INSTRUCTION MANUAL

MOSQUITO

ROSCAMAT®

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ISO 9001
BUREAU VERITAS
Certification

TECNOSPIRO
MACHINE TOOL SLU

DESIGN & QUALITY
ROSCAMAT
Made in Barcelona

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1 ABOUT THIS MANUAL

This is the instruction manual for the ROSCAMAT® MOSQUITO tapping machine.

- ORIGINAL MANUAL-

Intellectual/Industrial Property:

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1.1 CONSIDERATIONS

- ✓ Before using the equipment, make sure you read this instruction manual and follow the safety and operating instructions fully.
- ✓ All the instructions contained in this manual refer to the individual device; the end user is responsible for analysing and applying all the necessary safety measures required for the intended use.
- ✓ This manual must be kept near the device for consultation throughout its working life.
- ✓ If any part of this manual seems unclear, confusing or imprecise, please do not hesitate to contact your 3arm® and/or Roscamat® distributor.
- ✓ The contents of this manual may be subject to change without prior notice.
- ✓ If the manual is lost or damaged, contact TECNOSPIRO MACHINE TOOL, S.L.U. so we can provide you with a new one.
- ✓ This document, or any part thereof, may only be reproduced or provided to third parties with the express written authorisation of TECNOSPIRO MACHINE TOOL, S.L.U.
- ✓ Some details of the illustrations in this manual may differ from the specific device configuration. They should be understood as representative of the standard product.

Paragraphs indicating assembly, adjustment, installation and maintenance steps are indicated by brown shading.

Paragraphs containing important information are indicated by grey shading.

1.2 VERSION

Document	Revision date
Instruction Manual	2/16/2024

2 SAFETY INFORMATION

2.1 SCOPE OF APPLICATION

This section contains extremely important information on the safe operation of the device and is intended for anyone involved in any stage of the life cycle of this device (transport, assembly and installation, commissioning, adjustment–training, operation, cleaning, maintenance, troubleshooting and disassembly/ decommissioning).

2.2 WARNINGS AND GENERAL CONSIDERATIONS

- ✓ The device described in this document has been built using current technology and in accordance with applicable technical standards on safety. However, misuse or improper set-up by the end user may result in a risk of injury.
- ✓ The device must only be used if it is proper working order, and all safety rules and instructions in this document must be obeyed.
- ✓ Any problem that could affect the safety of the device must be corrected immediately.
- ✓ No modifications must be made to the device without due authorisation from TECNOSPIRO MACHINE TOOL, S.L.U.
- ✓ The device must only be used for the intended purpose; any other use is strictly prohibited. All use other than that indicated here will be considered misuse and is prohibited. The manufacturer assumes no liability for damage that may result from such misuse.
- ✓ The installer, owner and/or end user are responsible for determining whether the product is appropriate for each specific use, as well as determining the installation site and concretely defining the task to be performed with this product, within the limits set forth in this manual.
- ✓ Do not use it for any purpose not covered in this manual.
- ✓ The operator may only operate the device after having received applicable instructions for its use.
- ✓ It is recommended that only one operator use the device at one time; any other use must be evaluated by the installer / end user.
- ✓ Manipulating the device's moving parts and joints whilst the device is in use is strictly prohibited.
- ✓ When the manipulator is not in use, it must be left in the folded, or parked, position.
- ✓ Working parts (parts for tapping) must be correctly secured.
- ✓ Tapping materials must comply with the manufacturer's instructions.
- ✓ The operator must only use the device to perform safe movements, moving together with the device at all times to reduce the risk of uncontrolled or

involuntary movement of the equipment.

- ✓ Even though the parts that present the greatest risk of possible shearing or pinching are protected and enclosed, moving and jointed parts must not be handled during use.

- ✓ The working area of the device and its closest area of influence must comply with conditions of workplace safety, health and hygiene; the installer / end user are responsible for conducting a study to ensure safety.

- ✓ The operator must remain outside the vertical path of the swing arm.

- ✓ The presence of others in the device's working area must be restricted as much as possible in order to avoid any risk to safety; if any other use is intended, a supplemental study of the risks arising from the working mode must be conducted.

- ✓ It is important for operators of this device to be familiar with and have sufficient training in the use of this product or similar equipment.

- ✓ In any event, the operator must read and understand this manual before using the device, regardless of their prior knowledge, training or experience with similar equipment; the sections on installation, operation and safety are especially critical.

- ✓ If unsure about device usage or maintenance procedures, please contact your 3arm® and/or Roscamat® distributor.

2.3 EXCLUSIONS

The device is not intended for the following uses:

- ✓ Manipulation of any components or functions of the device aside from those specified in this manual.
- ✓ Use by persons with any type of disability, or by animals
- ✓ Use by staff who have not completed occupational risk prevention training

Excluded installation sites:

- ✓ Installation in corrosive areas
- ✓ Installation in dusty areas
- ✓ Installation in areas with high electromagnetic emissions
- ✓ Installation in areas with extreme temperatures (very high or very low)
- ✓ Installation in areas with high humidity
- ✓ Outdoors installation

2.4 SYMBOLS AND ICONS

✓ Throughout this manual and on the structure of the machine itself, you may see various symbols and icons whose meaning is summarised below:

	Danger: General danger symbol. This symbol is generally accompanied by an additional symbol or a more detailed description of the danger.
	Risk of pinching
	Electrical hazard

2.5 SYSTEM INSTALLER

The system installer or end user is responsible for installing the machinery in accordance with all applicable safety measures.

The installer / end user is responsible for the following tasks:

- ✓ Location and proper installation.
- ✓ Connections.
- ✓ Risk assessment.
- ✓ Installation of mandatory safety and protectives features.

2.6 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The following personal protective equipment should be used with this machine: **safety boots, hardhat, safety goggles and safety gloves** for transport, assembly and installation, commissioning and dismantling.

Safety footwear, safety gloves and safety goggles for adjustment, training, operation and troubleshooting.

The installer or end user is responsible for specifying the required personal protective equipment for the intended application of the machinery and to meet essential health, safety and hygiene requirements.

Operators must not wear loose clothing, rings, bracelets or watches since these may become caught in the workings of the machinery.

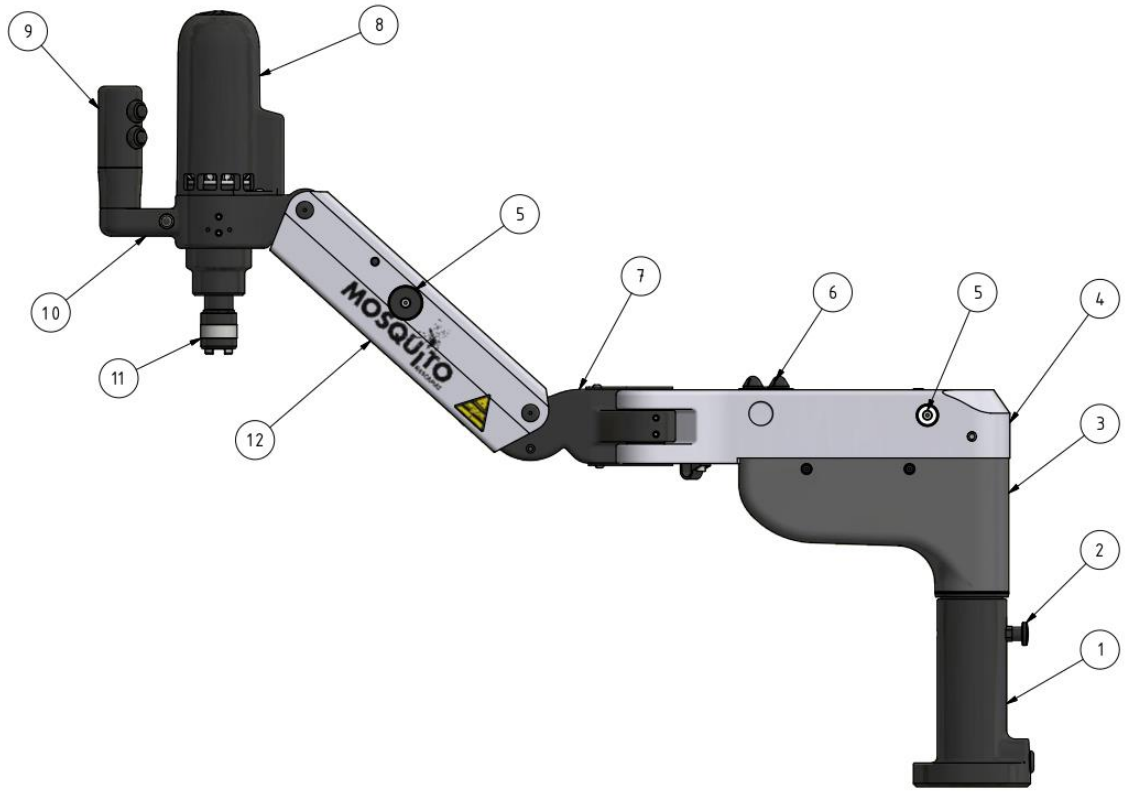
Hair must be tied up to prevent it getting caught in the moving parts of the machinery.

2.7 LEVEL OF TRAINING FOR PERSONNEL WHO WORK WITH THE DEVICE

Anyone who works with the machinery must have read and understood the information in the chapter on safety.

3 GENERAL DESCRIPTION AND TECHNICAL INFORMATION

3.1 MAIN PARTS



1.- Base
2.- Lift mechanism control
3.- Lift mechanism/electrical box cover
4.- Radial arm
5.- Arm lock (magnetic)
6.- Speed control
7.- Elbow joint assembly
8.- Electric motor
9.- Grip/motor control buttons
10.- Head assembly
11.- Quick-change clutch
12.- Articulated arm

3.2 DESCRIPTION AND OPERATING PRINCIPLES

The machine comprises a combined base and column attached to a radial arm, a swing arm balanced by a gas spring, and a head assembly. These components provide the mounting for the motor and ensure that it is positioned perpendicular to the working area. The operator uses the motor grip to align the head assembly with the part requiring tapping.

The equipment has a high-frequency motor, controlled by a frequency variator inside the electronic component housing. The turning speed of the motor (to the left and to the right) and automatic lubrication (optional) can be controlled using the turning speed adjustment.

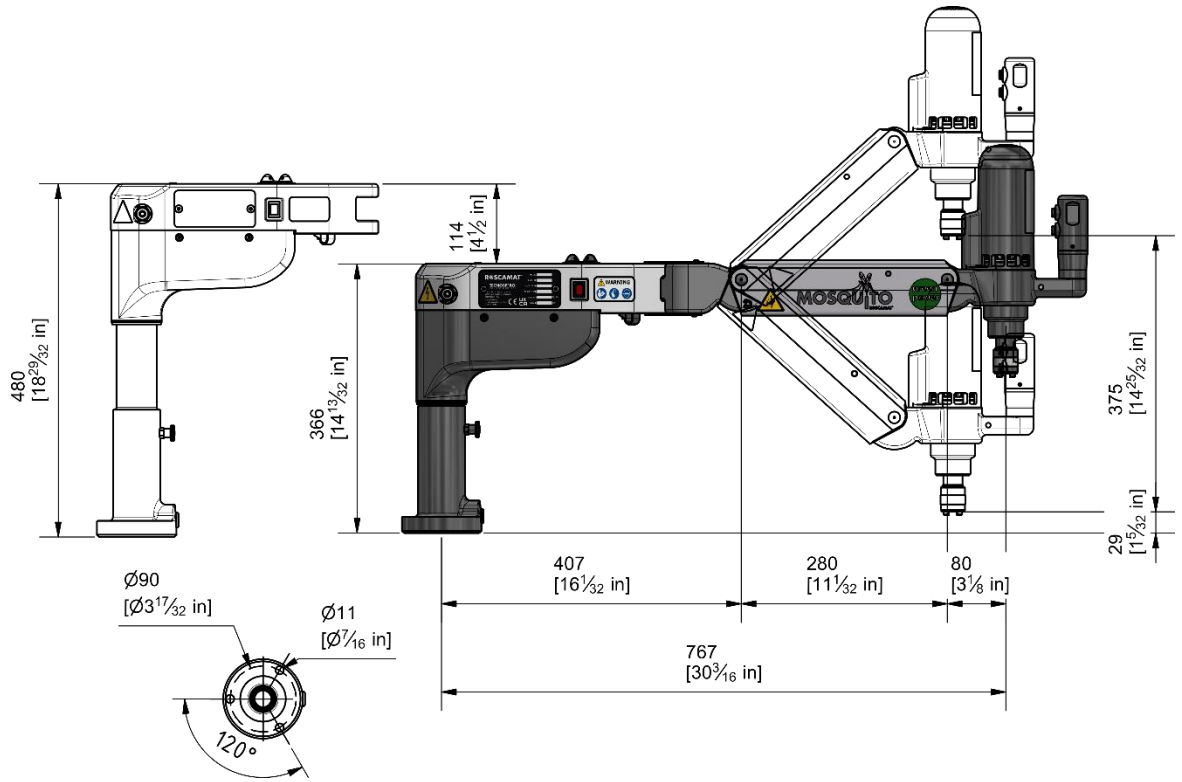
The tool holder (or tap holder), with or without safety clutch, is also connected to the motor by means of a quick-change system.

3.3 CONFIGURATIONS

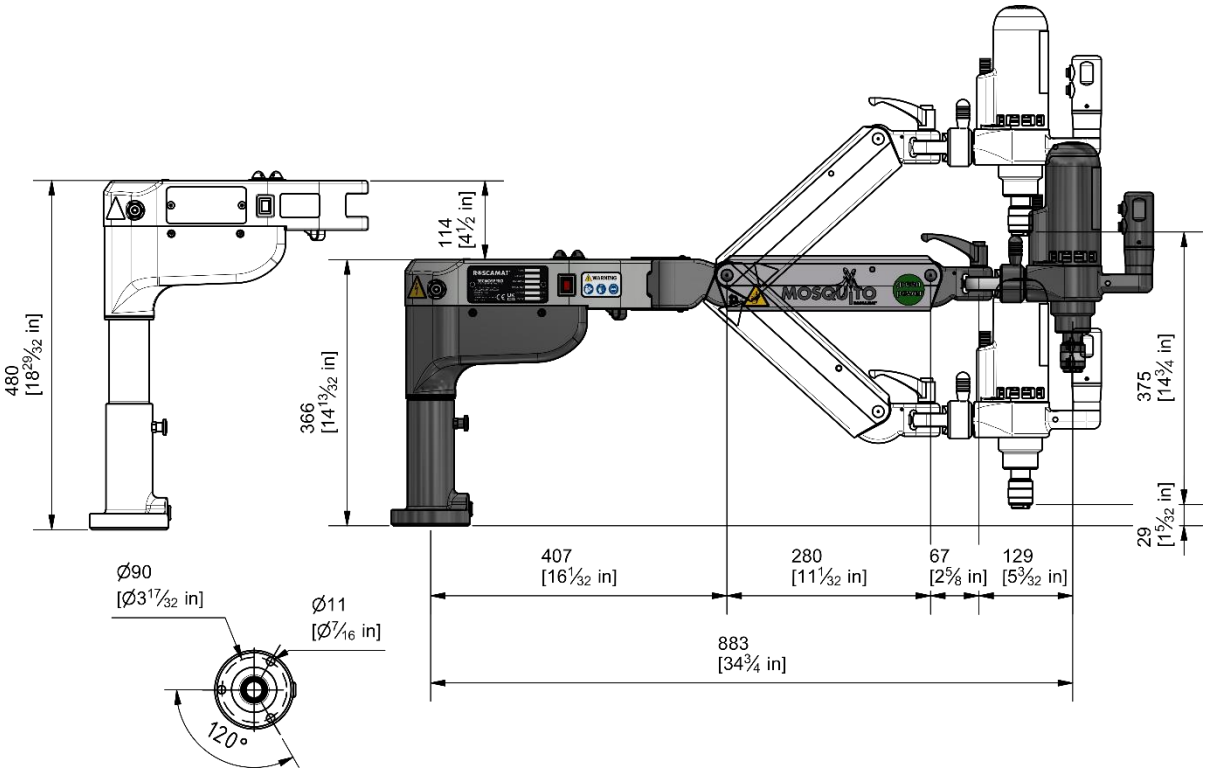
The following machine configurations are available (in both 120-V and 230-V versions):

	ARTICULATED HEAD ASSEMBLY	HEAD ASSEMBLY VERTICAL	LUBRICATION	300 RPM	600 RPM	300/600 RPM
MOSQUITO V - 300 RPM		✓		✓		
MOSQUITO V - 600 RPM		✓			✓	
MOSQUITO V 2V – 300/600 RPM		✓				✓
MOSQUITO VH - 300 RPM	✓			✓		
MOSQUITO VH - 600 RPM	✓				✓	
MOSQUITO VH 2V – 300/600 RPM	✓					✓
MOSQUITO V E - 300 RPM		✓	✓	✓		
MOSQUITO V E - 600 RPM		✓	✓		✓	
MOSQUITO V 2V E – 300/600 RPM		✓	✓			✓
MOSQUITO VH E - 300 RPM	✓		✓	✓		
MOSQUITO VH E - 600 RPM	✓		✓		✓	
MOSQUITO VH 2V E – 300/600 RPM	✓		✓			✓

