LIFA Duct Control Cleaning Robot

OPERATING AND MAINTENANCE INSTRUCTIONS

Combined brushing machine and inspection camera robot operated with electricity and compressed air, for circular and rectangular ducts.

These instructions must always be available to personnel using the equipment. Please read instructions before operating the machine. Observing the instructions carefully will guarantee many years of trouble-free use.

IMPORTANT!
Read this manual before you operate the machine

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General directions

Lifa Duct Control Cleaning Robot, electrically driven cleaning robot with inspection camera equipment and compressed air operated cleaning machine. In order to rotate brush a separate compressor is needed. It is also possible to spray liquids or air-jet simultaneously while brushing (separate feeding hose needed). It is constructed for inspecting and cleaning of different kind of ducts, circular and rectangular, pipes and crawl spaces in dry conditions.

The unit is NOT water resistant; it cannot be used in wet conditions, like sewage pipes!

It is forbidden to use the equipment for any other purpose without permission from the manufacturer. If the equipment is used for a purpose other than that for which it is designed, the manufacturer is not responsible for the possible consequences.

The equipment may only be used by personnel who have been trained in its use and who have read the operating and other instructions supplied by the manufacturer.

The persons responsible for operating the machines or equipment must acquaint themselves with their structure, functions and safe use.

No safety functions may be removed or disabled while the machine is being used.

If the machine has to be installed in a way that stops or impairs the functioning of its original safety functions, the personnel in charge must be notified of this immediately.

The equipment covered by these instructions has been manufactured according to the current laws, statutes and bylaws of European Union. Viewpoints and regulations on the safe use of machines change over time. If the person using the Lifa's equipment notices any reasons or possibilities for improving work safety, Lifa Air Ltd. would be most grateful to receive such information.

IMPORTANT!
Always save the inspection report given with the machine: this is the proof of purchase for you and helps to order the right spare parts for your unit (some components may change over time). Also, the CE-marking plates in robot may fade over time and use, so necessary information is found from your office records also.

Lifa Duct Cleaning Robot

Congratulations for your new Lifa Duct Control Cleaning Robot from Oy Lifa Air Ltd. Lifa Duct Control Cleaning Robot is designed and manufactured according to international quality- and environmental management system ISO 9001:2008 and ISO 14001:2004.

Lifa Duct Control Cleaning Robot video inspection system and brushing machine is a 12V electrically driven unit primary for cleaning and inspecting the inside surfaces of air ducts or pipes ranging from 200mm in height and 300mm in width up to 700 mm in height.

Technical information

Operating power	Compressed Air
Brush motor	Pneumatic motor
Rotating speed of the brush	Step less up until 800 rpm
Sound	79,2 dB(A) ISO/CD 15 744
Air consumption of the motor	340 l/min, 7 bar (100psi)
The required compressor	350 - 450 l/min constant flow. 7 bar
Driving control	Joy stick box
The change of the rotating direction	Manual switch valve on the double hose reel
Brush connection	M12
Nozzles	Fast coupling ¼" at robot body
Height	190 mm (7 inch)
Width	280 mm (11 inch)
Length	410 mm (16 inch)
Weight of robot / with control boxes	8 kg / 20 kg (21 lb / 54 lb)
The length of the cable	25 m (82 ft)
Drive motor circuit (fuse/breaker)	12V (5A)

It is forbidden to make any alterations to Lifa Duct Control Cleaning Robot.

CE-plate is situated both on the robot and carrying box.
The information on the CE -plate must be taken into account during connection, maintenance and when ordering spare parts.

Operating instructions

1. Permissible use

Lifa Duct Control Cleaning Robot is a ventilation air ducts cleaning machine that operates with compressed air. It cleans the inner surfaces of the ventilation ducts with a rotating brush and/or air-jetting. The machine is meant for both circular and rectangular ducts. Through built-in camera the cleaning operation can be monitored real time or recorded. Any other use is forbidden without a written permission from the manufacturer.

