

LAVINA®



LAVINA® 20N-S-E/20N-S-OE User Manual



SUPERABRASIVE

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1. GENERAL INFORMATION

This owner's manual is intended for the operator of the Lavina® S-E machine, the servicing technician as well as for anyone involved with operating or servicing the machine. We recommend that you read the instructions very carefully and follow them strictly.

The manual includes information about assembling, using, handling, adjusting and maintaining your Lavina® S-E floor grinding and polishing machine.

MANUFACTURER

Superabrasive was founded in 1987, as a manufacturer of high quality diamond tools for the stone and concrete industry. Today, Superabrasive is one of the world's leading companies in the production of diamond tools and floor grinding machinery. At Superabrasive, we strive to deliver the very best solutions to our customers, and enable them to work more efficiently.

GENERAL DESCRIPTION

The Lavina® S-E machine is intended for grinding, polishing and buffing concrete, marble, granite, limestone and terrazzo surfaces with diamond tools.

The Lavina® S-E machine is a three-disc machine, which can be used dry as well as wet.

For best results, use only tools manufactured or recommended by Superabrasive and its distributors. Additionally, the machine could be used for grinding wood floor surfaces.

⚠ WARNING The Lavina® S-E machine is manufactured and fitted for the above-mentioned applications only! Every other use may cause risks to the persons involved.

MACHINE CHARACTERISTICS

The Lavina® S-E machine is made of two main component sections:

MAIN DESIGN

The two main component sections are the carriage and main head.

The **handle** (Fig.1.2) on the frame is adjustable in height and allows the operator to work in a correct and safe working posture.

The **halogen spotlight** (Fig.1.2) enables the operator to work in darker areas.

⚠ WARNING Existing lighting system does not replace adequate overhead lighting.

The **frame**

The **controls** are positioned on top of the electrical box (fig.1.3)

The **electrical box** (fig.1.3) contains the electric switching devices and the inverter. The **main feeding cable** is connected with a plug and socket on top. The motor feeding cable is plugged into the socket located on the bottom of the box. The **tank** is on the opposite side of the frame, so that the weight of the water has no influence on the operation of the machine. The frame weight, on the other hand, is fully absorbed by the driving wheels. An electric pump sprays the water through a front sprayer or internal. The **motor** is mounted on the base plate and is driving the three heads with a belt system. The **planetary head** is driven by a second flat belt.

ENVIRONMENTAL CONDITIONS

The temperature range for operating the Lavina® S-E machine outdoors is between 41°F and

86°F or 5°C and 30°C. Never use the Lavina® S-E machine during rain or snow when working outdoors. When working indoors, always operate the machine in well-ventilated areas.

ELECTRICAL CONNECTION

The voltage (Volt) and power (Ampere) are displayed on a label on the electrical control box to avoid any incorrect connection. Refer to these before connecting the power. To avoid electrical shocks, make sure the ground power supply is functioning properly.

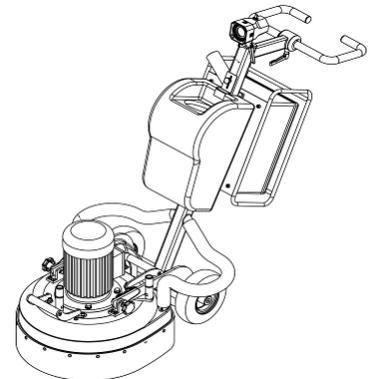


Figure 1.1



Figure 1.3

A connection for a vacuum dust extractor is located on the carriage. The Lavina® S-E machine does not include a vacuum dust extractor. The customer must purchase the vacuum dust extractor separately. The hose of the vacuum extractor must be Ø 50.8 mm and can be glided over the pipe. The vacuum dust extractor must be adapted for floor grinders and have a minimum air displacement of 320m³/h with a negative vacuum of 21 kPa.

TECHNICAL DATA

| | Lavina® 20N-S-OE | | Lavina® 20N-S-E | |
|--------------------------|----------------------------------|-------------------|----------------------------------|-------------------|
| Voltage/Hz | 1 ph x 200-240V 50-60Hz | | 3 ph x 380V 50-60Hz | |
| Amperage | Max 15 Amps | | Max 15 Amps | |
| Power | 5,5 kW | 7,5 HP | 5,5 kW | 7,5 HP |
| Tool holder rpm | 300-1100 rpm | | 300-1100 rpm | |
| Working width | 510 mm | 20" | 510 mm | 20" |
| Tool diameter (QC Plate) | 3x 225 mm | 3x 9" | 3x 225 mm | 3x 9" |
| Weight | 167 kg | 368 lbs | 167 kg | 368 lbs |
| Grinding pressure | 80 kg | 177 lbs | 80 kg | 177 lbs |
| Additional weight | max 2x 22 kg | max 2x 48 lbs | max 2x 22 kg | max 2x 48 lbs |
| Application | wet and dry | | wet and dry | |
| Vacuum hose port | Yes | | Yes | |
| Water tank capacity | 20 l | 5.2 gal | 20 l | 5.2 gal |
| Water feed | with pump (peripheral and front) | | with pump (peripheral and front) | |
| Cable length | 17.4 m | 57 ft | 17.4 m | 57 ft |
| Machine LxWxH | 1350x540x1100 mm | 53.1"x21.3"x43.3" | 1350x540x1100 mm | 53.1"x21.3"x43.3" |
| Packing LxWxH | 1150x730x1155 mm | 45.2"x28.7"x45.5" | 1150x730x1155 mm | 45.2"x28.7"x45.5" |

CE-CERTIFICATION

The Lavina® S-E machine is designed to operate correctly in an electromagnetic atmosphere of industrial type and is equipped with all the mechanical and electrical safety protections in conformity with the following European CEE rules and regulations:

The Lavina® S-E machine complies with the Safety Directive for machines 2006/42/EC, the EMC Directive 2004/108/EC and the Low Voltage Directive 2006/95/EC.

Also complies with the norms in use BDS EN ISO 12100, BDS EN 13862, BDS EN ISO 13857, BDS EN 349, BDS EN ISO 13850, BDS EN 13732-1, BDS EN 953, BDS EN ISO 13849-1, BDS EN 1037, BDS EN ISO 5349-1, BDS EN ISO 11201, BDS EN ISO 3744, BDS EN 1033:2002, BDS EN 60204-1, BDS EN 1837, BDS EN 61000-6-4, BDS EN 61000-6-2, BDS EN 61000-4-2, BDS EN 61000-4-4, BDS EN 61000-4-5, BDS EN 61000-4-11, BDS EN 55016-2-1

Test results are a part of the machine’s technical information and can be sent upon a special request. The machine is delivered with the CE mark exposed and provided with a EC declaration of conformity.

VIBRATIONS

The measured vibration value on the surface of gripping in case of guiding the machine is $a_{hw}=2.95m/s^2$. The measurement is made in accordance with the BDS EN ISO 1033 and BDS EN ISO 5349-1.

SONOROUS EMISSIONS

The maximum noise level at distance of the machine of 1m in case of working at idle does not exceed 70 dB(A). The measurement is made in accordance with the BDS EN ISO 11201 and BDS EN ISO 3744.

LABEL DATA

The data on the label provides the correct Voltage and kW (needed for operational purposes);

Weight (needed for transportation purposes); production year and serial number (needed for maintenance purposes).

CUSTOMER SERVICE

For customer assistance and technical support contact your local distributor or contact the producer Superabrasive Ltd. or visit us at www.superabrasive.com , where you can download a copy of this manual.

2. SAFETY INSTRUCTIONS

RECOMMENDED USE

The Lavina® S-E machine is designed and manufactured to grind and polish concrete, terrazzo, and natural stone floors. It can be used for renovations as well as for polishing. The machine is designed for dry or wet



use. When using it dry, use a vacuum of appropriate size. For more information, please refer to the chapter on handling the vacuum connection.

PROHIBITED USE

The machine MUST NOT be used:

For applications different from the ones stated in the General



Description chapter.

For not-suitable materials.

In environments which: Possess risks of explosion

Possess high concentration of powders or oil substances in the air

Possess risks of fire

Feature inclement conditions. Possess electromagnetic radiation.

PREPARATION FOR WORK

Make sure that You have closed

the work area, so that no person unfamiliar with operating the

machine can enter the area. The tool plate and tools are adjusted

the machine properly. There are no missing parts of the machine.

The machine is in upright working position. The protection

devices are working properly. The electrical cable is free move

and follow the machine easily. In order to keep the electrical

cable from being damaged, no vehicle should cross the zone

where electrical cables are situated.

PROTECTION DEVICES

The machine is equipped with

several protection devices including the following:

An emergency stop button

A protection skirt and hood for protecting the tool plates.

These devices protect the operator and/or other persons from

potential injuries. Do not remove them. On contrary, before

using the machine, please ensure that all protection devices are

mounted and function properly. The Security plate prevents the

QuickChange pads from loosening during use.

ARREST FUNCTIONS

Functions of arresting the

machine are following: Button to stop the motor

(category 1)

Emergency button (category 1)

SAFE USE

The Lavina® S-E is designed to

eliminate all risks correlated with its use. However, it is not

possible to eliminate the risks of an eventual accident with the

machine. Unskilled or uninstructed operator may cause

correlated residual risks. Such risks are:

Position Risks due to operator's incorrect working position

Tangling up Risks due to wearing inappropriate working clothes

Training Risks due to lack of operational training

NOTE: In order to reduce all consequences of the above-

mentioned risks, we advise that machine operators follow the

instructions in the manual at all times.

RESIDUAL RISKS

During the normal operating

and maintenance cycles, the operator is exposed to few residual

risks, which cannot be eliminated due to the nature of the

operations.

BEFORE YOU BEGIN

Working area must be clear

from any debris or objects.

A first-time operator must always read the manual and pay

attention to all safety instructions.

All electric connections and cables must be inspected for

potential damages.

Ground wire system of the power supply must be also inspected.

Perform general daily inspections of the machine and inspect

the machine before each use.

Always inspect the safety devices: Mount the Security plate for the Quickchange pads.

The emergency break must be clear and working

The tool protector must be working

The machine must be clean

Never operate the machine in the rain!

Confirm that there are no missing parts especially after transportation, repair, or maintenance.

Before filling the water tank with water make sure the machine

is not working and the main switch is turned off.

Before turning on the machine make sure that the base is placed

on the floor, the machine MUST NOT be in an upright

position when turned on!

OPERATING MACHINE

When operating the Lavina® S-E, make certain that there is no one, but you around the machine.

Never leave the machine unattended while working.

The electrical cable must move freely and must be damage-free.

The water hose must move freely and must be damage-free.

Check the floor you will work on to make sure it is not too

uneven. If this is the case, it may damage the machine.

AFTER WORK IS COMPLETED

Clean the machine and its

surroundings properly

Empty and clean the water tank

Unplug the machine and wind up the electrical cable

Store the machine in a safe place

THE WORK AREA

Make certain that people or

vehicles do not enter the work area.

Avoid cables and hoses being in the way.

Always check the floor for debris

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Always wear safety shoes when working with the machine.

Always wear ear protectors

when working with the

machine.

All personnel in the immediate work area must wear safety

glasses with side shields.

Always wear safety gloves when changing the tools.

Always wear clothes suitable for the work environment.

OPERATOR

The Lavina® S-E machine.

The operator must know the machine's work environment.

Only one operator at a time can work with the machine.

The operator must be properly trained and well instructed

prior operating the machine.

The operator must understand all the instructions in this

manual.

The operator must understand and interpret all the drawings

and designs in manual.

The operator must know all sanitation and safety regulations

pertaining to the operation of the machine.

The operator must have floor grinding experience.

The operator must know what to do in case of emergency.

The operator must have an adequate technical knowledge and

preparation.



3. HANDLING AND TRANSPORTATION

PREPARING THE MACHINE FOR TRANSPORTATION



Figure 3.1



Figure 3.2



Figure 3.3

Unplug the motor cable plug from the control box (Fig. 3.1) and disconnect the water hose from the main head by pulling it out (Fig. 3.2). Wind the electrical cable on the carriage. Release the pin sets (Fig. 3.3) which attach the head to the carriage.



Figure 3.4



Figure 3.5

Pull out the vacuum hoses, and dismount the head from the carriage (Fig. 3.4).

The head of the Lavina® S-E machine has one bar and a support used as handles intended for easy moving and transportation (Fig. 3.4). The Lavina® S-E machine is engineered with easy transportation in mind. The ability to dismantle the machine in two parts allows convenient transportation and storage (Fig.3.4, Fig.3.5).

STORAGE

Always store and transport the Lavina® S-E machine in a dry place. Never transport the Lavina® S-E machine unprotected; it may be damaged if transported unprotected during rain or snow.

⚠ WARNING

When storing the machine the temperature may fall to or less than 32F (0°C), therefore, you should empty the water from the system using following steps:

- Pull out the hose of the tank (Fig.3.6)
- Using compressed air blow out the water from the system for the two positions of the turn-cock (Fig. 3.7, Fig. 3.8).



Figure 3.6



Figure 3.7



Figure 3.8

4. OPERATION

PRELIMINARY CONTROLS

Inspect the working area as explained in the safety instructions. For wet use, fill in the water tank when the electrical cable is disconnected. Connect the vacuum extractor and ensure that the vacuum hose is clear and it will follow the machine easily. Plug in the machine and make sure that the power cord is free to follow the working direction of the Lavina® S-E machine.

WATER FLOW CONTROL UNIT

The operator can choose the water sprays in the front (Fig.4.1) when the level of the tap is in the horizontal position (Fig.4.2), when the level is in the vertical position (Fig.4.2) water will spray under cover of the machine.

The flow regulating valve located on the tank (fig.4.2.1) is increasing or reducing the waterflow to the working area – in front of the machine or under the main head cover of the machine/only for machines produced after Jan.1 2014/.



Figure 4.1



Figure 4.2



Figure 4.2.1

ADJUSTING AND MOUNTING TOOLS

Figure 4.3

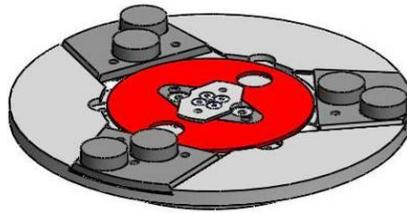


Figure 4.4



Figure 4.5

Mount the tools only after ensuring that there is enough diamond bond material left. Be sure that the plates are always clean before mounting. (Fig.4.3)

WARNING: Always secure the “Quickchange” pads with the security plate (Fig.4.4), and lock with the tool holder key (Fig.5.4). Diamond tools with Velcro are attached to three 9inch foam plates. The foam plates are mounted on the key lock (butterfly). Always use the tool holder key (Fig.5.4).

