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LUBRICATION SYSTEMS

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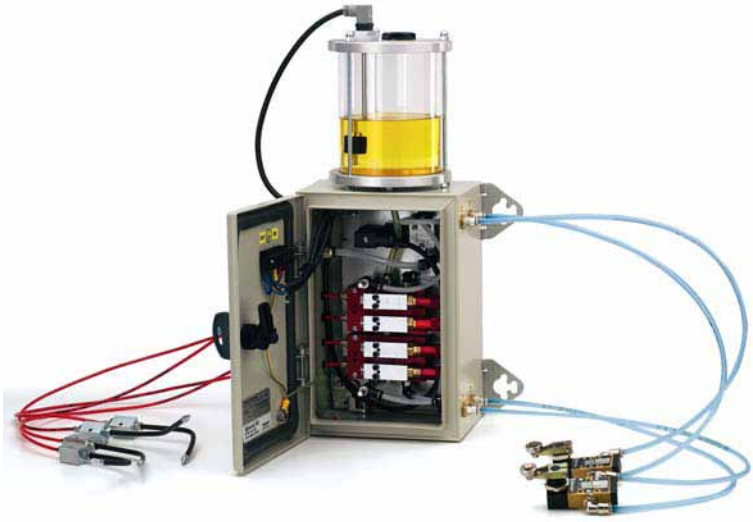
# MINIPUMPS MODULAR SYSTEM



# OPERATING AND MAINTENANCE INSTRUCTIONS

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# 1 INFORMATION CONCERNING THE CE DECLARATION OF CONFORMITY AND THE MANUFACTURER´S DECLARATION

## 1.1 PRODUCER'S NAME AND ADDRESS

LUBRICATION SYSTEMS
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## 1.2 MODEL AND CE MARK

MINI PUMPS MODULAR SYSTEM
CE mark concerning the directive 97/23/EC
model and type: mini pumps modular system
year's made-up in: 2005

## 2 INTRODUCTION

The operating manual contains safety requirements and instructions by observing during lifetime of minipumps modular system (packaging, storing, transport, installation, startup, use, maintenance and disposal)
But these instructions don't replace professional experience of operator about industrial process results.
The instructions can't also preview and resolve all problems that could be taken place during the use of modular system.
If you have any problems or questions, please contact our technical sales.

For a correct use of this manual observe scrupulously the following indications:

- Before starting the system read these operating instructions.
- the operator authorized (in charge) to use minipumps modular system must be qualified with knowledge of the mechanical, hydraulic and electrical systems.
- the information contained in this manual are addressed to all the persons in charge to use.
- this manual is an integral part of the minipumps modular system and it must be conserved for all the operating life, even if this pass on to the new owner upon sale.
- this manual must be conserved in dry place and protected from the light beams. The conservation place must be known and accessible to all the operators.

For other information or for other copies of this operating manual, please contact Dorsa.

For post-sale service contact directly Dorsa.

* Dorsa reserves the right to modify the minipumps modular system for whichever technical or trades motivation and/or to modernize this manual without any obligation to modify manuals previously delivered.
* Dorsa will not accept liability for every damage or reduced performances caused by improper use and opertion that arent' carried out by personnel adequately qualified and instructed.

## 2.1 INTENDED USE

### 2.1.1 Use and operation

This system is fitted for a lubrication forced with mixed oil/air system.
It is a modular system; each modulus corresponds to a lubrication point and it is controlled by a pneumatic valve with mechanical gear.
Such system of lubrication with minipumps is the type "minimal" at a smallest oil consumption and operates with air compressed as transport vehicle.
This lubrication system can be used for automatic lubrication of:

- Conveyers overhead (chains, carrier and directional bearings, mono-rail and be-rail bearings).
- Machine tool (cutting tool, threads, rilling, cooling of tool).
- Cold -deformation or cold-warping of plate (deep-drawing, cut, flange).·

***Principle of oil/air lubrication***

Lubricant is poured in the lubricant's tank of metallic unit. From this point the minipump transports lubricant until air/oil mixer group. The lubricant is distributed with a microdosage from an airflow in a forced pipe, shaping a veil, and is transported until the point to lubricate. The point lubricating is lubricated through the outlfow of fine drops from the relative nozzle. The spray that leak out the point to lubricate is almost free from lubricant.
The low-pressure compressed air along pipe creates a vortex in the nozzle. Consequently previously dosed lubricant is divided in microdrops that directly are transported by air on the point lubricating without create aereosol. These microdrops form an oil veil much thin.
lubricant quantity for each lubricating points can be set with precision through an appropriate ring nut (green color) for each point in order to obtain optimal conditions of lubrication.
The compact unit works in cyclic way; it means that for each lubrication cycle it corresponds always a time of pause.
The control of pauses is directly executed by control board of machine.