2. General

Lifa Duct Control Cleaning Robot is designed for demanding cleaning tasks in rectangular and circular ventilation air ducts. A suitable duct size is 315-700mm round duct and rectangular ducts from 200mm height up to 700mm. The special feature of the Duct Control Cleaning Robot is the use of compressed air for brush rotation and electrical controls for height control and other operation. The pneumatic system also enables a compressed air operating remote controlled spraying of chemicals or air-jetting instead of brush rotation when needed.

The rotating brush mechanically cleans the dirt that has accumulated in the walls of the duct. The brush operates in both directions (left / right). The rotating speed of the brush is adjusted with a separate inlet valve either connected to the hose or in the compressor.

The operating range is approximately 20 m from the service hatch / access door in both directions (40m). The brushed off dirt is collected in to a bag filter of the negative pressure air vacuum unit, i.e. LIFA Hepa Clean 2500, 4000 or LIFA Air Clean 3500.The minimum size of the service hatch / access door is 300 mm in width and 200 mm in height.

Duct Control Cleaning Robot is started and turned off by switching the main switch in control box. Then the actual driving and other controlling of the robot happens with the joy stick box.

Duct Control Cleaning Robot is positioned on flat surface in to suitable direction from the service hatch/access door.

Principle of operations

The robot is steered by a joystick at the control box of Duct Control Manual or Mini. At the joystick box is also a switch button for the camera's LED lights. Brush rotation direction and lifting arm height control is done manually on the robot itself.

Duct Control Cleaning robot can be used to inspect both circular and rectangular ducts.

Camera

The view inside the duct is seen from the TFT monitor. The angle of view can be adjusted manually: loosen the tightening screw and tilt the camera into desired position, then lock the angle by tightening the screw again.

The lights of camera can be adjusted, or the camera automatically reacts to lightning.

Video can be recorded on a separate standard SD card recorder (not included) through a RCA type/analogue output. It is also possible to view the recording from the TFT display. Alternatively, the view can be recorded on a laptop PC computer by using a video grabber picture card (accessory) that converts analogue video signal to digital through USB 2.0 feature.

Please, read the separate instruction manual from the manufacturer for both the
TFT monitor and video grabber picture card recommended by Lifa Air Ltd.

Driving

Before any operation, train yourself by driving on the floor and under the furniture to be able to control the movements of the Robot.

Hold the Joystick Box with your both hands and push the joysticks forward. The Robot will then crawl straight forward. It is to be backed/reversed by pulling the joystick backwards. Turning is done by switching the joystick crosswise.

The accessory extra weight (not included) gives additional grip for the wheels, when driving out the full length of the cable.

When you feel ready-to go, put the Robot in the duct through an access door or other suitable entrance for the equipment. Adjust the light according to the darkness and reflections in the duct. Drive smoothly forward looking the view inside. Be careful about the possible sharp edges and screws, which are a risk for the cable and the whole robot might get stuck when the cable tangles around such object!

If the Robot gets stuck in the duct, do not pull it from the cable aggressively in order to avoid damaging the cable! Try to drive the robot forward and back and gently draw the cable at the same time. If not succeeded, you may have to cut an extra access opening to the duct to collect the robot or use a glass fiber rod to catch and release the stuck Robot/Cable.

Safety

The following safety precautions must be taken into account in order to avoid injury to personnel or damage to the environment or to the Lifa Duct Control Cleaning Robot itself.

Following these instructions will ensure the safe and uninterrupted use of the machine.

- The Lifa Duct Control Cleaning Robot is both electrically and pneumatically operated unit. The electrical power for the Duct Control Cleaning robot's drive-motor come from the battery of the Duct Control Manual or Mini. The battery of Duct Control Manual or Mini should be charged every day after using and stored with fully charged battery only.

- The 12 V battery of Duct Control Manual or Mini should be charged by the original charger connected to a single phase 110/230 V, 50/60 Hz.

- The constant air flow for running the brush motor must have 340 l/minute in 7 bar pressure. Use only approved hoses for compressed air.

- The equipment must not be positioned or used in places where there is a risk of explosion or hazardous substances.

- **The equipment must not get wet and it has to be protected from moisture, vibration and wind.**

- Foreign objects must not be inserted or fitted into the equipment.