3.4 DIMENSIONS



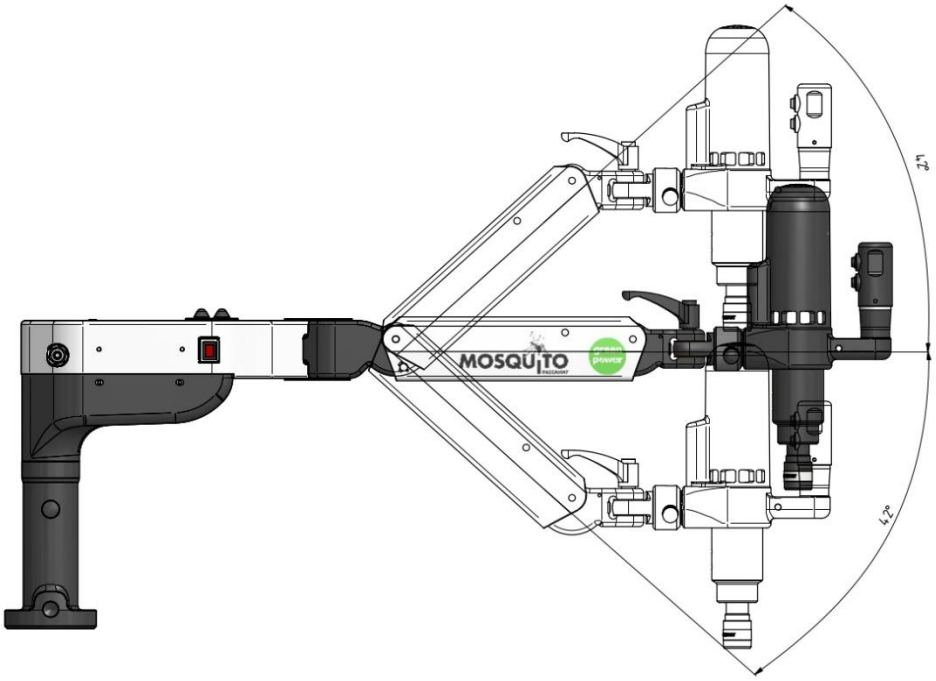
Roscamat MOSQUITO – Vertical head assembly



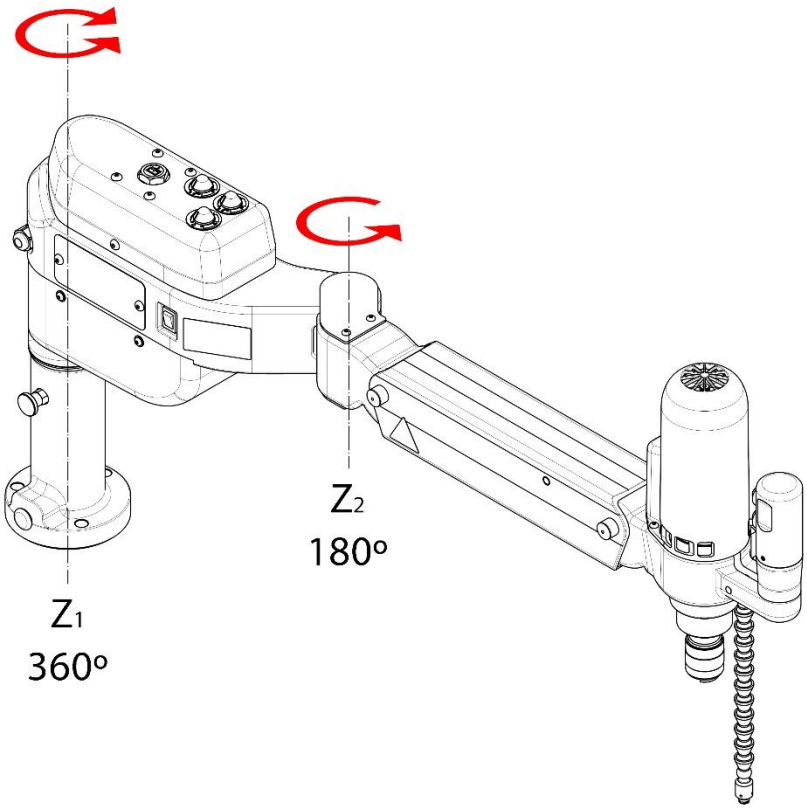
Roscamat MOSQUITO – Articulated head assembly

3.5 MOVEMENTS

3.5.1 Vertical movements



3.5.2 Radial movements



3.6 TECHNICAL SPECIFICATIONS

GENERAL TECHNICAL SPECIFICATIONS		
Tapping capacity[1]		M2-M14
Suitable materials for tapping[2]		Metals and metal and plastic materials
Speed		300 rpm
		600 rpm
		300/600 rpm
Empty weight		15 kg *(33 lb)*
Electrical specifications		
	Power supply voltage and frequency	220–240 V 50 Hz
	Motor power	0.45 kW
	Protection class	IP 54
	Power supply voltage and frequency	100–120 V 60 Hz
	Motor power	0.45 kW
	Protection class	IP 54
Working conditions		
	Temperature	10 ºC a +50 ºC *(14–122 °F)*
	Relative humidity	Max. 70%
	Environment	Industrial environments

3.7 IDENTIFICATION PLATE

A metal plate on the radial arm of the machine provides details of the following:

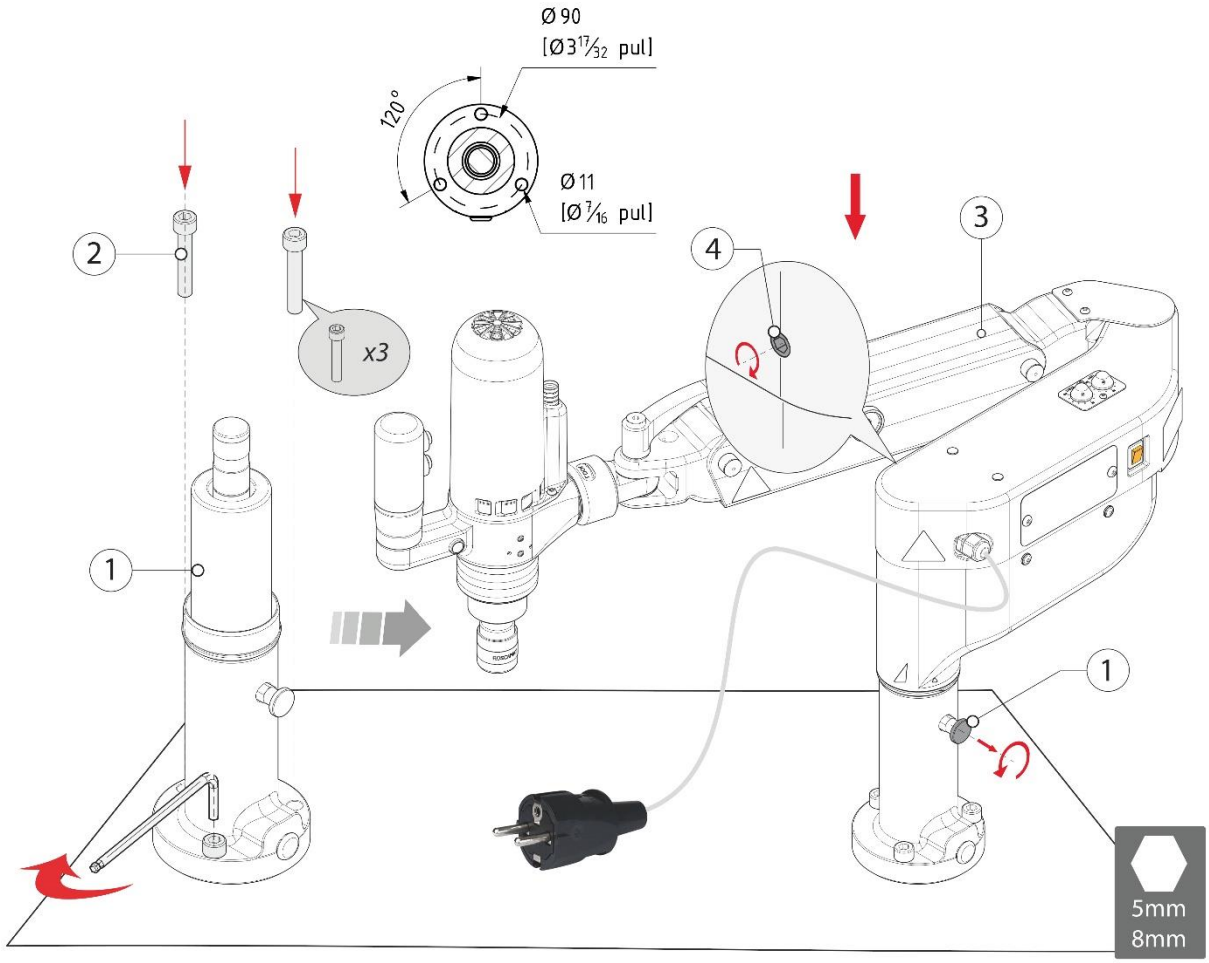
Manufacturer (name, address and company name), manufacture date, serial number, model, power supply voltage and frequency, motor power and CE and UKCA mark.

[1] Minimum and maximum tapping values for tapping with 90 kg/mm^2 steel.
[2] In general, all types of metals and plastics can be used. Special care must be taken with materials such as magnesium (highly flammable) and certain plastics. Any other type of material must be subject to an additional study to identify risks by the installer or end user.

4 INSTALLATION, ADJUSTMENTS AND OPERATION

4.1 INSTALLATION

1. Remove the equipment from the original packing.
2. Anchor the base (1) using 3 M10 bolts (2) (Recommended torque 45Nm) suited to the chosen installation site (alternative methods may be used if approved by the installer).
3. Mount the machine (3) on the spindle of the base (1) and firmly tighten the stud (4) *(5-mm Allen key).*
4. Connect the power supply.



INSTALLATION

The installation site must be horizontal to prevent drifting or shifting.

INSTALLATION SITE

Do not install the device in areas such as:

- ✓ Explosion or fire hazard zones.
- ✓ Outdoor areas.
- ✓ Areas with corrosive atmospheres.
- ✓ Areas with extreme temperatures (very high or very low).
- ✓ Areas with high humidity.
- ✓ Dusty areas.
- ✓ Areas with high electromagnetic emissions.

4.2 ADJUSTMENTS

4.2.1 ADJUSTING MOTOR TURNING SPEED

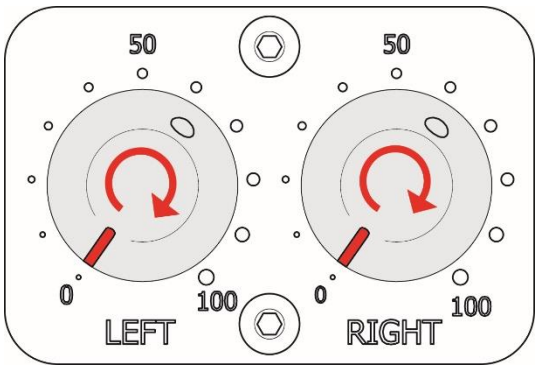
The motor turning speed can be adjusted using the dials on the electronic component housing.

To increase or decrease the tapping speed (clockwise direction):

1- Turn the dial marked RIGHT to the left or right as required.
2- A value of 50 indicates 50% of rated speed.

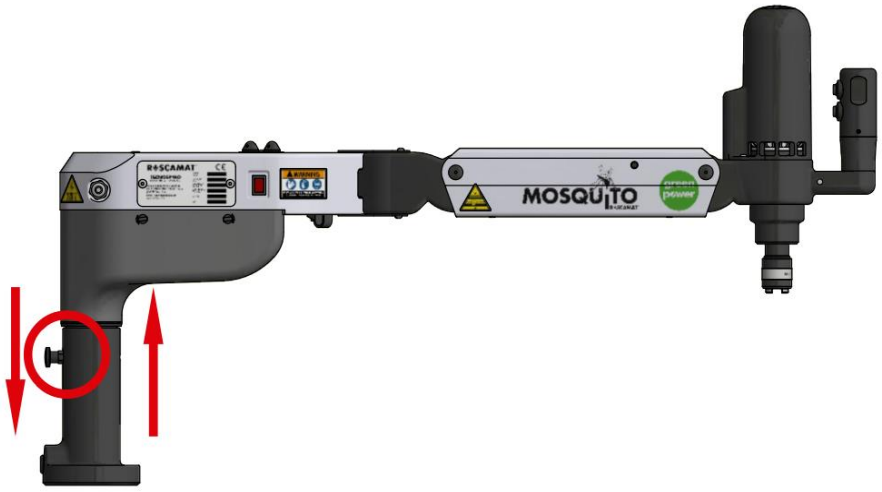
To increase or decrease the tap release speed (anti-clockwise direction):

3- Turn the dial marked LEFT to the left or right as required.
4- A value of 50 indicates 50% of rated speed.



4.2.2 ADJUSTING THE BASE HEIGHT

The machine can be raised 130 mm, allowing the operator to work at different heights. Follow the steps below:



Raising the arm:

1. Set the machine to the folded or parking position.
2. Raise the machine assembly as far as it will go.

Lowering the arm:

1. Set the machine to the folded or parking position.
2. Pull the lift control out and lower the assembly. Do not allow the machine to descend under its own weight. Support the assembly to stop it descending abruptly.

PLEASE NOTE

- ✓ Do not allow the machine to descend under its own weight. Support the assembly to stop it descending abruptly.
- ✓ Do not place your hands below the bottom of the cover.

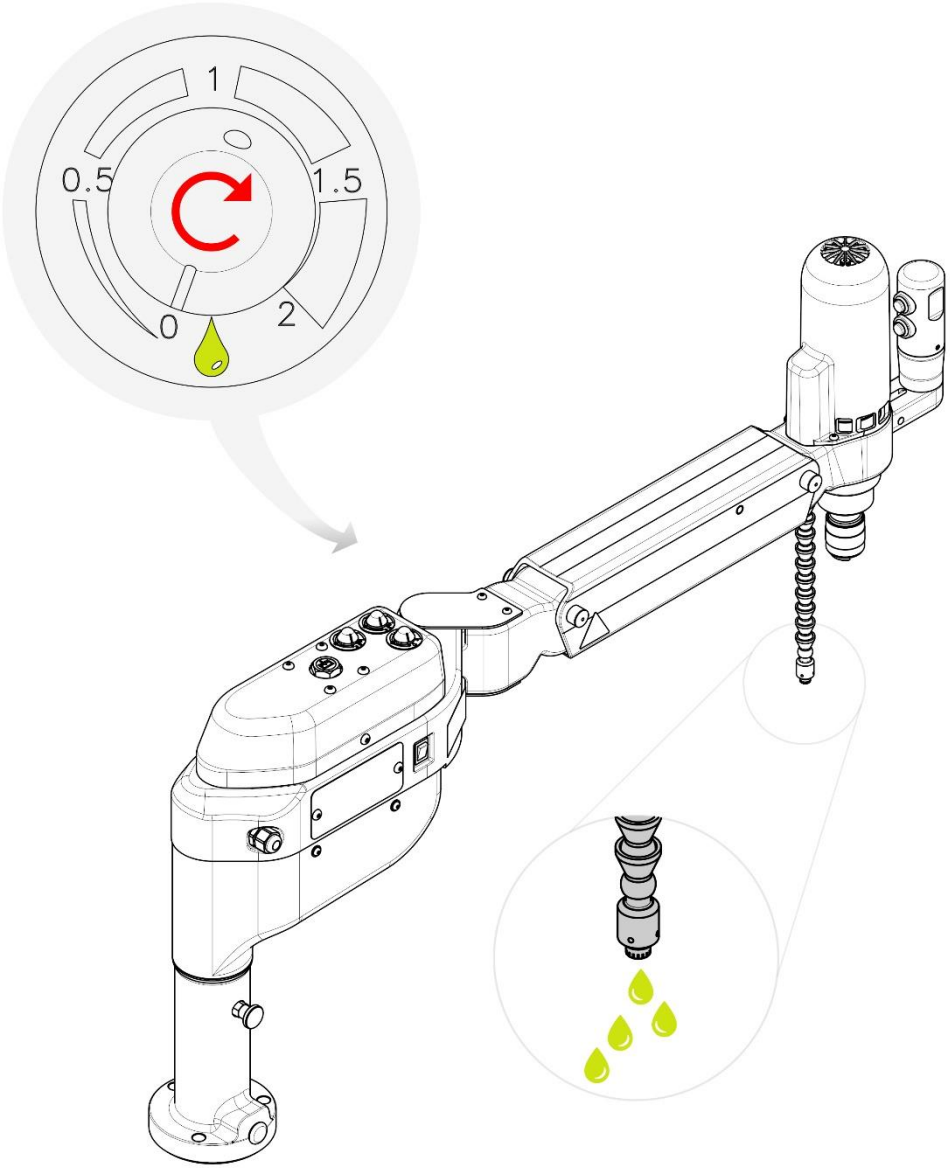
4.3 LUBRICATION

The oil pump and, therefore, the oil supply are activated simultaneously when the buttons that control the motor are pressed.

The lubrication time is counted in seconds and is adjusted using the potentiometer on the cover of the radial arm.

