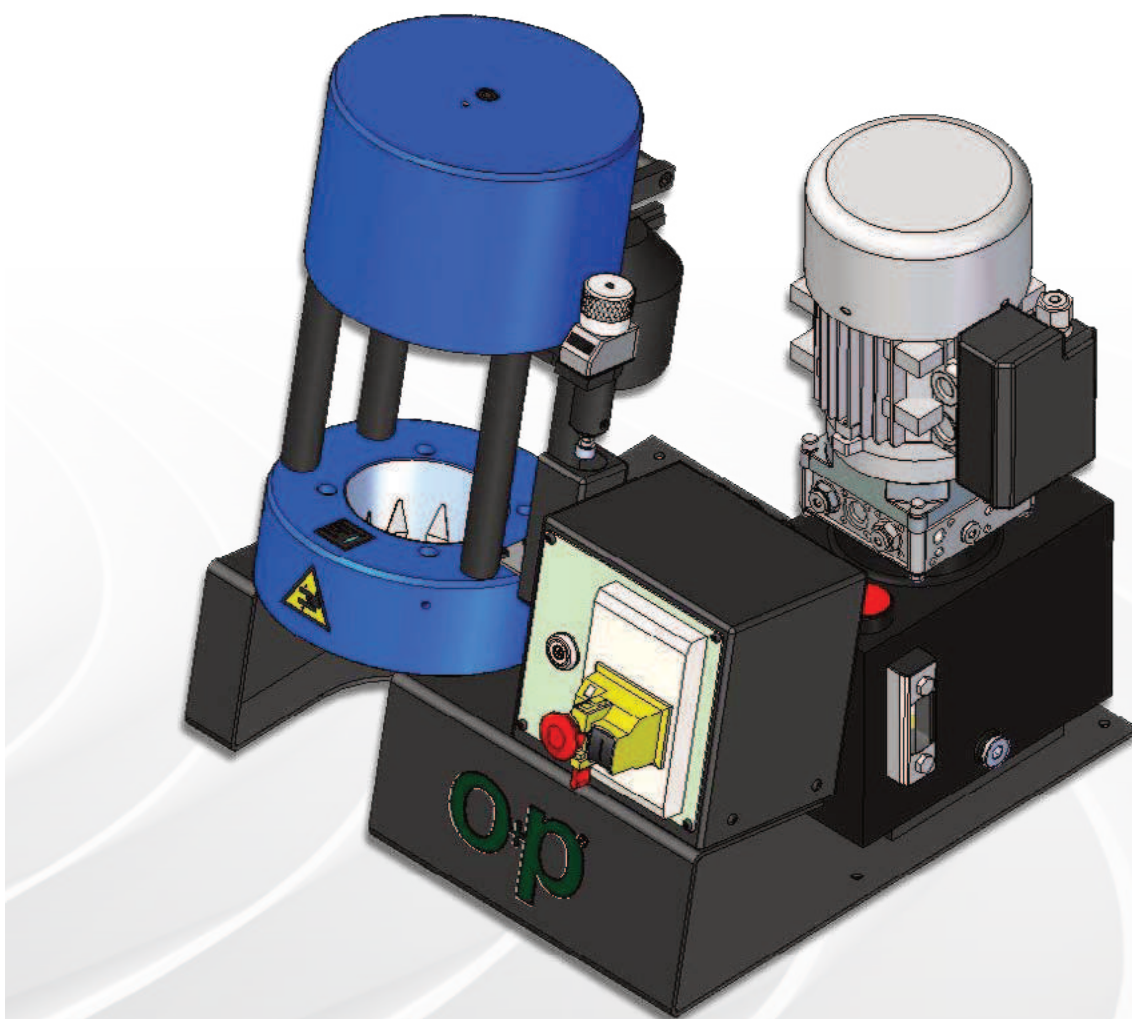


# Operating and maintenance manual

00068MDG



# TUBOMATIC J67 EL

ORIGINAL INSTRUCTIONS

SERIAL N.

YEAR



**WARNING!**

For safety reasons these instructions must be carefully read by anyone who makes use this equipment.

# 1 - Introduction

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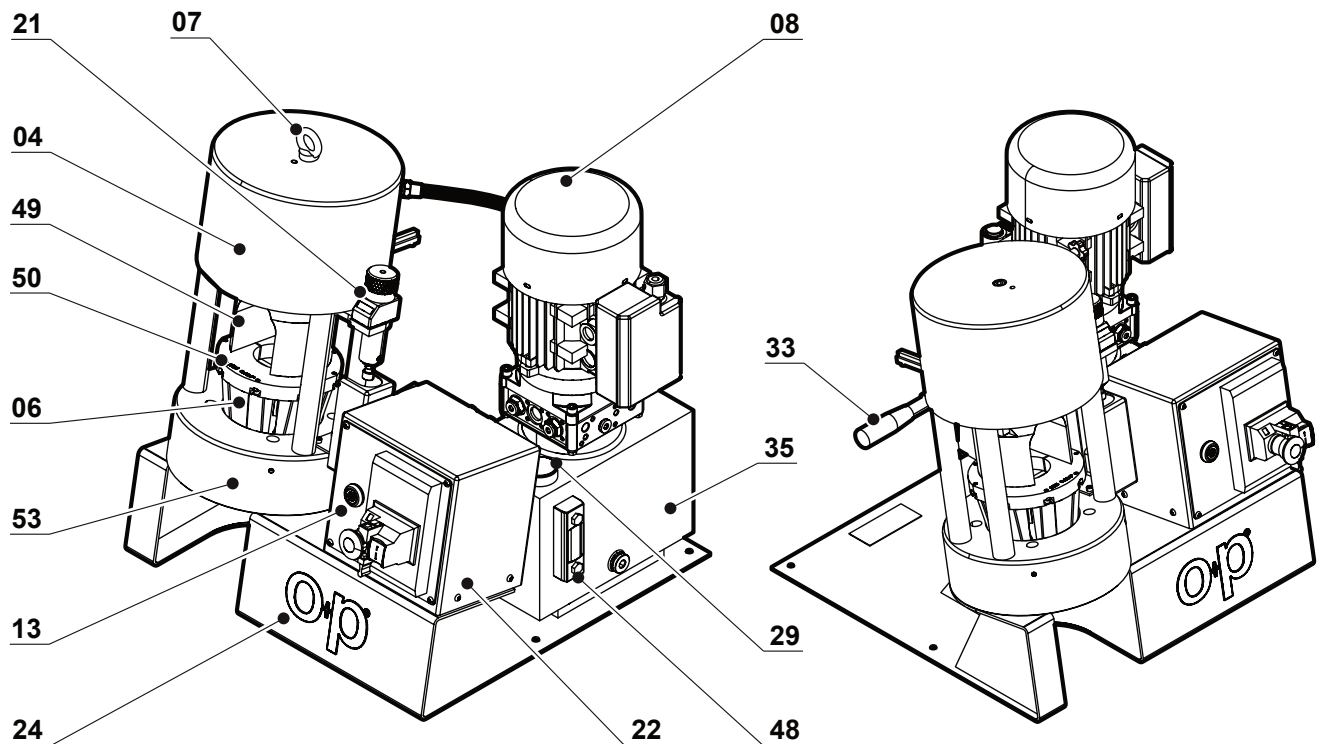
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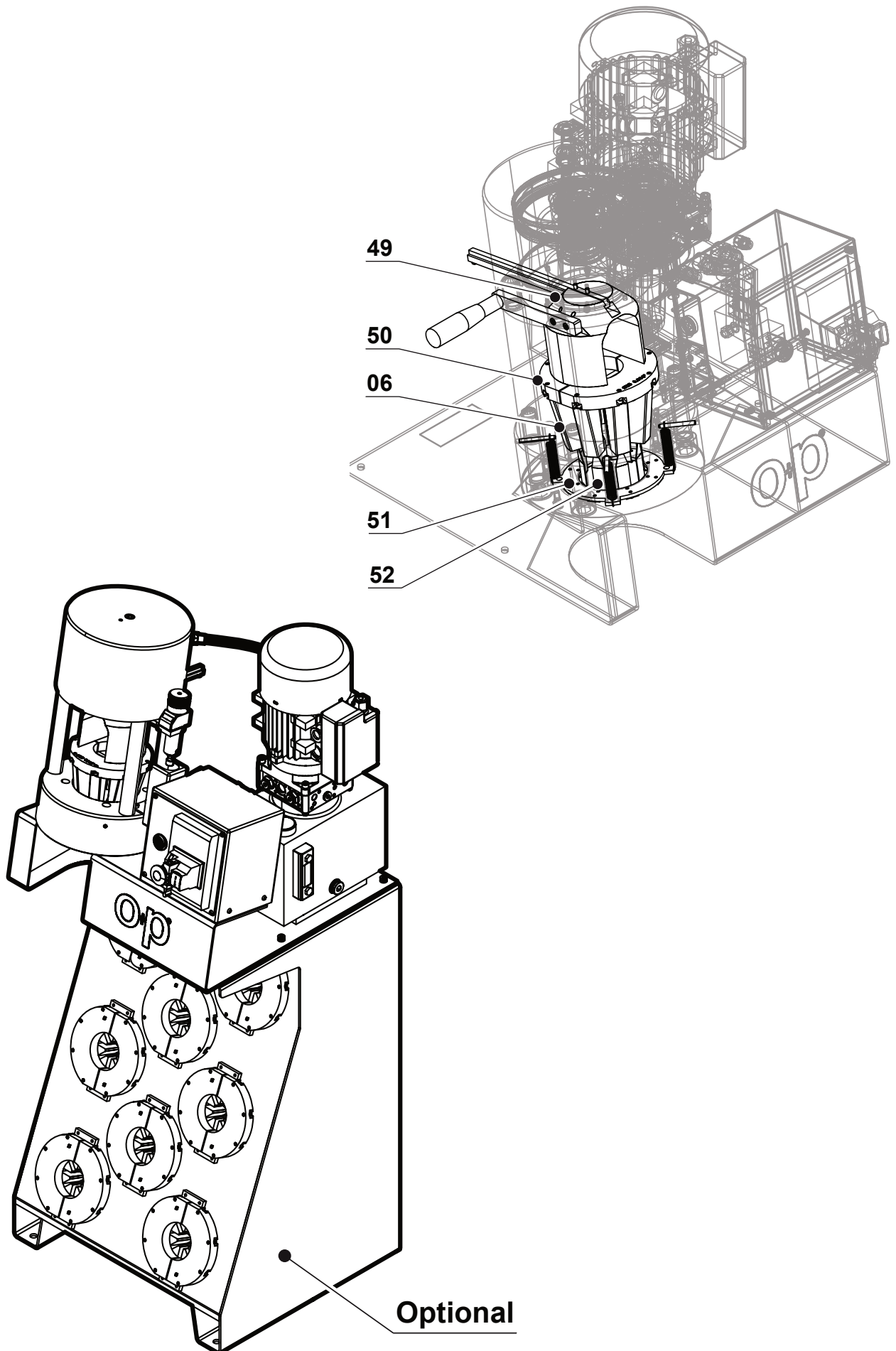
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## THE DOCUMENT AND INTENDED READERS

This document is intended to be read by professionals whose experience or qualifications allow them to work in conformity with the most common safety standards and specific skills. It is presupposed that each person has the basic knowledge required for their role.

The Client is to make sure that the operator has the capacity and training necessary for their duties.



**Reading of this manual is obligatory for all the professionals that are involved with the machine. They must also be informed of any RESIDUAL RISKS associated with the use of the machine or of the products it works with.**

The manual does NOT make up for educational or intellectual gaps that affect the professionals that work with the machine.

Personnel involved with operation, maintenance, and/or other operations relating to the machine must have specific experience with this type of machine or similar machines, or they must have specific professional training.



**The Client is responsible for all damage caused or suffered by personnel who has been authorised by the client himself to use the machine.**

Some general safety instructions provided may be excessive or even impossible to comply with under some infrequent situations (e.g. starting for the first time, specific maintenance tasks, tests without loads, faults or malfunctioning, etc.).

In these cases the operator, rigger or maintenance technician may act in a different way, provided:

- They are fully aware of what they are doing.
- They have adequate skill and training.
- They do not act in a way that deliberately causes injury to themselves.

### Scope and structure of the document

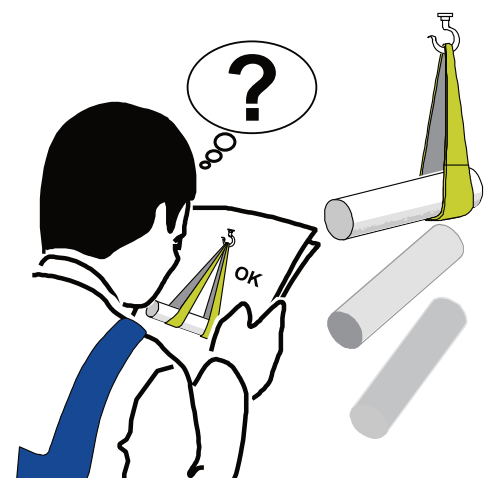
This scope of this document (OPERATING AND MAINTENANCE MANUAL) is to provide a valid guide that makes it possible to work safely and to carry out the operations that are necessary for maintaining the machine well.

All personnel that work with the machine are to read and understand everything described in this document.

This document was originally prepared in ITALIAN and so, if any incongruence or doubt arises ask for the "ORIGINAL INSTRUCTIONS" or further clarification from the manufacturer.

The indications given in this document do not replace the safety regulations and technical data for installation and operation that apply directly to the product, nor the rules dictated by common sense and safety rules in force in the country in which the machine is installed.

This document is broken down into CHAPTERS (INTRODUCTION, CHARACTERISTICS, etc.) as described in the CONTENTS. The chapters and information contained are in order of priority.



## Personnel characteristics

The person tasked with operating the machine must have received specific professional training or have adequate experience with machines of this type.

If, for any reason, when installing and/or starting the plant training has NOT been given the Client is obliged to ask for it and/or make sure that all the conditions described in this document are in place.



***In order to avoid damage to people or property, we suggest that the Client adequately inform the operators on any RESIDUAL RISKS resulting from use of the machine.***

Personnel tasked with operation or maintenance of the machine must be an expert, aware, and mature for the tasks described and they must be reliable when it comes to correctly interpreting the contents of this manual and to guaranteeing safety and scrupulous carrying out of the checks.

Involving personnel that are NOT qualified, handicapped, incapable, not sober, or drug users is specifically forbidden.  
The Client takes full responsibility for the qualifications and mental or physical state of the professionals involved.  
The Client or employer is civilly responsible for all damage caused or suffered by personnel that they have authorised to use the machine.

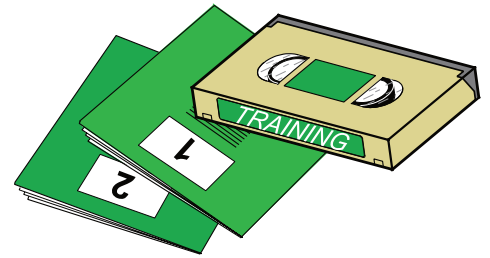
The assigned personnel used must fulfil the following requirements:

- Full use of their upper and lower limbs.
- Identification and knowledge of colours.
- Good eyesight and hearing.
- Know how to read and write.
- Know the danger and warning signals on the machine.
- Be able to operate completely autonomously on production plants and machinery that is similar to this.
- Be capable of running the work cycle, check the correct operations and the quality status of the product, and correct and report anomalies when necessary.
- Make the necessary notes in order to guarantee the assigned quality and proper efficiency of the plant.



***Use of the machine by people that use alcohol, medicines, and/or drugs is forbidden.***

Personnel that work with the machine must always use the personal protective equipment called for in the laws of the country in which it is used and anything else made available by their employer, such as: leather gloves, safety shoes, etc.



## SYMBOLS AND SIGNS

In some cases the danger zones are indicated in the manual and/or on the machine in some cases, using signs, plates, symbols, or icons that represent the danger or the obligation. For example, the obligation of consulting the document, which must be available for future use and must not be deteriorated in any way.

Operations or situations in which the personnel involved are to be very careful. General danger of hazardous voltage.

Operations that require the involvement of qualified and authorised professionals and/or the obligation to earth the plant.

Danger due to electromagnetic interference.

Hot zones: it indicates a danger due to the presence of heated areas or that involves parts at high temperatures (danger of scalding).

Crushing, cuts or grazes, and slipping: it indicates prohibitions or dangers that could cause injury to the operator.

Explosions: it indicates a potential risk of explosion or the need to ask for fireproof equipment.

Prohibition of removing the guards on the machine.

General prohibition: it indicates prohibition to access the zone examined or to carry out such operation of manoeuvre.

Obligation: it indicates the obligation to carry out the operations described using the clothing and/or personal protective equipment made available by the employer (overalls, leather gloves, safety shoes, etc.).

Prohibition of improper use. It is forbidden to use the spray gun targeting the spray to persons, animals and electrical equipment in operation.

CE Mark for identifying the obligation of disposing of electrical and electronic products via dumpsites that are suitable for the purpose and separate disposal to avoid environmental pollution.



## RANGE OF USE

OP s.r.l. does not accept any responsibility for any type of damage that may result from incorrect or imprudent operations.



***The machine MUST NOT be used by unskilled personnel or experts that do work on the machine that does not comply with the contents of this manual and the annexed documentation.***



***Using the machine for a purpose that does not comply with the range of use is completely forbidden as well as dangerous.***

### Normal envisaged use

The machine is intended to be operated by a single trained operator aware of the residual risks. When operating the operator's work zone or environment is in front of the machine, in which adequate space must be provided for working safely.