- The machine cannot be covered during the use

- The user must ensure that the appliance is adjusted for the task and that the statutory requirements are met.

- Be careful with sharp edges in the ductwork.

- Use only accepted ladders or stands when working with Duct Control Cleaning Robot.

- Wear protective mask, eye protection glasses, overall, gloves shoes etc. according to the requirements of the working place/environment.

- In any questions, contact Lifa Air Ltd, or an authorized dealer.

1. Avoid contamination of the environment
The machine should be kept as clean as possible. When the cable is being pushed back to the drum it should be cleaned with a cloth. After the work has been completed the brushes and the shell of the cleaning shaft must be cleaned, before transporting the machine into another location.

2. General Safety
It is forbidden to stay in immediate contact with the machine while it is operating.

3. The safety of the operator
The person/persons who are performing the work should use personal protection: filtered mouth mask, helmet, earmuffs, goggles, overall, protection shoes and other necessary protective equipment that the task at hand requires.

Lifa Duct Control Cleaning Robot has a strong rotating force. Clothes or hair can easily get caught in the brush and cause damage or accidents. The brush has to be placed always in the ventilation duct before starting the machine. The machine cannot be used when the brush is outside the ventilation duct. Because of the great rotating force, the Duct Control Cleaning Robot is recommended to be used by two persons. One who drives and controls the robot in the duct and another who feeds/draws the cables (electrical cable and pneumatic hose).

4. The safety of the working environment
Make sure that the lightning, air conditioning, latter and trestles are sufficient. If the brush generates static electricity or sparks in the duct do not use these types of brushes in the duct if there are any flammable liquids, gases, dust or other sensitive substances. Use antistatic brushes and safety ground by following the special instructions in difficult conditions.

5. Cable (electrical)
Be careful not to damage the cable. If the cable is damaged take immediate contact to your local distributor. If the cable has been scratched only it can be coated again with a heat shrinkable tube. During the storage and transportation, the cable has to be reeled. Always make the reeling so that other end is free so that all the twists/kinks are taken out.

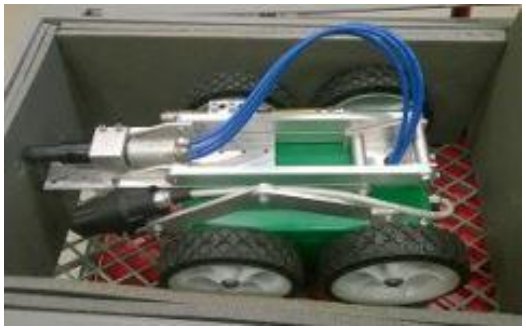
6. Compressed air connection
Make sure that the compressed air feed matches to the information on the CE-plate and the operating instructions. The connector for brush motor is CEJN 320 series, other analogic connectors: Rectus 25, Tema 1600 and JWL520/530, all Euro-standard 7.6 (7.4).
The connector for air/liquid jetting is CEJN 221 or Rectus series 21.

7. Sound level
The sound level of Duct Cleaning Robot motor is quite high, still less than 80 dB(A). It is compulsory to wear earmuffs.

Construction and Installation

Following parts are required for using Duct Control Cleaning robot

1) Duct Control Cleaning robot, delivered in a plastic box that includes:

Duct Control Cleaning robot: length 41 cm, width 28cm, height 19 cm	
Color video camera with integrated LED lamps (“drop camera”)	
Nozzle holder, 2 nozzles: one air and one liquid nozzle	

2) Duct Control Mini or Manual in a plastic case

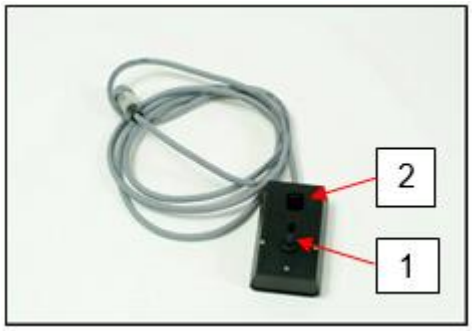
Connection Central Box	
Main power supply control (fuse/breaker)	
Power on-off switch	
Input for video/steering cable	
Input for Joystick cable	
Output for TFT/LCD Monitor	
Output (RCA) for Video recorder or picture card for PC	
TFT/LCD Color monitor (separate instruction manual)	
A cable reel, plastic	
Video/steering cable 25 m with connection plugs	