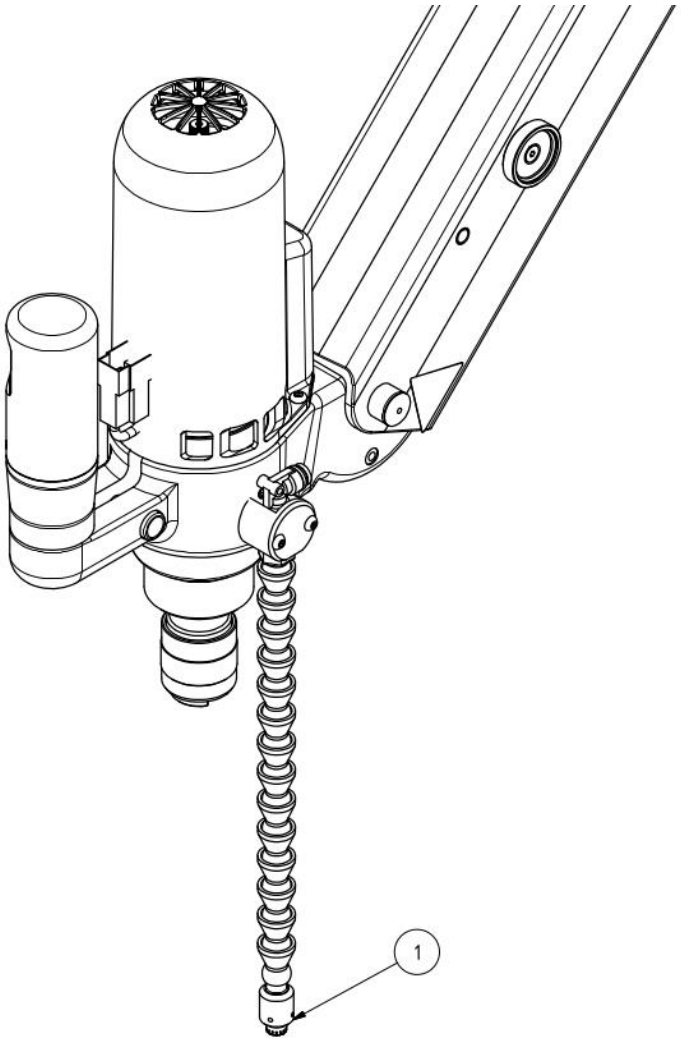
Lubrication time is adjusted as follows:

1. To increase the lubrication time, twist the potentiometer clockwise.
2. To decrease the lubrication time, twist the potentiometer anti-clockwise.



If the tank is empty, the pipes may fill with air. In this case, they must be bled after the tank is refilled.

1. Loosen the end (1) by rotating it 2 turns anticlockwise.
2. Increase the lubrication time to maximum and turn the motor several times until the pipes have been bled.
3. Tighten the end (1) by rotating it 2 turns clockwise.



The tank filler cap is located on top of the radial arm.

OIL SPECIFICATIONS

- ✓ Oil type: Viscosity of 20–40 cSt; EP (extreme pressure) additives (sulphur, phosphorus and inactive chlorides).
- ✓ ONLY USE PURE CUTTING OIL WITHOUT SOLVENTS. Certain types of tricolour or alcohol lubricants can seriously damage some system components.

MAINTENANCE

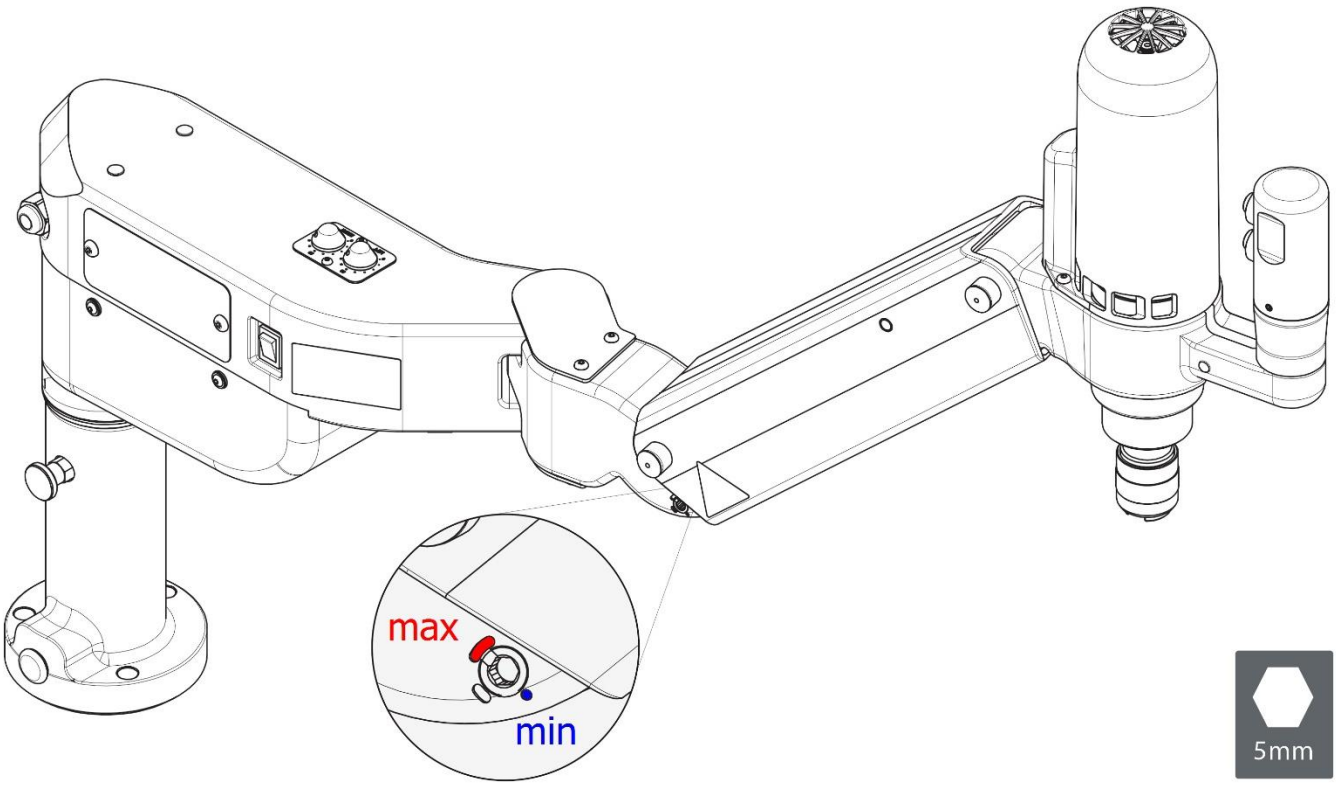
- ✓ Clean the oil tank regularly to remove metal shavings.

4.4 BALANCING THE ARM

Adjust the tension on the inner damper if the arm drops down or has too much upward force.

1- Keep the swing arm in an approximately horizontal position to facilitate operation.
2- Adjust the spring tension regulator as required (dot = minimum tension, dash = maximum tension).

- **Turn anti-clockwise**: reduce spring tension.
- **Turn clockwise**: increase spring tension.



5 OPERATION

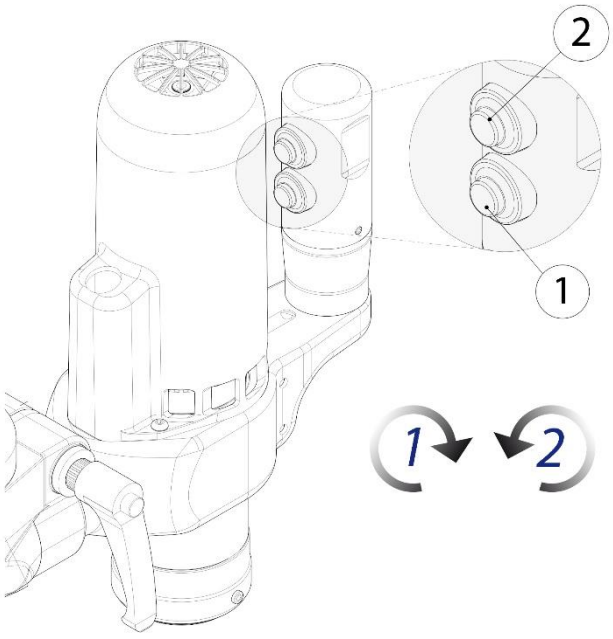
WARNING

- ✓ The sequence described below is for information purposes only and assumes that installation, adjustment (e.g. balancing and installing the arm) and configuration (e.g gears, where applicable, tap holder, with or without clutch, and tap) have been completed.
- ✓ Use the required personal protective equipment described in [see PERSONAL PROTECTIVE EQUIPMENT (PPE) p. -7-].
- ✓ Ensure the machine configuration is suitable for the characteristics of the tapping operation.
- ✓ Ensure the necessary adjustments have been made to adapt the equipment to the characteristics of the work to be carried out.
- ✓ Ensure the materials for tapping meet the requirements described in [See TECHNICAL SPECIFICATIONS p. -12-].
- ✓ The parts to be worked must be secured correctly.
- ✓ Upon completion of the task or during periods of prolonged inactivity, set the machine to folded or parking position.

5.1 TAPPING

Follow the steps below for a correct and safe sequence for the tapping operation.

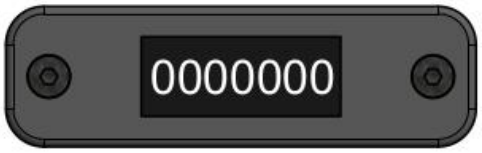
1- Switch on the main switch.
2- To perform tapping (clockwise rotation), hold down button[3] 1.
3- Hold button 2 to release the tap (turning to the left).
4- Move the machine to its folded or parking condition and switch off at the main switch.



[3] Holding down buttons 1 and 2 prevents the machine operating without the intervention/supervision of an operator.

INFORMATION

The machine incorporates a screen with a cycle counter.



When you turn on the equipment, appears the total cycle counter.

Once you start to work, on the screen will appear a partial counter during the working session.

To view the total counter, you have to turn off the equipment, wait for 5 seconds and turn on the equipment again.

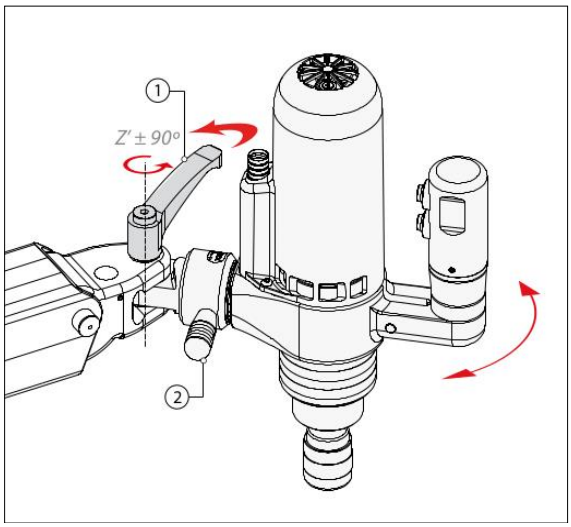
6 HEAD ASSEMBLIES

6.1 ARTICULATED HEAD ASSEMBLY

The articulated head assembly allows the motor to be used in 4 positions (at 90° intervals) to perform both vertical and horizontal tapping.

Vertical operations:

1- Align the motor vertically and firmly tighten the handle (1) and handwheel (2) as far as they allow.



Horizontal operations:

1- Release the handwheel (2) to loosen the motor join.
2- Rotate the head assembly 90° until it locks and firmly re-tighten the handwheel (2).
3- Release the handle (1) on the upper part of the head assembly.
4- When moving the arm, the operator must manually ensure it is perpendicular to the reference plane.

PLEASE NOTE

- ✓ Do not block the handle (1) for horizontal operation.
- ✓ The handle (2) can only be locked in the 4 right-angle positions.

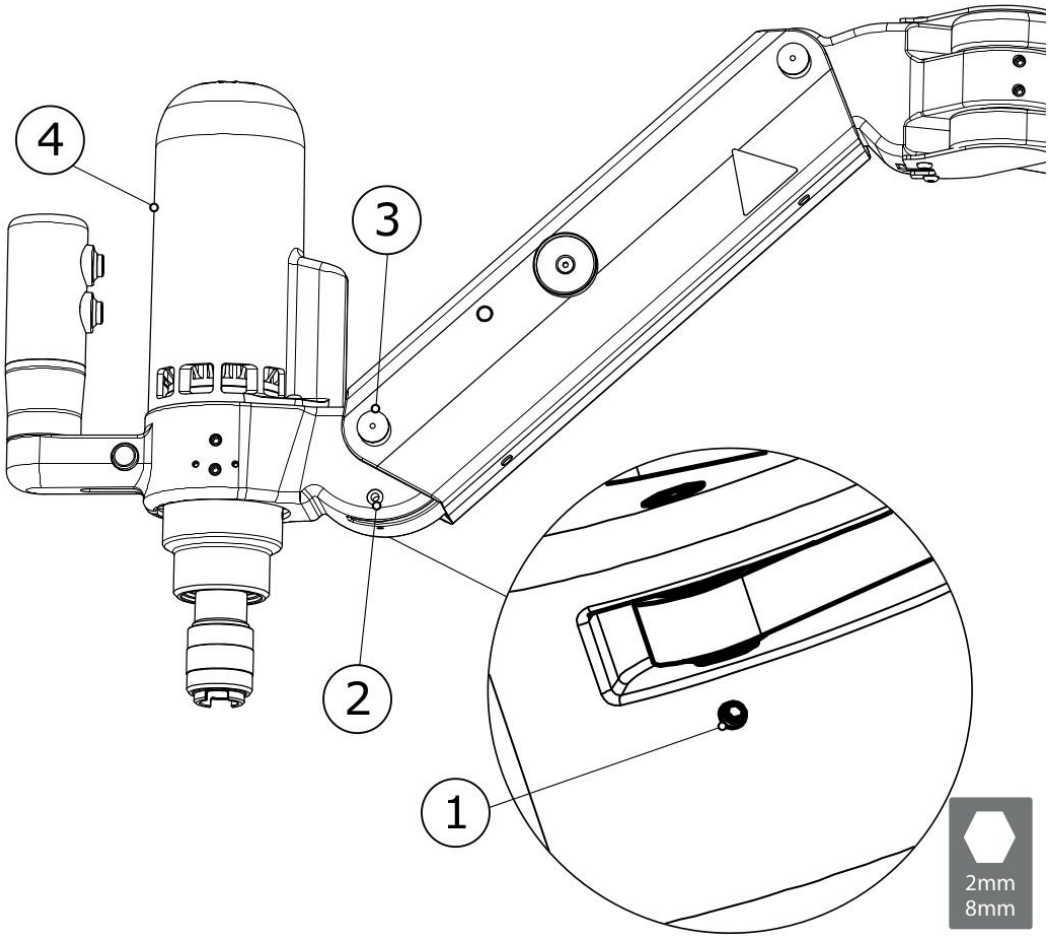
7 MAINTENANCE

7.1 REPLACING THE GAS SPRING

BEFORE REPLACING THE GAS SPRING

- ✓ The equipment must be correctly installed and set-up.
- ✓ Switch off the equipment at the main switch and disconnect from the power supply.
- ✓ If necessary, assign two operators to this operation to ensure it is performed safely.

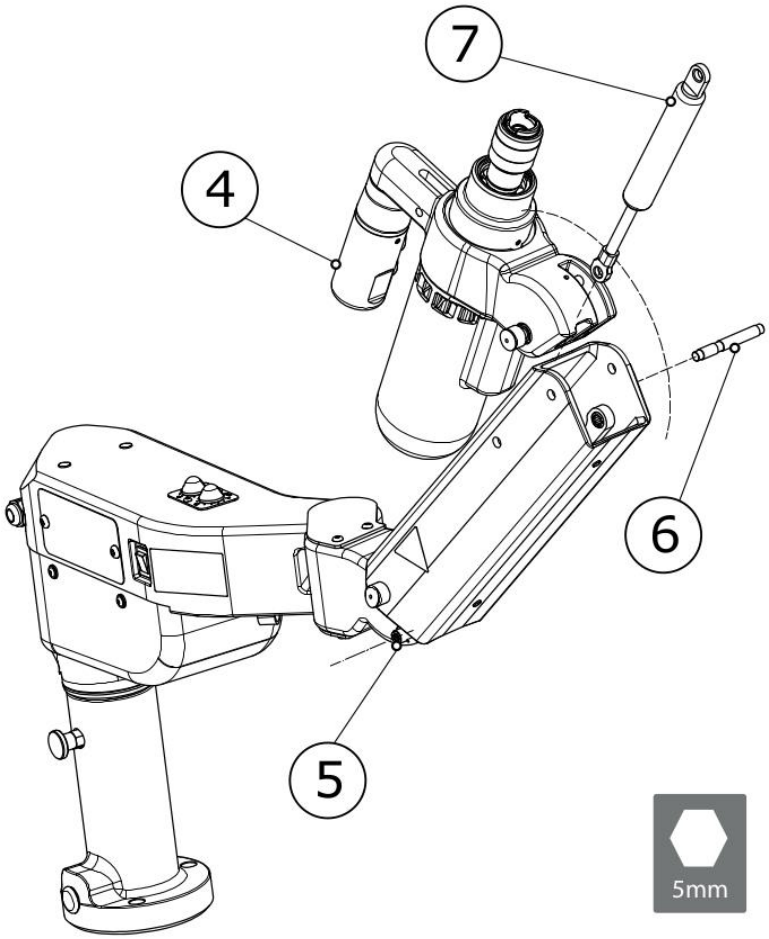
1- Lower the arm to its lowest position and remove the stud (1) (2-mm Allen key).
2- Using an M5 extractor, remove the spindle (2).
3- Remove the plugs and bolts (3) (8-mm Allen key). Note that the head assembly (4) will be suspended solely by the cables.

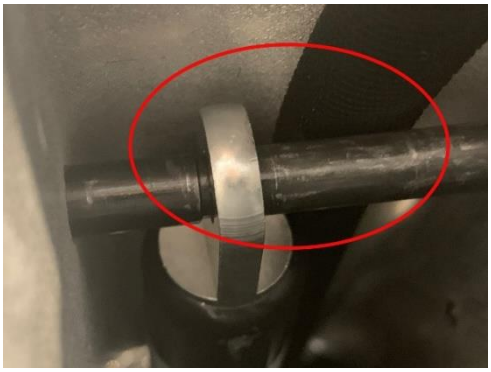


PLEASE NOTE

✓ Always keep the arm in its highest position.