The machine documented in this manual was designed for:

**Joining, by means of a pressing system,  
metal hose fittings with high or low pressure  
oil-pneumatic hoses  
(the hose fittings and hoses must have specific  
characteristics and/or materials defined in the order  
and/or exclusively for the Client).**

The machine's extremely user-friendly electronic system makes it suitable for use by a vast range of Clients.

The electronic system (ES version only) has three work programs: manual, semi-automatic, and automatic, as well as numerous functions to facilitate and speed up hose crimping or pressing.



***The range of use of the machine must comply with the limits defined in the purchase contract and described in the "technical characteristics table" and the entire manual.***



***N.B. The operator is obliged to stay at a distance sufficiently close to the machine to carry out the operations required, but far enough away to exclude any possibility of involuntarily inserting the hands or parts of the body into the hose crimping or pressing zone.***

This manual lists and describes the RESIDUAL RISKS that it was not possible to eliminate during the design phase (see "Table: Residual risks").

For safety reasons, during working operations nobody other than the operator is allowed in the area around the machine. As a departure from this requirement maintenance personnel are allowed in the area, provided they are expressly authorised by the production manager.



### PLEASE NOTE!

If used incorrectly the equipment can be dangerous and may cause injury to parts of the body, which must never come into contact with or be put in the spaces affected by the machine's moving parts.

## Use not allowed

Using the machine or parts thereof for a purpose that does not comply with the range of use is completely forbidden.



**IT IS COMPLETELY FORBIDDEN TO:**



**- Use the machine or parts thereof without having read and correctly interpreted the contents of the operating and maintenance manual.**

- Machine material that is friable, fragile, or that does not conform to the range of use: ceramics, glass, etc.
- Use corrosive products that attack parts of the machine or may damage the operator's health.
- Modify work parameters that are not accessible to the common operator because they are password protected.
- Use the hydraulic unit and/or plant (if available), connecting them to other equipment.
- Use the machine with the safety devices not working or by-passed.
- Heat or dry rags or clothing on hot parts. In addition to be dangerous this will compromise ventilation and cooling of the components.
- Use the machine or parts thereof in environments that are particularly inflammable.
- Use the machine or parts thereof without authorisation by specialist personnel or qualified and authorised professionals.
- Use the machine it parts thereof at pressures higher than those set and established by the manufacturer.

**OP s.r.l.** does not accept any responsibility for any type of damage that may result from incorrect or imprudent operations.



***If used incorrectly the equipment can be dangerous, or can cause injury to parts of the body that must never come into contact with or be put into spaces affected by the machine's moving parts.***

## 2 - Characteristics

### GENERAL CONDITIONS



*The description of the machine's characteristics makes it possible to identify its main components and refine the technical terminology used in the manual.*

The technical terminology is covered in the CONTENTS AND INDEXES chapter. The CHARACTERISTICS chapter contains information on the composition of the machine, its characteristics, dimensions, and how it is identified.

Setting, operation, and maintenance are described below, based on the information contained in this chapter having been taken on board.



*In some cases it may be necessary to document operation of the machine's software separately or to annex additional documentation to this manual that is intended for qualified professionals.*

## MACHINE DESCRIPTION AND SETTINGS

### Technical characteristics

Table: technical characteristics

- Swaging force ..... 171 TON (190 US TONS)
- Crimping range ..... 10 - 54 mm
- Working capacity on 4 spirals..... 1"1/4
- Working capacity on 2 braids ..... 1"1/2
- Max. dies lenght ..... 85 mm



#### **PRESSING VALUE (\*)**

**The maximum pressing diameter is 67 mm (2.638"); and this value cannot be exceeded.**

mini power pack **35**..... 1 kW (1.5Hp)



Power supply voltage ..... (see labels on machine)

Oil quantity ..... 7 lt.(1.849 gal)

.....(1.85 US gal lqd / 1.54 imperial gal)

Oil characteristics ..... (see chapter: Maintenance)

**The machine is delivered without oil.**

Noise pressure level ..... ≤ 70 dB(A)

Overall dimensions of machine (L x D x H) ..... 640 x 570 x 600 mm

..... (25.2" x 22.440" x 23.622")

Weight of machine (static load) ..... 132 kg (291 Lbs)

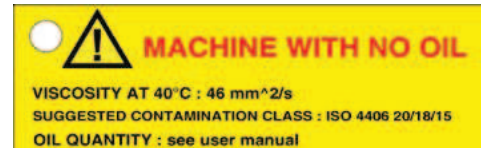


Number of operators..... 1 #

Maximum admissible ambient temperature..... from -5 to + 40 ° C

Maximum admissible relative humidity ..... 80 %

**(\*) This data depends on the type of machining.**



## Drawing showing overall dimensions

The measurements are expressed in mm.



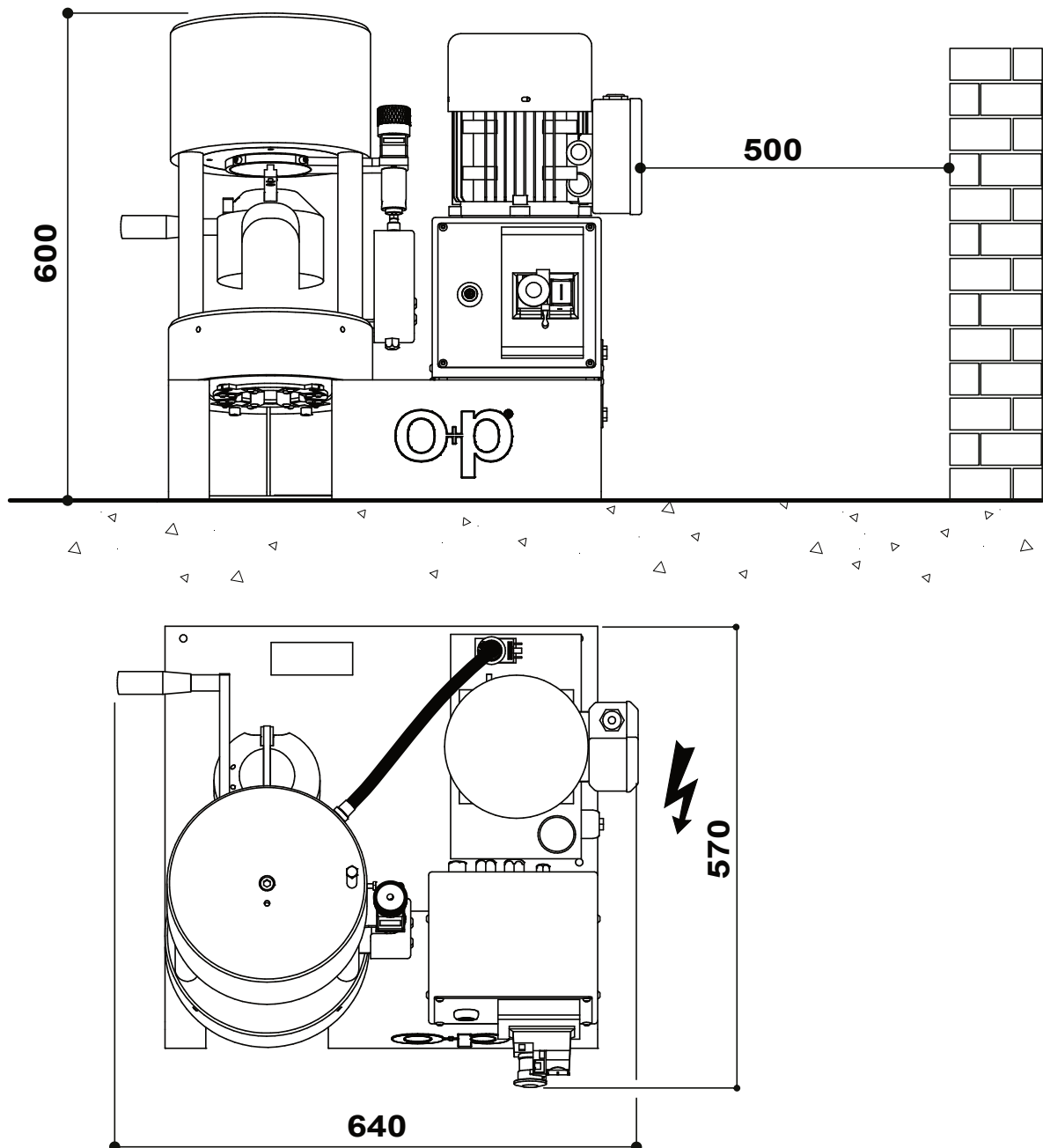
Electrical line connection entrance.



Operator's position or workstation.



The manual indicates the maximum measurements and where necessary the safety distances or spaces required for maintenance. The exact measurements of the machine and/or equipment are shown in the drawings that can be supplied if requested.



## Machine identification and manufacturer






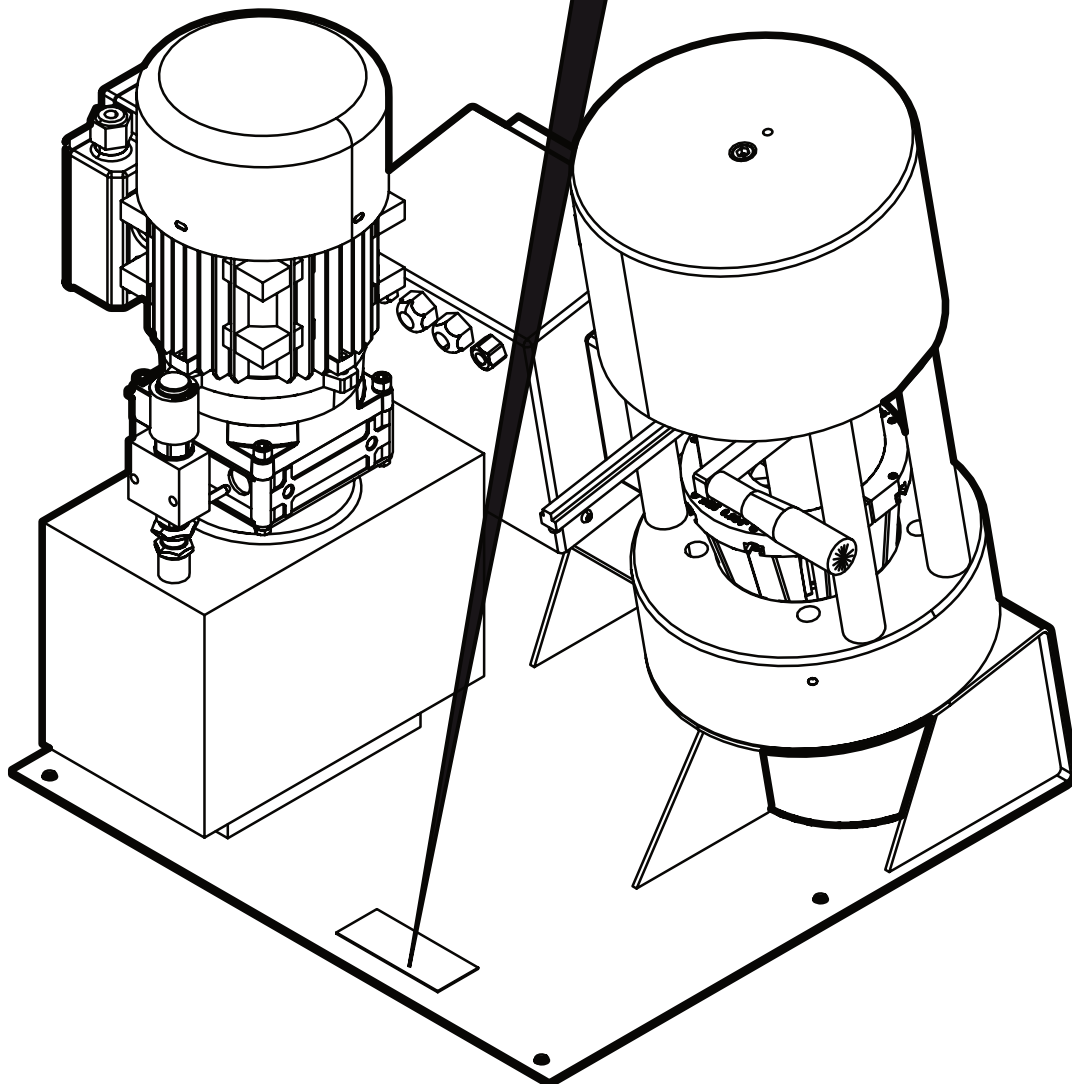
**The information plates on the machine must NOT be removed, damaged, dirtied, hidden, etc under any circumstances.**



The information plates must be cleaned periodically and always kept visible, that is, they must NOT be hidden by any objects or items (rags, boxes, equipment, etc.).

The technical details given in this manual do not replace those shown on the information plates on the machine.

 		MODEL	<input type="text"/>
OP Srl VIA DEL SERPENTE, 97 25131 BRESCIA (ITALY) Tel. +39.030.35.80.401 Fax +39.030.35.80.838 <a href="http://www.op-srl.it">www.op-srl.it</a>		SERIAL N°	<input type="text"/>
		YEAR	<input type="text"/>

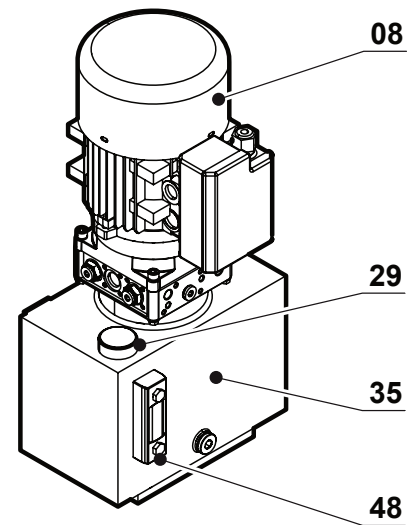




### - Drive

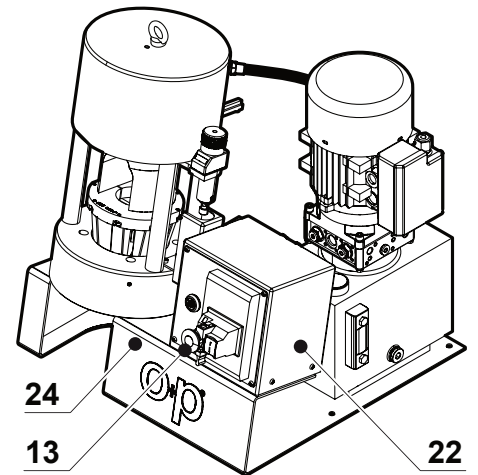
It is made up of a mini power pack **35**.

The mini power pack is completed by a level indicator **48**, the tank cap **29** and the motor **08**



### - Control panel

The branch box **22** is positioned ergonomically on the right side of the machine and it houses the control panel **13** where the buttons described in chapter 7 - OPERATION - are located.



### - Accessories

The machine may also be supplied with some accessories, as described in the Chapter 6: "INSTRUMENTATION".

## 3 - Accident Prevention and Safety

### GENERAL CONDITIONS

This machine is built according to the most severe accident prevention standards and is fitted with safety devices that are suitable for protecting components and operators.



***For obvious reasons it is not possible to foresee the multitude of installations and environments in which the machine will be installed, and so the Client must provide the Manufacturer with adequate information on specific installation conditions.***

The indications given in this document do not replace the safety regulations and technical data for installation and operation that apply directly to the product, nor the rules dictated by common sense and safety rules in force in the country in which the machine is installed.



***It is essential that the operators be given correct information. It is therefore obligatory for them to read and comply with the technical information given in the manual and annexed documentation.***

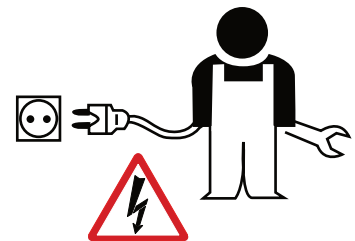
The manufacturer is available to provide training for professionals working with the machine, both on its own premises and in situ, on the basis of conditions to be defined contractually.

Handling and/or lifting heavy pieces or equipment (over 30 kg) must be done with the aid of suitable lifting equipment and using the specific lifting lugs fitted by the manufacturer.



***Do not use the machine if any operating anomaly is encountered. Avoid any precarious repairs. Repairs are only to be done using original spare parts that must be installed to suit the intended use.***

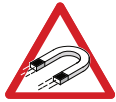
Responsibility for components bought on the market rests with the respective manufacturers.



## RISK ZONES AND OPERATIONS

### Installation conditions

This machine must not be installed out in the open or under adverse ambient conditions (sun, rain, wind, etc.). The safety distances must also be respected to avoid dangerous situations.



**Also make sure that there is no electromagnetic interference.**



**Standard machines are not equipped to work in environments that are particularly inflammable or explosive. Flameproofing is only supplied by request.**

The machine has been designed according to the standards for conserving energy and those in force on energy saving.

N.B. These conditions also apply to any subsequent installations.

### Maintenance works and safety devices

Guards, doors, or gates can only be removed using tools. In some cases they can be opened, but are protected by specific systems.



**Removal of guards or protective devices with the door open is only permitted for qualified personnel and only for extraordinary maintenance works.**



**Once this work has been completed the technician must reinstate the original conditions.**

**The guards may be removed only after the power is switched off.**

Switches and / or emergency buttons that are placed directly on the machine or nearby are provided with locking devices to prevent accidental power on. In any case, make sure that nobody else can reset or start the machine. Maintenance technicians are to report any fault or deterioration due to wear or ageing.

The machine must be cleaned using suitable equipment and detergents that do not attack the machine's components in any way. Cleaning the machine with water jets is completely forbidden.

