INSTRUCTION MANUAL

MANIPULATOR M3

3arm®

TECNOSPIRO MACHINE TOOL, S.L.
P.I Pla dels Vinyats I, s/n nau 1
08250 - Sant Joan de Vilatorrada. Barcelona - España
Telf. +34 938 76 43 59
E-mail: 3arm@3arm.net

ISO 9001
BUREAU VERITAS Certification

TECNOSPIRO MACHINE TOOL SL

DESIGN & QUALITY 3arm Made in Barcelona

www.3arm.net

TABLE OF CONTENTS

1 INTRODUCTION

Dear Customer,

Congratulations to you on your choice and congratulations to the dedicated people at Tecnospiro Machine Tool for their continuous efforts on improving ergonomics at work.

We hope these simple instructions will be helpful for you for starting and operating the manipulator. We suggest you pay special attention to the pages on the concepts of installation, safety and maintenance.

We hope your manipulator will have a long life and that you can reaffirm the very good investment you have made in acquiring this product.

2 ABOUT THIS MANUAL

This document corresponds to the M3 Manipulator instruction manual.

- ORIGINAL MANUAL –

Intellectual/Industrial Property Information:

Tecnospiro Machine Tool, S.L. (the Company) informs that all content in this document including, for example, the text, images, graphic designs, brands, trading and company names (hereinafter, the Intellectual/Industrial Property), belong to the Company and that the Company is the exclusive owner of their use. Copying, reproduction, distribution, public communication and total or partial use of the Intellectual/Industrial Property, in any form or manner, even quoting the sources, is prohibited, unless expressly agreed in writing by the Company. The use of any content that due to its characteristics is similar to the Industrial/Intellectual Property is also considered an infringement of the Company's Industrial/Intellectual Property rights.

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 unit. 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.
- ✓ If the manual is lost or damaged, contact TECNOSPIRO MACHINE TOOL, S.L. for a replacement.
- ✓ Reproducing or sharing this documentation – or part of it – to third parties is only permitted with express written authorisation from TECNOSPIRO MACHINE TOOL, S.L.
- ✓ The illustrations shown in this manual may differ in some details from its specific configuration and should 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 M3 manipulator	16/03/2021

3 SAFETY INFORMATION

3.1 SCOPE OF APPLICATION

This section contains very important information related to the safety of your manipulator, it is addressed to all personnel involved in any of the life phases of this equipment (transport, assembly and installation, commissioning, adjustment, learning, operation, cleaning, maintenance, fault finding/detection, dismantling/de-commissioning).

3.2 ALERTS AND GENERAL CONSIDERATIONS

- ✓ The equipment described in this document has been built in accordance with the current technological level and in accordance with 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.

- ✓ Without the proper authorisation of TECNOSPIRO MACHINE TOOL, S.L. No modification of equipment should be made.

- ✓ The equipment must only be operated for its intended use. Any other use is strictly prohibited. Any use other than that 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.

- ✓ 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 load-mounting device is suitable for the end application.

- ✓ Do not exceed the maximum working load limits (WLL) indicated in this manual and on the manipulator's identification plate.

- ✓ It is recommended that only one operator use the manipulator 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 manipulator for safe movements, accompanying the movement of the equipment at all times, and thus reducing the risk of uncontrolled or involuntary movements of the manipulator and/or the load.

- ✓ 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 remain outside of the vertical path of the swivel arm.

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

- ✓ The presence of third parties in the manipulator's work area must 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 manipulator is in use.

- ✓ It is important that the users who operate this manipulator 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, safe work habits and cargo handling.

- ✓ 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.

- ✓ 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.

- ✓ The devices for manipulation and loading may be subject to different regulations in every country. These regulations may not be specified in this manual.

- ✓ To the perimeter of the equipment, you must add the opportune distance to allow people to walk around it safely. The work areas must be kept clear of obstacles, columns, etc. that could hinder the work of the operators.

- ✓ For tasks of maintenance, adjustment, cleaning, etc. there must be the spaces necessary for these tasks.

- ✓ If you have questions about handling or maintenance procedures, please

contact the authorised technical service.

3.3 EXCLUSIONS

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

- ✓ Handling loads whose nature could lead to hazardous situations (molten metal, acids/alkalines, radioactive material, especially fragile loads).
- ✓ Operation subject to special rules described in chapter 1 of the standard UNE-EN 14238:2005+A1, related to "Cranes. Manually controlled load manipulating devices".
- ✓ 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).
- ✓ Lifting and/or handling of people or animals.
- ✓ 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 of the manipulator.
- ✓ Connections of the manipulator.
- ✓ 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 hazard 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 the manipulator 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 should not wear loose clothing, rings or bracelets that may fall within the mechanism of the equipment.

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 of the documentation.

The minimum level of training to use the manipulator shall be:

- Production workers: occupational risk prevention course, full training on work stations and residual risks of the equipment. Minimum of one year's experience in similar facilities.

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

- Cleaning operators: Occupational risk prevention course, training on products and procedures for carrying out cleaning tasks.

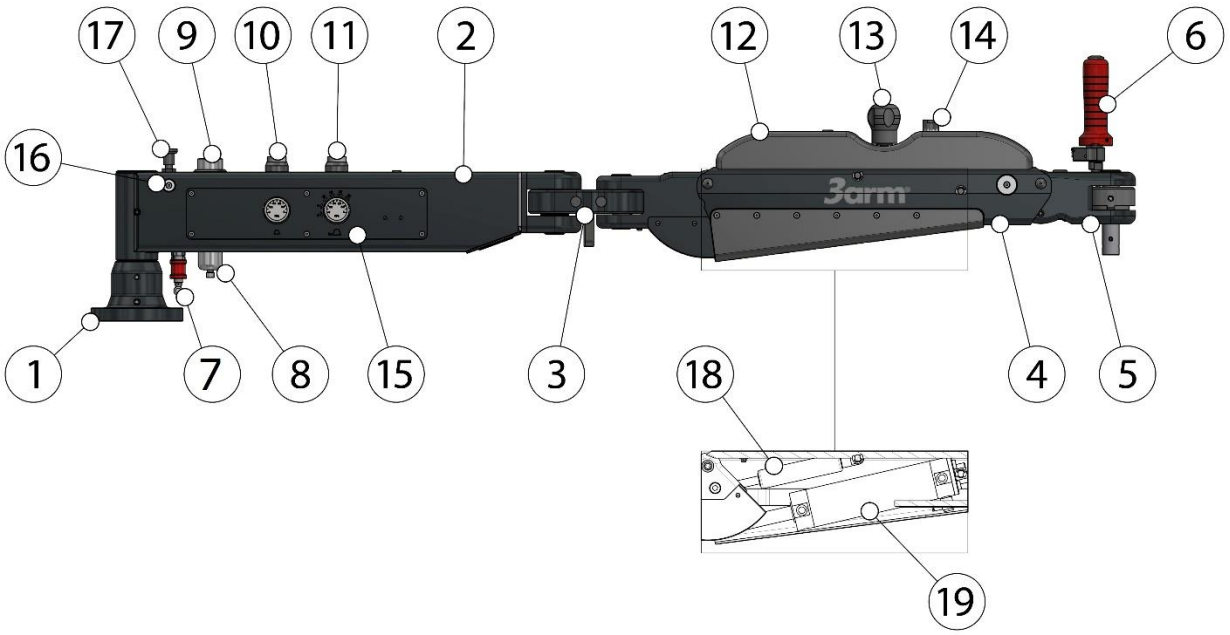
- Apprentices/students: They may only work on the equipment if supervised at all times by one of the facility's suitably qualified employees.

- Public (non-operators): 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 manually controlled load handling device consists of a pendulum parallelogram balanced by a gas spring and a pneumatic cylinder, plus a radial arm. The assembly of both secures the clamping head and keeps it in a perpendicular position to the work area. It equips different systems such as a knob and a safety grip, which also help to govern the manipulator. To make it functional, different load securing devices must be added with which a final product that can be adapted to different working conditions can be obtained.

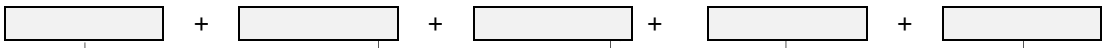
4.1 MAIN PARTS



1 - Base
2 - Radial arm
3 - Joint
4 - Swivel arm
5 - Head
6 - Handle - Handlebar
7 - Air supply
8 - Air Group
9 - Feed regulator (R1)
10 - No-load regulator (R2)
11 - Load regulator (R3)
12 - Control cover
13 - Knob
14 - Control buttons
15 - Pressure display panel
16 - Magnet (Folded position - Parking)
17 - Closure
18 - Gas spring
19 - Pneumatic cylinder

4.2 CONFIGURATIONS

4.2.1 CONFIGURATION TABLE



Radial arm + Arm

PB3	Tabletop 627 mm *(24 11/16")*
PT3	Ceiling 627 mm *(24 11/16")*
PX3	Customised

Arm lock

L0	No lock
LX	Customised lock

Head

CD3	Vertical head
CF31	90º Revolving Head + M. Rotating
CF32	Revolving180º Head + M. Rotating
CF3X	Revolving Xº Head + M. Custom rotating
CH31	90º Rotating Head
CH32	180º Rotating Head
CH33	270º Rotating Head
CI3	Head M. Rotating
CX3	Customised Head

Pneumatic system

Code	Effect	Rotation	No. high pressures
NA3	Basic	0	1
NB3	Actuator	0	1
NC3	Actuator	1	1
NE3	Suction cup	0	1
NF3	Suction cup	1	1
NH3	Basic	1	1
NJ3	Basic	0	2
NK3	Basic	1	2
NM3	Actuator	0	2
NN3	Actuator	1	2
NP3	Suction cup	0	2
NQ3	Suction cup	1	2
NX3	Customised		

Handlebar

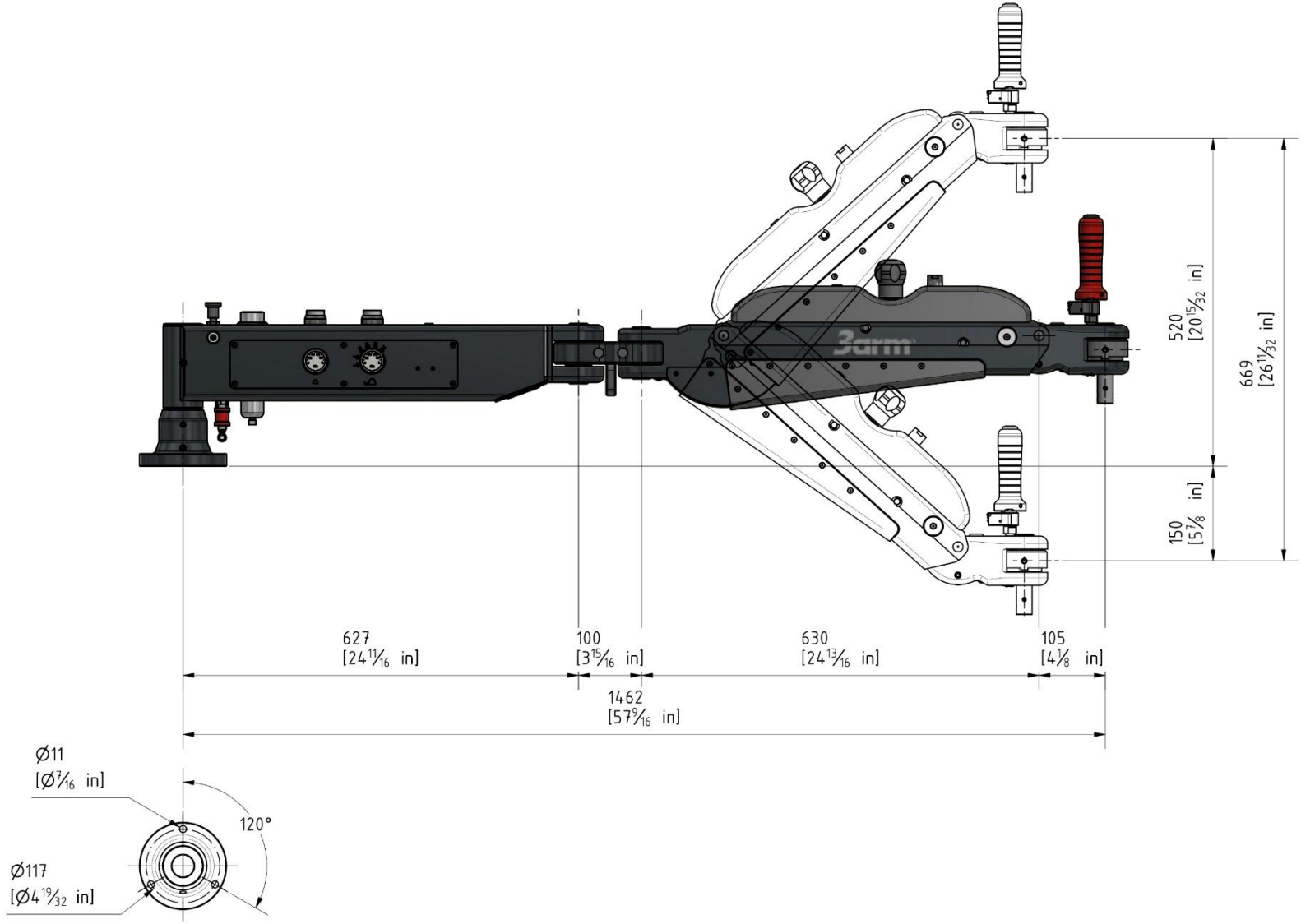
MA3	Single handlebar
MB3	Double handlebar
MC3	No handlebar
MD3	Automatic double handlebar
ME3	Vertical handlebar (only with CD3)
MX3	Custom handlebar

4.2.2 ORDER EXAMPLE

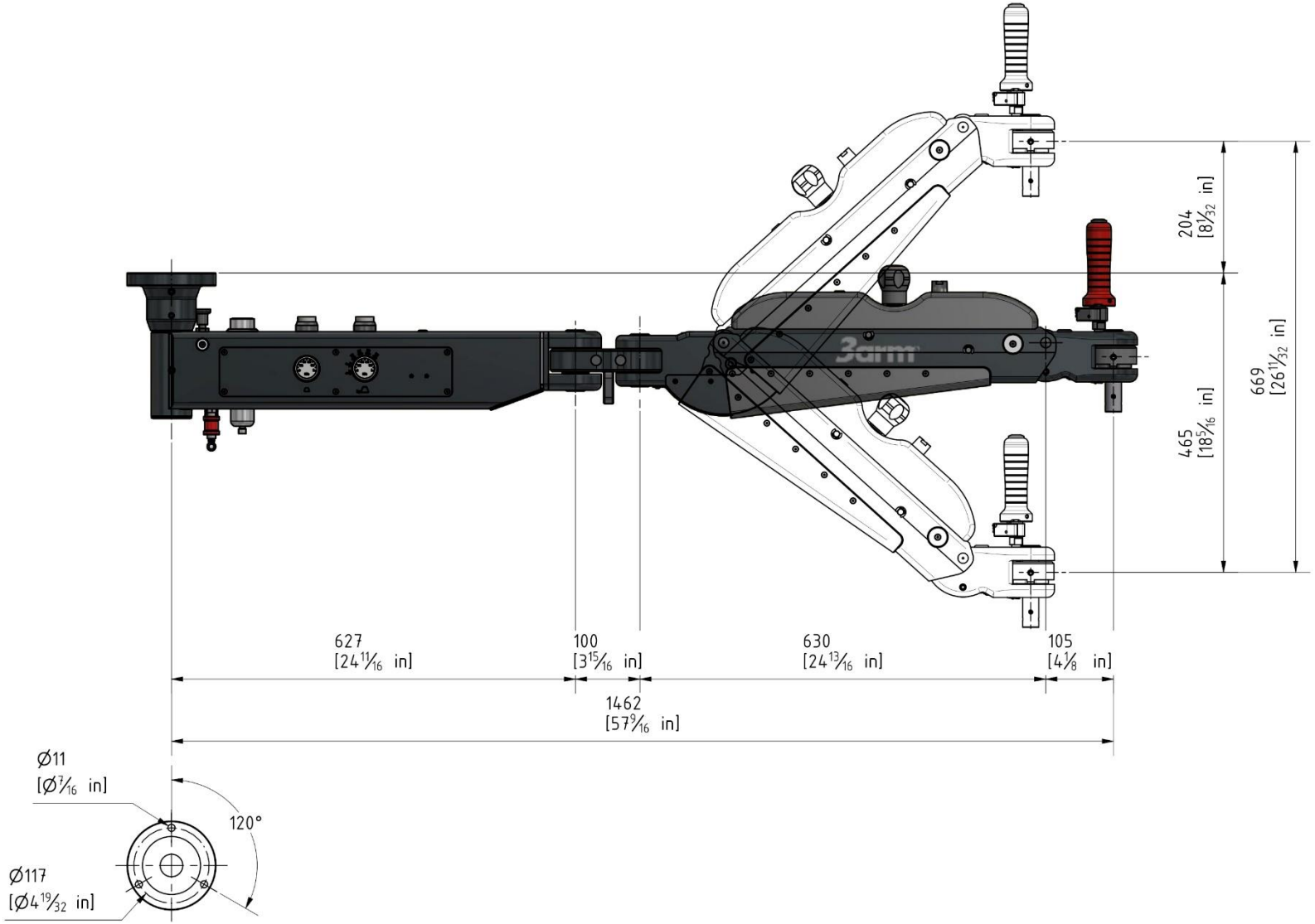
Order example: **MANIPULATOR M3- PB3+CI3+MA3+NB3+L0 (XX kg)**
XX= Weight of the load securing device.

