INSTRUCTION MANUAL

3arm®

SERIES 6

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ISO 9001
BUREAU VERITAS
Certification

TECNOSPIRO
MACHINE TOOL SL

DESIGN & QUALITY
3arm
Made in Barcelona

www.3arm.net

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1 INTRODUCTION

Dear Customer,

We would like to congratulate you on your choice and we are pleased to continue our constant work to provide our customers with a simple, reliable and versatile way to improve ergonomics in the workplace.

We hope these simple instructions will help you commission and operate the arm you have selected. We suggest you pay special attention to the pages on the concepts of installation, maintenance and safety.

We hope your arm will have a long life and that you can reaffirm the very good investment you have made in acquiring a 3arm©.

2 ABOUT THIS MANUAL

This document corresponds to the Series 6 instruction manual.

- ORIGINAL MANUAL –

Intellectual/Industrial Property Information:

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2.1 CONSIDERATIONS

- ✓ Before using the equipment, be sure to read this instruction manual and follow the instructions for use and safety correctly.
- ✓ All the instructions listed in this manual refer to the individual equipment. It is the end user's responsibility to analyse and apply all the necessary safety measures required for the end use.
- ✓ This manual must be kept for the entire life of the equipment, in a place close to it for future consultations.
- ✓ If any part of this manual is unclear, confusing or inaccurate, please do not hesitate to contact us.
- ✓ The content of this manual may be subject to change without prior notice.
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- ✓ The illustrations shown in this manual may differ in some details with respect to their specific configuration and must be understood as a standard representation.

Paragraphs indicating assembly, adjustment, installation or maintenance steps are framed with a brown background.

Paragraphs with highlighted information are framed with a grey background.

2.2 DOCUMENT VERSION

Document	Date - version
Instruction manual Series 6	09/06/2020

3 SAFETY INFORMATION

3.1 SCOPE OF APPLICATION

This chapter contains very important information related to the safety of your arm; it is aimed at all staff involved in any of the stages of the life of this equipment (transport, assembly, installation, commissioning, adjustment, learning, operation, cleaning, maintenance, troubleshooting, dismantling/removal from service.

3.2 ALERTS AND GENERAL CONSIDERATIONS

- ✓ The equipment described in this document has been built in accordance with the current technological level and pursuant to the applicable technical standards in terms of safety. However, improper use, or incorrect integration by the end user can generate risk of injury.

- ✓ The equipment must only be used in perfect technical condition, respecting the safety regulations and the instructions provided in this document.

- ✓ Any breakdown that may affect safety must be corrected immediately.

- ✓ The equipment must not be modified without due authorisation from TECNOSPIRO MACHINE TOOL, S.L.

- ✓ The equipment must only be operated for its intended use. Any other use is strictly prohibited. Any use other than the use indicated is considered misuse and is prohibited. The manufacturer assumes no responsibility for any damage that may arise from it. This is solely at the user's own risk.

- ✓ It is the responsibility of the integrator, owner and/or end user to determine the suitability of the product for each use, as well as its place of installation and the specific definition of the task to be carried out with this product within the limits stated in this manual.

- ✓ Do not use the equipment in any way that is not considered in this manual and pay special attention to the uses mentioned in section 3.3 EXCLUSIONS, which must not be carried out.

- ✓ The operator must only use the equipment after having received the instructions for its use.

- ✓ The integrator/end user must ensure that the gripping device is suitable for the end application.

- ✓ Do not exceed the maximum working loads indicated in this manual as well as in the identification on the structure of the equipment.

- ✓ It is recommended that only one operator use the equipment at a time, any other use must be evaluated by the integrator/end user.

- ✓ When it is not in use, it must be left in the retracted or parking position. Ensure the air supply to the equipment has been cut off at the end of the working day.

- ✓ The operator may only use the equipment for safe movements, accompanying the movement of the equipment at all times, and thus reducing the risk of uncontrolled or involuntary movements.

- ✓ Although the parts with a higher risk of possible shearing or mechanical gripping are protected and have guards, it is forbidden to manipulate the moving components and joints when it is in use.

- ✓ The operator must stay out of the swivel arm's vertical travel.

- ✓ The work area of the equipment and its surrounding area must respect conditions of safety, health and hygiene at work. It is the integrator/end user's responsibility to conduct a study to guarantee safety.

- ✓ The presence of third parties in the work area of the equipment should be restricted as much as possible, thus avoiding any impact on safety. For any other use, an additional study of the hazards derived from this way of working must be carried out.

- ✓ Only authorised personnel may be present in this area while the equipment is in use.

- ✓ It is important that the users who operate this equipment are familiar with and sufficiently trained to use this product or similar products.

- ✓ It is recommended that the operator have basic knowledge of: Safety procedures, precautions and safe working habits.

- ✓ In any case, the operator must read and understand this manual before use regardless of their knowledge, training or experience with similar equipment, especially the sections dedicated to installation, operation and safety.

- ✓ The appropriate distances that allow people to circulate safely must be added around the perimeter of the equipment. Work areas must remain free from obstacles, columns, etc. that may hinder the operators' work.

- ✓ Before any type of adjustment or maintenance task, the staff and/or operators responsible for these tasks must bear in mind that the 3arm© arm is configured to work with a certain range of loads.

- ✓ Suitable spaces must be available to carry out maintenance, adjustment, cleaning, etc. tasks.

- ✓ If you have questions about handling or maintenance procedures, please contact the authorised technical service.

- ✓ Protective equipment must be used pursuant to the manufacturer's instructions for the tool attached to the arm.

- ✓ If for any manipulation, adjustment or maintenance task, or for any other reason, the load is released from the arm (for example, when changing the tool), the arm may suddenly ascend sharply and could cause harm. Carefully read the section *Safety considerations in maintenance and adjustment tasks to avoid them*.

- ✓ Lifting devices are subject to different regulations in each country. These regulations may not be specified in this manual.

3.3 EXCLUSIONS

The following is beyond the scope of use of this arm:

- ✓ Operation in severe conditions (e.g. extreme environmental conditions such as freezing, high temperatures, corrosive environment, strong magnetic fields).
- ✓ Loads greater than the maximum working load limits (WLL).
- ✓ Use in areas with risk of explosion.
- ✓ Installation in outdoor areas.
- ✓ Handling of any component or functions of the equipment outside of those specified in this manual.
- ✓ Use by people with some type of disability or by animals.

3.4 SYSTEM INTEGRATOR

The system's integrator or end user is responsible for integrating the machine in the installation, respecting all the relevant safety measures.

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

- ✓ Siting the equipment.
- ✓ Connecting the equipment.
- ✓ Risk assessment.
- ✓ Facilities with the necessary safety and protection functions.
- ✓ Issue of the EC statement of compliance.
- ✓ Placement of the CE marking.
- ✓ Preparing the machine's service instructions.

3.5 SYMBOLOGY AND ICONS

Throughout this manual and in the structure of the machine, different symbols and pictograms can be observed, the meaning of which is summarised below.

	General danger symbol. This symbol is usually accompanied by another symbol, or a more detailed description of the danger.
	Trapping hazard

3.6 PERSONAL PROTECTION EQUIPMENT (PPE)

The personal protection equipment for this arm is merely safety footwear for all stages of the life of the equipment.

It is the integrator/end user's responsibility to define the personal protection equipment derived from the final application of the equipment in order to comply with the essential health, safety and hygiene requirements.

Operators must not wear loose clothing, rings or bracelets that may fall within the equipment's mechanism.

It is also mandatory to wear the hair collected to avoid snags with the moving parts of the equipment.

3.7 TRAINING LEVEL OF THE STAFF INVOLVED

All people working with the equipment must have read and understood the safety chapter in the documentation.

The minimum training level required to use the equipment is:

- Production workers: a course on workplace hazard prevention, complete training on the equipment's tasks and residual risks. Minimum of one year's experience in similar facilities.

- Maintenance workers: workplace hazard prevention course, complete training on the handling, operation, maintainability and conservation of the equipment and residual risks. Minimum of two years' experience in similar facilities and with the technical level necessary to perform tasks without problems.

- Cleaning workers: course on workplace hazard prevention, training on products and procedures for carrying out cleaning tasks.

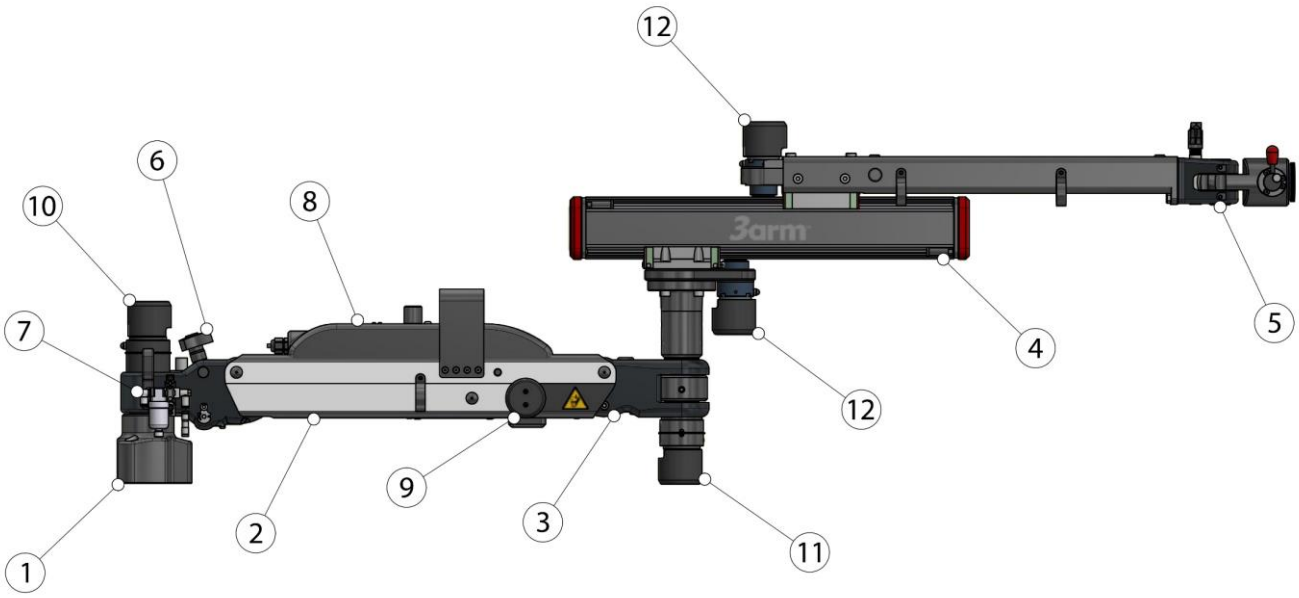
- Apprentices/students: may only work on the equipment supervised at all times by a person responsible for the facility.

- Public (non-workers): visitors or passers-by must maintain a minimum safety distance of two metres from the edges of the perimeter of the equipment.

4 GENERAL DESCRIPTION AND TECHNICAL INFORMATION

The equipment consists of a pendular parallelogram balanced by a gas spring, and a telescopic arm. The assembly of both secures the clamping head and keeps it in a perpendicular position to the work area. In addition, it is possible to incorporate locks (manual or pneumatic) that lock the rotation on the shaft of the base and cross, the tilting motion of the arm and the extension of the arm.

4.1 MAIN PARTS



1.- Base
2.- Swing arm
3.- Cross
4.- Telescopic arm
5.- Head
6.- Adjustment assembly
7.- Air filter and connection
8.- Control cover
9.- Swing arm lock
10.- Base radial lock
11.- Cross radial lock
12.- Telescopic lock

INFORMATION

The equipment in the image is a BP + RA + SC + R6 + L92 arm

4.2 CONFIGURATIONS

4.2.1 CONFIGURATION TABLE

BP	+		+		+		+	

Base:

BP	Low base

Arm:

SA	Inverted bench-top 500 mm *(19.7")*
SB	Inverted ceiling 500 mm *(19.7")*
RA	Bench-top 500 mm *(19.7")*
RB	Ceiling 500 mm *(19.7")*

Telescope:

SC	Telescopic arm, stroke: 800 mm *(31.5")*
SM	Telescopic arm, stroke: 1200 mm *(47.2")*

Locking:

No lock	L00
Manual lock	L11
Base lock	L50
Pneumatic lock	L22
Pneumatic lock	L92

Head:

A6	Vertical head	M6	Pressure support head
B6	Flat vertical head	N6	Multi-position head
BA6	Flat vertical head + ring	P6	Double flat articulated head
C6	Adjustable vertical head	Q6	Reinforced multi-position head
D6	Articulated head	QA6	Safety reinforced multi-position head
E6	Flat articulated head	R6	Revolving head
EA6	Flat articulated head + ring	RS6	Automatic double revolving head
EB6	Reinforced flat articulated head	RA6	Swivel revolving head
EC6	Reinforced flat articulated head + ring	RAS6	Automatic tilting single revolving head
F6	Adjustable articulated head	RB6	Swivel revolving head
G6	Multi-turn head with quick change	RBS6	Automatic tilting single revolving head
GH6	Multi-turn head with quick change and reinforced handles	RC6	Vertical/horizontal revolving head
H6	Reinforced multi-turn head with quick change	SR6	Revolving giraffe head
I6	Flat electromagnet head	SN6	Multi-position giraffe head
IR6	Reinforced flat electromagnet head	SQ6	Reinforced multi-position giraffe head
J6	Adjustable electromagnet head	SQA6	Automatic reinforced multi-position giraffe head
JR6	Reinforced adjustable electromagnet head	T6	Multi-position head
K6	Belt head	U6	Reinforced multi-position head
L6	Vertical adjustable ball joint head	UA6	Safety reinforced multi-position head
LA6	Automatic vertical adjustable ball joint head	Z6	Fork head
LB6	Horizontal adjustable ball joint head	ZA6	Reinforced fork head
LC6	Automatic horizontal adjustable ball joint head		

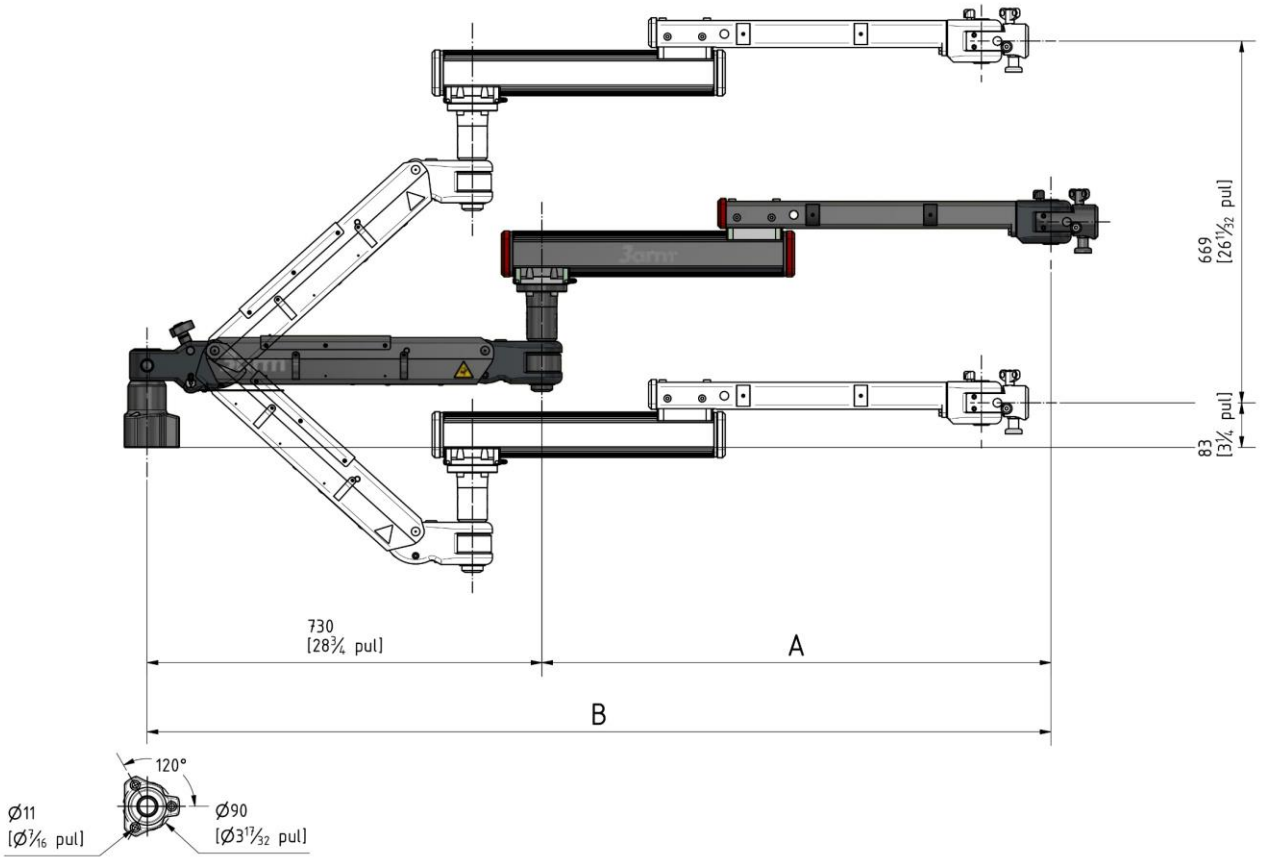
NOTE: See dimensions of the heads and functional applications in the ***Appendix of S6 heads.***
NOTE: For dangerous environments consider the HARD version with stainless steel handles.
NOTE: The telescopic arm with stroke 1200 mm (47.2") can be used with heads G6, N6 and T6 only.

