elcometer®

TORNADO

Airless Pneumatic Pumps

www.elcometer.com

Index

Original version in Spanish

OPERATING AND MAINTENANCE INSTRUCTIONS OF HIGH PRESSURE PRODUCT TRANSFER EQUIPMENT

01. Attention

Before starting the unit you must read, take into consideration and comply with all the indications described in this Manual.

This manual must be kept in a safe place, accessible to all users of the unit.

The unit must be started and handled exclusively by personnel instructed in its use and must be employed only for the purpose for which it was designed.

Likewise, accident prevention standards, regulations, work centre directives and current legislation and restrictions must be taken into consideration at all times.

02. Meaning of the pictograms

			
Refer to the manual/ instruction leaflet	**Important information**	**Danger (user)**	**Hand crush pinch hazard**
			
Moving parts hazard	**High pressure hazard**	**Skin injection hazard**	**Explosion hazard**
			
Toxic fluid or fumes hazard	**Grounding**	**Gloves required**	**Safety glasses are mandatory**
			
Hearing protection	**Mandatory respiratory protection**	**Ice hazard**	**Depressurisation**

03. Introduction

This unit belongs to the **family of devices designed to spray products** with compressed air by means of a spray gun. They provide a high level of product transfer and excellent quality finish, as well as low levels of contamination.

Minimum life is 25 years.

The equipment consists of the following standard features:

Elcometer TORNADO with Product Suction Hose

Case • Hook spanner • Oil Pack 500 c.c.
Adapter fitting from 1/2" to 3/8" for second spray gun
Web Instruction manual

As optional and complementary elements of the equipment:

38L (10 US Gal) Hopper

Product hoses

Airless spray gun

Spray air cap
Fixed Spray Fan

Rotational air caps
(Self-cleaning)

04. Technical details

Unit featuring a **pneumatic cylinder** that activates the hydraulic device which provides the pressure necessary to spray the product. The unit is supplied with a **suction probe**, which is inserted directly in the container of the product to be applied.

	TORNADO 71	TORNADO 43
Pneumatic cylinder	**Ø 320** *mm.*	**Ø 250** *mm.*
	Ø 12.6"	**Ø 9.85**"
Pump displacement size	**270** *c.c.* / **3.57** *gpm* / **4.28** *US gpm*	
Stroke motor	**120** *mm.* / **4.72**"	
Pressure rating	**71:1**	**43:1**
Max. air inlet pressure	**6** *bar* / **87** *psi* **0.6** *MPa*	
Maximum pump speed	**60** *Cycles/min* *(Do not exceed maximum recommended speed of fluid pump, to prevent premature pump wear)*	
Max. air consumption *(60 cycles/min)*	**6,894** *L/min.*	**4,187** *L/min.*
	1,516.4 *gpm*	**921** *gpm*
	1,821.2 *US gpm*	**1,106.1** *US gpm*
Ø min. supply hose	**3/4" - 19** *cm.* / **0.75"**	
Max. product outlet pressure	**425** *bar*	**260** *bar*
	6,164 *psi*	**3,771** *psi*
	42.5 *MPa*	**26** *MPa*
Over Pressure Rupture Disc	**551** *bar* / **8,000** *psi* / **55.1** *MPa*	
Free flow rate *(60 cycles/min)*	**16.2** *L/min.* / **3.56** *gpm* / **4.28** *US gpm*	
Air inlet	**3/4" BSP H**	
Product outlet	**3/8"** & **1/2" BSP H**	
Wetted Parts	**Polyamide, Stainless Steel, Steel, Zinc-coated Steel, Chromium-plated Steel, P.T.F.E., Leather, Tungsten Carbide, UHMWPE**	
Air supply	**Treated compressed air**	
Air motor oil	**SAE 10**	
Sound Pressure, Tested 1m. (3.28 ft) from equipment (*)	**88** *dB*	**84** *dB*
Packing Gland Oil	**ELCOMETER Lubricant 30090100**	
Operating temperature range	**-10 - 60** *°C*	
	14 – 140 *°F*	
Lifting Ring Weight	**713** *kgf* / **1,573** *lbf max.*	
Weight	**102** *Kg.*	**92** *Kg.*
	225 *lbs*	**203** *lbs*

(*) A-rated Acoustic pressure level measured at 1 m distance (3.28 ft) at maximum air pressure, LpA1m, according to UNE-EN 14462:2015

Directives and standards

Machinery Directive	**2006/42/UE**
ATEX regulations	**EU Directive 2014/34/EU compliant** **Explosive atmospheres (Atex): Ex II 2G T4 x (*)**

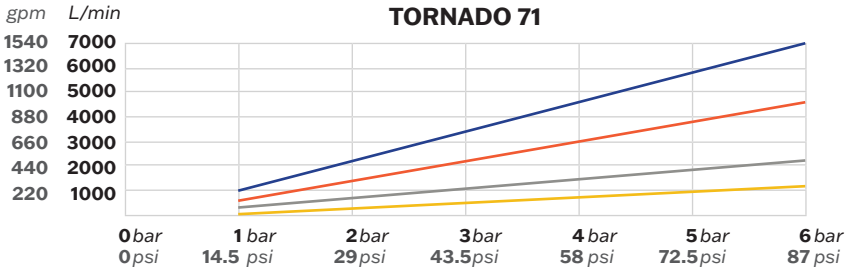
(*) Non electric equipment in explosion hazard areas (ATEX) must have the earthing connections and/or static-free feed hoses.

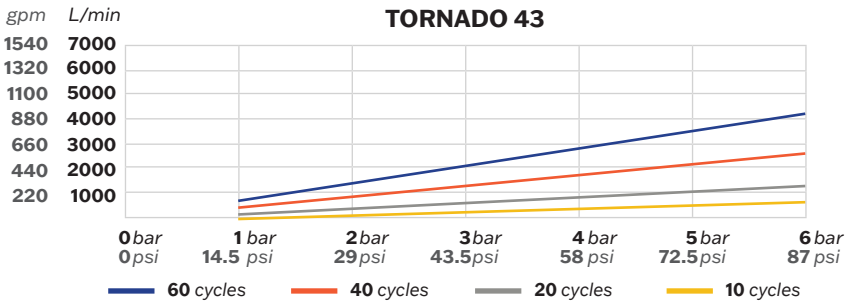
Fluid pressure scheme

MODEL	RATIO	Air inlet pressure	Product outlet pressure
TORNADO 43	43:1	2 *bar*/ 29 *psi* / 0.2 *MPa*	87 *bar*/ 1,261 *psi* / 8.7 *MPa*
		4 *bar*/ 58 *psi* / 0.5 *MPa*	173 *bar*/ 2,509 *psi* / 17.3 *MPa*
		6 *bar*/ 87 *psi* / 0.6 *MPa*	**260** *bar* / 3,771 *psi* / 26 *MPa*
TORNADO 71	71:1	2 *bar*/ 29 *psi* / 0.2 *MPa*	142 *bar*/ 2,059 *psi* / 14.2 *MPa*
		4 *bar*/ 58 *psi* / 0.5 *MPa*	283 *bar*/ 4,104 *psi* / 28.3 *MPa*
		6 *bar*/ 87 *psi* / 0.6 *MPa*	**425** *bar* / 6,194 *psi* / 42.5 *MPa*

Air flow consumption

Increasing the feed air pressure to the motor (via the regulator-air purifier) increases the number of cycles per minute of the pump piston, which in turn leads to an increase in the flow rate and output pressure of the pumped product.



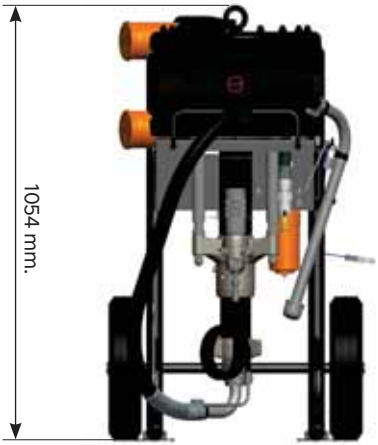


Equipment identification Elcometer Tornado

Inspect the identification plate of the TORNADO pump. On this plate, you will find:

- Model
- Serial number
- Air inlet pressure (Bar/Psi/Mpa)
- Fluid outlet pressure (Bar/Psi/Mpa)
- Flow Rate at 60 CPM
- Operating Temperature (max.)
- Homologations: CE UK CA Ex II 2G x

Dimensions



05. Component Identification

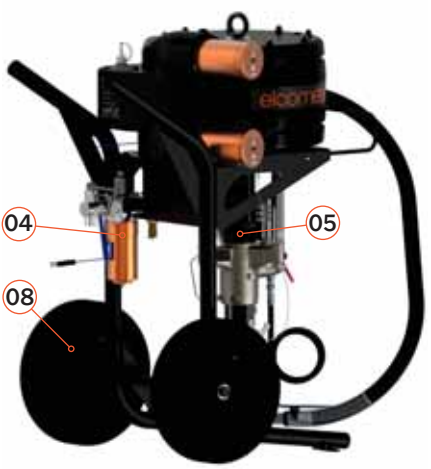


Fig.1

Fig.2

01 Product Suction Hose (Fig. 2)
02 Hose support (Fig. 2)
03 Product outlets (Fig. 2)
04 Air regulator-purifier (Fig. 1)
05 Shaft protection cover (Fig. 1)
06 Hydraulic cylinder (Fig. 2)
07 Pneumatic cylinder (Fig. 2)
08 Transport trolley (Fig. 2)