4.3 GENERAL DIMENSIONS

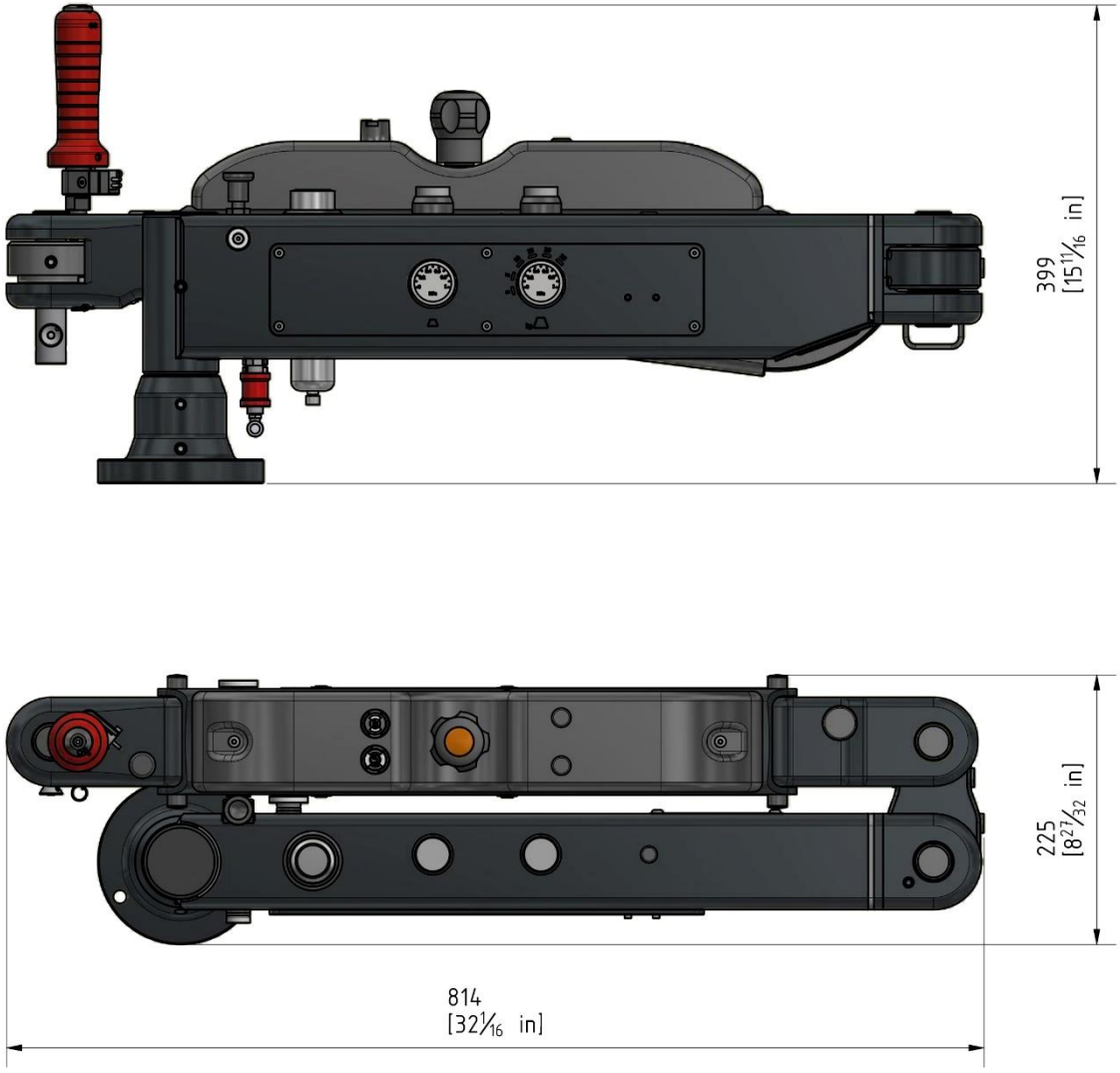
4.3.1 Extended position (Tabletop version)



4.3.2 Extended position (Ceiling-mounted version)

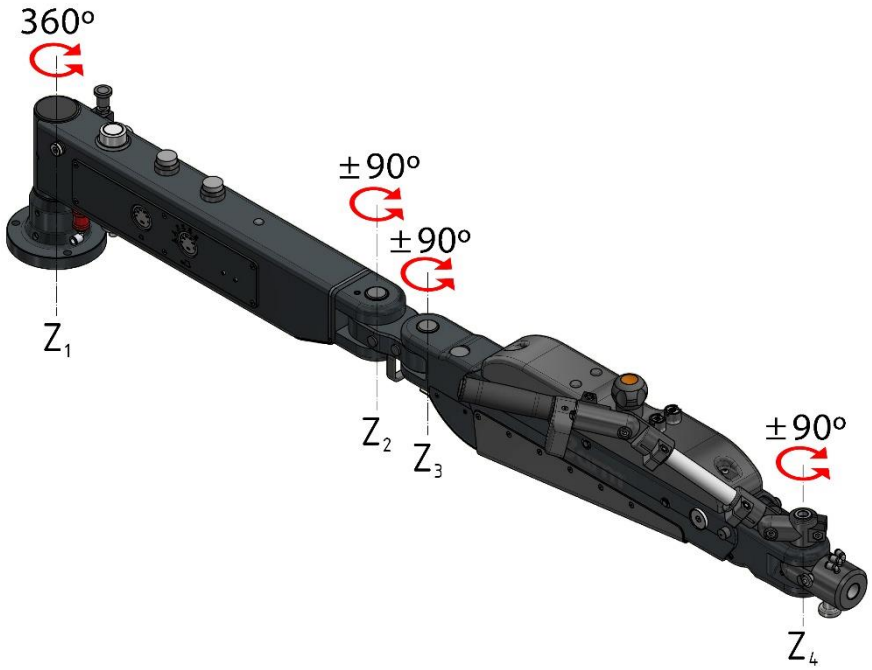


4.3.3 Retracted position – Parking



4.4 MOVEMENTS

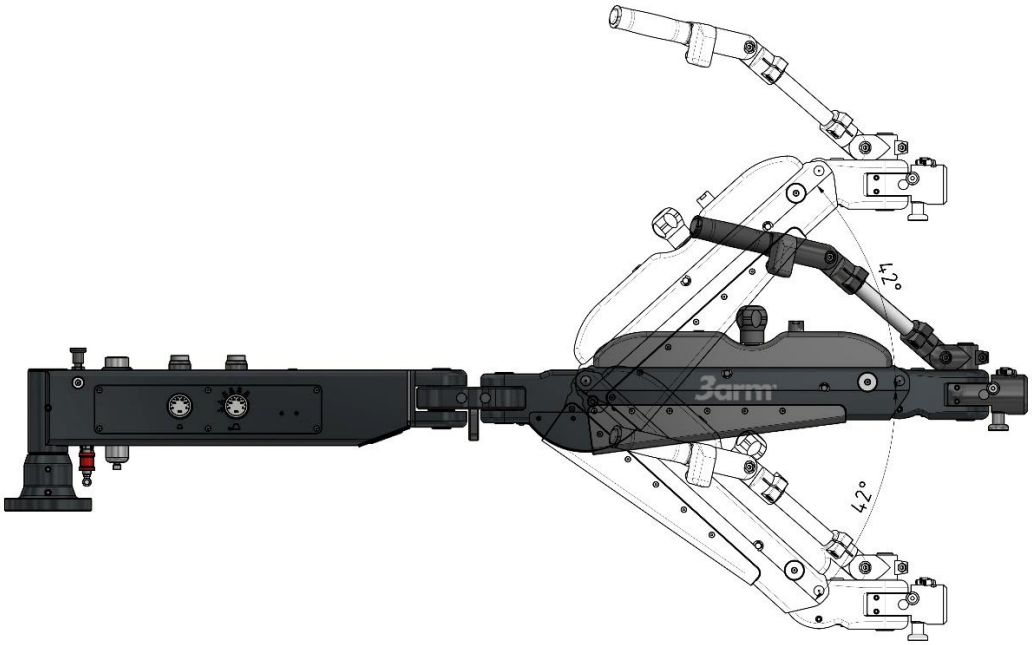
4.4.1 Arm and radial arm movements



Base rotation - radial arm: 360º (Z_1 axis)
Radial arm – joint rotation movement: 180º (Z_2 axis)
Joint – arm rotation movement: 180º (Z_3 axis)
Head rotation movement: 180º (Z_4 axis)[1].

4.4.2 Ascending and descending arm movements

The arm can move horizontally from -42º to + 42º.
The vertical stroke is 669 mm. *(26.3")*
This movement is made by the operator, although the weightless system facilitates it.



[1] The vertical head (CD3) has a higher rotation of 340º in Z_4.

4.5 CONSIDERATIONS OF USE

The equipment should only be operated for its intended use. Any other use is forbidden [See GENERAL WARNINGS AND CONSIDERATIONS page 6].

The manipulator must only be used with the type of loads that have been considered in its design, without exceeding the working load limit (WLL) indicated in the technical specifications and in the identification plate of the equipment.

Only one operator can work with this manipulator at a time and must use safe movements and transitions.

The manipulator is designed for fast, controlled and repetitive load handling.

4.6 DESIGN CONSIDERATIONS

The manipulator has been designed applying the mechanical resistance requirements corresponding to the standard UNE-EN 13001-1:2006+A1:2009/AC: 2010EN and UNE-EN 13001-2:2006+A1:2009/AC: 2010.

All parts and components accessible to the operator have been manufactured without sharp edges or angles that could cause injury.

All the indications of the UNE-EN 14238:2005+A1:2010EN standard, regarding ergonomics and noise emission, have been considered.

4.7 TECHNICAL SPECIFICATIONS

4.7.1 General technical specifications

GENERAL TECHNICAL SPECIFICATIONS		
Dimensions and mass		
	Height	399 mm *(15.7")*
	Length	814 mm *(32.1")*
	Width	225 mm *(8.9")*
	Mass	30 kg *(66 lb)*
Movements		
	ZX Plan	± 42º
	XY working radius	1462 mm *(57.6")*
	$Z_{1\ axis}$	360º
	$Z_{2\ axis}$	180º
	$Z_{3\ axis}$	180º
	$Z_{4\ axis}$	180º
	Vertical travel	669 mm *(26.3")*
Reaction torque		
Maximum torque	Max. vertical work Head	150 Nm *(110 ft lb)*
Load capacity		
	Maximum net load range	0-25Kg *(0-55 lb)*
	Maximum net load	25 kg *(55 lb)*
	Maximum gross load *(load securing device + load to be handled)*	35 kg *(77 lb)*
Pneumatic specifications		
	Power fluid	Pressurised air
	Max. working pressure	0.75 Mpa *(7.5 bar)*
	Max. working pressure	0.7 Mpa *(7 bar)*
	Min. working pressure	0.45 Mpa *(4.5 bar)*
	Maximum instant consumption	325 dm^3/min
Operating conditions		
	Temperature[2]	-10 to +50 ºC
	Max. relative	humidity 70%
	Environment	Interior industrial environments

4.7.2 Maximum load

The manipulator can support up to 25 kg *(55 lb)* net load and 35 kg *(77 lb)* gross load.

- ✓ **Net load** refers to the mass of the load you want to work with.
- ✓ **Gross load** refers to the sum of the net load and the load securing device.

MAXIMUM LOAD

- ✓ The manipulator can carry a net load of up to 25 kg *(55 lb)*. (Regardless of the weight of the securing device).

[2] The temperature range will be reduced to +10 to +50°C if suction cups are used on the load securing device

4.7.3 Working pressures

Depending on the working conditions and the mass of the load you wish to work with, you must adjust the supply pressure according to the following table.

WORKING PRESSURE		
Pressure (bar)	Pressure (MPa)	Maximum net load (kg)/(lb)
7	0.7	25 *(55.1 lb)*
6	0.6	21.4 *(47.2 lb)*
5	0.5	17.8 *(39.4 lb)*
4	0.4	14.2 *(31.5 lb)*
3	0.3	10.7 *(23.6 lb)*
2	0.2	7.1 *(15.7 lb)*
1	0.1	3.6 *(7.9 lb)*

4.7.4 Pneumatic consumption

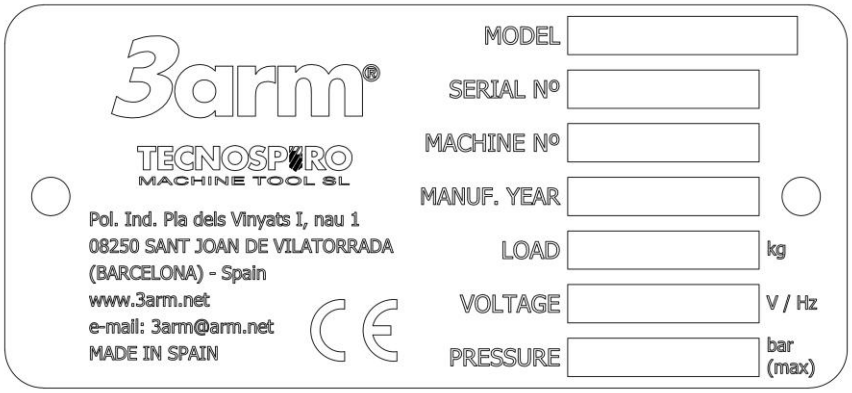
The pneumatic load handling equipment has an associated pneumatic consumption. The following table details the maximum consumption per cycle:

ACTUATORS	MAXIMUM CONSUMPTION PER CYCLE
Main cylinder	4 dm^3
Revolving module	3 dm^3
Rotating module	2 dm^3

4.8 IDENTIFICATION

A metal sheet riveted to the support structure identifies its manipulator and indicates the following specifications.

CE Marking, Manufacturer (name, address and company name), Date of manufacture, Serial number, Model, Designation, Maximum working load, Maximum working pressure.

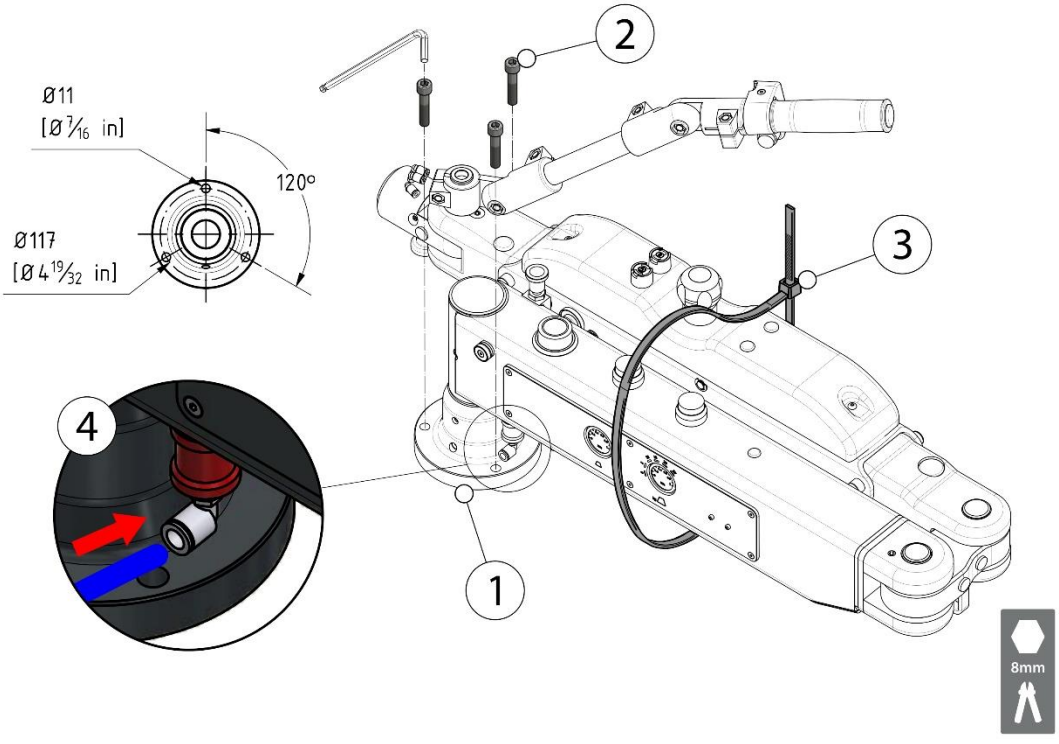


5 INSTALLATION

GENERAL CONSIDERATIONS ABOUT THE INSTALLATION

- ✓ The work bench or installation location must be a horizontal surface, thus avoiding shifts and deviations.
- ✓ The steps to follow for the installation will depend on the fastening method and the alternatives available in the selected location. In any case, the integrator, owner and/or end user is responsible for determining the product's suitability for each use, the installation location, specifically defining the task to be performed within the limits set forth in this manual and the issue of the statement of compliance.
- ✓ ATTENTION! Do not cut the ties, unlock the arm or connect the air intake until the load securing device installation is complete, otherwise the arm could begin a violent upward movement that could cause damage.