The system is not equipped with own electrical connection; by customer's choice it is possible to connect the out signal to a PLC or to an acoustic or visual signal.

### 2.1.2 Tool specifications

| TECHNICAL SPECIFICATIONS | |
|---|---|
| ***COMPRESSED AIR*** | |
| Operating inlet pressure | 5 ÷ 8 bar (73.5 – 117.6 psi) |
| Maximum quantity of particles in suspension | 15 mg/Nmc |
| Maximum diameter of particles in suspension | 0.05 |
| Dew point | 2°C (35.6°F) |
| Max quantity oil in suspension | 5 mg/Nmc |
| ***SOLENOID*** | |
| Solenoid Voltage | BY CUSTOMER'S CHOICE |
| Maximum Voltage | BY CUSTOMER'S CHOICE |
| ***SONDA DI LIVELLO*** | |
| Max Voltage . filling level indicator (commutable) | 220 V 50 HZ |
| ***MODULAR SYSTEM*** | |
| Capacity Single Modulus | 1 ÷ 35 $mm^3$ |
| Operating Temperature | -10 ÷ 80 ° C |
| Humidity | 95 % MAX. |
| ***LUBRICANT*** | |
| Lubricants admitted | Minerals - Synthetic not aggressive<br>Not inflammable Not toxic Not harmful |
| Operating lubricant viscosity | 30 ÷ 320 cSt ($mm^2$/S) a 40°C |
| The air must be filtered and dry | |

### 2.2 NOISE INFORMATION

The A-weighted noise level of Modular System are lower than sound power level 70 dB(A).

### 2.3 APPLICABLE LAWS

The system has been planned and constructed according to the EC - Machinery Directive 98/37/EC.

### 2.4 SAFETY INSTRUCTIONS

- Supply air compressed from 6 to 8 bars in order to correct functioning of lubrication system.
- Don't feed system at different pressures and/or tensions than those indicated in *paragraph 2.1.2*.
- Lubricant used be not inflammable, not toxic, not harmful.
- Don't use modular system in explosive atmosphere.
- The system is equipped with a lubricant level indicator connected to a pneumatic electro-valve which stops system in case of lubricant lack.
- If the system is feed with the same electric power line of machine, in case of machine stop, the system working stops.
- Lubrication nozzles are equipped with a retaining embody valve in order to ensure long lasting.
- Don't use the system when metallic unit is opened. The key of metallic unit door must not to remain on the keyhole, but must be foster by operator authorized use.

### 2.5 OPERATOR'S SAFETY

During maintenance, control and assembly/dismantling it is recommended to take protecitive measures using gloves oils resistant. In case of sprays it is recommended to wear glasses oils resistant with lateral protection.

However consult however safety datasheet of lubricant used.

# 3 FUNCTIONAL DESCRIPTION

## 3.1 Machine elements

The minipumps modular system is composed of following particulars:

- n°1 metallic unit, protective covering of minipumps, equipped with support stirrups;
- n°1 lubrication tank equipped with an electromagnetic level indicator;
- n°1 or more modular systems. Each modular system (modulus) is composed of an air/oil mixing base and of a minipump;
- n°1 electro-valve;
- n°1 or more rigid or flexible nozzles;
- n°1 or more pneumatic valves;
- pipes and connection cables comprehensive of connectors and earth clips.

The modular system can weigh between 8,5 kg and 10 kg (weight suggestive of n°4 modulus).

### 3.1.1 Packaging

The Modular system is supplied in a packing box. Nozzles are packed in small bags. Pneumatic valves and connection pipes are packed in small bags and banding with plastic hoop.
During transport and storage of modular system it is necessary to attend direction labelled on the packaging box. Upon receiving, please ensure that there is no damage, and storage modular system in a dry and dust-free environment.

### 3.1.2 Metallic Unit

Metallic unit that contains the system, is a box equipped with door and key. It can fixed on machine/plant through appropriate stirrups.
On interior side of metallic unit's door there are connecting terminals. The earth connection is outfitted.