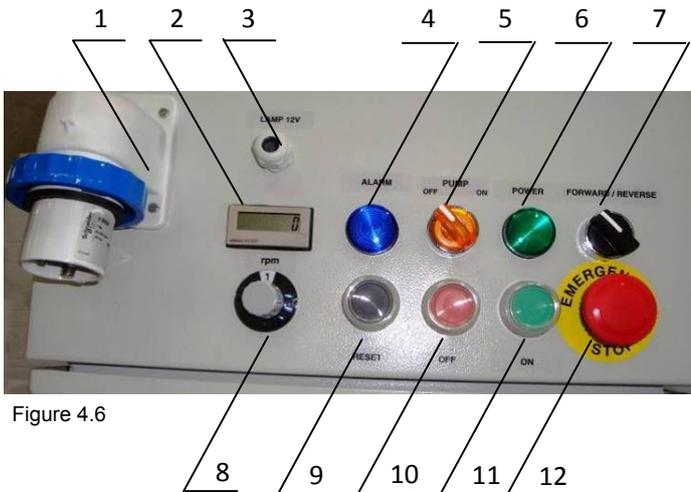


Figure 4.6

THE CONTROL BOARD

1. **Power cable plug**
2. **Digital RPM indicator** Indicates the revolution per minute of the grinding plates (not the revolution per minute of the entire unit).
3. **Lamp cable gland**
4. **Inverter alarm led** Lights blue when the inverter goes into alarm mode.
5. **Water pump switch** Lights orange when the water pump is working.
6. **Power led** lights green when the power is on
7. **Forward/Reverse switch** choose forward for clockwise rotation of the grinding plates or reverse for anti-clockwise rotation of the grinding plates
8. **Potentiometer** changes the RPM of the grinding plates from 300-1100 rpm
9. **Reset button** resets the alarm of the inverter
10. **OFF button** stops the motor
11. **ON button** starts the motor
12. **Emergency button** used in Emergency situations for stopping the motor

STARTING THE MACHINE

First, follow the directions in chapter Safety Devices and Safety Instructions. Next, pull the emergency stop (12) to ensure that the machine is in working condition. Check the potentiometer (8) and ensure that it is set at the working speed. If working wet, add water to the floor surface. If working dry, omit this step, and instead, switch on the vacuum unit. Finally, hold the machine firmly and push the start button (11).

OPERATING THE MACHINE

Guide the machine in straight lines across the floor, and with each new line overlap a little bit of the previously completed surface. Work at a constant speed allowing the tools time to work at a speed appropriate for the tools' grit size. Avoid vibrations. Do not stop the Lavina® S-E machine in one spot while the tools are still working because they will leave marks on the floor surface. When working wet, first choose the water tap position (Fig4.2) for water feed and periodically start the pump to release water onto the floor's surface (Fig.4.6 Pos.5). When working dry, check the floor surface periodically to ensure that dust is not accumulating on the surface, also check regularly if your vacuum works properly.

STOPPING THE MACHINE

The stopping of the machine must be done gradually until the motor stops. Do not stop moving the machine before arresting the motor as the tools could damage the surface. To stop push the off button (10). Use the Emergency button (13) only in emergency or use it to switch the power totally off. Remember not to hold the machine in one spot before turning off the motor.

ALARM

The Alarm light (4) will light incase inverter goes in alarm mode. The most common failure is motor in overload. To reset the mode push reset button (9).

5. TOOLS AND ACCESSORIES

WEIGHTS



Figure 5.1

Superabrasive offers additional weights for increasing the productivity of the machine (Fig.5.1). Each additional weight weighs about 48 lbs or 22 kg. Each individual application, type and condition of surface, power capacity of the outlet, etc. will determine the number of weights you can use without tripping a breaker. The weight stacks on to three posts around the outer bowl (Fig.5.2). The additional weights depend on the tools; it is not always possible to add weights. Some tools work too aggressively and the machine can stop. The weight can be ordered with item number A07.00.00.00.



Figure 5.2

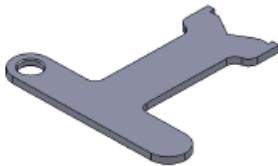


Figure 5.3

TOOL HOLDER KEY

The tool holder key (Fig. 5.3) is used for adjusting, mounting and dismounting of the foam plates. Always use the key for mounting. Item number is A03.00.00.00

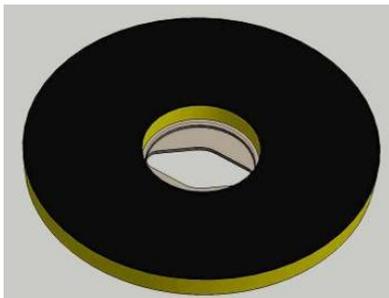


Figure 5.4

FOAM PLATE

Diamond tools with Velcro are mounted on the foam plate 9"(Fig.5.4). The foam plate is mounted on the "QuickChange" System. Item number is LV-9-FP-S

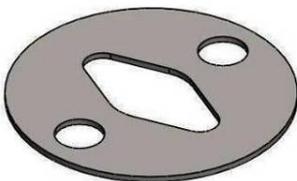


Figure 5.5

SECURITY PLATE FOR QUICKCHANGE PADS

Plate used to ensure the "Quickchange" pads. Item number is A38.00.01

6. POPULAR TOOLS

RECOMMENDED TOOLS



QuickChange System and Tooling feature extremely fast and convenient tool changes, and a long tool life, providing for great long-term cost savings. The QuickChange pads are produced in four different bonds for super hard, hard, medium and soft concrete, in a variety of grit sizes. They are offered with 1 or 2 buttons or rectangular segments, which allows you to customize the aggressiveness of the cut.



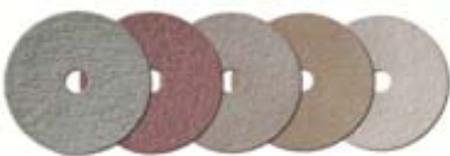
Calibra grinding discs: our popular ceramic bond discs are designed for the removal of difficult scratches and they save you valuable time by eliminating the need for multiple passes with metal tools. They can be used wet or dry, and are best for hard concrete applications. They are 3-inch, with included Velcro back attachment.



NATO® polishing discs feature a special resin formula designed for both wet and dry applications and a unique design with wide channels allowing for work on a cleaner surface and ensuring a quality polish. Available in 3 and 4 in sizes. They are with included Velcro attachment.



V-HARR® Premium Polishing Pads are designed for mechanically polishing and restoring concrete; also ideal for terrazzo and hard stone floors. V-HARR® pads are offered in a wide variety of diameters and grit sizes to accommodate many applications. Dry use is strongly recommended.



Shine Pro® are high quality diamond-impregnated pads for floor maintenance. Available in a variety of sizes, and are great for daily use. When used wet, they require only water (no wax or chemicals needed) and are a very environmentally friendly solution for maintaining floors.

Use only Superabrasive's recommended tools. For more tooling options, visit www.superabrasive.com

7. EXPLODED VIEW

GENERAL EXPLODED VIEW (FIG.7.1)

MAIN HEAD EXPLODED VIEW (FIG.7.2)

TOP COVER EXPLODED VIEW 1 (FIG.7.3)

TOP COVER EXPLODED VIEW 2 (FIG.7.4)

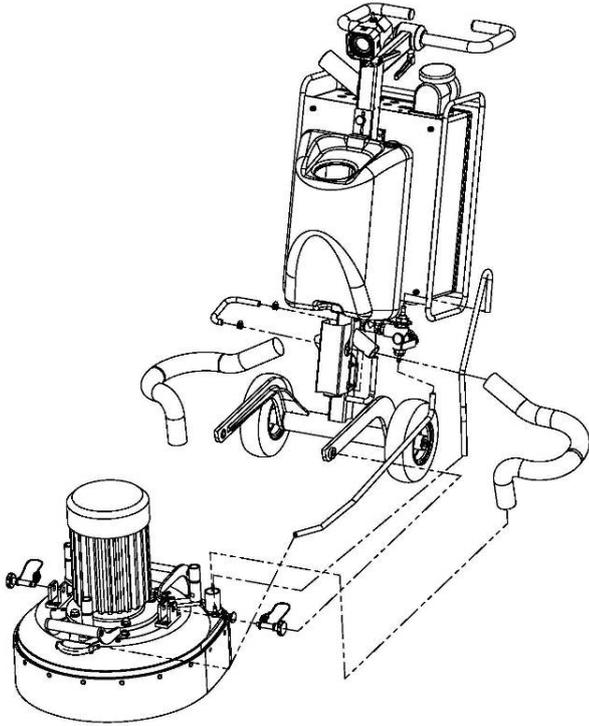


Figure 7.1

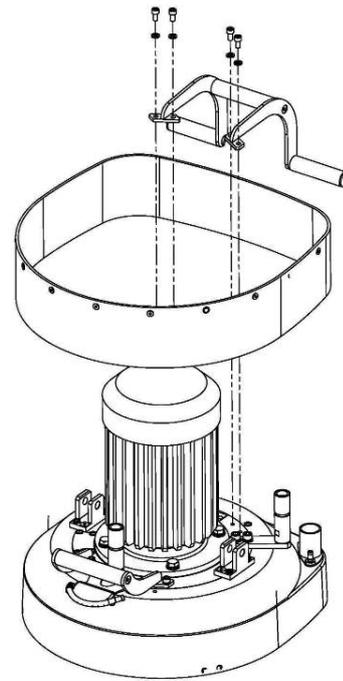


Figure 7.2

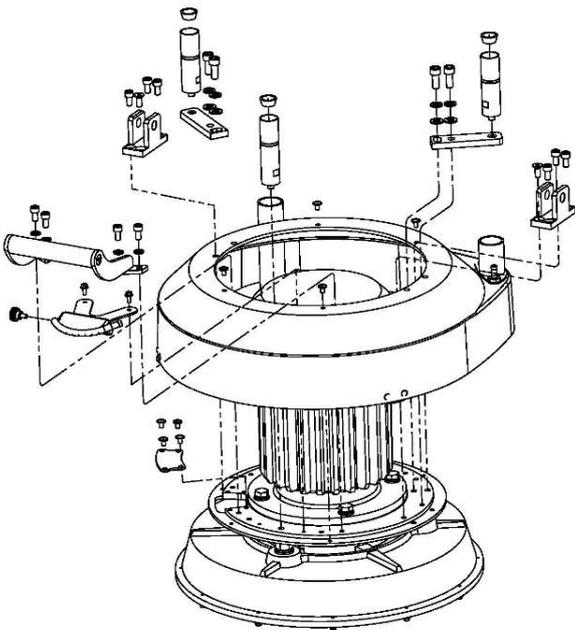


Figure 7.3

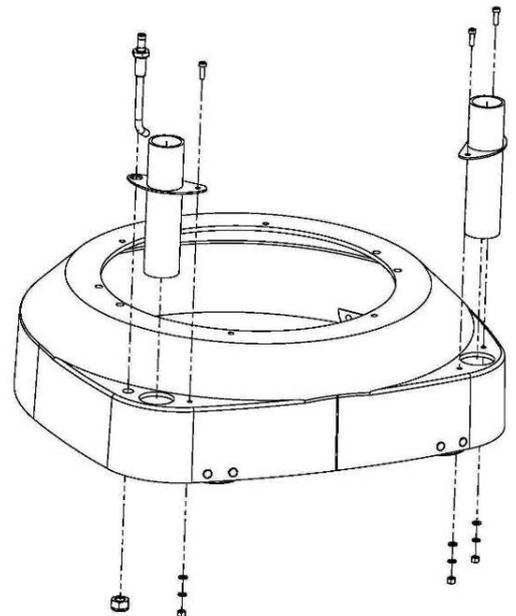


Figure 7.4

- BOTTOM COVER EXPLODED VIEW 1 (FIG.7.5)**
- PLANETARY DRIVE EXPLODED VIEW (FIG.7.6)**
- BOTTOM COVER EXPLODED VIEW 2 (FIG.7.7)**
- PULLEY UNITS EXPLODED VIEW (FIG.7.8)**
- CARRIAGE EXPLODED VIEW (FIG.7.9)**
- TOOL HOLDER EXPLODED VIEW (FIG.7.10)**

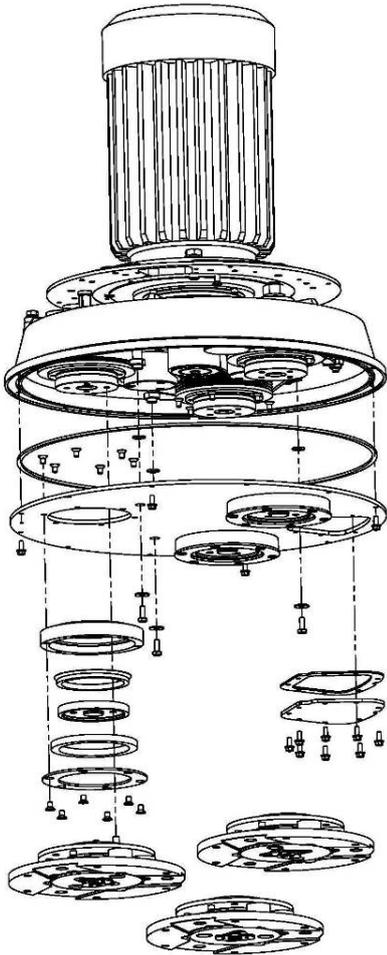


Figure 7.5

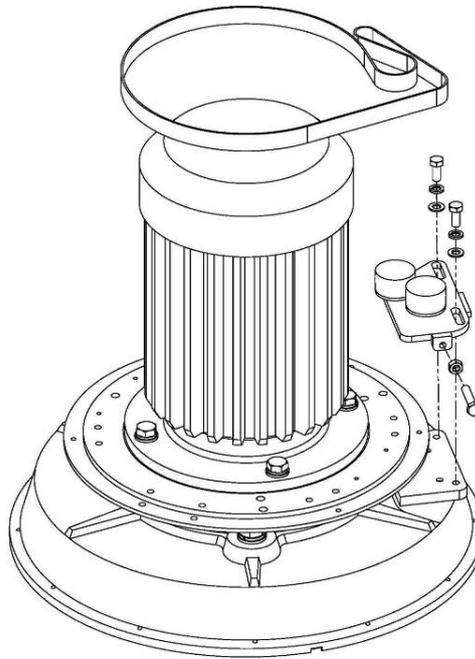


Figure 7.6

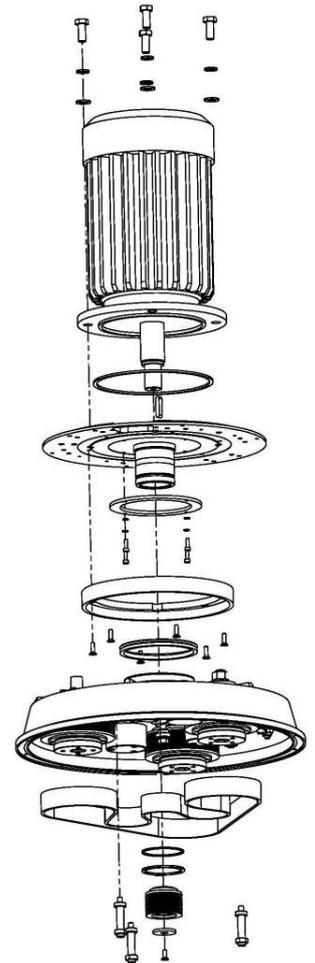


Figure 7.7

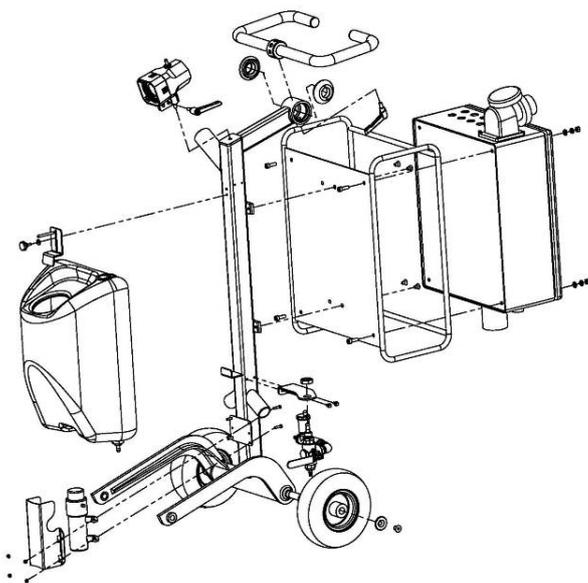


Figure 7.9

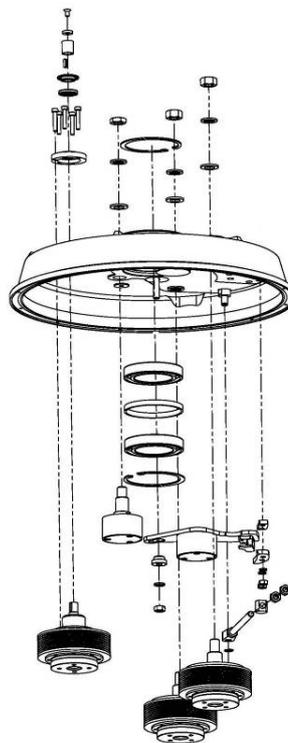


Figure 7.8

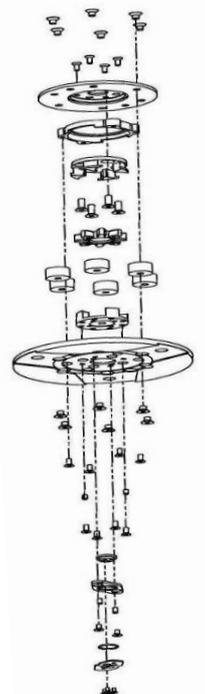


Figure 7.10

8. MAINTENANCE AND INSPECTION

Cleaning

Keep your machine clean. Cleaning the machine on a regular basis will help detect and solve potential problems before they cause damage to the machine. Most importantly, check and clean the tool plate connections, power cord and plugs, vacuum hoses and water tank.