4- Loosen the cam (5) (5-mm Allen key) to reduce the tension in the damper.
5- Remove the pin (6) from the arm and remove the cam (5).
6- Remove the damper (7) and replace it with a new one.
7- Mount the cam (5) on the shaft of the new damper and make sure that it is securely in place.
8- When inserting the pin (6), make sure the head assembly cables pass over it.
9- Attach the head assembly and tighten the bolts (3).
10- Position the spindle (2) with the slot facing downwards and re-insert the stud (1).





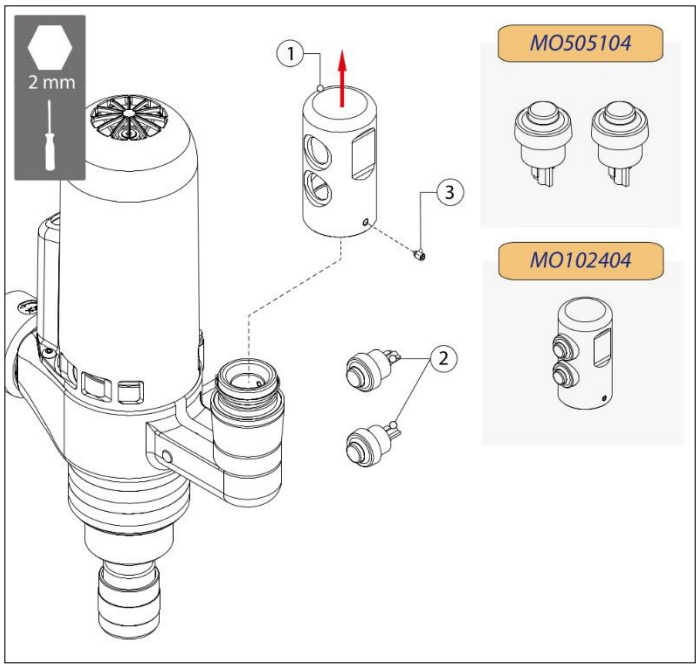
Machine/model	*Reference*	*Machine/model V-H*	*Reference*
Roscamat Mosquito 300 rpm -400N-	*MO1021A3*	Roscamat Mosquito V-H 300 rpm -450N-	*MO1027A3*
Roscamat Mosquito 600 rpm -400N-	*MO1021A3*	Roscamat Mosquito V-H 600 rpm -450N-	*MO1027A3*
Roscamat Mosquito 2-speed -450N-	*MO1027A3*	Roscamat Mosquito V-H 2-speed -500N-	*MO2005A3*

7.2 REPLACING THE GRIP AND BUTTONS

BEFORE REPLACING THE GRIP

- ✓ The equipment must be correctly installed and set-up.
- ✓ Switch off the equipment at the main switch and disconnect from the power supply.

1- Set the machine to the folded or parking position.
2- Switch off at the main switch and unplug from the power supply.
3- Remove the motor control buttons (2) and disconnect them from their FASTON connector *(use a small screwdriver to lift out the buttons).*
4- Remove the bolt (3) (2-mm Allen key) and slide the grip (1) upwards as show in the diagram.
5- For assembly, follow the procedure in reverse, making sure none of the cables are trapped.



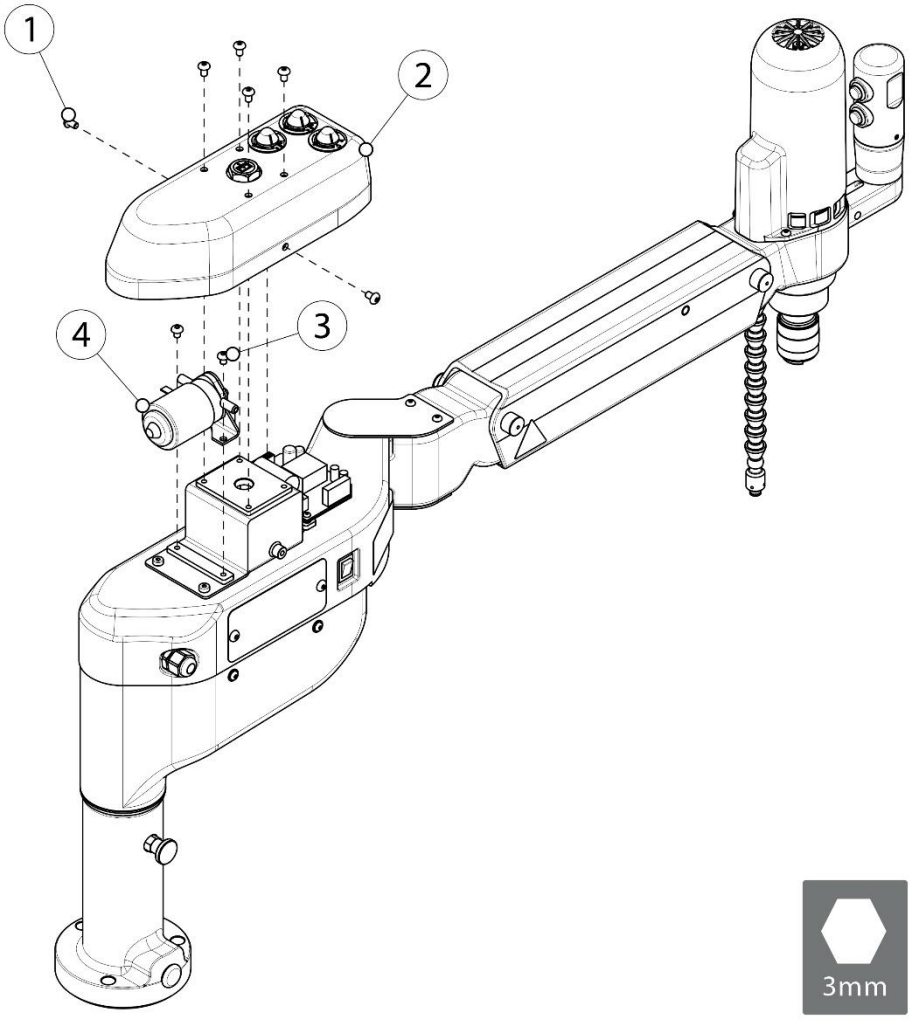
7.3 REPLACING THE OIL PUMP

ONLY FOR MACHINES FITTED WITH THIS DEVICE

BEFORE REPLACING THE OIL PUMP

- ✓ The equipment must be correctly installed and set-up.
- ✓ Switch off the equipment at the main switch and disconnect from the power supply.

1. Raise the machine *[see* ADJUSTING THE BASE HEIGHT *p.15].*
2. Remove the 6 bolts (1) (3-mm Allen key) from the cover of the lubrication system (2) located on the radial arm and remove the cover.
3. Disconnect the two FASTON terminals and the oil pump inlet and outlet tubes.
4. Loosen the 2 bolts (3) (3-mm Allen key) that hold the oil pump (4) in place and replace the pump.
5. For assembly, follow the procedure in reverse.

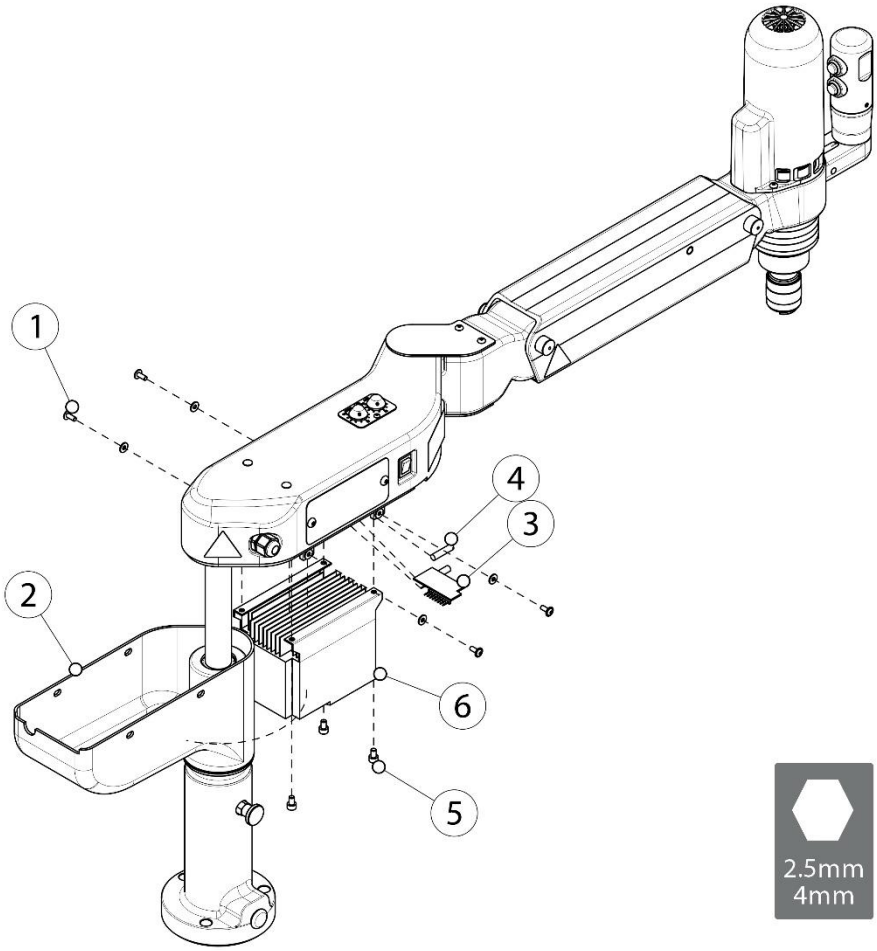


7.4 REPLACING THE VARIABLE-SPEED DRIVE

BEFORE REPLACING THE VARIABLE-SPEED DRIVE

- ✓ The equipment must be correctly installed and set-up
- ✓ Switch off the equipment at the main switch and disconnect from the power supply

1. Raise the machine *[see* ADJUSTING THE BASE HEIGHT *p.15].*
2. Remove the 4 bolts (1) (2.5-mm Allen key) from the cover of the electrical box (2) located on the radial arm and remove the cover.
3. Remove the top cover protecting the variator connections.
4. Disconnect the variator connection board (3).
5. Remove the variator side protection.
6. Disconnect the remaining cables (4).
7. Remove the 4 bolts (5) (4-mm Allen key) attaching the variable-speed drive (6) to the radial arm and remove the drive.
8. Attach the new variable-speed drive and connect all the cables to their corresponding connections *[see* ELECTRICAL DIAGRAM *p. 31].*
9. Finally, replace the radial arm cover.



7.5 ASSEMBLY OF AUTOMATIC LUBRICATION KIT FOR THE TOOL

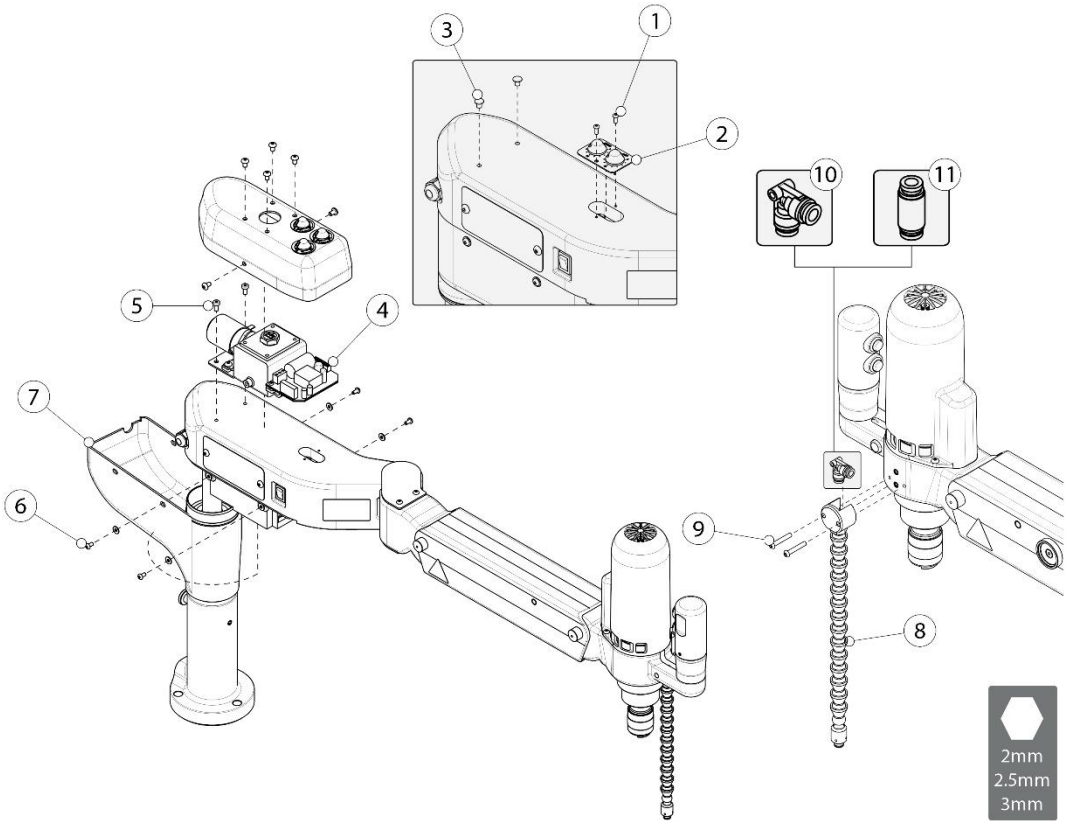
BEFORE ASSEMBLING THE AUTOMATIC LUBRICATION KIT

- ✓ The equipment must be correctly installed and set-up.
- ✓ Switch off the equipment at the main switch and disconnect from the power supply.

1. Raise the machine *[see* ADJUSTING THE BASE HEIGHT *p.15].*
2. Remove the 2 bolts (1) (2-mm Allen key) and remove the potentiometer (2).
3. Remove the plugs (3).
4. Attach the lubrication system assembly (4) using the bolts (5) (3-mm Allen key) provided.
5. Remove the bolts (6) (2.5-mm Allen key) and remove the electrical box cover (7).
6. Insert the fittings and connect the pump outlet pipe.
7. Connect the potentiometer cable to the board supplied with the kit and the power and communications cables between the board and the variable-speed drive *[see* ELECTRICAL DIAGRAM *p. 31].*
8. Connect the oil pipe to the lower part of the arm.
9. Attach the articulated tube and nozzle (8) using the bolts (9) (2.5-mm Allen key) for the oil outlet (if working with a machine that only performs vertical tapping, attach fitting 10. If the machine performs both vertical and horizontal tapping, attach fitting 11).
10. Fill the tank and make sure the filler cap is in place.

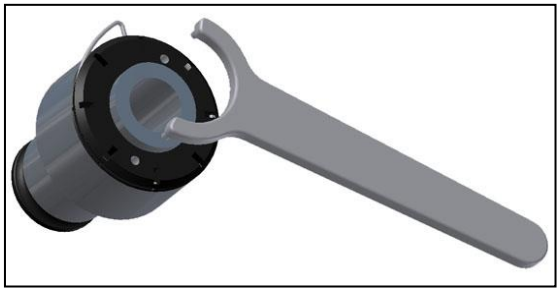
PLEASE NOTE

- ✓ Before starting the system, the circuit must be bled [see LUBRICATION p. 16].



7.6 ADJUSTING THE CLUTCH

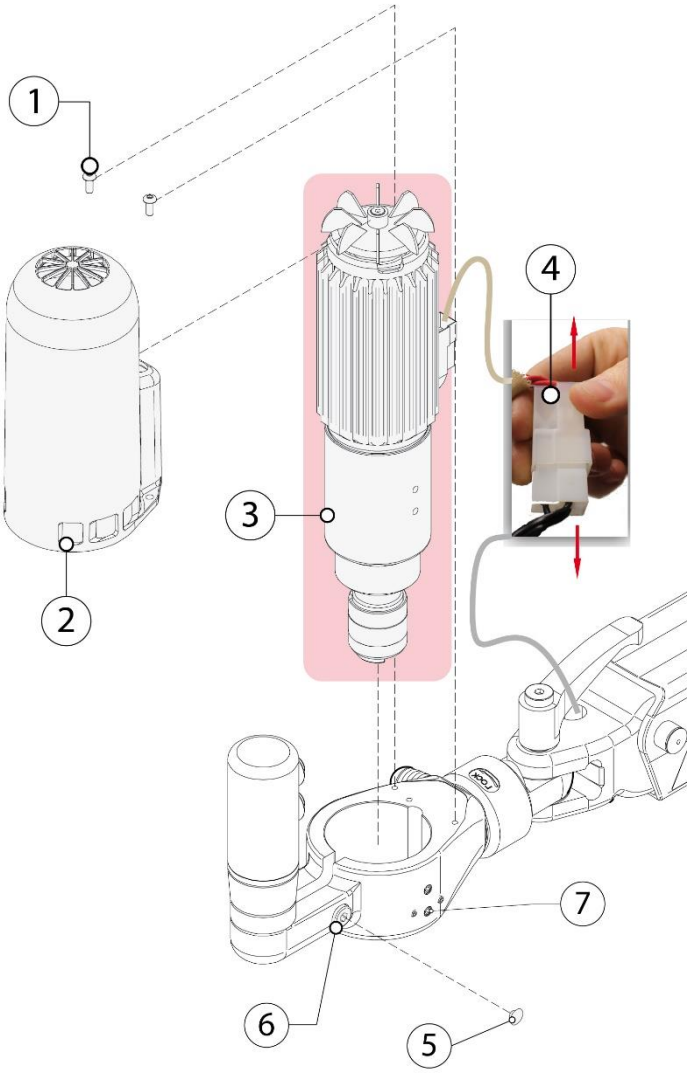
1. Remove the locking ring.
2. Turn the slotted nut clockwise to increase clutch tension and anticlockwise to decrease it.
3. Re-insert the ring in the slot.