4.2.2 ORDER EXAMPLE

Order example: BP+RA+SC+R6+L92

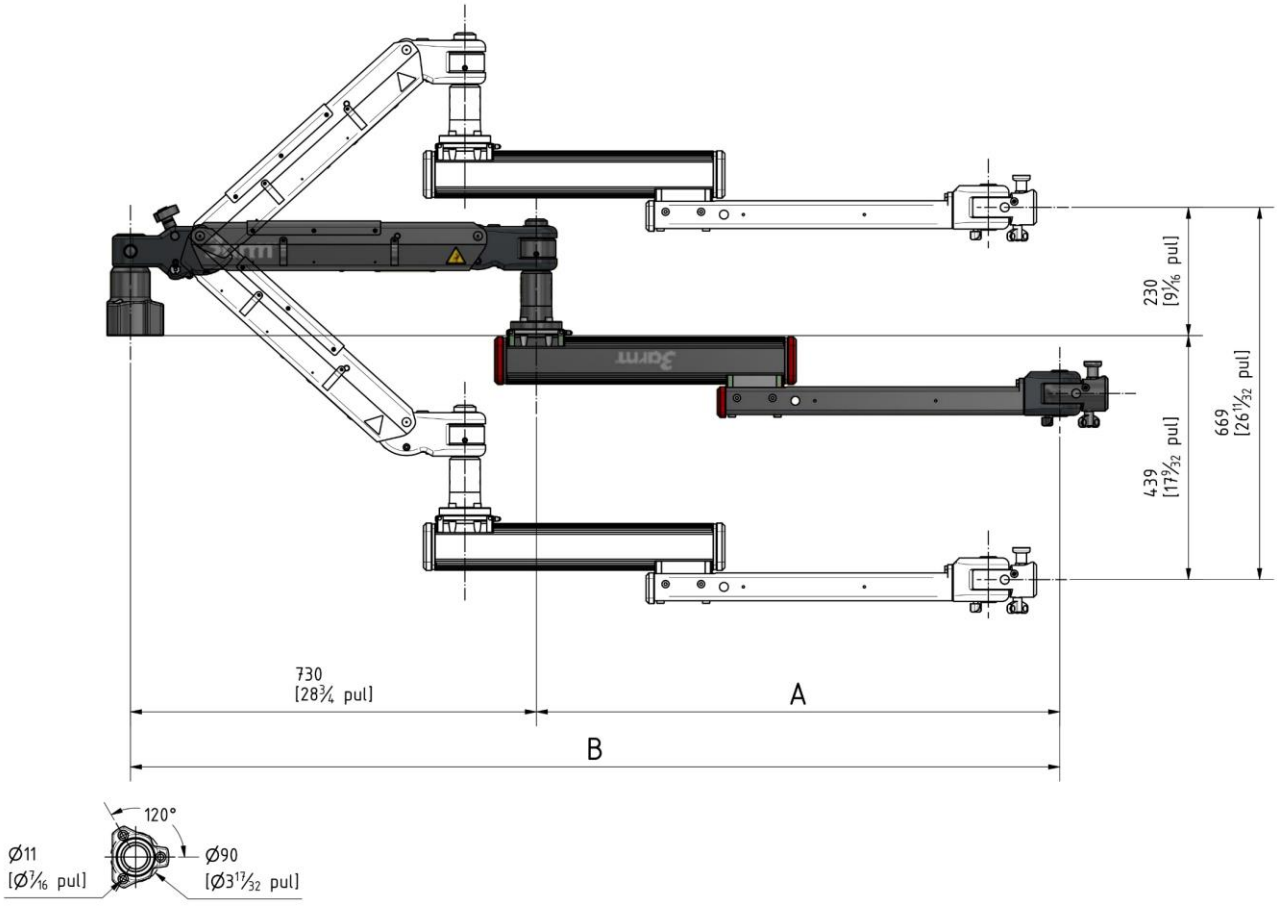
BP	+	RA	+	SC	+	R6	+	L92

4.3 DIMENSIONS



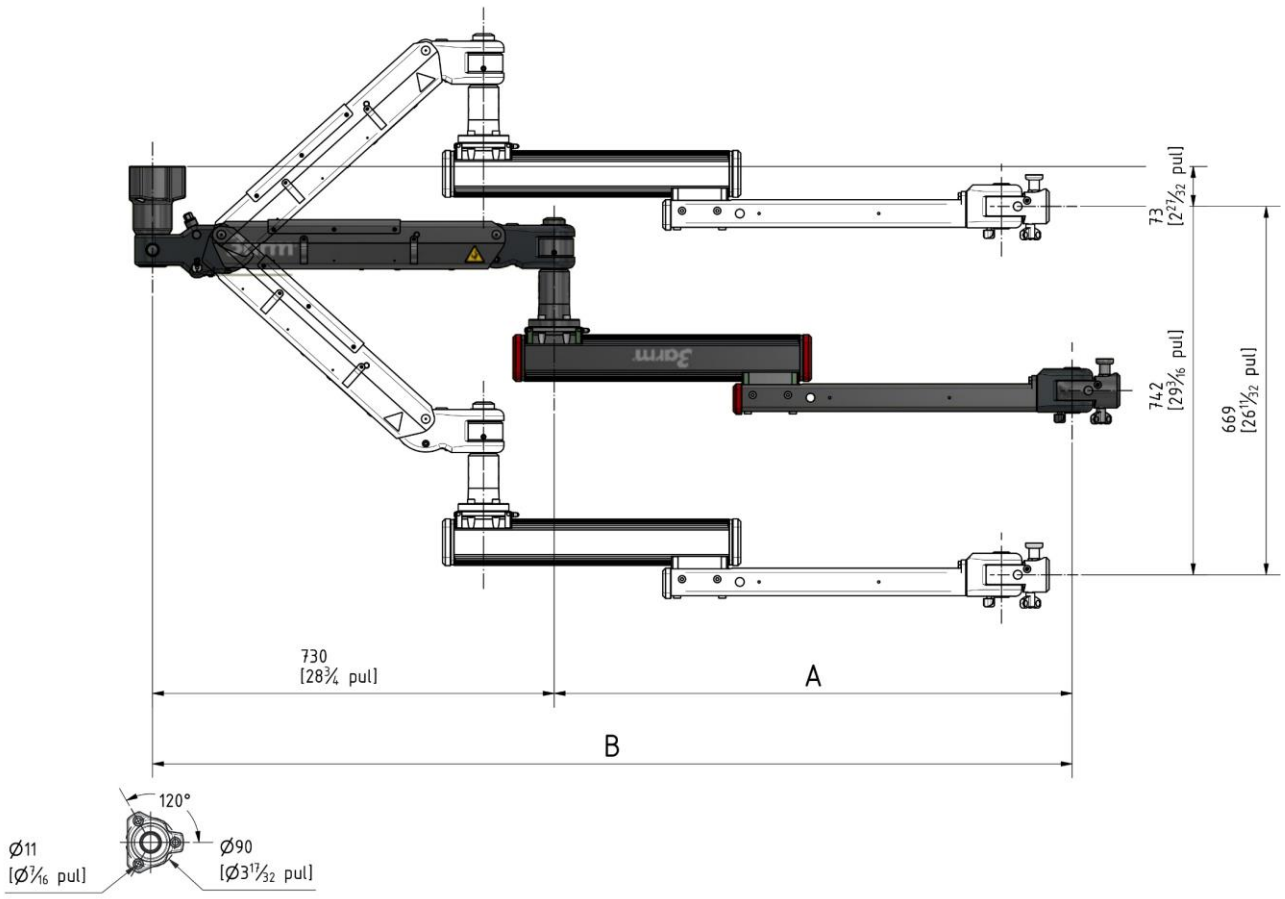
3arm© Series 6 bench-top

CONFIGURATION		DIMENSIONS	
Arm	Telescopic	*A (mm/inches)*	*B (mm/inches)*
RA	SC	937 / *36.9″*	1658 / *65.3″*
	SM	1288 / *50.7″*	2018 / *79.5″*



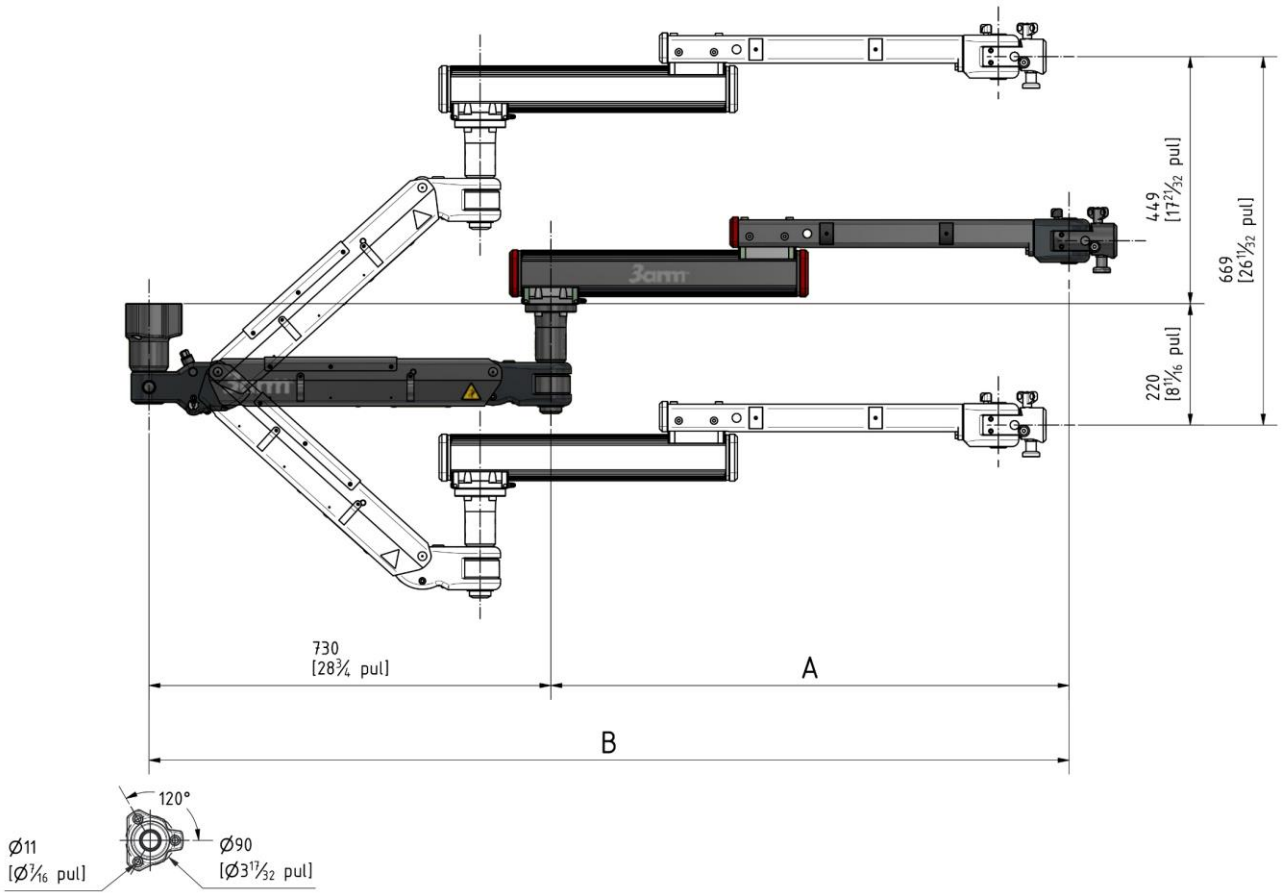
3arm© Series 6 inverted bench-top

CONFIGURATION		DIMENSIONS	
Arm	Telescopic	*A (mm/inches)*	*B (mm/inches)*
SA	SC	937 / *36.9″*	1658 / *65.3″*
	SM	1288 / *50.7″*	2018 / *79.5″*



3arm© Series 6 Ceiling

CONFIGURATION		DIMENSIONS	
Arm	Telescopic	*A (mm/inches)*	*B (mm/inches)*
RB	SC	937 / *36.9″*	1658 / *65.3″*
	SM	1288 / *50.7″*	2018 / *79.5″*

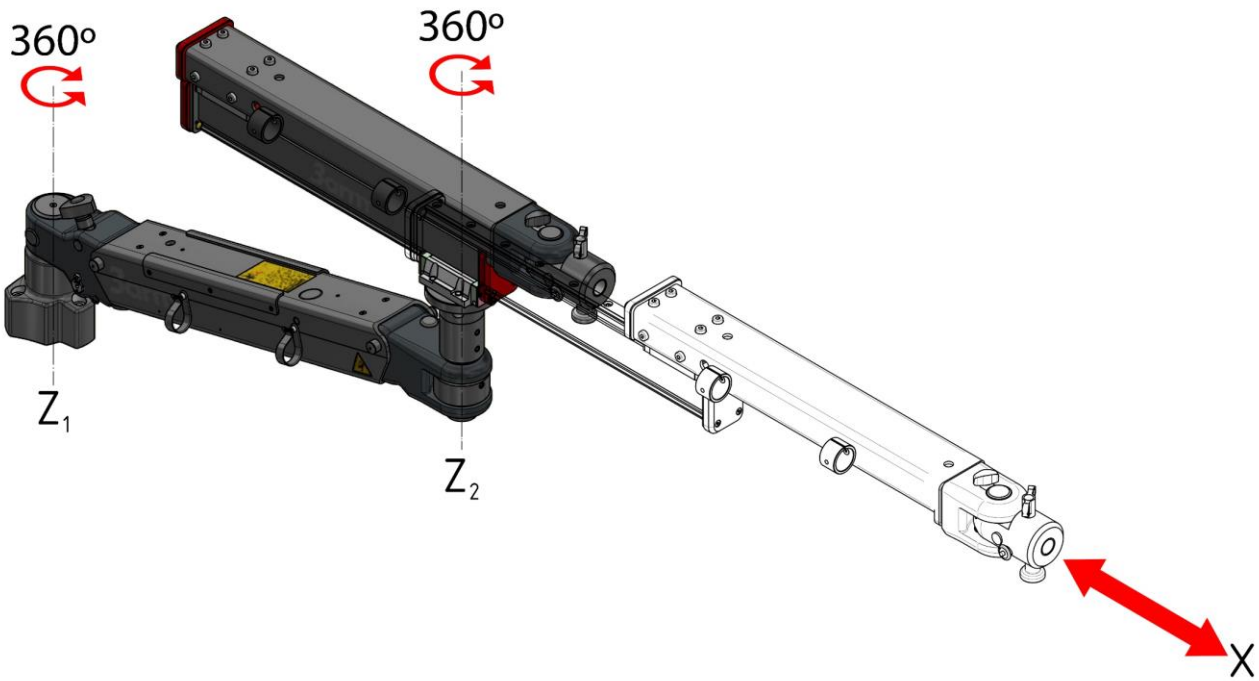


3arm© Series 6 Inverted ceiling

CONFIGURATION		DIMENSIONS	
Arm	Telescopic	*A (mm/inches)*	*B (mm/inches)*
SB	SC	937 / *36.9″*	1658 / *65.3″*
	SM	1288 / *50.7″*	2018 / *79.5″*

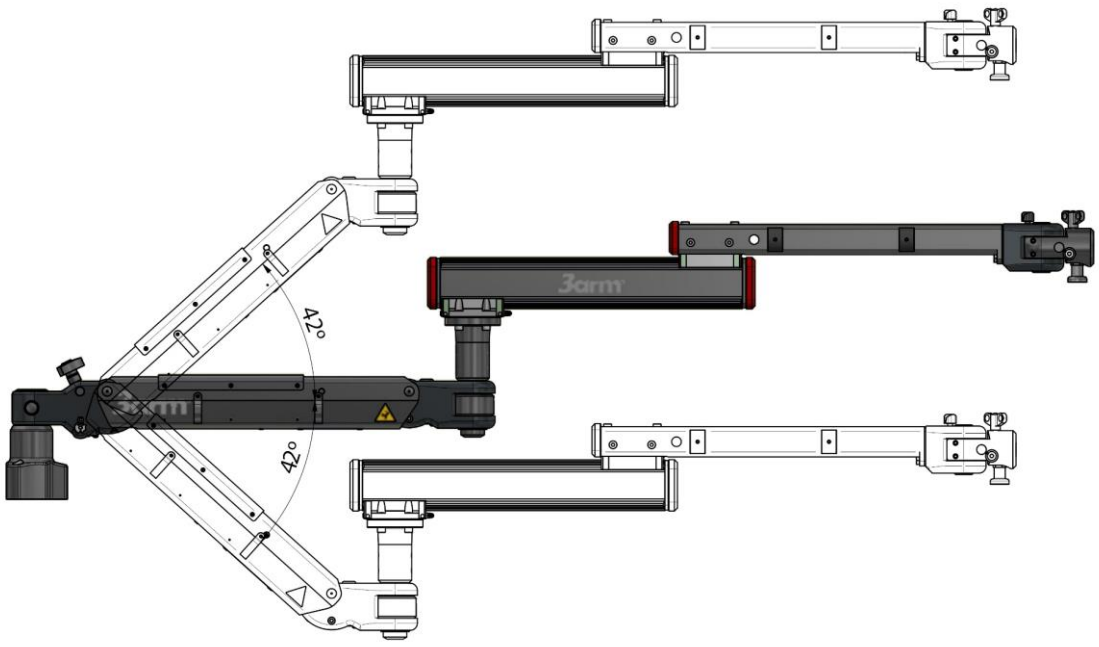
4.4 MOVEMENTS

4.4.1 MOVEMENTS OF ROTATION AND EXTENSION



- Base rotation movement: 360º (Axis Z_1)
- Cross rotation movement: 360º (Axis Z_2)
- Extension movement (X Axis): * SC Arm: 937 mm *(36.9")*
  * SM Arm: 1288 mm *(50.7")*

4.4.2 ASCENDING AND DESCENDING MOVEMENTS



The tilting movement on the plane ZX goes from -42º to +42º, obtaining a complete vertical stroke of 669 mm (*26.4"*).