09 Air valve
10 Air inlet
11 Pressure gauge
12 Time indicators
13 Filter
14 Safety valve
15 Drain
16 Regulator knob

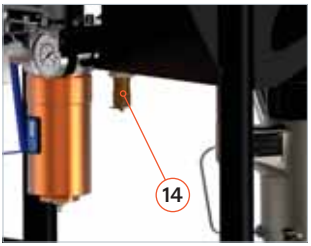


Fig.3

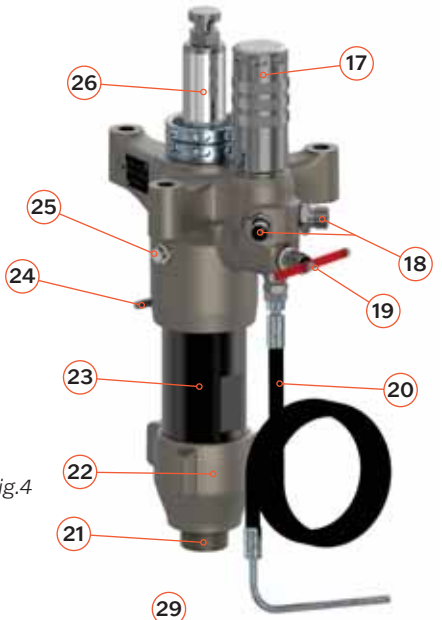


Fig.4

17 Anti-Pulsation Filter
18 Product outlets (2 guns)
19 Purge valve
20 Purge / Product return hose
21 Product inlet
22 Absorption valve
23 Hydraulic cylinder
24 Locking screw
25 Over Pressure Rupture Disc (551bar / 8000 psi)
26 Hydraulic shaft

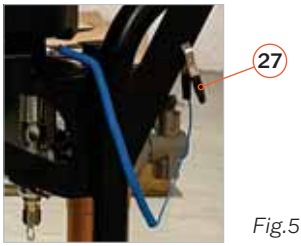


Fig.5

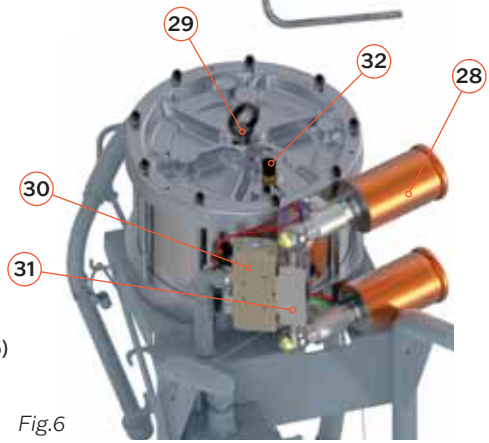


Fig.6

27 Ground wire (Fig. 5)
28 Air outlet (Fig. 6)
29 Lift Ring (713Kgf / 1573lbf Máx.) (Fig. 6)
30 Bistable air valve (Fig. 6)
31 Manifold (Fig. 6)

Fig.7

Fig.8

32 Upper and lower limit switch (Fig. 7)

33 Hopper (Optional) (Fig. 8)

06. Warnings

Before putting the unit into operation, we recommend that you **clean the equipment** as this has been subjected to functional tests and before packaging it is treated internally with a protective coating, some of which may still remain. Apply solvent to eliminate this. Remove any residual grease applied during assembly.

The **unit** is supplied **depressurised** (without pressure inside).

Before starting up and especially after each cleaning and/or repair procedure, you must **check** that the **components** of the unit are perfectly **tightened** and that the **hoses** are technically suited to the features of the equipment and the work to be carried out, in addition to being **flexible and sealed** (without leaks). Faulty parts must be replaced or repaired as appropriate.

Check that the unit's safety devices work properly before using it.

Handling the equipment requires a level of technical knowledge, skill, and experience that can only be provided by qualified personnel. This is essential to ensure safety, efficiency, and optimal operation of the equipment in industrial environments.

Use it according to the operating, maintenance and safety instructions indicated in this manual and follow the application methods indicated to obtain the required finish quality.

USE ANTISTATIC AIR HOSES. SHOULD AN ANTISTATIC AIR HOSE NOT BE AVAILABLE, YOU MUST ATTACH THE UNIT TO A GROUND CONNECTION IN ORDER TO ELIMINATE ANY STATIC ELECTRICITY.

You must always connect the equipment and all the elements involved in the work process to a **grounding connection** to eliminate static electricity. Regularly verify (one a week) its electrical continuity. If its resistance exceeds the recommended limits, it must be fixed. An equipment unit without or with a faulty grounding connection may make the installation dangerous.

The total derivative resistance must be <1 million Ohms (Ω).

Read and carefully apply all the information, instructions and safety measures given by the manufacturer of the products to be used (products to be applied, solvents, etc.), as chemical reactions, fire and/or explosions may occur. These may be toxic, irritant or noxious and in any event are dangerous for the health and wellbeing of the user and the personnel around him (See section on Health and Safety).

Ensure that the products to be applied are chemically compatible with the components of the equipment they come into contact with (Polyamide, Stainless Steel, Steel, Zinc-coated Steel, Chrome-plated Steel, P.T.F.E., Leather, Tungsten Carbide, UHMWPE)

If corrosive or abrasive products are used, it will result in increased wear on the machine parts that come into contact with the product.

Mix, prepare and filter the product to be applied in accordance with the manufacturer's instructions, ensuring that no foreign particles ruin the quality of the finish and application. Should there be any doubt on the purity of the product, its composition, etc., please contact your supplier.

Control the viscosity of the product to be applied by means of ELCOMETER 2435 Viscosity Cup.

The exit speed of the product to be transferred is determined depending on the air pressure, the product viscosity and the diameter of the hose to be used.

Insofar as possible, cover the containers of product to be transferred to prevent its contamination.

Do not use the hoses to move the equipment by dragging it. Keep the hoses away from moving parts and heated surfaces. Do not place them in contact with products that may affect them and do not expose them to temperatures greater than 65°C (149°F) or less than -20°C (-4°F).

Insofar as possible, keep the container of the product to be transferred fixed and inserted into it, the **product return tubing** (probe).

Lifetime use: Lifetime varies with use, materials sprayed, storage methods, and maintenance.

The unit has been designed for a long service life and can be used with most of the usual products on the market. Its use with highly aggressive products will quickly increase the need for maintenance and spare parts. If you need to apply special products, please contact ELCOMETER Ltd.

If the equipment is going to remain for a long time running empty, disconnect it from the general air network.

ELCOMETER RECOMMENDS THE INSTALLATION OF SOME SORT OF SAGOLA AIR TREATMENT EQUIPMENT IN THE GENERAL COMPRESSED AIR NETWORK, IN ORDER TO OPTIMISE THE OPERATION OF THE EQUIPMENT.

Prevention of ice in air motor on the Elcometer TORNADO pump

During the operation of the Elcometer TORNADO pump, the sudden release of compressed air can cause a sharp drop in air temperature, causing it to fall below freezing (0°C / 32°F). This situation can lead to the formation of ice when the air comes into contact with liquids or water vapor present in the environment.

The risk of ice accumulation increases with higher air pressures and faster cycle speeds, as these conditions promote greater air expansion and, consequently, a higher likelihood of freezing. Therefore, **it is crucial to select the pump with the appropriate pneumatic and hydraulic cylinders that can operate efficiently at lower pressures and slower cycles**.

Warm humid climates can produce high levels of icing because of the higher humidity levels. Low ambient temperatures near freezing 0ºC (32ºF), make it easier for the motor parts to drop below freezing.

To minimise ice build-up and maintain optimum performance of the Elcometer TORNADO pump, it is recommended to follow these preventive measures:

• **Lower the dew point of the compressed air**. Use an air dryer, coalescing filter or filter drier to reduce the water vapour content of the air.

• **Raise the compressed air temperature**. Warmer air going in helps the motor parts stay above freezing (0°C / 32°F). Compressed air, especially at these volumes, is warm when compressed. Keep the air warm or stay near the compressor to reduce icing.

• Use filtered air to eliminate ice build-up.

07. Functional description of the equipment

07.1 Purifier - Regulator

Regulate the pressure by filtering and separating solid and liquid components.

Without this air treatment, the pump would not function correctly or would suffer negative effects on its components, and in any case, the result obtained with them would fall well below expectations.

- Air valve

Used to manually control the supply of air to the pump. It can be opened or closed to allow or block the passage of air to the pneumatic cylinder.

- Regulator knob

Adjusts the air pressure to the pneumatic cylinder and the fluid output pressure of the pump. Read the air pressure on the pressure gauge.

- Filter

Friction and spinning Filtering System + 40 microns Bronze Filter.

The compressed air is forced to pass through the porous bronze filter, which removes solid and liquid particles from the air coming from the general network, which settle and deposit at the bottom of the tank.

- Time indicators (Service life of 6 months)

Offer a **helpful visual reminder** of maintenance programs of our filters. They help **ensure optimum performance of filters** that need replacement indicators to function effectively.

When you start using the filter, firmly squeeze a few seconds the **activation button** timer of each filter. Once activated, an **activation red line** will appear in the window, which will continue to fill with color over time.

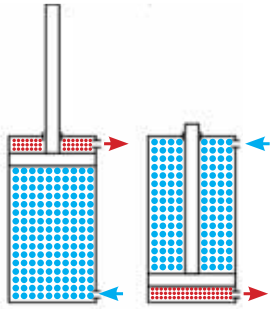
- Semi-automatic Purge

When the air pressure of the Network is lower than 0.20 bar, the valve opens, evacuating the content of the decanting vessel.

- Safety valve

It operates by evacuating excessive pressure from the pump when its pressure has exceeded the setting of the safety valve (6 bar / 87 psi).

07.2 Pneumatic cylinder



The **ELCOMETER Tornado** pump is equipped with a **double-acting pneumatic cylinder**, a fundamental component that converts pneumatic energy, i.e., compressed air, into linear motion in both directions. This pneumatic cylinder has the capability to perform both a forward stroke and a return stroke.

The pneumatic cylinder operates in conjunction with **limit switches**, which are controlled by a **bi-stable pneumatic valve**. This valve allows directing the flow of compressed air to the pneumatic cylinder so that the **forward or backward** stroke can be performed as needed for the ongoing process.

During the **forward stroke**, compressed air is directed to one side of the cylinder, driving the piston's movement in a specific direction. Conversely, during the return stroke, the airflow is reversed, causing the piston to move in the opposite direction. This cycle of forward and backward strokes is repeated in a controlled and precise manner, with air being released through the exhaust.

The pneumatic cylinder has been designed to be coupled with the hydraulic cylinder recommended by ELCOMETER in order to achieve the desired ratio and flow rate.