7.7 REPLACING THE MOTOR (300 AND 600 RPM)

1- Set the machine to the folded or parking position.
2- Switch off at the main switch and unplug from the power supply.
3- Remove the bolts (1) *(2.5-mm Allen key).*
4- Slide the housing (2) up until the connector (4) is visible. Disconnect the connector as shown in the diagram and fully remove the housing (2).
5- Remove the plug (5) and loosen the bolt (6) (5-mm Allen key).
6- Loosen the studs (7) *(3-mm Allen key).*
7- Remove the motor (3) and replace if necessary.
8- Reverse the process for assembly.

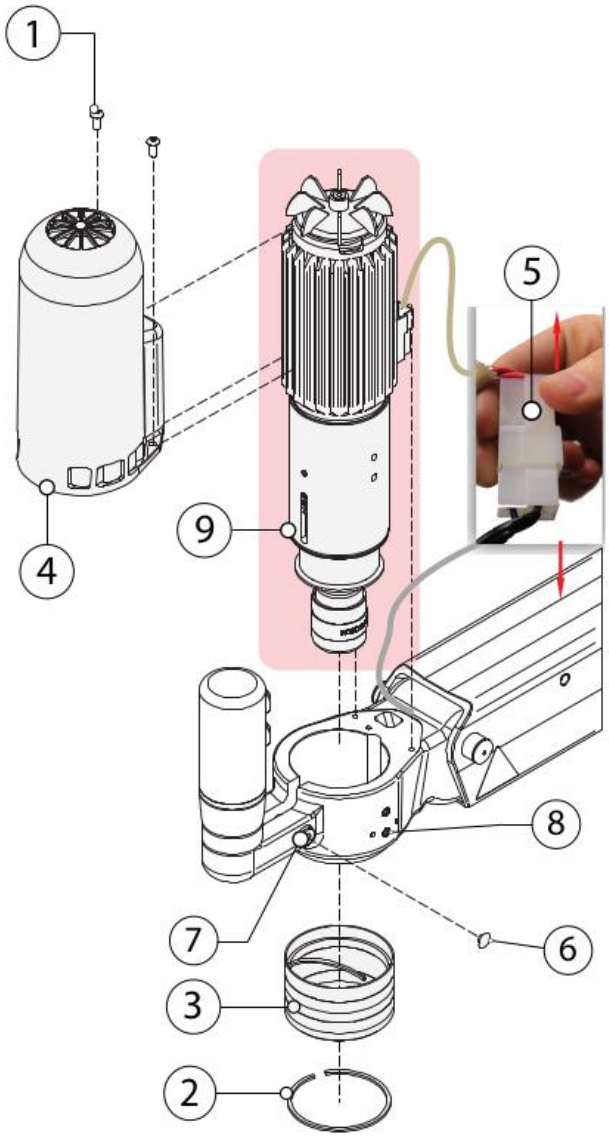
NOTE: When assembling the motor, make sure none of the cables are trapped.



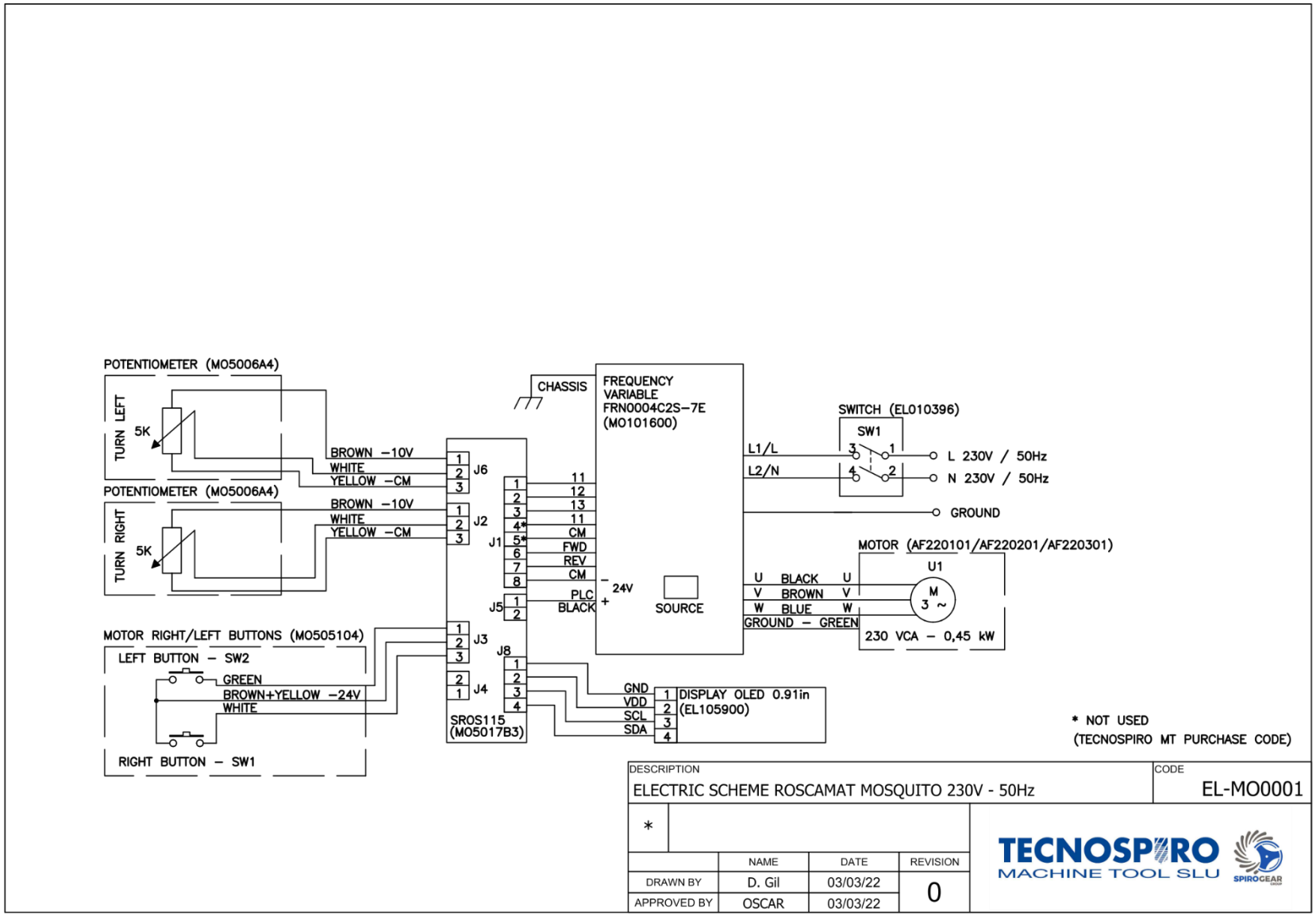
7.8 REPLACING THE MOTOR (2 V)

1- Set the machine to the folded or parking position.
2- Switch off at the main switch and unplug from the power supply.
3- Remove the Seeger ring (2) and remove the chuck (3).
4- Remove the bolts (1) *(2.5-mm Allen key).*
5- Slide the housing (4) up until the connector (5) is visible. Disconnect the connector as shown in the diagram and fully remove the housing (4).
6- Remove the plug (6) and loosen the bolt (7) (5-mm Allen key).
7- Loosen the studs (8) *(3-mm Allen key).*
8- Remove the motor (9) and replace if necessary.
9- Reverse the process for assembly.

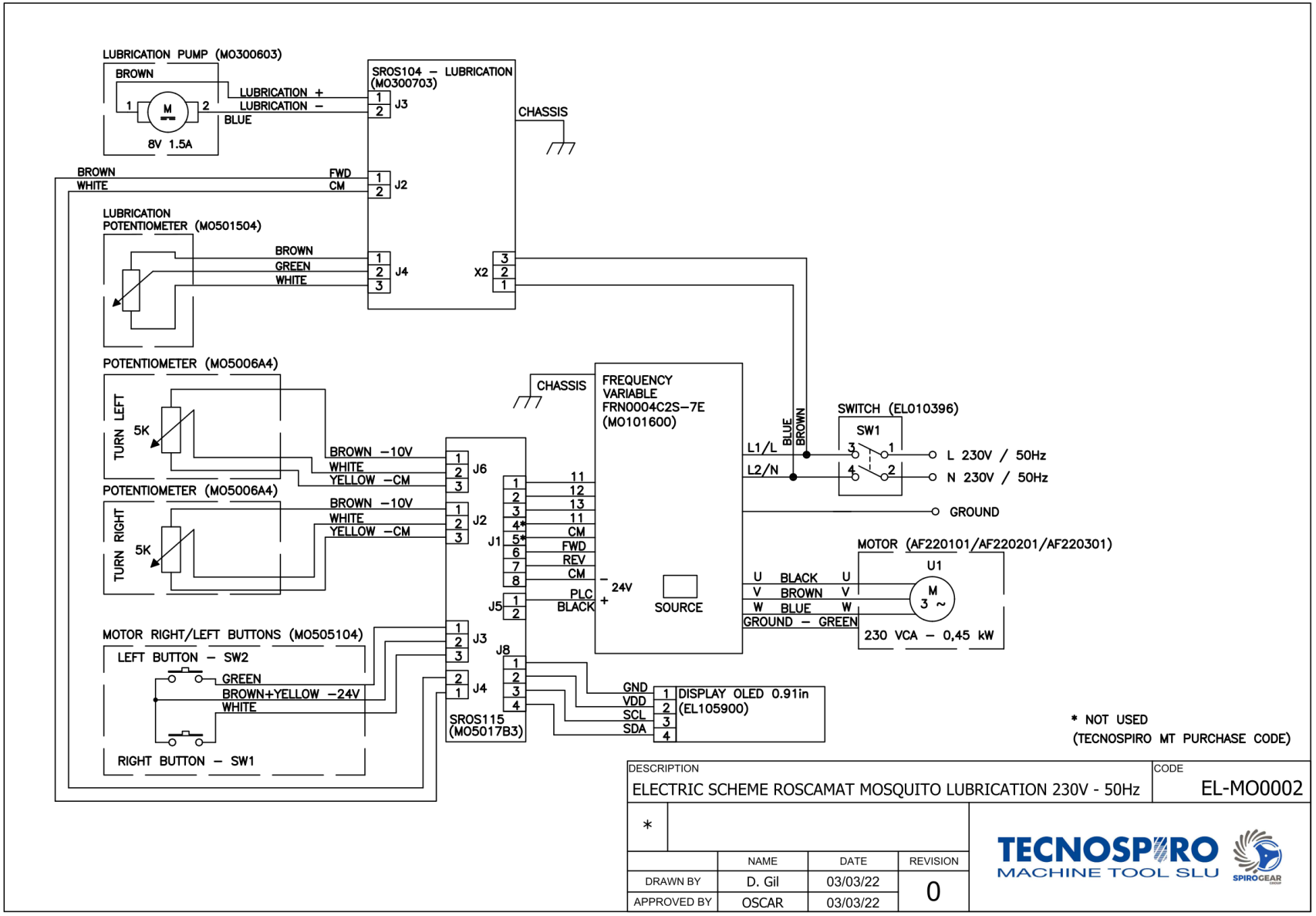
NOTE: When assembling the motor, make sure none of the cables are trapped.



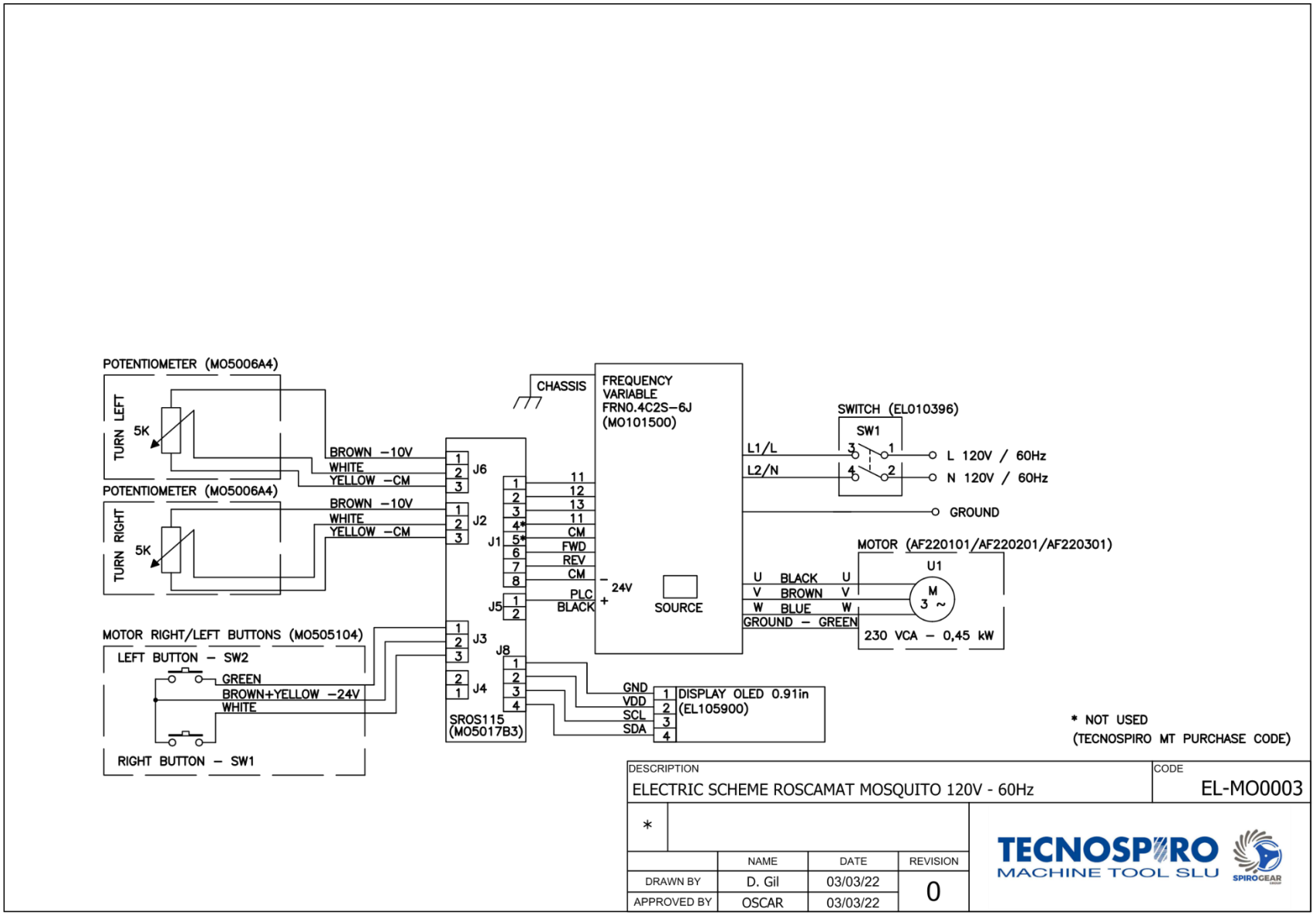
8 ELECTRICAL DIAGRAM



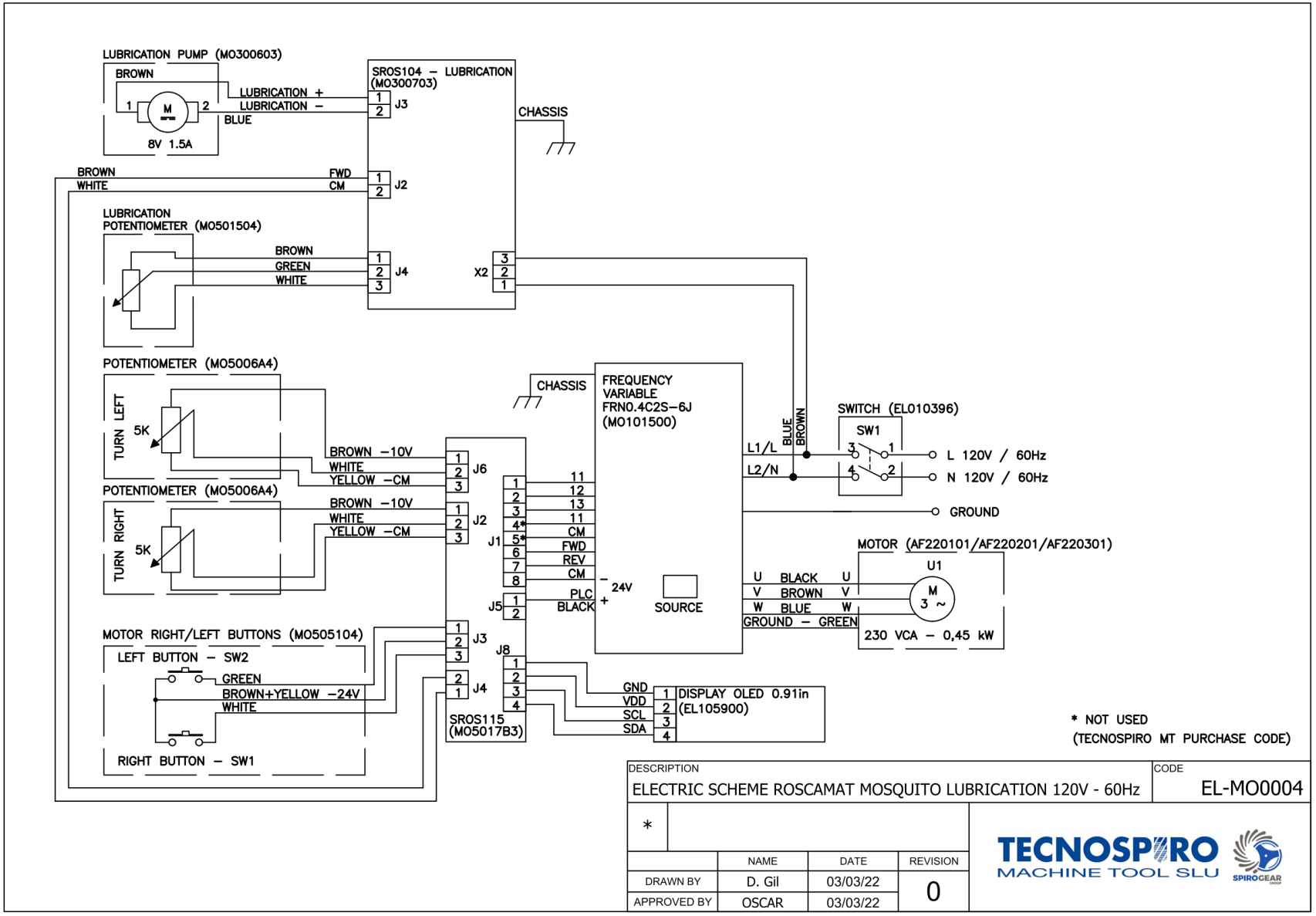
Electrical diagram, configurations WITHOUT lubrication – 230V