### Thermal danger



**The machine may have hot surfaces due to overheating (e.g. motors, coils, piping, etc.), so be careful where you touch it.**

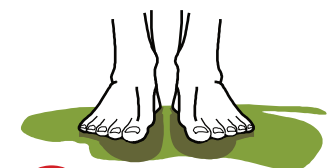
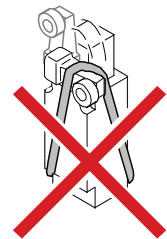
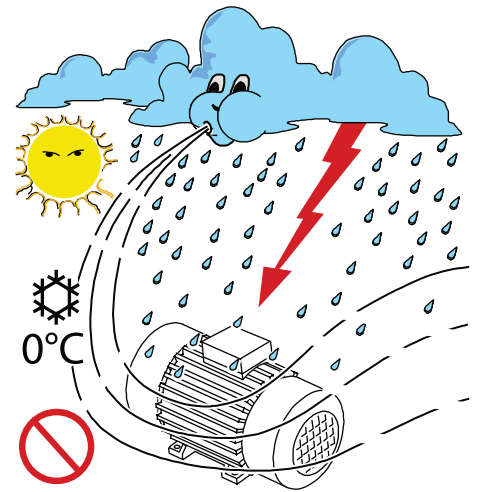
In case of fire use CO2 foam extinguishers and self-suctioning systems to fight the fire in closed environments.

### Personnel clothing

Personnel are NOT to go near the machine or equipment with bare feet or wet hands.

Personnel are not to wear clothing with long sleeves, laces, or belts that may hamper their personal safety.

Personnel are to wear the clothing and personal protective equipment made available by the employer: gloves, shoes, overalls, etc.



## Machine moving

When moving the machine poses a potential danger and so it is completely **FORBIDDEN** to run it empty, do maintenance, or clean it when the machine is running.



*When the machine is working of necessity it has pressing movements that can be seen and that for obvious operating reasons cannot be actively protected. Therefore, to avoid crushing it is necessary to take maximum care and concentrate when carrying out working operations.*

The operator must also pay attention to the work environment around them in order to guarantee sufficiently large space for escape routes.

## Machine stopped or switched off

Even when the machine is switched off it can pose a danger: guards, dies **06**, sharp edges, etc. are inevitably exposed and so care must be taken when entering the working area and when handling parts of the machine use suitable protective measures (gloves, shoes, etc.).



*Correct cleaning of the working environment can avoid accidents or superfluous risks. Even a small oil leak can prove dangerous.*

**Note:** Stores or dispensers can be provided of wheels; take great care and/or use the proper brakes.

## Lighting the workplace

The workplace must be correctly lit to guarantee the complete safety of all working and maintenance operations. The lighting must avoid stroboscopic or dazzling effects and stress of shadowy areas.

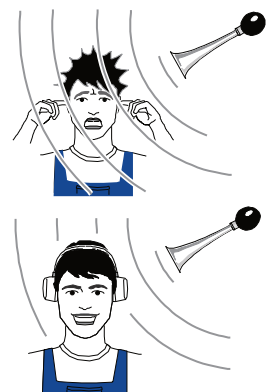
**Note:** On some models a mirror is mounted that makes easier to see the hosefitting when it is in the opposite part of the user

Use of the machine when good lighting is not available is forbidden.

## Noise

When running flat out, evaluated on its own and with correct maintenance, the machine generates a (noise) acoustic pressure level of less than 80 db(A) and so is completely harmless for the operator.

Where, as a result of the various and unforeseeable installation possibilities the noise threshold allowed by law in the country in which the machine is installed is exceeded, the Client must see to removing the causes or protect the operators by means of adequate personal equipment (ear muffs), as well as prior information to sensitise them to use and routine checking of their hearing.



## RESIDUAL RISKS

Despite the warnings and safety systems that the Manufacturer has adopted, there are still some residual risks that cannot be eliminated. These risks are listed in the table below, with some suggestions to avoid them.

**Table: Residual risks**

RISK ANALYSIS AND DESCRIPTION	SUGGESTED SOLUTION
<b>A risk of crushing</b> of the upper limbs is inevitably present and cannot be eliminated. Be very careful when using the machine. Respect any safety distances.	During pressing do not move your hands near to the dies and keep a minimum distance of 120 mm.
<b>Leaks or seepage</b> with a danger of slipping and/or environmental pollution.	Clean the machine and workplace thoroughly.
<b>Noise pollution</b> due to the type of machining or wrong pressure setting conditions.	Check the settings and operation or provide additional insulation.
<b>Guards must only be opened</b> after working ended to avoid the risk of residual voltages and allow the temperature of hot components to diminish.	Do not open the guards before the time indicated has elapsed and make sure that the operating conditions are correct.
<b>Aggressiveness and toxicity of fluids or greases:</b> Hydraulic oil and some greases may attack the skin or mucous membranes.	Use personal protective equipment or wash any parts exposed to contact immediately.
<b>Cutting parts:</b> Any burrs on the stub hoses or bushing being machined, dies <b>06</b> damaged etc.	Use personal protective equipment and handle with care.
<b>The hydraulic system</b> may cause serious injury if used with excess pressure or connected to accessory equipment.	DO NOT use for purposes not described in the manual or change valve settings.
<b>Poor cleaning:</b> This makes it difficult to read the controls and safety signs and creates dangerous situations.	Clean the instrumentation, plates, and working environment thoroughly.
<b>External weather agents</b> such as infiltration of water, low or high temperatures, high humidity, etc.	See to maintaining ambient conditions that are suitable for the plant.
<b>Accumulation of energy:</b> Inside the control panel <b>13</b> or hydraulic or pneumatic accumulators (if fitted).	Make sure that the devices have released their energy before working on them.
<b>Format change or Set-Up errors</b> with serious damage to the machine.	Make the change of the dies following the proper procedure and this must be done by experienced workers.
Poor or no <b>lighting</b> in the workplace.	Light correctly.
<b>Installation in small spaces</b> that do not allow adequate movements or correct escape routes from the workplace in case of danger.	Maintain the correct safety distances.
<b>Poor training</b> of personnel involved or professionals that work with the machine.	Ask the Manufacturer or their Agent for an additional course.

## 4 - Lifting and Transportation

### GENERAL CONDITIONS

#### Lifting

Where indicated and/or provided for, lugs **07** are inserted and/or can be inserted to which a hook or shackle (of correct size) can be anchored correctly, as shown in the figure.



**Lifting is only to be done by specialist personnel (riggers, crane operators, haulage contractors, etc.).**

The lifting means used (cables, polyester straps, chains) must be suitable for supporting the load imposed by the machine. The cables must form an opening angle of less than or equal to 90°.

The lifting cables must not damage the machine, if necessary protect it by means of rags or cardboard.

When handling check that the loads are correctly distributed on the cables and do not make any brusque or quick movements that may cause dangerous waving.

#### Transportation

Transporting the machine, especially by road, must be done using means and methods that are suitable for protecting the components (especially electronics) against violent impacts, humidity, vibrations, etc.

#### Unpacking and cleaning components

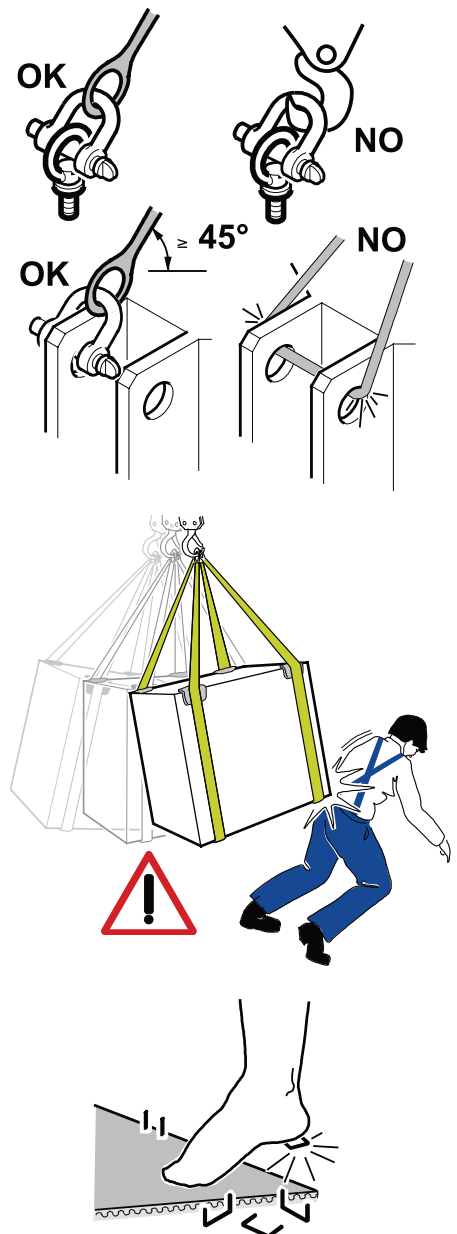
We wish to point out that packaging (wood, nails, cellophane, metal staples, adhesive tape, etc.) can pose a danger.

They must be removed using suitable means and not left within reach of irresponsible people (e.g. children). The same goes for tools used to remove packaging (scissors, hammers, tongs, etc.).

The packaging is to be disposed of in compliance with the standards in force in the country in which the machine is installed.

When opening the package check the integrity and completeness of the machine and make sure there are no defects or deterioration. If necessary, stop work immediately and call the haulage contractor or transporter as well as informing the Manufacturer.

Remove any protective film and carry out meticulous cleaning using suitable products for the surfaces to be cleaned. Do not use petrol, trichloroethylene, solvents, or abrasive products.



## SPECIFIC LIFTING OF UNITS


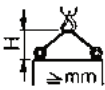


Lifting is to be done according to the general conditions described previously and anchoring to the points indicated in the manual on the machine or the packaging.

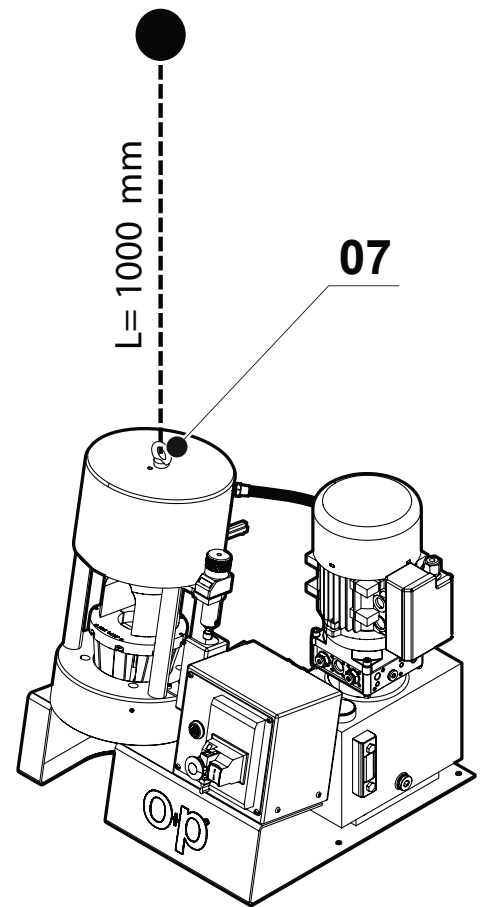
The table below shows the weight (mass) and other data of use for the lifting system.



**If there is a mobile base for the machine is recommended lifted using a forklift truck. In this case be careful not to bang the sides and crush any cables.**

**Tables: Lifting points**

Mass / Weight in kg	Lifting points	Minimum cable height	Lugs UNI2947	shackles UNI1947
	n°#			
132	1	1.000	8	8



## 5 - Installation

### GENERAL CONDITIONS

#### Means of installation

The machine must be installed to suit the Client's needs and the place in which the machine is to be installed.



***This operation must be carried out by specialist personnel. However, it is recommended to follow the indications given in this manual.***

The operating and maintenance manual CANNOT make up for any technical shortcomings among the installers. They must therefore be able to read and understand the diagrams annexed or provided beforehand to the Client.

#### Preliminary checks

- Check the foreseeable ambient conditions (explosive atmosphere, excessive ventilation, or high humidity level) and that the machine is not exposed to the weather (rain, wind, etc.).
- Avoid electromagnetic interference that may compromise correct functioning of the electronic equipment (**if present**).
- Position the machine in a room with safety distances that make it possible to carry out the normal working / maintenance operations. Positioning of the machine must be studied to avoid creating inconvenience or stress (windows or lighting lamps that may cause a glare, draughts, narrow spaces full of obstacles, etc.).
- Check that the floor is solid and suitable for supporting the weight of the machine.
- Check that the machine is stable and that it does not cause bothersome vibrations.

***Level out the machine and fix it with screws or bolts to the holes on the base and / or frame (if present).***

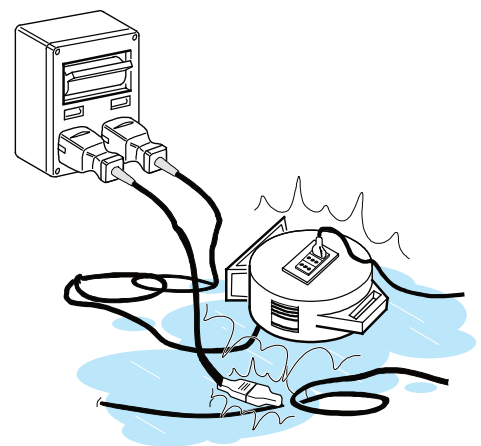
- Check for possible collision with other machines or moving equipment (e.g. overhead crane).
- Make sure that the power supply voltage is the same as that indicated on the information plates on the machine or in the manual.
- Check that the motors rotate in the correct direction.
- Install an adequate system on the electrical line to protect against overloads or short-circuits. We also recommend protection against excessively low voltages.

**The machine is supplied with cable connected up, but without plug.**

- Check that there is an adequate EARTHING.
- Make sure that the pneumatic line (**if used**) is protected against supplying compressed air at pressures exceeding 10 atm.
- Check the presence and quantity of hydraulic oil (**if present**).



***During installation operations, barriers and signs must be put up indicating "WORK IN PROGRESS".***



- The motor **08** doesn't work when the switch is connected :

1. Check whether the emergency button is locked.
2. Check whether the wall switch corresponds to the machine's switch poles.
3. Check whether the fuse of the wall switch is burnt.

### Installation procedure

The installation is done bearing in mind the comments made above, and following the procedure below in the order indicated:

- Place the machine on a flat surface in a convenient position for the operator.
- Make sure that the parts subjected to friction are clean and greased.
- Introduce oil into the mini power pack **35** by refilling through the tank cap **29** (see Table: lubricants and symbols).
- Make a test of the piston advancement and return to ascertain that everything works without problems.

## 6 - Instrumentation

### GENERAL CONDITIONS

Full knowledge of the INSTRUMENTATION is one of the prime rules to avoid damage the machine and the operator.



***We therefore recommend reading this manual carefully and if there is any uncertainty or discrepancy in the information, ask the manufacturer for more specific information.***

**Do not use the machine if:**



- ***If you do not have sufficient training on this machine or similar machines.***
- ***If you are not able to understand how it works.***
- ***If you are not sure of the consequences of the manoeuvres to be used.***
- ***If you encounter any functioning anomaly.***
- ***If any doubts or contradictions arise between your own experience, the manual, and/or other operators.***

If any controversy should arise in the technical information provided, the "ORIGINAL INSTRUCTIONS" and original language in which the document was prepared – ITALIAN – shall take precedence.

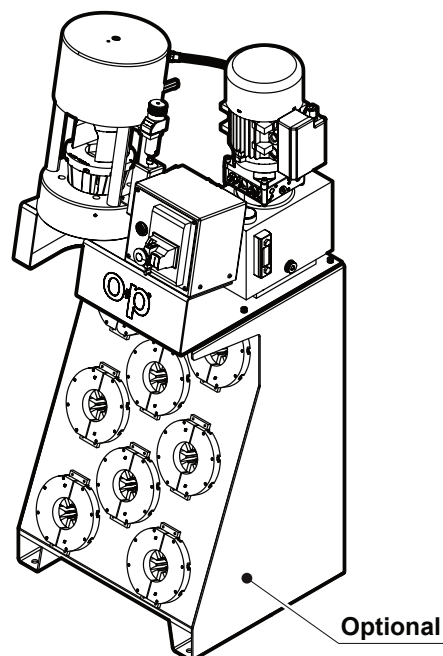
The employer is to make sure that the conditions indicated above are respected and that those tasked with operating the machine have been adequately trained.

The Manufacturer does not accept any responsibility for damage caused by the machine and the operator if these are due to incompetence, poor preparation or a lack of training.

## Equipping

The crimping machine can be equipped with (OPTIONAL) devices that facilitate preparation or machining, such as, for example:

- The base “P” (OPTIONAL)



A set of dies **06** is also available with the machine, as indicated in the **Table: Hose crimping dies** and defined when ordering to suit the Client's needs.

Upon request it is possible to supply dies with special diameters.



**No equipment or devices made by other manufacturers may be used. If this is done the pre-requisites for honouring the guarantee lapse and the Client takes full responsibility for any damage.**

**Table: Hose crimping dies mm / inch**

Order code	Recommended hosefitting diameter			
	Ø min mm	Ø max mm	Ø min inch	Ø max inch
TUBJ67M10	10	12	0,394	0,472
TUBJ67M12	12	14	0,472	0,551
TUBJ67M14	14	16	0,551	0,630
TUBJ67M16	16	19	0,630	0,748
TUBJ67M19	19	22	0,748	0,866
TUBJ67M22	22	25	0,866	0,984
TUBJ67M25	25	29	0,984	1,142
TUBJ67M29	29	34	1,142	1,339
TUBJ67M34	34	38	1,339	1,496
TUBJ67M38	38	42	1,496	1,654
TUBJ67M42	42	46	1,654	1,811
TUBJ67M46	46	50	1,811	1,969
TUBJ67M50	50	54	1,969	2,126
TUBJ67M54	54	67	2,126	2,637

## 7 - Operation

### GENERAL CONDITIONS

Before starting to control the machine's movements and functions a series of essential checks must be carried out and a thorough knowledge must be gained of the INSTRUMENTATION chapter.