- **The metallic unit's door must be closed.**
- **The key of metallic unit' door must not to remain on the keyhole, but must be foster by operator in charge.;**
- **The metallic unit's door must be only opened by operator in charge qualified and instructed exclusively during installation, maintenance and regulation.**

### 3.1.3 Lubrication Tank

The lubrication tank is made in transparent material (acrylic) - the bin - equipped with base and lid metallic, proper to contain mineral and syntethic oils. It is supplied with two capacities: 1.5 liters and 3 liters.
The lubricant tank is fixed upon metallic unit because it's a feed gravity.

The tank's lid is equipped with a filling level indicator connected through a cable to pneumatic electro-valve outfitted into metallic unit.
The tank's lid is also equipped with a filler cap; once unscred filler cap, it is possible to fill the lubricant tank.
For cleaning and emptying of tank see *paragraph 7.1*.

### 3.1.4 Modular System: mixing base and minipump

Each modular system is composed by one or two mixing "bases" and by one or two pneumatic minipump. Each system can be provided with ten minipumps at most.
The mixing base and the minipump are already connected each other and with the tank electrically, pneumatically and hydraulically.
The mixing base is connected with spray nozzles through polypropylene pipe.
*Minipump*
Each minipump is pneumatic. Every minipump is equipped with a ring nut in order to regulate lubricant amount (lubricant capacity) and with a (damper) regolation screw of outlet air pression.
It's equipped with discharge screw on the central part.
Air pression outlet damper can be adjusted only through an appropriate hand tool; the regulation's screw is secured by a cup.

- **The regulation of air pression outlet of nozzles must be adjusted by operator in charge, qualified and instructed**

Each modular system is supplied with nozzles connected through polyethylene pipe.
Lubricant output amount (capacity) from minipump can be regulated acting on the appropriate red screw according to the following table:

| **Capacity ($mm^3$/stroke)** | **turns** |
|---|---|
| 30 | 6.5 |
| 25 | 5.5 |
| 20 | 4.5 |
| 15 | 3.5 |
| 10 | 2.5 |
| 5 | 1.5 |
| 0= no capacity | Completely unscrewed |

Before using, completely unscrew the red screw of the pump (capacity 0 $mm^3$), screw for 1,5 turns (minimal capacity 5 $mm^3$), after every turn will correspond to an increase of capacity of 5 $mm^3$ until catching up the 30 mm3, to the $7^{th}$ turn. Upper minipump is connected up to tank through polyethilene pipes.

### 3.1.5 Nozzles and pipes for mixture lubricant/air

Nozzles can be supplied one or two for each modular system and are connected at polyethilene pipeline.
Lubrication nozzles are equipped with a retaining embody valve - with the aim to avoid losses of oil - and the output air/oil mixture is constant and is not adjustable.
It is allowed to reduce the length of polyethylene pipe only acting on the head grafted on the nozzle.
It's allowed to reduce polyethylene pipe length, only adjusting the head grafted with nozzle.
For improving the pipe's length it's necessary acted on its connection with minipump.
This operation must be made by operator in charge, qualified and instructed.

### 3.1.6 Pneumatic valves and pipe

Each modulus is connected to pneumatic valves through polyethilene pipes.
The length of polyethilene pipes can be chenged according to wanted lengths .
Pneumatic valves ensure seal.

### 3.1.7 Electromagnetic drilling level indicator

The lubricant filling level indicator is connected with an electric valve placed into the metallic unit, which stops the system in default of lubricant.

## 4 LUBRICANTS

Only lubricants proper to this type of system must be used. Note that properties of some lubricants may lie within the limit values indicated, but these may not be suitable for use on lubrication oil/air systems.

Fluids unsuitable may cause damage to the system, serious injury of persons and damage to the machine or other property.
Don't use lubricant with additives solid.

- **Don't use lubricants inflammable, toxic, harmful**
- **Don't use lubricants containing abrasive additives or silicon additives**
- **Don't use petrol, solvents, inflammable liquidis**
- **Don't use water because may oxidize minipump**

Keep in mind that lubricants are generally chemical substances that are considered environmentally hazardous and that their transport, storage and processing require that special safety measures are taken. Also observe safety and tecnichal datasheet of the lubricant.
Oils containing additive with solid substances must not be use because they introduce the risk of solid particle 's depot that could overload the holes of nozzles.
The risk of uncontrolled lubricant spillage may have caused exclusively to break of the tank.
During maintenance and cleaning operations it may succeed leak of modicum lubricant.
Lubricants in lubrication circuits must not come in contact with hot parts or flames.