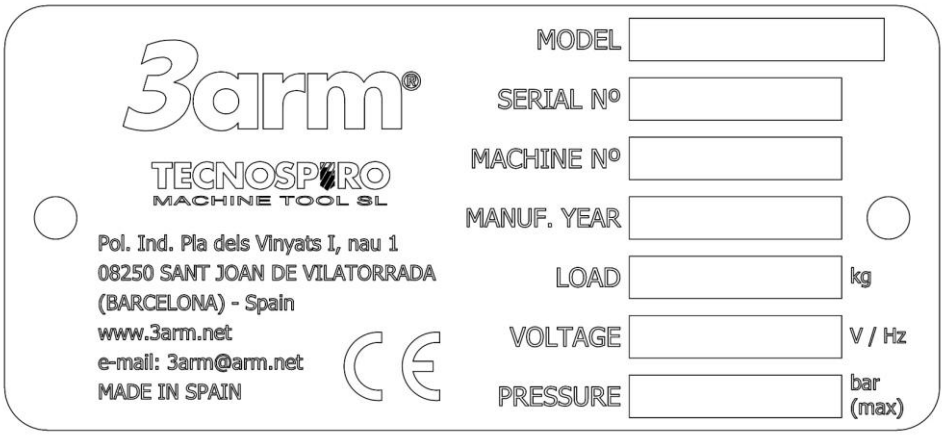
4.5 TECHNICAL SPECIFICATIONS

GENERAL TECHNICAL SPECIFICATIONS		
Load capacity[1]		
(Gross load: Tool + head)	Gross load range (SC)	0-18 kg *(40 lbs)*
	Gross load range (SM)	0-10 kg *(22 lbs)*
Reaction torque[2]		
Maximum torque	Vertical work Max.	300 Nm *(221 ft lb)*
	Horizontal work Max.	250 Nm *(184 ft lb)*
	Work at any angle Max.	200 Nm *(148 ft lb)*
Other		
	Resistance to manipulation	0.5 kg *(1.34 lb)*
Pneumatic specifications[3]		
	Power fluid	Pressurised air
	Max. power pressure	0.8 MPa *(8 bar)*
	Max. working pressure	0.7 MPa *(7 bar)*
Operating conditions		
	Temperature	-10ºC to + 50ºC
	Relative humidity	Max. 70%
	Environment	Industrial environments

4.6 IDENTIFICATION

A metal plate riveted to the support structure identifies your arm and indicates the following specifications.

CE marking, manufacturer (name, address and business name), date of manufacture, serial number, model, name, maximum working load, maximum working pressure (for versions with pneumatic lock L22 and L92) and voltage (for versions with pneumatic lock L92).



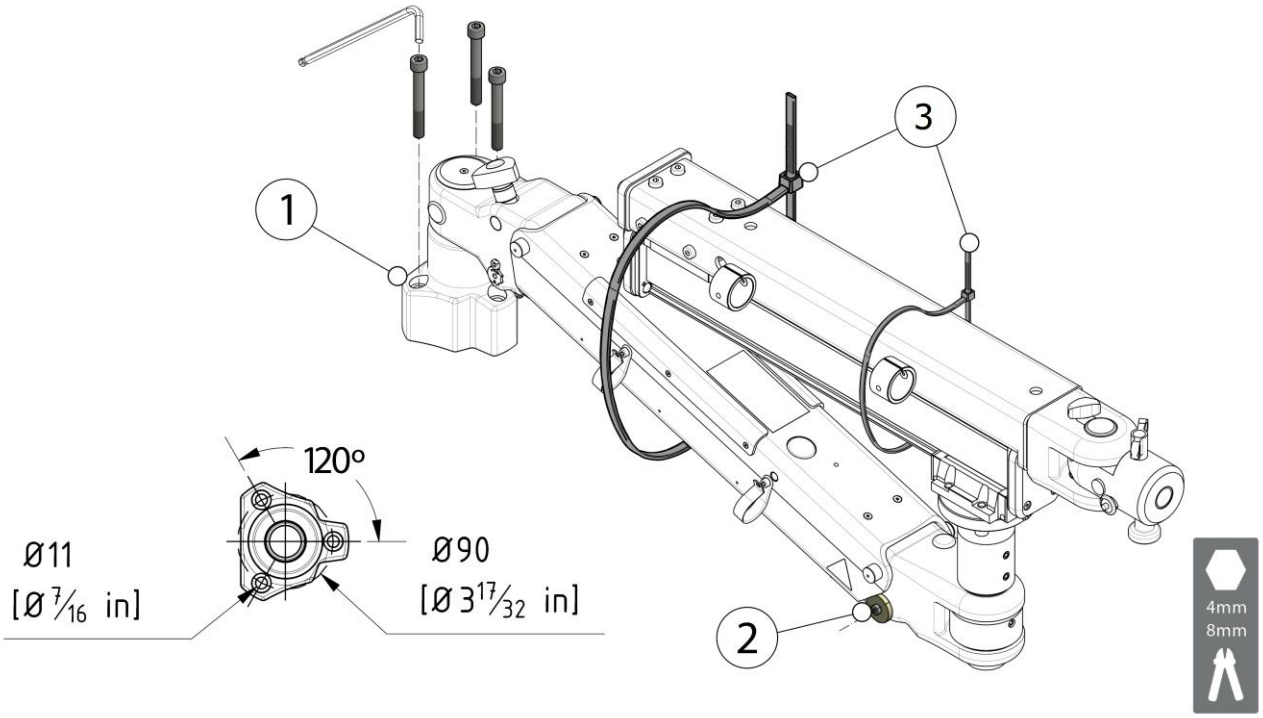
[1]The load shown corresponds to the upper limit for a Series 6 arm. This arm may have a lower maximum load. Consult the maximum load of your arm on the identification plate riveted to the structure of the arm.
[2] The data shown corresponds to the maximum torque that the arm can absorb. These values may be reduced depending on the head used.
[3] For versions with pneumatic locks.

5 INSTALLATION

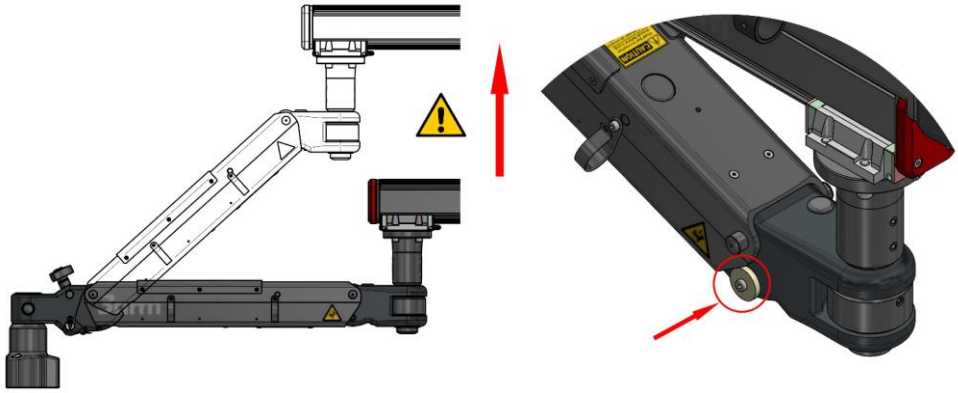
INSTALLATION

- ✓ The work bench or installation location must be a horizontal surface, thus avoiding shifts and deviations.
- ✓ When using the 3arm® fastening flange the maximum weight is 10 kg.
- ✓ **CAUTION!** Do not remove the washer before you have finished installing the tool. Otherwise the arm could start a sharp upward movement that could cause harm.

1. **Fasten the base of the arm (1) to the work bench with the three M10 screws supplied** or with the fastening flange (3arm® accessory).
2. **Fasten the tool to the head**. (Consult details in the ***Appendix of S6 heads***).

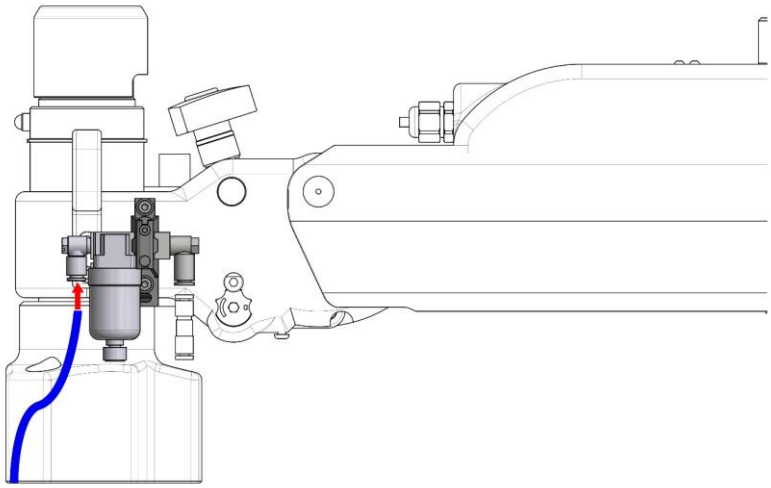


3. **Remove the screw and nylon washer (2)** that stops the tilting arm being in a raised position. Take care as the arm could start a sharp upward movement.
4. **Cut the plastic ties (3)** that keep the arm parallel.



5. Air connection (for versions with pneumatic locks L22 or L92 only).

Requires suitable piping tube for use with compressed air. ($Ø_{exterior}$= 6 mm and maximum supply pressure 0.8 MPa/ 8 bar).



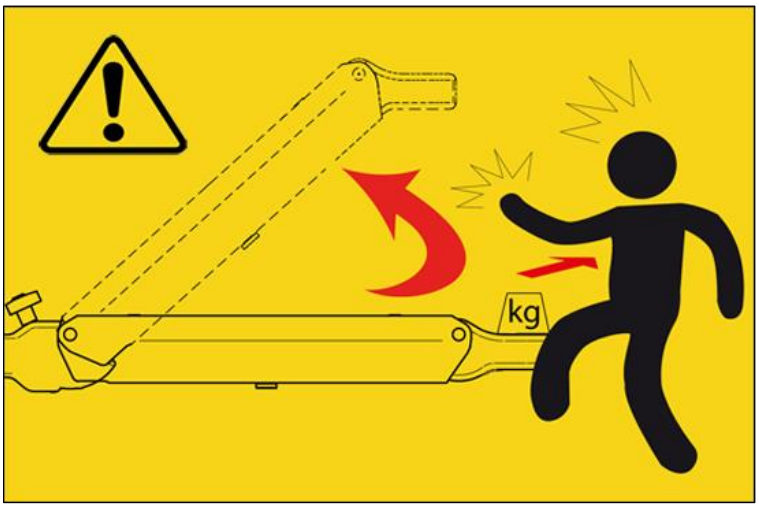
6. Wiring connection (for versions L92 only). To connect your 3arm® arm to the controller of your tool *[See ELECTROPNEUMATIC SYSTEM p. 33].*

5.1 INSTALLING AND CHANGING TOOLS

Before any type of adjustment or maintenance task, the staff and/or operators responsible for these tasks must bear in mind that the 3arm© arm is configured to work with a certain range of loads.

SUDDEN SHARP UPWARD MOVEMENT

If for any manipulation, adjustment or maintenance task, or for any other reason, the load is released from the arm (for example, when changing the tool), **the arm may suddenly ascend sharply and could cause harm.**



Follow these guidelines to minimise the risks and/or possible damage:

In tool replacement tasks
Take the tilting arm to its highest position and secure it in that position at all times. If necessary, have two operators to carry out this task with total safety.

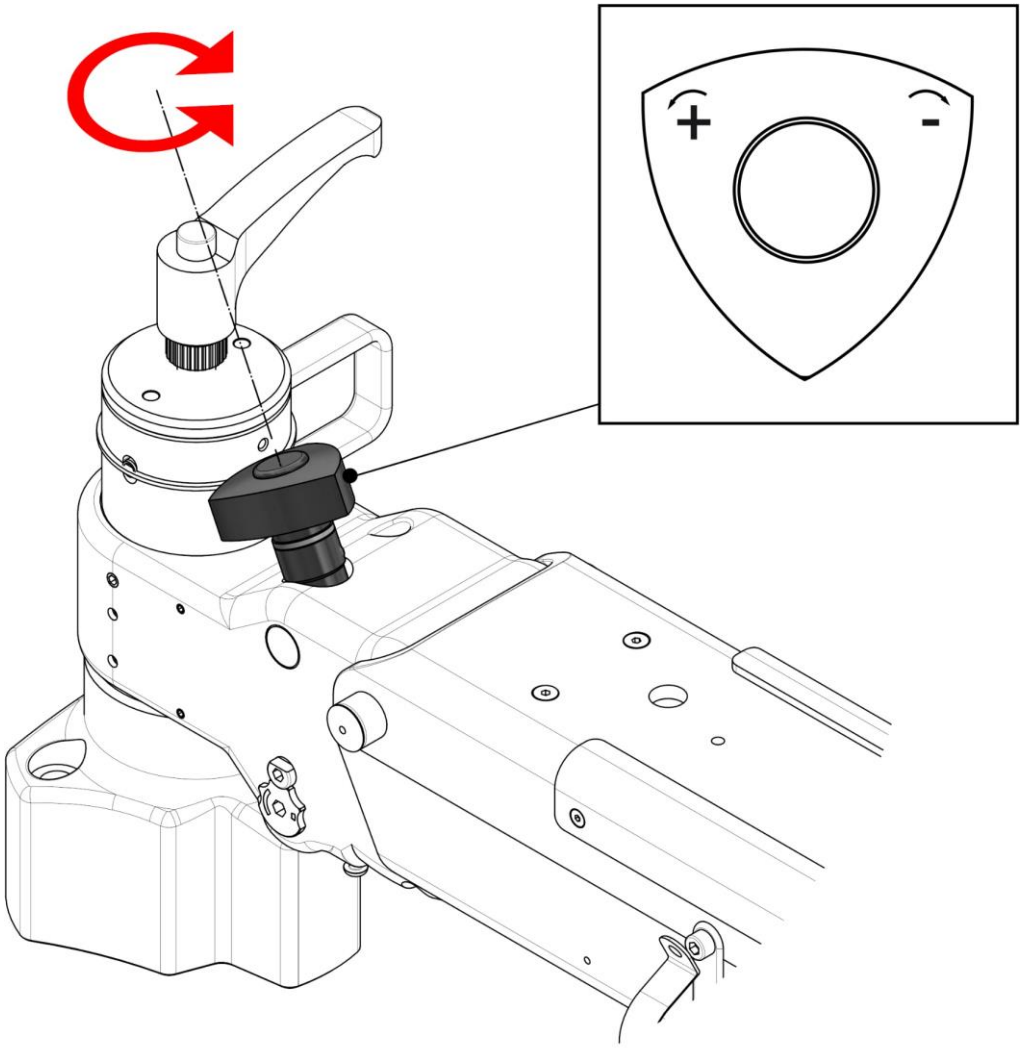
6 ADJUSTMENTS

6.1 BALANCING THE ARM

Regulate the tension of internal shock absorber if the arm drops or has a lot of upward force.