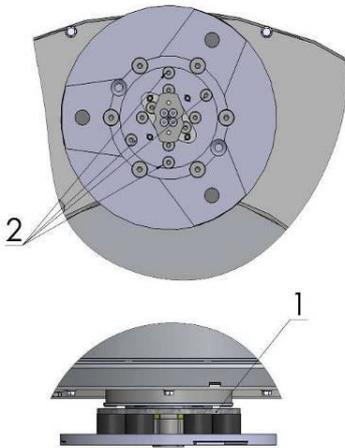


Figure 8.1

CHECK DAILY

After operating the Lavina® S-E machine, the operator should conduct a visual inspection of the machine. Any defect should be solved immediately. Pay attention to power cords, plugs and vacuum hoses, loose bolt or screws.

Tool holders: Buffers and spiders are consumables and must be visually checked daily and replaced if needed. See that flanges or discs are mounted and locked well in place. The key lock holders (butterflies) should be also checked.

Check the rubber buffers and fixing of the holders. The flange holding the buffers (Fig.8.1 1) has to be firmly fixed to the unit. A gap seen there means that there are loose screws fixing the holder. The screws have to be tightened immediately for safe operation.

Working with loose screws on the holder could also cause bad damages on the machine. Tightening force of the screws has to be 25...30N.m(18...22 ft/lbs).

It is very important to regularly check the screws (Fig.8.1 2) that fix the "Quickchange" holder to the safety part, so that the holder will not fly away if the buffers get damaged.

"Quickchange" should be clean. The tension of the planetary belt can be checked daily by moving the main head and feeling the resistance of the moving pulleys, if the belt slips tension immediately, see the chapter Troubleshooting .

CHECK AND REPLACE AFTER THE FIRST 15 WORKING HOURS

Check the belt tension after 15 hours working with the machine.

The bottom cover has a control cover (Fig.8.2) that allows fast and easy control and correction of the belt. It is recommended to check the tension of the belt after the first 15 hours and to tighten if necessary. For the correct tension, see TROUBLESHOOTING "mounting the belt".

Every time you open the control cover, mount back all the screws.

CHECK EVERY 200 WORKING HOURS

Every 200 working hours, the operator should inspect all parts of the machine carefully. Most importantly, inspect and clean the tool plate connections, power cord and plugs, vacuum hoses and water tank, and filter. Also, check the water flow of the pump. Check the guard assembly. Make certain the wheels are clean and rotate properly. Inspect the control buttons. If there are defective control parts, they should be replaced immediately. Replace worn vacuum- and water hoses. Check the tension of the belt and to tighten if necessary. For the correct tension, see TROUBLESHOOTING.

Dismount the tool holders (See Troubleshooting) replace all parts (Spider, buffers, sealer caps, "O" rings) with the slightest damage or consume.

Open the inspection cover on the motor base to check the planetary driving belt, by moving the main head the belt should not slip on the planetary pulley and drive the pulleys.

CHECK EVERY 400 WORKING HOURS

Besides the checks of 200 working hours, replace sealer and V-rings like described in chapter "TROUBLESHOOTING REPLACING BELT AND PULLEY UNITS". Check if belts and bearings are in good condition, change if needed.

VACUUM

As stated previously, frequently check hoses and other parts for clogging.

WATER LEAKS

Replace any leaking parts immediately as the water could damage your machine

MECHANICAL PARTS

Parts such as the belts, seal rings, cap rings, spiders and buffers and guard assembly are subject to wear and should be replaced as needed.

ELECTRICAL SYSTEM

Dust should not enter the control box, as it will destroy the contacts. Remove (blow out) any dust present.

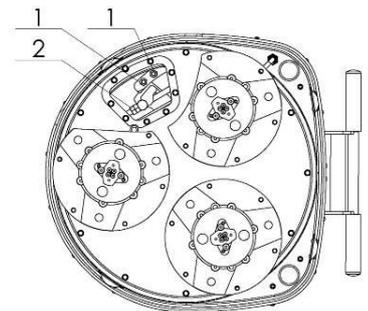


Figure 8.2

200-240 Volt

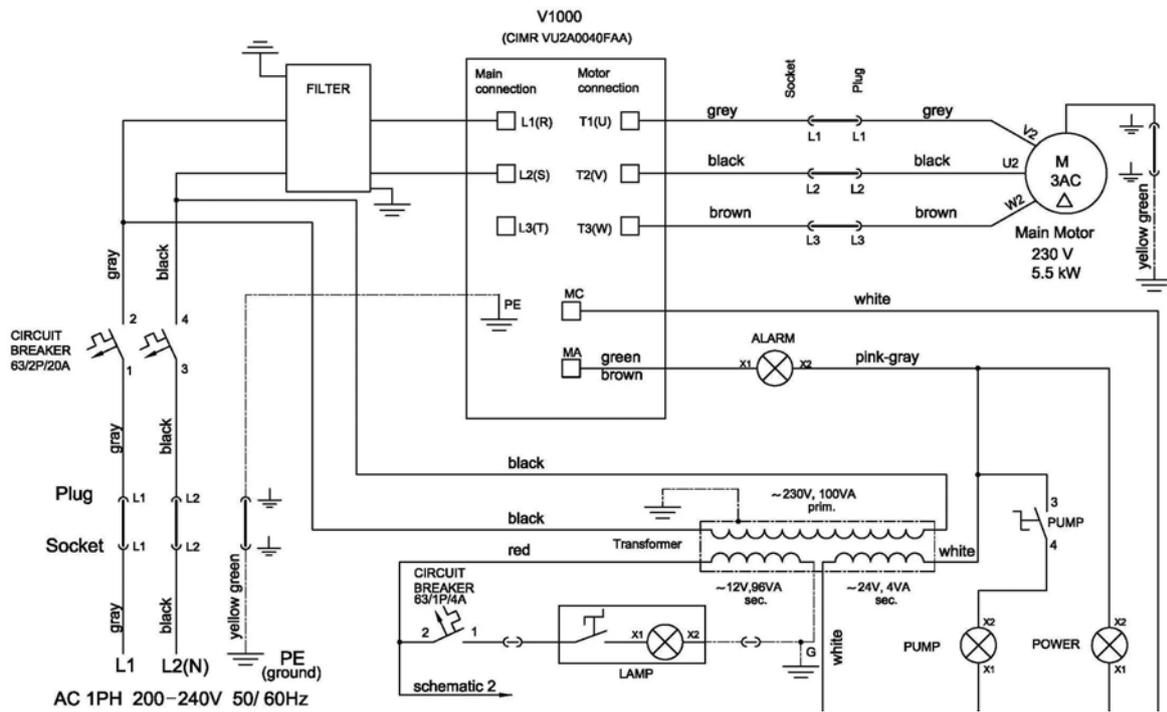


Figure 8.4

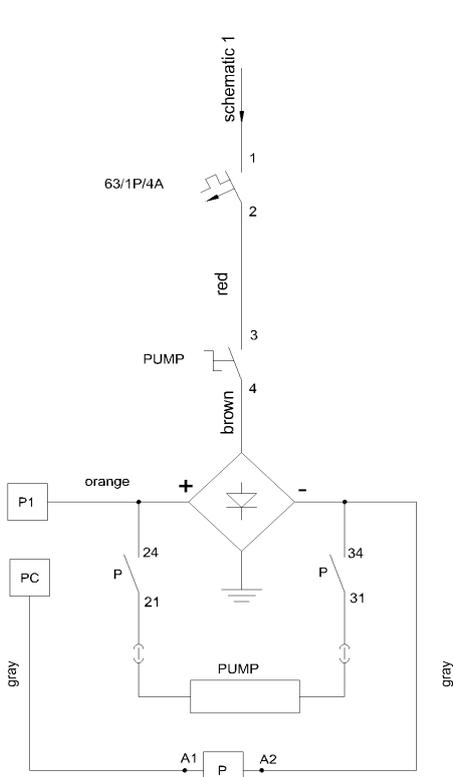


Figure 8.5

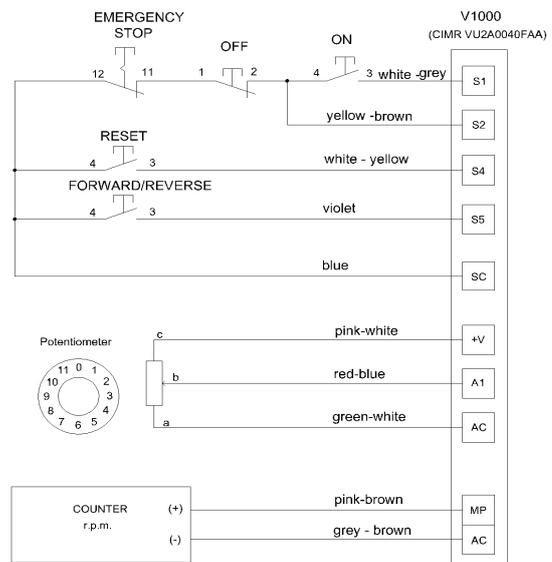


Figure 8.6

The motor is connected in "Delta" (triangle) 230 Volt, reminder for the wire connection of the motor.

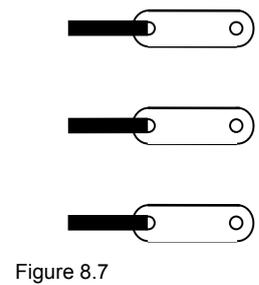


Figure 8.7

LAVINA® 20N-S-E ELECTRICAL SCHEMES WITH YASKAWA INVERTER 380 VOLT

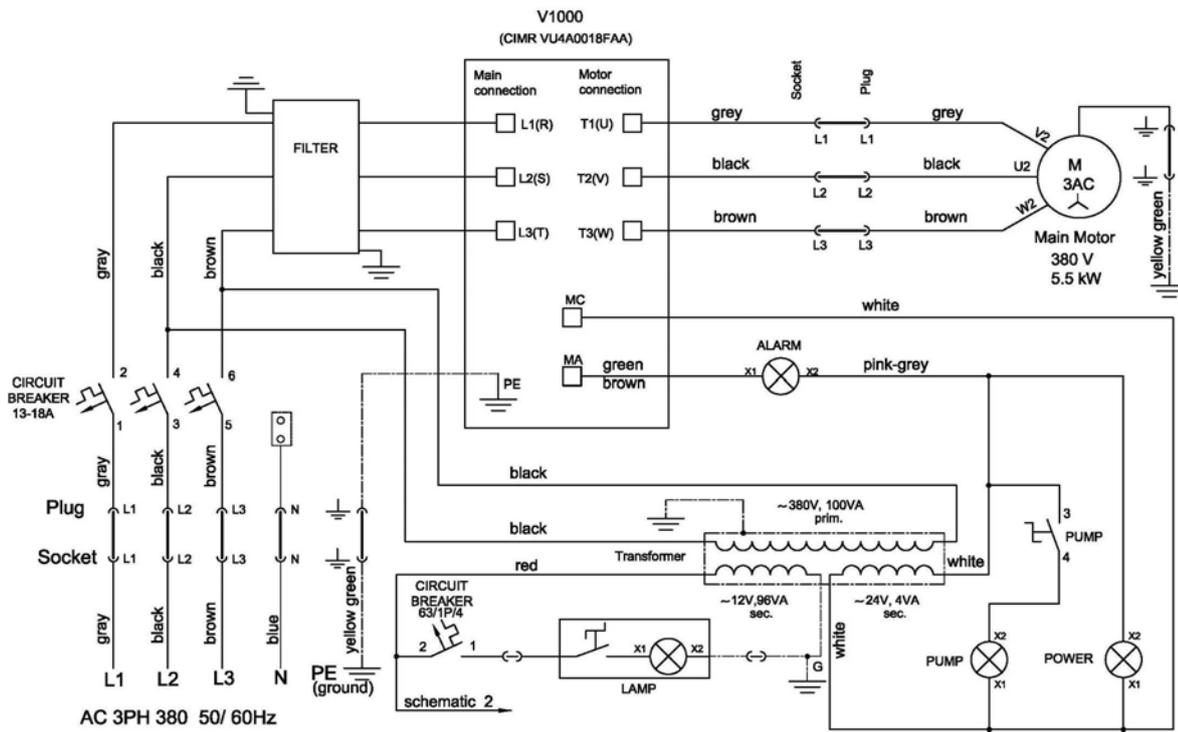


Figure 8.8

LAVINA® 20N-S-E ELECTRICAL SCHEMES YASKAWA CONNECTION MAIN CIRCUIT TERMINALS

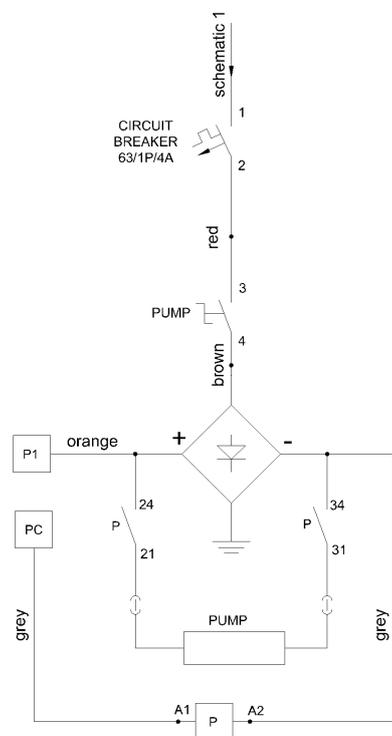


Figure 8.9

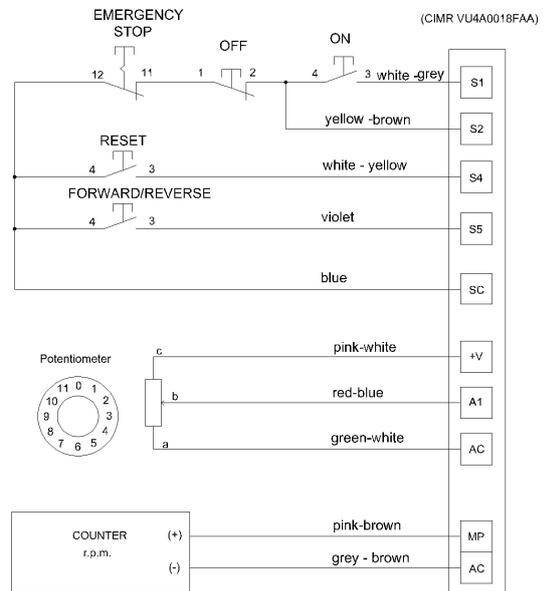


Figure 8.10

The motor is connected in "Star" 380 Volt, reminder for the wire connection of the motor

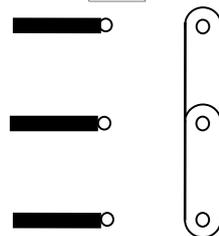


Figure 8.11

9. TROUBLESHOOTING

9.1 REPLACING POWER CORD AND PLUGS

When replacing the power cord or plugs always use cords and plugs with specifications as the original ones. Never use lower quality or different type cord and plugs.