***Before doing any operation you must have read, interpreted, and correctly implemented all the conditions indicated previously in the manual and/or annexes.***

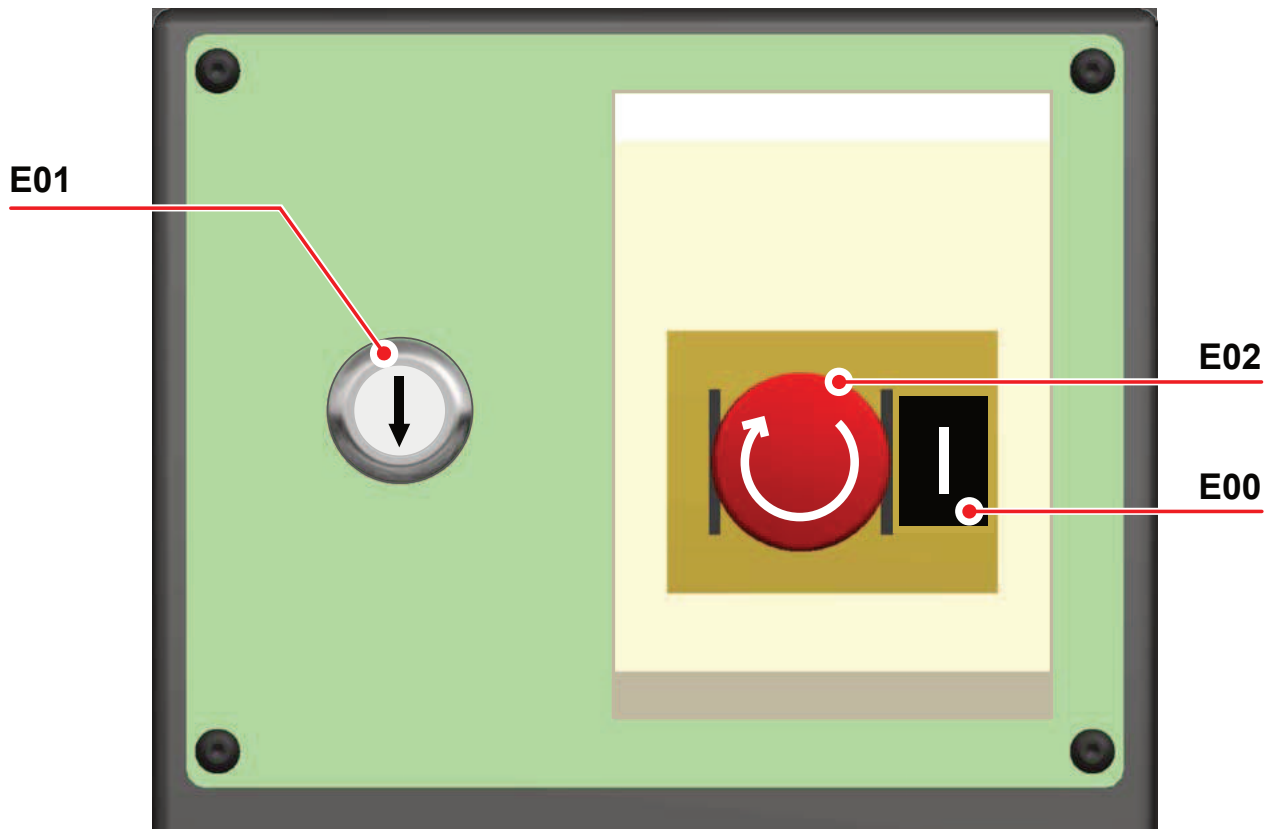
Before starting the crimping operations, carefully read the following sections of this manual:

- Machine characteristics
- Routine maintenance
- Safety regulations
- Preliminary inspections
- Lighting
- Fitting and replacing dies **06**

### PRELIMINARY INSPECTIONS

- Place the machine on a stable surface so that it is adequately supported.
- Make sure that the parts subject to friction are clean and have been lubricated every six months.

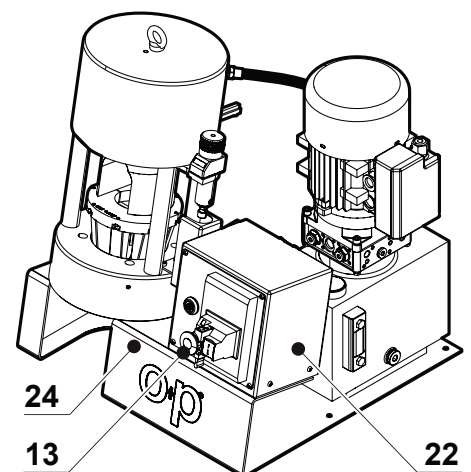
## CONTROL PANEL



E00	START BUTTON
E01	CLOSE BUTTON
E02	EMERGENCY STOP

### DESCRIPTION OF PANEL CONTROLS:

- **E00 - START BUTTON:** This button should be pressed to start working after an emergency stop or after a power outage.
- **E01 - CLOSE BUTTON:** When this button is pressed the piston advances and the dies grip the union.
- **E02 - EMERGENCY STOP.** When this button is pressed the mini power pack stops immediately. To restore operation, unlock the button by turning it in the direction of the arrows and press the "START" button.



## VERNIER DIAL CONTROLS

vernier dial **21**:

- Use the knurled adjusting ring nut to obtain the required diameter, turning it clockwise to reduce the swaging diameter or counterclockwise to increase it.

Use the knurled flywheel to adjust the pressing diameter (pos. **D**) and the electronic position indicator display (pos. **E**).

*Example: in order to obtain a final diameter of 12 mm, use a die with size 10. Bearing in mind that the two diameters have a 2 mm difference, this value should be shown on the display.*

- the vernier dial group **21** is provided with an electronic position indicator (**E**) for detecting the absolute or incremental position of the vernier.

Characteristics:

- Convert the linear unit of measure: (mm, inches).

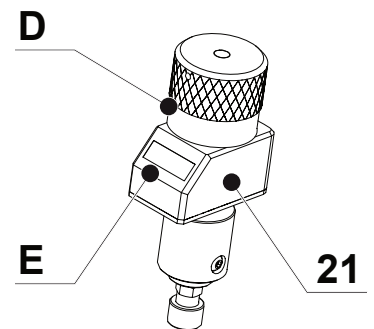
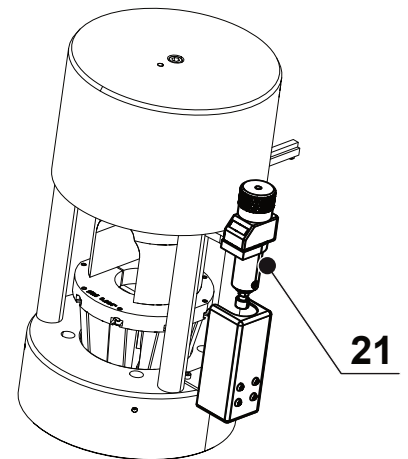
**N.B.: The direct drive electronic position indicators (pos. E) is provided with its own use and maintenance manual (see CHAP. 10: "Annexes").**

Full knowledge of the INSTRUMENTATION is one of the prime rules to avoid damage the machine and the operator.



**We therefore recommend reading this manual carefully and if there is any uncertainty or discrepancy in the information, ask the manufacturer for more specific information.**

For any dispute regarding the indicated technical information, please make reference to the "ORIGINAL INSTRUCTIONS" of the instructions manual provided alongside the machine and reproduced in SECTION 10: Annexes



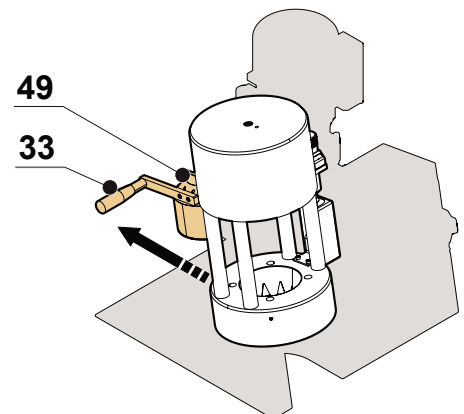
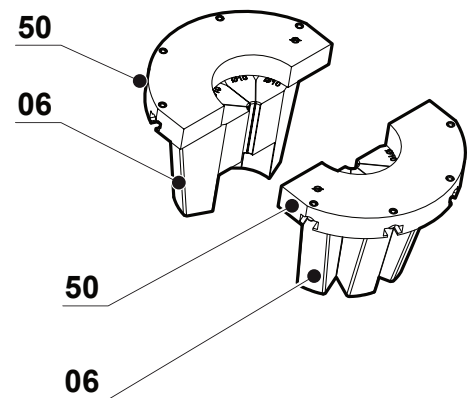
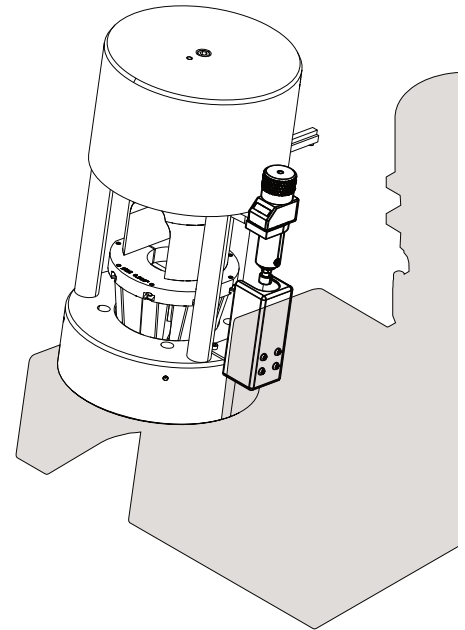
## OPERATING PROCEDURE

Decide the final swaging diameter required (the final swaging diameter is supplied by the producers of the unions; follow their instructions).

1. After establishing the required crimping diameter, select the pair of master dies half rings **50**, already complete with the relative dies **06**, suitable for machining.

**N.B.: Always use dies with nominal diameter less than the required swaging diameter.**

2. Remove the stem extension **49** using the handle **33**.



3. Act on the vernier dial **21** using the knurled flywheel (pos. **D**) to obtain the crimping diameter.

*The direct drive electronic position indicators (pos. **E**) is provided with its own use and maintenance manual (see CHAP. 10: "Annexes").*

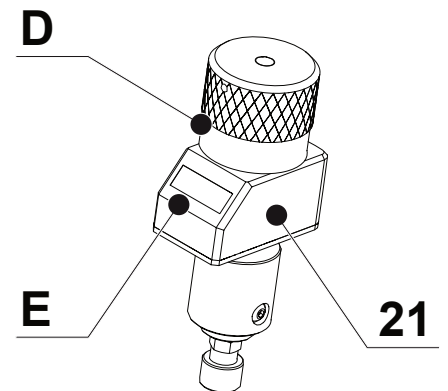
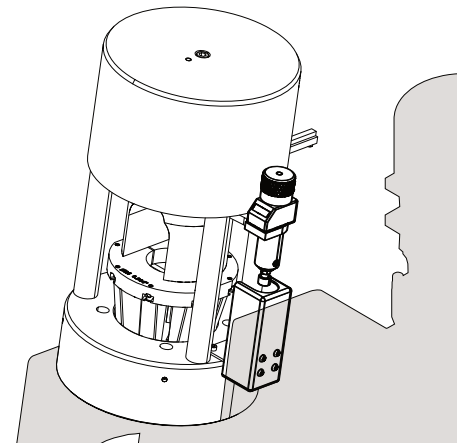
**WARNING:**  
*NEVER switch the direct drive electronic position indicator off.*

*In case of battery replacement, it is necessary to perform a "zero setting" of the machine; please contact O+P srl for this purpose.*

The low battery symbol is shown on the display when the battery replacement is required.

**WARNING:**  
*When this symbol is shown on the display:*

**ADJUST THE VERNIER DIAL TO ZERO** and proceed to the replacement of the battery (remove the screw of the front cover using a TORX-TX6 tool)



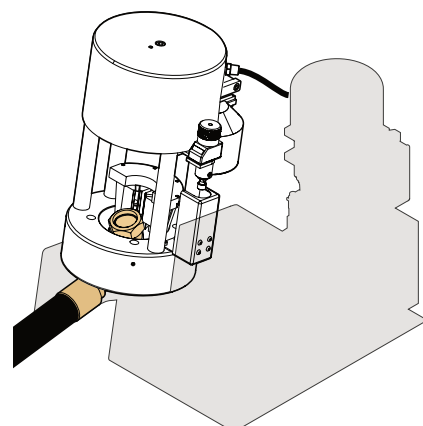
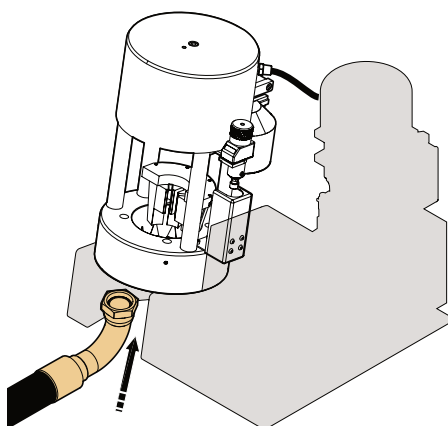
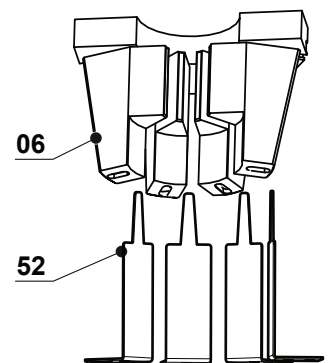
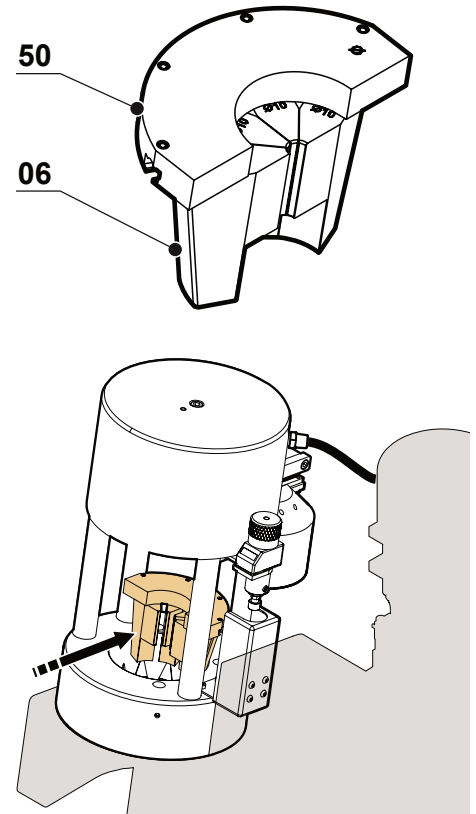
Flashing low battery symbol

4. Insert the first master dies half ring **50**.

**WARNING:**  
Make sure that the top of these fingers 52 enter perfectly between the dies 06.

5. Insert the assembled hose into the lower part of the hydraulic cylinder **04**.

**WARNING:** the hose fittings to be crimped, both straight and at 90°, shall always be inserted at the lower part of the hydraulic cylinder **04**.