1- Maintain the tilting arm in an approximately horizontal position to facilitate the task.
2- Using the flywheel installed for this purpose, in the upper part of the cross, rotate it as necessary.

- **Anticlockwise:** Gives the shock absorber more tension.
- **Clockwise**: Reduces the tension in the shock absorber.



6.2 BALANCED, CENTRED POSITION

-Balanced arm position: It tends to stay in the position in which it was left free.
-Centred arm position: It tends to remain horizontal once left free.

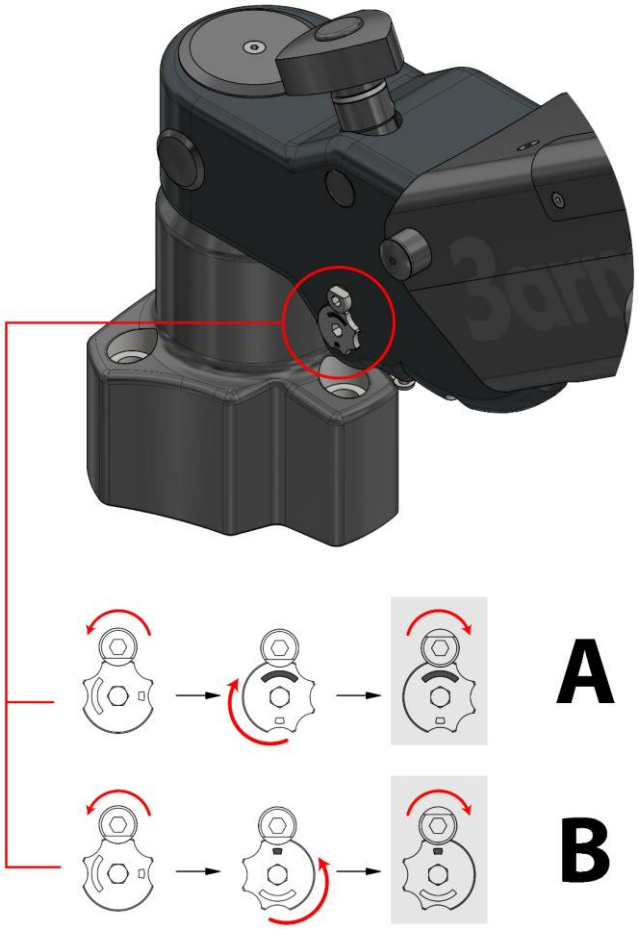
It is possible to adjust the arm to achieve balanced or centred adjustment.

A - BALANCED (see image below)

1- Turn the Allen screw *(4 mm Allen key)* until the flat part of the screw head is in contact with the eccentric.
2- Position the eccentric so the **line** marking is just under the screw *(5 mm Allen key).*
3- Turn the screw back to the original position (safety lock).

B - CENTRED (see image below)

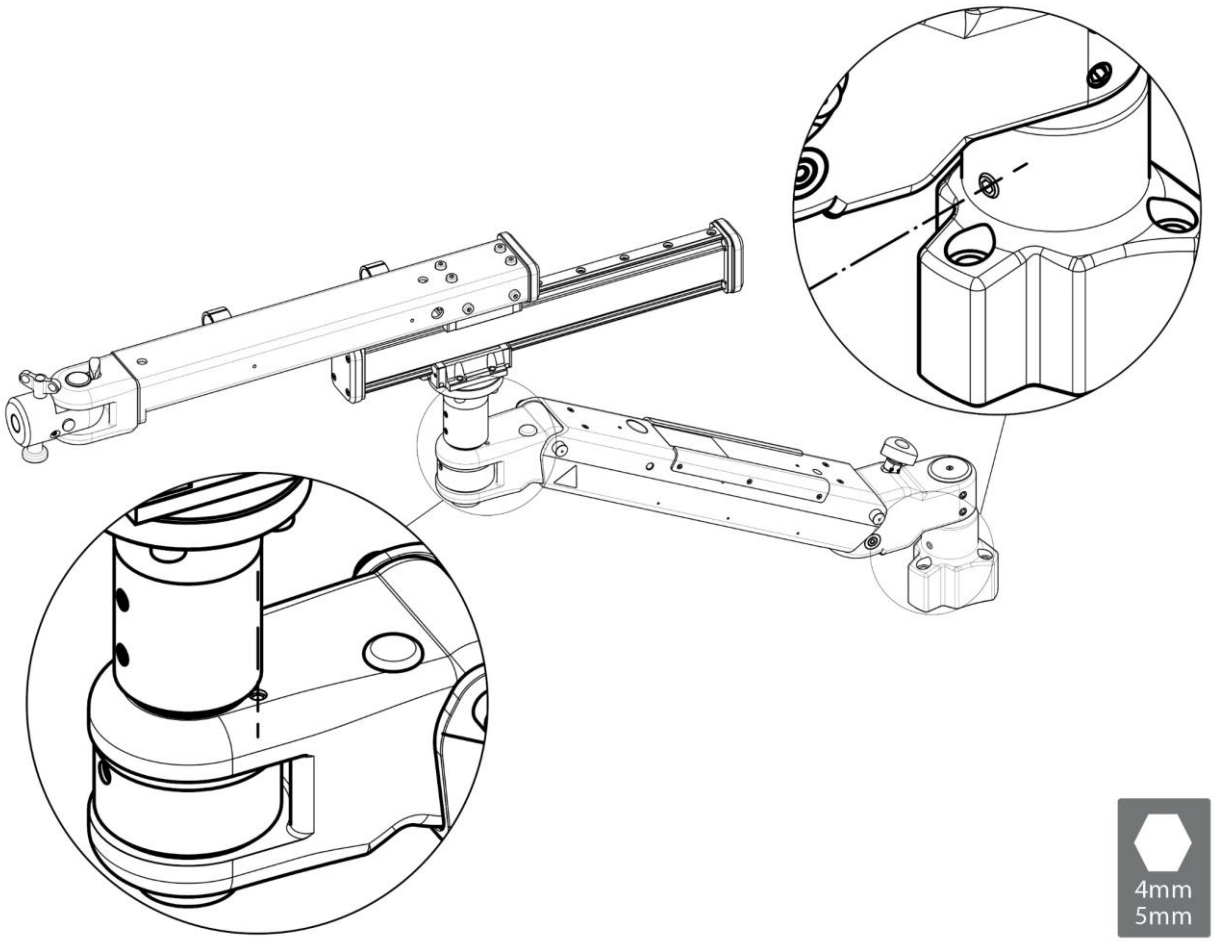
1- Turn the Allen screw *(4 mm Allen key)* until the flat part of the screw head is in contact with the eccentric.
2- Position the eccentric so the **dot** marking is just under the screw *(5 mm Allen key).*
3- Turn the screw back to the original position (safety lock).



6.3 REGULATION OF THE RESISTANCE TO ROTATION.

The studs in the Base – arm and arm - cross enable you to adjust the rotational resistance of the different axes of movement of the arm. The studs can be tightened or loosened with a Nylon tip to regulate this turning resistance (4 and 5 mm Allen keys).

Regulating the turning resistance is especially useful in situations where the base of the arm is not completely horizontal.

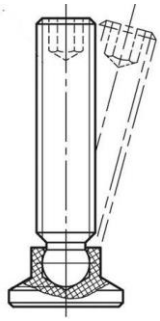


SHIFTING AND DEVIATIONS

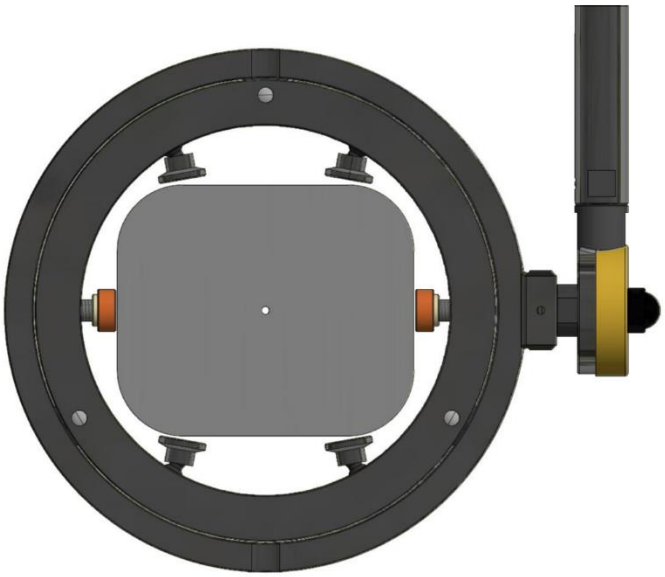
Correctly adjusting the regulation of the turning resistance prevents the risk of shifting and deviations during the operation of the arm.

6.4 HOW TO SECURE TOOLS WITH A SQUARE SECTION

To secure the tool correctly, Tecnospiro recommends using ball-tip headless Allen studs for thrust pads. This component allows you to adjust the tool from all sides, adapting the pads to the surface of the tool.



Example of securing a square tool:

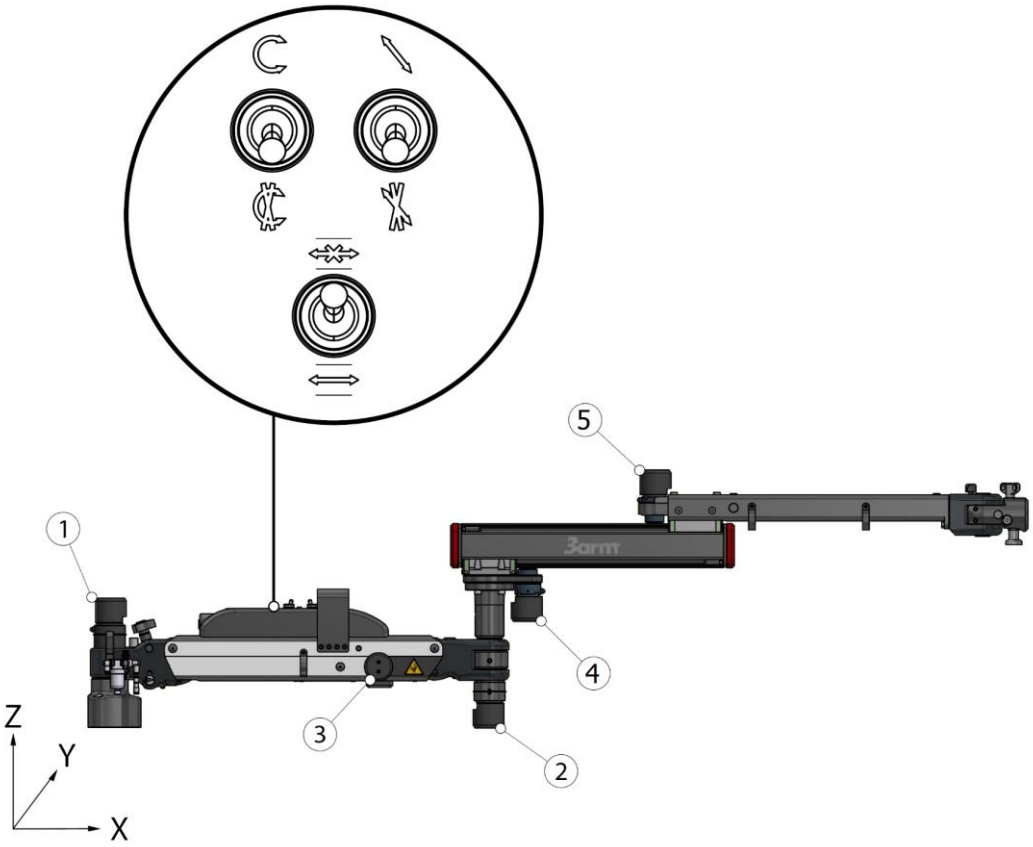


Check that the assembly for securing square tools is in the machine packaging.

7 OPERATION

7.1 PNEUMATIC LOCK "L22"

The "L22" configuration allows you to pneumatically lock different arm movements using switches.

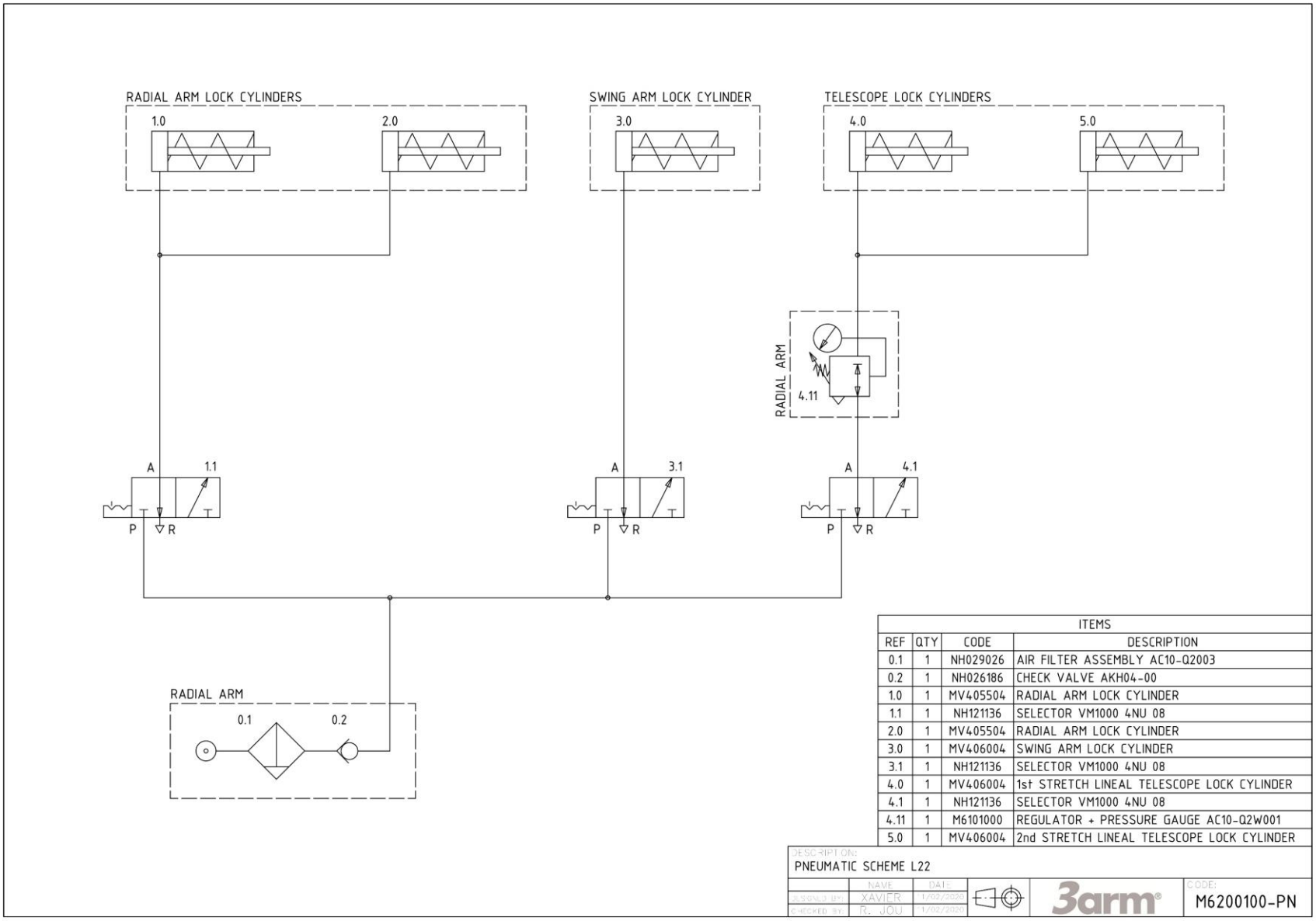


1- Base radial lock
2- Cross radial lock
3- Swing Arm lock
4- Telescopic arm 1st section lock
5- Telescopic arm 2nd section lock

Position of the switches to obtain one lock or another.