In addition, take into consideration the distance of the appliance from the electrical source. The greater the distance, the greater the resistance and the less current that will be available at the other end; there will be a voltage drop and the inverter will sign alarm mode. This can also happen if several machines are working on the same line or when the generator is underrated. In general our standard power cable can be doubled in length; if longer lengths are needed you have to replace all the cables with bigger gage rated cables for the length and amperage.

9.2 DISMOUNTING AND MOUNTING TOOL HOLDER TO CHANGE BUFFERS AND SPIDERS, CHANGING V-RINGS AND FELTRINGS



Figure 9.2.1



Figure 9.2.2



Figure 9.2.3



Figure 9.2.4



Figure 9.2.5



Figure 9.2.6

To check or replace the buffers and the spiders, the tool holders have to be dismantled. Remove the countersunk screws on top of the buffer (Fig.9.2.1). Take the disc off (Fig.9.2.2), the spider can be removed or replaced (Fig.9.2.3). By loosening four Hex cap bolts (Fig.9.2.4), the disc comes loose (Fig.9.2.5) and the buffers can be replaced (Fig.9.2.6). Attention, by mounting use always the "blue" thread locking adhesive, except on the bolts to lock the buffers (Fig.9.2.5). Always use the original bolts. Depending on the number (3, 4 or 6) of buffers, the holder can be more flexible or rigid.



Figure 9.2.7



Figure 9.2.8



Figure 9.2.9

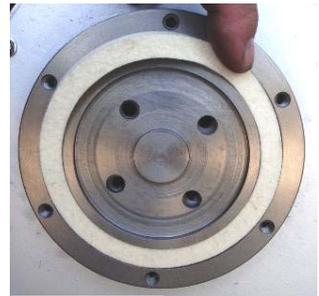


Figure 9.2.10

When the tool holder is dismantled, you can change the sealers (V-Ring and Felt-Ring). Take out Felt-Ring, Adaptor and V-Ring. Before mounting check on which side the adaptor is fitting, remember the correct side. Mount the V-Ring with the smallest lip of the V to inside (Fig.9.2.7) just push the V-ring so the top is on the same level as the pulley top (Fig.9.2.8). Then take the adaptor in the correct way and push the V-Ring down with the adaptor (Fig.9.2.9). The lowest lip of the V-Ring should only barely touch its gliding surface; also never push the V-Ring down with fingers. Mount now the Felt-ring on top (Fig.9.2.10). Close the sealers with the cap (Fig.9.2.11).



Figure 9.2.11

9.3 TENSIONING AND REPLACE THE PLANETARY BELT



Figure 9.3.1



Figure 9.3.2



Figure 9.3.3



Figure 9.3.4



Figure 9.3.5

If the belt slips or is broken separate the carriage from main head, pull out motor plug (Fig. 9.3.1), water-(Fig. 9.3.2) (Fig. 9.3.3) and vacuum tubes. Take off handles, forks and weight holders so you can dismount the top cover (Fig. 9.3.4) (Fig. 9.3.5)

9.4 TENSIONING USED PLANETARY BELT



Figure 9.4.1



Figure 9.4.2

Noticing speed lost in planetary movement it is possible to tension the belt for planetary movement as described in 9.5 Mounting and tensioning a new planetary belt.

9.5 MOUNTING AND TENSIONING A NEW PLANETARY BELT



Figure 9.5.1

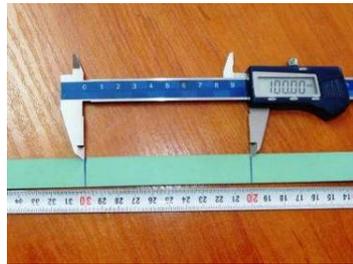


Figure 9.5.2



Figure 9.5.3



Figure 9.5.4

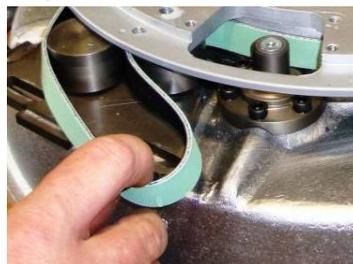


Figure 9.5.5



Figure 9.5.6

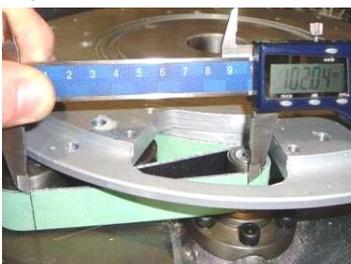


Figure 9.5.7



Figure 9.5.8



Figure 9.5.9

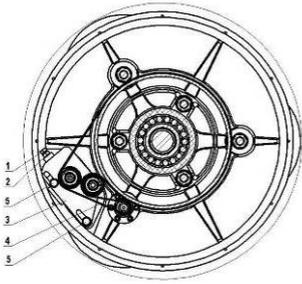


Figure 9.5.10

the marks becomes 10.2 cm

(Fig. 9.5.7) (Fig. 9.5.8). Tighten the tensioning device while turning the bolt move the planetary head so the belt can slide. (Fig. 9.5.8). Do not forget to lock the tensioning device (Fig.9.5.9).

9.6 REPLACING PULLEY UNITS

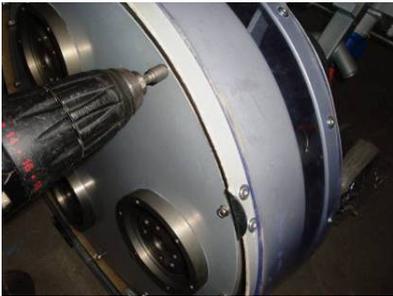


Figure 9.6.1



Figure 9.6.2



Figure 9.6.3

See previous chapters to take of the tool holders and top cover. Unscrew the screws of the bottom cover (Fig. 9.6.1). Set the bottom cover assembly aside (Fig.9.6.2). Remove the O-rings to avoid losing them (Fig.9.6.3).



Figure 9.6.4



Figure 9.6.5



Figure 9.6.6

Only the two loose (non-driving) pulleys can be remove without removing on top the motor base disc and motor. Loose the nut on top of the pulley (Fig.9.6.4). Carefully pull out the unit with crowbars, but do not use excessive force (Fig.9.6.5) (Fig.9.6.6).



Figure 9.6.7

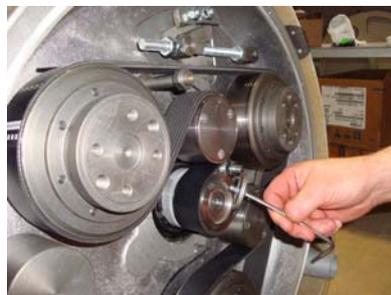


Figure 9.6.8



Figure 9.6.9

If all the pulley units have to be replaced, dismantle motor base disc and motor. Before removing the belt unscrew the central pulley (so it does not turn while unlocking) (Fig.9.6.7) (Fig.9.6.8). Pull the central pulley off (Fig.9.6.9).



Figure 9.6.10



Figure 9.6.11



Figure 9.6.12



Figure 9.6.13



Figure 9.6.14



Figure 9.6.15



Figure 9.6.16



Figure 9.6.17



Figure 9.6.18

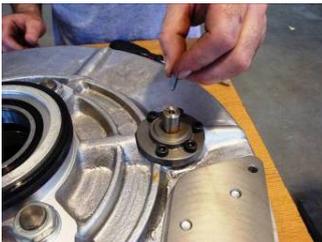


Figure 9.6.19



Figure 9.6.20



Figure 9.6.21



Figure 9.6.22



Figure 9.6.23



Figure 9.6.24

Unlock bolts (Fig.9.6.10) and take more off (Fig.9.6.11). Unlock retaining shaft/bearing (Fig.9.6.12). Take away the filling ring (Fig.9.6.13). Now the motor base disc is unlocked, the only way to dismount it is to press it out on a bearing press (Fig.9.6.14) (Fig.9.6.15). Dismounting the driving pulley: take the top screw out to release the bushing (Fig.9.6.16), push the bushing together with the washer up (Fig.9.6.17), push washer down of the bushing., take bushing out (Fig.9.6.18), push key out (Fig.9.6.19), now the washer releases (Fig.9.6.20), dismount sealer cap (Fig.9.6.21), the pulley can be released with two crowbars; do not use excessive force (Fig.9.6.22) (Fig.9.6.23), push the sealer cap to dismount (Fig.9.6.24), by mounting back the sealer cap, secure with sealant, center the holes to mount the pulley.



Figure 9.6.25



Figure 9.6.26



Figure 9.6.27

Change the two other pulleys as earlier described in the chapter, best when the motor base disc is dismount to change the roller units too. Unlock the nut on top (Fig.9.6.25). The pulleys can be released with two crowbars; do not use excessive force (Fig.9.6.26) (Fig.9.6.27).

9.7 MOUNTING THE BELT



Figure 9.7.1



Figure 9.7.2



Figure 9.7.3



Figure 9.7.4



Figure 9.7.5



Figure 9.7.6



Figure 9.7.7



Figure 9.7.8



Figure 9.7.9

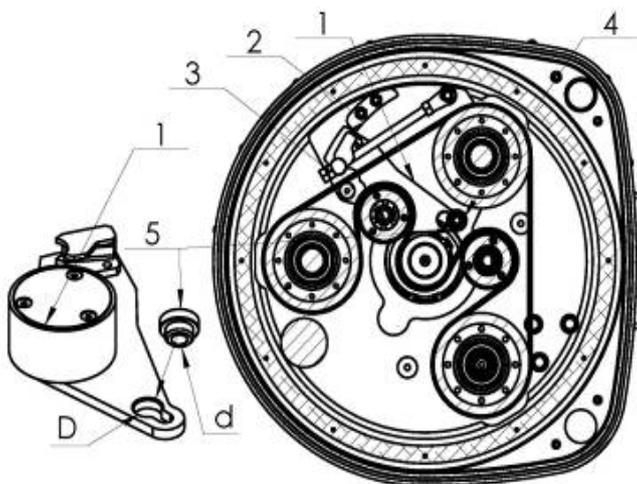


Figure 9.7.11

The mounting of the belt is shown on Fig. 9.7.11. Putting the belt is possible when the tensioner is in starting position:

- loosen the nuts pos.2
- loosen enough the nuts pos.3 (or unscrew them).
- unscrew the nut (pos.4) and pull out the bush (pos.5) from hole D in the tensioner (pos.1), that will allow the tensioner to have the position in Fig. 9.7.11.

- put the belt following steps shown on Fig. 9.7.2; Fig. 9.7.3 and Fig. 9.7.4. (It is possible also to put the belt on the roller unit assembly as a last step.) Check if the belt is on the right place in the grooves of each of the pulley units and on the central pulley.

Put back the tensioner in a position the axle bushing to fit in the tensioner hole (Fig. 9.7.5) (You can push down the bush screwing the nut pos.4)

Tighten the nuts (pos.2, Fig. 9.7.1) on the sectors and unscrew half rev. (Fig. 9.7.5) This will allow the tensioner turn in minimum clearance. Fast light the belt (Fig. 9.7.7) in order to achieve the right position and then tighten the nut in the center of the tensioner (Fig. 9.7.6). Fast up the belt taking care of the tensioning (Fig. 9.7.7).

It is recommended that the tensioning of the belt be measured with Optikrik II Device (Measuring range: 500-1400 N) (Fig. 9.7.8) . For a new belt the tensioning force is 650N, and the fastening force is 520 N.

ATTENTION: NEVER "OVER" TENSION THE BELT, THE BELT WILL BE DAMAGED AND IT WILL NEVER RECOVER ITS ORIGINAL TENSION

Tighten the two nuts on the sectors and contra nut on the tensioner (Fig. 9.7.10). Put the seal ring on the bottom cover and close the machine (Fig. 9.7.11).

Reassemble in the same manner.

Your Lavina® S machine is now ready for use!

9.8 CHECKING THE TENSION OF THE BELT



Figure 9.8.1



Figure 9.8.2



Figure 9.8.3



Figure 9.8.4

Open the checking cover to reach the belt and tension device (Fig.9.8.1). While tensioning check regularly tension. It is recommended that the tensioning of the belt be measured with Optikrik II Device (Measuring range: 500 -1400 N) (Fig.9.8.2). Fastening force is 520 N.

ATTENTION:

NEVER "OVER" TENSION THE BELT, THE BELT WILL BE DESTROYED AND IT WILL NEVER RECOVER ITS ORIGINAL TENSION Loosen the contra nuts (Fig.9.8.3), loosen the two nuts of the tension device (Fig.9.8.4), and adjust the tension with the nut seen in. When the right tension is reached: close the contra nuts and the two nuts of the support. Reassemble in the same manner.

PLEASE MAKE SURE YOU CHECK THE TENSION OF THE BELT AFTER THE FIRST 15 HOURS OF OPERATION

9.9 MOTOR CONNECTION

In case of changing the motor, please check the cable connection to your motor.

Lavina®20N- S-OE

The motor is connected in "Delta" (Triangle) 230 Volt, reminder for the wire connection of the motor.

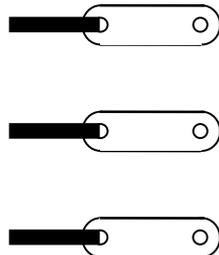


Figure 9.9.1

Lavina® 20N-S-E

The motor is connected in "Star" 380 Volt, reminder for the wire connection of the motor.

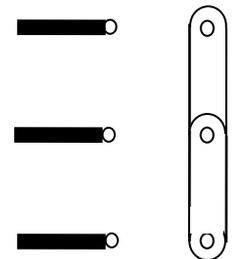


Figure 9.9.2

9.10 FAULT DIAGNOSIS INVERTER YASKAWA V1000

Pages are referring to

Yaskawa Electric SIEP C710606 18A YASKAWA AC Drive – V1000 Technical Manual

◆ Types of Alarms, Faults, and Errors

Check the LED operator for information about possible faults if the drive or motor fails to operate. *Refer to Using the Digital LED Operator on page 70.*

If problems occur that are not covered in this manual, contact the nearest Yaskawa representative with the following information:

- Drive model
- Software version
- Date of purchase
- Description of the problem

Table 6.4 contains descriptions of the various types of alarms, faults, and errors that may occur while operating the drive. Contact Yaskawa in the event of drive failure.