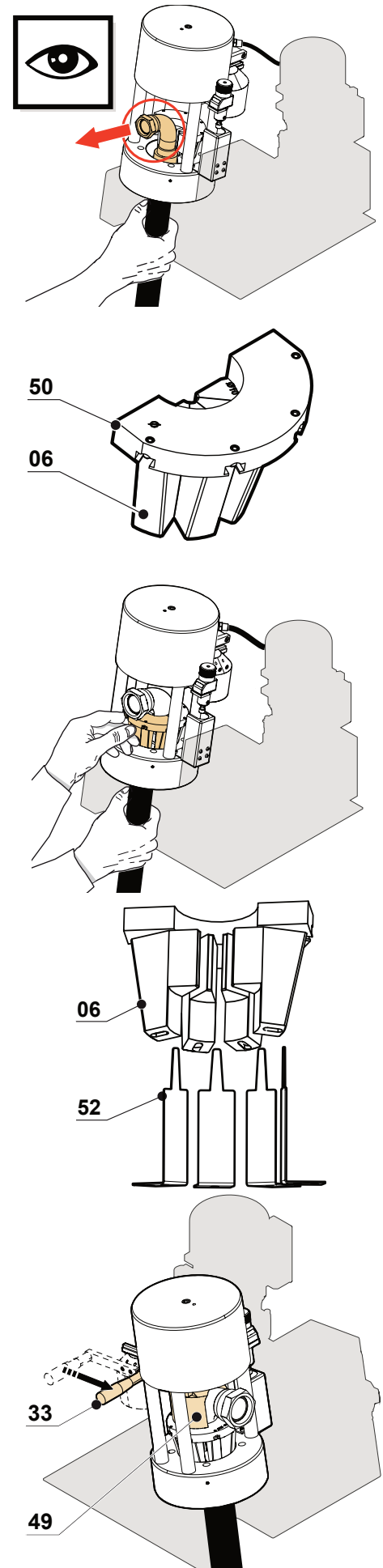


**WARNING:** for crimping 90° fittings, position the fitting like in figure.

6. Couple the assembled hose to the second master dies half ring **50**.

**WARNING:**  
Make sure that the top of these fingers **52** enter perfectly between the dies **06**.

7. Remove the stem extension **49** using the handle **33**.



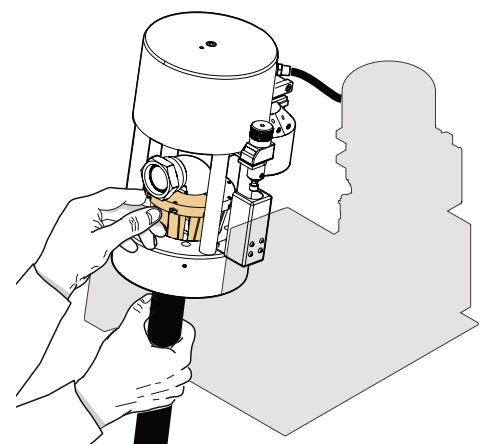
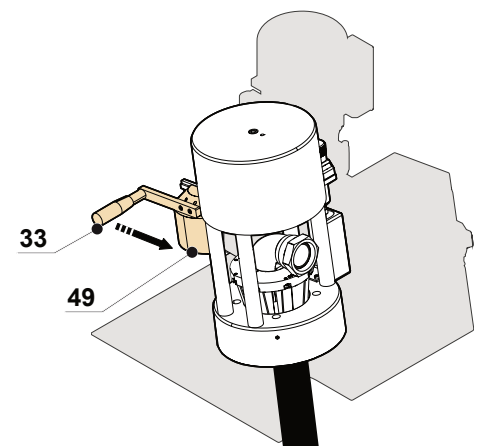
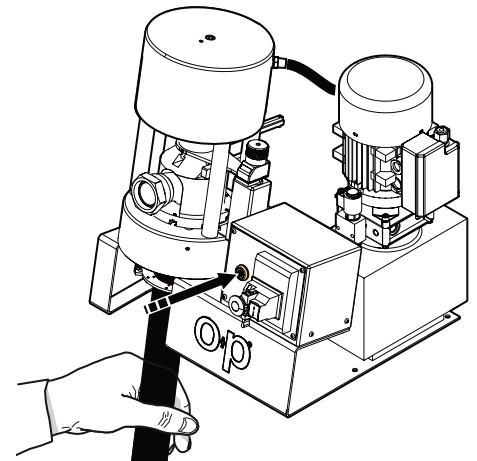
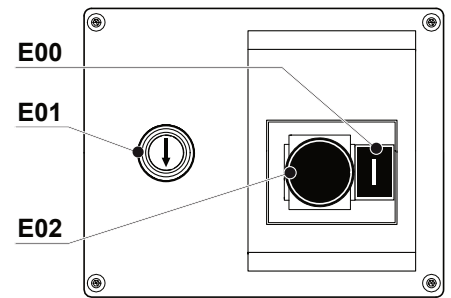
8. Press the "START" button [ E00 ] and crimp the fitting on the hose by pressing the CLOSURE BUTTON [ E01 ] and simultaneously hold the hose firmly with one hand.

**N.B.: It is always possible stop the machine by pressing the red EMERGENCY button [ E02 ].**

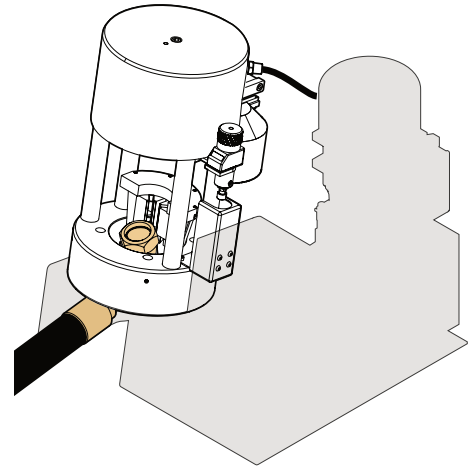
**N.B.: Release the button upon reaching the crimping diameter. The cylinder returns to position upon releasing this button.**

9. After completing crimping, remove the stem extension 49 using the handle 33.

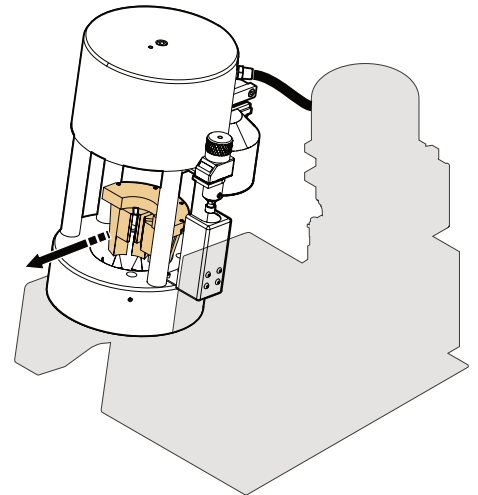
10. Remove the second master dies half ring 50.



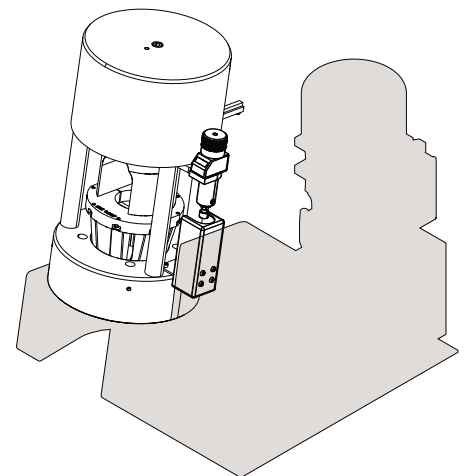
11. Remove the assembled hose.



12. Remove the first master dies half ring **50**.



- Now, the machine has a free crimping area and it is ready for a new equipping and new machining.



## 8 - Maintenance

### GENERAL CONDITIONS

Maintenance and lubrication operations are to be carried out with the machine stopped and power supply switched off, unless otherwise indicated.



***Maintenance and lubrication operations are to be done by specialist service personnel.***

Check that the quantity and/or types of oil used correspond to the indications given. Never mix oils of different qualities or brands.

For cleaning do NOT use rags that leave lint or products that may pollute or alter the characteristics of the fluids.

Avoid any precarious repairs – repairs must only be done using original spare parts.

Always use the personal protective equipment made available by the employer (gloves, overalls, shoes, etc.).

The maintenance technician is to report any anomaly timeously: drips, abrasions, fraying, etc.

DO NOT allow the use of the machine should problems of any kind be encountered, and see to reinstating normal conditions correctly or make sure that this is done.

The Manufacturer does not accept any responsibility if the maintenance cycles indicated in this manual and the annexed documentation are not respected, or if maintenance is entrusted to incompetent personnel or if procedures or lubricants are used with characteristics that are not compatible with those indicated.



***Remember that the hydraulic oil, grease, and lubricants can generate dangerous situations (see the ACCIDENT PREVENTION chapter). The same applies to tools or accessories for using or maintaining the machine.***



## Routine maintenance

### DESCRIPTION OF MAINTENANCE AND CHECKS

### SYMBOLS AND FREQUENCY

- **Each day** clean the working environment and workplace, technical and accident prevention information plates, control panels and the whole machine in general (e.g. an oily or dirty handle may give rise to a dangerous situation).

Especially, use a jet of compressed air to remove dust deposits, water, or dirt from the dies **06**.



**24 h**

- **Each year** check and tighten all the bolts on the machine, applying adequate tightening torques.

Also check that the cable die on the electrical equipment is tight, as well as the integrity of the power supply cable and protective sheaths.



**2.000 h**

- **Each day** carry out a visual check of the safety systems and check their activation.



**24 h**

- **Each month** check the oil level and top it up if necessary using the mini power pack **35** tank cap **29** (see Table: Lubricants and symbols).



**200 h**  
**4.000 h**  
**12.000 h**



- **Each day** check that there is no seepage from piping and hose fittings. Tighten the nuts and if the seepage persists change the hose fitting, hose, or gasket (if fitted).



**24 h**

- **Every 6 months** lubricate moving parts. For the type of grease recommended see Table: Lubricants and symbols



**1.200 h**


















- When the machine has been working **for about six years** check and fully service the machine.

**For this task contact the Manufacturer or their Agent.**



**12.000 h**

**Lubricants and symbols**  
**Table: lubricant e symbols**

Description	Lubricant	Ref. UNI 7164 ISO 34978	Symbol	
			DIN 30600 ISO 7000	ICON
OIL Hydraulic	MOBIL OIL DTE 25 AGIP OSO 46	HM46		
OIL Lubricating for guide	MOBIL VACTRA 4 AGIP EXIDIA HG320	G220		
OIL For lubrication	TELLUS SHELL T15			
OIL For hand pump	HLP 10 AGIP ACER 15		DIN 51524	
SOLVENT For cleaning	SOLVENT Q Cod. HA59200			
GREASE For general use	KLUBER STABURAGS NBU 30		DIN 1102	
CLEANING			DIN 484 ISO 423	
CHECK LEVELS			DIN 691 ISO 159	
CHECK FOR LEAKS OR SEEPAGE			DIN 257 ISO 29	
CHECK FILTERS			DIN 668 ISO 114	
GENERAL CHECK ANOMALIES AND FAULTS			DIN 1279 ISO 421	
WARNING ! DO NOT REMOVE OR DAMAGE ANY PART OF THIS DOCUMENT			DIN 1677 ISO 81	
GENERAL DANGER	Maintenance is to be done with the machine switched off by trai- ned personnel,unless otherwise indicated in the operating and maintenance manual,which must be consulted.		DIN 1008 ISO 434	 
PERSONNEL CLOTHING	Always use personal protective aquipment.		UNI 7543 CEE 92/58 DPR 524	  

## STORAGE AND DISASSEMBLY

### Storing the machine or prolonged stoppage

If the machine is not to be used immediately or is to be stored for long periods of time, check that it is packed correctly.  
It must be stored in closed spaces that are well ventilated and that do not present characteristics that are harmful to the machine's components, especially the electronic parts.  
Protect unpainted parts against corrosion using suitable grease or sprays. If necessary store it with dehydrating salts.



***In any case after long periods of inactivity the machine needs to be checked and inspected by specialist personnel, but this cannot be described here - ask the Manufacturer for instructions.***

If the machine is stopped for a relatively long period of time it is good practice to run the hydraulic system for short periods and then discharge the pressure, to ensure lubrication.

The stems on the cylinders must preferably be in the retracted position, otherwise they must be covered with anti-corrosion products.

When starting again after a long stoppage check the quality of the fluid in the hydraulic unit and replace if necessary.

### Decommissioning, dismantling, or scrapping of the machine

- Disconnect the energy supply lines: electrical, pneumatic, etc.
- Empty the tanks and components that contain harmful substances.
- Discharge any pressure vessels to make them harmless.
- Eliminate any stored voltages and/or residual energy.
- Dispose of the various types of materials that make up the parts of the machine via dumpsites that are suitable for this purpose:

**Table: Disposal of products**

COMPONENT .....	.....CONSTRUCTION MATERIAL
Buffer battery .....	.....Nickel/Lithium/Lead/Acids
PC Monitor and/or Display.....	.....Glass/Copper/Pressurised Gas
Frame .....	.....Arc welded FE37 steel
Guard.....	.....Painted and treated Steel/Plating
Paint .....	.....RAL.....
Motors.....	.....Steel/Cast Iron/Copper
Reducers .....	.....Steel/Cast Iron
Bushings or anti-friction materials .....	.....Bronze/Brass/Teflon/Silicone
Supports .....	.....Cast Iron/Steel/FE52
Bearings .....	.....Steel
Gaskets .....	....Rubber/Teflon/Viton/Vulkolan/Kevlar
Electric cables .....	.....Copper/Rubber
Flexible hoses (low pressure).....	.....Nylon
Flexible hoses (high pressure) .....	.....Steel/Rubber
Resistances .....	.....Copper/Steel/Ceramics
Printed circuits .....	.....Copper/Tin/Acids/Resin



Users must see to disposing of the equipment in such a way as to avoid causing pollution, and are to take them to a collection point approved for recycling electrical and electronic equipment.

The manufacturer does not accept any responsibility for damage caused to the environment and for the systems used for disposing of the materials: machine parts, lubricants, and anything else is to be disposed of according to the law.

***Ensure that the in inoperative or stored machine is completely open and without any parts stretched (e.g. springs, cylinders etc).***

## 9 - Spare Parts Catalog

### GENERAL CONDITIONS

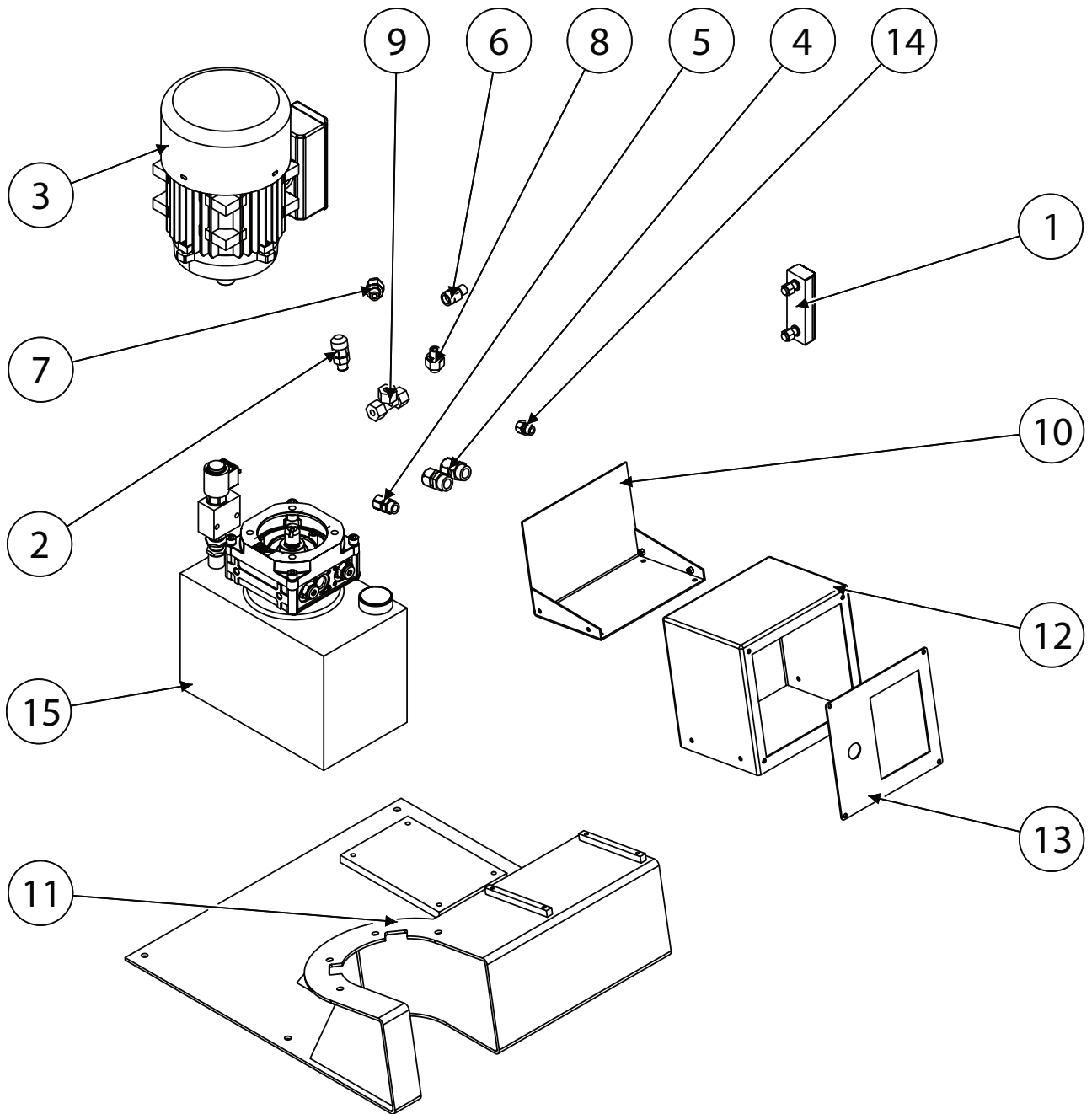
By request for spare parts please mention:

- Type of machine
- Serial number
- Part number of the spare part
- Page number
- Item description
- Required quantity
- For the electric material please mention in addition:  
the voltage (Volt) and the frequency (Hz)

