINI DVR built into the joystick (record to SD card)

When red LED is lit steadily it means that the DVR is working, press the REC button to start recording and the red LED will start flashing; to stop recording, press the REC button again and the red LED will stop flashing.

2) External DVR on Demand (Record to SD Card)

Connect the yellow cable to the REC socket

3) USB Converter Video Grabber for Laptop

Connect the yellow cable to the REC socket

To connect you need to install the software that comes with the video grabber and have a video management program installed on your PC

SYSTEM NOT INCLUDED (WE DO NOT TREAT IT)

6. Maintenance

6.1 General Safety Warnings

IT IS FORBIDDEN TO CARRY OUT MAINTENANCE, LUBRICATION, REPAIR WORK WHEN THE TOROBOT X BRUSHING ROBOT IS ELECTRICALLY POWERED.

Report the of maintenance operations in progress by displaying special warning signs.

- *Cleaning, ordinary and extraordinary maintenance must be entrusted exclusively to expert personnel who know the TOROBOT X BRUSHING ROBOT. Unauthorized persons must keep a proper distance from it. No untrained person may operate or linger in the vicinity of the TOROBOT X BRUSHING ROBOT during operation or maintenance.*
- *The removal of the covers and/or the deactivation of the safety devices must be carried out only by specialized and authorized personnel; for the duration necessary for maintenance operations, after which it will be necessary to restore the initial conditions of use.*
- *After each intervention, always reassemble any covers that have been removed, bringing the TOROBOT X BRUSHING ROBOT back to its initial state.*
- *Adequately illuminate the work area during maintenance and repair operations. It is forbidden to use matches, cigarette lighters, torches, open flames as means of lighting.*
- *Where necessary, use personal protective equipment (such as non-slip shoes, helmets, gloves, goggles) that comply with the regulations in force in the country of use of the TOROBOT X BRUSHING ROBOT. Wear protective equipment suitable for the operations to be carried out. Clothing must be close to the body and resistant to cleaning products. Avoid wearing ties, necklaces, or belts that could get caught or caught between moving parts.*
- *Before putting the TOROBOT X BRUSHING ROBOT back into operation, check the closure of the fixed covers, failure to observe this warning may result in serious danger to personnel.*
- *Always keep in mind all the safety regulations listed in the following manual and those established by the regulations in force in the country of installation.*

6.2 General rules of good maintenance

To ensure regular operation and prevent any anomalies, the maintenance technician must comply with the intervention frequencies indicated in the **"ORDINARY AND SCHEDULED MAINTENANCE"** table.

Keep the **"MAINTENANCE REGISTER"** up to date, which must be completed by a person responsible for the maintenance of the TOROBOT X BRUSHING ROBOT by those carrying out the interventions, in particular during the warranty period.

When disassembling components, avoid allowing dust residues to enter the work areas and the components themselves.

Do not use sponge fragments, damp and/or abrasive cloths and filamentous rags to clean;

Do not use gasoline or flammable solvents as a cleaning agents, but always use authorized non-flammable and non-toxic commercial solvents.

When replacing components, it is advisable to use ORIGINAL SPARE PARTS or equivalent if authorized in writing by the Manufacturer.

Ensure the safe disposal and treatment of consumables and auxiliaries as well as replaced components, in compliance with the regulations in force for environmental protection in the country where the TOROBOT X BRUSHING ROBOT is used.

6.3 Safe maintenance procedure

The procedure below must be carried out before any ordinary and extraordinary maintenance operation, it involves isolating the plant from all energy sources.

- ***Equip yourself with PPE and tools suitable for the type of work to be carried out.***
- ***Turn the Main Switch to the "0" (OFF) position.***
- ***Disconnect the industrial plug from the power outlet.***

Attention! Only specialized and authorized operators are allowed to work on powered components.

6.4 Ordinary and scheduled maintenance

Ordinary and scheduled maintenance includes all the periodic operations necessary for the good management and optimal conservation of functional and control equipment.