- **If it shouldn't be used oils in base natural compatible with safety rules, it'is necessary to regulate mixing pressure in order to avoid dispersion of oil fog in work room**

# 5 INSTALLATION

## 5.1 WORK PLACE AND PLACE OF UNIT METALLIC

Lubrication oil/air system should be installed in a location that is protected from moisture and vibration, but should be readily and easily accessible.
Once started, the lubrication system works automatically. Therefore it is not necessary a definied fixed workplace.
**In order to a correct functioning, it is adviced to installed the metallic unit in at lowe place than noozles.**
Metallic unit must be installed on machine/plant through the appropriate stirrups.
Metallic unit can also be not installed near lubricating points.
Lubricant level in the tank should be well- visible. Moreover it is necessary to leave enough space in workplace in order to top up lubricant and to make regulations.

## 5.2 UNPACKING

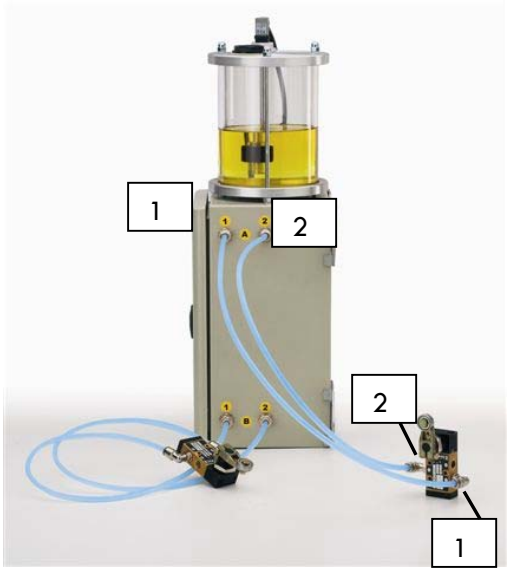
Open box and possibly extract the system through stirrups.
Control that the system has not been damaged during transport and storing.

- **Probably nozzles and tank may contain drops or traces of lubricant since before being packed all the system has been tested**

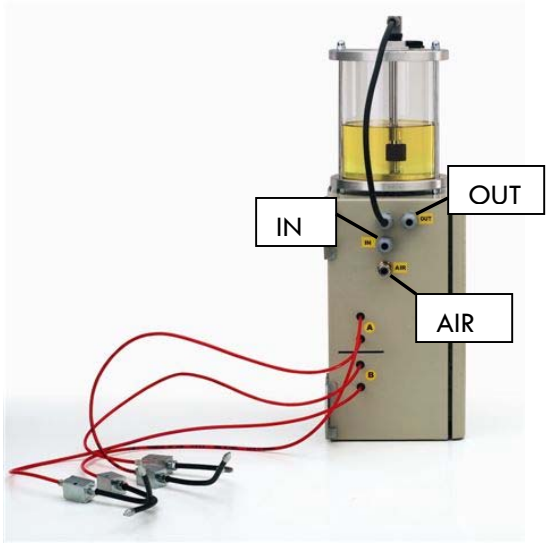
### 5.3 ASSEMBLY SEQUENCE

To assembly the modular system, operate as it is indicated:

a) fix metallic unit with appropriate stirrups;
b) connect a head of polyethylene pipe (ϕ 6 mm) (of compressed air) to pneumatic graft n°1; connect the other head of polyethylene pipe to pneumatic valve (see n°1);
c) repeat operations described in the point b) for the other grafts;
d) if necessary cut length air's pipe;




e) connect air inlet pipe to the graft called "AIR";
f) installed nozzles near to lubricating points. The modular system is supplied with nozzles already connected;
g) open door of metallic unit;
h) connect power control lines to the connecting terminal that is put on the interior side of metallic unit's door;
i) insert the power cable of the system through the insert point called "IN";
j) insert the outlet safety interface cable through the insert point called "OUT".




- **Clamps connetion must be carried out only by an electrician qualified and instructed**
- **Incorrept connection of system may cause materials serious damages and personal injuries**
- **Input voltage available must correspond to the values indicated on identification label**

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- **Air compressed plant connected to the modular system must be equipped with safety devices and with manometer in order to read the inlet pressure**
- **Before setting in function the system it makes sure that all cables and pipes are protect by any hit and opportunely fixed**

# 6 FIRST OPERATION

***Filling tank***

- **Before filling tank, disconnect power of system**

The tank fills through filler cap.

- **It is recommended to read safety datasheet of lubricant**

***Regulation of the lubricant's capacity***

Lubricant's consumption to the friction point is a value prescribed from the manufacturer of the machine. Generally it is expressed in $mm^3/h$.
Such prescription of quantity is converted in small doses shared on short times of cycle.
About regulation of lubricant see *paragraph 3.1.4*.