3) A double hose on metallic reel with operation valve for brush motor (accessory)

4) A separate single hose with valve for air jetting or liquid spraying (accessory)

Driving the robot with Duct Control Manual or Mini

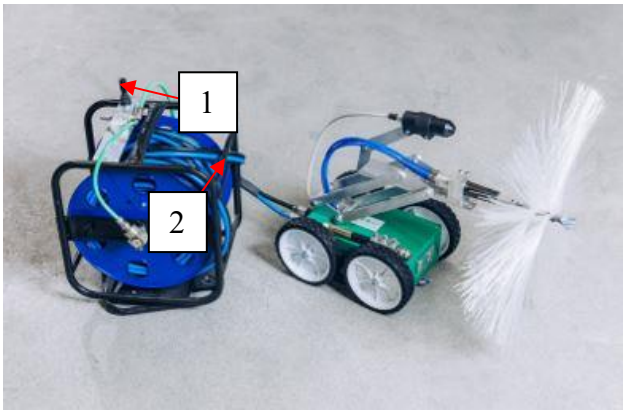
1) Joystick for wheels drive
2) Switch for the robot camera lighting. On/off & adjusting the brightness.



Driving forward: turn joystick forward
Driving backward: turn joystick backward
Turning left: turn joystick left
Turning right: turn joystick right

Try driving first on safe and open place in order to learn how the robot reacts to joystick.

Double hose reel for and controlling the brush motor and rotation direction.



1) Operation valve for brush motor/changing direction for motor rotation
2) Double hose on reel for pneumatic brush motor

1. Transportation

Before installation and use, check that all the parts look clean and unharmed. Insure that none of them have been damaged during transport. Lifa Duct Control Cleaning Robot must be protected from moisture and must not be stored unprotected outside. Please, take care when packing/unpacking the equipment.

2. Operating position

Place Lifa Duct Control Cleaning Robot on a stable surface. Protect the equipment from vibration and other agitation. The permitted operating temperature is ranging from 0ºC to +50ºC.

3. Electrical connection

Lifa Duct Control Cleaning Robot requires a power supply (12V DC) that is the battery of Duct Control Manual or Mini. When switching on the central box of Duct Control Manual or Mini a red light at the central box will light up if the power supply is OK. The battery at Duct Control Manual or Mini central box must be charged with a CE-marked charger that is connected to single-phase current 110/230 V 50/60 Hz. Please check that the mains for the charger is suitable! Please read also the user instructions of Lifa Duct Control Manual or Mini.

4. Fastening of the cables at Duct Control Mini or Manual

Loosen the Cable winder by unscrewing the central screw at the case lid. Connect the joystick cable and the video/steering cable to the Central Box. Connect the video/steering cable to the Duct Control Cleaning Robot. Connect the TFT monitor cable to the Central Box of Duct Control Manual or Mini. Check that all plugs are fastened properly, but do not over tighten the locking collar because of risk of damage to connector/connections. Do not use pliers/tongs!!!

5. Switch the power on to the Duct Control Mini or Manual

6. Switch on the camera's LED lamps

Driving lights is turned on by switching the light control knob on the joystick box.

7. Switch on the TFT Monitor

Monitor goes on by pressing the on/off –button in the monitor. The picture will appear. For other details, look at the User's Manual of the monitor.

Maintenance

Remember to lubricate the pneumatic motor at the end of each working day, see "The brush motor lubrication" instructions.
When the machine is in daily professional use it should be delivered to its first regular maintenance to the manufacturer or to repair shop that has been authorized by the manufacturer after six months from the first commissioning date (approximately 100 hours). The warranty expires if the machine has not been delivered to its first maintenance on time.