Electrical diagram, configurations WITH lubrication – 230V



Electrical diagram, configurations WITHOUT lubrication – 120V



Electrical diagram, configurations WITH lubrication – 120V

9 TROUBLESHOOTING

9.1 ISSUE: THE MACHINE DOES NOT WORK - THE MOTOR WILL NOT START OR HAS STOPPED

Remove the electrical box housing, leaving the electrical equipment uncovered and **read the fault shown on the drive display.**

Nominal dimensions			Technical Specifications
Indicator	Emergency stop	Stop cause indicator	
		Overcurrent protection	OC 1: Overcurrent during acceleration
			OC 2: Overcurrent during deceleration
			OC 3: Overcurrent during operation at constant rpm
		Network phase fault protection	L in: Entry phase fault
		Insufficient voltage protection	LU: Insufficient voltage
		Exit phase fault protection	OPL: Loss of output phase; problems in output cables of variator.
		Overvoltage protection	OU1: Overvoltage during acceleration
			OU2: Overvoltage during deceleration
			OU3: Overvoltage during constant revolutions operation
		Protection against overheating	OH1: Excess temperature on heat sink; excess load or fault.
			dbH: DB circuit overheating
		External fault entry	OH2: External faults
		Motor protection	OH4: Motor protection (PTC resistance)
			OL1: Motor overload; electrothermal motor protection relay.
		Overload protection	OLU: Variator overload
		Safety stop	Er1: Memory fault
			Er2: External control panel communications fault
			Er3: CPU fault
			Er6: Operational sequence fault
			Er8: RS485 communications fault
			ErF: Memorisation fault due to insufficient voltage
	Operation, safety stop		Data from the last four faults are memorised and can be displayed. Data stays memorised upon disconnecting the power

In any event, the machine must be reset to restart process. Switch the machine off and wait about 25 seconds before turning on the equipment. If the problem is due to an external current or voltage fault, please wait until the current is stabilised. If the problem persists, contact your distributor or manufacturer.

9.2 ISSUE: TILTING ARM FALLS

Possible causes		Solution
1. Arm not balanced	=	Balance the arm according to the weight to be supported. *[See BALANCING THE ARM page 18]*
2.- Defective damper	=	Replace it with a new one *[see REPLACING THE GAS SPRING p. 22]*

9.3 PROBLEM: THE CLUTCH SLIPS AND THE TAP FAILS TO TURN WHILE THE MOTOR IS RUNNING

Possible causes		Solution
1.- Clutch loose	=	Adjust the clutch *[see ADJUSTING THE CLUTCH p. 28].*
2.- Insufficient tool lubrication	=	Use a suitable oil or emulsion for the material.
3.- Tap not suited to the material	=	Use taps according to the material, following the manufacturer's instructions
4.- Tap in poor state (blunt)		
5.- Hole misaligned		
6.- Small hole diameter		

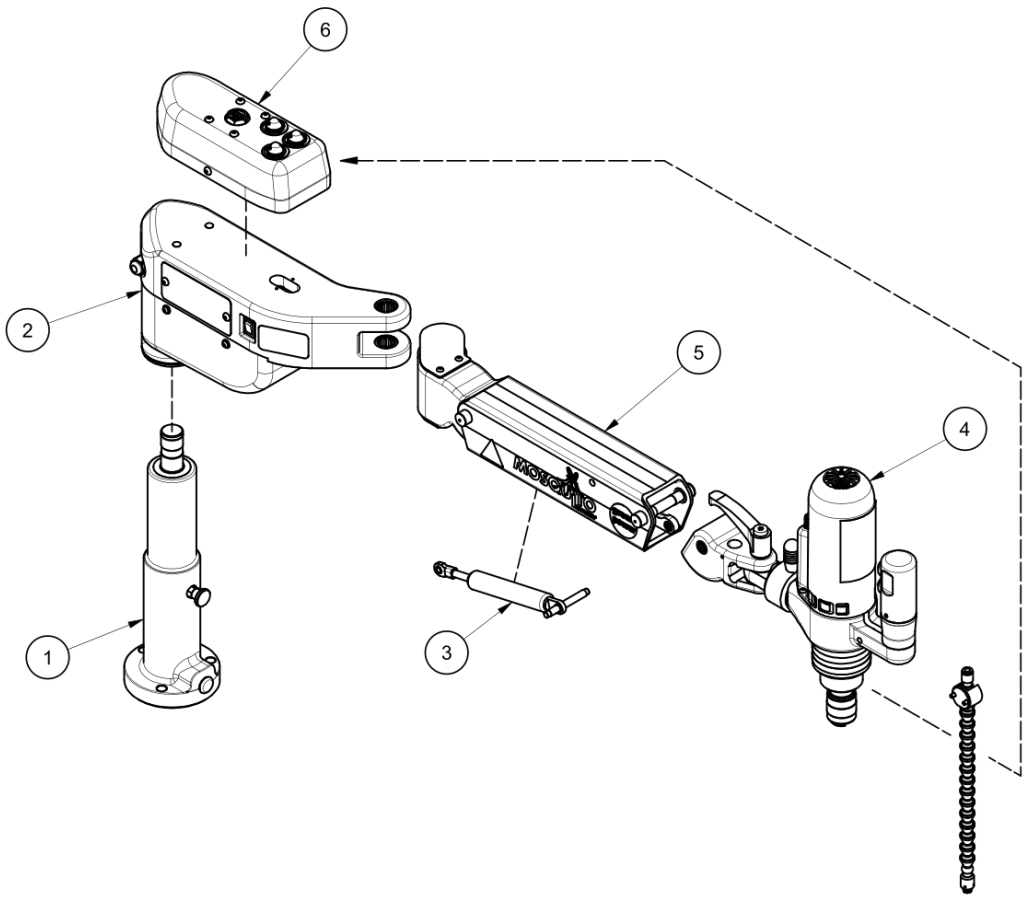
9.4 PROBLEM: THE LUBRICATION SYSTEM DOES NOT WORK

Possible causes		Solution
1. - Oil tank empty	=	Fill tank *[see* LUBRICATION *p. 16].*
2.- Grease stem blocked	=	Unscrew the end of the nozzle and clean it. (Please note: do not lose the spring and ball found inside the nozzle).

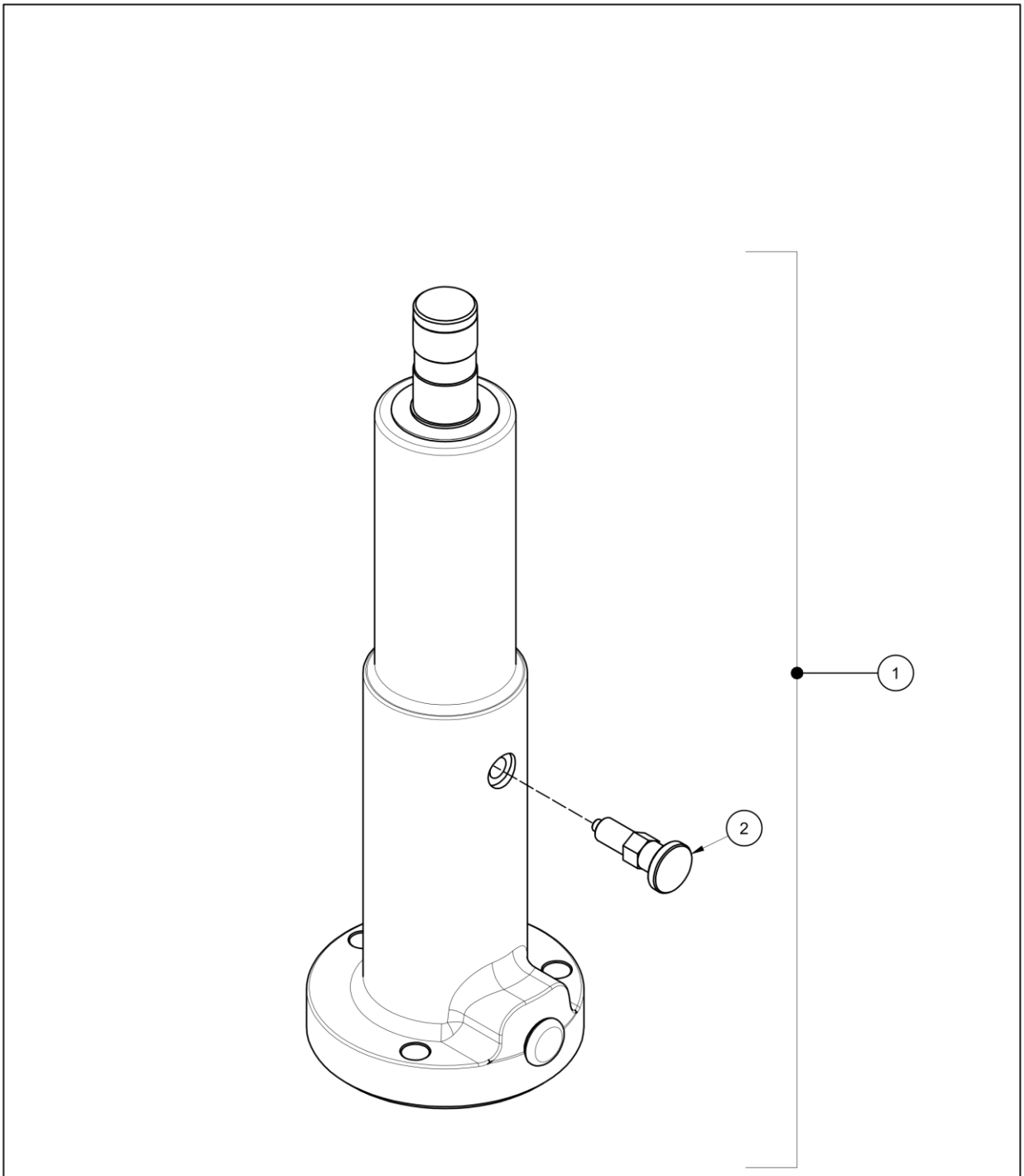
10 WARRANTY

See attached warranty document.

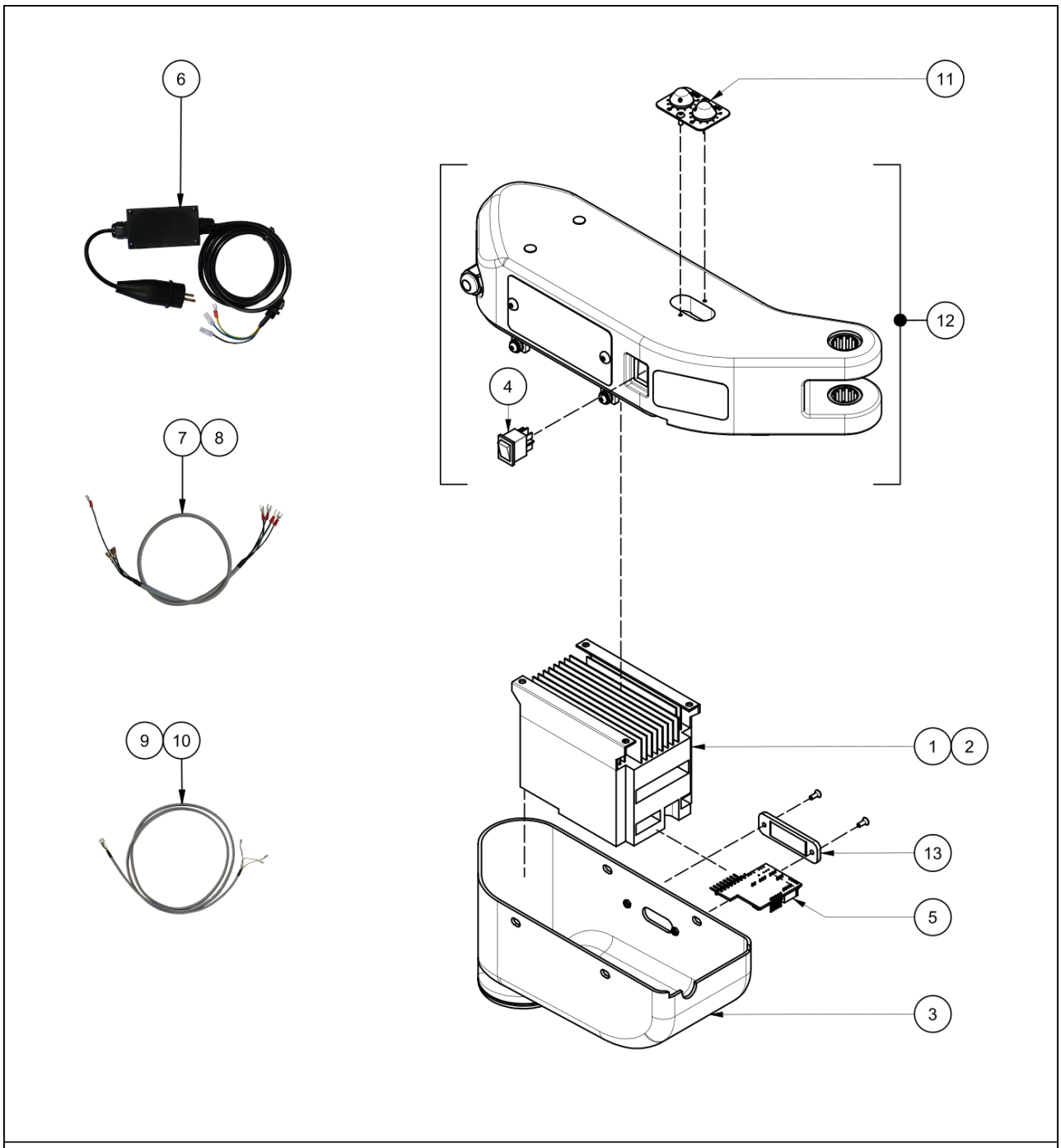
11 SPARE PARTS



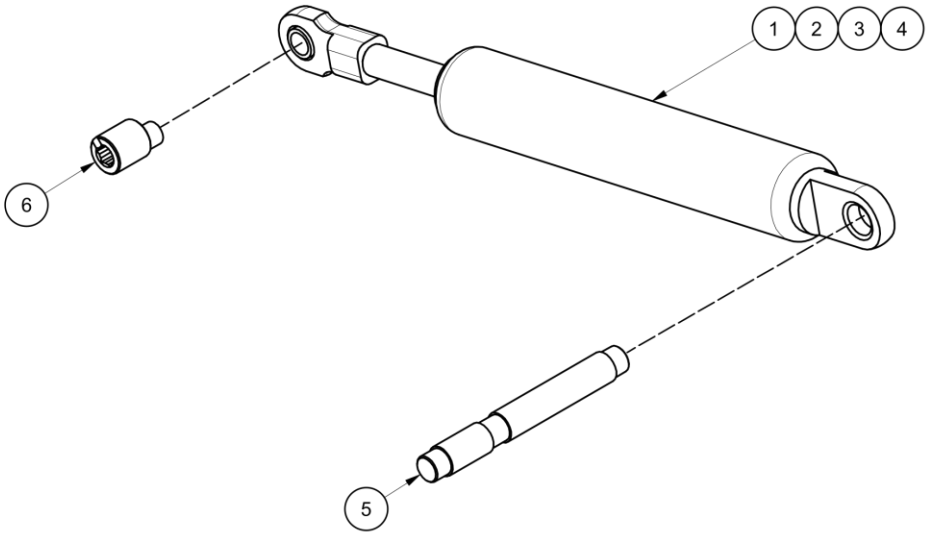
MOSQUITO MODEL V / MODEL VH	
POS	DESCRIPTION
1	BASE
2	RADIAL ARM
3	DAMPER
4	HEADMEMBER
5	ARM
6	LUBRICATION