1. **Remove the manipulator from its original packaging.**
2. **Secure the base** (1) of the manipulator with three bolts M10 (8mm Allen key).
3. **Install** the load securing device (if any).
4. **Cut the safety flanges** (3).
5. **Make the air connection** (4) (Ø8 mm tube).
6. **Check that the connection has been made properly** and that there is no risk of leaks or anomalies in the supply.



INSTALLATION LOCATION

Do not install the equipment in environments such as:

- ✓ Areas with explosion or fire hazards
- ✓ Exterior areas
- ✓ Corrosive areas
- ✓ Areas with extreme temperatures (very high or very low)
- ✓ Areas with high humidity
- ✓ Dusty areas
- ✓ Areas with high electromagnetic emissions

SUPPLY AIR

- ✓ The air supply must comply with the specifications shown in [See General Technical Specifications page17].
- ✓ Use clean air. If the compressed air contains chemicals, organic solvents, synthetic oil or corrosive gases, the parts may be damaged or may cause malfunction [See COMPRESSED AIR MAINTENANCE UNIT page43].
- ✓ When there is excessive condensation, install a device that removes water, for example, a dryer or water dryer (condensate collector), on the inlet side of the air filter.

ABOUT THE LOAD SECURING DEVICE

- ✓ If the manipulator has an approved load securing device provided by the manufacturer, this may be assembled in the equipment itself, following the recommendations and guidelines in the manual supplied.
- ✓ If the equipment does not have an approved load securing device, the integrator must attach the assembly/disassembly instructions to this manual.

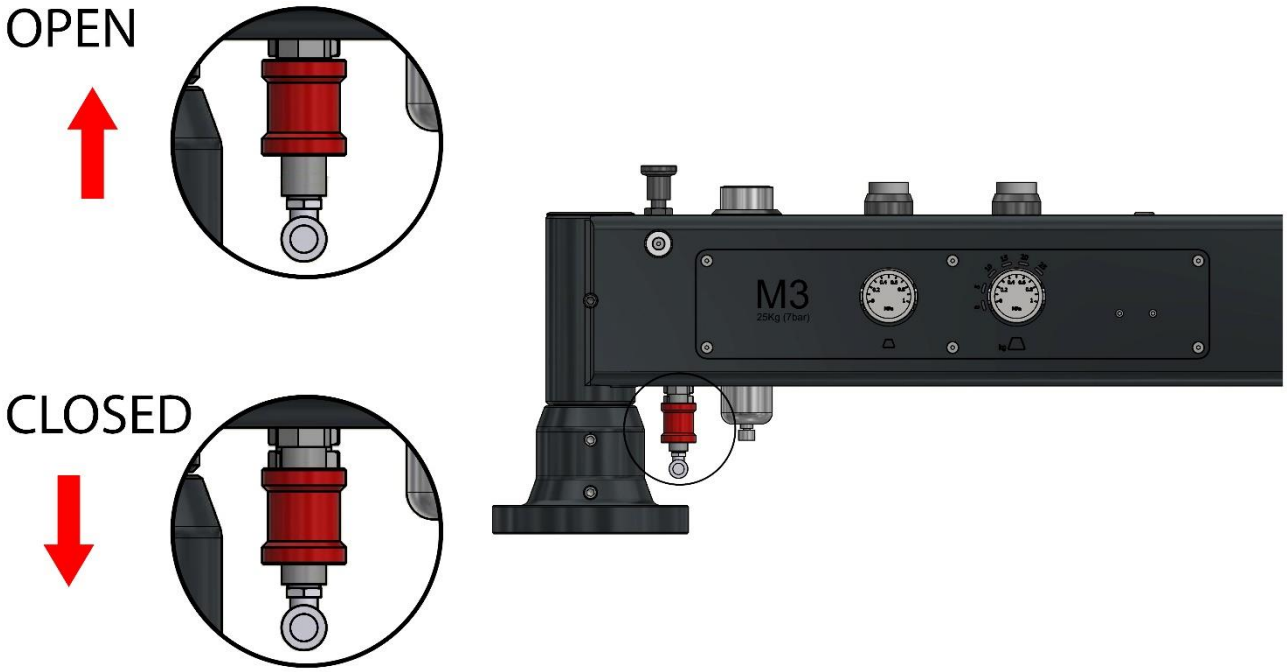
6 ADJUSTMENTS

GENERAL CONSIDERATIONS ABOUT THE SETTINGS

The settings indicated in this section assume that the manipulator and the corresponding load-mounting device are duly installed and integrated following the guidelines in this manual and, if appropriate, in the manual of the load-mounting device supplied.

6.1 OPENING AND CLOSING THE MAIN VALVE

The main valve allows (OPEN position) or restricts (CLOSED position) the passage of pressurised air to the manipulator.



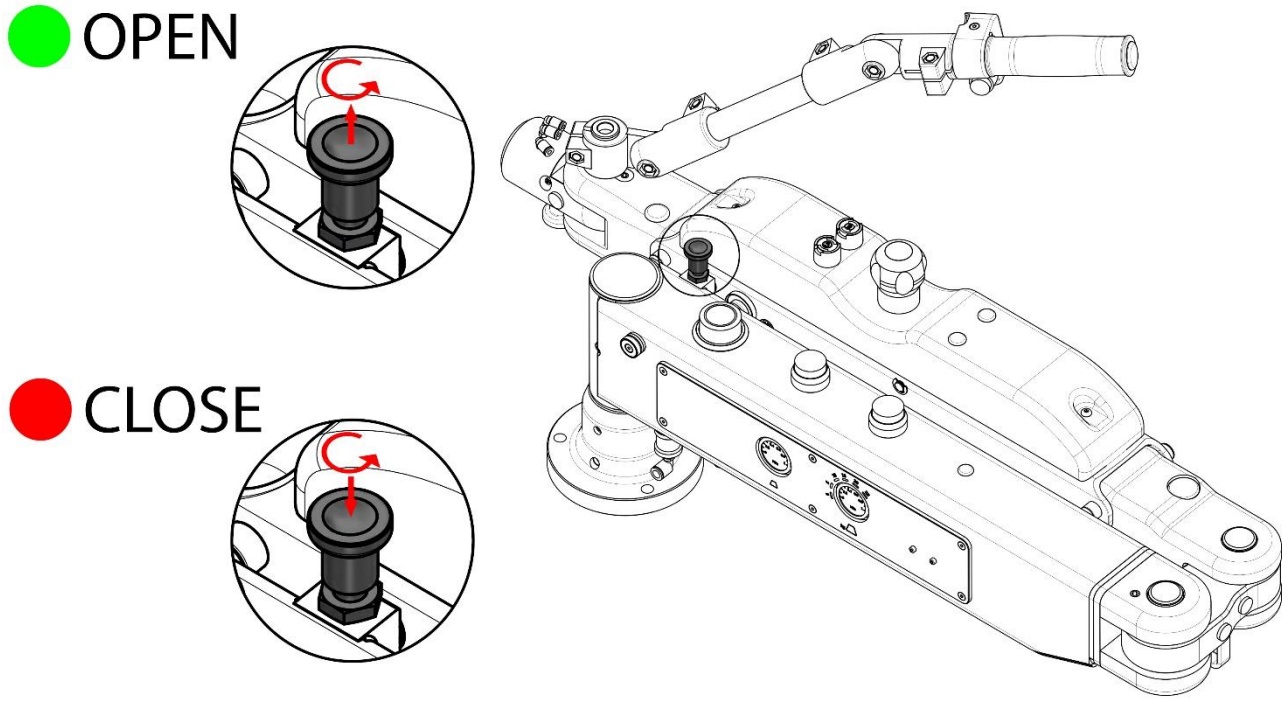
PERIODS OF INACTIVITY

The main valve must restrict the passage of air, closed position (CLOSED), when the equipment is not in use.

6.2 PARKING POSITION – WORKING POSITION

Follow these guidelines to bring the M3 Manipulator to the working position:

1. Unlock the locking device: pull the knob upwards and, without letting go, turn slightly counter-clockwise.
2. Accompany the arm away from its initial position.
3. Proceed in reverse order to interlock the locking device.



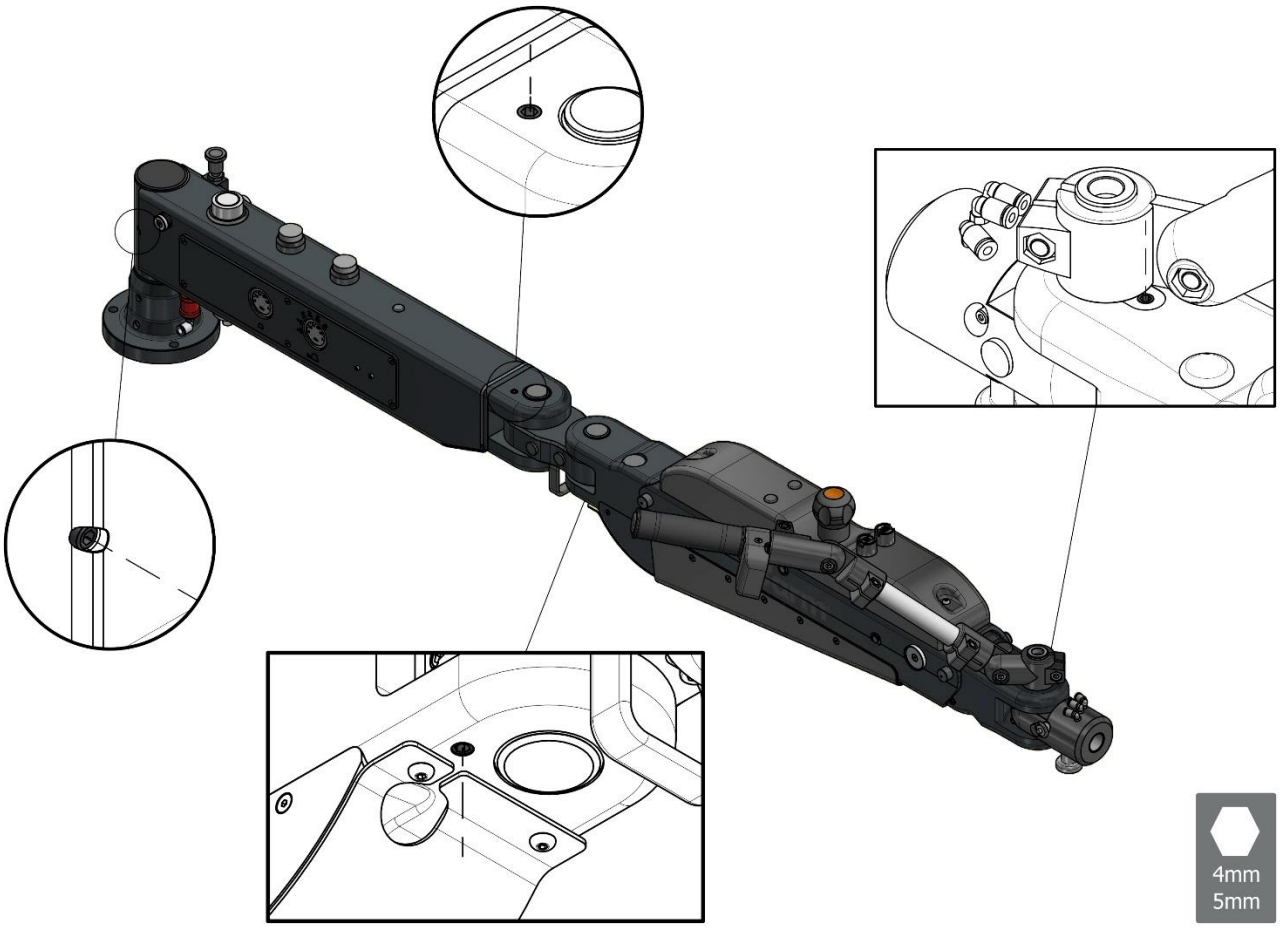
PARKING POSITION

- ✓ When the manipulator is not in use, it must be left in the collected or parking position with the locking device correctly locked.
- ✓ In installation and maintenance tasks and when changing the load securing device, or any other element on the manipulator, position the manipulator in parking mode making sure that the locking device remains correctly locked.
- ✓ Close the main valve while the equipment is not in use.

6.3 REGULATION OF THE RESISTANCE TO ROTATION.

Studs located on the base – parallel, parallel – joint, joint – cross and fork – head enable the rotation of the different axes of the manipulator's movement to be adjusted. The studs can be tightened or loosened to regulate this turning resistance (Allen key 4 and 5 mm).

Regulating the rotating resistance is especially useful in situations where the base of the manipulator is not completely horizontal.



SHIFTING AND DEVIATIONS

Correctly adjusting the regulation of the rotational resistance prevents the risk of shifting and deviations during the operation of the manipulator.

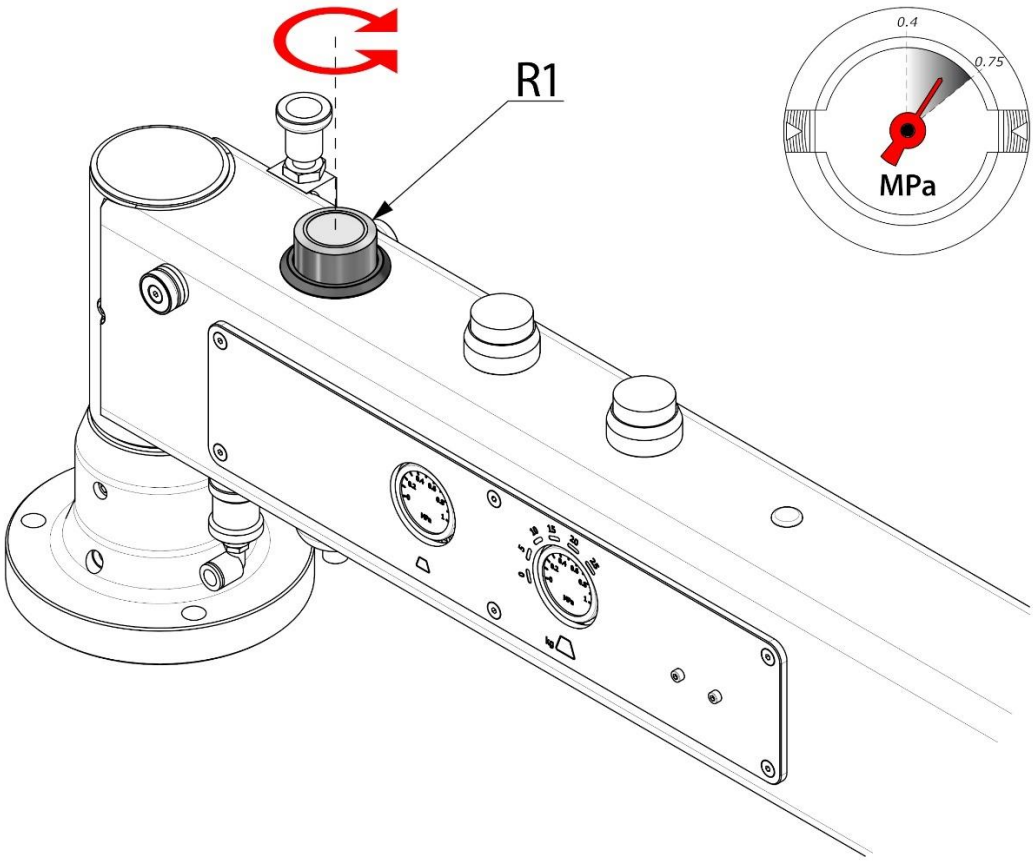
6.4 PRESSURE REGULATION

The objective of this regulation is to maintain the manipulator's swivel arm balanced and therefore ensure the assembly's weightlessness is adapted to the load and working conditions.

6.4.1 Regulating the supply pressure

Adjust the air supply pressure according to the working conditions, by operating the pressure **regulator R1.**

1. Push up on the knob edge to unlock the anti-rotation mechanism.
2. Turn the knob left or right to adjust the pressure. (max. 0.75 Mpa) (Note R1 should be approx. 0.1 Mpa greater than the highest pressure), taking as a reference [SeeWorking pressures page 18].



6.4.2 A high pressure

CAUTION

- ✓ A properly installed and integrated load securing device is required for the adjustment of the loaded and unloaded arm.
- ✓ Refrain from activating high pressure without grip and/or no load.
- ✓ Do not activate low pressure while the manipulator is bearing the load.

There are two working pressures.

- **Low pressure (R2)** This is the pressure that will reach the cylinder when the manipulator is not carrying a load.
- **High pressure (R3)** This is the pressure that arrives at the cylinder when the manipulator is carrying a load.