After that it is recommended to take the machine in to maintenance every year (200 operating hours). If there appear any defects in the machine or there is a doubt that it is not working as it is supposed to, it has to be brought to maintenance immediately.

Before maintenance the machine must be unplugged from power supply and the compressed air!

CLEANING OF THE MACHINE

The following maintenance and upkeep work has to be done in regular basis depending on the purpose of which the machine has been used. This enables a trouble-free use.

General cleanliness

Keep the machine as clean from the dirt and dust as possible. All parts must be cleaned after every use in order to avoid cross-contamination. Dirt and grease may cause defects in the compressed air valves and other moving parts. The robot and its parts should be cleaned with gentle air-shower and wet cloth; if necessary it can be washed with mild detergent and water but must then be dried immediately.

The compressed air hose (accessory)

The compressed air hose has to be cleaned every time after use. The dirt and grease that has collected onto the plastic surface can be removed with a mild grease removal detergent that is meant for plastic surfaces. If the hose has been used to spray chemicals, it must be rinsed/washed with water ASAP after finishing the use of chemicals, and then dried with compressed air. Never leave the hose with any chemicals inside for any longer time than absolutely necessary!!! The air nozzles have to be cleaned after each use: air nozzles with an air pistol, and chemical nozzles with water /

soaking. The brushes must be cleaned after every use in order to avoid cross-contamination. Wash or spray the brushes with mild detergent and wipe clean with paper / disposable cloth.

The brush motor lubrication:
The pneumatic brush motor must be lubricated every day after working with it. Regular lubrication enables the endurance of the motor. Pneumatic motor of Duct Control Cleaning robot must be lubricated with light motor oil (*) after every day the robot has been used for brushing.
Before lubricating, tilt the robot “bottom up” so that the oil goes deeper to the connector/air hose.
The lubrication is done by spraying a small amount of oil in to one compressed air feed connector on the back of Duct Control Cleaning Robot and then connecting compressed air to it so that the motor is rotated for a few seconds to one direction only. This procedure is repeated for 2-3 times and after this run the motor for one minute to clean the hose from excessive oil.
(*)Wurth Rost Off Plus, WD 40, CRC 5-56 or analog.

THE MAINTENANCE OF THE CAMERA

- When winding the cable back to the reel after use always try to get all the twist out of the cable; this is best done by hanging the whole cable in the air or releasing the cable to floor in full length before winding it to the reel.
- When winding the cable after use, wipe it clean with a soft cloth (microfiber, cotton, tissue or similar) moistened with a mild detergent suitable for plastics.
- Wipe the camera part, joystick box and the other parts with a soft cloth, too.
- Carefully wipe clean the lens of camera and the LED lights of the Robot with a microfiber cloth.
- Check all the connection plugs, cables for any loosened screws or possible damages.

Spare parts

When ordering spare parts, always specify the size and type of the equipment (found from the CE-plate located both in the robot body and control box).

NOTE!
Any repair needed must be carried out by the manufacturer or by a representative of the manufacturer. We are not responsible for any service or repair carried out by a third party.

Warranty also expires if any other than Lifa accessories (brushes etc.) are used.

Accessories

Item number	PRODUCT
6420281013010	Y-gear (for small robot)
6420281010309	Brush Adapter / brush with nylon center
7720281060038	Low pressure spraying bottle 5l
6420281020827	T-piece with backpressure valve for connecting 2 compressors to pneumatic brushing machine. Including 2 connecting hoses (á 1,5 m).
6420281023651	Connection hose 25m on reel (air or liquid)
6420281024566	High volume air jetting Nozzle (including fast coupling)
6420281012006	Foam Nozzle, with backpressure valve (including fast coupling)
6420281020513	Basic liquid Nozzle, with backpressure valve (including fast coupling)
6411517083105	Y-dual knife (nozzle) with adjustable-bending arms) for large rectangular ducts
6420281024245	Lifa Drop Camera (manually pushed, for small ducts)

Problem situations

Possible problem situations and solutions are presented below. If you are not sure on how to handle problem situations do not hesitate to contact us. Our experts are pleased to advice and help you in a way we can get the desired outcome together.