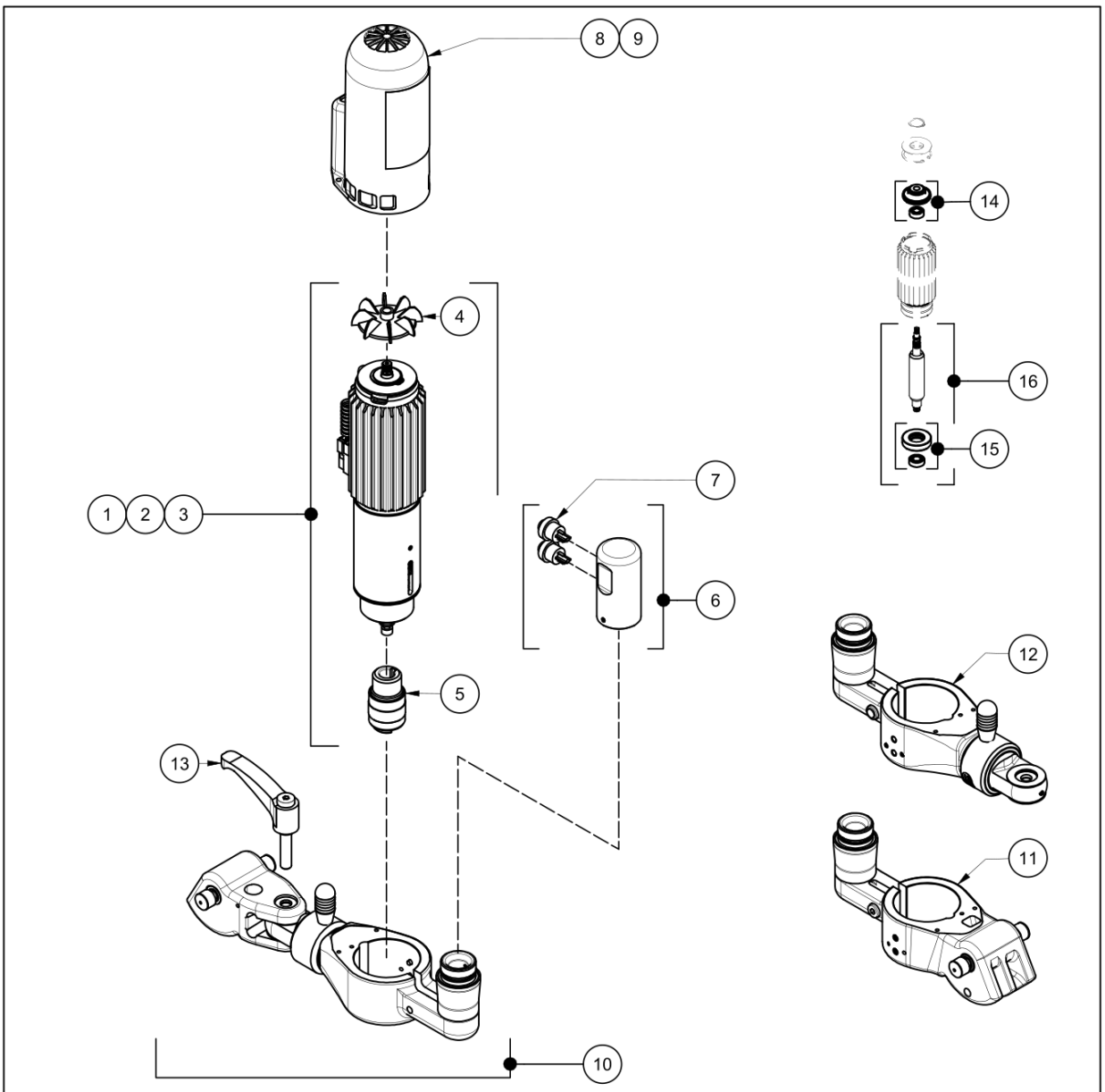
BASE			
POS	CODE	DESCRIPTION	MODEL
1	MO103004	BASE	V / VH
2	MO102903	BASE POSITIONER	V / VH



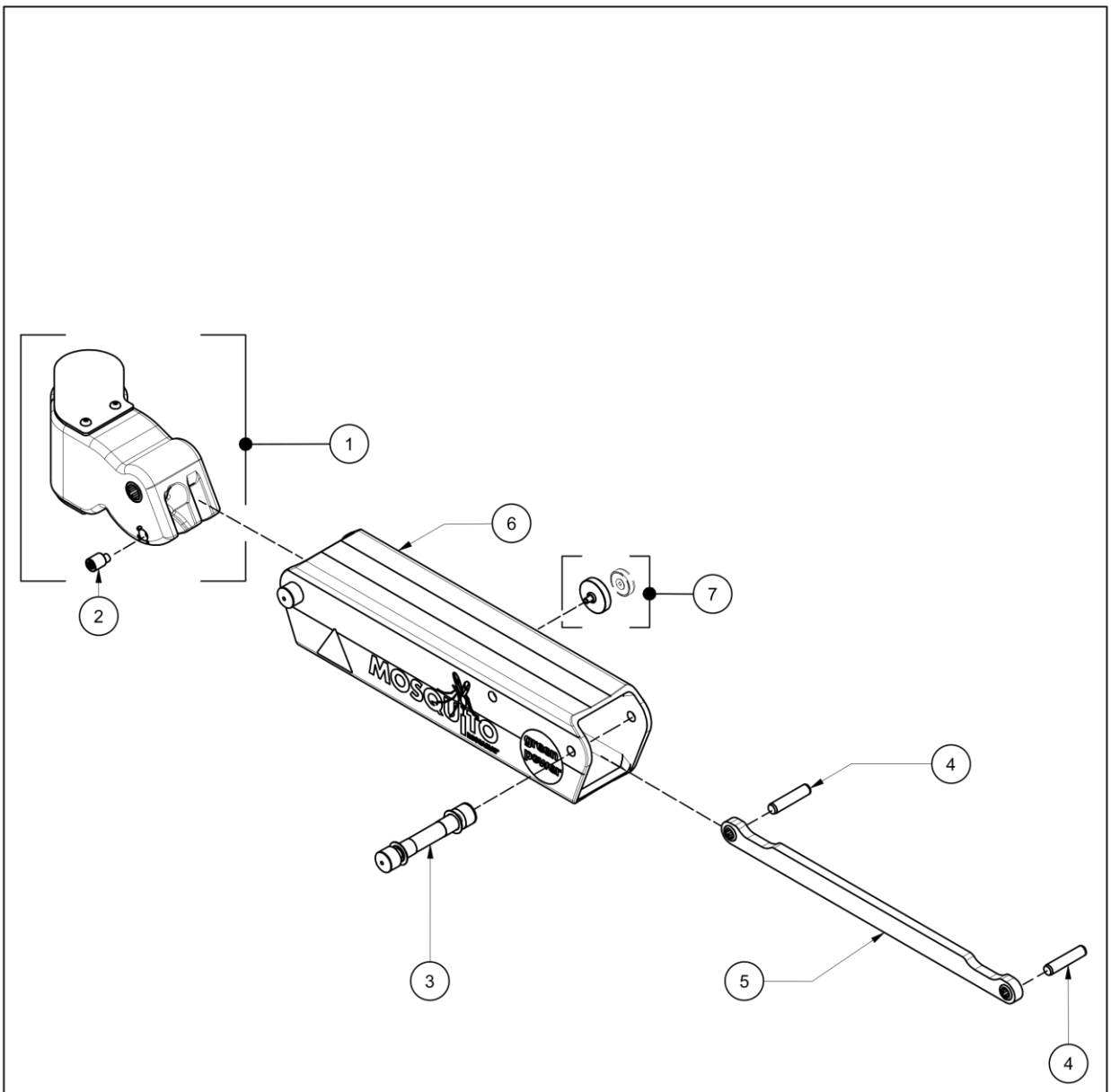
RADIAL ARM			
POS	CODE	DESCRIPTION	MODEL
1	MO101600	ELECTRONIC EQUIPMENT - FREQUENCY VARIATOR BOARD (220V)	V / VH
2	MO101500R	ELECTRONIC EQUIPMENT - FREQUENCY VARIATOR BOARD (110V)	V / VH
3	MO1019C3	BASE CASING	V / VH
4	EL010396	MAIN SWITCH	V / VH
5	MO5017B3	ELECTRONIC BOARD OF CONNEXIONS	V / VH
6	MO500504	PLUG WIRE	V / VH
7	MO502204	MOTOR TO VARIATOR WIRE	V
8	MO500104	MOTOR TO VARIATOR WIRE	VH
9	MO5002A4	GRIP TO VARIATOR WIRE	VH
10	MO502104	GRIP TO VARIATOR WIRE	V
11	MO4003A4	2 SPEEDS POTENTIOMETER + WIRE	V / VH
12	MO107000	SPARE RADIAL ARM	V / VH
13	MO107100	SPARE DISPLAY THREAD COUNTER	V / VH



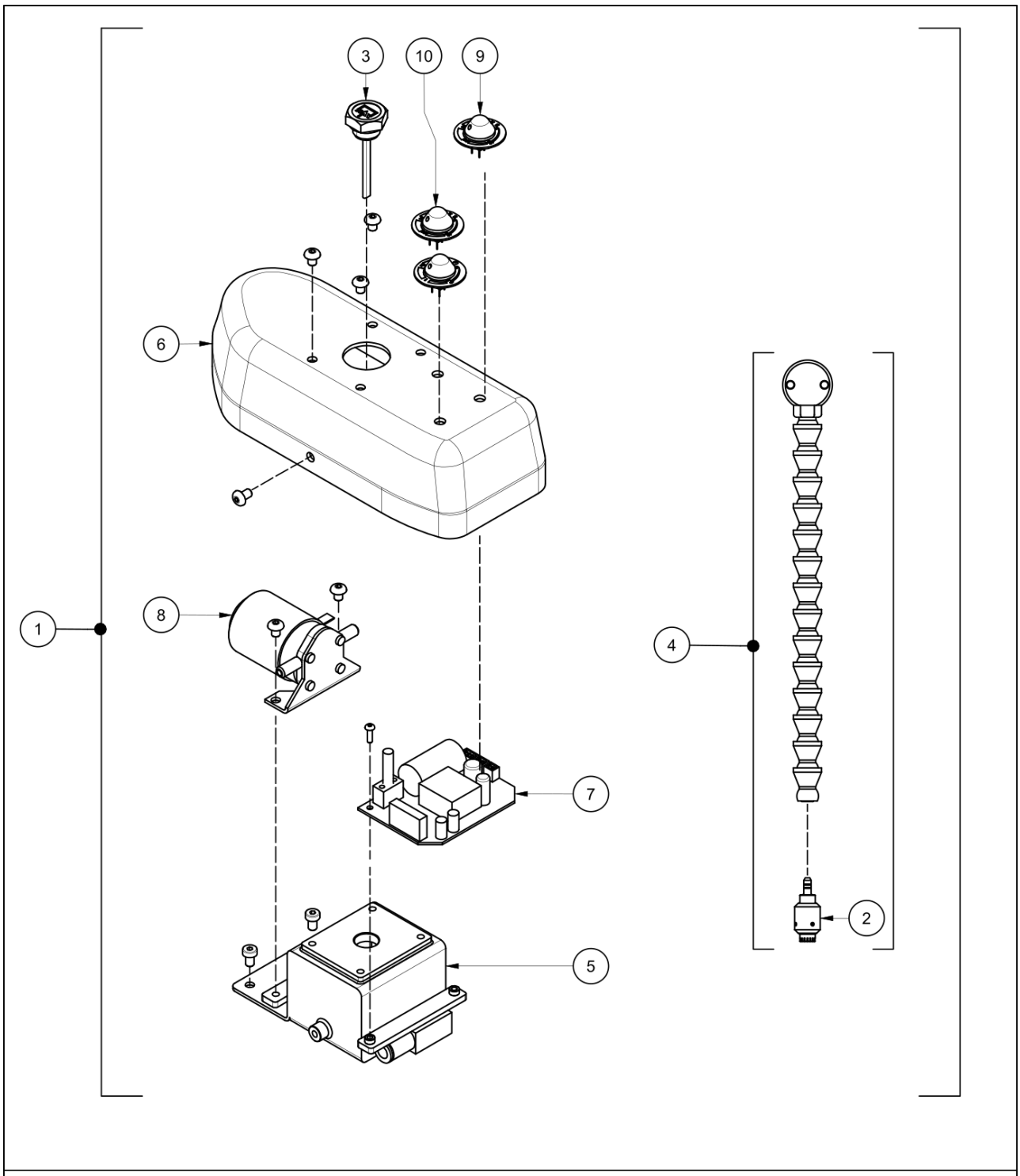
DAMPER			
POS	CODE	DESCRIPTION	MODEL
1	MO1021A3	DAMPER 400N - MOSQUITO V - 1 SPEED	V
2	MO1027A3	DAMPER 450N -MOSQUITO VH - 1 SPEED	VH
3	MO1027A3	DAMPER 450N -MOSQUITO V - 2 SPEED	V
4	MO2005A3	DAMPER 500N -VH 2 SPEED	VH
5	MO102303	SPINDLE OF THE ARM DAMPER	V / VH
6	MO100803	REGULATING DAMPER SCREW	V / VH



HEADMEMEBER			
POS	CODE	DESCRIPTION	MODEL
1	AF220101R	HIGH FREQUENCY ELECTRIC MOTOR -MODEL TS-XI - 2 SPEEDS	V / VH
2	AF220201R	HIGH FREQUENCY ELECTRIC MOTOR -MODEL TS-XII - 600 RPM	V / VH
3	AF220301R	HIGH FREQUENCY ELECTRIC MOTOR -MODEL TS-XII - 300 RPM	V / VH
4	AF211003	COOLING FAN	V / VH
5	AC090036	QUICK CHANGE 19/1	V / VH
6	MO102404R	MOTOR GRIP	V / VH
7	MO505104	PUSH BUTTON KIT 2 UNIT	V / VH
8	AF2101A3	MOTOR FRAMEWORK	VH
9	AF211203	MOTOR FRAMEWORK	V
10	MO200304	ORIENTABLE HEADMEMBER	VH
11	MO103604	VERTICAL HEADMEMEBER	V
12	MO200805	1/2 ORIENTABLE HEADMEMBER (MOTOR SUPPORT + TURNING BASE)	VH
13	AC060546	HANDLE FOR ORIENTABLE HEADMEMBER	VH
14	TG108100	MOTOR BALL BEARING - TOP COVER 6000 ZZ	V / VH
15	MO106700	MOTOR BALL BEARING - LOWER COVER 6001 ZZ	V / VH
16	AF211204	BODY ROTOR AF2	V / VH



ARM			
POS	CODE	DESCRIPTION	MODEL
1	MO106900	SPARE CROSS UNIT	V / VH
2	MO100803	REGULATING DAMPER SCREW	V / VH
3	MO101204	SPINDLE ARM WITH SCREWS	V / VH
4	CL021046	STAY AXIS	V / VH
5	MO103204	STAY	V / VH
6	MO101403	SPARE TILTING ARM	V / VH
7	MO107300	MAGNET PARKING	V / VH



LUBRICATION			
POS	CODE	DESCRIPTION	MODEL
1	MO300804	COMPLETE LUBRICATION KIT	V / VH
2	61130105	LUBRICATION NIPPLE	V / VH
3	MO102500	TANK OIL FILLING CAP	V / VH
4	MO300504	ARTICULATED PIPE	V / VH
5	MO3003B4	OIL TANK	V / VH
6	MO102400	LUBRICATION EQUIPMENT COVER	V / VH
7	MO300703	LUBRICATION BOARD	V / VH
8	MO300603R	LUBRICATION PUMP	V / VH
9	MO200104	LUBRICATION CONTROL BUTTON + POTENTIOMETER + WIRE	V / VH
10	MO107200	SPARE POTENTIOMETER AND WIRE TO VARIATOR	V / VH

12 GUIDELINES FOR PACKAGING, TRANSPORT AND DISASSEMBLY

12.1 PACKAGING

Follow the instructions below for packaging the device to change location or to ship it for repair and maintenance.

12.1.1 Preparations

The device must be taken out of service. Using straps during transport will prevent movement and possible damage to the equipment.

12.1.2 Choice of packaging

During long-distance transport, the device's component parts must be packaged appropriately to protect them against weather damage.

12.1.3 Inscription on packaging

Follow the specific provisions of the country where transport is taking place. For completely closed packages, a label must be placed on the package indicating which end is up.

12.1.4 Packing procedure

Place the device on manufactured wooden pallets. Using tie-down straps, secure the components to keep them from falling. Attach all accompanying technical documentation required for the device.

12.2 TRANSPORT

The following information must be considered when transporting the device.
External dimensions according to segment (755 mm x 410 mm x 285 mm), approx.
Total weight (according to segment): 16.5 kg.

12.3 DISASSEMBLY

- ✓ The equipment must be taken out of service by properly trained and authorised personnel.
- ✓ The equipment must be disassembled taking into account the instructions on safety, waste disposal and recycling.
- ✓ Protect the environment. The equipment must be disposed of following standards and directives in force in the areas of safety, noise prevention, environmental protection and accident prevention.

NOTES

DATE	DESCRIPTION

CE DECLARATION OF CONFORMITY

The manufacturer:

Company:	TECNOSPIRO MACHINE TOOL, S.L.U.
Address:	P.I. Pla dels Vinyats I, s/n nau 1
City:	Sant Joan de Vilatorrada - 08250
County:	Spain - EU

Declares that this product:

Name:	ROSCAMAT MOSQUITO
Model:	V 300 RPM, V 600 RPM, V 2V 300/600 RPM, VH - 600 RPM, VH - 600 RP, VH - 300 RPM, VH 2V - 300/600 RPM, V E - 300 RPM, V E - 600 RPM, 2V E - 300/600 RPM, VH E - 300 RPM, VH E - 600 RPM, VH 2V E - 300/600 RPM, V 300 RPM – 120V, V 600 RPM – 120V, V 2V 300/600 RPM – 120 V, VH - 600 RPM – 120V, VH - 600 RP -120V, VH - 300 RPM - 120 V, VH 2V - 300/600 RPM – 120V, V E - 300 RPM – 120V, V E - 600 RPM – 120 V, 2V E - 300/600 RPM – 120 V, VH E - 300 RPM – 120V, VH E - 600 RPM – 120 V.
Initial series number:	003-318 (consecutive)

Conforms with Directive 2006/42/EC on machinery, Directive 2014/35/EU on electrical equipment designed for use within certain voltage limits (low voltage), Directive 2011/65/EU on restriction of the use of certain hazardous substances in electrical and electronic equipment and Directive 2014/30/EU certified by the TELPRO CE laboratory, Av. Ca n'Enric, 39, 08197 Sant Cugat (Valldoreix), Barcelona

Authorised for documentation:

Ramon Jou Parrot, TECNOESPIRO MACHINE TOOL, S.L.U.