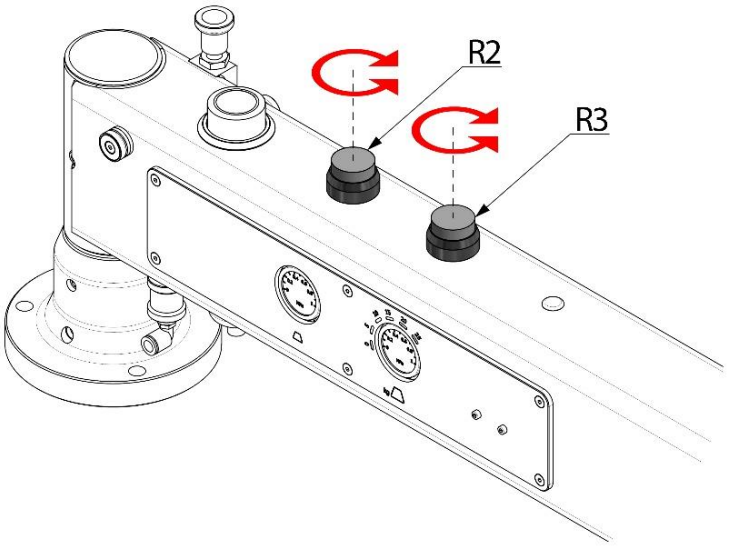
Both pressures must be adjusted according to the working conditions, following these guidelines:

6.4.2.1 Unloaded balanced arm (Low pressure - R2)

1. Ensure that the equipment remains with the low pressure activated [See OPERATIONpage 28].
2. Set the low pressure using the **R2** precision regulator so that the manipulator swivel arm is balanced on its own.

6.4.2.2 Arm balancing with load (High pressure - R3)

1. Ensure that the equipment remains with the high pressure on [See OPERATION page 28].
2. Set the high pressure using the **R3** precision regulator so that the swivel arm of the manipulator is balanced on its own.



6.4.3 Two high pressures

CAUTION

- ✓ A properly installed and integrated load securing device is required for the adjustment of the loaded and unloaded arm.
- ✓ Refrain from activating high pressure without grip and/or no load.
- ✓ Do not activate low pressure while the manipulator is bearing the load.

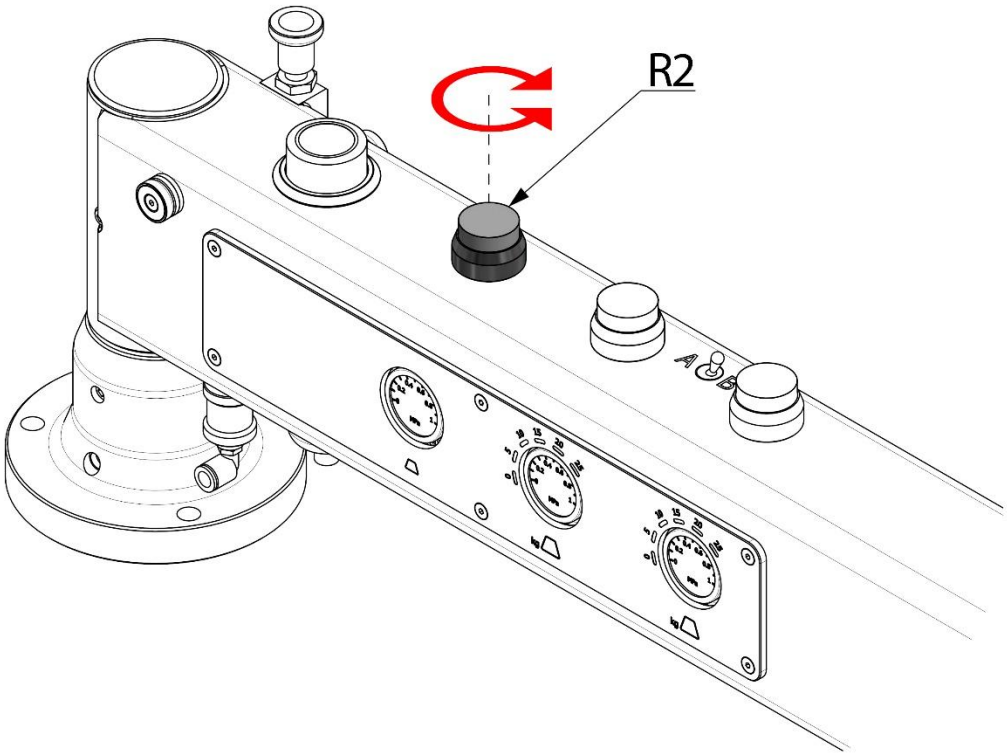
There are two working pressures.

- ***Low pressure (R2)*** This is the pressure that arrives at the cylinder when the manipulator is not carrying a load.
- ***High pressure (R3 and R4)*** This is the pressure that arrives at the cylinder when the manipulator is carrying a load.

Both pressures must be adjusted according to the working conditions, following these guidelines:

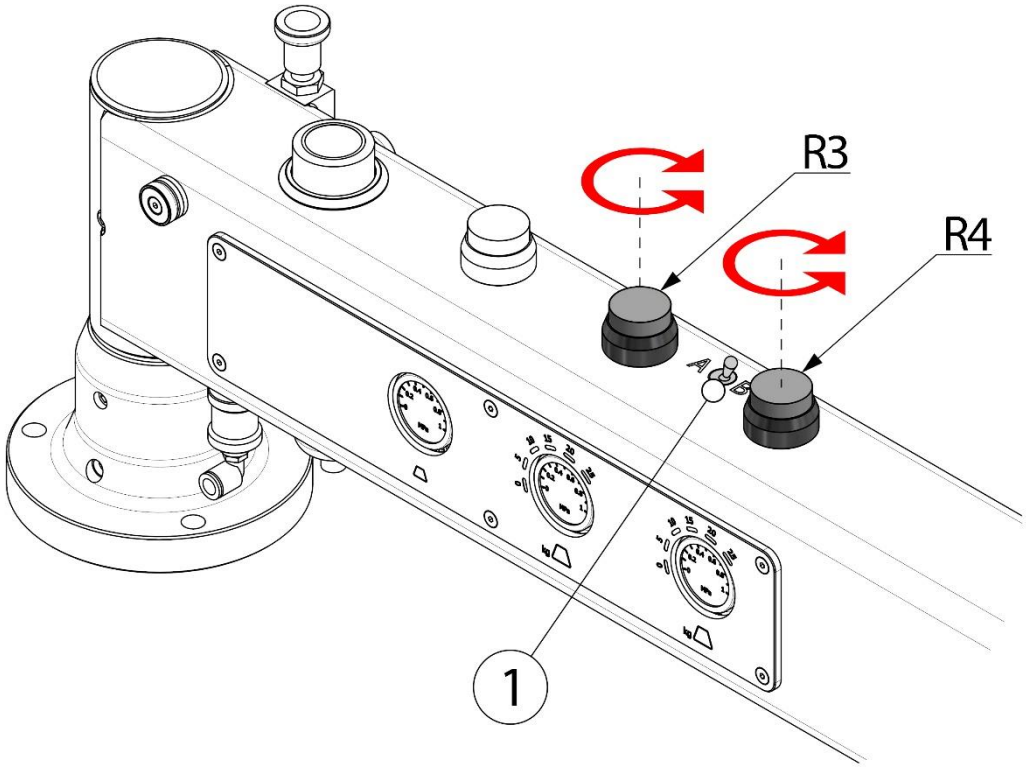
6.4.3.1 Unloaded arm balancing (Low pressure - R2)

1. Ensure that the equipment remains with the low pressure activated [See OPERATION page 28].
2. Set the low pressure using the **R2** precision regulator so that the manipulator swivel arm is balanced on its own.



6.4.3.2 Arm balancing with load (High pressure - R3 and R4)

1. Ensure that the equipment remains with the high pressure on [See OPERATION page28].
2. Set the switch (1) to (A).
3. Set the high pressure using the **R3** precision regulator so that the swivel arm of the manipulator is balanced on its own.
4. Leave the piece and activate the low pressure. Set the switch (1) to (B).
5. Take the next piece and activate the high pressure.
6. Adjust the high pressure using the **R4** precision regulator so that the swivel arm of the manipulator balances on its own.



7 OPERATION

The manipulator is designed to handle loads manually.

Although the handling of the load is manual, the pneumatic action helps to grip, orientate and support the load.

INTEGRATION

This manipulator in itself is not a machine; it needs a load-mounting device to perform a determined application. It is the responsibility of the integrator to study, design and validate the load-mounting device depending on the application. This device must be authorised by the manufacturer of the manipulator.

This chapter must be complemented with the corresponding section on the operation of the load-mounting device selected.

OPERATION

The equipment must only be used after correct integration and after correctly installing the load securing device.

7.1 SINGLE HANDLEBAR

OPERATION

- The following information regarding the operation of the M3 Manipulator is informative. The equipment must only be used after correct integration and after correctly installing the load securing device.
- Do not activate the high pressure without a load-mounting device duly installed and integrated.

All the actuators on[3] the equipment must remain locked to prevent unintentional activation.

To **activate the high pressure**:

1. Bi-manual safety system, press and hold button (1) and then press the button (2). The air flow to the actuator will be enabled and this will then be able to carry out its function.
2. Bi-manual safety system, press and hold button (1) and then press the button (2). High pressure is activated.

NOTE: It is possible to perform both tasks (activate the actuators and the high pressure) in one step. To do so, press and hold the buttons (1 and 2) for a few additional seconds.

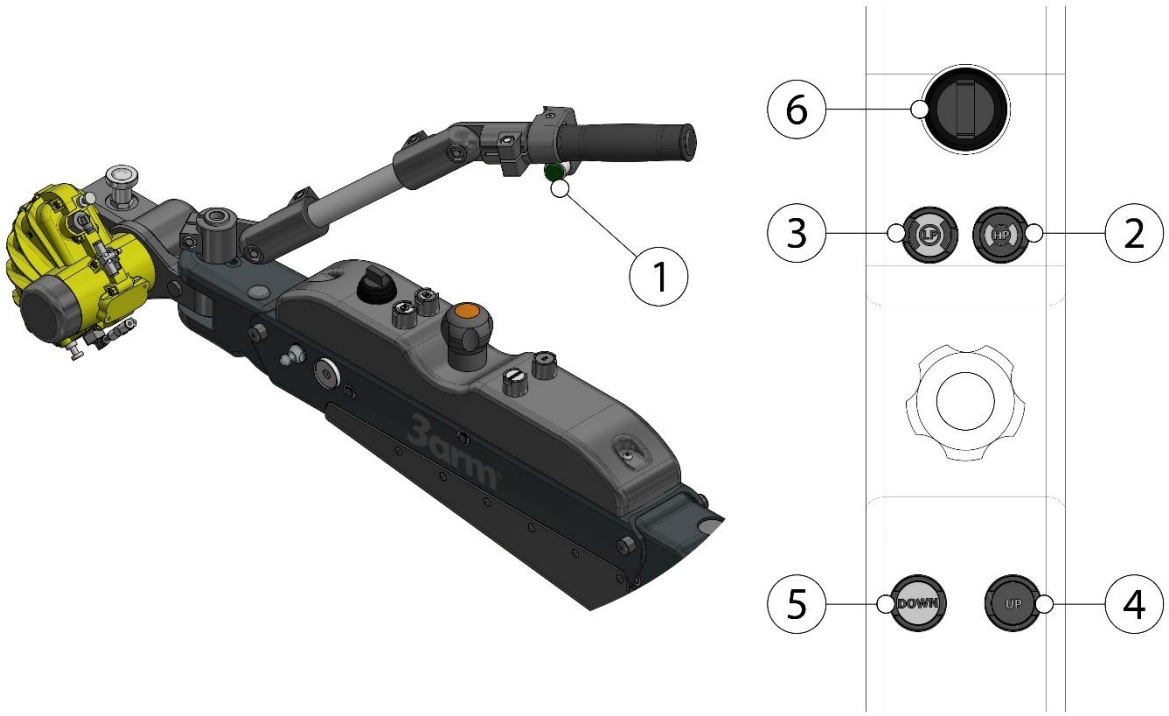
To **activate the low** pressure:

1. Bi-manual safety system, press and hold button (1) and then press the button (3). The low pressure is activated.
2. Bi-manual safety system, press and hold button (1) and then press the button (3). The air flow to the actuator is allowed to deactivate it.

NOTE: It is possible to carry out both tasks (low pressure activation and deactivation of actuators) in a single step; to do this, press and hold the buttons (1 and 3) for a few additional seconds.

If the manipulator is purchased together with a suitable securing device, the complete operating cycle can be found in the appendix for the corresponding securing device.

[3] Actuators of the Manipulator: Opening/closing clamp or securing device, transition from low to high pressure or vice versa, up/down movement of the lifting accessories, movement of the rotation modules or Revolving module.



IDENT	ACTUATOR
1	ENABLING MECHANISM/SAFETY SYSTEM
2	CLOSE MOUNTING DEVICE + HIGH PRESSURE
3	LOW PRESSURE + OPEN MOUNTING DEVICE
4*	RAISE PNEUMATIC HOIST / COLUMN D63
5*	LOWER PNEUMATIC HOIST / COLUMN D63
6*	ACTIVATION OF REVOLVING OR ROTATING ACTUATOR

***Optional**

ⓘ ADDITIONAL INFORMATION

Only for equipment with a lift (4) and (5).

To **raise the manipulator** you must:

Bi-manual safety system, press and hold button (1) and then press the button (4). The set will rise.

To **lower the manipulator** you must:

Bi-manual safety system, press button (1) and, without releasing it, press button (6). The assembly will be lowered.

ⓘ ADDITIONAL INFORMATION

Only for equipment with actuator (6) [See HEADS page57].

7.2 DOUBLE HANDLEBAR

OPERATION

- The following information regarding the operation of the M3 Manipulator is informative. The equipment must only be used after correct integration and after correctly installing the load securing device.
- Do not activate the high pressure without a load-mounting device duly installed and integrated.

All the actuators on the [4]equipment must remain locked to prevent unintentional activation.

To **activate the high pressure**:

1. Bi-manual safety system, press and hold button (1) and then press the button (2). The air flow to the actuator will be enabled and this will then be able to carry out its function.
2. Bi-manual safety system, press and hold button (1) and then press the button (2). High pressure is activated.

NOTE: It is possible to perform both tasks (activate the actuators and activate the high pressure) in a single step. To do so, press and hold the button (1 and 2) a few additional seconds.

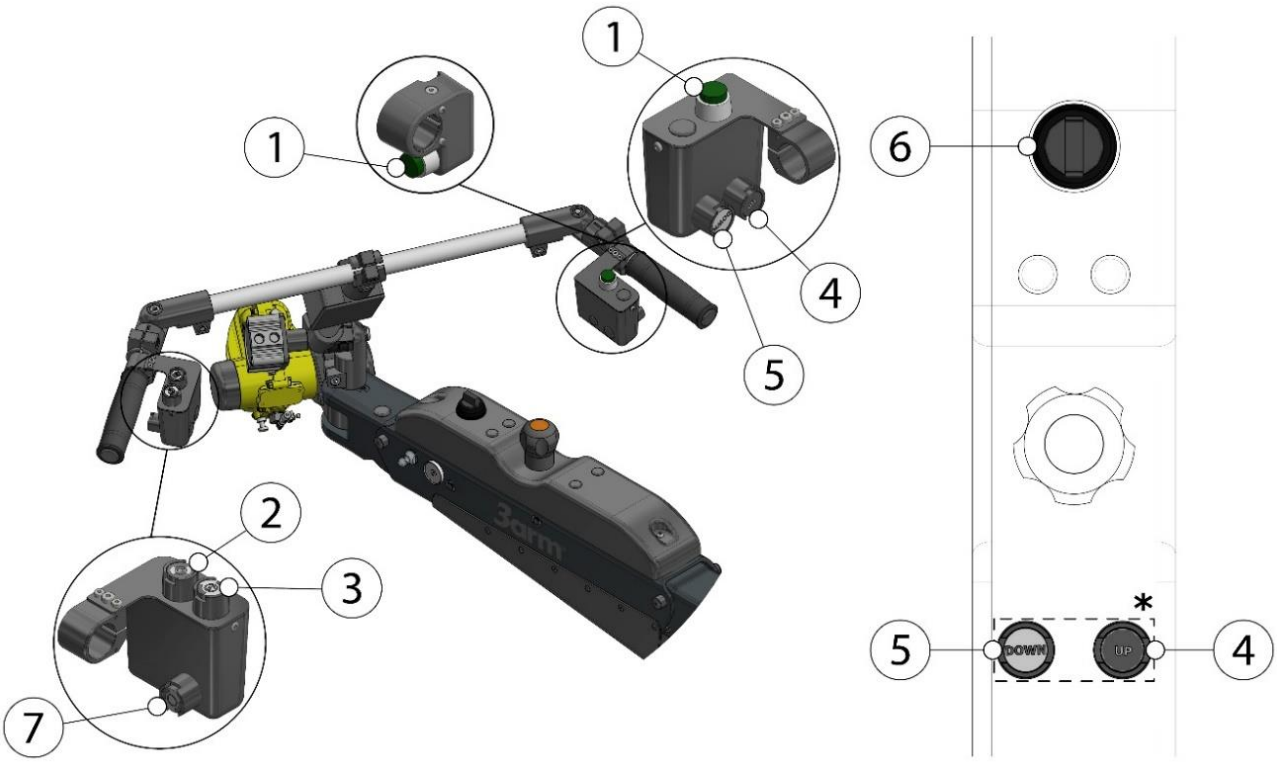
To **activate the low** pressure:

1. Bi-manual safety system, press and hold button (1) and then press the button (3). The low pressure is activated.
2. Bi-manual safety system, press and hold button (1) and then press the button (3). The air flow to the actuator is allowed to deactivate it.

