

Mastor, Lda

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Chip-cutter model 17

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1. General Information

1.1. General

- To guarantee correct operation of the chip-cutter, it is essential to follow all the instructions indicated in this user manual.
- Any fitter or maintenance operator manipulating the chip-cutter must follow these instructions. Interventions or handling actions not described or featured in this manual could lead to performance issues or permanent damage to the cutter.
- If these instructions are not followed when handling the cutter, the guarantee may be invalidated.
- This manual does not contain all the safety instructions possible for all normal or special applications. It is the user's and/or fitter's responsibility to follow the instructions that they consider appropriate during assembly, especially regarding the proper handling of electrical wiring and power supply.

1.2. EC Declaration of Conformity

- The declaration of conformity is in accordance with the Low Voltage Directive 73/23EEC, amended by directive 93/68/EEC and can be submitted separately along with the documentation of each chip-cutter.
- This declaration of conformity complies with the requirements of the declaration of incorporation in accordance with the Machines Directive 2006/42/EC (which repeals Directive 98/37/EC), Annex II, part 1, Section B.
- This declaration of conformity also complies with the requirements of the electromagnetic-compatibility declaration in accordance with Directive 89/336/EEC (and its amendments 92/31/CEE, 93/68/CEE and 2004/108/CE).

1.3. Range of application

- This Instructions Manual is valid and related solely to **MASTOR** chip-cutter model 17.

1.4. Application

- This chip-cutter was built for the sole purpose of cutting polyurethanes and rubbers that result from the machining of those materials. This is necessary to avoid damage to the finished products and/or tools in the process.
- Cutting polymers is not supported since it can damage the cutting blades.
- Maximum thickness advisable is 0.2mm for polyurethanes and 0.25mm for rubber compounds.
- Coolant can be present on the material to cut, but a large flow of water can damage the chip-cutter, namely the bearings inside the unit.
- The chip-cutter should always work together with a vacuum unit. The air flow inside the chip-cutter will refresh the bearing arrangement and therefor allow the continuous use of the chip-cutter system.

2. Inspection on receipt

- On receipt of the motor, immediately check to see if the chip-cutter shows any external damage, and if so, promptly inform the haulier in order to pass on the corresponding part.

- The goods shall be delivered with the delivery note, which shows the supply details; immediately check to see if the delivery coincides with the requested order.
- Check the data on the specifications plate, power, speed, voltage, etc., to see that they match the requested motor.
- Rotate the motor shaft by hand to check that it rotates without difficulty; remove the transport block if there is one.

3. Handling

3.1. Storage

- The chip-cutters must always be stored indoors, in dry atmospheres, with no vibrations or dust.
- They may be kept covered outside for short periods, provided they are protected from any environmental or mechanical damage.
- The chip-cutter must never be left on the fan cover.
- Unprotected mechanised surfaces (e.g. shafts and flanges) must be protected with anticorrosion treatment.
- It is advisable to rotate the shafts by hand to prevent grease displacement and/or leaks.
- It is preferable for the heating resistors, if the motor has them, to be connected.

3.2. Transporting and lifting

- Eyebolts and appropriate suspension methods must be used for transport.
- Only the motors must be suspended, with no attached parts such as bedplates, gears, etc.
- If the eyebolts are removed, the threaded holes should be properly sealed in accordance with the motor protection grade (see section 4.3).

4. Service start-up

4.1. Insulation check

- Before initial start-up and particularly after prolonged storage, it is necessary to measure the insulation value of the winding, between phases and earth phases. The check must be carried out with a megger with no more than 500V DC measurement voltage.
- During and immediately after measuring, the terminals may be live.
- At 25°C and depending on the rated plate voltage, the following minimum values must be obtained:

Rated power PN kW	Insulation resistance referred to rated voltage k _Ω /V
1 > PN < 10	6.3
10 < PN < 100	4
100 < PN	2.5

- If the minimum values are under these, the winding must be properly dried until the required insulation value is obtained.
- The oven temperature must be 90°C for 12-16 hours, followed by 105°C for 6-8 hours.