Movements	Switches	Cylinder control
Radial movement (X-Y plane)		1, 2
Swing movement (Z-X plane)		3
Linear movement (X axis)		4, 5

7.1.1 "L22" pneumatic diagram



ITEMS			
REF	QTY	CODE	DESCRIPTION
0.1	1	NH029026	AIR FILTER ASSEMBLY AC10-Q2003
0.2	1	NH026186	CHECK VALVE AKH04-00
1.0	1	MV405504	RADIAL ARM LOCK CYLINDER
1.1	1	NH121136	SELECTOR VM1000 4NU 08
2.0	1	MV405504	RADIAL ARM LOCK CYLINDER
3.0	1	MV406004	SWING ARM LOCK CYLINDER
3.1	1	NH121136	SELECTOR VM1000 4NU 08
4.0	1	MV406004	1st STRETCH LINEAL TELESCOPE LOCK CYLINDER
4.1	1	NH121136	SELECTOR VM1000 4NU 08
4.11	1	M6101000	REGULATOR + PRESSURE GAUGE AC10-Q2W001
5.0	1	MV406004	2nd STRETCH LINEAL TELESCOPE LOCK CYLINDER

DESCRIPTION: PNEUMATIC SCHEME L22

	NAME	DATE
DESIGNED BY	XAVIER	1/02/2020
CHECKED BY	R. JOU	1/02/2020

3arm®

CODE: M6200100-PN

7.2 "L92" PNEUMATIC LOCK

"L92" PNEUMATIC LOCK

- Failing to use telescopic compensators could cause malfunction or premature wear of the pneumatic locking system.

- To configure "L92" it is advisable to use telescopic compensators
[See "L92" PNEUMATIC LOCK: USE WITH COMPENSATORS p. 30]

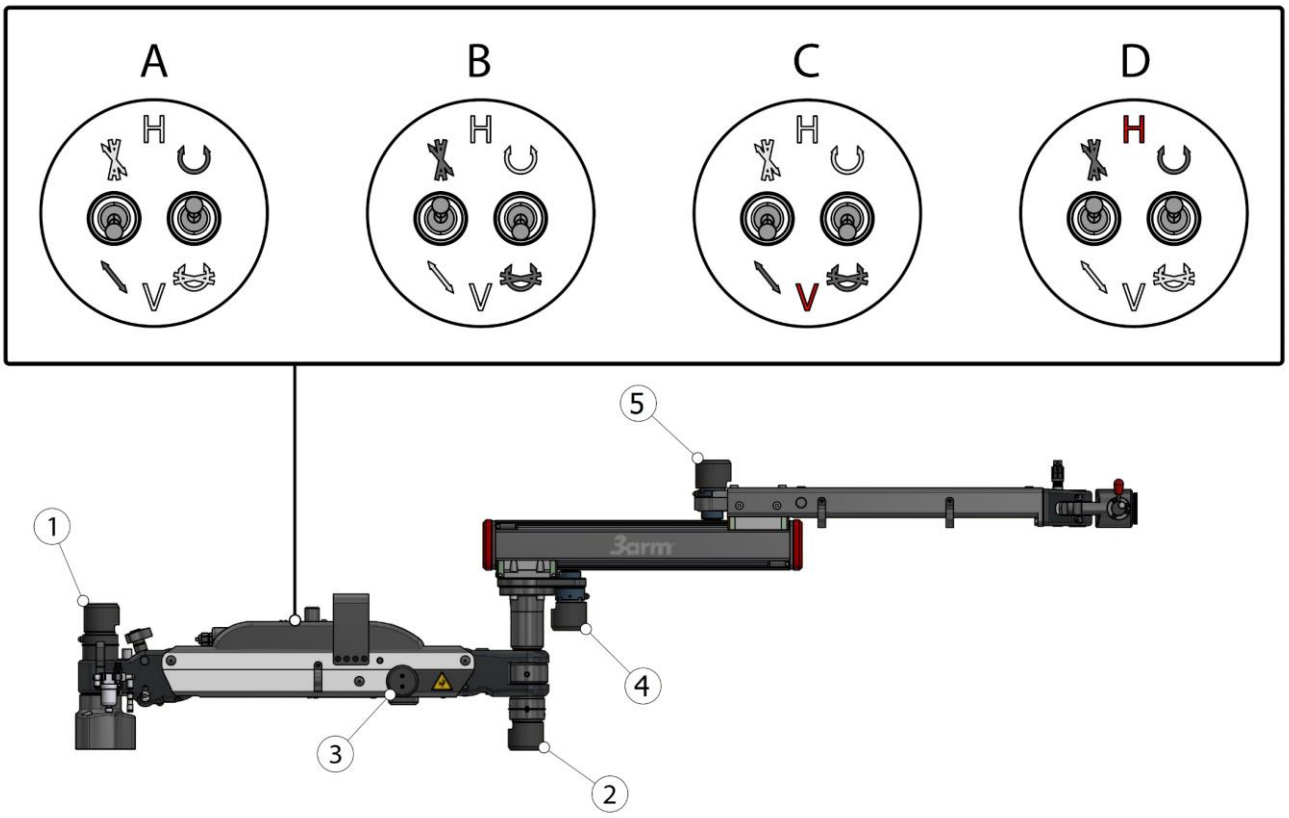
- If you decide to work without compensators, carefully read the following chapter their operation
[See "L92" PNEUMATIC LOCK: USE WITHOUT COMPENSATORS p. 28]

INFORMATION

If the supply pressure drops below 4.5 bar the tool will not be activated.

7.2.1 "L92" PNEUMATIC LOCK: USE WITHOUT COMPENSATORS

The configuration "L92" allows different arm movements to be locked **through the activation of the tool or, failing that, the electrovalve.**

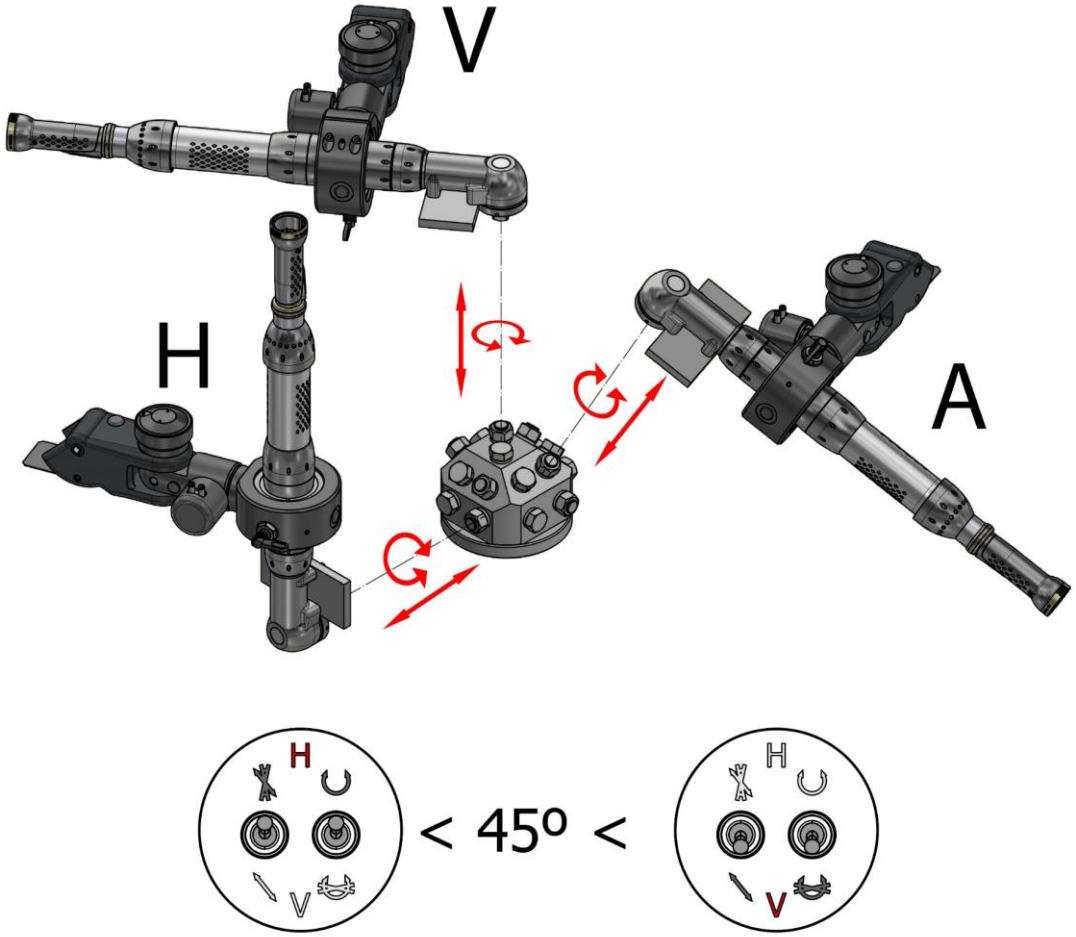


1- Base radial lock
2- Cross radial lock
3- Arm tilting lock
4- Telescopic arm lock
5- Telescopic arm lock

Below, the movements that are locked and unlocked depending on the ***position of the switch when the tool is operated***. (The switches are on the cover of the arm).

Movements	***Position switches***	***Cylinders locked***
All the movements are free (except cross radial)	A	2, 4, 5
All the movements are locked	B	1, 2, 3, 4, 5
Vertical work. V The movements are locked, except tilting.	C	1, 2, 4, 5
Horizontal work. H The movements are locked, except the radial of the base	D	2, 3, 4, 5

Depending on the Vertical (V) or Horizontal (H) work that is going to be carried out, you must position the switch as shown in the image.



If working in A (angle), the switches must be positioned at V (vertical) if a more vertical than horizontal position prevails, or otherwise H (horizontal).

In other words, taking 0º as a reference, the surface where the base of arm has been installed:

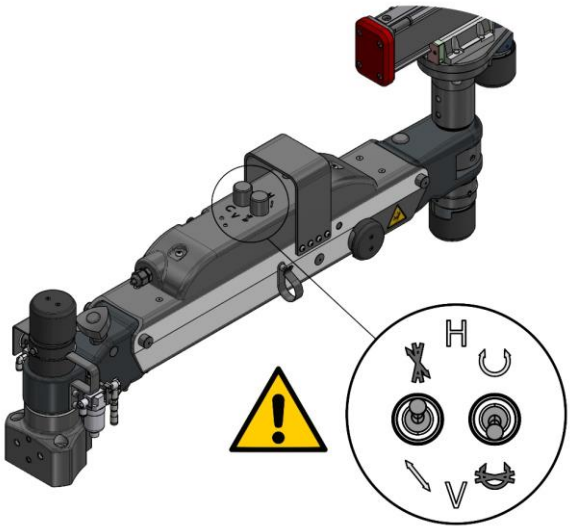
- ≤ 45º → H
- ≥ 45º → V

7.2.2 "L92" PNEUMATIC LOCK: USE WITH COMPENSATORS

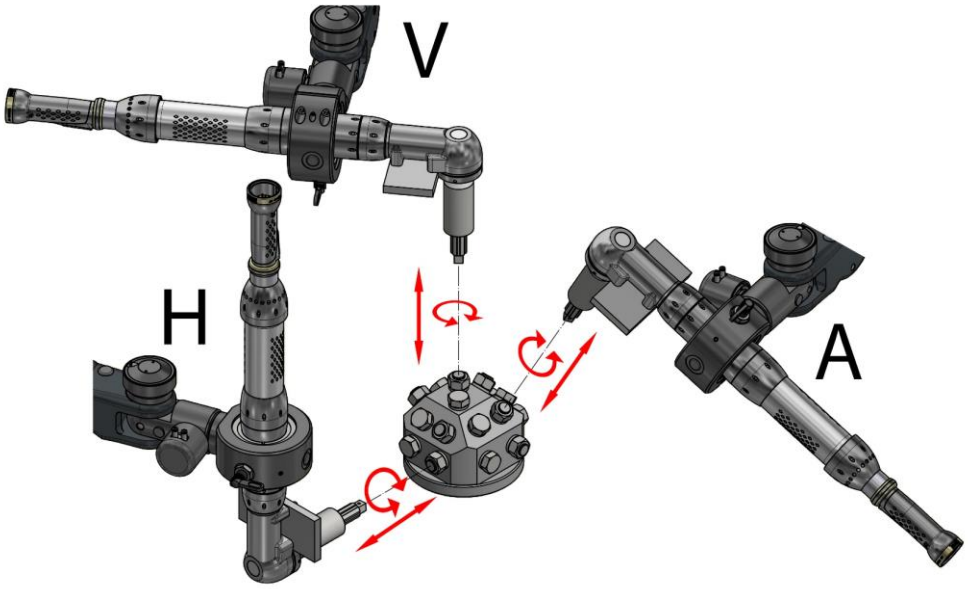
The use of telescopic compensators allows screw-mounting or tightening in any position (V-Vertical, H-Horizontal, A-Angle) with the arm completely blocked.

For the use of compensators in your 3arm arm, follow these instructions.

1. Remove the guards and verify that the switches are in the locked position. Put them back immediately.



2. Installer the compensator that have acquired with the tool according to the needs of torque and size of the panel *(Consult your distributor regarding the characteristics of the compensators).*
3. Connect the tool along with your control device following the manufacturer's recommendations *[See ELECTROPNEUMATIC SYSTEM p. 33].*
4. Compress the regulator into its position (V-Vertical, H-Horizontal or A- Angle) as necessary and actuate the tool.

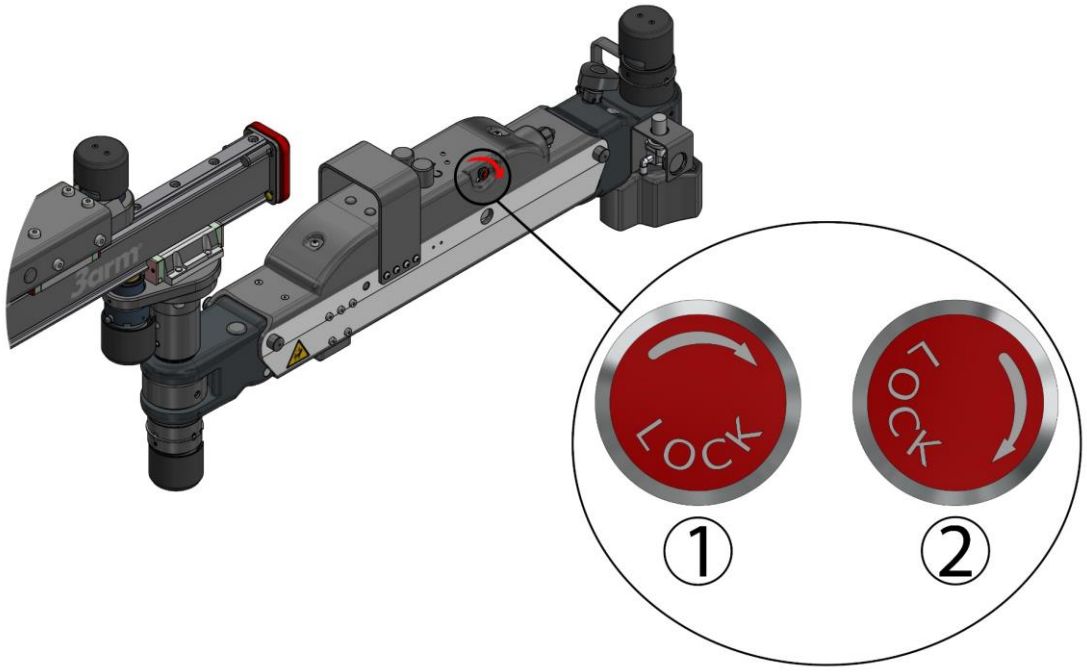


7.2.3 L92 PNEUMATIC LOCK: MANUAL ACTIVATION

When the wheel on the cover is operated (Versions L92), **the arm's pneumatic lock is activated.**

The wheel has to move from position 1 to 2.
To do this, apply a slight rotation, with your hand, as indicated in the diagram.