NOTE: It is possible to perform both tasks (activate the low pressure and deactivate actuators) in a single step; to do this, press and hold the button (1 and 3) a few additional seconds.

If the manipulator is purchased together with a suitable securing device, the complete operating cycle can be found in the appendix for the corresponding securing device.

[4] Actuators of the Manipulator: Opening/closing clamp or securing device, transition from low to high pressure or vice versa, up/down movement of the lifting accessories, movement of the rotation modules or Revolving module.



*Lift controls (4) and (5) are only on the handlebar or cover

IDENT	ACTUATOR
1	ENABLING MECHANISM/SAFETY SYSTEM
2	CLOSE MOUNTING DEVICE + HIGH PRESSURE
3	LOW PRESSURE + OPEN MOUNTING DEVICE
4*	RAISE PNEUMATIC HOIST / COLUMN D63
5*	LOWER PNEUMATIC HOIST / COLUMN D63
6*	ACTIVATION OF REVOLVING OR ROTATING ACTUATOR
7*	PNEUMATIC HANDLEBAR LOCK

***Optional**

ADDITIONAL INFORMATION

Only for equipment with a lift.

To **raise the manipulator** you must:

Bi-manual safety system, press and hold button (1) and then press the button (4). The set will rise.

To **lower the manipulator** you must:

Bi-manual safety system, press button (1) and, without releasing it, press button (6). The assembly will be lowered.

ADDITIONAL INFORMATION

Only for equipment with a pneumatic lock on the handlebar.

To **lock the handlebar**:

Bi-manual safety system, press and hold button (1) and then press the button (7). This activates the pneumatic lock of the handlebar and locks it.

ADDITIONAL INFORMATION

Only for equipment fitted with actuator (6) [See HEADS page57].

7.3 VERTICAL HANDLEBAR

This handlebar is specially designed for fast and dynamic handling applications, using suction cup or magnet-type actuators. In the case of applications with grippers, a bi-control button is added for the user's safety.

OPERATION

The following information regarding the operation of the M3 Manipulator is informative. The equipment must only be used after correct integration and after correctly installing the load securing device.

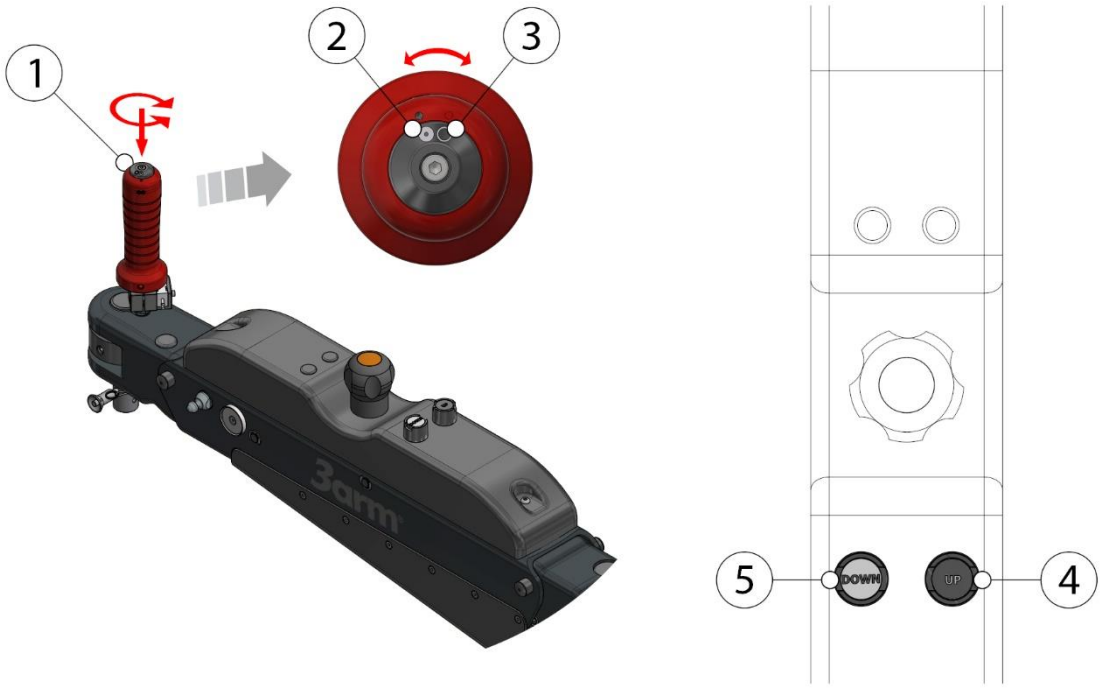
The handle remains locked by default to prevent accidental activation of the high/low pressure, or opening of the grippers or mounting devices.

To **activate the high pressure**:

1. Press the central button of the handle (1) and, without releasing it, turn it counter clockwise (2). The load securing device, e.g. a suction cup, will close its grip.
2. Then the high pressure will be activated (High pressure ⊙).

To **activate the low** pressure:

1. Press the centre button of the handle (1) and, without releasing it, turn it clockwise (3). Low pressure is activated (Low pressure ○).
2. Then the load-mounting device, for example grippers, will close its jaws.



OPERATING THE HANDLE
(Option for manipulators without handlebar and/or vertical movement)

- ✓ If the handle is positioned at (2), and the pressure gauge of the regulator (R3) shows pressure without the manipulator supporting the load, there is a danger of the arm starting to move upwards suddenly.
- ✓ Refrain from positioning the handle on (2), with no grip and no load.
- ✓ Do not position the handle on (3) while the manipulator is loaded.

IDENT	ACTUATOR
1	ENABLING MECHANISM/SAFETY SYSTEM
2	CLOSE MOUNTING DEVICE + HIGH PRESSURE
3	LOW PRESSURE + OPEN MOUNTING DEVICE
4*	RAISE PNEUMATIC HOIST / COLUMN D63
5*	LOWER PNEUMATIC HOIST / COLUMN D63

***Optional**

ADDITIONAL INFORMATION

Only for equipment with a lift.

To **raise the manipulator** you must:

Press the button (4). The set will rise.

To **lower the manipulator** you must:

Press the button (5). The assembly will be lowered.

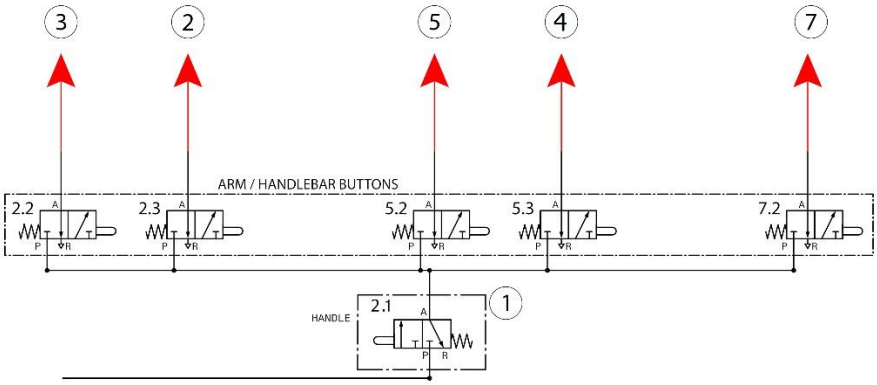
8 SAFETY DEVICES

8.1 BI-MANUAL SYSTEM

With single or double handlebar any of the movements commanded by the buttons (2.2, 2.3, 5.3 and 7.2[5]) will be blocked by default. **Enabling is only possible if the safety button (2.1) is pressed and held beforehand.**

The operating mode will then be as follows:

Press and hold the two-hand safety button (2.1) and, without releasing it, press the buttons (2.2, 2.3, 5.2, 5.3 y 7.2[5]) as required [See OPERATION page 28].



VERIFICATION

✓ Its correct operation must be checked as detailed below and at the periods indicated in the maintenance programme [See MAINTENANCE PROGRAMME page 42].

1- Move the arm to its retracted or parking position [See PARKING POSITION – WORKING POSITION page 22].

2- Open the main valve (OPEN position) [See OPENING AND CLOSING THE MAIN VALVE page 21].

3- Check that the buttons on the control cover are not operational.

4- Press and hold the two-hand safety button (2.1) and, without releasing it, press the buttons (2.2, 2.3, 5.2, 5.3 and 7.2[5]) as required [See OPERATION page 28] to check its correct operation.

CAUTION

Before checking, it is be a good idea to set the supply pressure R1 so that the parking system does not receive the stress of activating the high pressure [See Regulating the supply pressure page 24].

[5] Only with double handlebar

8.2 COMBINED USE OF BUTTON AND HANDLE

OPERATION

✓ The following information regarding the operation of the M3 Manipulator is informative. The equipment must only be used after correct integration and after correctly installing the load securing device.

This safety device locks the rotation of the vertical handlebar grip (the functions: opening and closing the load securing device and adjusting the pneumatic cylinder are locked).

To unlock, the operator must press the central button and, without releasing it, turn the handle in the appropriate direction. [See VERTICAL HANDLEBAR page 34].

This device prevents the suspended load from being released by an involuntary or accidental action.

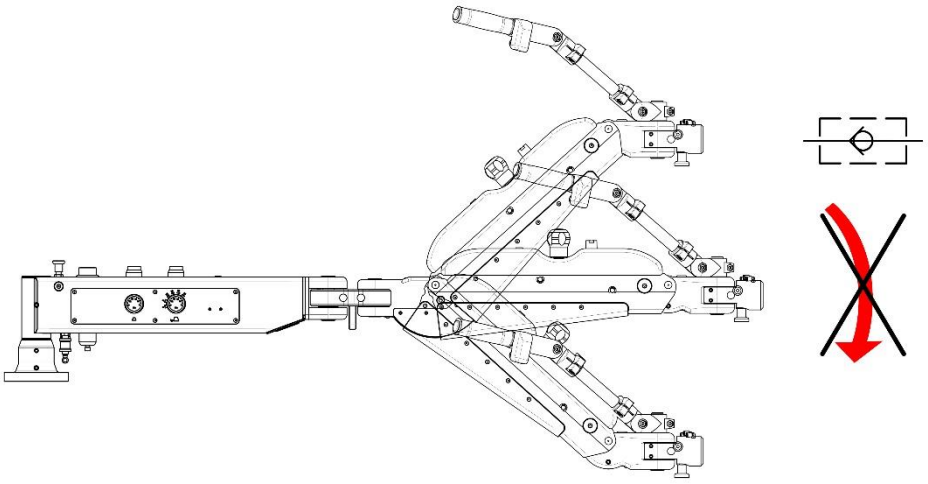
VERIFICATION

✓ Its correct operation must be checked as detailed below and at the periods indicated in the maintenance programme [See MAINTENANCE PROGRAMME page 42].

1. Move the arm to its retracted or parking position [See PARKING POSITION – WORKING POSITION page 22].
2. Open the main valve (OPEN position) [See OPENING AND CLOSING THE MAIN VALVE page 21].
3. Turn the handle without pressing the central button. The handle (red part in the image) will remain locked.
4. Press and hold the central button and turn the handle (red part in the image).

8.3 LOCKING THE ARM'S SWIVEL MOTION

In the event of sudden failure of the pneumatic power supply, a non-return valve will lock the arm preventing uncontrolled and sudden descent.



VERIFICATION

- ✓ Its correct operation must be checked as detailed below and at the periods indicated in the maintenance programme. [See MAINTENANCE PROGRAMME page 42].
- ✓ To ensure this verification is effective, an approved load securing device must be installed next to the manipulator.

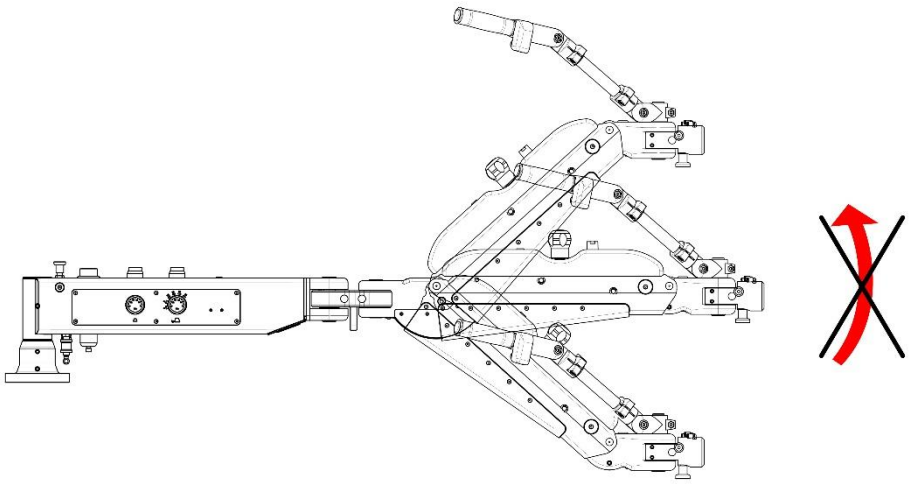
Steps for verification:

1. Open the main valve (ON position) and check the air supply [See OPENING AND CLOSING THE MAIN VALVE page 21].
2. Activate high pressure in the equipment [See OPERATION page 28].
3. Close the main valve (CLOSED position) [See OPENING AND CLOSING THE MAIN VALVE page 21].

The swivel arm must remain still or be lowered slightly after the air supply is cut off.

8.4 SAFETY VALVE IN THE ACTUATOR TO ENSURE THE PART IS CLAMPED CORRECTLY (OPTIONAL)

If the part to be manipulated is incorrectly clamped and an attempt is made to activate high pressure, it will not be activated, thus avoiding uncontrolled and sudden ascent.



VERIFICATION

- ✓ Its correct operation must be checked as detailed below and at the periods indicated in the maintenance programme. [See MAINTENANCE PROGRAMME page 42].
- ✓ To ensure this verification is effective, an approved load securing device must be installed next to the manipulator.

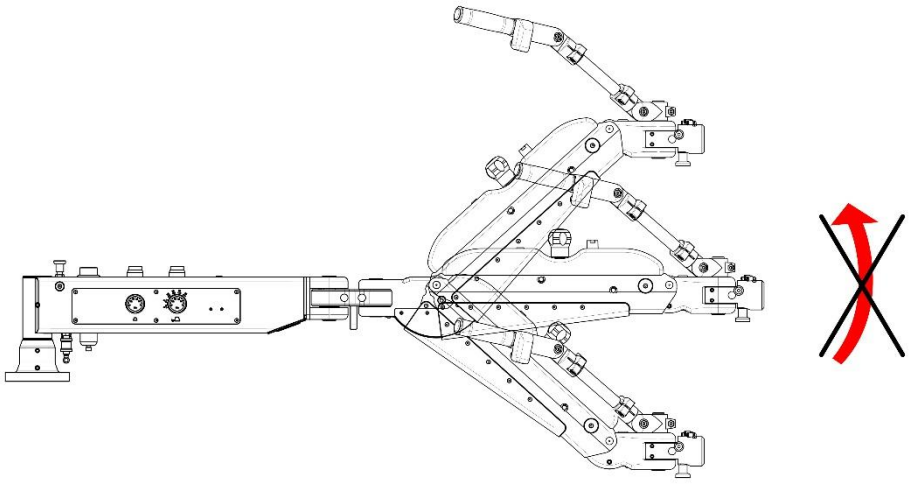
Steps for verification:

1. Open the main valve (OPEN position) and check the air supply [See OPENING AND CLOSING THE MAIN VALVE page 21].
2. Activate the actuator with the part to be clamped. [See OPERATION page 28].
3. Check that the safety valve located on the actuator is correctly activated, which indicates that the part is clamped correctly.
4. Disable the actuator [See OPERATION page28].

8.5 LOW PRESSURE ACTIVATION IN CASE OF LOSS OF CORRECT ACTUATOR CLAMPING SIGNAL

Valid if there is a safety valve for correct clamping.

In case of sudden failure of securing the part to be manipulated, low pressure is automatically activated, thus avoiding uncontrolled and sudden rise.



VERIFICATION

- ✓ Its correct operation must be checked as detailed below and at the periods indicated in the maintenance programme. [See MAINTENANCE PROGRAMME page 42].
- ✓ To ensure this verification is effective, an approved load securing device must be installed next to the manipulator.
- ✓ If necessary, have two operators to carry out this task with total safety.