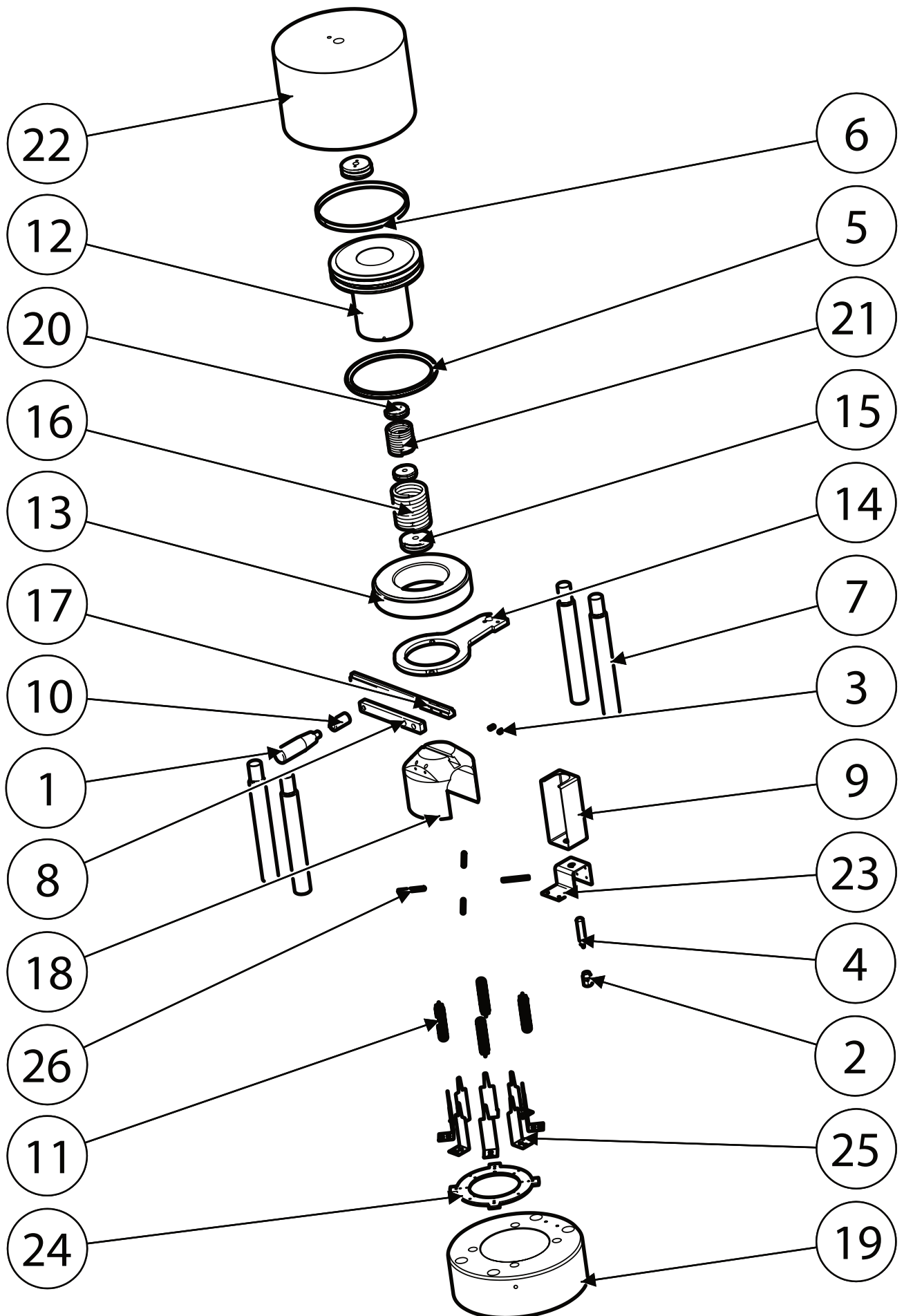


***For warranty coverage purposes only original spare parts must be used.***

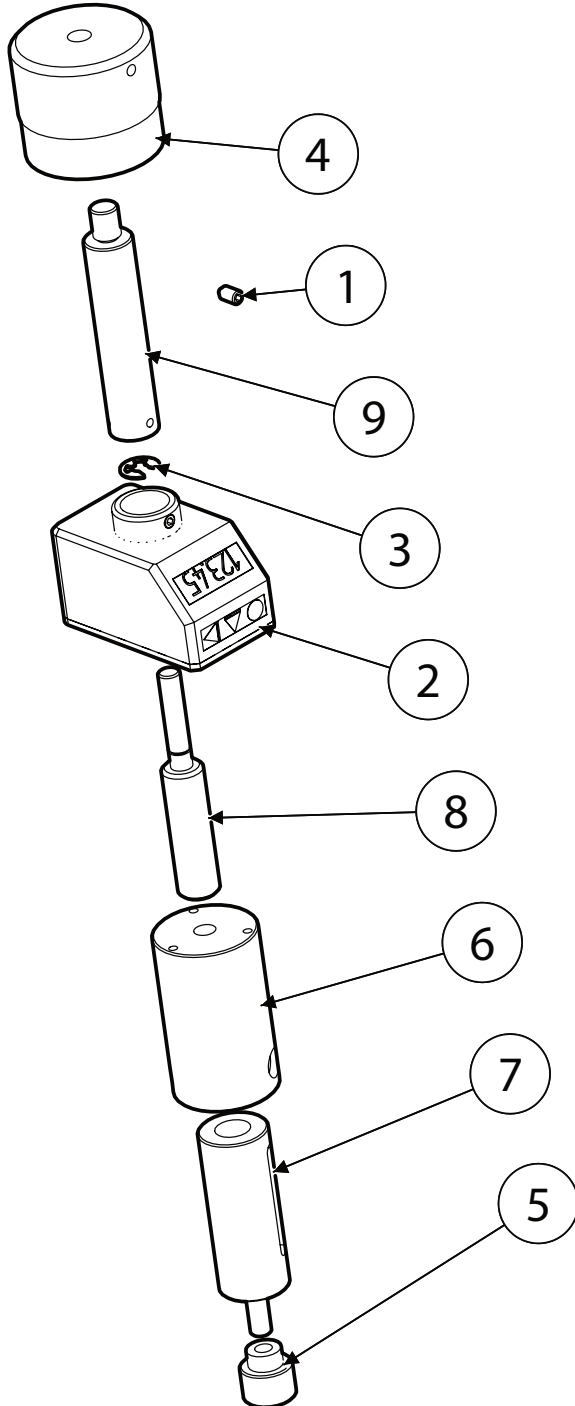
**SPARE PARTS**



Pos.	Code / Codice	Pos.	Code / Codice
1	INDLIVEL000	9	RACCRIGIDO008
2	MINIPRESA004	10	TUBJ67S34512
3	ME015HP005	11	TUBJ67S34549
4	ELPG13+ELPGR13	12	TUBJ67S34551
5	ELPG09 + ELPGR09	13	TUBJ67S34552
6	RACCRIGIDO006	14	ELPG07 + ELPGR07
7	RACCRIGIDO292	15	MINICTRPPC151116
8	RACCRIGIDO229		



Pos.	Code / Codice
1	MII280P22011
2	ELPG7+ELPGR7
3	MIGN615M6K
4	SENSORE006
5	GUARNI170002
6	FASCIAG170003
7	TUBJ67S24708
8	TUBJ67S34505
9	TUBJ67S34509
10	TUBJ67S34520
11	TUBJ67S34541
12	TUBJ67S34544
13	TUBJ67S34545
14	TUBJ67S34546
15	TUBJ67S34547
16	TUBJ67S34548
17	TUBJ67S34550
18	TUBJ67S34553
19	TUBJ67S34554
20	TUBJ67S34559
21	TUBJ67S34560
22	TUBJ67S34562
23	TUBJ67S34582
24	TUBJ67S345101
25	TUBJ67S34586
26	FE060506364B



Pos.	Code / Codice
1	MIGN9133M46MS
2	INDICATOREPOS003
3	FE057434
4	USFLS04144
5	TUBJ67S34517
6	TUBJ67S34518
7	TUBJ67S34519
8	TUBJ67S34535
9	TUBJ67S34536

## 10 - List of annexes

In addition to this operating and maintenance manual, the following documentation is supplied as annexes and/or upon request (if applicable):

- Wiring diagrams
- Hydraulic diagrams
- Pneumatic diagrams
- Declaration of conformity
- Instruction on how to change the supply voltage
- Instruction on how to change the filter and for cleaning and greasing ( H Version)
- Manuals and/or technical/commercial catalogues for machines or part-machines fitted on your model.



***This documentation is intended to be read by professionals and/or specialist personnel. Also only the documentation that is specifically used for your machine model is provided.***



***The manual and its annexes cannot make up for any shortcomings in training or professionalism of operators and so the Client must make sure that they are able to correctly interpret the contents of the documentation.***



**PLEASE NOTE!**

***The information provided in this document is partly taken from original documents from the various suppliers. This document contains only the information deemed necessary for using and routine maintenance of the machine.***



**DICHIARAZIONE DI CONFORMITA'**  
**DECLARATION OF CONFORMITY**

**2006/42/CE Nuova direttiva per la marcatura CE**  
( Abrogazione della direttiva 98/37/CE ex 89/392/CEE )

**2006/42/CE New machinery directive for the CE**  
( Abrogation of Directives 98/37/CE ex 89/392/CEE )

NOI - WE  
**OP S.r.l.**

( Nome del fabbricante o del suo mandatario stabilito nella comunità - Supplier's name)

Via del Serpente, 97 - 25131 BRESCIA  
( Indirizzo completo - Address)

DICHIARIAMO SOTTO LA NOSTRA ESCLUSIVA RESPONSABILITA' CHE IL PRODOTTO :  
DECLARE UNDER OUR SOLE RESPONSIBILITY THAT THE PRODUCT :

**TUBOMATIC J67 EL**

( nome - name, tipo - type, modello - model / n° di serie - serial number )

- **La macchina non rientra nell'elenco contenuto nell'Al. IV della Direttiva Macchine 2006/42/CE**  
The machine is not part of the list included in Ann. IV Machinery Directive 2006/42/CE.

- **La macchina rispetta i requisiti essenziali di sicurezza indicati sulla Direttiva Macchine e successive modifiche:**  
The machine follows the safety requirements included in the Machinery Directive and its following modifications:

**2006/42/CE**  
2006/42/EC

**DIRETTIVA MACCHINE**  
MACHINE DIRECTIVE

**2014/35/EU**  
2014/35/UE

**DIRETTIVA BASSA TENSIONE**  
LOW VOLTAGE DIRECTIVE (LVD)

**2014/30/EU**  
2014/30/UE

**DIRETTIVA COMPATIBILITA' ELETTROMAGNETICA**  
ELECTROMAGNETIC COMPATIBILITY (EMC)

- **La macchina è provvista di marcatura CE**  
The machine is provided with EC mark

- **Norme di riferimento applicate:**  
Applied references normative:

**UNI EN ISO 12100:2010**  
UNI EN ISO 12100:2010

**CEI EN 60204-1**  
CEI EN 60204-1

Brescia, li

DANIELE PIANTONI



(nome e firma o timbratura della persona autorizzata)

(name and signature or equivalent marking of authorized person)

Dichiariamo che il Fascicolo Tecnico è costituito presso OP s.r.l Via del Serpente 97, 25131 BRESCIA

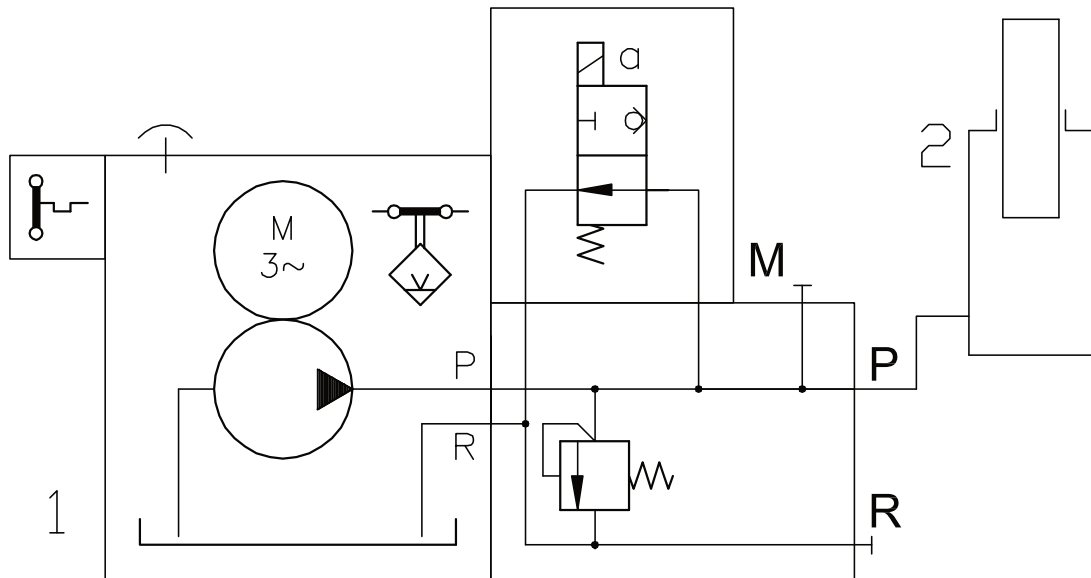
We declare that the technical documentation is established c/o OP s.r.l. Via del serpente 97, 25131 BRESCIA

La persona responsabile del fascicolo tecnico è il Sig. Massimo Ziliani Resp. Ufficio Tecnico.

Our technical manager, Mr. Massimo Ziliani, is responsible for the technical dossier

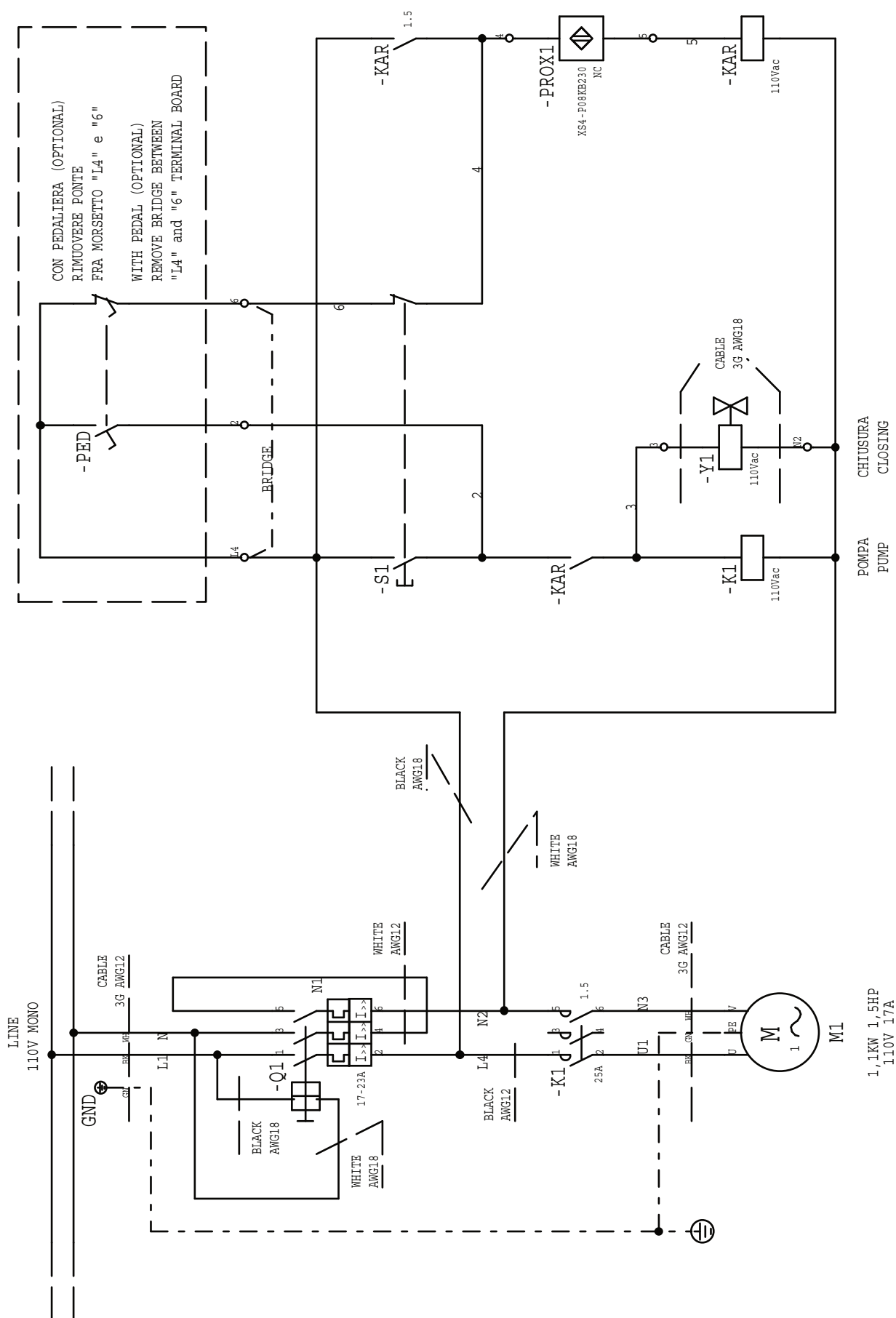


**SCHEMA IDRAULICO  
HYDRAULIC SYSTEM DIAGRAM**

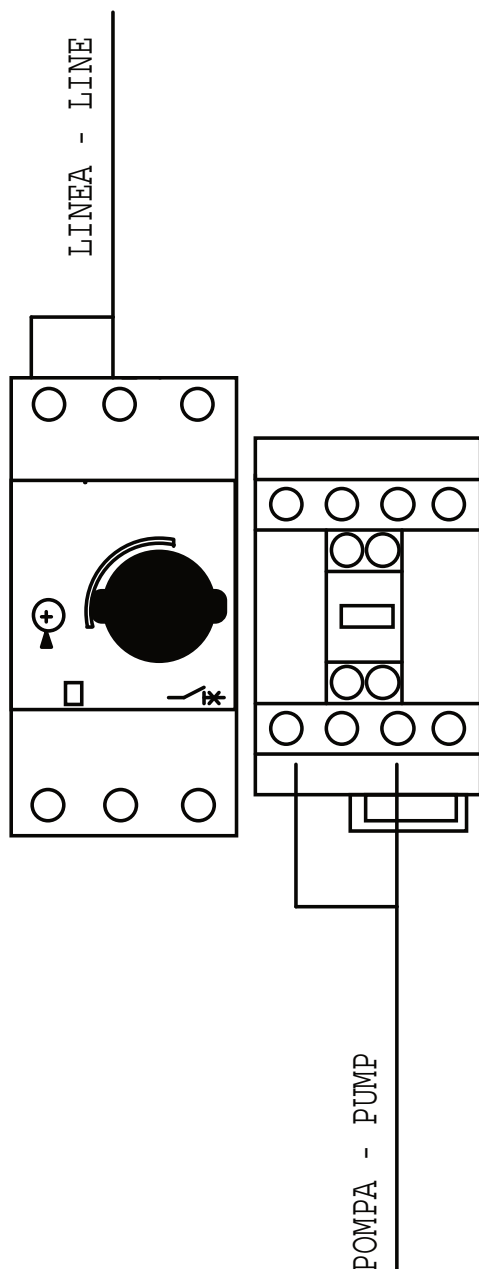


2	CILINDRO	Cylinder
1	CENTRALINA MOTORE	Compact hydr. power packs
N°	DESCRIZIONE	Description

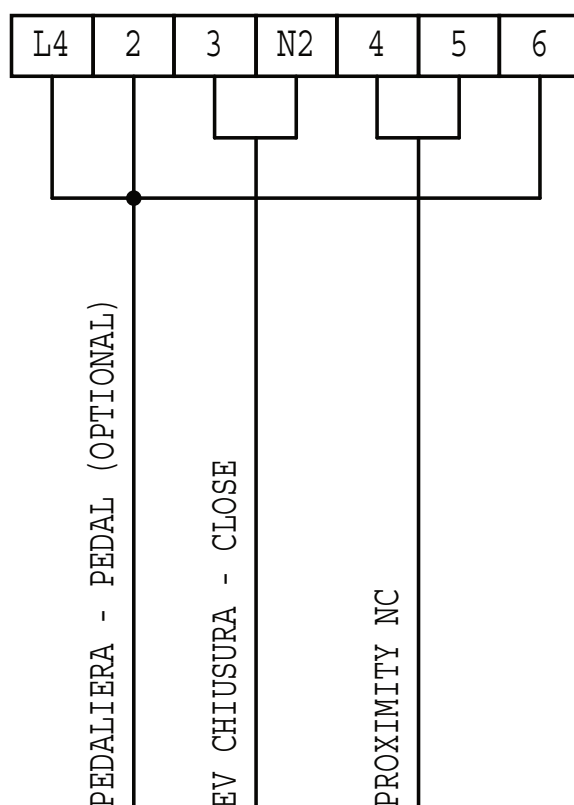
SCHEMA ELETTRICO  
ELECTRIC SYSTEM DIAGRAM