1- Wheel extended, arm free.
2- Wheel retracted, lock activated *[See "L92" PNEUMATIC LOCK p. 27]*

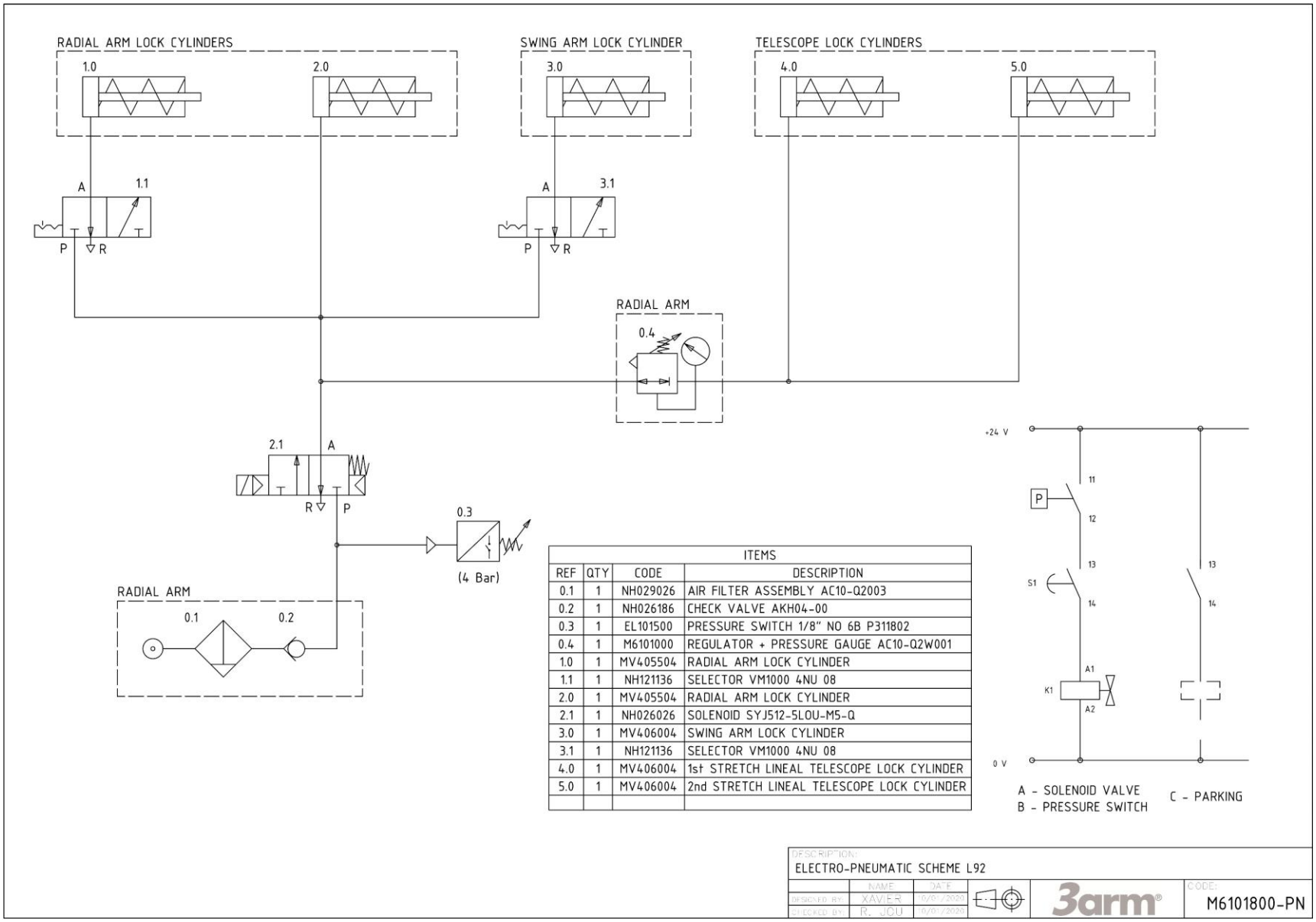


To disable the lock, proceed in reverse order (from 2 to 1), rotating it the opposite direction.

- Keep it in position 2 during maintenance tasks, periods when not in use, and when changing the tool and/or head.

-Manual actuation, together with the switches, enables you to lock the arm without the tool connected.

7.2.4 PNEUMATIC DIAGRAM "L92"



ITEMS			
REF	QTY	CODE	DESCRIPTION
0.1	1	NH029026	AIR FILTER ASSEMBLY AC10-Q2003
0.2	1	NH026186	CHECK VALVE AKH04-00
0.3	1	EL101500	PRESSURE SWITCH 1/8" NO 6B P311802
0.4	1	M6101000	REGULATOR + PRESSURE GAUGE AC10-Q2W001
1.0	1	MV405504	RADIAL ARM LOCK CYLINDER
1.1	1	NH121136	SELECTOR VM1000 4NU 08
2.0	1	MV405504	RADIAL ARM LOCK CYLINDER
2.1	1	NH026026	SOLENOID SYJ512-5LOU-M5-Q
3.0	1	MV406004	SWING ARM LOCK CYLINDER
3.1	1	NH121136	SELECTOR VM1000 4NU 08
4.0	1	MV406004	1st STRETCH LINEAL TELESCOPE LOCK CYLINDER
5.0	1	MV406004	2nd STRETCH LINEAL TELESCOPE LOCK CYLINDER

DESCRIPTION: ELECTRO-PNEUMATIC SCHEME L92

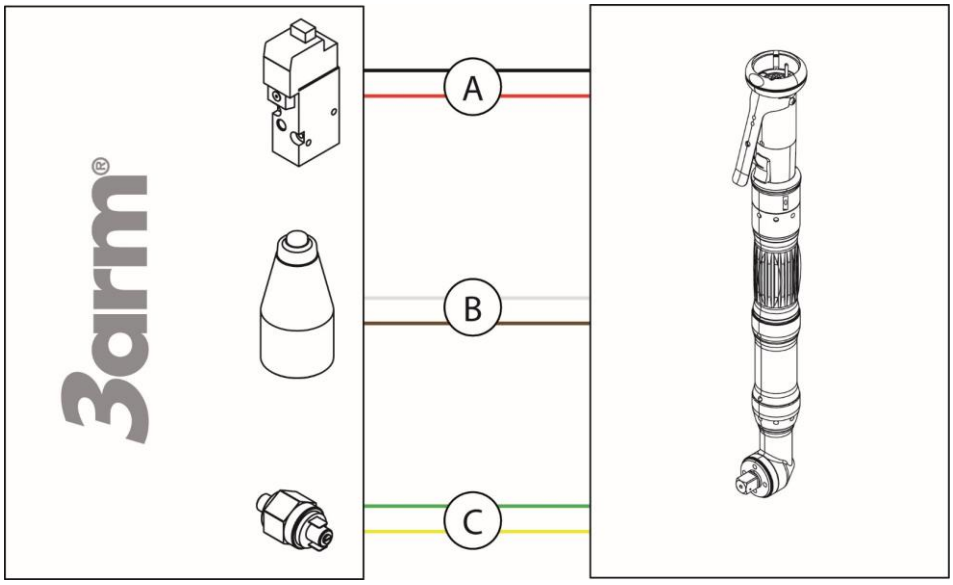
	NAME	DATE
DESIGNED BY:	XAVIER	0/0/2020
CHECKED BY:	R. JOU	00/0/2020

3arm®

CODE: M6101800-PN

7.2.5 ELECTROPNEUMATIC SYSTEM

This system links the 3arm® L92 arm with the tool using a suitable controller or control device (DC) following the diagram below.



The left of the diagram represents the 3arm® arm while the right shows the tool that will be used, controlled by the control device (DC).

The connecting cable that you will find with the 3arm® arm are identified with the following correlation.

a) Electrovalve. Cables labelled A (red and black cables)
The electrovalve is responsible for operating the arm locks when the tool is functioning.

b) Parking. Cables labelled B (white and brown cables)
Provides a potential free signal when the arm is retracted. This signal can be used to enable other components such as a light, activate other processes, etc.

c) Pressure switch. Cables labelled C (green and yellow cables)
This component disables the tool when there is insufficient supply pressure (below 4.5 bar).

Consult further details on the connections between the control device (DC) and the distributor of the tool.

8 MAINTENANCE

The arm does not require maintenance and, when used properly, anomalies are unlikely to occur. Even so, the main, simple repairs that you can do are set out.

8.1 COMPRESSED AIR MAINTENANCE UNIT

For good functioning of the compressed air unit, an air quality level of class 1.4.1 is recommended, according to the table attached. ISO8573-1 2010

ISO8573-1:2010 CLASE	Partículas sólidas				Agua		Aceite
	Número máximo de partículas por m^3			Concentración másica mg/m^3	Punto de rocío a presión de vapor	Líquida g/m^3	Concentración total de aceite (líquido, aerosol y vapor) mg/m^3
	0,1 - 0,5 micras	0,5 - 1 micras	1 - 5 micras				
0	Tal como especifique el usuario o el proveedor del equipo y más estrictos que los de la Clase 1.						
1	≤ 20 000	≤ 400	≤ 10	-	≤ -70 °C	-	0,01
2	≤ 400 000	≤ 6000	≤ 100	-	≤ -40 °C	-	0,1
3	-	≤ 90 000	≤ 1000	-	≤ -20 °C	-	1
4	-	-	≤ 10 000	-	≤ +3 °C	-	5
5	-	-	≤ 100 000	-	≤ +7 °C	-	-
6	-	-	-	≤ 5	≤ +10 °C	-	-
7	-	-	-	5 - 10	-	≤ 0,5	-
8	-	-	-	-	-	0,5 - 5	-
9	-	-	-	-	-	5 - 10	-
X	-	-	-	> 10	-	> 10	> 10

Periodically check the water level accumulated in the reservoir, and bleed if it has reached the limit.

8.2 OLEO-PNEUMATIC LOCKING BRAKES

It is advisable to revise the functioning of the locking brakes periodically.
The frequency of this revision will, in each case, depend on the number of cycles carried out with them. It is recommended to revise the functioning every 6 months. For revision, adjustment or replacement, consult the specific chapter on PNEUMATIC LOCKS.
The stroke of the locking brake actuators is 1.2 mm.

CAUTION

Do not operate the oleo-pneumatic brakes at no load (with the sub-assemblies removed), as this would damage the mechanism.

8.3 TIGHTENING THE SCREWS

To ensure the equipment functions correctly, it is advisable to check the tightness of all the screws periodically. The recommended period is every 6 months. The recommended torque for the 4 screws of the arm is 27 Nm.

8.4 GENERAL CLEANING

It is advisable to carry out a general clean of the arm and accessories every week to keep the whole unit in good condition and prolong its useful life.

8.5 REPLACING THE GAS SPRING

PRIOR TO REPLACING THE GAS SPRING

- ✓ The equipment must be duly installed and integrated.
- ✓ Disconnect the pneumatic supply from the equipment.
- ✓ Turn off the equipment at the main switch and disconnect it from the electricity grid.
- ✓ It is advisable to dedicate two operators to this task.
- ✓ If the arm has a double spring, in the event a fault is detected in one of the two, both springs must be replaced.

1- Adjust the arm to put it in the balanced position *[See BALANCED, CENTRED POSITION p.22].*

2- Remove the screws (2) (2.5 mm Allen key) and remove the cover (3).

3- Swivel the arm to its highest position.

CAUTION! KEEP THE ARM IN THAT POSITION

4- Rotate the regulation flywheel (4) anticlockwise all the way.

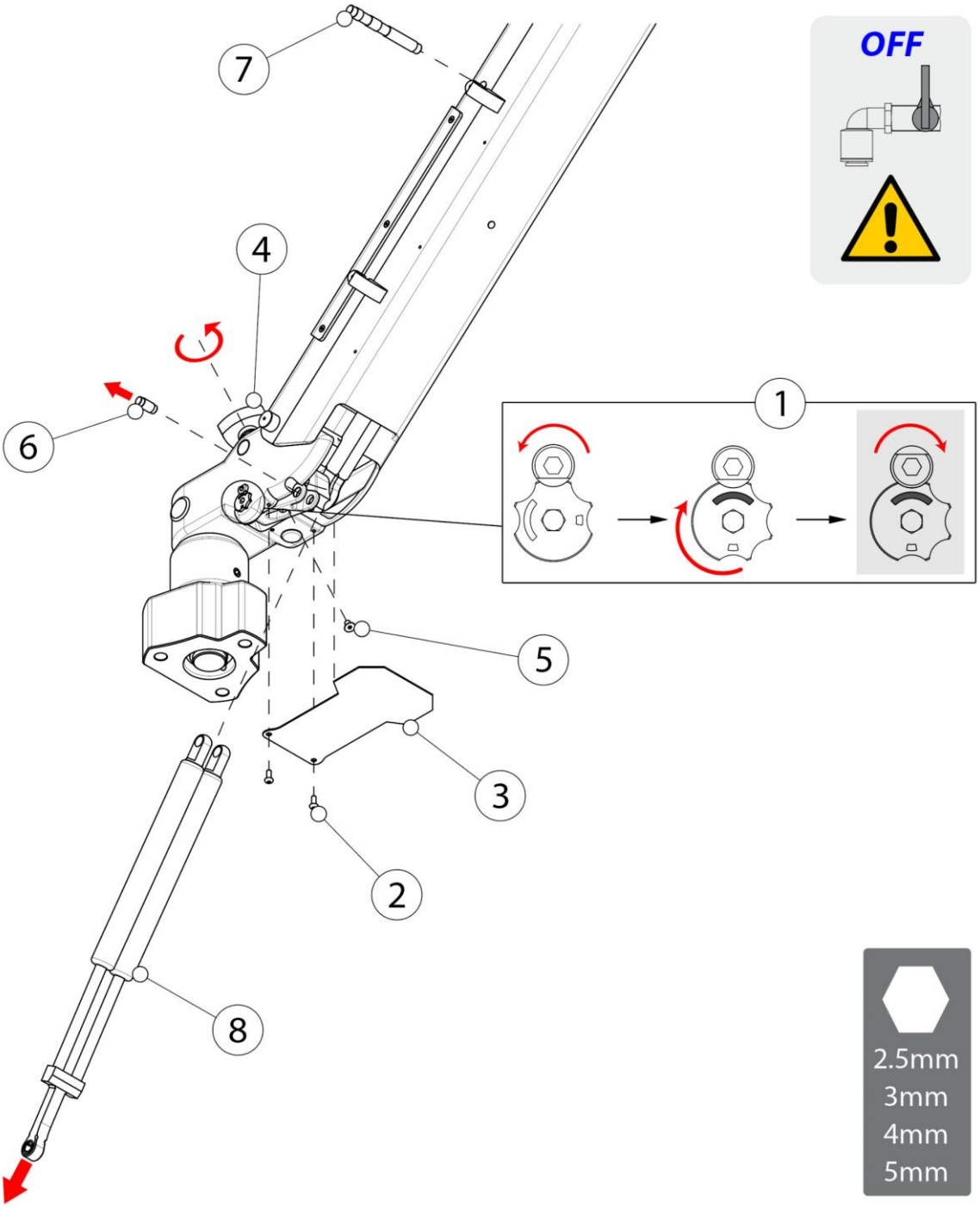
5- Remove the screw (5) (3 mm Allen key) from the end of the fork.

6- Turn the regulation flywheel (4) again until the lower shaft of the spring protrudes.

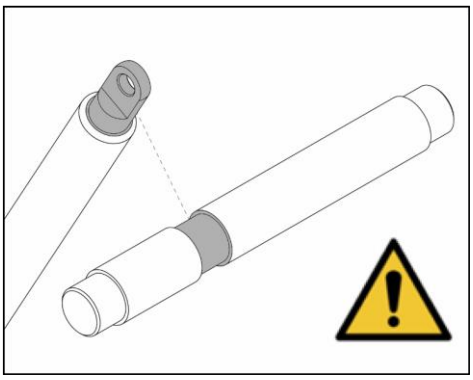
7- Remove the lower shaft of the spring (6) in the direction indicated in the image, securing the spring (8).

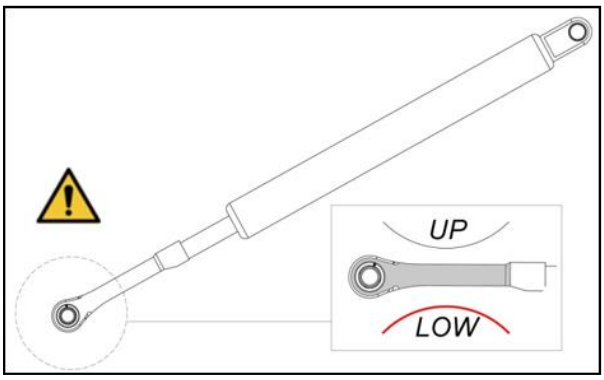
8- Remove the upper shaft of the spring (7) and remove the spring (8) by moving it in the direction indicated.

9- Replace the spring (8) and proceed in reverse order for assembly.



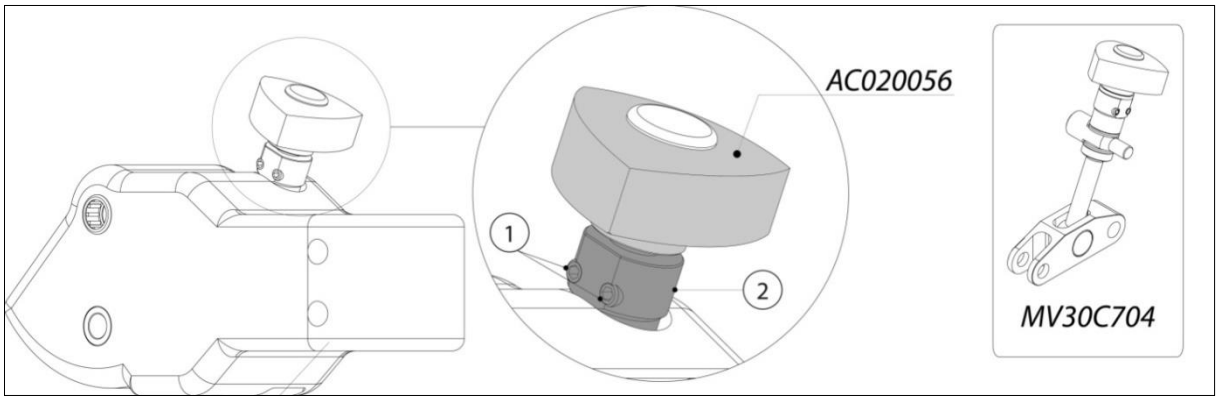
Pay special attention to the position of shock absorber within the groove of arm shaft and the position of the end of the shock absorber, **"concave" face down.**





8.6 ADJUSTING THE SPRING REGULATION SYSTEM

1. Move the arm to its highest position.
2. Loosen the threaded rods (1). *2.5 mm Allen key.*
3. Adjust the nut (2) until there is no play. The noise must disappear. Do not tighten this nut too much, as it stops the regulation turning gently.
4. Re-tighten the studs (1).