Frequency of interventions	Operations	Procedure
Every week	Covers, safety and control devices check	If their state of wear or operation is precarious, proceed to replace them. In particular, check the function of the emergency button. **Keep them checked, clean and in good working order at all times**.
	Safety sign control	Check the presence and legibility status of the safety signs applied to the TOROBOT X BRUSHING ROBOT
Every three months	Control of the electrical panel box	Carry out cleaning using vacuum cleaners and dry antistatic cloths. Check that all screws related to terminals, circuit breakers, relays, etc. are correctly tightened. **The power cables in the electrical panel, even with the main switch set to "0", remain POWERED (RISK OF ELECTRIC SHOCK!!).**
Every year	Annual maintenance	Carry out a general check of the state of wear and tightening of all components, including the electrical equipment and the instruction manual.

For all ordinary maintenance operations not mentioned in the table and for extraordinary maintenance operations, please contact AIRCLEAN&SERVICE S.r.l.

6.5 Extraordinary maintenance

Extraordinary maintenance operations concern breakages or adjustments of components where specific knowledge of the fault is required, consequently it is necessary to contact the manufacturer.

All the safety warnings described above also apply to extraordinary maintenance work.

6.6 Problem solving

- ***BRUSH MOTOR DOESN'T WORK***
  - ***a) Turn the main power off and on again.***
  - ***b) Check the FU48S fuse inside the electrical box.***
  - ***c) Check the two relays RES1 and RES2 that the LEDs light up when the switch is operated and the two orange coils are engaged all the way in.***
  - ***d) If you do not experience any of the above problems, please contact support***
- ***ARM UP/DOWN DOESN'T WORK***
  - ***a) Check the fuse FU24A inside the electrical box.***
  - ***b) Check if the arm does not have free movement by hand (with the power off) for any gear problems on the gearbox, contact the service if this problem occurs.***
  - ***c) If you do not experience any of the above problems, please contact support.***

6.6 Problem solving

- ***ROBOT MOVEMENTS DOESN'T WORK***
  - ***a) Check the FU24 fuse inside the electrical box.***
  - ***b) Check that the chain drive is all regular by moving the two front wheels by hand so that they don't freely move.***
  - ***c) If you do not experience any of the above problems, please contact support.***
- ***LCD SCREEN DOESN'T WORK***
  - ***a) Check that the LCD screen is on AV1.***
  - ***b) If the robot lights also do not work, check the FU12C fuse inside the electrical box.***
  - ***c) If you do not experience any of the above problems, please contact support.***
- ***RECORDING ON SD CARD DOESN'T START***
  - ***a) The robot comes with 64GB SD card, you can use cards with a smaller size but not with a larger size as it would not be read properly by the DVR.***
- ***Robot drive in circular ducts***
  - ***a) Be careful when advancing on circular ducts, the lack of the horizontal optical reference must be taken into consideration, the robot risks to crash unvolountarly upside down, to correctly check the advance phase, it is advisable to check every meter with the rear camera in order to use the cable as an optical reference point to prevent the machine from unknowingly climbing to the side with the risk of crashing upside down.***
  - ***b) Optional anti-crash upside down kit available on request.***

6.7 Spare Parts

To order spare parts, you must fill out the form on the next page, otherwise always specify:

- Customer name and identification data;
- Order number (or protocol);
- Identification data of the TOROBOT X BRUSHING ROBOT (model, type and serial number);
- Codication part and component name;
- Quantity to order.

Replacement of spare parts must be entrusted to qualified, instructed and authorized technicians.

Please note that with regard to parts that affect safety, the Customer is obliged to always purchase original spare parts (or equivalent authorized in writing by the manufacturer) as the use of non-original spare parts and/or incorrect assembly of the same, frees the manufacturer from any liability.

In case of need, please contact:

AIR CLEAN&SERVICE S.r.l.

Registered office: Corso Martiri, 162 - 41013 Castelfranco Emilia (MO) Tel. +39 059/923266 - Fax: +39 059/9536184

Headquarters: Caduti sul lavoro, 2 – 41013 Piumazzo – Castelfranco Emilia (MO)Tel. +39 059/5801486

To simplify the ordering of spare parts, we recommend that you photocopy or print the "SPARE PARTS ORDER FORM" (par. 6.7.1), then complete it in all its parts and send it to the Spare Parts Service indicated above.