- If the dampness is caused by sea water, the motor must be wound again.
- Any drainage caps must be removed before drying in the oven.

4.2. Checking bearings

- After prolonged storage, the grease in the bearings must be inspected visually and replaced with new grease if there is any hardening.
- After three years of storage, the grease must be replaced.
- After four years, the bearings must be replaced if they were of the closed type (lifetime lubricated).
- The bearings maximum load values must not be exceeded. If necessary, ask the manufacturer.
- If the motor is operated without a radial load applied to the shaft, the roller bearings may be damaged. The roller bearings must always be subjected to a minimum radial load in order to ensure that they operate correctly.
- If the motor is operated without an axial load applied to the shaft in the correct direction, the angular-contact bearings may be damaged.
- When the motor is started up for the first time, or after a long period of storage (12 months), at least the indicated amount must be applied until the new grease issues from the outlet valve (see section 7.2).

4.3. Checking the protection grade

- The protection grade of the motor is indicated on the specifications plate. The protection grade of the elements attached to the motor may be different, which must be taken into account when fitting the motor.
- In outdoor installations (grade > IP 44), it is necessary to protect the motors from the direct action of atmospheric agents (e.g. rain, snow, ice; blockage of fan by freezing).

4.4. Terminals and rotation direction

- The rotation direction is clockwise, as seen from the shaft side, and the phase sequences of line L1, L2, and L3 is connected to the terminals (see section 11).
- To change the rotation direction, switch the connection of two cables of any line.
- If the motor fan only rotates in one direction, ensure that the rotation direction matches that of the arrow drawn on the motor.
- The rotation direction is not relevant for the chip-cutter blades.

5. Installation and assembly

5.1. Cooling

- The normal ambient temperature must not exceed 40°C for correct operation.
- Even when correctly installed, the motors may, during operation, have surface temperatures of more than 100°C; it is therefore necessary to avoid any contact with them if they are easy to access. It is also necessary to avoid fixing parts or elements that are sensitive to heat.

- Keep ventilation holes unimpeded, thus complying with the minimum distances set in the following table, so that the cool air flow is not obstructed and to ensure that the expelled air is not sucked in again.

5.2. Anchoring/Fixing the chip-cutter

- The buyer is responsible for preparing the anchoring or base of the motor.
- Metal anchors must be painted to prevent corrosion.
- The anchoring must be smooth and firm enough to bear the forces that may occur in the case of a three-phase short-circuit. It must also be able to prevent the vibrations produced by resonance.
- The anchoring must be made with a solid plate that will also cover the front area of the chip-cutter (recommended 2.5mm plate thickness). This plate will fully support the chip-cutter and also prevent moisture or dirt to enter the engine. Refer to the following CAD for the creation of the fixing plate.
- Several examples are shown on section 11.

5.3. Anchor bolts

- Screws should be M6. No more than 25mm of the screw should be inserted into the chip-cutter.