Sant Joan de Vilatorrada, Friday, 16 February 2024

TECNOSPIRO MACHINE TOOL SL

Ramon Jou Parrot, Chief Engineering Officer

ROSCAMAT®

TECNOSPIRO MACHINE TOOL SLU

APPENDIX ROSCAMAT®

ROSCAMAT ANNEX

1 TAPPING ACCESSORIES

QUICK-CHANGE TOOL HOLDER

A wide range of tap holders with and without clutch, as well as other tools for quickly attaching different tools, such as drill bits, countersinking bits, die stocks, socket spanners, etc.

•Tap holder with safety clutch
(to ensure it slips when it reaches the bottom of the hole)

•Tap holder without safety clutch
(to attach different tools with a cylindrical handle and drive)

Type 1 – Ø19 mm: capacity M2–M16
(for 300, 550, 750, 1050 modules)

Type 2 – Ø31 mm: capacity M14–M30
(for 90, 170 modules)

Type 3 – Ø 48 mm: capacity M30–M42
(for the 40 modules)

STANDARD MEASUREMENTS

Metric	Ø Coupl.	Ø Shaft	□	Standard
M3	19	3.5	2.7	DIN 371
M4	19	4.5	3.4	DIN 371
M5	19	6	4.9	DIN 371
M6	19	6	4.9	DIN 376
M7	19	7	5.5	DIN 376
M8	19	8	6.2	DIN 376
M10	19	10	8	DIN 376
M12	19	9	7	DIN 376
M14	19/31	11	9	DIN 376
M16	19/31	12	9	DIN 376
M18	31	14	11	DIN 376
M20	31	16	12	DIN 376
M22	31	18	14.5	DIN 376
M24	31	18	14.5	DIN 376
M27	31	20	16	DIN 376
M30	31/48	22	18	DIN 376
M33	48	25	20	DIN 376
M36	48	28	22	DIN 376
M39	48	32	24	DIN 376
M42	48	32	24	DIN 376

STOCK HOLDER

For threading with stocks
Capacity M5–M27

LONG STOCK HOLDER

For stock-guided threads.

Types:
– Long stock holder 19/1 M5–M6
– Long stock holder 19/1 M8
– Long stock holder 19/1 M10
– Long stock holder 19/1 M12-M14
– Long stock holder 31/2 M16-M18–M20

Please enquire about other measurements
Capacities from M6–M27

QUICK-CHANGE EXTENSION

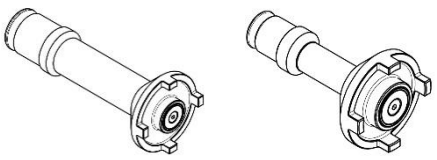
80-mm extension for head assembly tool, allowing access to hard-to-reach areas.
Ø coupling = Ø19 mm

REDUCER BUSHING

To adapt different coupling diameters of tap holders to modules with different output dimensions.

PROBES

Two models available (19 and 31). Angled threading tools.



2 MODULAR SYSTEM

2.1 TIGER AND DRAGON MODULES

MODULE	Max. speed (rpm)	Max. torque		Ø Adaptor	Tapping capacity – steel <90 kg	
		Nm	Ft · lb		Metric	Inches
90	90	150	110	Ø31	M16-M27	$^{5}/_{8}" - 1\ ^{1}/_{8}"$
170	170	79	58	Ø31	M16-M20	$^{5}/_{8}" - ^{3}/_{4}"$
300	300	44	32	Ø19	M2-M16	$^{1}/_{8}" - ^{5}/_{8}"$
550	550	24	15	Ø19	M2-M12	$^{1}/_{8}" - ^{1}/_{2}"$
750	750	17	13	Ø19	M2-M10	$^{1}/_{8}" - ^{3}/_{8}"$
1050	1050	12.5	9	Ø19	M2-M8	$^{1}/_{8}" - ^{3}/_{8}"$
2100	2100	6	4	B-16 cone	Drills up to Ø8 aluminium, cast iron, etc.	

2.2 SHARK MODULES

MODULE	Max. speed (rpm)	Max. torque		Ø Adaptor	Tapping capacity – steel <90 kg	
		Nm	Ft · lb		Metric	Inches
40	40	340	251	Ø48/3	M27-M36	$1\ ^{1}/_{8}" - 1\ ^{3}/_{8}"$
75	75	185	136	Ø31/2	M18-M27	$^{3}/_{4}" - 1\ ^{1}/_{8}"$
140	140	95	70	Ø31/2	M18-M22	$^{3}/_{4}" - ^{7}/_{8}"$
320	320	44	32	Ø19/1	M2-M16	$^{1}/_{8}" - ^{5}/_{8}"$
500	500	28	21	Ø19/1	M2-M12	$^{1}/_{8}" - ^{1}/_{2}"$
900	900	15	11	Ø19/1	M2-M8	$^{1}/_{8}" - ^{3}/_{8}"$

3 ACCESSORIES

NOT all the accessories shown below are compatible with your arm, for this see the compatibility table *[See* ROSCAMAT COMPATIBILITY TABLE *p. 54]*

TABLES

(1)

(2)

(3)

Four wheels (two with brake)
Slots for fastening parts or tools.
Supports for tap holder or tools.

CODE	DESCRIPTION	DIMENSIONS		MAX. LOAD
TP0001A0	Small table (1)	500 x 500 x 900 mm	19 11/16″ x 19 11/16″ x 35 7/16″	100 kg
TF0001A0	Mid-size table (2)	850 x 850 x 850 mm	33 7/16″ x 33 7/16″ x 33 7/16″	200 kg
907B00A0	Large table (3)	1100 x 850 x 850 mm	43 5/16″ x 33 7/16″ x 33 7/16″	500 kg

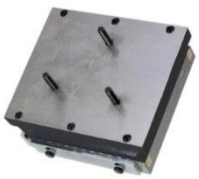
SUPPORTS

(1)

(2)

Clamp for securing the machine
Magnetic support for placing it on a metal surface and securing the machine

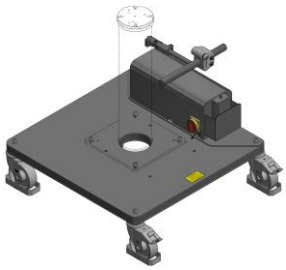
CODE	DESCRIPTION	DIMENSIONS
BR000100	Small clamp (1)	N/A
BR100100	Large clamp (2)	N/A
IA000100	Magnetic support (3)	150x150
IB000100	Magnetic support (4)	Ø200
IC000100	Magnetic support (5)	Ø250

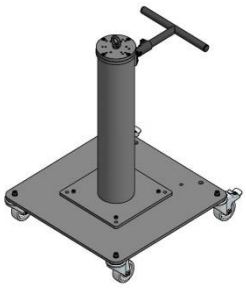


(3)

(4)(5)

TROLLEY



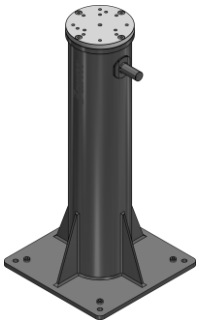


To move the work unit.
It has four orientable wheels.

DESCRIPTION	DIMENSIONS	
Trolley 700	700x700 mm	27 9/16″ x 27 9/16″
Trolley 900	900x900 mm	35 7/16″ x 35 7/16″
Electrical trolley	900x900 mm	35 7/16″ x 35 7/16″
Electrical trolley	800x800 mm	31 1/2″ x 31 1/2″

*Code according to load

FIXED COLUMN



To secure to the floor using four metal studs.

CODE	DESCRIPTION/DIMENSIONS	
CL144000	Column 62 mm	2 ½ ″
CL115800	Column 112 mm	4 3/8″
CL128900	Column 162 mm	6 3/8″
CL140800	Column 275 mm	10 7/8″
CL115400	Column 375 mm	14 ¾″
CL144800	Column 450 mm	17 ¾″
CL145300	Column 635 mm	25″
CL007004	Column 740 mm	29 1/8″
CL005300	Column 850 mm	33 ½″
CL145700	Column 1100 mm	43 ¼″
CL145800	Column 1350 mm	53 1/8″
CL146100	Column 1600 mm	63″

PNEUMATIC LIFTER

It consists of a telescopic column and a pneumatic cylinder with anti-rotation.

DESCRIPTION	VERTICAL STROKE
Pneumatic lifter 300	300 mm – 11 7/8″
Pneumatic lifter 500	500 mm – 19 7/8″
Pneumatic lifter 750	750 mm – 29 17/32″

D63 PNEUMATIC LIFTER

Pneumatic lift. The vertical position can be locked at any point, it has a pneumatic cylinder. It can be secured to the ground, on a trolley or on the ground rail to have movement on two shafts.

DESCRIPTION	VERTICAL STROKE
1500 D63 Pneumatic lifter	940 mm – 37″
2000 D63 Pneumatic lifter	1440 mm – 56 11/16″
2500 D63 Pneumatic lifter	1940 mm – 76 3/8″

RADIAL EXTENSION

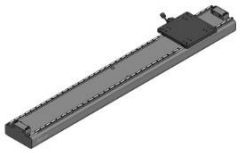
(1)

Extender that enables the arm's working area to be increased. It can also be installed on other accessories, such as column, lift, linear guide, etc.

(2)

CODE	DESCRIPTION	ADDITIONAL WORK AREA
ER0010C0	Radial extension 500 (1)	500 mm – 19 11/16″
ER000100	Radial extension 1000 (2)	1000 mm – 39 3/8″

FLOOR RAIL



Rail to fasten to the floor and on which the different columns and lifts can be fastened. Several sections can be joined from a base section 2 m. The horizontal position can be locked at any point.

CODE	DESCRIPTION	STROKE
CL040000	Floor rail	1520 mm – 59 13/16″

LINEAR GUIDE

Guide for the horizontal movement of the arm. Several sections can be joined from a base section 2 m. This may be table-top, fixed to the wall or ceiling, or on pillars of various heights that can be selected. The horizontal position can be locked at any point.

CODE	DESCRIPTION	STROKE
CL023300	Linear guide 1000	635 mm – 25″
CL020000	Linear guide 2000	1635 mm – 64 3/8″
CL023000	Linear guide 3000	2635 mm – 103 3/4″

4 ROSCAMAT COMPATIBILITY TABLE

ACCESSORY	SERIES – ROSCAMAT						
	200	400	500	Mosquito	Tiger	Shark	Dragon
RADIAL EXTENSION	●	●	●	●	●	●	●
TROLLEY + FIXED COLUMN	●	●	●	□700x18	□700x24	□700x30	□700x36
FIXED COLUMN	●	●	●	●	●	●	●
PNEUMATIC LIFTER	●	●	●	●	●	●	●
D63 PNEUMATIC LIFTER	●	●	●	●	●	●	●
FLOOR RAIL	●	●	●	●	●	●	●
LINEAR GUIDE	●	●	⊘	●	⊘	⊘	⊘
SMALL TABLE (500)	●	●	⊘	●	⊘	⊘	⊘
MID-SIZE TABLE (850 x 850)	●	●	●	●	●	*	*
LARGE TABLE (1110 x 850)	●	●	●	●	●	●	●
SMALL CLAMP	●	●	⊘	●	⊘	⊘	⊘
LARGE CLAMP	●	●	●	●	●	●	●
MAGNETIC SUPPORT	□150	Ø200	Ø250	Ø200	Ø250	Ø250	Ø250

● = Compatible
⊘ = NOT Compatible
* = Request information

5 TECHNICAL INFORMATION

5.1 MOTOR – PROPERTIES

High frequency electric motor
Three models with different speeds:

a) 300 rpm
b) 600 rpm
c) Two-speed: 300/600 rpm

- Power: 450 W.
- Frequency: 50/60 Hz
- Single phase; Voltage: 220–240 V.
- Machine weight: 15 kg.
- Noise level: 74 dBA

5.2 ELECTRONIC VARIATOR PROPERTIES

5.2.1 Variable frequency drive (used in 230V versions)

Nominal dimensions			Technical Specifications
Nominal power of motor			0.4 kW
Output properties	Nominal power (kVA)		1.3 kVA
	Nominal voltage (V)		Three-phase, 200 to 240V (with AVR function)
	Nominal current		3.5 A.
	Overload capacity		150% of nominal output current for 1 min. 200% of nominal output current for 0.5 sec.
	Nominal frequency (Hz)		50 / 60 Hz
Input properties	Phases, voltage, frequency		Single phase, 200 to 240 V 50/60 Hz
	Tolerances		Voltage: +10 to -15% Frequency: +5% to -5%
	Nominal current	(With DC reactance)	3.5 A.
		(Without DC reactance)	5.4 A.
	Power required from the electricity supply (kVA)		0.7 kVA
Brakes	Brake torque (%)		100 (average brake torque with AVR off)
	DC brake injection		Start frequency: 0.0–60.0 Hz Braking time: 0.0–30.0 secs Brake current: 0–100% of nominal current
	Braking transistor		Built-in
Applicable safety standards			UL508C, IEC61800-5-1:2007
Protection type			IP20 (IEC 60529), UL open type (UL50)
Cooling			Natural cooling
Weight			0.7 kg

5.2.2 Variable frequency drive (used in 120V versions)

Nominal dimensions			Technical Specifications
Nominal power of motor			0.4 kW
Output properties	Nominal power (kVA)		0.95 kVA
	Nominal voltage (V)		Three-phase, 200 to 240V (with AVR function)
	Nominal current		2.5 A.
	Overload capacity		150% of nominal output current for 1 min. 200% of nominal output current for 0.5 sec.
	Nominal frequency (Hz)		50 / 60 Hz
Input properties	Phases, voltage, frequency		Single phase, 100 to 120 V 50/60 Hz
	Tolerances		Voltage: +10 to -10% Frequency: +5% to -5%
	Nominal current	(With DC reactance)	6.4 A.
		(Without DC reactance)	9.5 A.
	Power required from the electricity supply (kVA)		0.7 kVA
Brakes	Brake torque (%)		100 (average brake torque with AVR off)
	DC brake injection		Start frequency: 0.0–60.0 Hz Braking time: 0.0–30.0 secs Brake current: 0–100% of nominal current
	Braking transistor		Built-in
Applicable safety standards			UL508C, IEC61800-5-1:2007
Protection type			IP20 (IEC 60529), UL open type (UL50)
Cooling			Fan
Weight			0.8 kg

5.3 TABLE OF TORQUE – THREAD SIZE – MOSQUITO

<table>
<tr><th>TORQUE</th><th>SIZE</th><th>WHITWORTH</th><th>GAS</th><th>STEEL > 80</th><th>STEEL < 80
CAST
BRONZE < 40</th><th>ALUMINIU
M
PLASTIC</th></tr>
<tr><td>0.3
0.5
0.6
0.8</td><td>M2
M3</td><td>

1/8”</td><td></td><td rowspan="5">600 RPM</td><td rowspan="5">600 RPM</td><td rowspan="9">600 RPM</td></tr>
<tr><td>1
1.2
1.6
2
2.5</td><td>
M4

M5</td><td>
5/32”</td><td></td></tr>
<tr><td>3
4
5</td><td>M6</td><td>3/16”
7/32”
1/4”</td><td></td></tr>
<tr><td>6</td><td></td><td></td><td>G 1/8”</td></tr>
<tr><td>8</td><td>M8</td><td></td><td></td></tr>
<tr><td>10</td><td></td><td>5/16”</td><td></td><td rowspan="4">300 RPM</td></tr>
<tr><td>12
16</td><td>
M10</td><td>
3/8”</td><td></td><td rowspan="3">300 RPM</td></tr>
<tr><td>18
20</td><td></td><td></td><td>G 1/4”</td></tr>
<tr><td>22</td><td>M12</td><td>7/16”</td><td>G 3/8”</td></tr>
<tr><td>25
28
32
36</td><td>

M14</td><td>

1/2”</td><td></td><td rowspan="2">300 RPM</td></tr>
<tr><td>40</td><td>M16</td><td>9/16”</td><td></td><td></td><td></td></tr>
</table>

5.4 CLUTCH TORQUE ADJUSTMENTS FOR TAPPING (Nm)

Metric thread	Steel > 100 kg	Steel 80–100 kg	Steel < 80 kg	Aluminium Grey Iron
3	0.9	0.6	0.5	0.4
4	2	1.3	1.2	0.8
5	3	2	2	1.3
6	5	4	4	2.4
8	11	8	8	5
10	20	15	14	9
12	33	24	23	14
14	50	36	35	22
16	57	42	40	26
18	101	73	70	45
20	112	81	78	50
22	123	90	86	55
24	194	140	135	86
27	218	158	152	97
30	330	240	230	150
33	364	260	252	160
36	-	-	280	230
39	-	-	-	250
42	-	-	-	340

5.5 MACHINE THREAD TAPS

Blind hole	Tap with helical grooves.	Lubrication.
Lubrication	Tap with straight grooves and helical entry.	
Steel > 80 kg	Ang. cutting 8–10.	Cutting fluid with additives.
Steel < 80 kg	Ang. cutting 12–14.	Cutting fluid.
Steel < 50 kg Stainless steel	Ang. cutting 14–16. Treatment of surface	
Soft iron casting	Tap with straight grooves. Treatment of Nitride Surface Ang. cutting 5.	Petroleum, cutting fluid, dry
Duralumin	Ang. cutting 12–15.	Cutting fluid, dry
Aluminium	Ang. cutting 17–25.	Cutting fluid with additives.
Plastic		Cutting fluid, dry