6.7.1 Spare Parts Order Form

SPARE PARTS REQUEST FORMMail:
info@air-clean.it

CUSTOMER: .....VIA:..... N .....

Please take note of our orderN°..... of..... with delivery requested on.....

for the BRUSHING ROBOT TOROBOT X serial number.....

Serial number	Nr	Ref.	Note
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....
.....	.....	.....	.....

Timbro e firma

Note: .....

.....

Date: .....

6.8 Maintenance register

Note all extraordinary maintenance interventions in the following table.

Date	Type of intervention	Time taken	Signature

6.8 Maintenance register

Date	Type of intervention	Time taken	Signature

7. Decommissioning

7.1Introduction

Decommissioning means that the TOROBOT X BRUSHING ROBOT is parked in non-operational conditions for an extended period of time

- Unplug the electrical power cable

If you have to store the TOROBOT X BRUSHING ROBOT for long periods of inactivity, it is recommended to protect it with waterproof material.

If the TOROBOT X BRUSHING ROBOT is parked for a long time not under normal use, it is recommended not to expose it to the elements, as this would cause serious damage to many of its electrical components.

Store the TOROBOT X BRUSHING ROBOT indoors under environmental conditions within the following values:

- Temperature: -10/+45 °C;
- Relative humidity 90% Max.;
- Closed and sheltered from atmospheric agents.

Values other than those indicated above can seriously damage the components.

7.2 Dismantling, demolition and waste disposal

Dismantling and demolition operations must be entrusted to specialized personnel with the mechanical and electrical skills necessary to work safely. For these operations, contact Airclean&Service S.r.l.

For legal and tax aspects (any reports, complaints, etc.) comply with the laws in force in the country where the TOROBOT X BRUSHING ROBOT has been installed

Disassembly procedure

- disconnect the electrical power supply to the electrical box and observe the manufacturer's instructions for long periods of inactivity;
- disconnect the cables from the terminal block of the electrical box;
- disassemble all the parts of the TOROBOT X BRUSHING ROBOT and divide the components to be discarded and reused considering that the structure is made of iron/aluminum. The electrical box is made of sheet metal.

Each material of which the TOROBOT X BRUSHING ROBOT is made must be treated, disposed of or recycled, according to the classification and legislation in force in the country of use.

EC Declaration of Conformity for Machinery

Machinery Directive 2006/42/EC, Annex II, Part 1, Section A
(Original Declaration)

Manufacturer: Airclean&Service S.r.l.
Address: Corso Martiri, 162 - 41013 Castelfranco Emilia (MO)
Person authorized to prepare the Technical File: Airclean&Service S.r.l.

I declare regarding the following delivery

DESCRIPTION: ELECTRIC ROBOT machine brushing for aeraulic ducts; Equipment designed to control the cleaning of ducts of various kinds.
SERIAL NUMBER: 310000-01 onwards
PRODUCTION YEAR: 2021

- That the machine complies with all relevant provisions of the Machinery Directive 2006/42/EC
- That the machinery is in conformity with the provisions of the following other directives:
  Directive 2014/35/EU "Electromagnetic compatibility";
  Directive 2014/30/EU "Electrical equipment intended for use within certain voltage limits";
  Directive RoHS 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment "

Source that harmonizes standards:
EN 55014-2 Electromagnetic compatibility part 2: Immunity
EN 60204-1:2018 "Safety of machinery – Electrical equipment of machines Part 1: General rules – Ed. 6.0
EN ISO 12100:2010 – Safety of machinery – General principles of design – Risk assessment and risk reduction.

In accordance with the provisions of Annex II, part 1, section A of Directive 2006/42/EC, the manufacturer points out that this declaration relates exclusively to the machinery described above, in the state and with the intended use for which it was placed on the market, excluding any components added and/or operations carried out subsequently by the end user without the manufacturer's authorisation.

Castelfranco Emilia, 20/04/2022

Responsabile Tecnico
Roberto Ragazzi