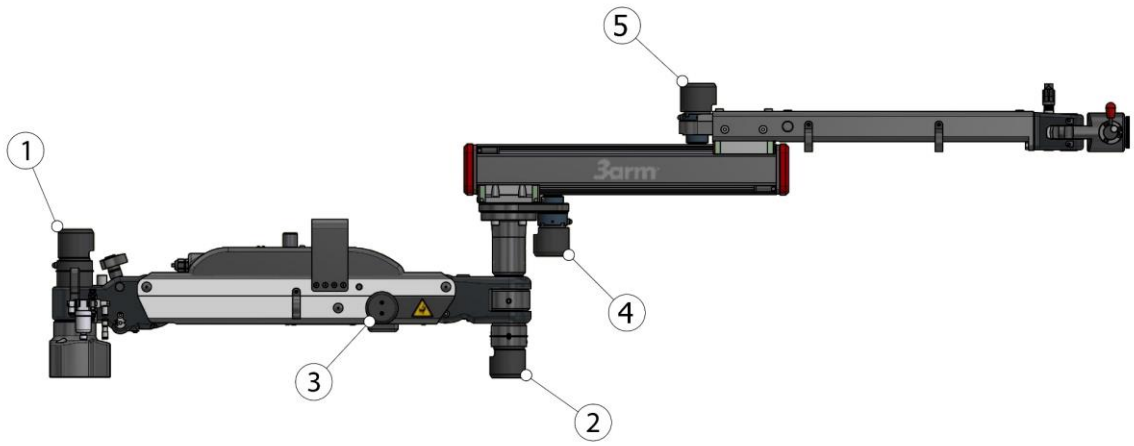


9 PNEUMATIC LOCKS

In case of malfunction of the pneumatic locks of your 3arm® arm
In versions L22 and L92, follow these checkpoints.

Complement this information with that shown in the section *[see PNEUMATIC LOCK "L22" p. 25 and "L92" PNEUMATIC LOCK p. 27]*

9.1 PNEUMATIC LOCKS: IDENTIFICATION



1- Base radial lock
2- Cross radial lock
3- Swing arm lock
4- Telescopic arm 1st section lock
5- Telescopic arm 2nd section lock

9.2 CHECK CONNECTIONS: DEVICE CONTROL – 3arm® ARM (L92 versions only)

The locks failing to act in versions L92 is often due to a bad connection between the device control and the 3arm© **To rule out this possibility, enable the pneumatic lock manually.** *[See L92 PNEUMATIC LOCK: MANUAL ACTIVATION p. 31].*

If the check is not satisfactory, and the locks still do not work correctly, ensure the device control and 3arm® arm are properly connected. *[See ELECTROPNEUMATIC SYSTEM p. 33]* Also verify that the following checkpoints described below are passed successfully.

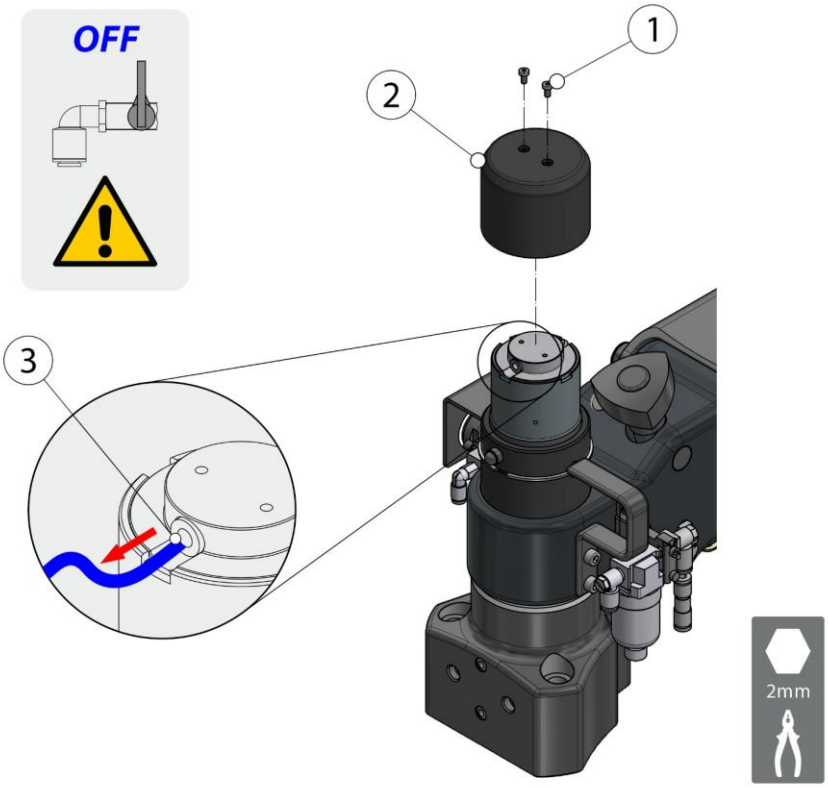
9.2.1 CHECK AIR SUPPLY

Operative valid for any locking cylinder.

To perform this check:

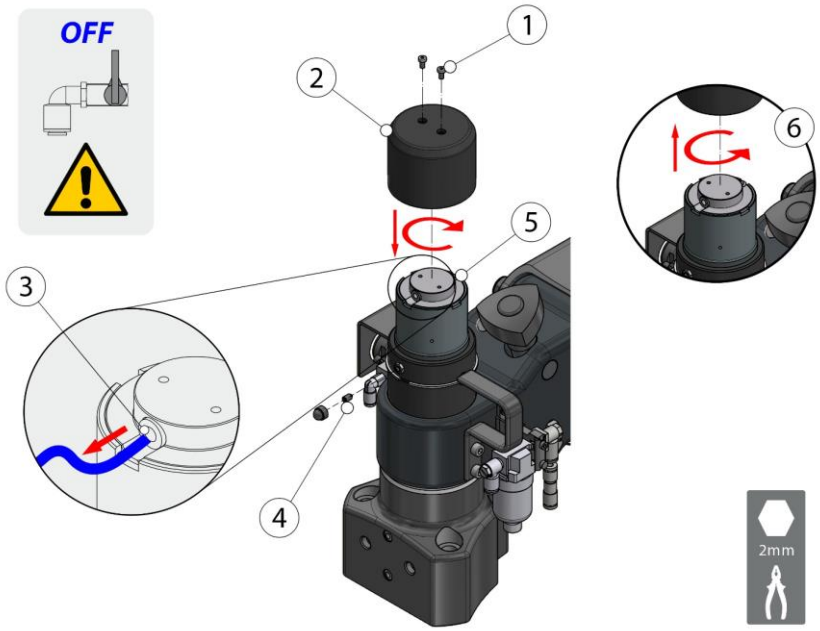
1. Release the air pressure of the arm.
2. Remove the cap (2), first removing the screws (1) *(2 mm Allen key)* and disconnect the air supply tube from the joint (3) that feeds the cylinder.
3. Allow the air to pass and activate the lock in question, checking that air flows through the tube.
4. Proceed in reverse order for assembly and verify the functioning of the lock again.

If the check is not satisfactory, review the pneumatic diagram paying special attention to the connection between tubes and derivations, pinching or a failure with the electrovalve (in versions L92).



9.2.2 CHECK CYLINDER ADJUSTMENT

1. Release the air pressure of the arm.
2. Remove the cap (2), first removing the screws (1) (2 mm Allen key) and disconnect the air supply tube from the joint (3) that feeds the cylinder.
3. Loosen the stud (4) (2 mm Allen key).
4. Screw the cylinder (5) clockwise until it stops.
5. Slightly unscrew the cylinder (5) anticlockwise (approx. 1/12 turn).
6. Proceed in reverse order for assembly and verify the functioning of the lock again.



If the problem persists, it is probably due to a fault in the functioning of the cylinder (it must be replaced), or wear of the pads (they must be replaced).

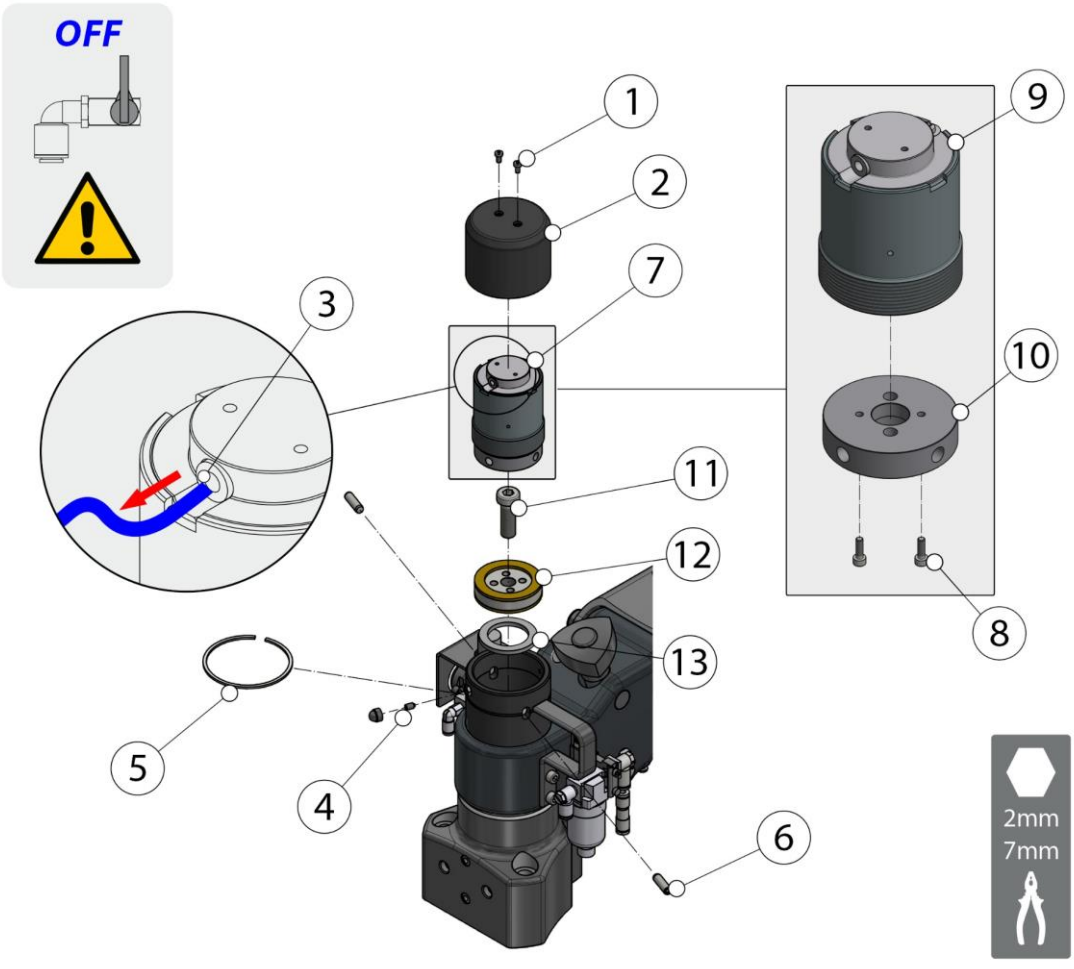
9.2.3 REPLACING THE CYLINDER AND/OR RADIAL PADS

PRIOR TO REPLACING THE CYLINDER AND/OR RADIAL PADS

- ✓ The equipment must be duly installed and integrated.
- ✓ Disconnect the pneumatic supply from the equipment.
- ✓ Turn off the equipment at the main switch and disconnect it from the electricity grid.

Procedure valid for the cylinders of the base and cross.
If you wish to replace the locking cylinder (9) do step 1 to 6 and 10 to 16.
If you have the pad replacement kit (parts 10, 12 and 13) carry out the full process.

1. Release the air pressure of the arm.
2. Remove the cap (2), first removing the screws (1) (2 mm Allen key) and disconnect the air supply tube from the joint (3) that feeds the cylinder.
3. Loosen the stud (4) (2 mm Allen key).
4. Remove the safety ring (5) and use an M4 extractor to remove the pins (6).
5. Unscrew the cylinder assembly (7) and remove it.
6. Remove the screws (8) (2 mm Allen key) and separate the cylinder (9) from the pushrod (10).
7. Remove the screw (11) (7 mm Allen key) and use an M10 extractor to take out the brake assembly with the pads (12) and remove the brake disc (13).



8. Replace the brake assembly (12) and the brake disc (13) and screw them onto the shaft of the base with the screw (11) (7 mm Allen key).
9. Replacing the pushrod (10).
10. Assemble the cylinder (9) and the pushrod (10) with the screws (8) (2 mm Allen key).
11. Position the cylinder assembly (7) and screw it on clockwise until the pushrod holes coincide (10) with the elongated holes of the lug.
12. Fit the pins (6).
13. Screw the cylinder assembly (7) all the way on and unscrew it slightly, anticlockwise (approx 1/12 turn).
14. Tighten the stud (4), fit the safety ring (5) and connect the supply pipe.
15. Put the cover in place (2) with the screws (1) (2 mm Allen key).
16. Check the lock works correctly.

INFORMATION

The cylinder replacement kit **MV405504** includes part (9).

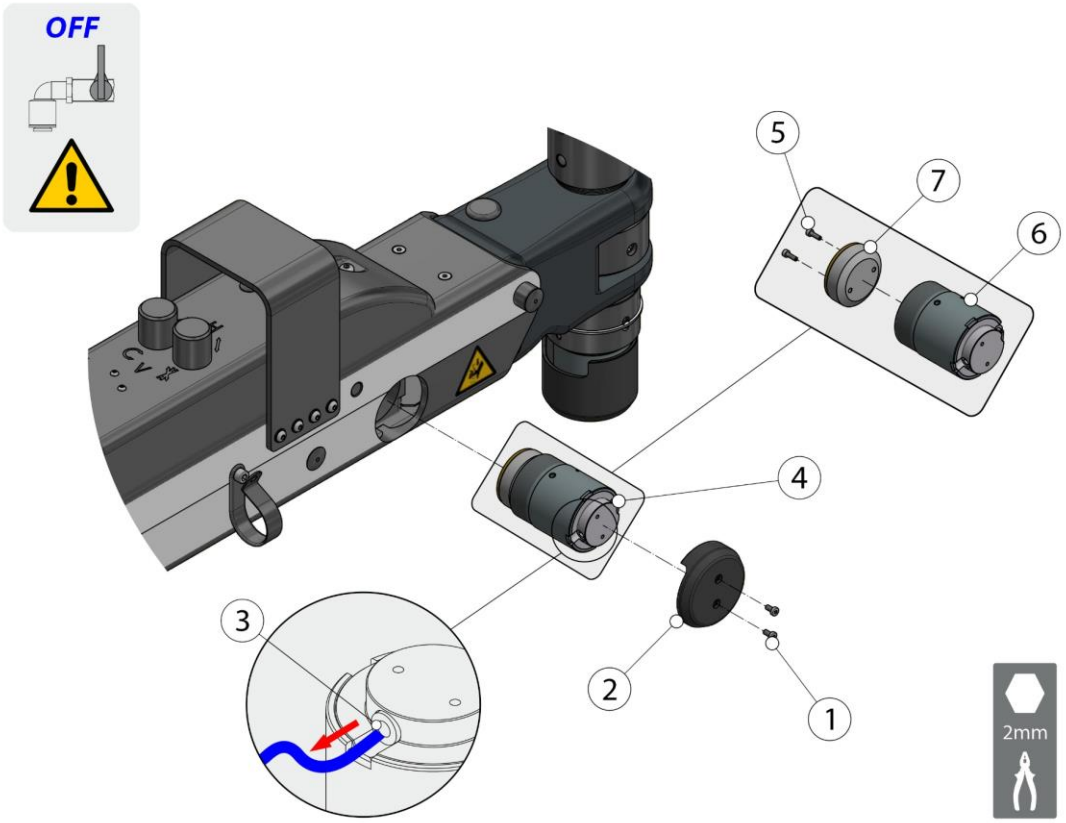
The pad replacement kit **MV4315A5** includes parts (10), (12) and (13).