Table 6.4 Types of Alarms, Faults, and Errors

| Type | Drive Responses to Alarms, Faults, and Errors |
|--------------------------------|---|
| Faults | When the drive detects a fault: <ul style="list-style-type: none"> • The digital operator displays text that indicates the specific fault and the ALM indicator LED remains lit until the fault is reset. • The fault interrupts drive output and the motor coasts to a stop. • Depending on the setting, the drive and motor may stop via different methods than listed. • If a digital output is programmed for fault output (H2-□□ = E), it will close if a fault occurs. • When the drive detects a fault, it will remain inoperable until that fault has been reset. <i>Refer to Fault Reset Methods on page 264.</i> |
| Minor Faults and Alarms | When the drive detects an alarm or a minor fault: <ul style="list-style-type: none"> • The digital operator displays text that indicates the specific alarm or minor fault and the ALM indicator LED flashes. • The motor does not stop. • One of the multi-function contact outputs closes if set to be tripped by a minor fault (H2-□□ = 10), but not by an alarm. • The digital operator displays text indicating a specific alarm and ALM indicator LED flashes. • Remove the cause of an alarm or minor fault to automatically reset. |
| Operation Errors | When parameter settings conflict with one another or do not match hardware settings (such as with an option card), it results in an operation error. When the drive detects an operation error: <ul style="list-style-type: none"> • The digital operator displays text that indicates the specific error. • Multi-function contact outputs do not operate. • When the drive detects an operation error, it will not operate the motor until the error has been reset. Correct the settings that caused the operation error to reset. |
| Tuning Errors | Tuning errors occur while performing Auto-Tuning. When the drive detects a tuning error: <ul style="list-style-type: none"> • The digital operator displays text indicating the specific error. • Multi-function contact outputs do not operate. • Motor coasts to stop. • Remove the cause of the error and repeat the Auto-Tuning process. |

◆ Alarm and Error Displays

■ Faults

When the drive detects a fault, the ALM indicator LEDs remain lit without flashing. If the LEDs flash, the drive has detected a minor fault or alarm. *Refer to Minor Faults and Alarms on page 240* for more information. An overvoltage situation trips both faults and minor faults, therefore it is important to note whether the LEDs remain lit or if the LEDs flash.

| LED Operator Display | Name | Page | LED Operator Display | Name | Page |
|----------------------|---|------|----------------------|------------------------------------|------|
| bUS | bUS Option Communication Error | 242 | CPF08 | EEPROM Serial Communications Fault | 243 |
| CE | MEMOBUS/Modbus Communication Error | 242 | CPF11 | RAM Fault | 243 |
| CF | Control Fault | 242 | CPF12 | FLASH Memory Fault | 243 |
| CoF | Current Offset Fault | 242 | CPF13 | Watchdog Circuit Exception | 243 |
| CPF02 | A/D Conversion Error | 242 | CPF14 | Control Circuit Fault | 243 |
| CPF03 | PWM Data Fault | 243 | CPF16 | Clock Fault | 243 |
| CPF06 | Drive specification mismatch during Terminal Board or Control Board replacement | 243 | CPF17 | Timing Fault | 243 |
| CPF07 | Terminal Board Communication Fault | 243 | CPF18 | Control Circuit Fault | 243 |
| | | | CPF19 | Control Circuit Fault | 244 |

| LED Operator Display | Name | Page | LED Operator Display | Name | Page | | |
|----------------------|----------------------------|--|----------------------|-------|-------------------|--|-----|
| CPF20 or CPF21 | RAM Fault | 244 | GF | GF | Ground Fault | 245 | |
| | FLASH Memory Fault | 244 | LF | LF | Output Phase Loss | 245 | |
| | Watchdog Circuit Exception | 244 | LF2 | LF2 | Output Open Phase | 246 | |
| | Clock Fault | 244 | oC | oC | Overcurrent | 246 | |
| oH3 | oH3 | Motor Overheat 1 (PTC input) | 247 | oFA00 | oFA00 | Option Card Fault (port A) | 246 |
| oH4 | oH4 | Motor Overheat 2 (PTC input) | 248 | oH | oH | Heatsink Overheat | 247 |
| oL1 | oL1 | Motor Overload | 248 | oH1 | oH1 | Heatsink Overheat | 247 |
| oL2 | oL2 | Drive Overload | 248 | PGo | PGo | PG Disconnect (for Simple V/f with PG) | 250 |
| oL3 | oL3 | Overtorque Detection 1 | 249 | rH | rH | Dynamic Braking Resistor | 251 |
| oL4 | oL4 | Overtorque Detection 2 | 249 | rr | rr | Dynamic Braking Transistor | 251 |
| oL5 | oL5 | Mechanical Weakening Detection 1 | 249 | SEr | SEr | Too Many Speed Search Restarts | 251 |
| oL7 | oL7 | High Slip Braking oL | 249 | STO | STO | Pull-Out Detection | 251 |
| oPr | oPr | Operator Connection Fault | 249 | UL3 | UL3 | Undertorque Detection 1 | 251 |
| CPF22 | CPF22 | A/D Conversion Error | 244 | UL4 | UL4 | Undertorque Detection 2 | 251 |
| CPF23 | CPF23 | PWM Feedback Data Fault | 244 | UL5 | UL5 | Mechanical Weakening Detection 2 | 251 |
| CPF24 | CPF24 | Drive Capacity Signal Fault | 244 | Uv1 | Uv1 | Undervoltage | 252 |
| dEv | dEv | Excessive Speed Deviation (for Simple V/f with PG) | 244 | Uv2 | Uv2 | Control Power Supply Undervoltage | 252 |
| EF0 | EF0 | Option Card External Fault | 244 | Uv3 | Uv3 | Soft Charge Circuit Fault | 252 |
| EF1 to EF7 | EF1 to EF7 | External Fault (input terminal S1 to S7) | 244 | oS | oS | Overspeed (for Simple V/f with PG) | 249 |
| FbH | FbH | Excessive PID Feedback | 245 | ov | ov | Overvoltage | 249 |
| FbL | FbL | PID Feedback Loss | 245 | PF | PF | Input Phase Loss | 250 |

Note: If faults CPF11 through CPF19 occur, the LED operator will display CPF00 or CPF11.

■ Minor Faults and Alarms

When a minor fault or alarm occurs, the ALM LED flashes and the text display shows an alarm code. A fault has occurred if the text remains lit and does not flash. Refer to *Alarm Detection on page 253*. An overvoltage situation, for example, can trigger both faults and minor faults. It is therefore important to note whether the LEDs remain lit or if the LEDs flash.

Table 6.5 Minor Fault and Alarm Displays

| LED Operator Display | Name | Minor Fault Output (H2-□□ = 10) | Page | |
|----------------------|------------|--|-----------|-----|
| bb | bb | Drive Baseblock | No output | 253 |
| bUS | bUS | Option Card Communications Error | YES | 253 |
| CALL | CALL | Serial Communication Transmission Error | YES | 253 |
| CE | CE | MEMOBUS/Modbus Communication Error | YES | 253 |
| CrSt | CrSt | Can Not Reset | YES | 253 |
| dEv | dEv | Excessive Speed Deviation (for Simple V/f with PG) | YES | 254 |
| dnE | dnE | Drive Disabled | YES | 254 |
| EF | EF | Run Command Input Error | YES | 254 |
| EF0 | EF0 | Option Card External Fault | YES | 254 |
| EF1 to EF7 | EF1 to EF7 | External Fault (input terminal S1 to S7) | YES | 255 |
| FbH | FbH | Excessive PID Feedback | YES | 255 |
| FbL | FbL | PID Feedback Loss | YES | 255 |
| Hbb | Hbb | Safe Disable Signal Input | YES | 255 |
| HbbF | HbbF | Safe Disable Signal Input | YES | 255 |
| SE | SE | MEMOBUS/Modbus Test Mode Fault | YES | — |
| oL5 | oL5 | Mechanical Weakening Detection 1 | YES | 249 |
| UL5 | UL5 | Mechanical Weakening Detection 2 | YES | 251 |
| dWAL | dWAL | DriveWorksEZ Alarm | YES | 244 |
| HCA | HCA | Current Alarm | YES | 256 |
| oH | oH | Heatsink Overheat | YES | 256 |
| oH2 | oH2 | Drive Overheat | YES | 256 |
| oH3 | oH3 | Motor Overheat | YES | 256 |
| oL3 | oL3 | Overtorque 1 | YES | 256 |
| oL4 | oL4 | Overtorque 2 | YES | 257 |
| oS | oS | Overspeed (for Simple V/f with PG) | YES | 257 |

| LED Operator Display | | Name | Minor Fault Output (H2-□□ = 10) | Page |
|----------------------|------|--|------------------------------------|---------------------|
| <i>ou</i> | ov | Overvoltage | YES | 257 |
| <i>PASS</i> | PASS | MEMOBUS/Modbus Test Mode Complete | No output | 257 |
| <i>PGo</i> | PGo | PG Disconnect (for Simple V/f with PG) | YES | 257 |
| <i>rUn</i> | rUn | During Run 2, Motor Switch Command Input | YES | 258 |
| <i>rUnC</i> | rUnC | Run Command Reset | YES | 258 |
| <i>UL3</i> | UL3 | Undertorque 1 | YES | 258 |
| <i>UL4</i> | UL4 | Undertorque 2 | YES | 258 |
| <i>Uu</i> | Uv | Undervoltage | YES | 258 |

■ Operation Errors

Table 6.6 Operation Error Displays

| LED Operator Display | | | Name | Page | LED Operator Display | | | Name | Page |
|----------------------|-------|---|------|---------------------|----------------------|-------|-------------------------------------|------|---------------------|
| <i>oPE01</i> | oPE01 | Drive Unit Setting Error | | 259 | <i>oPE08</i> | oPE08 | Parameter Selection Error | | 260 |
| <i>oPE02</i> | oPE02 | Parameter Setting Range Error | | 259 | <i>oPE09</i> | oPE09 | PID Control Selection Error | | 260 |
| <i>oPE03</i> | oPE03 | Multi-Function Input Setting Error | | 259 | <i>oPE10</i> | oPE10 | V/f Data Setting Error | | 261 |
| <i>oPE04</i> | oPE04 | Terminal Board Mismatch Error | | 260 | <i>oPE11</i> | oPE11 | Carrier Frequency Setting Error | | 261 |
| <i>oPE05</i> | oPE05 | Run Command Selection Error | | 260 | <i>oPE13</i> | oPE13 | Pulse Train Monitor Selection Error | | 261 |
| <i>oPE07</i> | oPE07 | Multi-Function Analog Input Selection Error | | 260 | | | | | |

10. WARRANTY AND RETURNS

WARRANTY POLICY FOR THE LAVINA® S-E MACHINE

Superabrasive Ltd. guarantees that the original purchaser of the Lavina® S-E machine will be covered against defects in material and workmanship for a period of 2 years from the date of delivery or 500 hours of use whichever comes first.

The following conditions pertain to this warranty:

- Applies only to the original owner and it is not transferable.
- Machine must not be dismantled and tampered with in any way.
- Covered components proven defective will be repaired or replaced at no charge. Covered components include motors, bearings and switches.
- This warranty does not apply to any repair arising from misuse, neglect or abuse, or to repair of proprietary parts.
- This warranty does not apply to products with aftermarket alterations, changes, or modifications.
- This warranty is in lieu of and excludes every condition of warranty not herein expressly set out and all liability for any form of consequential loss or damage is hereby expressly excluded.
- This warranty is limited to repair or replacement of covered components and reasonable labor expenses.
- All warranty returns must be shipped freight prepaid.

The above warranty conditions may be changed only by Superabrasive. Superabrasive reserves the right to inspect and make a final decision on any machine returned under this warranty. This warranty applies to new, used and demo machines.

Superabrasive does not authorize any person or representative to make any other warranty or to assume for us any liability in connection with the sale and operation of our products

RETURN POLICY FOR LAVINA® S-E MACHINES

The Lavina® S-E machines may be returned, subject to the following terms:

In no case, a machine is to be returned to Superabrasive Ltd. for credit or repair without prior authorization. Please contact Superabrasive Ltd. or your local distributor for an authorization and issuance of a return authorization number. This number along with the serial number of the machine must be included on all packages and correspondence. Machines returned without prior authorization will remain property of the sender and Superabrasive Ltd. will not be responsible for these.

11. DISPOSAL

If your machine after time is not usable or needs to be replaced, send the machine back to Superabrasive or a local distributor, where a professional disposal complying with the environment laws and directives is guaranteed.

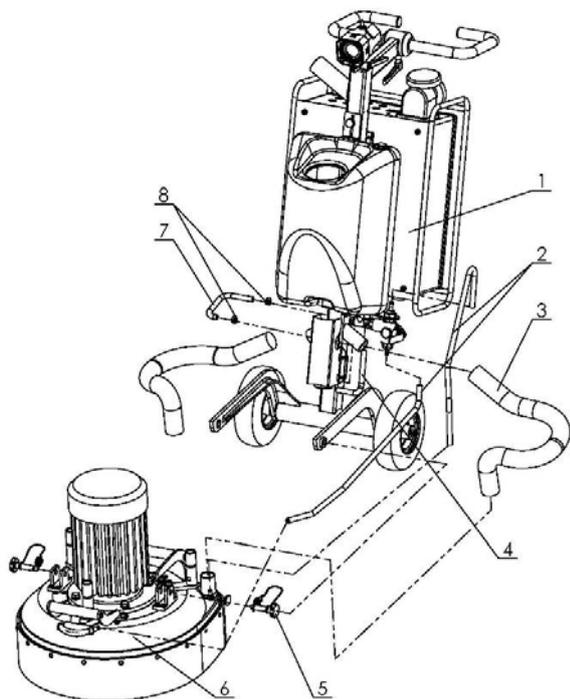
12. MANUFACTURER'S CONTACTS

If you need to contact Superabrasive Ltd. with technical support questions, below is the contact information.

| | | | |
|----------|--------------------|----------|--|
| Address: | Superabrasive Ltd. | Email: | factory@superabrasive.com |
| | Rabotnicheska 2A | Tel.: | +359 431 6 44 77 |
| | BG-6140 Krun | Fax: | +359 431 6 44 66 |
| | Bulgaria | Website: | www.superabrasive.com |