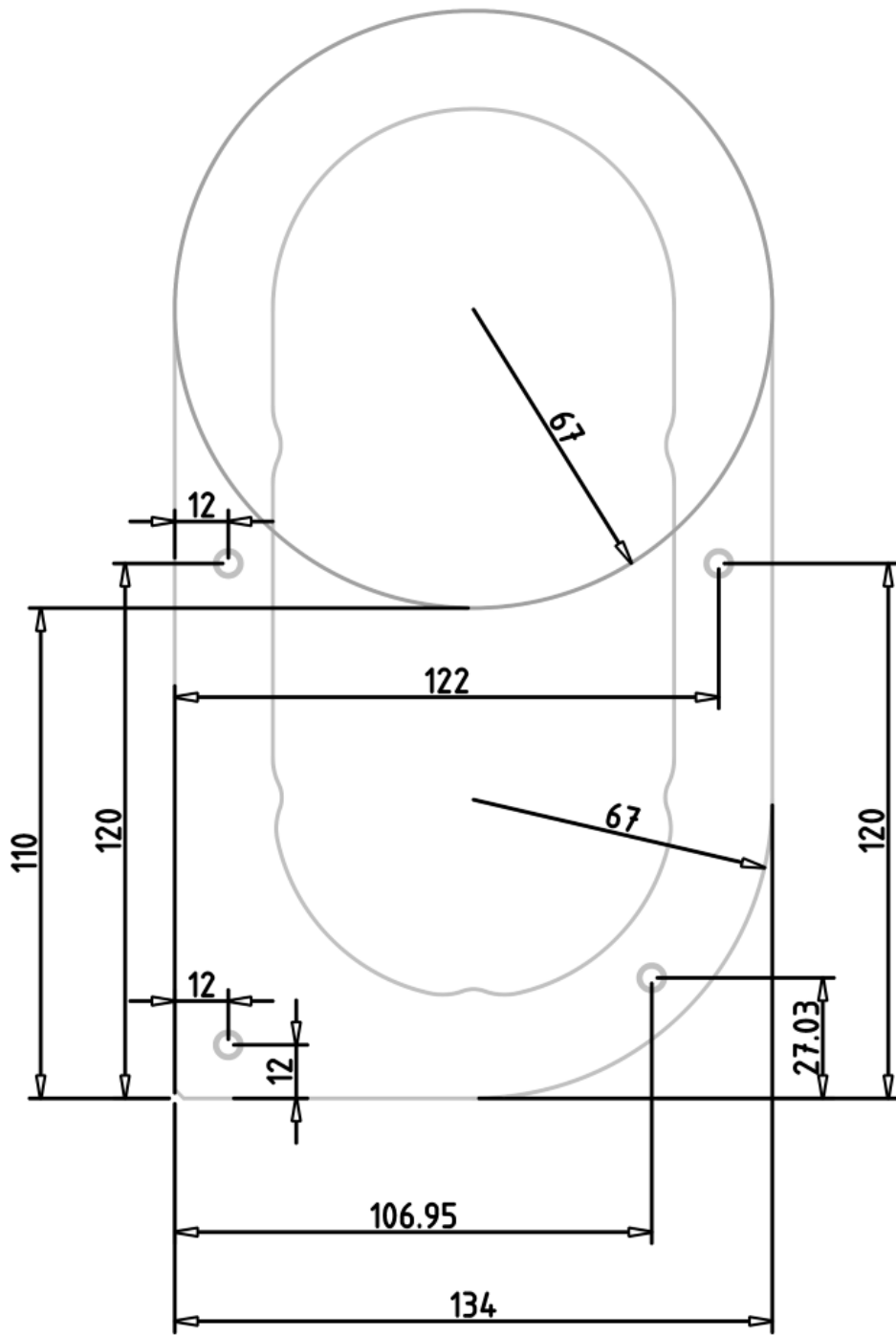
5.4. Drainage

- Electrical connection of the motor should be placed on a protected zone. The motor body can rotate and be mounted in 4 different positions in relation to the chip-cutter body. Depending on the fixing angle and the available space of the machine, the electrical box can be more or less exposed to coolant and dirt. Please choose the most appropriate to avoid condensation inside the electrical box.

5.5. Coupling, aligning, and balancing

- Belt transmissions use relatively large radial loads. In addition to the belt manufacturer's recommendations, it is necessary to check that its drive and tension does not exceed the radial force permissible at the end of the motor. It is important to properly adjust the initial tension during assembly.