*This document is the property of the Manufacturer and/or its Agent and must not be tampered with or changed, reproduced or provided to others without written consent.*



## MORSETTIERA TERMINAL BOARD



CODICE CODE	DESCRIZIONE DESCRIPTION
-Q1	SALVAMOTORE MAGNETO TERMICO - MANUAL MOTOR CONTROLLER
-K1	TELERUTTORE POMPA - CONTACTOR
-KAR	RELE' 2 SCAMBI - RELAY 110Vac
-S1	PULSANTE RASATO NERO CON SIMBOLO - BLACK PUSH BUTTON WITH SYMBOL
-Y1	ELETTROVALVOLA CHIUSURA - EV. CLOSING
-PROX1	PROXIMITY RAGGIUNGIMENTO QUOTA - PROXIMITY MEASURE OK
-PED	PEDALIERA - PEDAL (OPTIONAL)

## DIRECT DRIVE ELECTRONIC POSITION INDICATOR



# DD51-E

Direct drive electronic position indicators

## INSTRUCTIONS FOR USE

**elesa**<sup>®</sup>

## DD51-E

## Direct drive electronic position indicators

### 1. Safety Instructions

The product has been designed and manufactured in accordance with the current regulations.

The product leaves the factory ready for use and complies with the safety standards.

To maintain the product in this state, it is necessary that it is assembled and used properly, in the closest compliance with this instruction manual and with the following specific safety precautions.

Ensure that the user has read and understood the instruction manual and in particular the chapter "Safety Instructions".

In addition to the instruction manual, all the rules of law must be observed, in regard to accident prevention and environmental protection.

This manual is intended as an indispensable supplement to the existing documentation (catalogues, data sheets and assembly instructions).

The use without complying with the descriptions / specific parameters, in combination with systems / machines / processes to be controlled, it can lead to a malfunction of the product, causing:

- health hazards,
- environmental hazards,
- damage to the product and its proper functionality.



Do not open nor modify the case of the indicator.

Tampering with this product may endanger the correctness and accuracy of its operation.

In case of malfunction, do not attempt any repairs to the units and contact Elasa sales office.

### 2. System description

DD51-E position indicators, with battery power supply, can be used on passing through shafts in any position to provide the reading of the absolute or incremental positioning of a machine component.

Mechanical and electrical characteristics	
Power supply	Lithium battery CR2450 3.0 V
Battery life	5 years
Display	5-digit LCD of 8 mm height and special characters
Reading scale	-19999; 99999
Number of decimal digits	programmable <sup>(1)</sup>
Unit of measure	mm, inches, degrees programmable <sup>(1)</sup>
Rotation max. speed	300/600/1000 r.p.m. <sup>(2)</sup> programmable <sup>(1)</sup>
Precision	10.000 impulses/revolution
Protection level	IP65 or IP67
Working temperature	0° C ÷ +50° C
Storing temperature	-20° C ÷ +60° C
Relative humidity	max. 95% to 25° C without condensation
Interference	IEC 61000-4-2

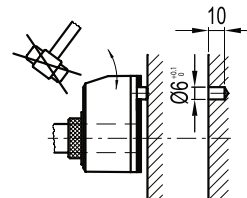
(1) See paragraph 8.2

(2) Default: 600 r.p.m.

Higher rotation speeds to 600 r.p.m. can be maintained for short periods of time. The value of the max speed affects the battery life.

### 3. Assembly

1. Drill a Ø 6x10 mm hole in the body of the machine with a 22 mm centre distance from the shaft to fit the rear referring pin.
2. Fit the indicator onto the shaft and make sure that the referring pin fits into the hole.
3. Clamp the bushing to the shaft by tightening the grub screw with hexagon socket and cup end, according to UNI 5929-85.





### 4. Turning on the system

After you have read and understood the section "Safety Instructions", proceed by switching on the indicator.

To turn the indicator on hold  while pressing the key . The display will light up and the indicator will be ready to be used.

#### 4.1 Turning off the system (only for storage)

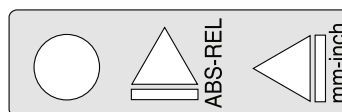
To turn the system off enter the programming mode, select the **rESEt** parameter then press the key . At this point, press the button  for 5 seconds; the display will turn off and the indicator will go into low power mode of the battery.




### 5. Symbols on the display



1. Absolute / incremental mode
2. Battery
3. Unit of measure (mm/inch/degrees)

### 6. Key function



FUNCTION		
KEY	Operating mode	Programming mode
	Access to the programming mode	Parameter selection / Confirm of parameter change
	Absolute or incremental mode selection	Digit increase / programming mode exit
	Unit of measure selection	Scroll for parameters / digit selection

## DD51-E

## Direct drive electronic position indicators

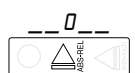
### 7. Operating mode

#### 7.1 Absolute / incremental measuring mode selection

Press the key to select the absolute or incremental measuring mode.

The measuring mode selected is shown on the display by the symbols:

- **ABS**: absolute measuring mode
- **REL**: incremental measuring mode



It is possible to change the key function by setting the parameter **\_\_\_D\_\_\_**.

The available options are:

- **ArCLR** (default): passing from **ABS** to **REL** the counter is set to zero.
- **Ar**: passing from **ABS** to **REL** the counter is not set to zero. In this case, the counter is set to zero by pressing + .
- **OFF**: the key is disabled and does not allow changing the selected measuring mode.

To program the parameters listed above, see paragraph 8.2.

#### 7.2 Unit of measure selection

Press the key to select the unit of measure needed. The options available are millimeters, inches and degrees.

The measuring mode selected is shown on the display by the symbols:

- **mm**: millimeters
- **INCH**: inches
- **D**: degrees



It is possible to change the key function by setting the parameter **\_\_\_D\_\_\_**.

The available options are:

- **ALL** (default): of measure that can be selected: mm, inch, D
- **noDEG**: of measure that can be selected: mm, inch
- **OFF**: the key is disabled and does not allow changing the selected measuring mode.

To program the parameters listed above, see paragraph 8.2.

#### 7.3 Setting the absolute reference

After having selected the absolute measuring mode and stopped the shaft in the starting position or in the reference position, press the key combination to set the absolute value to the sum of the values of the parameters **0rG** (absolute value of reference) and **OFFS** (compensation value).

The value of compensation (offset) allows you to adjust the value shown on the display in such a way that takes into account, for example, wear or tool change. The system allows you to store up to 10 values of compensation. Press the key

combination + . The screen will display the last compensation value used (eg **OFFS D**). Choose the desired compensation value by pressing the key , and then press the key to confirm.

Then the screen will display the absolute value to the sum of the values of the parameters **0rG** and **OFFS**.

To program the offset values, see parameter **OFFS** of paragraph 8.2.



It is possible to change the function of the keys combination by setting the parameter **\_\_\_D\_\_\_**.

The available options are:

- **L\_0rG**: the reference value and the compensation value are set as shown above. Choose the desired offset among the 10 available values, then press the key to confirm;
- **OFF**: the keys combination + is not associated to any function in the operating mode

For programming the parameters listed above see paragraph 8.2.

#### 7.4 Direct programming of the absolute reference value (source)

- of the compensation value (offset)
- of the reading after one revolution

The function of the keys combination allows direct access to the programming of one of the following parameters, depending on the value assigned to parameter **\_\_\_D\_\_\_**.

The available options are:

- **P\_0rG**: direct programming of the absolute reference value (**0rG** parameter)
- **P\_StP**: direct programming of the reading after one revolution (**StEP** parameter)
- **P\_0FS**: direct programming of the compensation value (**OFFS** parameter)
- **OFF**: the keys combination + is not linked to any function in the operating mode

For programming the parameters listed above see parameter **\_\_\_D\_\_\_** of paragraph 8.2.

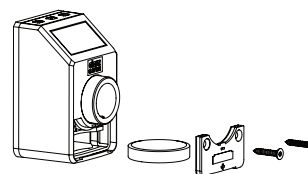
#### 7.5 Battery replacement

The internal lithium CR2450 – 3.0V battery ensures over 5 years battery life.

The symbol is shown on the display when the battery replacement is required.

The replacement is made by simply removing the front cover without disassembly of the indicator from the control shaft and keeping unchanged all the configuration parameters.


To simply remove the battery from the battery compartment, we recommend the use of a magnet.





## DD51-E

## Direct drive electronic position indicators


### 8. Programming mode

Press the key  for 3 seconds to enter the programming mode. Depending on the setting of **PASS** parameter, the system may require you to enter a password.


Press the key  to scroll through the list of parameters.

Press the key  to exit the programming mode. The programming mode is automatically dropped after 30 seconds of inactivity.

#### 8.1 Programming parameters with numeric values

Press the key  to increase the flashing digit.

Press the key  to select the next digit.

Press the key  to confirm the value and go back to the list of parameters.




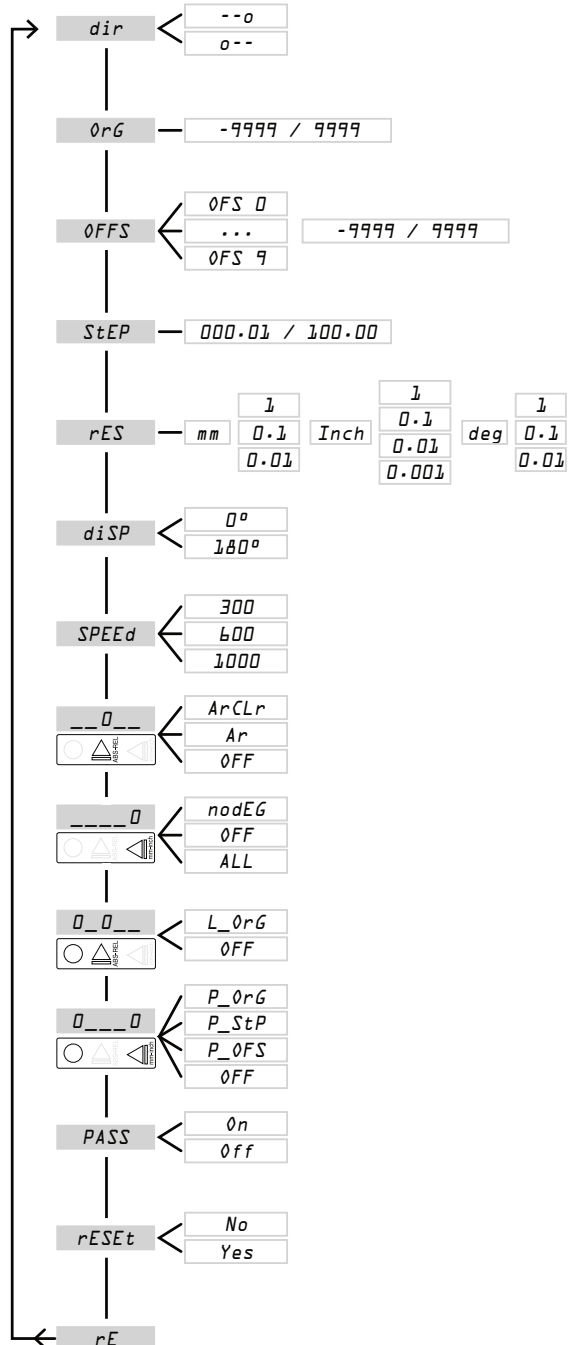
The numeric values of the parameters must be inserted taking into account the selected unit of measure

### 8.2 Programming parameters

Press the key  for 3 seconds

Enter the password 22011 (only if **PASS** = 0n)





Press the key  to scroll through the list of parameters



## DD51-E


## Direct drive electronic position indicators

The available parameters and their descriptions are listed in the following table.

Parameter	Description	Available options	Standard value
<i>dir</i>	Rotation direction	<i>--o</i> clockwise <i>o--</i> counterclockwise	<i>--o</i>
<i>Org</i>	Absolute reference value	<i>-9999, 9999</i> The parameter value depends on the unit of measure selected.	<i>0</i>
<i>OFFS</i>	Compensation values (Offset)	<i>-9999, 9999</i> The system allows you to store up to 10 compensation values: <i>0FS 0 ... 0FS 9</i> The parameter value depends on the unit of measure selected.	<i>0</i>
<i>StEP</i>	Reading after one revolution	<i>0.01; 100.00</i>	<i>001.00</i>
<i>rES</i>	Resolution	mm: <i>1; 0.1; 0.01</i> inches: <i>0.001; 0.01; 0.1; 1</i> degrees: <i>0.01; 0.1; 1</i>	mm: <i>0.1</i> inches: <i>0.01</i> degrees: <i>1</i>
<i>diSP</i>	Display orientation	<i>0°</i> : display right <i>180°</i> : display reverse	<i>0°</i>
<i>SPEED</i>	Reading max speed [rpm]	<i>300; 600; 1000</i>	<i>600</i>
	Key function	<i>ArCLR</i> : switching from <i>ABS</i> to <i>REL</i> the counter is set to zero. <i>Ar</i> : switching from <i>ABS</i> to <i>REL</i> the counter is not set to zero. <i>OFF</i> : the key is not assigned to any function in the operating mode	<i>ArCLR</i>
	Key function	<i>ALL</i> : selectable units of measure: mm, inch, D <i>noDEG</i> : selectable units of measure: mm, inch <i>OFF</i> : the key does not allow the unit of measure conversion	<i>ALL</i>
	Key combination function	<i>L_Org</i> : the key combination sets the absolute value to the sum of <i>Org</i> + <i>OFFS</i> parameters <i>OFF</i> : the key combination is not assigned to any function in the operating mode	<i>L_Org</i>
	Key combination function	The key combination activates the direct programming of the following parameters: <i>P_Org</i> : parameter <i>Org</i> <i>P_StP</i> : parameter <i>StEP</i> <i>P_0FS</i> : parameter <i>OFFS</i> <i>OFF</i> : the key combination is not assigned to any function in the operating mode	<i>P_Org</i>
<i>PASS</i>	Password	<i>ON</i> : the system requires the password 22011 to enter the programming mode <i>OFF</i> : the system does not require a password to enter the programming mode	<i>OFF</i>

Parameter	Description	Available options	Standard value
<i>rESet</i>	Setting of Parameters to standard values	<i>YES</i> : the parameters are set to the standard values <i>NO</i> : the parameters maintain the values set by the user	<i>NO</i>
<i>rE</i>	Software version	The software version is shown on the display.	

### 9. Problem solving

Message on the display	Description	Action
<i>-----</i>	Exceeding the reading scale (-19999;99999) The value cannot be shown on the display.	The system continues to measure displacements; the value will be shown on the display again if re-included in the reading scale.
<i>S_Err</i>	The shaft speed has exceeded the max system speed.	Press the key to go back to the value reading and re-set the absolute reference.
 Flashing battery symbol	Low Battery	Replace the battery (see paragraph 7.5).

## MINI POWER PACK OIL RECOMMENDATIONS

# Oil recommendations

## Hydraulic fluid, viscosity classes and use

The hydraulic fluid should essentially be selected according to the operating conditions, such as

- Temperature
- Device type
- Usage type
- Surroundings



Product documentation

D 5488/1

12-2014-1.0

**SOLUTIONS FOR A WORLD UNDER PRESSURE**

**HAWES**  
**HYDRAULIK**

## Contents

- 1 Selection of the hydraulic fluid
- 2 Mineral oils
- 3 Environmentally compatible hydraulic fluids
- 4 Flame-resistant hydraulic fluids
- 5 Special fluids
- 6 Viscosity class
- 7 Filtering
- 8 Service life
- 9 Changing the hydraulic fluid
- 10 Seals
- 11 Pressure fluids – notes for selection
- 12 Manufacturers' addresses (selection)

**1**

## Selection of the hydraulic fluid

The performance of a hydraulic system depends to a large extent on the quality of the hydraulic fluid used.