There are 2 variants:

MODEL	REFERENCE
Ø320 mm.	PT56416818
Ø250 mm.	PT56416823

- Identification plate

Inspect the identification plate of the TORNADO pneumatic cylinder located on the top cover. On this plate, you will see:

- Maximum pressure
- Manufacturing order number

- Grounding

YOU SHOULD ALWAYS CONNECT THE EQUIPMENT AND ALL ELEMENTS INVOLVED IN THE WORK PROCESS TO A GROUND OUTLET TO ELIMINATE STATIC ELECTRICITY.

Sparks from static electricity can cause ignition or explosion of vapors. Grounding provides a discharge path for electrical current.

USE ANTISTATIC AIR HOSES. SHOULD AN ANTISTATIC AIR HOSE NOT BE AVAILABLE, YOU MUST ATTACH THE UNIT TO A GROUND CONNECTION IN ORDER TO ELIMINATE ANY STATIC ELECTRICITY.

- Bi-stable air valve

The 5/2 bi-stable air valve controls the airflow to the pneumatic cylinder in two different stable directions. It changes the airflow position when it receives a signal from the actuators or limit switches.

Two stable positions: The air valve has two stable positions it can change between. In one position, the air is directed to the top of the cylinder, causing it to move **forward**, and when it reaches the limit switch, it changes to the other position and redirects the cylinder to the **backward** position.

These positions remain stable without the need for additional power supply, meaning that once the valve changes position, it stays in that position until activated again.

- Upper and lower limit switches

The limit switch is the device used to detect the position of the pneumatic cylinder. They are used to indicate when it has reached the specific position in its **forward or backward** stroke, the limit switch detects this movement and sends a signal to the air valve, indicating that the specific action has been completed.

MAINTENANCE OF THE BLACK PLUG OF THE UPPER LIMIT SWITCH (No. 32) IS VERY IMPORTANT

This black plug plays a fundamental role in the proper functioning of the equipment

It prevents obstruction of the hole that allows air communication, thus ensuring proper system operation.

In case this hole gets blocked, there is a risk of the machine stopping.

- Pneumatic manifold

The pneumatic manifold is utilized to efficiently and precisely distribute compressed air from the air valve to the pneumatic cylinder. It serves as a central point from which air lines branch out to the consumption points of the pneumatic motor.

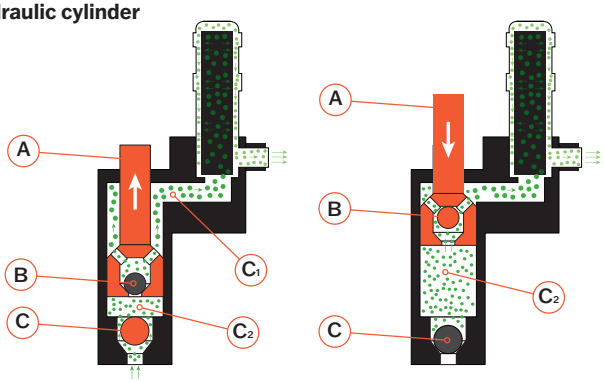
This ensures that all pneumatic devices operate efficiently and that the air supply is uniform across all parts of the system.

- Pneumatic connections

The pneumatic connections of the cylinder are made through the main inlet, which uses a “T” fitting to distribute air to the top or bottom of the cylinder.

When the piston reaches the end of its stroke, it sends a signal to the valve, which then reverses the movement of the piston

07.3 Hydraulic cylinder



When shaft A rises, ball B closes and ball C of the lower absorption valve opens. Shaft A pushes the product from the upper chamber C1 towards the anti-pulsation device and product outlet, while it draws in the product to fill the lower chamber C2.

When shaft A descends, ball B opens and ball C of the lower absorption valve closes. Shaft A compresses the product in the lower chamber C2 and transfers it to the upper chamber C1.

The hydraulic cylinder has been designed to be coupled with the pneumatic cylinder recommended by ELCOMETER in order to achieve the desired ratio and flow rate.

MODEL	REFERENCE
270 c.c.	PT56416817

- Identification plate

Inspect the identification plate of the TORNADO Hydraulic cylinder located on the gland body. On this plate, you will see:

- Cubic centimetres.
- Reference

- Anti-Pulsation Filter

It is designed to smooth out fluctuations in product flow due to the compression and expansion cycle of air in the system, providing a more uniform and stable product flow.

The filter ensures that the product is clean and free from impurities before being expelled by the pump.

- Purge valve and Purge hose

Its purpose is the depressurization and elimination of any unwanted air residue or accumulation that may affect the performance or quality of the product, cleaning of the system, or prevention of blockages, which helps maintain smooth and efficient operation of the equipment.

System cleaning: It should be used as part of a cleaning process. It helps clean the hydraulic cylinder ducts of the pneumatic pump to prepare it for the next operation.

This is especially important in applications where viscous materials are used or tend to solidify, as duct obstruction could disrupt material flow and affect work quality or if paint color is changed or maintenance is performed; it is important to thoroughly clean the system to prevent contamination.

- Over Pressure Rupture Disc

It is an instant pressure relief membrane. To protect the pump, and above all people, it is necessary to use safety equipment that allows excess pressure to be eliminated, providing the fluid with a point of escape or outlet.

The maximum rupture pressure is 551.5 bar / 8000 psi / 55.15 MPa

08. Installation

INCORRECT INSTALLATION OF THE MACHINE MAY CAUSE DAMAGE TO PEOPLE, ANIMALS OR OBJECTS. THE MANUFACTURER CANNOT BE CONSIDERED RESPONSIBLE FOR THESE DAMAGES.

08.1 Transport and discharge

The equipment is delivered packaged. It must be transported and stored according to the indications on the packaging. Don't transport any objects without securing them (e.g., hopper, tools) with the machine.

When unloading the machine, ensure that the lifting tools have sufficient traction force and attach them to the machine's lift ring provided for this purpose.

The lift ring is designed solely for loading and unloading the pump the pump. **(713Kgf / 1573lbf Máx.)**

For safety, DO NOT lift the entire machine as a whole (including accessories, hoses, or guns)!

For lifting and loading or unloading, securely place the machine on a pallet.

Never stand underneath with the machine suspended in the air, or in the unloading area. There is a risk of death!

Empty the machine before transportation; however, residual liquid may come out during transport.

08.2 Storage

Maximum Storage Time: 5 years
Storage Maintenance: To maintain original performance, replace soft seals after 5 years of inactivity.
Ambient Storage Temperature Range: **1 - 71 °C / 30 - 160 °F**

08.3 Arrangement of the lighting system

The Client must make sure that there is suitable lighting for the surroundings and that the lighting conforms to the regulations in force. In particular, the Client must arrange the positioning of lighting that illuminates all the working area in the case of indoor settings.

08.4 Arrangement of the pneumatic system

The Client must arrange a line of filtered compressed air supplied by a compressor that is suitable for the consumption required.

Do not use compressed air that contains chemical products, synthetic oil with organic solvents, salts or corrosive gases as they can cause damage to or malfunction of the equipment. The line of compressed air must arrive up to the supply points of the machine.

If the compressed air contains a large amount of moisture, it may cause malfunctioning in the valves and in the pneumatic components. Install a moisture separator downstream from the compressor to avoid this.

08.5 Classification according to the ATEX directive

The machine conforms to the essential requisites of the **EU Directive 2014/34/UE**, better known as **ATEX** ("Explosive atmospheres"). It is classified as group II category 3 letter G system. The assessment procedures of conformity, carried out by an internal factory check, allow the installation of the machine in surroundings where there may be potentially explosive atmospheres due to the presence of gas, fumes or mist.

08.6 Equipment assembly

1.- Product tank

2.- Pneumatic pump

3.- Air regulator filter

4.- Airless spray gun

YOU MUST ALWAYS CONNECT THE EQUIPMENT AND ALL THE ELEMENTS INVOLVED IN THE WORK PROCESS TO A GROUNDING CONNECTION TO ELIMINATE STATIC ELECTRICITY.

The machine can be installed inside or outside spray booths. However, in order to avoid contamination an external installation is preferable.

Position the machine horizontally on floor that is level, firm and free of vibrations. The machine must not be tilted or tipped. Make sure that all controls and safety devices are easy to reach.

09. Start up

Before each start-up and especially after **cleaning or repairing** the unit, a check must be made that all its elements are securely tightened.

The first time you use your equipment there is no need to depressurise it, as it is already supplied in a totally **depressurised** state, though it will be necessary to do this each time any maintenance or repair work is carried out.

Should this safety measure not be observed, this may lead to malfunctions, personal injury and accidents, which may prove to be fatal. ELCOMETER Ltd. does not accept any responsibility for the consequences of any non-compliance with these safety regulations.

Only if the whole process indicated in the section regarding DEPRESSURISATION, described in section 10, has been correctly carried out will the unit be ready to be started and used again.

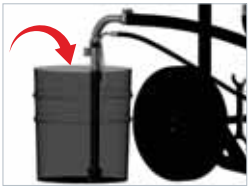
The incorrect observance of this Depressurisation process could lead to malfunctions in the equipment and deterioration of its components.

An OIL PACK (30090100) bottle is supplied with each pump, the OIL PACK is used to refill the bowl (No. 70) of the hydraulic cylinder cover before the startup of the pump.

The OIL PACK prevents paint from drying on the hydraulic shaft and makes it easier to detect leaks on the hydraulic cylinder. Replace if dirty or damage.

FAILING TO USE THE OILPACK REDUCES THE LIFE OF THE COMPONENTS.

1.- Remove the shaft protector, pour oil into the cup then replace the shaft protector.



2.- Insert the product suction hose and purge hose (No.02 and No.09) into the container with the product to be applied.

3.- Open the air supply valve (No. 83), then open the purge valve (No. 42), turn the pressure knob (No.104) clockwise, until you see product circulating through the unit and flowing through the equipment and the purge hose (No. 09).

4.- Close the product valve (Nº42).

5.- Conduct an application test by directing the application onto a grounded metallic container, WITHOUT the air cap on the gun.