Excessive tension of the belts may damage the bearings and cause the shaft to break.



x4 M6 thread

Figure 1- CAD dimensions for front plate creation

5.6. Cutting blades frictional adjustment

- The cutting blades are mounted in such a way that they will always be in slight contact with each other. The contact is necessary for the proper cutting of soft materials like rubbers or polyurethanes.
- No contact between the blades will result on a poor cutting of material softer materials.
- Excessive friction will damage the cutting blades and will make the chip-cutter work with high noise. To avoid this situation, use o'rings or a spacer between the two metal parts that provide the necessary gap and avoid extra glade friction.
- If the blades are excessively tightened, they may break. Caution must be undertaken in order the prevent overtightening of the blade screws.
- The correct adjustment of the tension is performed with the chip-cutter rotating. Slowly tighten each of the 4 screws, in alternative method, until the fixing blade starts to touch the fixed blade. **Important: use googles to protect from possible blade shatter.**
- It is important that the fixing blade holder is parallel to the chip-cutter body. This ensures that the blades are touching equally each other.
- If the blades are touching each other equally, the adjustment is already made.
- The chip-cutter produces vibration when the blades are touching. The vibration should be minimal. If that is not the case, untighten the screws or check if the chip-cutter body and the holding part of the fixed blade are exactly parallel.
- If the chip-cutter is to used to dispose of harder materials, like plastics, the blades should not touch each other. Instead, they should be close enough but not actually touching. The recommended distance between blades for these materials is 0,15mm.

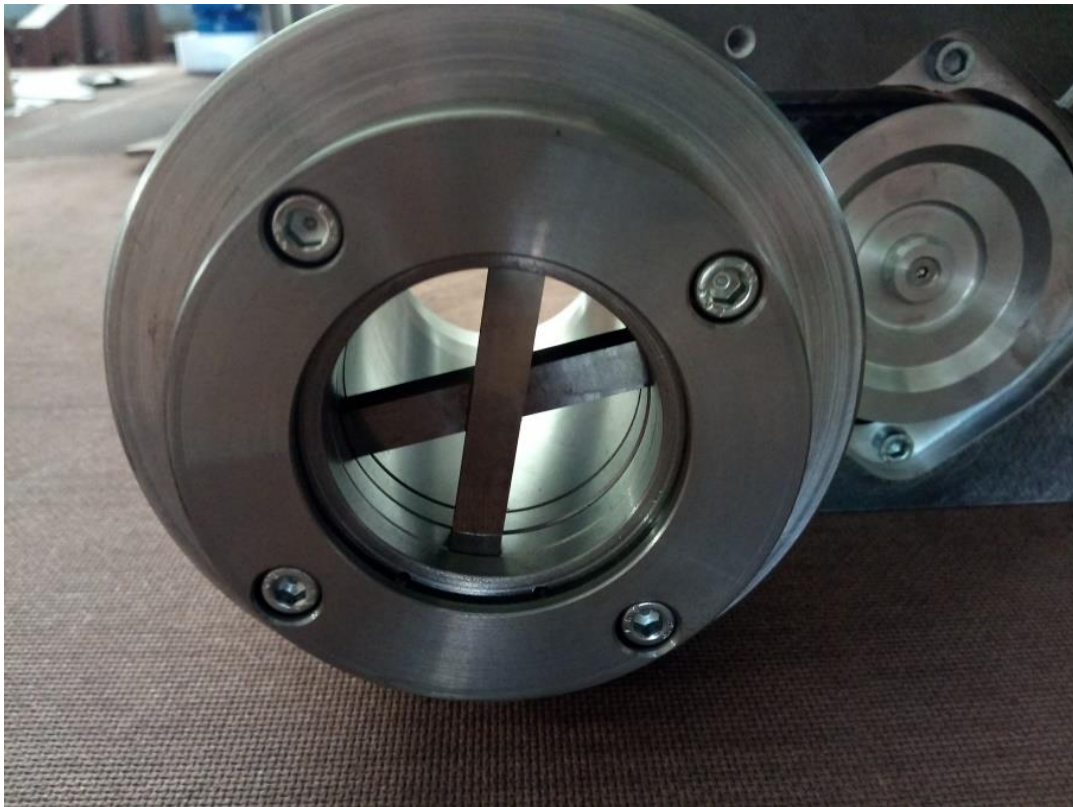


Figure 2- x4 M6 bolts that adjust the blades friction

6. Start-up

- Please pay attention to the safety standards and regulations.
- Only carry out operations on the chip-cutter while it is switched off.
- The chip-cutter should be fitted by specialist workers, fully prepared and in accordance with applicable regulations. Improper installation may hinder its performance and result in damaged parts.