9.2.4 REPLACING THE CYLINDER AND/OR SWIVEL PADS

PRIOR TO REPLACING THE CYLINDER AND/OR SWIVEL PADS

- ✓ The equipment must be duly installed and integrated.
- ✓ Disconnect the pneumatic supply from the equipment.
- ✓ Turn off the equipment at the main switch and disconnect it from the electricity grid.

1. Release the air pressure of the arm.
2. Remove the cap (2), first removing the screws (1) (2 mm Allen key) and disconnect the air supply tube from the joint (3) that feeds the cylinder.
3. Unscrew the cylinder assembly (4) and remove it.
4. Remove the screws (5) (2 mm Allen key) and separate the cylinder (6) from the pushrod (7).
5. Replace the cylinder (6) and/or the pushrod with the pads (7).
6. Assemble the cylinder (6) and the pushrod (7) with the screws (5) (2 mm Allen key).
7. Screw the cylinder assembly (7) all the way on and unscrew it slightly, anticlockwise (approx 1/12 turn).
8. Connect the supply pipe.
9. Put the cover in place (2) with the screws (1) (2 mm Allen key).
10. Check the lock works correctly.



INFORMATION

To replace the pad inside the arm, consult your 3arm© distributor.

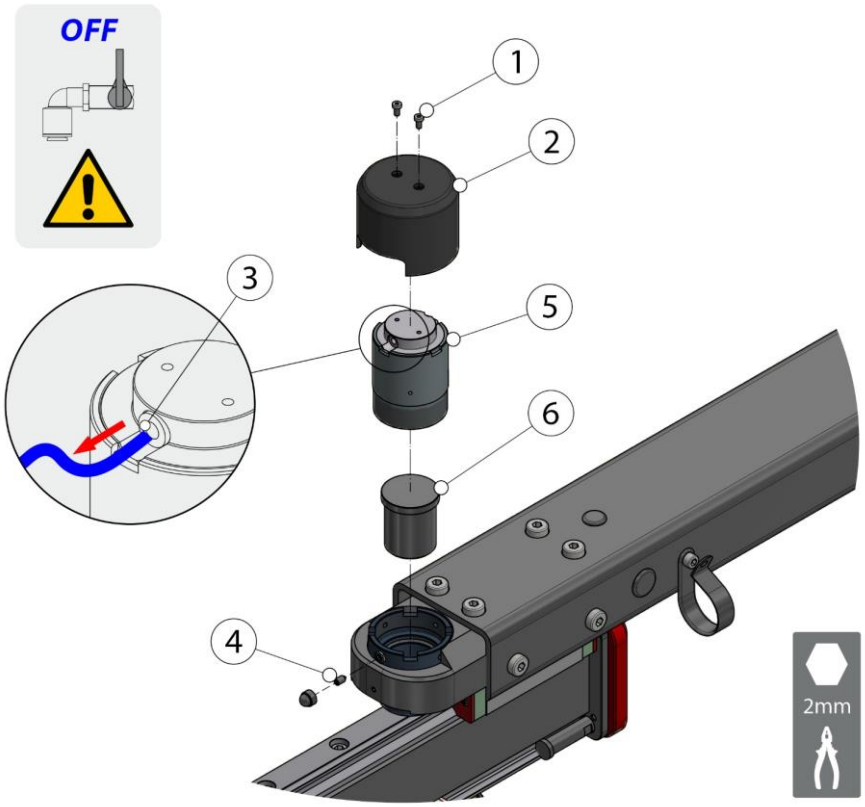
9.2.5 REPLACING THE CYLINDER AND/OR TELESCOPIC PADS

PRIOR TO REPLACING THE CYLINDER AND/OR TELESCOPIC PADS

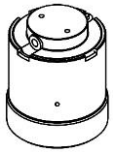
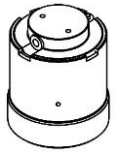
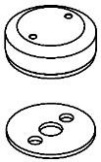
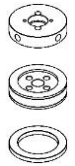
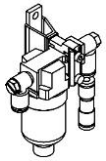
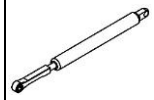
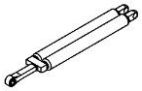
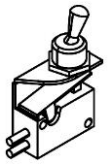
- ✓ The equipment must be duly installed and integrated.
- ✓ Disconnect the pneumatic supply from the equipment.
- ✓ Turn off the equipment at the main switch and disconnect it from the electricity grid.

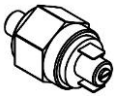
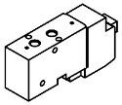
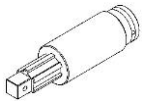
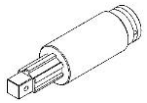
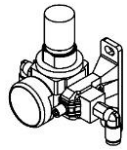
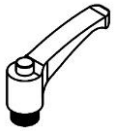
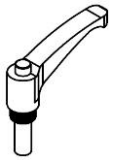
Procedure valid for cylinders of the telescopic arm.

1. Release the air pressure of the arm.
2. Remove the cap (2), first removing the screws (1) (2 mm Allen key) and disconnect the air supply tube from the joint (3) that feeds the cylinder.
3. Loosen the stud (4) (2 mm Allen key).
4. Unscrew the cylinder (5) and remove it.
5. Replace the cylinder (5) and/or the pushrod with the pads (6).
6. Screw the cylinder (6) all the way on and unscrew it slightly, anticlockwise (approx 1/12 turn).
7. Connect the supply pipe and tighten the stud (4) (2 mm Allen key).
8. Put the cover in place (2) with the screws (1) (2 mm Allen key).
9. Check the lock works correctly.



10 SPARE PARTS

CODE	DESCRIPTION	PICT.	CODE	DESCRIPTION	PICT.
MV405504	CYLINDER LOCK RADIAL ARM		**MV406004**	SWIVEL/TELESCOPIC LOCK CYLINDER	
MV405903	CLAO COVER CIL 42		**MV406503**	CLAO COVER CIL 38	
MV431805	SWIVEL PADS KIT L22-L92		**MV4315A5**	RADIAL PADS KIT L22-L92	
MV499104	AIR FILTER ASSEMBLY		**MV30C704**	FORK REGULATION ASSEMBLY Ø15	
MVHXXX04	3ARM 1 SHOCK ABSORBER KIT		**MVHXXX04**	3ARM 2 SHOCK ABSORBERS KIT	
NH121136	SWITCH VM1000 4NU 08		**MV404604**	ELECTROVALVE PUNCH ASSEMBLY	
MV300903	ARM 1 SHOCK ABSORBER SHAFT		**MV301003**	ARM 2 SHOCK ABSORBERS SHAFT	

M6200200	NB BUTTON PAD COVER L22 – S6		**MV4075A3**	BUTTON PAD COVER L92	
EL101500	PRESSURE SWITCH 1/8" NC 6 bar		**NH026026**	ELECTROVALVE SMC	
MV328104	SCREW-MOUNTED COMPENSATOR T2140801/00 3/4" (Stroke: 45 mm/ 1.77″ – Max. torque: 300 Nm Panel: ¾″ – Weight: 1.5 kg / 0.7 lbs)		**MV328204**	SCREW-MOUNTED COMPENSATOR T2141212/00 1/2" (Stroke: 40 mm/ 1.57″ – Max. torque: 150 Nm Panel: ½″ – Weight: 0.9 kg / 0.4 lbs)	
MV432405	ACTUATION GUARDS KIT SWITCHES		**M6101000**	AIR REGULATOR ASSEMBLY S6	
AC060406	RADIAL HANDLE L11		**M3179400**	LOCK HANDLE ASSEMBLY SWIVEL L11	
TEL01105	ARM TIE				

11 ACCESSORIES

NOT all the accessories shown below are compatible with your arm, for this see the compatibility table *[See* COMPATIBILITY TABLE *p. 51]*

TABLES

(1)

(2)

(3)

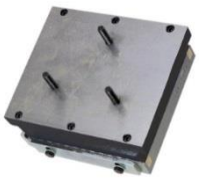
Four wheels (two with brake)
Slots for fastening parts or tools.
Supports for tap holder or tools.

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)

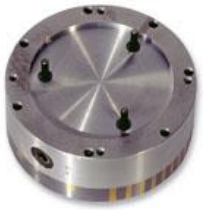
Clamp for securing the machine
Magnetic support for placing it on a metal surface and securing the machine



(3)

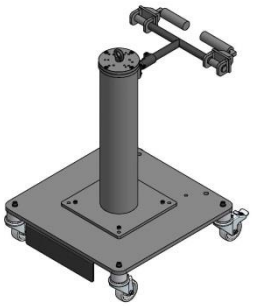
(2)

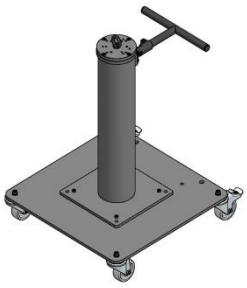
CODE	DESCRIPTION	DIMENSIONS
BR000100	Small clamp (1)	N/A
BR100100	Large clamp (2)	N/A
IA000100	Magnetic support (3)	150x150
IB000100	Magnetic support (4)	Ø200
IC000100	Magnetic support (5)	Ø250



(4)(5)

TROLLEY



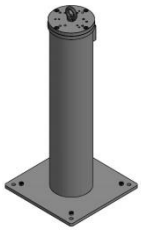


To move the work unit.
It has four orientable wheels.

DESCRIPTION	DIMENSIONS	
Trolley 700	700x700 mm	27 9/16" x 27 9/16"
Trolley 900	900 x 900 mm	35 7/16" x 35 7/16"
Electrical trolley	900 x 900 mm	35 7/16" x 35 7/16"

*Code according to load

FIXED COLUMN



To secure to the floor using four metal studs.

CODE	DESCRIPTION/DIMENSIONS	
CL115400	Column 375 mm	14 3/4"
CL002700	Column 400 mm	15 3/4"
CL106800	Column 500 mm	19 11/16"
CL101100	Column 630 mm	24 13/16"
CL122800	Column 640 mm	25 3/16"
CL000100	Column 740 mm	29 1/8"
CL005300	Column 850 mm	33 7/16"
CL002500	Column 940 mm	37"
CL002400	Column 1000 mm	39 3/8"
CL002600	Column 1200 mm	47 1/4"
CL004500	Column 1500 mm	59 1/16"

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

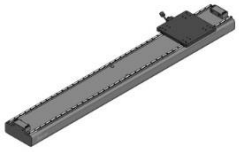
(1)

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.

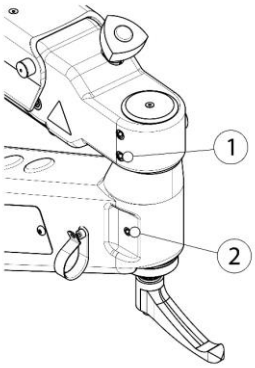
CODE	DESCRIPTION	STROKE
CL040000	Floor rail	1520 mm – 59 13/16″

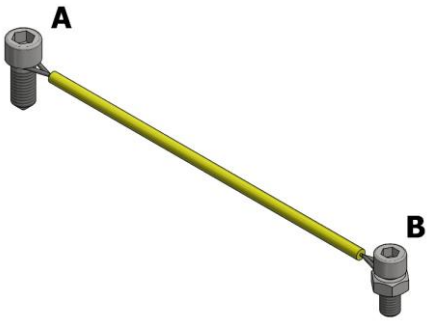
LINEAR GUIDE

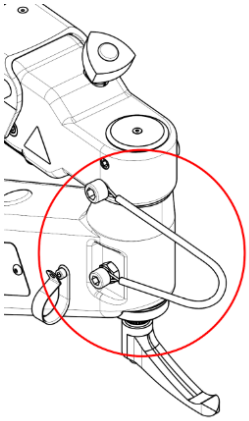
Guide for the horizontal movement of the arm. Several sections can be joined from a base section 2 m. This may be table-top, fixed to the wall or ceiling, or on pillars of various heights that can be selected. The horizontal position can be locked at any point.

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″

ROTATION LIMITER







The rotation limiter is a flexible reinforced steel cable that limits the rotational movement of the front arm, to a maximum of 1 turn, with an added margin of 10% in each rotation direction.
To assemble it, unscrew the screws/studs (1) and (2) that come in the arm from the factory, and replace them with screws "A" and "B" in the KIT.
Screw "A" (M12) will go in position 1 and screw "B" (M10) in position 2.

CODE	DESCRIPTION
LG100600	Rotation limiter assembly

HANDRAIL BRACKET

Used to couple the device to elements in the working area, such as rails, structures, etc.

CODE	DESCRIPTION
CL108500	Rail support

11.1 COMPATIBILITY TABLE

ACCESSORY	SERIES – 3 ARM					
	S0	S1	S2	S3	S4	S6
RADIAL EXTENSION	●	●	●	●	●	●
TROLLEY + FIXED COLUMN	●	●	●	●	●	●
FIXED COLUMN	●	●	●	●	●	●
PNEUMATIC LIFTER	●	●	●	●	●	●
D63 PNEUMATIC LIFTER	●	●	●	●	●	●
FLOOR RAIL	●	●	●	●	●	●
LINEAR GUIDE	●	●	●	*	*	*
SMALL TABLE (500)	*	●	●	⊘	⊘	⊘
MID-SIZE TABLE (850x850)	●	●	●	*	*	*
LARGE TABLE (1100x850)	●	●	●	●	●	●
SMALL CLAMP	⊘	●	●	⊘	⊘	⊘
LARGE CLAMP	●	●	●	●	●	●
HANDRAIL BRACKET	●	●	●	●	●	●
MAGNETIC SUPPORT	*	*	*	*	*	*
ROTATION LIMITER	⊘	⊘	⊘	●	⊘	⊘

● = Compatible
⊘ = NOT Compatible
* = Request information

12 WARRANTY

See attached warranty document.

13 GUIDELINES FOR PACKAGING, TRANSPORT AND DISMANTLING

13.1 PACKAGING

Follow the instructions below for packing the equipment for location changes or shipments for repair and maintenance.

13.1.1 Preparatory measures

The equipment must be placed out of service. Assembling the "transport safety elements" will prevent movement during transport and thus possible damage to the installation.

13.1.2 Choice of packaging

For long transport distances, the components of the production installation must be packed in such a way that they are protected from atmospheric conditions.

13.1.3 Inscription on the packaging

Observe the specific provisions of the country in which the equipment is transported. In fully closed packaging, an indication must be placed on the packaging indicating where the top is.

13.1.4 Packaging procedure

Place the components of the machine on manufactured wooden pallets. Use lashing straps to ensure the components are secured against possible falls. Attach all the technical documentation that must accompany the machine.

13.2 TRANSPORT

The following data must be taken into account for transport.

- ✓ Approx. external dimensions (width x height x depth): 1090 x 500 x 350 mm
- ✓ Total weight depending on the segment: maximum approx. 35 kg

13.3 DISASSEMBLY

- ✓ The equipment must be taken out of service by duly trained and authorised personnel.
- ✓ The machine must be dismantled taking the safety instructions, waste disposal and recycling into account.
- ✓ Protect the environment. The machine must be disposed of pursuant to current regulations and guidelines on safety, noise prevention, environmental protection and accident prevention.

NOTES

DATE	DESCRIPTION

CE STATEMENT OF COMPLIANCE

The manufacturer:

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

Declares that this product:

Name: Series 6
Serial number: From 006 - 013

Complies with Machinery Directive 2006/42/EC and with the Pressure Equipment Directive 2014/68/EU

Harmonised reference standards:

EN ISO 12100-1:2012	Safety of machinery. General principles for design. Risk assessment and risk reduction.
UNE-EN 349:1994+A1:2008	Safety of machinery. Minimum gaps to avoid crushing of parts of the human body.
UNE-EN ISO 13857:2008	Safety of machinery. Safety distances to prevent hazard zones being reached by upper and lower limbs.
UNE-EN ISO 11201:2010 V2	Acoustics. Noise emitted by machinery and equipment. Determination of emission sound pressure levels at a workstation and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections.
UNE-EN ISO 10931:2006/A1:2015	Plastics piping systems for industrial applications. Poly (vinylidene fluoride) (PVDF). Specifications for components and the system.
UNE-EN ISO 15493:2004/A1:2017	Plastics piping systems for industrial applications. Acrylonitrile-butadiene-styrene (ABS), unplasticized poly(vinyl chloride((PVC-U) and chlorinated poly(vinyl chloride) (PVC-C). Specifications for components and the system. Metric series.

Authorised for documentation:

Mr Ramon Jou Parrot, TECNOSPIRO MACHINE TOOL, S.L

TECNOSPIRO MACHINE TOOL SL

Sant Joan de Vilatorrada, Tuesday, 09 June 2020

Ramon Jou Parrot, Technical Director

3arm®

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