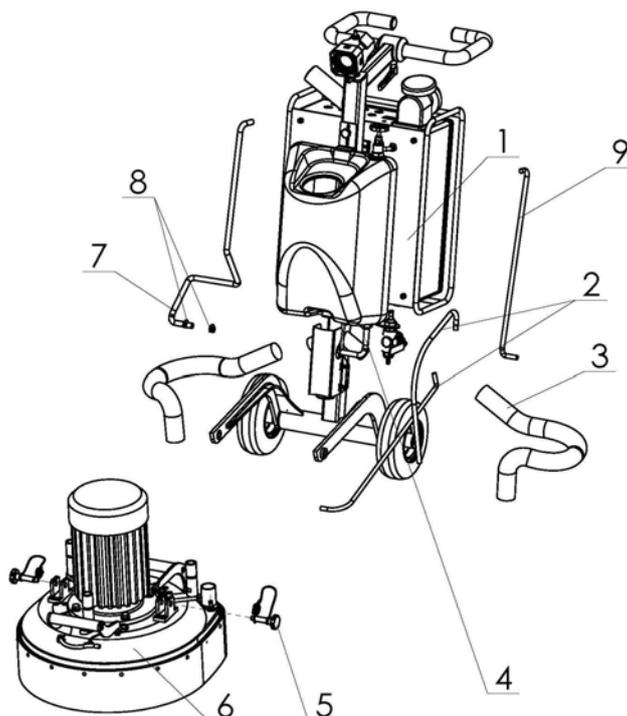
13. SPARE PARTS

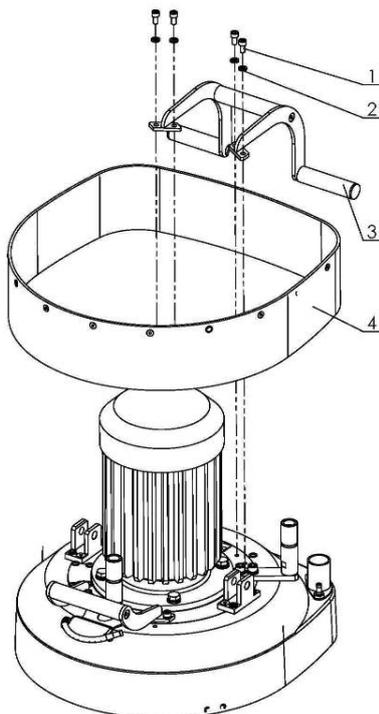
ASSEMBLY AND PARTS SPECIFICATIONS



| 1. LAVINA® 20N-S-E GENERAL PARTS /FOR MACHINES PRODUCED BEFORE JAN.1 2014/ | | | | |
|---|-----|--------------------|--------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | L20NSE-20.00.00 | Carriage | 1 |
| L20N-S-E | 2 | MAR8.78 | Tube | 2 |
| L20N-S-E | 3 | D40L820 | Vacuum Hose | 2 |
| L20N-S-E | 4 | MAR8.20 | Tube | 1 |
| L20N-S-E | 5 | L25SPS-07.03.00.00 | Pin Assembly | 2 |
| L20N-S-E | 6 | L20NS-10.00.00 | Main Head | 1 |
| L20N-S-E | 7 | MAR8.25 | Tube | 1 |
| L20N-S-E | 8 | 10-16DIN3017 | Clamp | 3 |

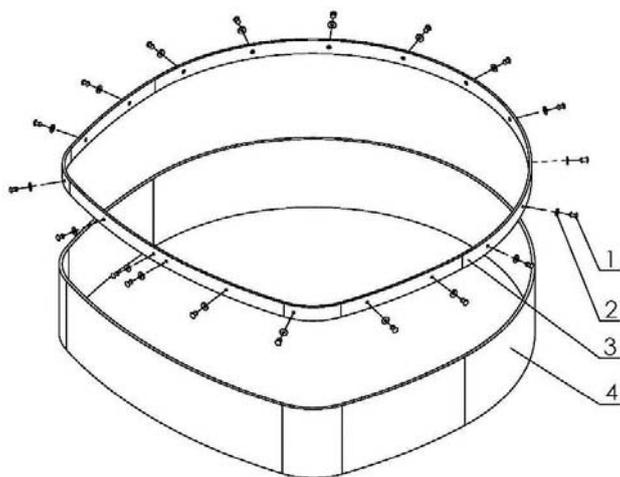
| 1. LAVINA® 20N-S-E GENERAL PARTS /FOR MACHINES PRODUCED AFTER JAN.1 2014/ | | | | |
|--|-----|--------------------|--------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | L20NSE-20.00.00-01 | Carriage | 1 |
| L20N-S-E | 2 | MAR8.78 | Tube | 2 |
| L20N-S-E | 3 | D40L820 | Vacuum Hose | 2 |
| L20N-S-E | 4 | MAR8.25 | Tube | 1 |
| L20N-S-E | 5 | L25SPS-07.03.00.00 | Pin Assembly | 2 |
| L20N-S-E | 6 | L20NS-10.00.00 | Main Head | 1 |
| L20N-S-E | 7 | MAR8.85 | Tube | 1 |
| L20N-S-E | 8 | 10-16DIN3017 | Clamp | 6 |
| L20N-S-E | 9 | MAR8.71 | Tube | 1 |





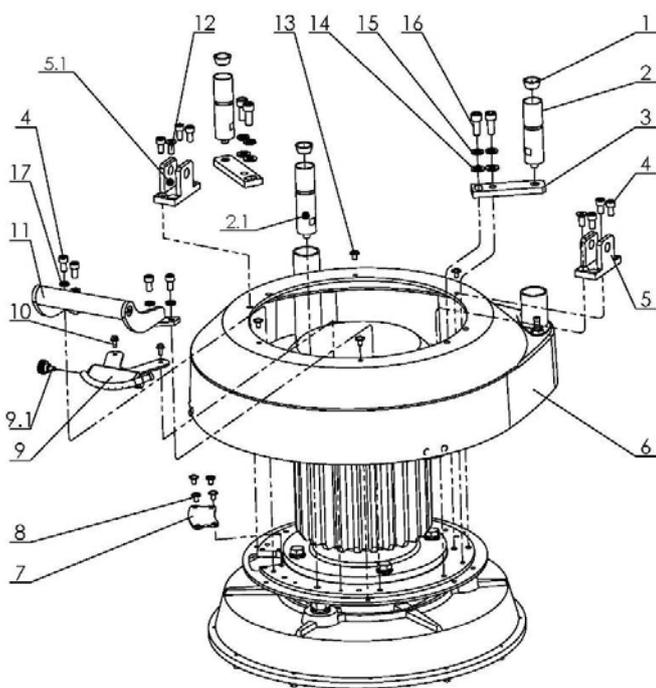
2. LAVINA® 20N-S-E TOP COVER PARTS 1

| Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|-----------------|------|
| L20N-S-E | 1 | M8X16DIN912 | Screw | 4 |
| L20N-S-E | 2 | M8DIN127B | Spring Washer | 4 |
| L20N-S-E | 3 | L20SPS-03.00.00.00 | Machine Support | 1 |
| L20N-S-E | 4 | L20SPS-05.00.00.00 | Guard Assembly | 1 |



3. LAVINA® 20N-S-E GUARD PARTS

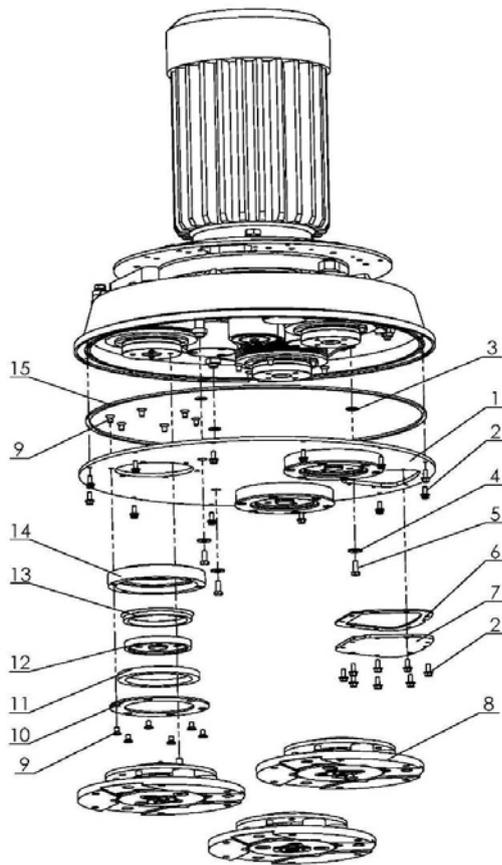
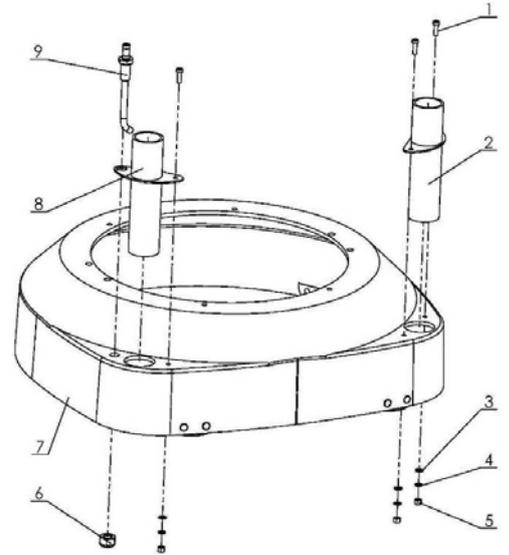
| Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|-------------|------|
| L20N-S-E | 1 | D4X10DIN7337 | Rivet | 18 |
| L20N-S-E | 2 | M4DIN9021A | Washer | 18 |
| L20N-S-E | 3 | L20SPS-05.00.00.01 | Ring | 1 |
| L20N-S-E | 4 | L20SPS-05.00.00.02 | Guard | 1 |



4. LAVINA® 20N-S-E TOP COVER PARTS 2

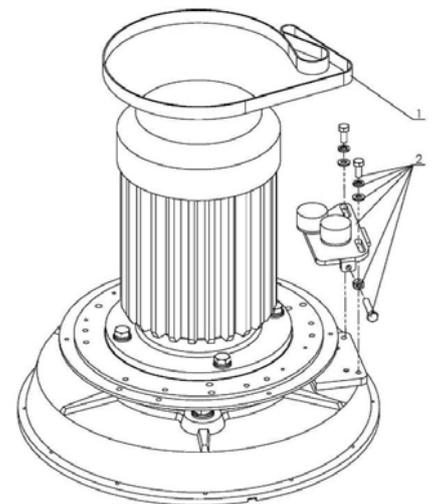
| Model | No. | Item No. | Description | Pcs. |
|----------|-----|----------------------|---------------------|------|
| L20N-S-E | 1 | L25SPS-07.00.00.29 | Rubber Buffer | 3 |
| L20N-S-E | 2 | L25SPS-07.00.00.05 | Weight Holder | 2 |
| L20N-S-E | 2.1 | L20SPS-07.00.00.02 | Front weight Holder | 1 |
| L20N-S-E | 3 | L20SPS-07.00.00.01 | Support | 2 |
| L20N-S-E | 4 | M8X16DIN912 | Screw | 10 |
| L20N-S-E | 5 | L25SPS-07.00.00.02-L | Left Fork | 1 |
| L20N-S-E | 5.1 | L25SPS-07.00.00.02-R | Right Fork | 1 |
| L20N-S-E | 6 | L20S-19.00.00 | Top Cover | 1 |
| L20N-S-E | 7 | L20S-15.00.20 | Inspection Cover | 1 |
| L20N-S-E | 8 | M6X10ISO7380F | Screw | 4 |
| L20N-S-E | 9 | A29.10.00-01 | Spray Unit | 1 |
| L20N-S-E | 9.1 | H766-21 | Knob Bolt | 1 |
| L20N-S-E | 10 | M5X12DIN6921 | Bolt | 2 |
| L20N-S-E | 11 | L20SPS-08.00.00.00 | Handle | 1 |
| L20N-S-E | 12 | M8X20DIN7991 | Screw | 2 |
| L20N-S-E | 13 | M6X10ISO7380F | Screw | 4 |
| L20N-S-E | 14 | M10DIN125A | Washer | 4 |
| L20N-S-E | 15 | M10DIN127B | Spring Washer | 4 |
| L20N-S-E | 16 | M10X25DIN912 | Screw | 4 |
| L20N-S-E | 17 | M8DIN127B | Spring Washer | 4 |

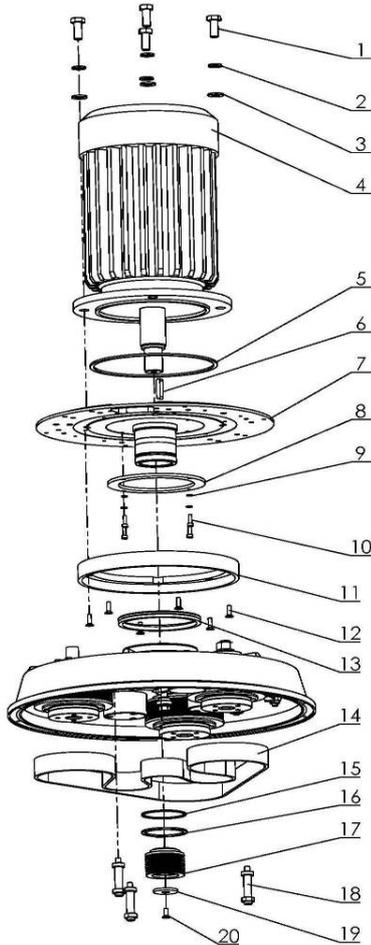
| 5. LAVINA® 20N-S-E TOP COVER PARTS 3 | | | | |
|--------------------------------------|-----|--------------------|---------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | M5X16DIN84A | Screw | 3 |
| L20N-S-E | 2 | L25SPS-04.01.00.00 | Vacuum Port | 1 |
| L20N-S-E | 4 | M5DIN127B | Spring Washer | 3 |
| L20N-S-E | 3 | M5DIN125A | Washer | 3 |
| L20N-S-E | 5 | M5DIN934 | Nut | 3 |
| L20N-S-E | 6 | M12DIN985 | Nut | 1 |
| L20N-S-E | 7 | L20S-19.00.01 | Top Cover | 1 |
| L20N-S-E | 8 | L25GS-19.10.00 | Vacuum Port | 1 |
| L20N-S-E | 9 | L25GS-19.20.00 | Water Fitting | 1 |



| 7. LAVINA® 20N-S-E PLANETARY DRIVE PARTS | | | | |
|--|-----|-----------------|--------------------------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | TC-20EF110X20X2 | Endless Transmission Flat Belt | 1 |
| L20N-S-E | 2 | L20S-17.00.00 | Planetary Tensioning Unit | 1 |

| 6. LAVINA® 20N-S-E BOTTOM COVER PARTS 1 | | | | |
|---|-----|----------------|-------------------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | L20NS-14.00.00 | Bottom Cover Assembly | 1 |
| L20N-S-E | 2 | M5X12DIN6921 | Bolt | 20 |
| L20N-S-E | 3 | D12X2 | O-Ring | 3 |
| L20N-S-E | 4 | M6DIN9021A | Washer | 3 |
| L20N-S-E | 5 | M6X16DIN933 | Screw | 3 |
| L20N-S-E | 6 | L20NS-14.00.05 | Sealer Inspection Cover | 1 |
| L20N-S-E | 7 | L20NS-14.00.04 | Inspection Cover | 1 |
| L20N-S-E | 8 | A31.00.00 | Tool Holder A31 | 3 |
| L20N-S-E | 9 | M6X10DIN7991 | Screw | 36 |
| L20N-S-E | 10 | L25LS-14.00.03 | Outer Cover | 3 |
| L20N-S-E | 11 | 110X90X8.5 | Felt Ring | 3 |
| L20N-S-E | 12 | A34.00.01 | Adaptor | 3 |
| L20N-S-E | 13 | TWVA00800 | V-Ring Type A | 3 |
| L20N-S-E | 14 | L25LS-14.00.02 | Flange | 3 |
| L20N-S-E | 15 | D4X2X1450 | Seal | 1 |