Steps for verification:

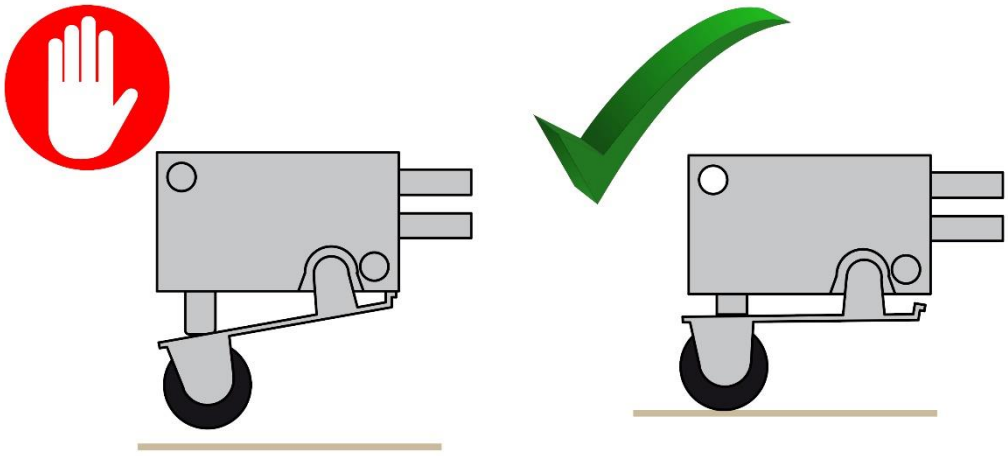
1. Open the main valve (OPEN position) and check the air supply [See OPENING AND CLOSING THE MAIN VALVE page 21].
2. Adjust the high pressure with the regulator R3 to 1 bar above the pressure of the regulator R2.
3. Activate the actuator without any part to be clamped. [See OPERATION page 28].
4. Activate the safety valve located on the actuator and that indicates the correct clamping of the part.
5. Activate high pressure on the equipment. CAUTION: when activating the high pressure, the arm will rise with a force of 4 kg [See OPERATION page28].
6. Stop operating the safety valve and check that the arm drops; that is, that low pressure is activated.

The swivel arm must remain with low pressure activated.

8.6 SAFETY MICRO

If the safety micro notes the presence of the part to be manipulated, this will give the signal so the high pressure can be enabled. If you do not notice the presence of the part, it would not be allowed to activate the high pressure, thus avoiding the arm to rise suddenly and uncontrolled [See SAFETY VALVE IN THE ACTUATOR TO ENSURE THE PART IS CLAMPED CORRECTLY (OPTIONAL)page39 39].

If, with the part already clamped and the high pressure activated, the safety microphone no longer senses the presence of the part being handled, the low pressure will be activated to prevent the uncontrolled and sudden rise of the arm [See LOW PRESSURE ACTIVATION IN CASE OF LOSS OF CORRECT ACTUATOR CLAMPING SIGNALpage40].



8.7 VACUUM SWITCH

If the vacuum pressure switch detects a correct vacuum level it will give the signal to activate the high pressure and make it possible to take the workpiece. If the correct vacuum level is not detected, it will not be possible to enable the high pressure, thus preventing the sudden, uncontrolled elevation of the arm.

9 PNEUMATIC DIAGRAM

Consult the pneumatic diagram corresponding to the chosen configuration with the documentation supplied with your Manipulator.

10 MAINTENANCE

10.1 MAINTENANCE PROGRAMME

DESCRIPTION ELEMENT	ACTION / PERIOD	PERIOD
Regulator filter (air group)	Look for breaks, scratches or any deterioration of the transparent resin vessel on the air filter, regulator.	Periodically
	Replace the filter cartridge.	Every two years or when the pressure drop is 0.1 MPa, whichever comes first.
Bi-manual control (Single and double handlebar)	Checking the correct use of the handle-knob system according to [See BI-MANUAL SYSTEM page 36].	Before each use
Button and handle control (Vertical Handlebar)	Checking the correct use of the handle-knob system according to [See COMBINED USE OF BUTTON AND HANDLE page 37].	Before each use
Crankpin CR (mounted on the head CF5 and CI5)	Rubber components such as gaskets are considered consumables and their condition must be checked every year and replaced every three years. [See CHECKING THE JOINTS page 45]. 	Yearly/every three years
Pneumatic circuit	Check that it is working correctly, especially the safety systems according to [See PNEUMATIC DIAGRAM page 42].	Before each use
Screws and fasteners	Check tightening and functionality of the securing elements.	Periodically
Drain filter regulator	Purge the air filter belonging to the filter regulator assembly.	Periodically
General cleaning	When dirty, clean with a mild household product. Do not use other cleaning agents, as they may cause damage.	Periodically
General check of the pneumatic connections	Carry out a general check of the pneumatic connections. [See PNEUMATIC DIAGRAM page 42].	Periodically
Gas spring	Check its correct operation and, if necessary, replace it [See REPLACING THE CYLINDER AND THE GAS SPRING page 44].	Before each use

10.2 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. ISO 8573-1 2010.

ISO 8573-1:2010 CLASS	PARTICLES				WATER		OIL
	Maximum number of particles of the following size [µm]/m³ of compressed air			Mass Concentration	Vapour Pressure Dewpoint	Content of liquid	Total content (liquid, aerosol, gas)
	0.1 - 0.5 µm	0.5 - 1 µm	1 - 5 µm	[mg/m³]	[°C]	[g/m³]	[mg/m³]
0	By definition of the user, less contamination than class 1						
1	≤ 20000	≤ 400	≤ 10	-	≤ -70	-	≤ 0.01
2	≤ 400000	≤ 6000	≤ 100	-	≤ -40	-	≤ 0.1
3	-	≤ 90000	≤ 1000	-	≤ -20	-	≤ 1
4	-	-	≤ 10000	-	≤ +3	-	≤ 5
5	-	-	≤ 100000	-	≤ +7	-	-
6	-	-	-	≤ 5	≤ +10	-	-
7	-	-	-	5 - 10	-	≤ 0.5	-
8	-	-	-	-	-	0.5 - 5	-
9	-	-	-	-	-	5 - 10	-
X	-	-	-	> 10	-	> 10	> 5

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

10.3 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.

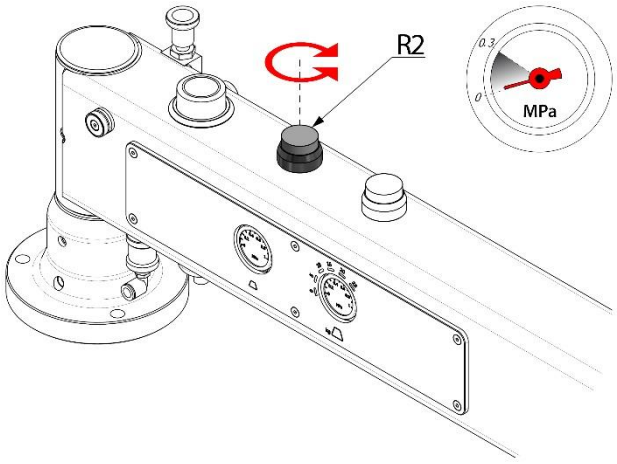
10.4 GENERAL CLEANING

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.

10.5 CHECKING THE GAS SPRING OPERATION

To check that the gas spring is working correctly:

- ✓ Regulate the ***pressure regulator R2 between 0 - 0.3 Mpa***
- ✓ Check that the ***arm is able to stay balanced in a horizontal position within the indicated pressure range.***



10.6 REPLACING THE CYLINDER AND THE GAS SPRING

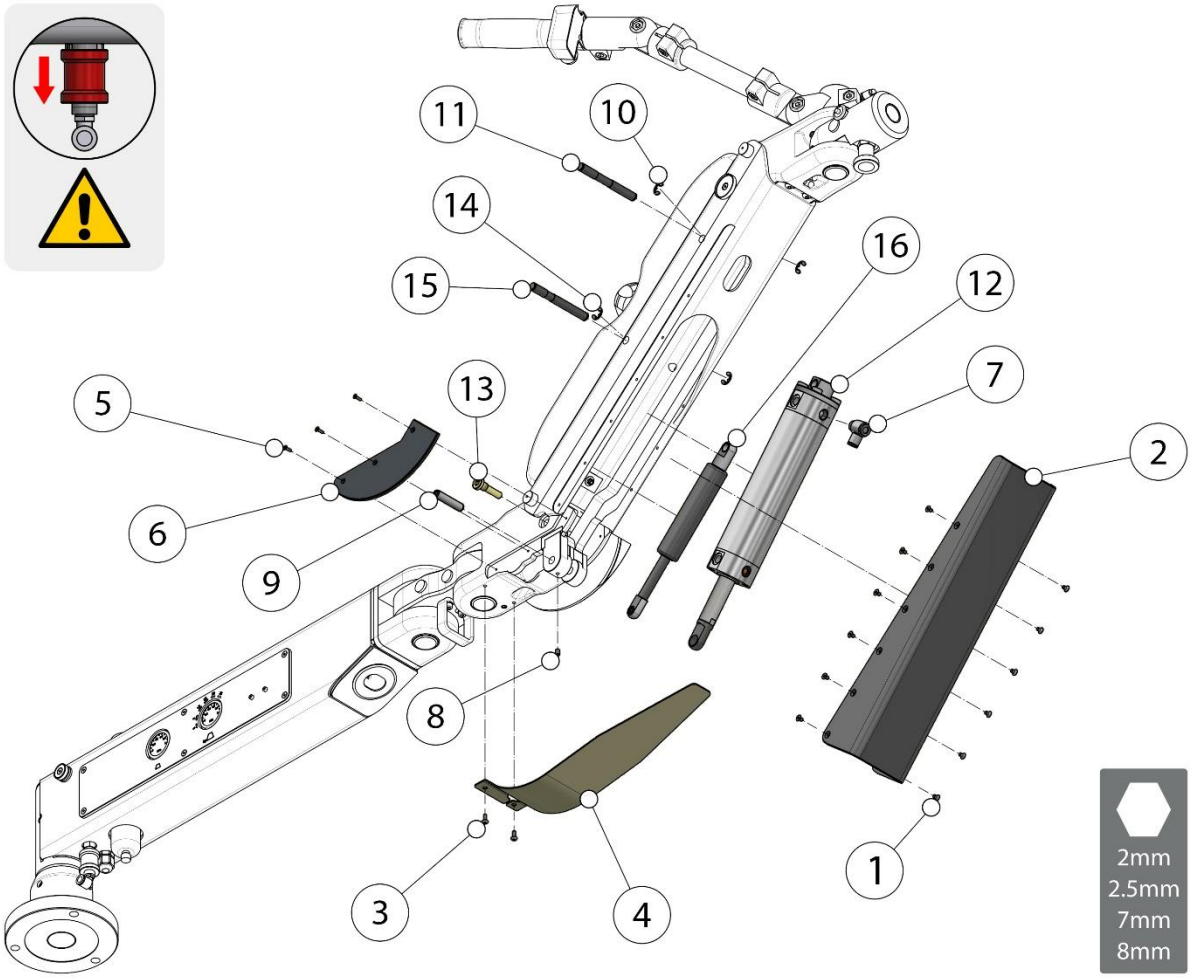
BEFORE REPLACING THE GAS SPRING

- ✓ The equipment must be duly installed and integrated.
- ✓ Disconnect the pneumatic supply from the equipment [See OPENING AND CLOSING THE MAIN VALVE page 21].
- ✓ It is advisable to dedicate two operators to this task.

1. Swivel the arm to its highest position.

KEEP THE ARM IN THAT POSITION

2. Remove the screws (1, 3, 5) (2 and 2.5mm Allen key) and remove the covers (2, 4, 6).
3. Disconnect the air tube from the cylinder and remove the fitting (7) (8mm Allen key).
4. Loosen the stud (8) (2.5mm Allen key) and remove the cylinder shaft (9) (M5 extractor).
5. Remove the lock washers (10) and pull out the shaft (11) to release the cylinder (12).
6. Pull out the crankpin (13) (7mm Allen key) taking care not to drop the spring shaft end.
7. Remove the lock washers (14) and pull out the shaft (15) to release the cylinder (16).
8. Replace the cylinder (12) and/or the gas spring (16) and proceed in reverse order for assembly.



10.7 CHECKING THE PNEUMATIC CIRCUIT

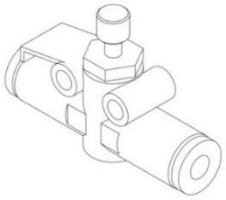
Carry out a general check of the fixings and housings between tubes. Check there is no air leakage and that the connectors are working correctly.

10.8 ADJUSTING THE REGULATORS

The manipulator is fitted with two flow regulators, located under the control cover, which ensure a constant flow to the actuator and low pressure selectors.

These regulators are factory set and serve to adjust the response time between actions and ensure the sequential process of actuator activation and activation of the high pressure, and activation of the low pressure and deactivation of the actuator. If the regulators were too open, there would be no time between actions and if they were too closed they would not be carried out.

If there are problems in the activation or deactivation sequence, they should be adjusted. Please contact your dealer before making the adjustment.

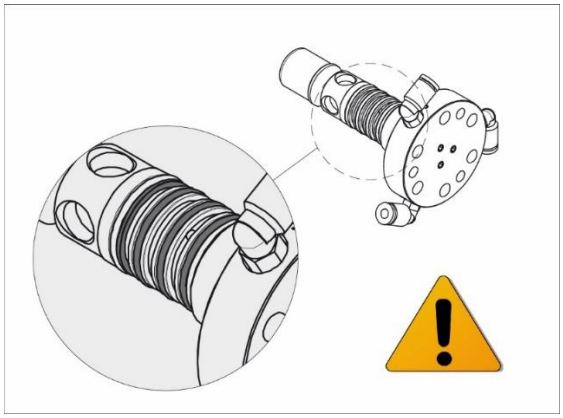


10.9 CHECKING THE JOINTS

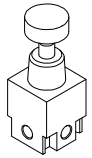
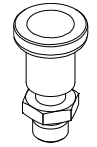
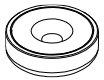
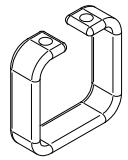
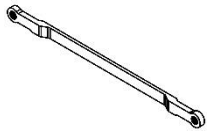
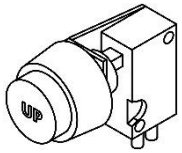
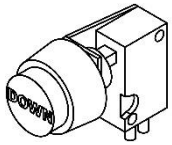
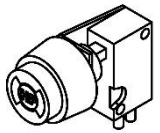
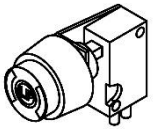
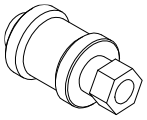
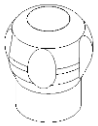
The gaskets located in the coupling allows the continuity of air flow from the manipulator to the grip system so if it is in poor condition, worn and/or badly positioned, it can cause operational problems.

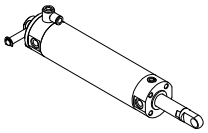
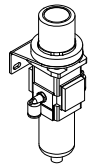
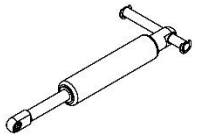
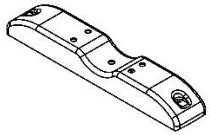
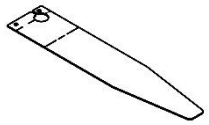
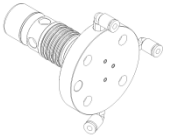
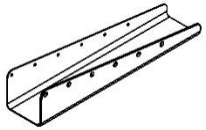
Before inserting the grip system in conjunction with the manipulator head, you must:

Check that each of the four joints is properly positioned in its respective housing. You must also check they are in good condition.



11 SPARE PARTS

CODE	DESCRIPTION	PICT.	CODE	DESCRIPTION	PICT.
NH030116	*PRESSURE REGULATOR*		**AC004046**	*POSITIONER*	
CL035006	*MAGNETIC BASE*		**MV406803**	*GROMMETS UNION M3*	
NH024016	*MANOMETER*		**W3110200**	*BRACE 500 M3*	
M3153100	*BLACK BUTTON (LIFT)*		**M3171800**	*WHITE BUTTON (LOWER)*	
W5187400	*HP BUTTON*		**W5199400**	*LP BUTTON*	
NH026156	*SLIDING VALVE*		**CM10290C**	*KNOB*	

W3110000	*CYLINDER UNIT M3*		***W3109300***	*M5 REGULATOR FILTER UNIT*	
W3109900	*SHOCK ABSORBER UNIT M3*		***W3108100***	*CONTROL COVER M3*	
MV401503	*MAGNETIC BASE FIXING*		***W3106700***	*INF COVER M3*	
W3111600	*CRANKPIN CR M3*		***W3105400***	*CROSS PROTECTION COVER M3*	

12 WARRANTY

See attached guarantee 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. (If load securing device is included, dimensions and weight may vary).

- ✓ External dimensions depending on the segment (width x height x depth), approx. mm: 1090 x 500 x 350 mm
- ✓ Total weight depending on the segment: maximum approx. 30 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.

14 ACCESSORIES

Caution: not all the accessories shown below are compatible. Check the compatibility table [See COMPATIBILITY TABLE page 52].

BENCHES

(1) (2) (3)



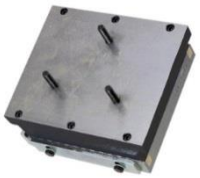
Four wheels (two with brake)
Slots for fastening parts or tools.
Supports for tap holder or tools.