6.1. Connection

- Firstly, ensure that the grid voltage and frequency matches those indicated on the motor specifications plate. The cable section must be appropriate for the current. Admissible voltage tolerance (DIN VDE 0530):
 - For design voltage: $\pm 10\%$.
 - For design frequency: $\pm 2\%$.
- The connection terminals of the motor are manufactured in accordance with standard DIN VDE 0530, part 7.
- Section 10 of these instructions shows the most common connection diagrams for three-phase motors of basic construction. For other constructions, the necessary diagrams are shown on the inside of the terminal box cover.
- **It is mandatory that the motor is protected with an overload circuit breaker adjusted for the nominal current of the motor.**
- The chip-cutter is a device that is subjected to stall under harsh conditions; therefore it presents a safety danger not to protect the device from overloads. Fire can occur if the motor is overloaded.
- It is advisable to check the insulation values between phases and earth phases before first start-up (see section 4.1). This is absolutely necessary after a prolonged period of storage.

6.2. Precautions before starting the motor

- Before starting the motor, it is advised to rotate manually the pulley attached to the motor. If the pulley rotates freely, it means that the motor will also rotate normally. If the pulley does not rotate, it means that mechanically something is jammed and it is necessary to check the chip-cutter, especially the cutting blades adjustment.
- During the first start-up, we recommend controlling the voltage received by the terminals and the load currents. This will make it possible to immediately recognise any overloads or imbalances in the grid.

7. Maintenance

- If maintenance work involves moving the chip-cutter from its position, then also disconnect the auxiliary circuits in place.
- If it is necessary to disassemble the chip-cutter during maintenance work, remove any sealing paste from the corresponding interstices. During assembly, the interstices must be sealed again with an appropriate product. If there are any copper washer-type joints, these must be replaced in all cases. Bearings should be lubricated.
- The two lubrication points inside the chip-cutter must be lubricated every two weeks.

- These advices are suitable for normal environment. Harsher working conditions may require additional precautions and more diligent check-ups of the blades and lubrication.

7.1. General inspection

- Inspect the chip-cutter at regular intervals.
- Keep the chip-cutter clean and ensure that it is well ventilated.
- Check the cutting blades every two months.
- Check the state of the seals (for example, V plug) and replace them if necessary.
- Check the state of the connections and the assembly bolts.
- Check the state of the bearings, listening for any strange noises, measuring vibration, body temperature, inspecting the lubricant used, or with SPM monitoring of the bearing.

If any changes occur in the condition of the chip-cutter, disassemble it, check the state of the parts and replace them if necessary.

7.2. Bearings and lubrication

- The bearings of the motors are lubricated in the factory, or by the manufacturer in the case of a closed model, with lubricant for bearings in accordance with standards DIN 51825.
- The body of the chip-cutter have 2 nozzles for grease. The nozzle near the cutting blades is to inject grease that will prevent water and dirt to enter the chip-cutter body. The nozzle on the middle of the chip-cutter body injects grease to the bearings.
- The unit should not operate full of grease. Too much grease will create more friction and will force the motor to overheat. Only add grease in small amounts and if needed.
- Under normal effort and ambient conditions, the quality of the grease for the motor allows for 10,000 hours of service in two-pole motors and 20,000 for greater polarities. If nothing else has been agreed, these periods are understood to be with the original grease, without renewing it. But it is advisable to control the state of this in shorter periods. The indicated duration in hours is only valid at normal speeds.
- The bearings must be re-greased after carefully cleaning with appropriate solvents.
- The same type of grease must be used. When replacing, only the replacement qualities indicated by the motor manufacturer must

be used. Bear in mind that only 2/3 of the free space of the bearing must be filled with grease. Completely filling the bearings and

the bearing covers with grease would cause an increase in the bearings temperature and therefore faster wear.