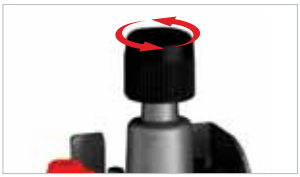
6.- Pull the trigger of the spray gun while maintaining the hand guard, in contact with the container being sprayed. In a few seconds the product will start to flow from the head of the gun without the air cap.

7.- Activate the gun's safety latch.

8.- Assemble the air cap on the gun.

9.- Adjust the Spray Pressure:

Adjust the spray pressure by turning the pressure regulator knob (No. 104) until the product flowing from the gun is completely atomised.



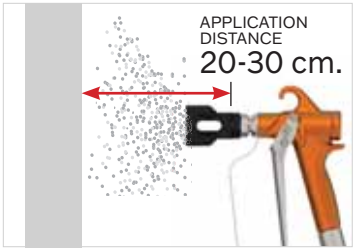
In order to avoid the use of excessive product quantity, which can lead to excessive misting and premature wear of the air cap and the components of the unit, it is recommended to always use the lowest possible pressure to obtain the performance and micronage expressed by the product manufacturer (it should be noted that greater spray pressure does not necessarily guarantee a better finish, while it does result in worse performance and product transfer).

Once the pressure at which the product atomises is determined, if a greater amount of product needs to be applied, we recommend that, preferably, a larger air cap is used instead of increasing the pressure.

To achieve the desired spray pattern, activate the gun's safety latch, loosen the screw that fixes the air cap and move it to the desired position.

Tighten the air cap holder screw again.
During application, the amount of product applied to areas with difficult access, reduced space, etc. can be reduced by decreasing the travel distance of the trigger when loosening the grip of your fingers on it.

Adjust the distance between the air cap and the object to be sprayed (20 / 30 cm.) depending on the same, the product to be applied and the working conditions, in order to increase transfer and obtain a reduction in the amount of mist depending on the air cap used in each case.



Useful tips

Use the lowest spray pressure in the air cap, allowing you to obtain the required finish. Not all products require the maximum pressure for correct spraying. With lower pressure there is an additional increase in product transfer.

Pay special attention to the application speed. The thickness of the film deposited may be greater than planned if the application speed is low, and the opposite is also true.

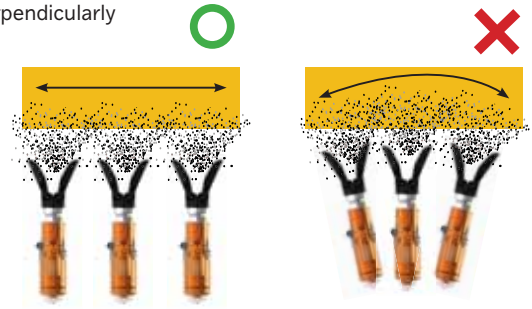
If the thickness of the layer is very thin, this is due to the fact that the air pressure is excessive for the amount of product being applied. Reduce the air pressure in the gun in order to ensure that the thinner in the paint does not evaporate during spraying and that it is not dry when it reaches the surface to be painted. Increase the amount of product, correct its viscosity or use a larger air cap in the gun.

If the film is very thick or granulated, this is due to the fact that the amount of product to be applied is excessive for the pressure used. Decrease the amount of product, reduce its viscosity or use a smaller air cap in the gun.

If sagging occurs, this is due to the fact that the amount of product to be applied is excessive for the pressure used, the viscosity is not correct or the application speed is not adequate.
Decrease the amount of product, adjust its viscosity or increase the application speed until the required finish is obtained.

The spray fan (spray pattern) obtained will depend on the air cap used and on your adjustment. If you require caps for other applications, contact the Technical Service of ELCOMETER.

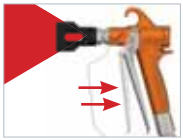
Apply the product perpendicularly to the part.



10. Depressurisation and stopping

10.1 Depressurisation

1.- With the unit, hose and gun pressurised, turn the unit's pressure regulator control (No.104) anticlockwise (Minimum).



2.- Pull the spray gun trigger, holding it until no more product comes out of the gun.

3.- Lock the spray gun trigger with the safety latch.

4.- Open the product return key (No.42).

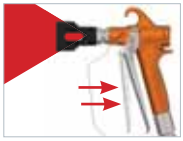
10.2 Stopping

- Short stop

When stopping for a short period of time that does not pose possible problems with catalysation or hardening of the product inside the unit and accessories, keep the product suction hose submerged in the product (if the unit has a gravity cup there is no need to empty it) and apply the procedure of Depressurisation Disassemble the air cap and dip it in thinner.

- Stopping when work is finished

1.- Turn the pressure regulator control. (No.104) anticlockwise all the way (Minimum). Remove the product suction hose from the container.



2.- Pull the spray gun trigger, holding it until no more product comes out of the gun.

3.- Lock the spray gun trigger with the safety latch.

4.- Open the product return key (No.42) to recover the product remaining inside the unit.

5.- Turn the pressure regulator (No.104) clockwise until the product flows out of the purge / product return hose (No.9), thus returning the existing product inside the unit to its container.

6.- When no more product comes out of the purge hose (No. 09), set the pressure regulator to the minimum (Nº104).

The unit is now ready to be immediately cleaned.

11. Maintenance

The unit must be overhauled on a periodic basis to check the status of its components and replace these when they are not in perfect condition.

In order to obtain the best possible results, ALWAYS USE ORIGINAL SPARES that guarantee total interchangeability, safety and perfect operation.

In order to carry out maintenance or repairs, **first disconnect the unit from the compressed air distribution network**.

Do not apply excessive force or use inadequate tools for maintaining and cleaning the unit.

Some repairs must be done with special tools on some occasions. In these cases, you must contact the Customer Service of Elcometer.

Do not use graphite greases as they dry out the joints, altering their operation. Any handling of this product by non-authorised personnel would render the warranty null and void.

- Daily maintenance

1.- Flush the pump: Clean the pump unit after working and after any colour change.

2.- Make sure there are no paint or air leaks: Check that the hoses are not damaged and that all threaded connections are firmly tightened. Replace immediately if you find any anomalies.

3.- Visual oil inspection: Top up the cup with Elcometer Packing Oil (Ref. 30090100), if necessary.

Check that there are no products (solvents or paints, etc.) in the oil. If so, check the tightness of the upper oil seal and replace it if necessary, and change the oil.

- Monthly maintenance

1.- Check the **product suction hose filter** (No. 01). Check for clogging or damage to the filter. Clean or replace if necessary.

2.- Check the **anti-pulsation paint filter** (No. 40). Check for clogging or damage to the filter. Clean or replace if necessary.

11.1 Air Purifier - Regulator

- Filter Replacement

In order to replace these, proceed as follows:

1.- **Close the air valve** (Nº83) **leading to the unit. Discharge the pressurised air.**

2.- With the unit totally de-pressurised, **disassemble the unit's deposit**.

3.- Disassemble the filter to be replaced, turning it anti-clockwise.

4.- **Insert the new filter** (No.90) and tighten it by turning it clockwise. Then assemble the deposit of the unit.

- Sintered Bronze Filter (No.90)

As a general rule, ELCOMETER recommends cleaning with an adequate thinner or replacing every six months.

When you **start using the filter**, firmly squeeze the activation button on the timer for a few seconds. Once activated, an activation red line will appear in the window, which will continue to fill with colour over time.

11.2 Pneumatic cylinder

To perform maintenance or repair, **first disconnect the equipment from the compressed air supply and depressurize the equipment to ensure safety during the process**.

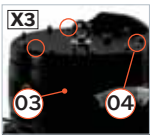
Arrange all disassembled parts in an orderly manner to make reassembly easier. Clean all parts with a compatible solvent if they are dirty and inspect them for wear or damage.

- Disassemling the Pneumatic Cylinder and Replacing the Piston Seals

1.- Remove the shaft protective cover (No.07) to access the shaft coupling sleeve (No.06) and release the pneumatic shaft.

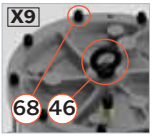
2.- Unscrew the silencers (No.14) to remove the housing (No.03).

3.- Loosen and remove the three screws (No. 04) that secure the housing (No. 03) of the pneumatic cylinder to gain access to it.



4.- Loosen the screw (No.47) indicated on the manifold and disconnect the pneumatic supply tubes from the limit switch.

5.- Loosen the nine nuts (No.68) that secure the top cover of the pneumatic cylinder and carefully remove the cover by lifting it using the lifting ring (No.46).



Be careful not to lose the O-ring (No.84).

6.- Push the piston or plunger of the pneumatic cylinder from the bottom of the shaft upwards to extract it from the cylinder. Once outside, replace the seals (No. 80) and apply grease.

MAKE SURE NOT TO DAMAGE THE PISTON DURING THE DISASSEMBLY OR ASSEMBLY PROCESS.

For assembly, follow the process in reverse order as described, greasing all parts thoroughly.

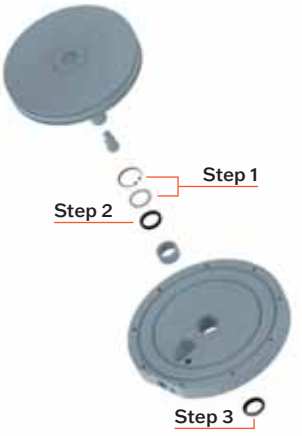
- Seal and Wiper Replacement (Kit No.72)

Once the piston is loose, you can proceed with the replacement of the pneumatic cylinder seal.

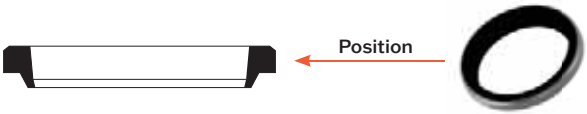
Follow these steps:

1.- Use needle-nose pliers to release the retaining **ring** and remove the **washer**.

2.- Replace the **seal** and apply grease. Place the seal in the correct position, with the flanges facing upwards.



3.- In the same operation, you can also replace the **wiper** on the bottom part of the cylinder cover. Place the wiper in the correct position, with the flanges facing downwards.



Apply grease to the shaft during assembly. Qualified personnel are recommended.