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

SUPPORTS

(1)

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



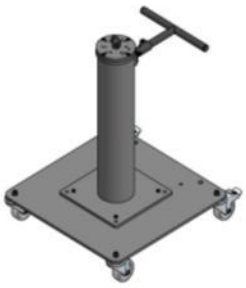
(3)

(2)

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

(4)(5)

TROLLEY

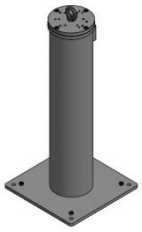


To move the work unit.
It has four orientable wheels.

DESCRIPTION		DIMENSIONS
Forklift truck 800.	800x800 mm	31 1/2" x 31 1/2"
Forklift truck 900	900 x 900 mm	35 7/16" x 35 7/16"
Electrical forklift truck	900 x 900 mm	35 7/16" x 35 7/16"
Electrical forklift truck	800 x 800 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	
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"

LIFTER

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

DESCRIPTION	VERTICAL TRAVEL
Lifter 300	300 mm – 11 7/8"
Lifter 500	500 mm – 19 7/8"
Lifter 750	750 mm – 29 17/32"

COLUMN D63

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 TRAVEL
Column 1500 D63	940 mm – 37"
Column 2000 D63	1440 mm – 56 11/16"
Column 2500 D63	1940 mm – 76 3/8"

EXTENSION

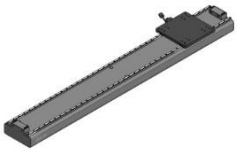
(1)

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

(2)

CODE	DESCRIPTION	ADDITIONAL WORK AREA
ER0010C0	Extension 500 (1)	500 mm – 19 11/16"
ER000100	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	TRAVEL
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 bench-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	TRAVEL
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"

BASE ROTATION LIMITER

Support that limits the rotation of the radial arm of the equipment. The stops can be moved to adjust the range of rotation.

CODE	DESCRIPTION
LG000104	Rotation Limiter

14.1 COMPATIBILITY TABLE

ACCESSORY	M3
SMALL BENCH (500)	⦸
MEDIUM BENCH (850 x 850)	*
LARGE BENCH (1100 x 850)	*
SMALL TIE	⦸
LARGE TIE	*
MAGNETIC SUPPORT	*
CARRIAGE + FIXED COLUMN	●
FIXED COLUMN	●
PNEUMATIC TELESCOPIC LIFT	●
D63 PNEUMATIC LIFTER	●
RADIAL EXTENSION	●
FLOOR RAIL	●
LINEAR GUIDE	*
BASE ROTATION LIMITER	●

● = Compatible
⦸ = NOT Compatible
*= Please inquire

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:	M3 manipulator
Model:	
Serial number:	

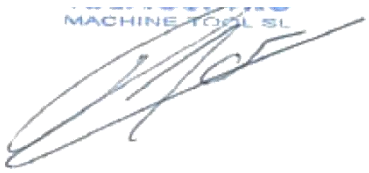
It is classified as a machine according to the Machinery Directive 2006/42/EC and to which this Declaration refers, and complies with the following European EC Directives, and their applicable Essential Health and Safety Requirements (EHSR):

2006/42/EC – Machinery Directive

2014/68/EU – Pressure Equipment Directive

Authorised for documentation:

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



Sant Joan de Vilatorrada, Tuesday, 16 March 2021

Ramon Jou Parrot, Technical Director

3arm®

TECNOSPIRO
MACHINE TOOL SL

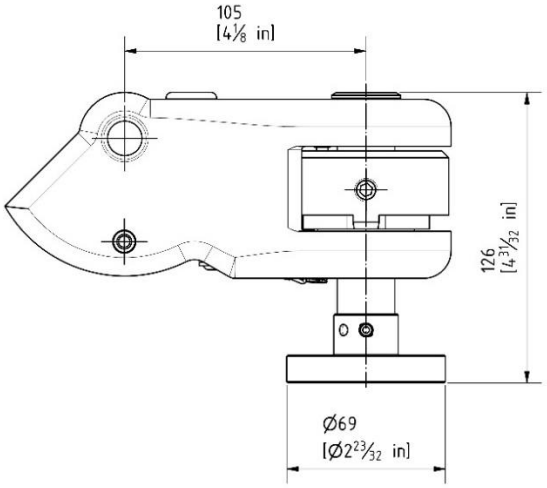
HEAD ATTACHMENT

TABLE OF CONTENTS

1 HEADS

To complement the manoeuvrability of your equipment, the M5 Manipulator has various heads that make it possible to move and rotate the load according to your needs:

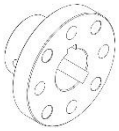
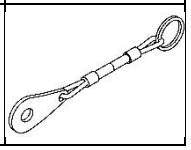
1.1 VERTICAL HEAD (CD5)



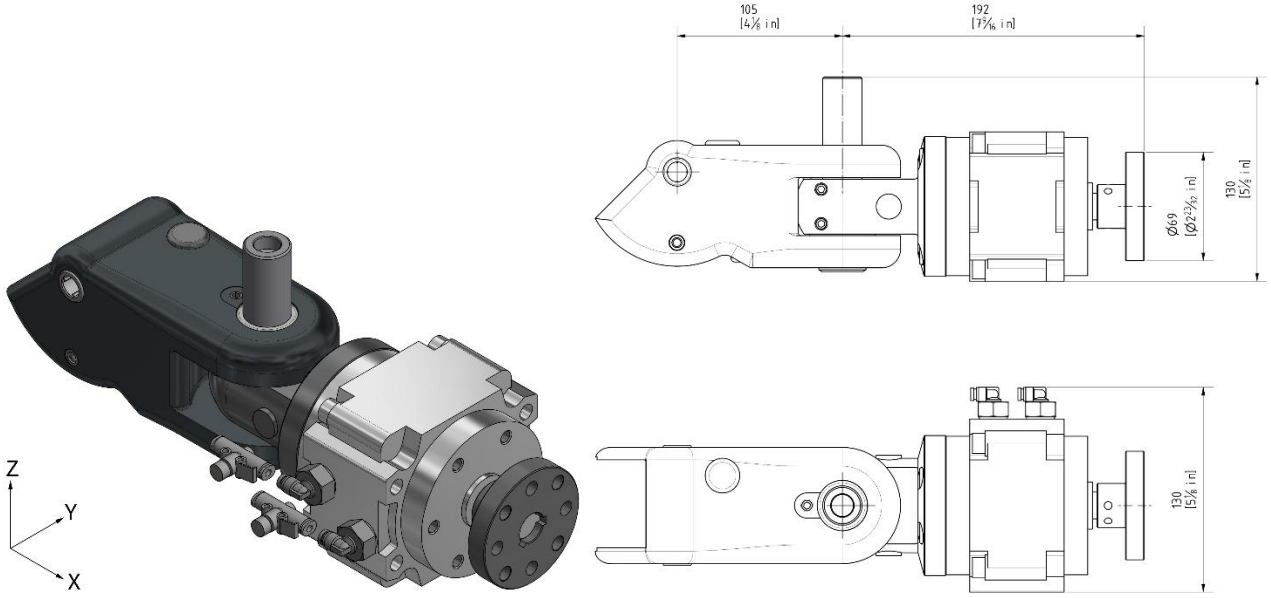
Z: 340º

This head makes it possible to rotate the load manually. To do this:

1. Adjust the rotational speed with the friction lever (1) (4mm Allen key).

CODE	*DESCRIPTION*	*PICT.*
W3103700	SPLINT BW80 M3	
CA019276	NYLON NUT THREAD BOLT M8x20	
CM121800	CABLE RETENTION	

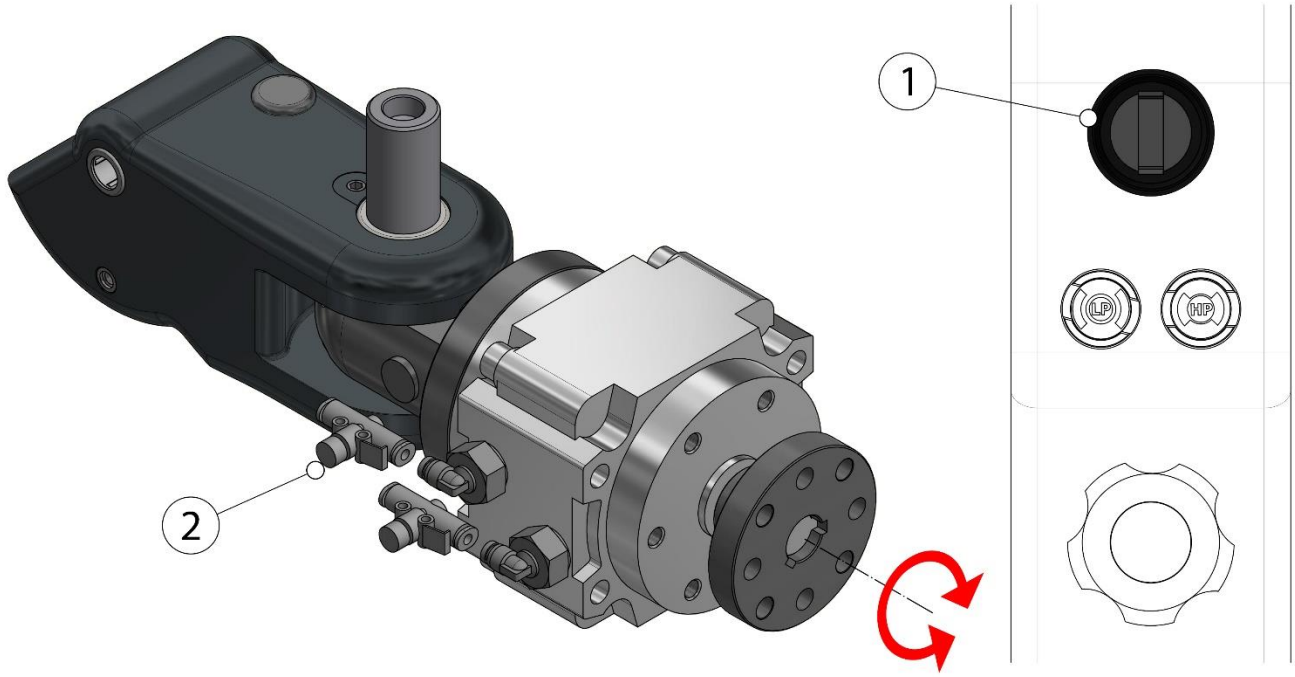
1.2 ROTATING HEAD (CH5)

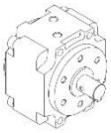
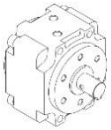
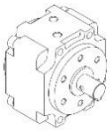
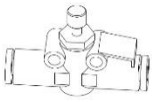
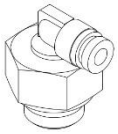
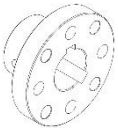
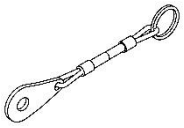


X: 90º / 180º / 270º
Z: ±90º (Swivel base)

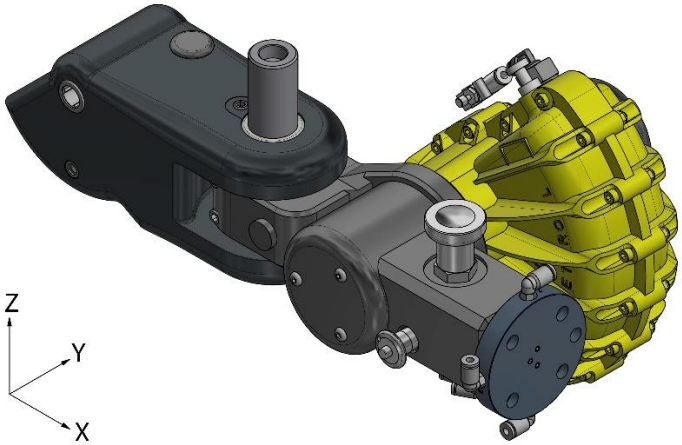
This head makes it possible to rotate the load. To do this:

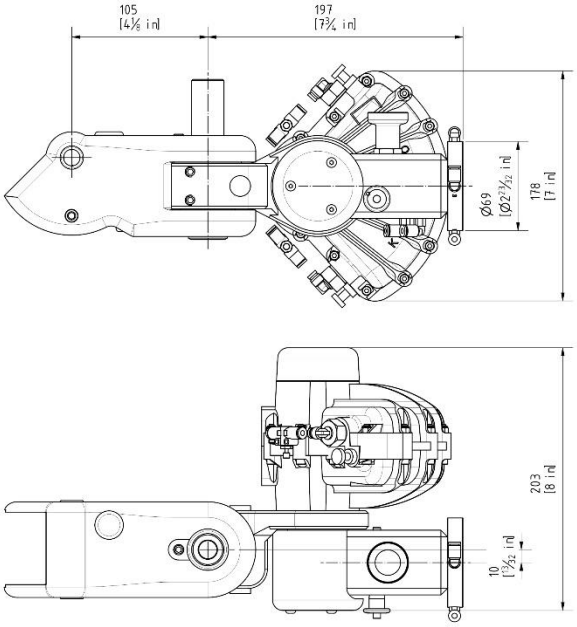
1. Rotate the selector (1).
2. Adjust the rotation speed with the flow regulators (2).



CODE	*DESCRIPTION*	*PICT.*
NH116700	ROTATION ACTUATOR CRB1BW80-90D-XF	
NH075016	ROTATION ACTUATOR CRB1BW100-180S-XF	
NH116800	ROTATION ACTUATOR CRB1BW100-270S-XF	
NH109500	FLOW REGULATOR	
NH027956	MALE ELBOW FITTING	
W3103700	SPLINT BW80 M3	
CM121800	CABLE RETENTION	

1.3 REVOLVING + MANUAL ROTATING HEAD (CF5)





X: 4x90º
Y: 90º±10º [6]
Z: ±90º (Swivel base)

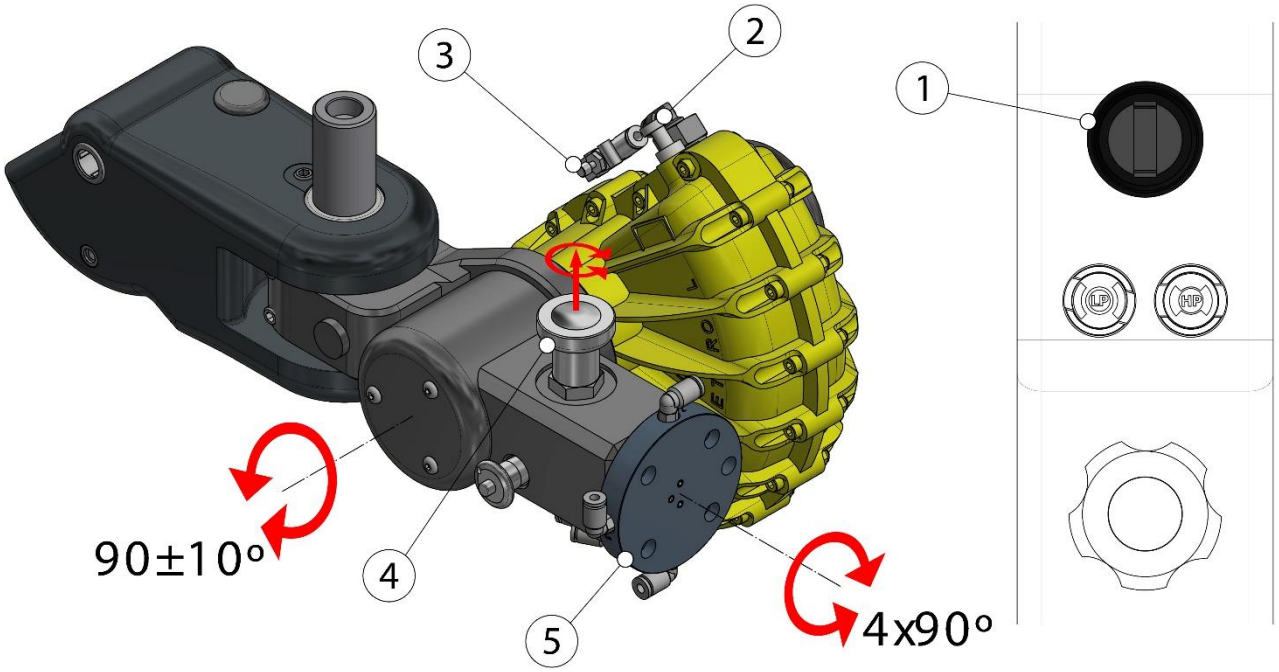
This head makes it possible to swivel and rotate the load. To swivel:

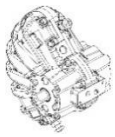
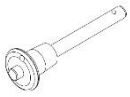
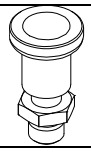
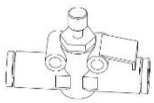
1. Rotate the selector (1).
2. Tighten or loosen the bolts (2) to modify the working angle by ±5º at each limiter.
3. Adjust the rotation speed with the flow regulators (3).