7.3. Cleaning

- The chip-cutter must be cleaned regularly so as not to interfere with the action of the cooled air.
- It will normally be enough to use compressed air free of water and oil.
- It will particularly be necessary to keep the ventilation holes and interstices clean between the fins.

- The fine carbon dust formed by the natural abrasion inside the motor must be cleaned out regularly.
- It is advisable to regularly check not only the actuated machine but also the electric motors.

7.4. Inspection work

- In compliance with the service reference conditions (DIN VDE 0530), inspection work must be carried out at least once every year. It is advisable, however, to perform additional inspections if the cutter is subjected to harsher working conditions and environments.
- The inspection measures are as follows: cleaning of dirty components, removal of corrosion, replacement of damaged bearings and checking the insulation resistance (see section 4.1).

8. Guarantee, Repair, Replacement parts

- The motors are guaranteed against manufacturing faults for one year, counting from the supply date. Unless specified otherwise, to invoke the guarantee the motor must be taken to the nearest authorised workshop, or to **MASTOR, LDA.**, free of carriage, for diagnosis and report. If the guarantee applies, it will cover materials and workforce, or replacement of the complete motor if necessary. The guarantee covers no other expense.
- The maintenance operations described in this manual are not considered to be guarantee jobs and therefore do not cancel it.

9. Electromagnetic compatibility

- The conformity of the motors, in their capacity as units constituting other assemblies, with EMC standards, has been checked.
- It is the installation user's responsibility to ensure that all the equipment globally complies with the aforementioned standards of electromagnetic compatibility.

10. Connection diagrams

- The chip-cutter motor can be connected to 3 phases 400 VAC or 230 VAC. Please reference to the corresponding connection diagram. Earth connection is mandatory.
- Since the chip-cutter is located inside the machine, an electrical cable with reinforced steel protection/shield is advised. It is also advisable that the section of each wire is no less than Ø1.5mm.

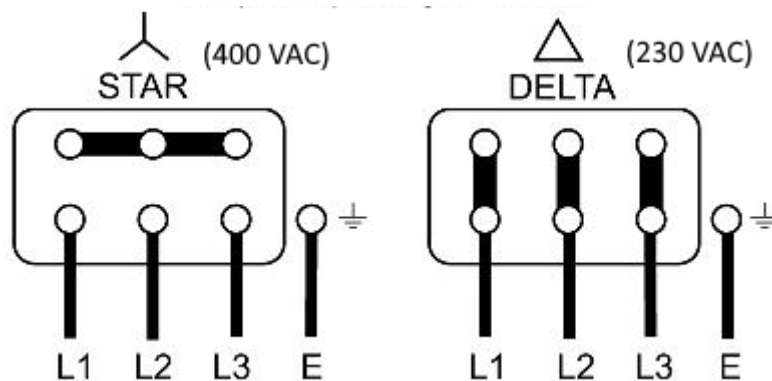


Figure 3- Electrical connection diagram (L1 L2 L3 are also represented as U1 V1 W1 respectively)

11. Power requirements

- Depending on the connection voltage, the amperage rating varies. Please refer to the table below to determine the correct thermic relay that should be installed.

Voltage, Frequency	Rated amperage	Thermic relay
230V, 50Hz	1.5A	1.8A
400V, 50Hz	0.9A	1.2A
275V, 60Hz	1.4A	1.7A
480V, 60Hz	0.8A	1.1A

12. Application examples

- The following figures show the chip-cutter installed on several different machines.