The hydraulic fluid should essentially be selected according to the operating conditions, such as

- Temperature (see viscosity classes)
- Device type (possible ban on certain hydraulic fluids due to undesired reactions with metals, seals etc.)
- Usage type (e.g. environmentally compatible hydraulic fluids)
- Surroundings (use of existing hydraulic fluids)

**For HAWE devices the following viscosity and temperature ranges apply:**

Temperature range:	Ambient: -40...+80°C, ( Important: air-powered pumps type LP +5...+80°C) Hydraulic fluid: -25...+80°C  Please observe viscosity range and any additional restrictions.
Start temperature:	Down to -40°C permissible Observe start viscosities as long as the steady-state temperature is at least 20K higher for subsequent operation! Biologically degradable or flammable hydraulic fluids generally not over max. +60...+70°C.
Viscosity range:	Min. approx. 4 mm²/s, Max. approx. 1500 mm²/s Optimum service approx. 10...500 mm²/s

**2**

**Mineral oils**

**Mineral oils**

Hydraulic fluid	Characteristics	Unusual features / restrictions
<ul style="list-style-type: none"> <li>Hydraulic oils HLP (DIN 51524 part 2)</li> </ul>	Mineral oil with additives improving corrosion, oxidation and wear protection	Common hydraulic fluid
<ul style="list-style-type: none"> <li>Hydraulic oils HL (DIN 51524 part 1)</li> </ul>	Mineral oil without wear protecting additives	<p>Not suitable for any types of gear pump due to the lack of wear protection additives.</p> <ul style="list-style-type: none"> <li>No pumps and power packs with gear pumps type RZ, Z</li> <li>No compact hydraulic power packs HC, KA, MP, MPN, HK, HKL</li> </ul>
<ul style="list-style-type: none"> <li>Hydraulic oils HVLP (DIN 51524 part 3)</li> </ul>	Mineral oil with same additives as HLP, but with increased viscosity index for use in higher temperature ranges	<p>The viscosity index correctors have a negative effect on the shearing resistance (viscosity loss approx. 30% when loaded), demulsifying properties and air release characteristics, for example. Only use if required due to temperature range. Oil manufacturer must be consulted!</p>
<ul style="list-style-type: none"> <li>Undoped oils H e.g.                             <ul style="list-style-type: none"> <li>- Lubricating oils (DIN 51517 part 1)</li> <li>- White oils (e.g. NSF H1)</li> </ul> </li> </ul>	Mineral oil without additives	<p>Due to lack of additives only suitable for systems in the standby mode (S2 or S3 mode) (low lubricity). White oils are mostly used in systems with possible contact with foodstuffs.</p>
<ul style="list-style-type: none"> <li>Hydraulic oils PAO (tested in line with DIN 51524 part 2 and part 3)</li> </ul>	Mineral oil with additives improving corrosion, oxidation and wear protection	See information on hydraulic oils HVLP
<ul style="list-style-type: none"> <li>Special fluids for aviation (MIL H-5606) for off-shore applications (NATO H 540)</li> </ul>	Mineral oils are based as a rule on naphthenic oil with wide temperature range	<p>Seals made of fluor rubber FPM might be required, depending on hydraulic fluid. Consult the oil manufacturer!</p>
<ul style="list-style-type: none"> <li>Other mineral oils                             <ul style="list-style-type: none"> <li>Engine oils HD</li> <li>ATF automatic transmission fluid (AQ A, suffix A)</li> <li>Diesel</li> <li>Test oil for diesel injection pump test</li> </ul> </li> </ul>	Mineral oils which basically were developed for other application purposes	<p>More or less suitable hydraulic fluids. Pay attention to the presence of oxidation and corrosion protection as well as material compatibility (above all in relation to the seals). Attention: increased leakage with directional spool valves. Oil manufacturer must be consulted!</p>

**3**

## Environmentally compatible hydraulic fluids

### Environmentally compatible hydraulic fluids ISO 15380

Hydraulic fluid	Characteristics	Unusual features / restrictions
<ul style="list-style-type: none"> <li>Seed oil type HETG</li> </ul>	Fluids based on seed oils e.g. rape or sunflower with additives show only low temperature resistance (< 60...70°C)	Not suitable for compact power packs type HC, KA, MP, MPN, HK, HKL, all valves with wet armature solenoids as well as control systems utilizing many throttles. Fluids type HETG show a tendency to gum, ageing, and sticking at higher temperatures (> 60...70°C). Their use should be avoided!
<ul style="list-style-type: none"> <li>Polyethyleneglycol HEPG</li> <li>PEG-Polyethylene (may be solved in water)</li> <li>PPG-Polypropylene (can't be solved in water)</li> </ul>	Fluids based on polyethylene glycol (PEG) Properties similar to mineral oil with regard to service life, lubricity and pressure resistance	<p>No restrictions with regard to the operation behavior, but it</p> <ul style="list-style-type: none"> <li>Is harmful to standard enamel (does not apply to two-pot enamel)</li> <li>Will clog cellulose filters (use only glass fiber or metallic filters)!</li> <li>Shows bad lubrication characteristic with material pairings steel / light alloy or brass</li> <li>No pumps and power packs with gear pumps type RZ and Z</li> <li>Do not use compact hydraulic power packs type HC, KA, MP, MPN, HK, HKL</li> <li>No connection blocks with return filter type A.F., AF, BF, EF, FF</li> </ul>
<ul style="list-style-type: none"> <li>Synthetical ester HEES (carbon acid ester, diester, polyester)</li> </ul>	Similar qualities i.e. service life, lubricating characteristics and pressure resistance, like mineral oil	No restrictions with regard to the operation behavior. Contact with PVC should be avoided.

## 4 Flame-resistant hydraulic fluids

### Flame-resistant hydraulic fluids ISO 12922

Hydraulic fluid	Characteristics	Unusual features / restrictions
<ul style="list-style-type: none"> <li>HFA (pressurized water, emulsions)</li> </ul>	Oil in water emulsion, (water content > 80%) max. temp. range approx. 60°C	<p>There is the danger of corrosion and cavitation due to the high water content, only use devices specially constructed for this purpose (radial piston pumps type R, directional seated valves type G) Max. pump pressure 50...60% (danger of cavitation) Min. oil content &gt; 4%</p> <ul style="list-style-type: none"> <li>Do not use compact hydraulic power packs HC, KA, MP, MPN, HK, HKL – risk of short circuit</li> <li>No paper filters – risk of blockage No connection blocks with return filter type A.F., AF, BF, EF, FF</li> </ul>
<ul style="list-style-type: none"> <li>HFC</li> </ul>	Diluted (poly-) glycol solution (water content < 35%) max. temp. range up to approx. 60°C	<p>No restrictions with regard to the operation behavior, but it</p> <ul style="list-style-type: none"> <li>No paper filters – risk of blockage No connection blocks with return filter type A.F., AF, BF, EF, FF</li> <li>Will clog cellulose filters (use only glass fiber or metallic filters)!</li> <li>Shows bad lubrication characteristic with material pairings steel/light alloy or brass</li> <li>No compact hydraulic power packs HC, KA, MP, MPN, HK, HKL</li> </ul>
<ul style="list-style-type: none"> <li>HFD HFDR phosphoric ester HFDU polyolester</li> </ul>	Fluids without water content, properties similar to mineral oil	<p>Normal operation possible Restrictions:</p> <ul style="list-style-type: none"> <li>Requires seals out of FPM (FKM) (see also section "Seals")</li> <li>Oil manufacturer must be consulted!</li> </ul>

## 5 Special fluids

### Special fluids

Hydraulic fluid	Characteristics	Unusual features / restrictions
<ul style="list-style-type: none"> <li>AT-Brake fluid</li> </ul>	Brake fluid based on glycol (DOT 4)	<p>No restrictions with regard to the operation behaviour, but devices must be equipped with EPDM or SBR seals (see "Seals" section) No compact hydraulic power packs type HC, KA, MP, MPN, HK, HKL</p>

## 6 Viscosity class

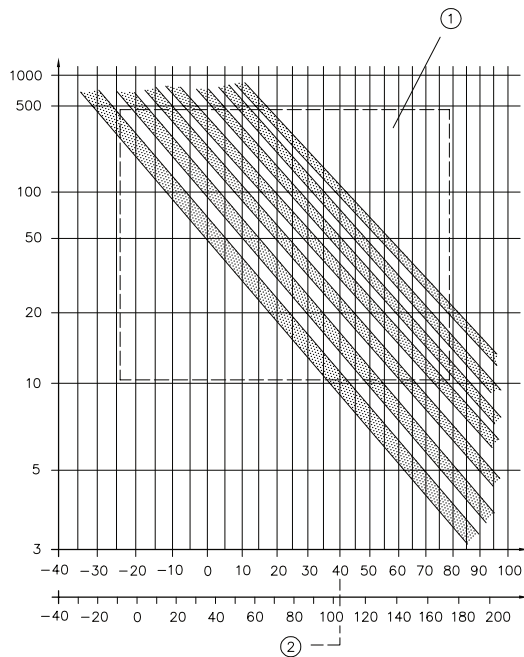
### Selection of the viscosity

Of the 18 viscosity classes (ISO VG) listed in the standard "ISO viscosity classification for liquid lubricants" (ISO 3448), the areas ISO VG10 to ISO VG68 are relevant for hydraulic systems. The number after "ISO VG" corresponds to the nominal viscosity at a reference temperature of 40°C. The temperature behaviour displayed in the diagram corresponds to that of mineral hydraulic oils. The characteristic curve increase of HVLP and the environmentally compatible hydraulic fluids is flatter, indicating that the temperature effect is lower.

Due to manufacturer-related differences, the following benchmark figures are to be clarified and compared with the permissible viscosity ranges:

- Viscosity at 40°C
- Viscosity at the lowest (estimated or demanded) temperature
- Viscosity at the highest (estimated or demanded) temperature  
(to ensure sufficient service life of the seals not above 80°C!)

### Temperature / viscosity curve



- 1 Optimum range
- 2 Reference temperature  
ISO 3448

### Guide lines for selection

- VG10, VG15  
Systems intended for short time operation or use in the open or for clamping devices.  
Systems intended for continuous operation  
(for use in the open, operation in winter only)
- VG22, VG32  
General application  
(for use in the open, operation in summer only)
- VG46, VG68  
Systems in tropical conditions at ambient temperatures up to 40°C or closed rooms

## 7 Filtering

### Filtration

Major malfunctions of a hydraulic system can be caused by contamination like fine wear particles and dust or bigger particles e.g. swarf, rubber from tubing or seals. Therefore the following filtration is recommended (after a thorough initial flushing):

Recommended purity of the hydraulic fluid	Recommended filter fineness	Devices	Note
ISO 4406 : 1999			
21/18/15...19/17/13	$\beta_{16..25} \geq 75$	Radial piston and gear pumps, valves, cylinders (use in general mechanical engineering)	The purity degree of the hydraulic fluid is especially important for the repeatability accuracy with proportional valves. It should be noted that new hydraulic fluid "from the barrel" does not necessarily fulfil the highest cleanliness requirements.
20/17/14...18/15/12	$\beta_{6..16} \geq 75$	Prop. pressure and flow control valves	
19/17/14	$\beta_{6..16} \geq 75$	Variable displacement axial piston pumps	

Lower limits must be applied for pressure >250 bar

## 8 Service life

### Service life

The aging of hydraulic fluids is caused by shearing processes, cracking induced by high temperatures (gumming), mixing with (condensed) water or reaction with other materials (e.g. metal) in the system (sludging). A major factor for the service life of the fluid is beside the anti-shear additives of the fluid the lay-out of the system e.g. tank size, operation temperature, number and design of throttling sections.

Besides the properties of the hydraulic fluid itself (e.g. due to additives for high shear stability), the design of the hydraulic control system (e.g. tank size, steady-state temperature, number and type of throttling points) has a major influence on this.

The following points are to be noted:

- Service temperature in the tank < 80°C  
(mineral oils, hydraulic fluids with low water content) Avoid higher temperatures – Service life reduction – (+10K corresponds to half service life)
- Rotational conditions of hydraulic fluid  $\frac{Q_{pump}[lpm]}{V_{circuit}[l]}$  (guideline)
  - approx. 0.2...0.4/min for conventional compact hydraulic power packs
  - approx. ...1/min in mobile hydraulics
  - approx. ...4/min for hydraulic power packs in standby or no load operation
- Control of the hydraulic fluid on a regular base (fluid level, contamination, coloring index, neutralization value etc.)
- Change of the hydraulic fluid on a regular base (depending on fluid type and application conditions)
 

Guideline:

  - approx. 4000 ... 8000 h (mineral oil)
  - approx. 2000 h (other hydraulic fluids)
  - or at least annually

Take into account notes of the fluid manufacturer!

## 9 Changing the hydraulic fluid

Change of the hydraulic fluid

Mixing different kinds of hydraulic fluid sometimes can cause unintended chemical reactions such as sludging, gumming etc.

Therefore the relevant manufacturers should be consulted when switching between different hydraulic fluids.

In all cases, the whole hydraulic system must be rinsed thoroughly.

Please observe the information in VDMA 24314.

## 10 Seals

Seals

Any question about the compatibility with seal material should be settled with the fluid manufacturer always before using a certain hydraulic fluid (except mineral oil and synthetic esters). A rough overview is given in the table at the start of this section. HAWE utilizes seals made of the following materials as standard:

- NBR (acrylonitrile rubber, e.g. Bunan, Perbunan) or HNBR (hydrated NBR).

Some devices are available on request with seals made of:

- FPM FPM (also FKM, fluor rubber) e.g. for fluids type HFD
  - The coding ...-PYD should be added to the coding for HAWE devices, e.g. WN1H-G24-PYD
- EPDM (ethylen propylen rubber) or SBR (styrene-butadiene rubber)
  - The coding ...-AT should be added to the coding for HAWE devices, e.g. WN1H-G24-AT (for brake fluid)

## 11 Pressure fluids – notes for selection

### Storage of hydraulic components

The storage conditions for hydraulic components depend primarily on the seals used and the test bench oil with which the parts are moistened. The storability of rubber materials is generally influenced by the following factors:

- Warmth, light, humidity, oxygen, ozone

Furthermore, storage should be de-energised as far as possible and not result in any deformations. It has been shown that a storage temperature range of 15 to 20°C is optimum. The relative humidity should be approx. 65% (+/-10%). Exposure to direct sunlight or a light source with strong UV rays should be avoided.

Ozone-producing equipment (electric motors, high-voltage equipment) among other things must not be present in the storage room.

If seals are packaged in plastic bags, these should not contain any plasticisers and, if necessary, should be impermeable to UV light. Details on storage of elastomers are also available in the following standards: DIN 7716/BS4F68:2012, MIL-HDBK-695, SAE ARP 5316, SAE AS 1933, DIN 9088.

Hydraulic oils can be stored for an unlimited period in sealed containers supplied by the manufacturer, as no chemical reactions take place. The presence of atmospheric oxygen, dust and moisture can lead to more or less rapid oxidation and resinification, depending on the type of oil and its additives.

A dark room with virtually constant temperature and humidity is recommended for storage of hydraulic components. The parts should be kept in a plastic bag to protect them from dust and continuous air exchange. In addition, a functional test (emergency manual override, dry switching) should be carried out on the device at least once a year to ensure operation when required.

With safety-related components, a six-monthly functional test on site and a regular factory inspection including seal replacement every 2 years are recommended.

The risk of corrosion of hydraulic components that are stored as described above is low, as most external parts are coated with a protective layer (galvanised, gas-nitrated) and moistened with oil.

## 12 Manufacturers' addresses (selection)

Company	Address		
Agip Schmiertechnik GmbH Deutschland	Paradiesstrasse 14	Telephone	+49 / (0) 931 / 90098-0
	D-97080 Würzburg	Fax	+49 / (0) 931 / 98442
Aral AG Geschäftsbereich Schmierstoffe	Überseeallee 1	Telephone	+49 / (0) 40 / 3594-01
	D-20457 Hamburg	E-mail	inboundaral@bp.com
BP Europa SE Castrol Industrial	Erekelenzer Straße 20	Telephone	+49 / (0) 2261 / 909-30
	D-41179 Mönchengladbach		
Esso AG	Kapstadtring 2	Telephone	+49 / (0) 40 / 63930
	D-22297 Hamburg	Fax	+49 / (0) 40 / 63933368
Fragol Industrieschmierstoffe GmbH	Reichspräsidentenstr. 21-25	Telephone	+49 / (0) 208 / 300020
	D-45470 Mülheim	Fax	+49 / (0) 208 / 3000246
Fuchs Mineraloelwerke GmbH	Friesenheimer Straße 15	Telephone	+49 / (0) 621 / 3701-0
	D-68169 Mannheim	Fax	+49 / (0) 621 / 3701-570
Liqui Moly GmbH	Jerg-Wieland-Str. 4	Telephone	+49 / (0) 731 / 1420-0
	D-89081 Ulm	Fax	+49 / (0) 731 / 1420-71
Mobil Oil AG	Kapstadtring 2	Telephone	+49 / (0) 40 / 63930
	D-22297 Hamburg	Fax	+49 / (0) 40 / 63933368
Shell Deutschland Schmierstoffe GmbH	Suhrenkamp 71-77	Telephone	+49 / (0) 01805 6324 00
	D-22284 Hamburg	Fax	+49 / (0) 0800 6324 000
		E-mail	Schmierstoffe-DE@shell.de
Panolin AG	Bläsimühle	Telephone	+41 / (0) 44 / 95665-65
	CH-8322 Madetswil	Fax	+41 / (0) 44 / 95665-75
Klüber Lubrication Deutschland KG	Geisenhausenerstrasse 7	Telephone	+49 / (0) 89 / 7876-403
	D-81379 München	Fax	+49 / (0) 89 / 7876-333