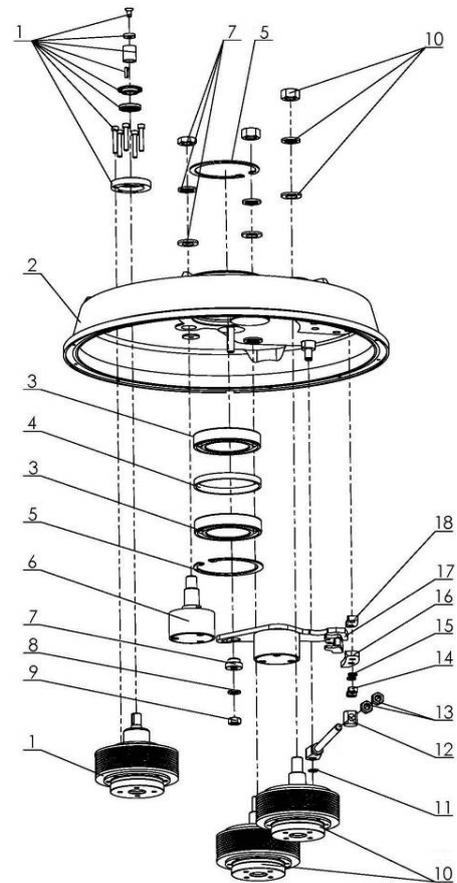


8. LAVINA® 20N-S-E BOTTOM COVER PARTS 2

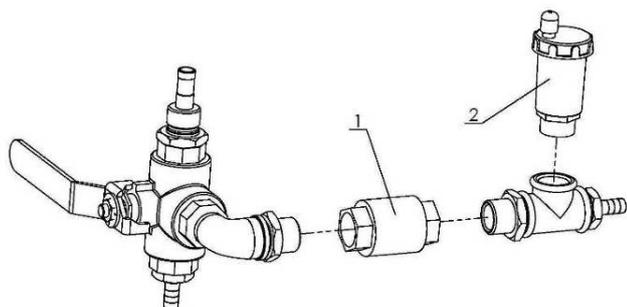
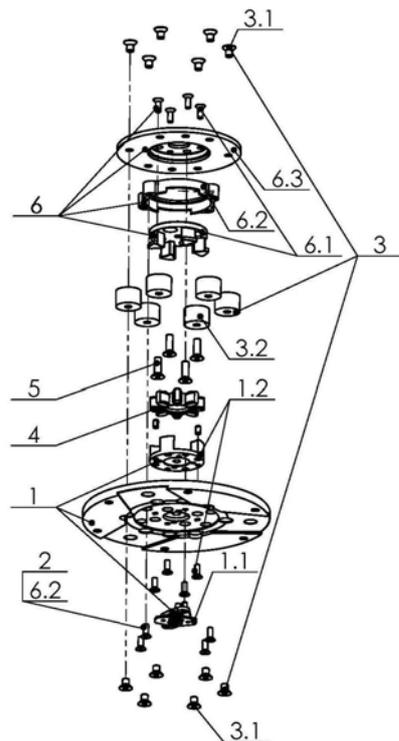
| Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|-----------------------------|------|
| L20N-S-E | 1 | M12X35DIN933 | Bolt | 4 |
| L20N-S-E | 2 | M12DIN127B | Spring Washer | 4 |
| L20N-S-E | 3 | M12DIN125A | Washer | 4 |
| L20N-S-E | 4 | S203 | Electro Motor | 1 |
| L20N-S-E | 5 | D4X2X650 | Seal | 1 |
| L20N-S-E | 6 | DIN6885A8X7X36 | Key | 1 |
| L20N-S-E | 7 | L20S-15.01.00 | Base Plate | 1 |
| L20N-S-E | 8 | L25P-01.03.00.09 | Flange | 1 |
| L20N-S-E | 9 | M5DIN7980 | Spring Washer | 4 |
| L20N-S-E | 10 | M5X16DIN912 | Screw | 4 |
| L20N-S-E | 11 | L20S-15.00.21 | Planetary Pulley | 1 |
| L20N-S-E | 12 | M6X20DIN7991 | Screw | 1 |
| L20N-S-E | 13 | TWVA01200 | V-Ring Type A | 1 |
| L20N-S-E | 14 | 1725PK9 | Endless Transmission V Belt | 1 |
| L20N-S-E | 15 | L25SPS-00.00.00.23 | Compensating Ring | 1 |
| L20N-S-E | 16 | B65DIN471 | Retaining Ring | 1 |
| L20N-S-E | 17 | L20NS-00.00.08 | Central Pulley | 1 |
| L20N-S-E | 18 | L20NS-10.00.20 | Distance Screw | 3 |
| L20N-S-E | 19 | L25SPS-00.00.00.15 | Front Washer | 1 |
| L20N-S-E | 20 | M6X16DIN7991 | Screw | 1 |

9. LAVINA® 20N-S-E PULLEY UNIT PARTS 2

| Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|----------------------|------|
| L20N-S-E | 1 | L20NS-16.00.00 | Driving Pulley Unit | 1 |
| L20N-S-E | 2 | L20NS-10.00.10 | Disc | 1 |
| L20N-S-E | 3 | 6013 | Roller Assembly | 2 |
| L20N-S-E | 4 | L25SPS-00.00.00.34 | Distance Ring | 1 |
| L20N-S-E | 5 | A10013943 | Retaining Ring | 2 |
| L20N-S-E | 6 | L20P-01.05.00.00 | Roller Unit Assembly | 1 |
| L20N-S-E | 7 | L20NS-10.00.14 | Axle Bushing | 1 |
| L20N-S-E | 8 | M10DIN127B | Spring Washer | 1 |
| L20N-S-E | 9 | M10DIN934 | Nut | 1 |
| L20N-S-E | 10 | L20NS-11.00.00 | Pulley Unit Assembly | 2 |
| L20N-S-E | 11 | B10DIN471 | Retaining Ring | 1 |
| L20N-S-E | 12 | L32C-14.20.04 | Nut | 1 |
| L20N-S-E | 13 | M10DIN934 | Nut | 2 |
| L20N-S-E | 14 | M8DIN934 | Nut | 2 |
| L20N-S-E | 15 | M8DIN127B | Spring Washer | 2 |
| L20N-S-E | 16 | L20NS-10.00.11 | Sector | 1 |
| L20N-S-E | 17 | L20NS-12.00.00 | Tensioning Support | 1 |
| L20N-S-E | 18 | L20NS-10.00.12 | Sector | 1 |

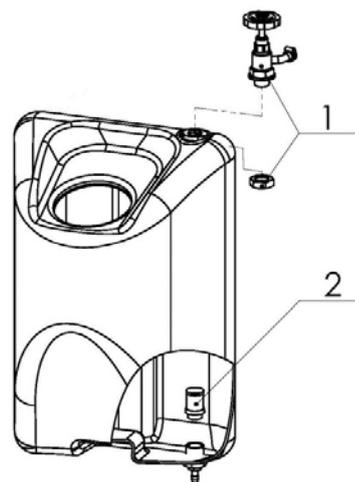


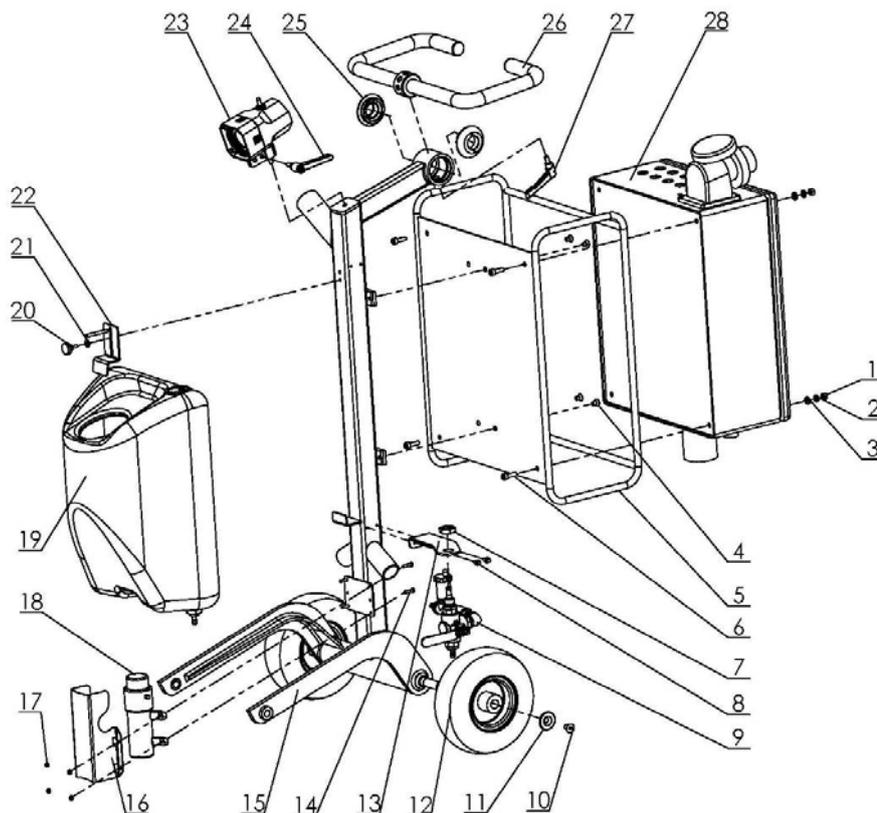
| 10 LAVINA®20N-S-E TOOL HOLDER PARTS | | | | |
|-------------------------------------|-----|-------------------|-----------------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | A31.10.00 | Quick Change Assembly | 1 |
| L20N-S-E | 1.1 | A31.12.00 | Keylock Set | 1 |
| L20N-S-E | 1.2 | A31.10.02-K | Copling 2 with screws | 1 |
| L20N-S-E | 2 | M6X16DIN7991 | Screw | 4 |
| L20N-S-E | 3 | A25.00.10-K | Buffer with two screw | 6 |
| L20N-S-E | 3.1 | M8X12DIN7991 | Screw | 12 |
| L20N-S-E | 3.2 | A25.00.10 | Buffer | 6 |
| L20N-S-E | 4 | A25.00.05-02 | Spider | 1 |
| L20N-S-E | 5 | M8X25DIN7991-10.9 | Screw | 4 |
| L20N-S-E | 6 | A31.20.00 | Flange | 1 |
| L20N-S-E | 6.1 | A31.20.03-K | Copling 1 with screws | 1 |
| L20N-S-E | 6.2 | A31.20.02-K | Security ring | 1 |
| L20N-S-E | 6.3 | A31.20.01 | Flange A31 | 1 |



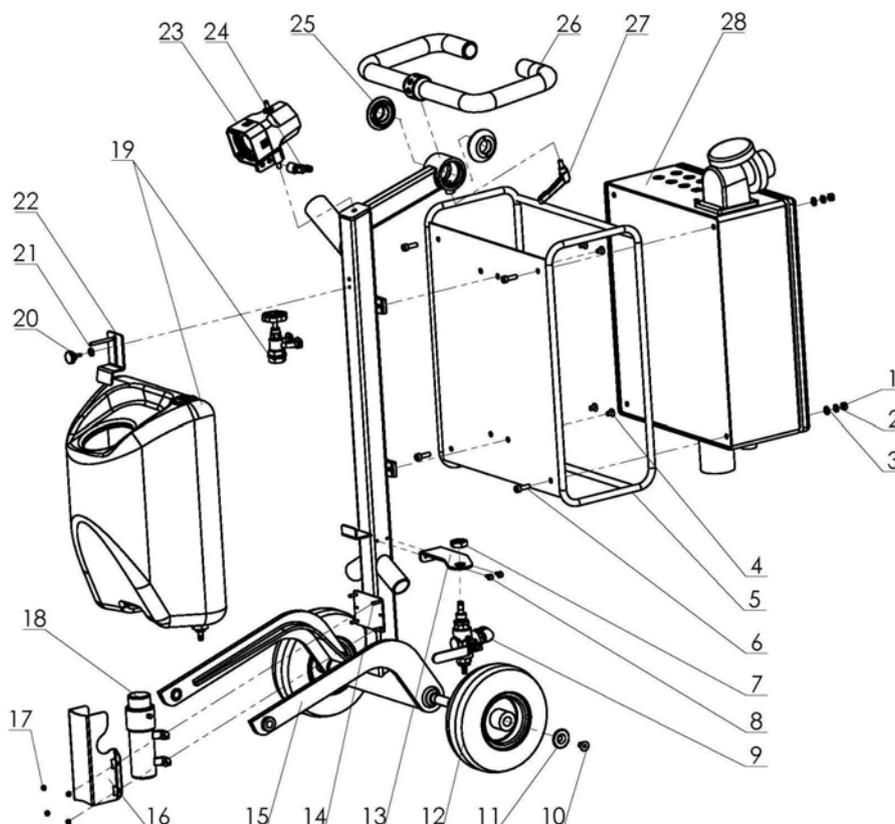
| 11. LAVINA® 20N-S-E WATER SUPPLY PARTS /FOR MACHINES PRODUCED BEFORE JAN.1 2014/ | | | | |
|---|-----|-----------|--------------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | A29.21.00 | Backflow Preventer | 1 |
| L20N-S-E | 2 | A29.22.00 | Vent Valve | 1 |

| 11. LAVINA®20N-S-E WATER TANK PARTS /FOR MACHINES PRODUCED AFTER JAN.1 2014/ | | | | |
|---|-----|-----------|-------------|------|
| Model | No. | Item No. | Description | Pcs. |
| L20N-S-E | 1 | A29.50.00 | Regulator | 1 |
| L20N-S-E | 2 | 1/2" | Filter | 1 |