For assembly, follow the process in reverse order as described. Make sure to tighten the nuts (No. 68) using a crisscross pattern and a torque of 25 N·m (18.4 ft·lb).

11.3 Hydraulic cylinder

It is very important to use the appropriate tools during maintenance of the ELCOMETER TORNADO pump.

To perform maintenance or repair, begin with a cleaning operation, **then disconnect the equipment from the compressed air supply and depressurize it to ensure safety during the process.**

Lay out all removed parts in sequence to ease reassembly.

Clean all parts with a compatible solvent and inspect them for wear or damage.

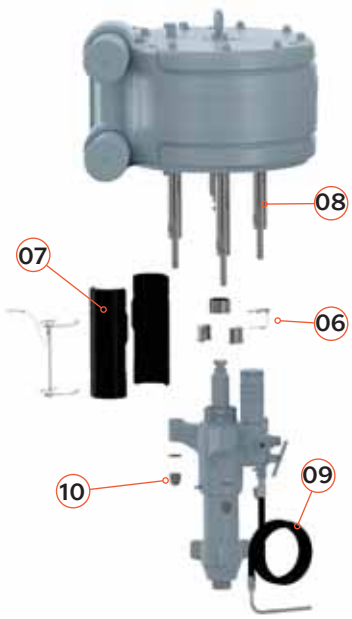
11.3.1. Disassembly hydraulic cylinder

1.- Disconnect the product suction hose (No.02) and the purge / product return hose (No.09).

2.- Remove the shaft protective cover (No.07) to access the shaft coupling sleeve (No.06) and release the hydraulic shaft.

3.- For convenience during the process of disassembling the complete hydraulic cylinder, the machine allows the user to lay the pump on the floor if necessary, to facilitate access to the cylinder and the disassembly or assembly process.

Lay rags onto the floor to catch Oilpack that may spill out of the packing nut.



4. Use a wrench to loosen the nuts (No.10) that secure the tie rods (No.08). Make sure to loosen them carefully to avoid damaging the parts. This will allow you to release the hydraulic cylinder and facilitate its extraction.

For reassembly, follow the process in reverse order as described. Ensure that you tighten the nuts (No. 10) with a torque of 70 N·m (51.6 ft-lb) and follow the start-up steps.

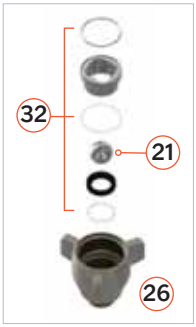
11.3.2. Disassembly Hydraulic Cylinder Components

Lay out all removed parts in sequence to ease reassembly. Clean all parts with a compatible solvent and inspect them for wear or damage.

• ABSORPTION VALVE

1.- Use the appropriate tool to loosen and unscrew the absorption valve from the hydraulic cylinder. Make sure to apply the necessary force carefully to avoid damaging the valve or the threads.

2.- Remove the O-rings, the ball guide, the ball (No.21), and the ball seat. Handle these parts carefully to avoid damaging them during the extraction process, and replace any damaged parts.

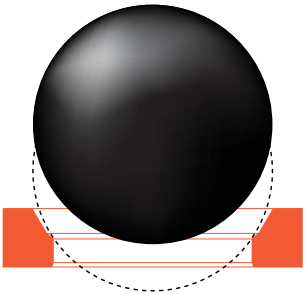


Use appropriate tools to remove the O-rings (No.32), ensuring to do so carefully to avoid damaging them. Please note that the O-rings are supplied with a complete seal kit for the hydraulic cylinder.

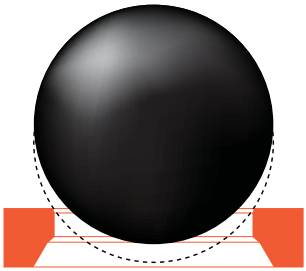
For assembly, follow the process in reverse order, thoroughly lubricating all parts.

The ball seat can have two positions, depending on the viscosity of the product we will be working with.

By changing the position of the seat, we alter the travel of the ball (No.21), which causes the ball to close sooner, resulting in a smaller pressure drop of the product and a more consistent painting process.



POSITION 1: For **denser or more viscous products**, a longer travel and therefore a **longer closing time** will be required.



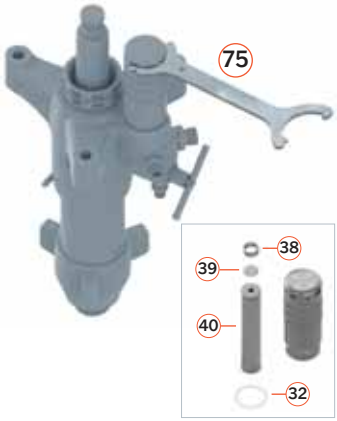
POSITION 2: For **less dense products**, a shorter travel and therefore a **shorter closing time** will be required.

• ANTI-PULSATION FILTER

1.- Use the wrench (No.75) provided with the machine to loosen and remove the anti-pulsation cap.

2.- Replace the filter (No.40) with the one most suitable for your application. Make sure to select a filter that meets the specifications of the product you will be applying.

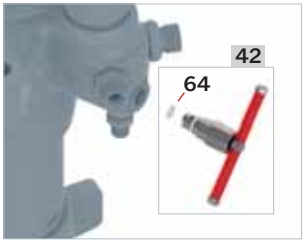
3.- Position the spring with its stop (No.39 and No.38) accordingly.



The O-ring (No.32) is supplied with a complete hydraulic cylinder seal kit.

For assembly, follow the process in reverse order as described, ensuring to grease the O-ring (No.32) well.

• **PURGE VALVE**



1.- Use a wrench to loosen and unscrew the purge valve (No.42) from the hydraulic cylinder.

2.- Replace the gasket (No.64) with a new one and make sure to grease it properly to facilitate assembly and ensure an optimal seal.

3.- Reassemble the purge valve back into its original position, ensuring it is correctly tightened.

• **Disassembly and Replacement of elcoTOUGH™ Packing-Sets**

To avoid costly damage to the shaft (No.23) or the cylinder (No.33), always ensure you use appropriate tools that do not mark or damage these critical parts of the equipment. Use a rubber mallet, a vice, or other tools specifically designed for the task at hand.

Careful handling and the use of proper tools will ensure effective and safe maintenance of the equipment, extending its lifespan and ensuring optimal performance.

1.- Place the hydraulic cylinder in a vice to secure it firmly and safely. Use the appropriate tool to loosen and unscrew the absorption valve (No.26) from the hydraulic cylinder. Ensure to apply the necessary force carefully to avoid damaging the valve or the threads.

2.- Use the wrench provided with the pump (No. 75) to loosen the bushing packing-gland (No. 24) but do not completely remove it, allowing the pressure on the hydraulic shaft packings to be released.

3.- Loosen the locking screw (No.36) of the cylinder.

4.- Use a rubber mallet (to avoid marking or damaging) or an adjustable wrench, to unscrew the cylinder (No.33) from the packing gland body, applying the necessary force.

Once the cylinder has been unscrewed from the packing gland body, you can remove it and proceed with the necessary maintenance.

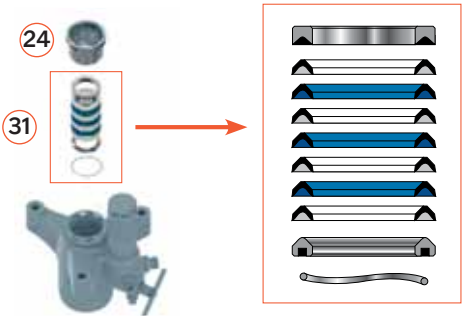
5.- To replace the **packings of the gland body**, unscrew the bushing (No.24) completely to access the packings and replace them. Use the wrench supplied with the machine (No.75).

6.- Once the bushing (No.24) has been completely unscrewed, carefully remove the packings (No.31).

Replace the old packings with new ones and make sure to install them correctly in place, **with lips facing down**.

Ensure that the packings are well lubricated and in good condition before installation.

Once the new packings are in place, reassemble the bushing (No. 24) and screw it back on **without tightening it completely.**

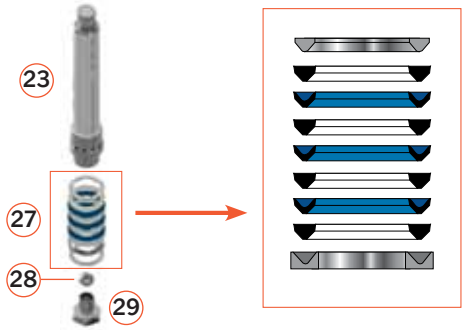


7.- To replace the **shaft packings** (No.27), secure the cylinder in a vice and gently tap to remove the shaft from the cylinder, being careful not to scratch or damage it.

Inspect outer surface of the shaft and inner surface of cylinder for scoring or wear; replace if damaged.

8.- Loosen the valve seat (No.29). If the ball (No. 28) is damaged, does not seal properly, or shows signs of wear, replace it with a new one.

Replace the old packings (No.27) with new ones and make sure to install them correctly in place, with **lips facing up**.



Ensure the packings are well-lubricated and in good condition before installation.

Use appropriate tools to remove the O-rings (No.32). If they are damaged, replace them. Keep in mind that the O-rings are supplied as part of a complete hydraulic cylinder seal kit.

11.3.3. Hydraulic cylinder assembly

Ensure that the shaft packings (No.27) are correctly installed and oriented in their position.

1.- **Apply a low-strength thread sealant uniformly around the threads of the valve seat** (No. 29).

Screw in the valve seat, but **avoid overtightening**.

2.- Apply a thin layer of heavy-duty grease on the outer face of the packings (No.27) and on the inner face of the cylinder (No.33) where the shaft will enter. This will reduce friction and facilitate the insertion of the shaft into the cylinder. The shaft should enter without much resistance due to the lubrication provided by the grease.

3.- After having installed the packings in the gland body according to the previous steps, proceed with the **assembly of the cylinder and the shaft with the gland body**.

Place the gland body in a **vice** (it is recommended to place it upside down to facilitate the assembly of the shaft and the cylinder). Ensure it is firmly secured to prevent movement during assembly.