To rotate:

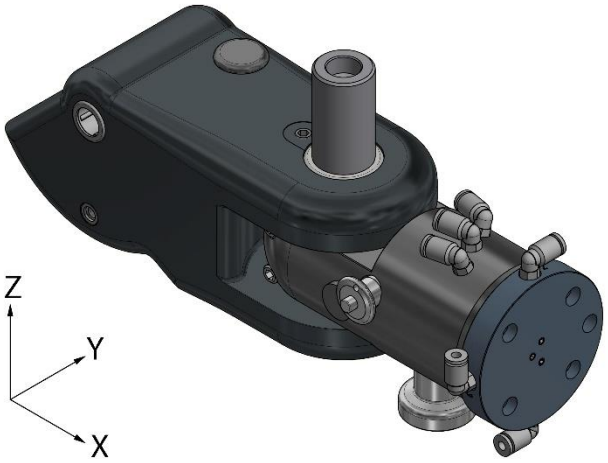
1. Pull and turn the positioner (4) to release the crankpin (5).
2. Position the crankpin (5) in the desired position.

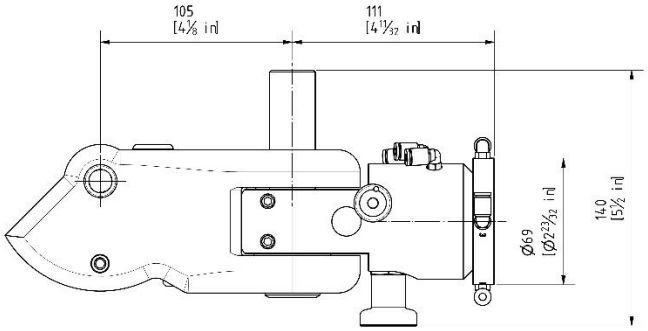
[6] Special models: -180º
-With interior limiters to reduce the rotation angle (less than 90º)



CODE	DESCRIPTION	PICT.
W3111800	REVOLVING MODULE-K07	
W3104000	REVOLVING BACK COVER	
NH027956	MALE ELBOW FITTING	
AC006426	POSITIONER	
AC004086	POSITIONER	
W3111600	CRANKPIN CR M3	
NH109500	FLOW REGULATOR	

1.4 MANUAL ROTATING HEAD (CI5)

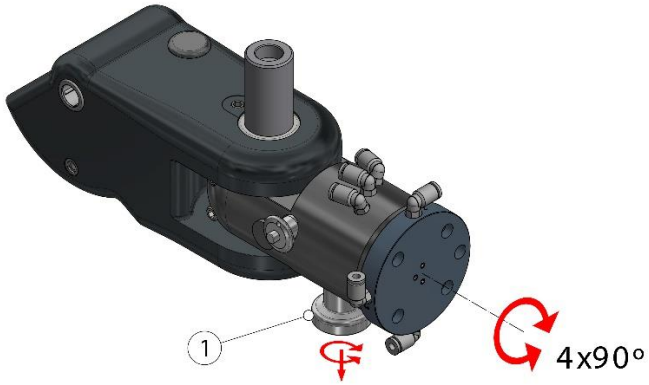


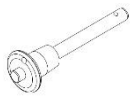
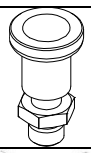
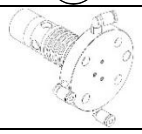


X: 4x90º
Z: ±90º (Swivel base)

This head allows manual rotation of the crankpin every 90º. To do this:

1. Rotate the positioner 180º to release the crankpin.
2. Position the crankpin (5) in the desired position.
3. Rotate the positioner back to its initial position.



CODE	DESCRIPTION	PICT.
AC006426	POSITIONER	
AC004086	POSITIONER	
W3111600	CRANKPIN CR M3	

APPENDIX ACTUATORS

TABLE OF CONTENTS

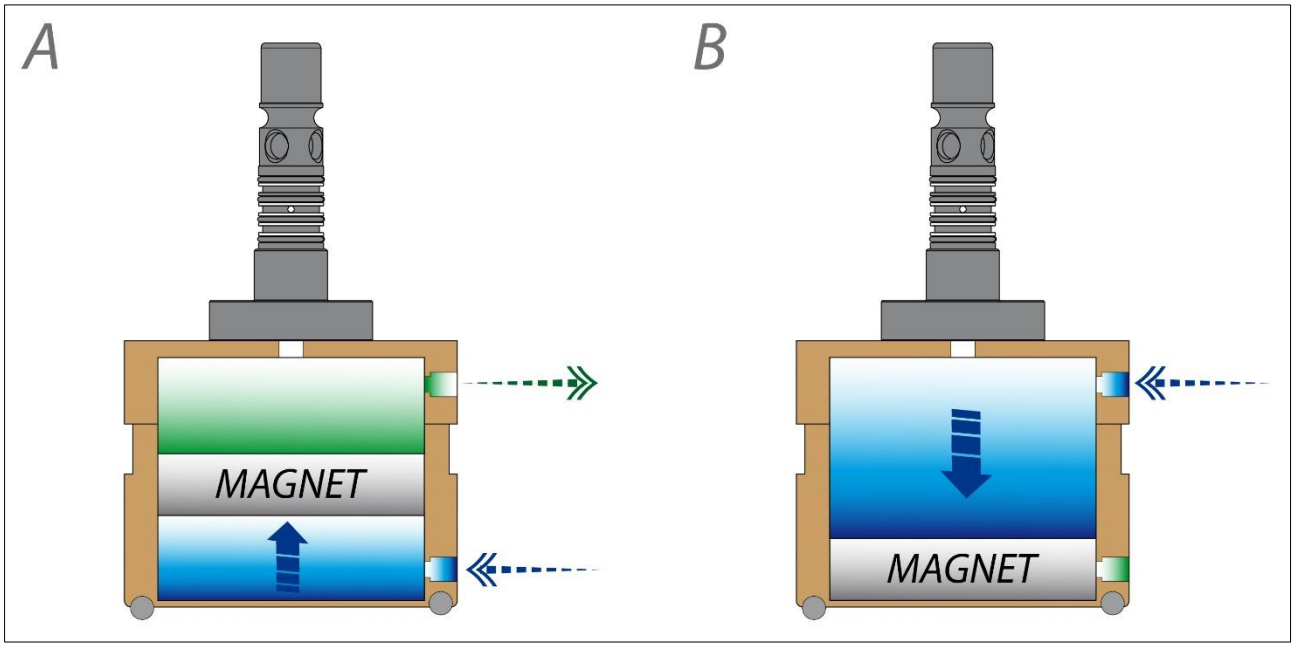
1 ACTUATORS

To complement the functionality of your equipment, the M3 Manipulator has various actuators that make it possible to grip and secure the load according to your needs:

1.1 MAGNET

1.1.1 OPERATING DESCRIPTION AND PRINCIPLE

The magnet-type load clamping device provides the M3 manipulator with the appropriate complement for handling loads of ferrous materials with flat surfaces exceeding 2 mm in thickness (e.g. bars, plates, etc.). In the loose workpiece position, the air pushes the magnet away from the gripping surface. (Drawing to the left - A). In the position to grip the part the air pushes the magnet down, closer to the grip surface (Drawing on the right - B).



WARNING

- ✓ The selection and design must be made carefully for each working load.
- ✓ The integrator/end user must ensure that the load securing device is suitable for the end application.

ADDITIONAL INFORMATION

- ✓ The models with rubber will not mark the surface of the workpiece and increases the friction with the workpiece.

1.1.2 OPERATIVE

WARNING

- ✓ The sequence described below supposes that the installation, settings such as the Opening of the main valve, the regulation of the supply pressure, the balancing of the arm at no load and with load, and the correct integration have been carried out following the guidelines indicated in the manual.
- ✓ Do not release the working load (low pressure) until it is resting on an appropriate, safe surface.
- ✓ Verify that the manipulator and the holding device receive compressed air before each use.

1. Bring the manipulator close to the workload and ensure the holding device remains in contact with the grip surface of the load.
2. Activate the high pressure [See OPERATION page 28].

NOTE: If the high pressure is not activated (and subsequently cannot hold the load) it is likely that the clamping device is not in contact with the workload or only partially. In this case the safety micro-valve will not give the necessary signal to activate the high pressure. [See SAFETY MICRO page 41].

3. Move the working load to the destination location. Rest the load on an appropriate, safe surface.
4. To release the load, activate the low pressure [See OPERATION page 28]. The magnet will stop working.

FAILURE IN THE AIR SUPPLY

- ✓ Although the manipulator's design aims to minimise possible damage arising from an inopportune start-up after a failure in the air supply, the operator must bear in mind that the swivel arm of the M3 Manipulator, as well as its load securing device and consequently the working load can descend sharply and unexpectedly, or ascend suddenly and inappropriately after the air supply is re-established.
- ✓ If the air supply is cut off, close the main valve and move the manipulator to its retracted or parking position, ensuring that the closing device is activated [See OPENING AND CLOSING THE MAIN VALVE and Retracted position – Parking page 21 and 14].

1.2 CLAMP

1.2.1 OPERATING DESCRIPTION AND PRINCIPLE

The clamp-type gripping device provides the M3 manipulator with the correct grip on the workload, as well as the necessary movements for proper handling.

Its main application is the manipulation and lifting of preferably cylindrical or circular loads. (Example: crankshafts and camshafts).

The jaws are opened and closed using the compressed air, which pushes the piston up or down. The lever system of the kinematic system converts the vertical movement of the piston into a synchronous angular movement of the jaws (in angular models) or a parallel movement (in parallel models).

WARNING

- ✓ The selection and design must be made carefully for each working load.
- ✓ The integrator/end user must ensure that the load securing device is suitable for the end application.

1.2.2 OPERATIVE

WARNING

- ✓ The sequence described below supposes that the installation, settings such as the Opening of the main valve, the regulation of the supply pressure, the balancing of the arm at no load and with load, and the correct integration have been carried out following the guidelines indicated in the manual.
- ✓ Do not release the working load (low pressure) until it is resting on an appropriate, safe surface.
- ✓ Verify that the manipulator and the holding device receive compressed air before each use.

1. Bring the manipulator close to the workload and ensure the holding device remains in contact with the grip surface of the load.
2. Activate the high pressure [See OPERATION page 28].

NOTE: If the high pressure is not activated (and subsequently cannot hold the load) it is likely that the clamping device is not in contact with the workload or only partially. In this case the safety micro-valve will not give the necessary signal to activate the high pressure. [See SAFETY MICRO page 41].

3. Move the working load to the destination location. Rest the load on an appropriate, safe surface.
4. To release the load, activate the low pressure [See OPERATION page 28]. The magnet will stop working.

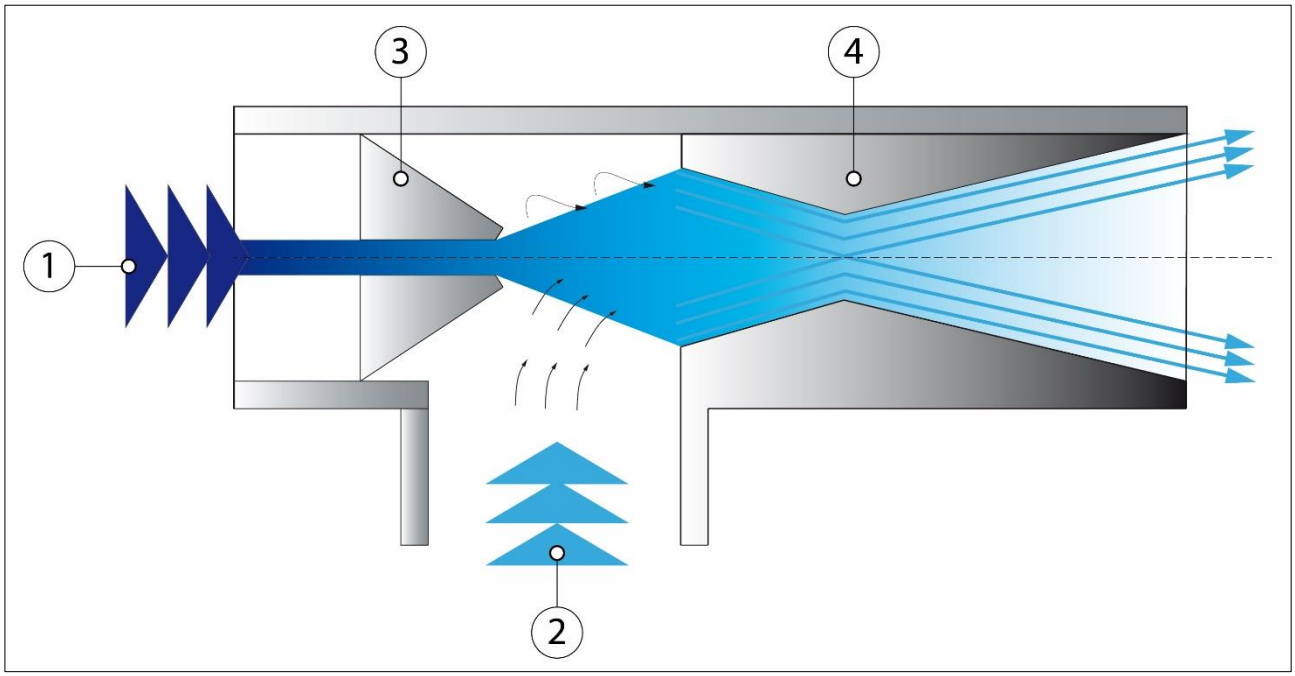
FAILURE IN THE AIR SUPPLY

- ✓ The clamps have springs that keep them closed if the air supply is cut off (there is also the inverse system which opens the grippers).
- ✓ Although the manipulator's design aims to minimise possible damage arising from an inopportune start-up after a failure in the air supply, the operator must bear in mind that the swivel arm of the M3 Manipulator, as well as its load securing device and consequently the working load can descend sharply and unexpectedly, or ascend suddenly and inappropriately after the air supply is re-established.
- ✓ If the air supply is cut off, close the main valve and move the manipulator to its retracted or parking position, ensuring that the closing device is activated [See OPENING AND CLOSING THE MAIN VALVE and Retracted position – Parking page 21 and 14].

1.3 SUCTION CUP

1.3.1 OPERATING DESCRIPTION AND PRINCIPLE

The suction cup type load securing device together with the M3 Manipulator makes it possible to grip and manipulate the working load creating a vacuum. The vacuum is generated with the Venturi effect, in which a nozzle (3) is fed with compressed air (1). The jet created drags the ambient air (2) into its turbulence, which then passes into the mixer (4) to be expelled. This action creates the depression that generates the necessary vacuum.



WARNING

- ✓ The selection and design must be made carefully for each working load.
- ✓ The integrator/end user must ensure that the load securing device is suitable for the end application.

1.3.2 OPERATIVE

WARNING

- ✓ The sequence described below supposes that the installation, settings such as the Opening of the main valve, the regulation of the supply pressure, the balancing of the arm at no load and with load, and the correct integration have been carried out following the guidelines indicated in the manual.
- ✓ Do not release the working load (low pressure) until it is resting on an appropriate, safe surface.
- ✓ Verify that the M3 Manipulator and the holding device receive compressed air before each use.
- ✓ Keep the grip surface as smooth and clean as possible.

1. Bring the manipulator close to the workload and ensure the holding device remains in contact with the grip surface of the load.
2. Activate the high pressure [See OPERATION page 28].

NOTE: If the joystick cannot be unlocked, it is likely that the vacuum switch is detecting insufficient vacuum pressure, so it will not give the signal necessary to activate the high pressure [See VACUUM SWITCH page 41].

3. Move the working load to the destination location. Rest the load on an appropriate, safe surface.
4. To release the load, activate the low pressure [See OPERATION page 28]. The magnet will stop working.

FAILURE IN THE AIR SUPPLY

- ✓ Although the manipulator's design aims to minimise possible damage arising from an inopportune start-up after a failure in the air supply, the operator must bear in mind that the swivel arm of the M3 Manipulator, as well as its load securing device and consequently the working load can descend sharply and unexpectedly, or ascend suddenly and inappropriately after the air supply is re-established.
- ✓ If the air supply is cut off, close the main valve and move the manipulator to its retracted or parking position, ensuring that the closing device is activated.

1.4 HOOK

1.4.1 OPERATING DESCRIPTION AND PRINCIPLE

The hook-type load securing device is the perfect accessory of the M3 Manipulator for handling loads.

WARNING

- ✓ The selection and design must be made carefully for each working load.
- ✓ The integrator/end user must ensure that the load securing device is suitable for the end application.

1.4.2 OPERATIVE

WARNING

- ✓ The sequence described below supposes that the installation, settings such as the Opening of the main valve, the regulation of the supply pressure, the balancing of the arm at no load and with load, and the correct integration have been carried out following the guidelines indicated in the manual.
- ✓ Do not release the working load (low pressure) until it is resting on an appropriate, safe surface.
- ✓ Verify that the M3 Manipulator and the holding device receive compressed air before each use.
- ✓ Keep the grip surface as smooth and clean as possible.

As a passive actuator, the load securing device follows the operation sequence of the M5 Manipulator [See OPERATION page 28].