12. LAVINA® 20N-S-E CARRIAGE PARTS /FOR MACHINES PRODUCED BEFORE JAN.1 2014/

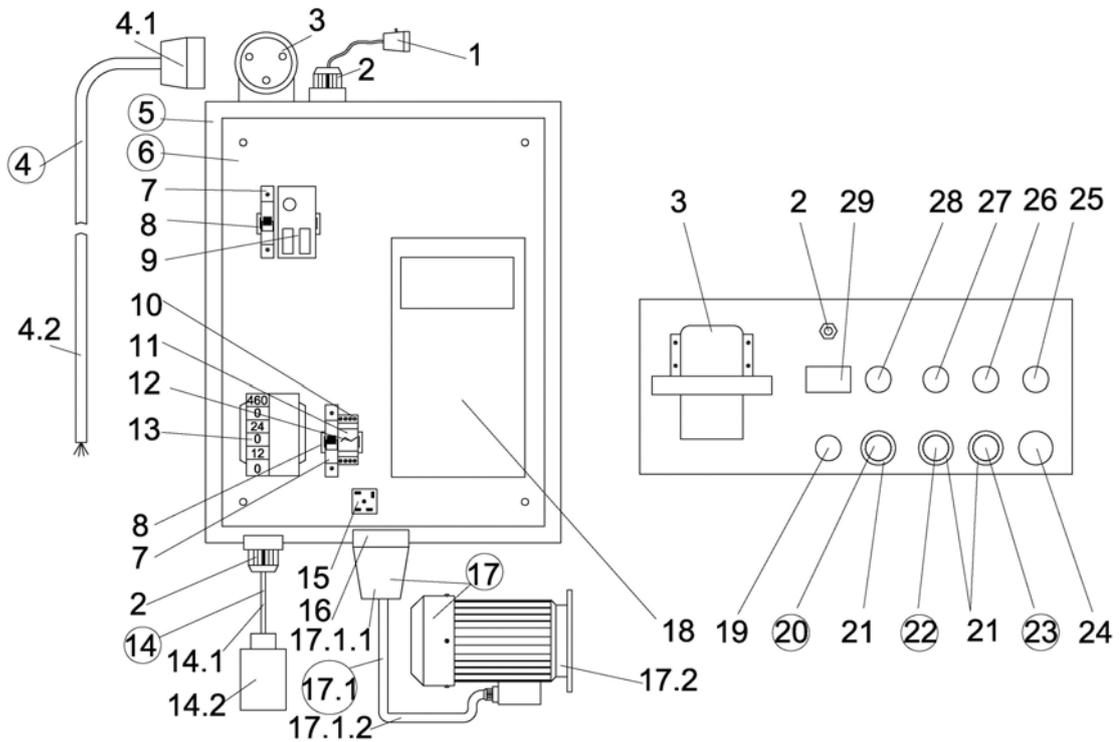
| Model | No. | Item No. | Description | Pcs. | Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|-------------------------|------|----------|-----|-----------------------|-----------------------|------|
| L20N-S-E | 1 | M8DIN934 | Nut | 4 | L20N-S-E | 15 | L20S-21.00.00 | Carriage | 1 |
| L20N-S-E | 2 | M8DIN127B | Spring Washer | 4 | L20N-S-E | 16 | L25S-20.00.26 | Guard | 1 |
| L20N-S-E | 3 | M8DIN125A | Washer | 4 | L20N-S-E | 17 | M5DIN985 | Nut | 4 |
| L20N-S-E | 4 | M8X12DIN7991 | Screw | 4 | L20N-S-E | 18 | 1040 | Water Pump | 1 |
| L20N-S-E | 5 | L25S-22.00.00 | Guard | 1 | L20N-S-E | 19 | A33.00.00 | Tank | 1 |
| L20N-S-E | 6 | M8X25DIN912 | Screw | 4 | L20N-S-E | 20 | T34391 | Knob Bolt | 1 |
| L20N-S-E | 7 | M20X1.5DIN439B | Nut | 1 | L20N-S-E | 21 | M5UN732 | Washer | 1 |
| L20N-S-E | 8 | M5X12DIN6921 | Bolt | 2 | L20N-S-E | 22 | L25P-02.00.00.01 | Top Bracket | 1 |
| L20N-S-E | 9 | A29.20.00 | Water Flow Control Unit | 1 | L20N-S-E | 23 | L20NS-30.30.00 | Lamp Unit Incl. Cable | 1 |
| L20N-S-E | 10 | M10X16DIN7991 | Screw | 2 | L20N-S-E | 24 | A58165 | Swivel Bolt | 1 |
| L20N-S-E | 11 | L20SPS-02.00.00.19 | Cap | 2 | L20N-S-E | 25 | L25SPS-02.00.00.18-01 | Nut | 2 |
| L20N-S-E | 12 | L20SPS-02.04.00.00 | Wheel | 2 | L20N-S-E | 26 | L20SPS-02.05.00.00 | Handle Assembly | 1 |
| L20N-S-E | 13 | A29.20.01-01 | Flow Unit Base | 1 | L20N-S-E | 27 | A58194 | Swivel Bolt | 1 |
| L20N-S-E | 14 | M5X20DIN933 | Bolt | 4 | L20N-S-E | 28 | L20NSE-30.00.00 | Control Box L20N-S-E | 1 |



12. LAVINA®20N-S CARRIAGE PARTS /FOR MACHINES PRODUCED AFTER JAN.1 2014/

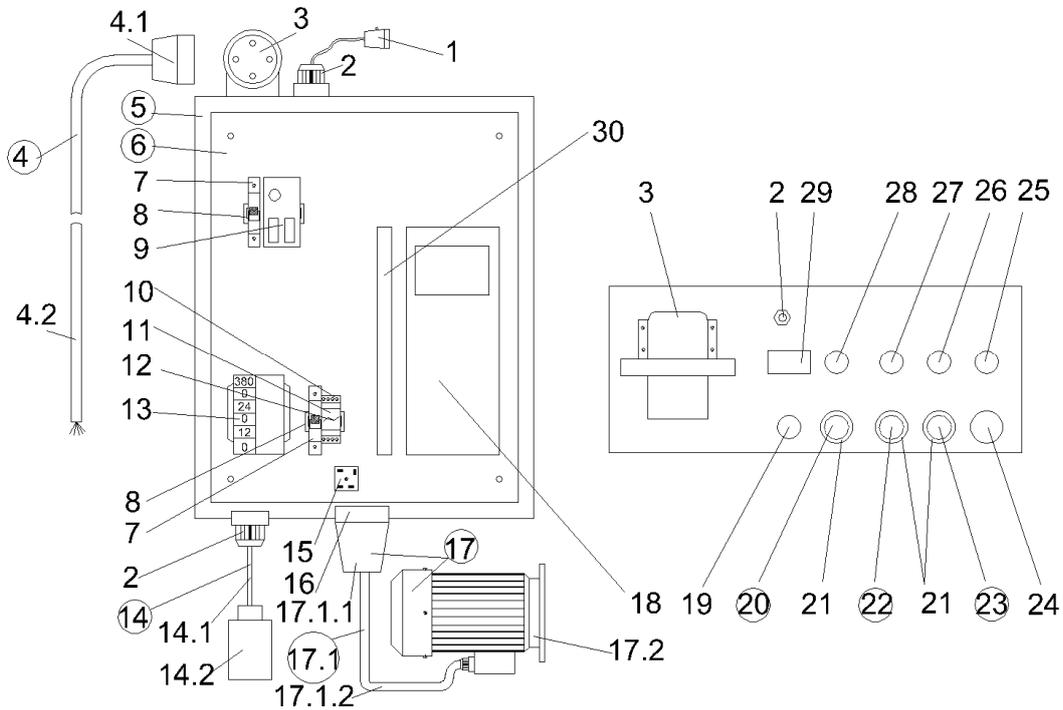
| Model | No. | Item No. | Description | Pcs. | Model | No. | Item No. | Description | Pcs. |
|----------|-----|--------------------|-------------------------|------|----------|-----|-----------------------|-----------------------|------|
| L20N-S-E | 1 | M8DIN934 | Nut | 4 | L20N-S-E | 15 | L20S-21.00.00 | Carriage | 1 |
| L20N-S-E | 2 | M8DIN127B | Spring Washer | 4 | L20N-S-E | 16 | L25S-20.00.26 | Guard | 1 |
| L20N-S-E | 3 | M8DIN125A | Washer | 4 | L20N-S-E | 17 | M5DIN985 | Nut | 4 |
| L20N-S-E | 4 | M8X12DIN7991 | Screw | 4 | L20N-S-E | 18 | 1040 | Water Pump | 1 |
| L20N-S-E | 5 | L25S-22.00.00 | Guard | 1 | L20N-S-E | 19 | A33.10.00 | Tank Assembly | 1 |
| L20N-S-E | 6 | M8X25DIN912 | Screw | 4 | L20N-S-E | 20 | T34391 | Knob Bolt | 1 |
| L20N-S-E | 7 | M20X1.5DIN439B | Nut | 1 | L20N-S-E | 21 | M5UN732 | Washer | 1 |
| L20N-S-E | 8 | M5X12DIN6921 | Bolt | 2 | L20N-S-E | 22 | L25P-02.00.00.01 | Top Bracket | 1 |
| L20N-S-E | 9 | A29.40.00 | Water Flow Control Unit | 1 | L20N-S-E | 23 | L20NS-30.30.00 | Lamp Unit Incl. Cable | 1 |
| L20N-S-E | 10 | M10X16DIN7991 | Screw | 2 | L20N-S-E | 24 | A58165 | Swivel Bolt | 1 |
| L20N-S-E | 11 | L20SPS-02.00.00.19 | Cap | 2 | L20N-S-E | 25 | L25SPS-02.00.00.18-01 | Nut | 2 |
| L20N-S-E | 12 | L20SPS-02.04.00.00 | Wheel | 2 | L20N-S-E | 26 | L20SPS-02.05.00.00 | Handle Assembly | 1 |
| L20N-S-E | 13 | A29.20.01-01 | Flow Unit Base | 1 | L20N-S-E | 27 | A58194 | Swivel Bolt | 1 |
| L20N-S-E | 14 | M5X20DIN933 | Bolt | 4 | L20N-S-E | 28 | L20NS-30.00.00 | Control Box L20N-S | 1 |
| | | | | | L20N-S-E | 28 | L20NSHV-30.00.00 | Control Box L20N-S-HV | 1 |

LAVINA® 20N-S-OE CONTROL BOX PARTS



| 13.1 LAVINA® 20N-S-OE CONTROL BOX PARTS 200-240 VOLT | | | | | | | | |
|--|------|-------------------|-----------------------|------|--------|------------------|--------------------------|------|
| L20N-S-OE | No. | Item No. | Description | Pcs. | No. | Item No. | Description | Pcs. |
| L20N-S-OE | 1 | L20NS-30.30.00 | Lamp Unit Incl. Cable | 1 | 16 | L20S-30.10.03 | Socket | 1 |
| L20N-S-OE | 2 | L20NS-30.10.01 | Cable Gland | 2 | 17 | L20NSOE-30.20.00 | Electro Motor Assembly | 1 |
| L20N-S-OE | 3 | L20S-30.10.02 | Plug on Control Board | 1 | 17.1 | L20S-30.20.10 | Plug with Cable | 1 |
| L20N-S-OE | 4 | L20S -30.02.00 | Cable with Connector | 1 | 17.1.1 | L20S -30.20.11 | Plug | 1 |
| L20N-S-OE | 4.1 | L20S -30.02.01 | Connector | 1 | 17.1.2 | L20S-30.20.12 | Cable for Electro Motor | 1 |
| L20N-S-OE | 4.2 | L20S -30.02.02 | Cable | 1 | 17.2 | S203 | Electro Motor | 1 |
| L20N-S-OE | 5 | L20NSOE -30.10.00 | Metal Box | 1 | 18 | L20NS-30.11.09 | Inverter Yaskawa (V1000) | 1 |
| L20N-S-OE | 6 | L20NSOE -30.11.00 | Metal Box Plate | 1 | 19 | L20NS-30.10.04 | Potentiometer | 1 |
| L20N-S-OE | 7 | L20NS-30.11.01 | Circuit Breaker | 2 | 20 | L20NS-30.10.05 | Reset Button | 1 |
| L20N-S-OE | 8 | L20NS-30.11.02 | Rail | 2 | 21 | L20NS-30.10.06 | Cap | 3 |
| L20N-S-OE | 9 | L20S-30.11.03 | Circuit Breaker | 1 | 22 | L20NS-30.10.07 | Off Button | 1 |
| L20N-S-OE | 10 | L20NS-30.11.04 | Rail Base | 1 | 23 | L20NS-30.10.08 | On Button | 1 |
| L20N-S-OE | 11 | L20NS-30.11.05 | Rail | 1 | 24 | L20NS-30.10.10 | Emergency Stop Button | 1 |
| L20N-S-OE | 12 | L20NS-30.11.06 | Rail Bracket | 1 | 25 | L20NS-30.10.11 | Switch Button F/R | 1 |
| L20N-S-OE | 13 | L20NS-30.11.07 | Transformer | 1 | 26 | L20NS-30.10.12 | Green LED Power | 1 |
| L20N-S-OE | 14 | L20NS-30.40.00 | Water Pump with Cable | 1 | 27 | L20NS-30.10.13 | Water Pump Button | 1 |
| L20N-S-OE | 14.1 | L20NS-30.40.01 | Cable for Water Pump | 1 | 28 | L20NS-30.10.14 | Blue Led Alarm | 1 |
| L20N-S-OE | 14.2 | 1040 | Water Pump | 1 | 29 | L20NS-30.10.15 | Revolution counter | 1 |
| L20N-S-OE | 15 | L20NS-30.11.08 | Rectifier | 1 | 30 | L20S-E-30.11.01 | Filter | 1 |

LAVINA® 20N-S-E CONTROL BOX PARTS



13.2 LAVINA®20N-S-E CONTROL BOX PARTS 380 VOLT

| Model | No. | Item No. | Description | Pcs. | No. | Item No. | Description | Pcs. |
|----------|------|------------------|-----------------------|------|--------|-------------------|--------------------------|------|
| L20N-S-E | 1 | L20NS-30.30.00 | Lamp Unit Incl. Cable | 1 | 16 | L20NHVS-30.10.03 | Socket | 1 |
| L20N-S-E | 2 | L20NS-30.10.01 | Cable Gland | 2 | 17 | L25HVS-30.20.00 | Electro Motor Assembly | 1 |
| L20N-S-E | 3 | L20NSE.30.10.02 | Plug on Control Board | 1 | 17.1 | L20NHVS-30.20.10 | Plug with Cable | 1 |
| L20N-S-E | 4 | L20NSE.30.02.00 | Cable with Connector | 1 | 17.1.1 | L20NHVS -30.20.11 | Plug | 1 |
| L20N-S-E | 4.1 | L20NSE.30.02.01 | Connector | 1 | 17.1.2 | L20NHVS-30.20.12 | Cable for Electro Motor | 1 |
| L20N-S-E | 4.2 | L20NSE.30.02.02 | Cable | 1 | 17.2 | S203 | Electro Motor | 1 |
| L20N-S-E | 5 | L20NSE.30.10.00 | Metal Box | 1 | 18 | L20NHVS-30.11.09 | Inverter Yaskawa (V1000) | 1 |
| L20N-S-E | 6 | L20NSE.30.11.00 | Metal Box Plate | 1 | 19 | L20NS-30.10.04 | Potentiometer | 1 |
| L20N-S-E | 7 | L20NS-30.11.01 | Circuit Breaker | 2 | 20 | L20NS-30.10.05 | Reset Button | 1 |
| L20N-S-E | 8 | L20NS-30.11.02 | Rail | 2 | 21 | L20NS-30.10.06 | Cap | 3 |
| L20N-S-E | 9 | L20NHVS-30.11.03 | Circuit Breaker | 1 | 22 | L20NS-30.10.07 | Off Button | 1 |
| L20N-S-E | 10 | L20NS-30.11.04 | Rail Base | 1 | 23 | L20NS-30.10.08 | On Button | 1 |
| L20N-S-E | 11 | L20NS-30.11.05 | Rail | 1 | 24 | L20NS-30.10.10 | Emergency Stop Button | 1 |
| L20N-S-E | 12 | L20NS-30.11.06 | Rail Bracket | 1 | 25 | L20NS-30.10.11 | Switch Button F/R | 1 |
| L20N-S-E | 13 | L20NSE-30.11.07 | Transformer | 1 | 26 | L20NS-30.10.12 | Green LED Power | 1 |
| L20N-S-E | 14 | L20NS-30.40.00 | Water Pump with Cable | 1 | 27 | L20NS-30.10.13 | Water Pump Button | 1 |
| L20N-S-E | 14.1 | L20NS-30.40.01 | Cable for Water Pump | 1 | 28 | L20NS-30.10.14 | Blue Led Alarm | 1 |
| L20N-S-E | 14.2 | 1040 | Water Pump | 1 | 29 | L20NS-30.10.15 | Revolution counter | 1 |
| L20N-S-E | 15 | L20NS-30.11.08 | Rectifier | 1 | 30 | L20NSE-30.11.01 | Filter | 1 |