Screw the cylinder and the shaft into the gland body, but do not overtighten.

4.- **Place the torque wrench on the valve seat** (No.29) **and adjust it to the required tightening torque of 80 N·m (59 ft·lb).**

This procedure will ensure an adequate seal of the shaft packings on the cylinder.

5.- With an adjustable wrench, **firmly tighten** the cylinder against the gland body.

6.- **Tighten the locking screw** (No. 36) of the cylinder and release the assembly from the vice.

7.- Place the **absorption valve** (No.26) on the vice to secure it during assembly.

Screw and tighten the cylinder assembly firmly with an adjustable wrench. Make sure to apply the necessary force.

During the assembly of components in the ELCOMETER Tornado pump, it is essential to apply grease to all threads to facilitate the process. This will help reduce friction and ease assembly, allowing the parts to slide smoothly during fitting and reducing the risk of damage during assembly.

8.- Use the wrench provided with the pump (No.75) to tighten the bushing gland (No.24), thus exerting pressure on the packings on the hydraulic shaft.

11.4 elcoTOUGH™ Packing Sets

- elcoTOUGH™ Packings - Gland Body

Packing replacement kits for the Elcometer TORNADO pump are designed to provide a comprehensive and versatile solution for various applications.

Lifetime Service Maintenance: Replace elcoTOUGH™ packings every five years or less based on use.

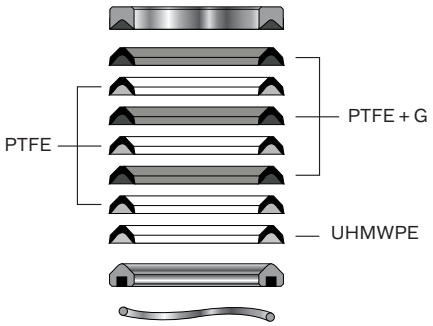
The elcoTOUGH™ packings for the gland body should be installed with the **lips facing down**.

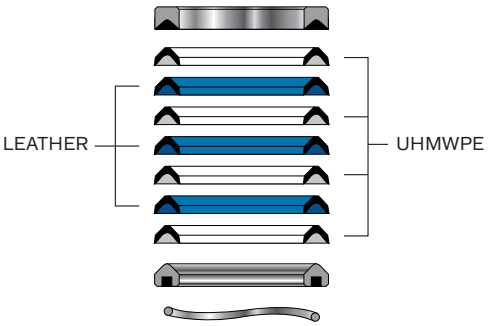
Each elcoTOUGH™ packing set includes essential components for maintenance and repair, consisting of:

- **Set of seven packings**: Designed to provide effective sealing in different parts of the pump, ensuring optimal, leak-free operation.
- **Two sealing rings**: These sealing rings complement the sealing provided by the packings, helping to prevent leaks.

Ref.	56418753	56418754 (1)
Version	270 c.c.	270 c.c.
Composition	UHMWPE + PTFE + PTFE G	UHMWPE + LEATHER (2)
Chemical compatibility	High	Medium
Resistance temperature	High	Medium
Abrasive resistance	Medium	High
Products	Good chemical compatibility. Pre-mixed 2K products. Solvent-based products. Not recommended for abrasives.	Abrasive and solvent-based products.

(1) This set set supplied fitted as standard to each unit.





- Always ensure to cover the packings with grease during assembly.
- (2) Lubricate Leather packings; soak packings in OilPACK oil for one hour before assembly.

- elcoTOUGH™ Packings - Cylinder Shaft

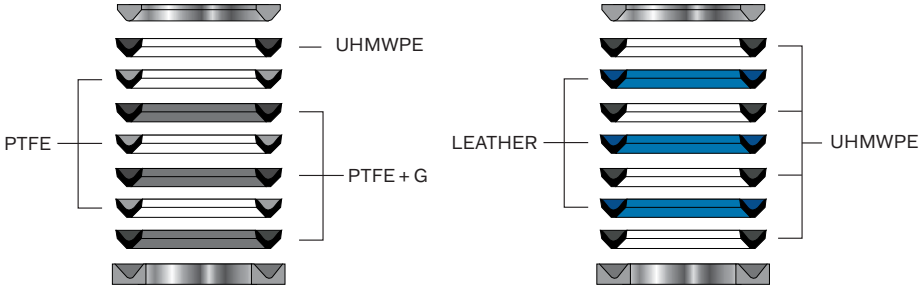
The elcoTOUGH™ packings for the cylinder shaft should be installed with the **lips facing up**.

Each elcoTOUGH™ packing set includes essential components for maintenance and repair, consisting of:

- **Set of seven packings**: Designed to provide effective sealing in different parts of the pump, ensuring optimal, leak-free operation.
- **Two sealing rings**: These sealing rings complement the sealing provided by the packings, helping to prevent leaks.

Ref.	56418749	56418750 (1)
Version	270 c.c.	270 c.c.
Composition	UHMWPE + PTFE + PTFE G	UHMWPE + LEATHER (2)
Chemical compatibility	High	Medium
Resistance temperature	High	Medium
Abrasive resistance	Medium	High
Products	Good chemical compatibility. Pre-mixed 2K products. Solvent-based products. Not recommended for abrasives.	Abrasive and solvent-based products.

(1) This set set supplied fitted as standard to each unit.



- Always ensure to cover the packings with grease during assembly.

- (2) Lubricate Leather packings; soak packings in OilPACK oil for one hour before assembly.

12. Cleaning

Before proceeding to clean the pneumatic pump, you must have followed each and every one of the steps described in the section **Stopping when work is finished** (Section 10).

This implies that the unit and its accessories must be **depressurised** and without any product inside.

The unit must be cleaned:

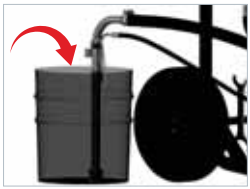
- Before using it for the first time, in order to eliminate the traces of maintenance oil that the equipment comes with from the factory.
- After each use.
- When proceeding to apply a different product (different colour or characteristics) to what we are currently using.
-Before proceeding with the maintenance or repair of the equipment.

Once the work is finished at the end of the day, it is necessary to clean the equipment and its accessories (gun and hoses) using the appropriate solvent to remove all traces of the product. The useful service life of the unit depends largely on the effectiveness of the cleaning process.

Flush at the lowest pressure possible. Flush with a fluid that is compatible with the fluid you are pumping and with the wetted parts in your system. Always use water for waterborne products, for other products always use whatever is recommended by the manufacturer of the product to be applied.

1.- Remove tip and tip guard from gun.

2.- Add the thinner to the external container where the product suction hose (No.02) is located, by inserting the product return hose (No.09).



3.- Open the air supply valve (No. 83), then open the purge valve (No.42) and turn the pressure regulator knob (No.104) clockwise until you see the product circulating through the equipment and flowing through the purge hose (No.09).

4.- When the solvent starts to flow through the purge hose (No.09) close the purge valve (No.42).

5.- Pull the trigger of the spray gun while maintaining the hand guard, in contact with the container being sprayed. In a few seconds the product will start to flow from the head of the gun without the air cap.

It is considered that the unit and its accessories are totally clean when the product sprayed through the gun, and that circulating through the purge hose (No.09), is clean thinner and free from the product previously applied, meaning that the process must be repeated as many times as necessary.

Turn the pressure regulator knob counterclockwise until the pressure gauge reads zero.

Once the unit and its accessories are clean, and as a prior step before definitively stopping it, the Depressurisation procedure described before in Section 10.1 of the Manual must be applied.

Clean the product suction hose filter or the hopper and those of the spray gun.

Remove any remains of product from the gun, hoses and the rest of the unit with a cloth soaked in thinner.

Keep gasket areas free of accretions and foreign bodies.

The air cap is a precision component. Any deformation, especially in the product outlet orifices, may cause malfunctions in its operation and incorrect or deficient quality spraying.

If necessary, dip the air cap in thinner in order to soften the remains of product or dirt. Once softened, blow the cap with compressed air until any remains of product and thinner are eliminated.

For automatic cleaning of the gun, tools and accessories used in the mixing and preparation of the product to be applied, we recommend the use of SAGOLA Washing Machines.

THE GUN CAN BE CLEANED WITH THINNERS OR DETERGENTS IN A GUN WASHING MACHINE.

If you opt for this cleaning system, we advise you to remember the following considerations, which, if not applied, may damage the gun and render the warranty null and void:

- **Do not submerge the gun in solvent or detergents longer than the time required for cleaning.**
- **Do not use the gun immediately after cleaning has been completed.**
- **Ensure that there is no thinner or detergent inside and that it is completely free of these. Other cleaning systems can be used (ultrasound).**

Anti-pulsation filter (No.40)

1. Empty the product from the equipment and perform the decompression procedure.

2. Unscrew the **cover** of the anti-pulsation filter.

3. Extract the product filter and clean it with the suited solvent or replace it if necessary.

4. Assemble the product filter.

5. Assemble, by tightening to the utmost, the cover of the anti-pulsation filter.

13. Spare parts

This drawing is not the bill of materials.