***Regulation of air compressed flow***

The air's requirement depend on quantity of lubricant transported (capacity), on number of nozzles and on specific characteristics of lubricating point.
Operating pressure has to be regulated in way of getting quantity required in every pipe considering pressure's leaks and disposition of support.
Correct regulation of air's flow is adjusted on strength of indications of manufacturer of lubricating machine or by way observationals.

- **The regulation of air's pressure outlet of nozzles must be adjusted by an operator qualified and instructed**
- **Don't exceeds t pressure values indicates in this manual**

The air's flow in single pipes is regulated through relative regulation screw (*See paragraph 3.1.4*).

- **It is not possible to completely turn off a lubricant outlet line through air regulation screw; minimal air in pressure always remains**
- **Air's flow variance in each lubrication pipe is always felt in the other lubrication pipe**
- **In case of abnormal functioning of the compressed air plant, modular system and machine must be put off in order to avoid lubricant lack in each point to lubricate**

### 6.1 REGOLATION

- **Regulation work must be carried out only by by an operator qualified and instructed**

Regulation of modular system must be carried out following these phases.;

- open pressure air regulation's valve and control that the operating pressure is that is indicated in tool specifications;
- open the ends of the main line, until lubricant comes out air bubble-free;
- regulate lubricant capacity acting on green screws;
- regulate pressure output from nozzles through appropriate flow screw;
- while modular system is going, check till to:
  - the point of making a continuous lubricant layer in lubrication pipes;
  - outlet from nozzles small drops of lubricant and after being eliminated eventual air bubbles in pipe;
- after to regulate flow and pressure outlet from nozzles insert cup on screws and close metallic unit's door.

### 6.2 PRACTISE

System lubrication works automatically.
However it suggests to regularly execute a visual control of the output lubricant as well as a control of the input air pressure. If necessary correct flow and pressure.
It moreover suggests to regularly control filling level of lubricant tank and - if necessary - to add lubricant (*see paragraph 6*).
Start and stop of system can happen through the PLC of the machine which the system is connected.

# 7 MAINTENANCE

Modular system is maintenance-free.
In order to assure a functioning without problems and to avoid certain dangers a priori, it suggests to regularly control joints and connections.
If necessary, the system can be cleaned up with mild, material-safe (non-alkaline, no soap). detergents compatible with the materials of the system.
In case of breakdown or accidental arrest of the system, contact Dorsa.

- **Before maintenance or cleaning work, disconnect all current, hydraulic and pneumatic connection and deprussurize minipumps and pipes**

After prolonged inactivity of system check leaks and exterior sign of damage of all lines, hoses and fittings.

- **Before cleaning, disconnect the system from current and from compressed air supply**

- **In order to avoid residual pressions, before operation maintenance, wait until the pressure has been released via the aerosol outlets, because they could cause oil sprays in case of taking apart of connections or component**

If possible, leave connected hoses and cables while, cleaning and close any openings in order to prevent entering by cleaning agents into the lubrication system.
Interior cleaning is not necessary in normal operation.
If an unsuitable or dirty lubricant has been used, the interior of lubricant container must be cleaned.

- **In case of replacement of drilling indicator level, disconnect system by electrical voltage**

### 7.1 CLEANING OF TANK

- **Before cleaning tank, disconnect the system by electrical voltage and drain tank**
- **In order to avoid residual pressions, before operation maintenance, wait until the pressure has been released via the aerosol outlets, because they could cause oil sprays in case of taking apart of connections or component**

In order to cleaning tank, proceed as it follows:

a) disconnect cable of the level indicator;
b) don't unscrew the level indicator;
c) unscrew upper nuts of tie bars of tank;
d) raise the cover of tank along with remaining part of level indicator;
e) remove bin from support;
f) carry tank on the bench;
g) clean up bin using absorbent paper and compatible detergents;
h) leave drying tank;
i) assemble bin installing for last cable of the level indicator.

### 7.2 CLOSING DOWN

***Temporany standstill***

For temporary stanstill of the modular system separate it from the electric power supply and from the compressed air supply.
For long-term shut-down it is recommend to empty tank (*see paragraph 7.1*).

***Final Taking out of Service***

Please observe the legal regulations for disposal of oil contaminated equipment.

## 8 Residual risks

Residual risks have not been finds using these lubrication systems.
During installation and/or maintenance of the system make sure that the installation site of the machine respect general rules and safety regulations for work with compressed air-bearing machines.
To ensure trouble-free operation and prevent hazards, we kindly ask you to read the present manual carefully and observe the notes contained in it.