1) The compressed air has been connected in to the robot and the valve of the connection is open but the brush still doesn't rotate.

a. Make sure that the compressed air valve isn't stuck and it is in open position.
b. Make sure that the compressed air hoses aren't stuck/kinked.

2) The cleaning brush doesn't start to rotate even though the compressed air is coming to the motor.

a. Make sure that any of the compressed air joints aren't leaking. If the joints are leaking the pressure may be so low that the motor does not rotate.
b. Switch the compressed air off from the machine and make sure that the motor isn't stuck by rotating it with e.g. a wrench from the brush adapter. The motor should rotate considerably freely. So do not use excessive force. If the motor does not rotate freely do the procedures that are that are instructed in the maintenance/air motor.

3) When loaded the brush does not rotate

a. Check the size of the brush in comparison to the duct. Too big brush may cause the motor to stop (if you don't have enough air power).
b. Make sure that the main valve is open entirely.
c. Make sure that the pressure in the compressed air compressor is adjusted high enough (about 7 bar).

4) Nothing is coming out from the liquid/compressed air nozzles even though the liquid/compressed air is attached to the machine.

a. Make sure that the valve is in an open-position.
b. If you are spraying liquids make sure that there is enough pressure in the low pressure sprayer (2-5 bar)
c. Make sure that the nozzles aren't stuck.
d. Check that the joints are in right places.
e. If there are any old detergents etc. left in the hose they may cause the hose to clog. The hose can be tried to open by spraying warm water or mild detergent solution in to the hose.

Warranty

The warranty is for one (1) year from the date of purchase and is valid per the general conditions of delivery, provided that these instructions have been carefully followed. Warranty also expires if any other than Lifa accessories (brushes, filters etc.) has been used.

Service and repair are free of charge within the warranty period (proof of purchase / receipt must be presented) under the following conditions:

- The defect is caused due to defects in materials or defective components.
- Defects due to normal wear and tear, misuse or insufficient maintenance are NOT covered by the warranty.
- The machine has been delivered to the first compulsory maintenance check within 6 months and/or 100 hours of use
- Any maintenance and repairs must be carried out by the manufacturer or by an authorized representative of the manufacturer. Manufacturer does not accept responsibility for maintenance carried out by a third party.
- A written reclamation form must be filled out and sent with descriptive photos

The appliance shall be delivered to the authorized Lifa Air representative from whom the buyer has bought the machine from OR when agreed mutually in writing beforehand to the factory postage paid to:

Oy Lifa Air Ltd
Vellamonkatu 30B
FI-00550 Helsinki, Finland
Tel. +358 9 3948 58
www.lifa.net

Oy Lifa Air Ltd reserves the right to introduce changes without a further notice.

Recycling

The machine can always be returned to the Lifa Air authorized representative from which the buyer has bought the machine from, or to the address above postage paid in case there is no recycling facility where the owner lives.

Metal parts (frame, reel, motor) can be recycled as metal scrap.

Electrical parts (frequency converter, main switch) should be returned to an authorized recycling depot. Other parts can be recycled as mixed normal waste.

Declaration of Conformity

Manufacturer's name:	Oy Lifa Air Ltd
Manufacturer's address:	Vellamonkatu 30B FIN-00550 Helsinki, Finland
Manufacturer's telephone:	+358 9 39 4858
Manufacturer's website:	www.lifa.net, www.lifa-air.com
Model:	**LIFA Duct Control Cleaning Robot**

Oy Lifa Air Ltd, hereby states, with sole responsibility, that the machine models covered by this announcement comply with the requirements of the following EC directives and standards:

- EU Low Voltage Directive LVD 2014/35/EY
- EU Electromagnetic Compatibility Directive EMC 2014/30/EY
- EU Directive of the restriction of the use of certain hazardous substances in electrical and electronic equipment RoHS 2011/65/EC
- EN ISO 12100:2010 Safety of machinery
- EN 60204-1:2007 Safety of machinery. Electrical equipment of machines. General Requirements.

The product fulfils requirements for CE-marking.

Oy Lifa Air Ltd., 31.01.2018

Johan Brandt, CEO