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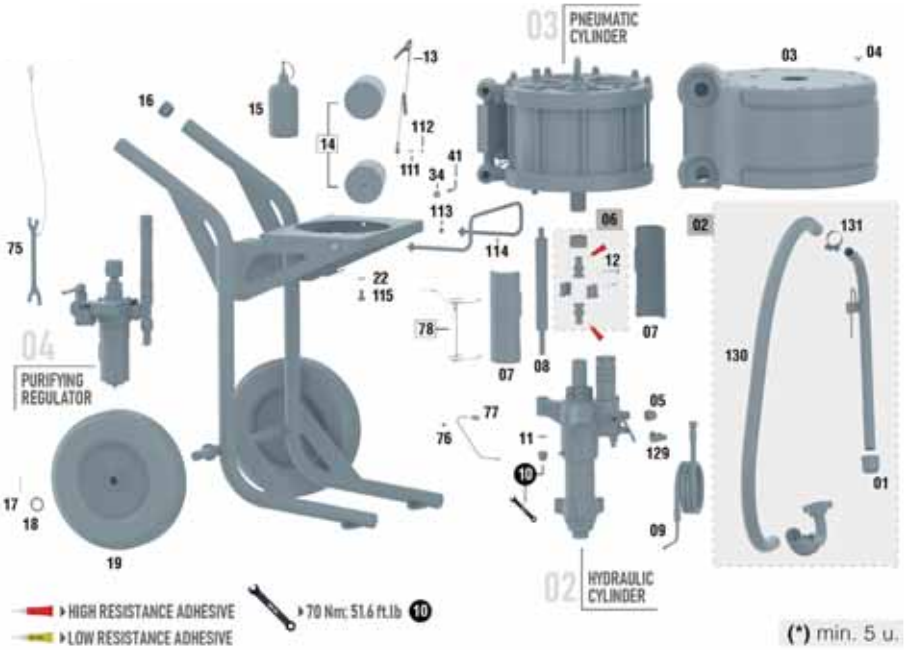
Part list 1/4



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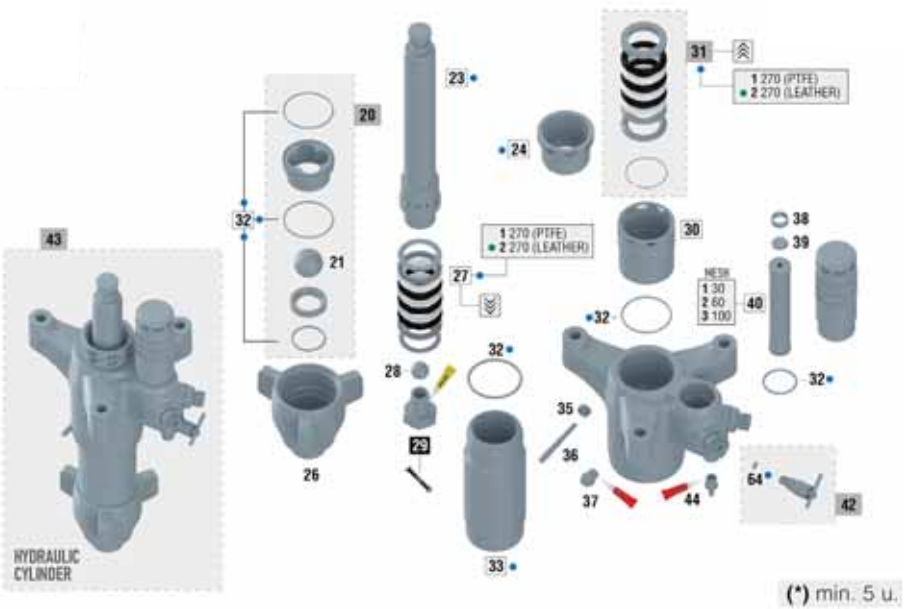
Part list 2/4



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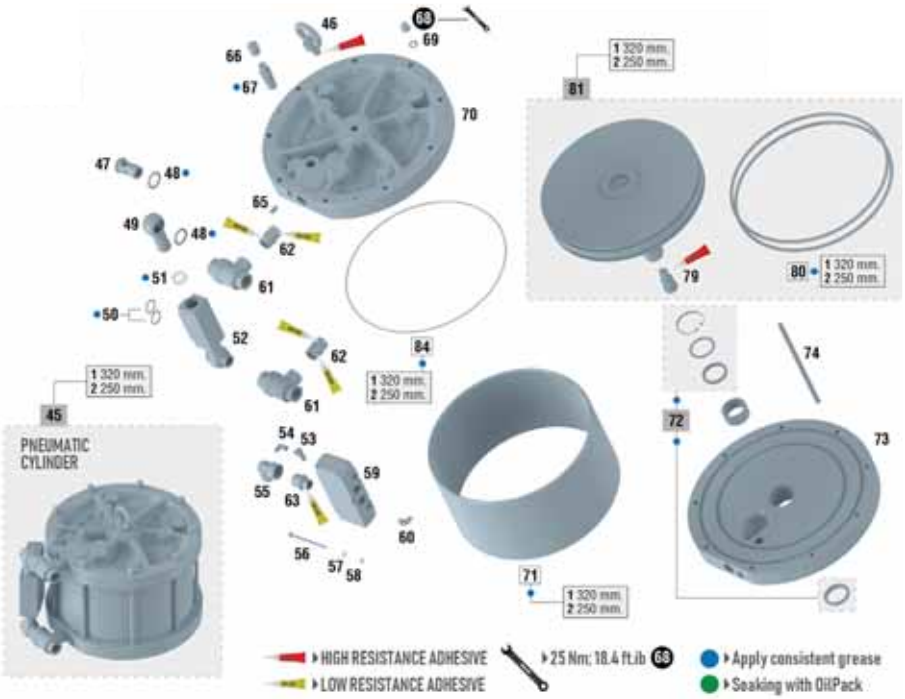
Part list 3/4



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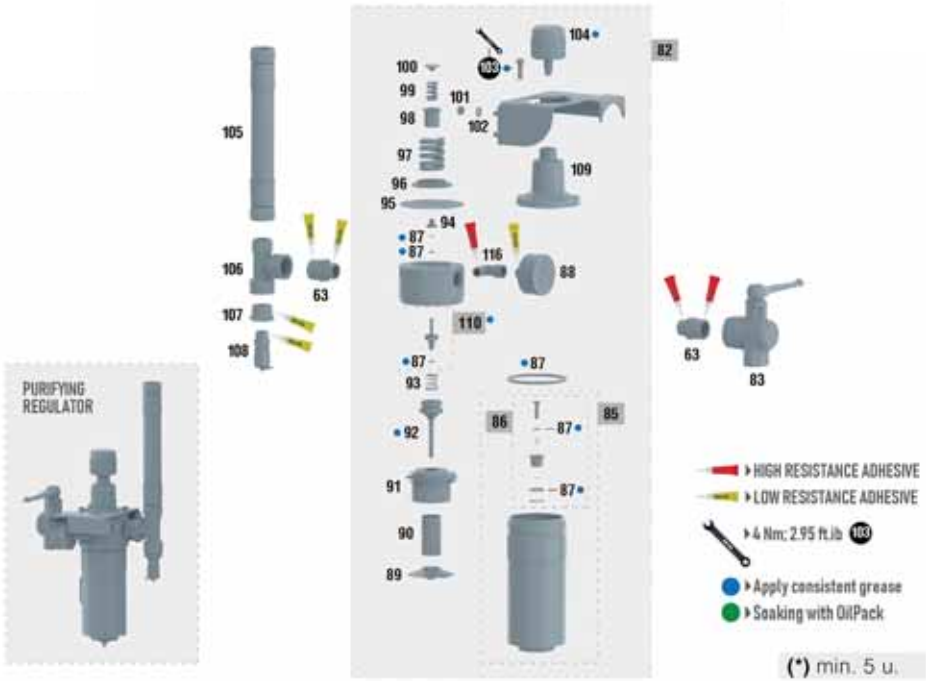
Part list 4/4



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14. Accessories

38L (10 US Gal) Hopper (Ref. PT30090389)

The depressurization procedure described earlier in Section 10.1 of the manual must be followed before performing any handling on the pump.

The hydraulic cylinder must be rotated 120º from its original position to properly install the tank or hopper

1. If necessary, disconnect the product suction hose.

2. Attach bracket (No.128) to the trolley **loosely** with the screws (No.117) and their respective nuts (No.113).

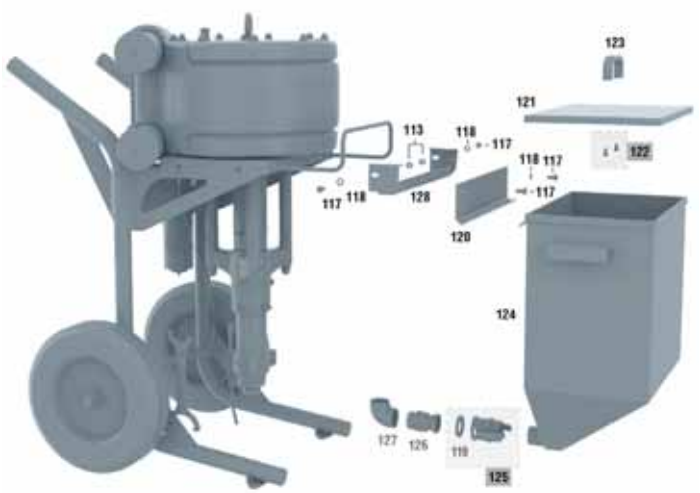
3. **Loosely** attach bracket (No.120) to bracket (No.128) with nuts (No.113) and screws (No.117).

4. Screw the elbow (No.127) and the male Camlock fitting (No.126) into the pump as far as possible, ensuring it is oriented towards the hopper.

5. Install the female Camlock fitting (No.125) on hopper (No.124).

6. Support the hopper (No.124) on the hopper attachment bracket (No.120).

7. Connect the female Camlock fitting (No.125) to the male Camlock fitting (No.126). Adjust the bracket (No.120) to the hopper and tighten the screws.



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15.Health and Safety

In order to perform maintenance, repairs or cleaning, first **disconnect the unit from the compressed air supply**, after having correctly carried out the DEPRESSURISATION procedure described in Section 10 of the Manual.

Never point the unit towards yourself, others or animals. The thinners and dilution media used can cause serious injury.

With this equipment the product is sprayed at high pressure. If the product is sprayed or splashed in the eyes it can cause serious injury.

Never attempt to stop the application stream or a leak with your hand or any other part of your body. If you feel that you may have been sprayed with the product on your skin, IMMEDIATELY SEEK MEDICAL CARE. This incident must not be treated as a simple cut. Describe the product with which it occurred to the Physician with as much detail as possible.

The premises where work is carried out must have sufficient ventilation in accordance with current legislation and regulations. Near the unit, only keep the amount of product and solvent required for the job being done at that time. After the job has been completed, the surplus solvents and product to be applied must be returned to their specific storage location. Keep the working area clean and free of potentially dangerous waste (solvents, rags, etc.).

While work is in progress, there must not be any source of ignition (naked flames, lighted cigarettes, etc.) in the working area as these might generate easily flammable gases. Likewise, the approved protective means must be used (breathing, hearing, etc.) in accordance with the regulations established in this regard.

If the unit is used in an inadequate manner or its components are altered in any way severe material damage may occur and bodily harm may be caused to the operator, other personnel and/or animals and may even cause death. **ELCOMETER Ltd.** accepts no responsibility in for any damage caused through the incorrect use of the equipment.

Pinch point hazard. Moving parts can crush and cut. Pinch points are any areas where there are moving parts.

Always use approved breathing units in accordance with current Standards and Regulations in order to protect yourself from emissions produced during application.

Never exceed the maximum operating pressure. The equipment units are calibrated by the manufacturer in accordance with the design performance features described in their technical specifications.

As a general, preventive measure we advise you to **wear goggles** in accordance with the specific environmental regulations and characteristics for the work centre.

Wear gloves when handling the product (see the manufacturer's recommendations) and clean the gun.

If, when the gun is in use, the ambient noise level exceeds 85 dB (A) **the use of approved ear protectors is required**.

The unit in itself does not propitiate any mechanical risk of perforations, impact or pinching, except those deriving from incorrect installations and handling.

USE ELCOMETER ANTI-STATIC HOSES TO ELIMINATE POSSIBLE ELECTRICAL SHOCK THAT MAY LEAD TO A RISK OF FIRE OR EXPLOSION.

Pay adequate attention when handling the unit in order to prevent any damage that might lead to dangerous situations for the user or personnel standing near the unit, as a consequence of leaks, breakages, etc.

The equipment has been designed for use at room temperature. The maximum operating temperature is 60°C (140°F).

The use of solvents and/or detergents that contain halogenated hydrocarbons (trichloroethane, methyl chloride, etc.), may cause chemical reactions in the unit as well as in its zinc-coated components (trichloroethane mixed with small amounts of water produces hydrochloric acid). For this reason, these components may rust and in extreme cases the chemical reaction caused may be explosive. We recommend using products that do not contain the aforementioned components. Do not use acids, soda (alkalis or pickling substances, etc.) for cleaning under any circumstances.

In general, **precautions must be taken whenever the unit is handled, in order to prevent any damage to this**.

Connectors must be securely tightened and in good condition. If pneumatic connectors are fitted, they must comply with the standard ISO 4414:2010.

Safety standards must be understood and applied.

Any non-compliance with the indications set out in this manual may lead to incidents affecting the physical integrity of the user or other personnel or animals.

Respect and comply with indications relating to the conservation of the environment.

Always keep the safety sheets for the products to apply and the cleaning liquids to hand in case you need to consult them.

16. Observations

By following the instructions set out in this manual you will ensure good spraying and quality of finish. Should you have any doubt, please contact the **Technical Service of ELCOMETER**.

For more information on other products:
- Sagola PSAM 500 airless spray gun
- Sagola 5000X Series air regulators

17. Warranty Conditions

This device has been manufactured with great precision and has been subjected to a large number of controls before leaving the factory.

The WARRANTY is valid for 1 year, which can be extended for a further year when registered via https://www.elcometer.com

Or insert the QR code

https://www.elcometer.com/en/extend-your-warranty-form

ELCOMETER reserves the right to make technical modifications.

18. Disposal

For complete and correct disposal of the equipment, when it has reached **the end of its useful life**, it must be completely dismantled so it can be **recycled**, separating the metal and plastic components.

19. Troubleshooting

MALFUNCTION	CAUSE	REPAIR
The unit does not start	Compressed air supply malfunctioning	Make sure the supply hose is not obstructed. Make sure the unit is properly connected to the mains supply. Make sure the compressed air valve is Open (*)
	Malfunction in the pneumatic system	Consult with Technical Service of ELCOMETER
	Pressurised unit	Depressurise the unit (*)
The Unit does not suck in any product	The product container is empty	Refill it
	The product suction hose filter is obstructed	Replace or clean. (*)
	The product suction hose is loose, blocked or damaged	Check the connection of the probe to the unit or replace it
	The pressure Regulator is set at minimum	Increase the pressure by adjusting the regulator.
	The purge Valve is closed	Open it (*)
	The product suction hose is stuck, dirty or damaged	Replace or clean. (*)
	Gaskets in poor condition	Replace (*)
	The hydraulic mechanism is loose or faulty	Tighten it or replace

NOTE: The symbol (*) means that before starting the procedure it is necessary to release pressure (see paragraph 10.1)

MALFUNCTION	CAUSE	REPAIR
The unit sucks in but doesn't reach the necessary pressure (it does not stop when the gun is closed)	The purge valve is open or faulty	Close it or replace (*)
	The Piston Valve is dirty or damaged (It doesn't stop when travelling up nor when travelling down) The Filter is dirty or the product suction hose is damaged	Replace or clean. (*)
	The Piston Valve is dirty or faulty	Replace or clean. (*)
	There are pockets of air in the Piston	Adjust the pressure Regulator (Maximum-Minimum) to eliminate the pockets of air
The product hose vibrates abnormally	The bottom Gasket of the Piston valve is faulty	Replace or clean. (*)
	The product suction hose and / or the filter is loose, dirty or damaged	Replace (*)
The unit sucks in and builds up pressure when the valve is closed, but it decreases too much when the trigger is pulled	The product suction hose and / or the filter is loose, dirty or damaged. Suction valve is damaged.	Tighten and/or clean the Probe and Filter, or replace elements Replace (*)
	The Gun has no Aircap	Assemble the aircap
	The anti-pulsation Filter is blocked	Replace or clean. (*)
	The aircap is worn	Replace or clean. (*)
	The product is too thick	Reduce its thickness
Abnormal spray pattern ("Horns" and streaks)	The pump Pressure is low	Increase the pressure by adjusting the pressure Regulator
	The product Filter is blocked	Replace or clean. (*)
	The Aircap is damaged	Replace (*)
	The anti-pulsation Filter is blocked	Replace or clean. (*)
	The product suction hose and / or the filter is loose, dirty or damaged	Tighten and/or clean the Probe and Filter, or replace elements

NOTE: The symbol (*) means that before starting the procedure it is necessary to release pressure (see paragraph 10.1)

MALFUNCTION	CAUSE	REPAIR
The Product is not sprayed	The product Filter is blocked	Replace or clean. (*)
	The Aircap is blocked	Replace or clean. (*)
	The purge valve is open or faulty	Close it or Replace
	The anti-pulsation Filter is blocked	Replace or clean. (*)
	Unit disconnected from the air supply, air valve closed or air inlet pressure regulator closed	Connect the unit to the supply. Open the air valve or adjust the pressure regulator to allow air to flow.
	The Piston Valve is dirty or damaged	Replace or clean. (*)
The unit builds up too much pressure	The pressure regulator is damaged	Replace (*)
	Excessive pressure at the air supply	Don't exceed the maximum recommended work pressures
	There is a fault in the hydraulic circuit	Send the unit to the Technical Service of ELCOMETER
There is product leak through the packing gland	Damaged gaskets or damaged Piston Shaft	Replace the gaskets and/or the Piston Shaft
The air motor freezes too much	Use of the unit at higher pressures than is admissible	Check that the air inlet pressure regulator operates correctly
	Untreated compressed air	Install SAGOLA air filtering group
	The air Compressor generates too much humidity in the compressed air	Purge the air compressor
The unit is leaking air and produces a small number of cycles when purging	Insufficient air supplied. Inadequate air hose (small Ø or air inlet regulator not adjusted (set at zero)	Replace the air hose. Adjust the pressure Regulator and increase the pressure
	Gaskets in poor condition	Replace (*)
	Pneumatic distributor damaged	Replace (*)

NOTE: The symbol (*) means that before starting the procedure it is necessary to release pressure (see paragraph 10.1)

20. Declaration of conformity

Manufacturer:	SAGOLA, S.A.U.
Address:	Urartea St, 6 • 01010 VITORIA-GASTEIZ (Álava) SPAIN
Hereby declares that the product:	PNEUMATIC PUMP
Brand:	ELCOMETER
Versions:	TORNADO

UE Declaration of Conformity

Is in conformity with the provisions of the UE Directive on machines (**Directive 2006/42/CE**), including the amendments to it and the related transposition into the National Law 1644/2008.

Is in conformity with the requirements of the following European Directives:

ATEX regulation (Directive 2014/34/CE) CE Ex **II 2G x**

Marked "**X**" All static electricity is discharged by the air ducts.
Air hoses should be "**ANTISTATIC**" as well as its modifications and updates, and provisions according to the national legislative code of the destination country.

Is in conformity with the requirements of the following European Standard Directives, and has used the following technical standards for its construction:

UNE-EN ISO 12100:2012 "Safety of machinery - General principles for design - Risk assessment and risk reduction"

UNE-EN ISO 80079-36:2017 / AC:2020 "Non electrical equipment used for potentially explosive atmospheres."

UNE-EN ISO 1127-1:2012 "Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology."

In Vitoria-Gasteiz on 01/02/2025

Signed:

Enrique Sánchez Uriondo
Technical Manager

elcometer®

Manufacturer:	SAGOLA, S.A.U.
Address:	Urartea St, 6 • 01010 VITORIA-GASTEIZ (Álava) SPAIN
Hereby declares that the product:	PNEUMATIC PUMP
Brand:	ELCOMETER
Versions:	TORNADO

UKCA Declaration of Conformity

The manufacturer herewith declares that the equipment is in conformity with the UK statutory requirements.

- The essential health and safety requirements mentioned in Supply of Machinery (Safety) Regulations 2008 have been applied. (**UKSI 2008 No. 1597**).

Equipment and Protective Systems Intended for Use in PotentiallY Explosive Atmospheres Regulations 2016 (**UKSI 2016 No. 1107**).

Ⓔx **II 2G x** Marked "**X**" All static electricity is discharged by the air ducts.
Air hoses should be "**ANTISTATIC**" as well as its modifications and updates, and provisions according to the national legislative code of the destination country.

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In Vitoria-Gasteiz on 01/02/2025

Signed:

Enrique Sánchez Uriondo
Technical Manager