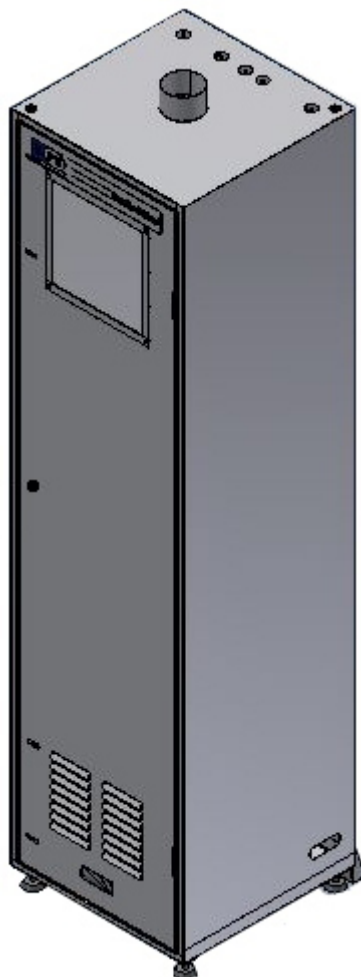

BUBBLER CABINET



User and Maintenance Manual

Bubbler Cabinet - MAN0065 - REV.00 - 18/03/2013

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Letter of Acceptance of the Manual

This Manual:

Bubbler Cabinet - MAN0065 - REV.00 - 18/03/2013

is an integral part of the machine:

Model	Bubbler Cabinet
Serial Number	
Year of manufacture	

The information contained in this manual (the "Manual") is private and confidential.

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By signing this Letter of Acceptance, the customer confirms that the manual:

Bubbler Cabinet - MAN0065 - REV.00 - 18/03/2013

has been delivered.

Accepted by:

.....
Date

.....
Signature

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1 GENERAL INFORMATION

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1.1 OVERVIEW

This manual describes the machinery identified in [1.5 - "Machine Identification"](#) and all the procedures for the correct operations.

1.2 PROPERTY RIGHTS



NOTE

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The information contained in this manual (the "Manual") is strictly confidential.

This Manual and the information contained herein should not be copied, reproduced, shown or disclosed, even partially, to third parties, nor used for purposes different to those described herein or without written authorisation of LPE S.p.A. ("LPE").

The descriptions and images of the machine contained in this Manual is not considered binding.

LPE makes this Manual available on an "as is" basis.

LPE does not warrant the information contained in this Manual against errors or deficiencies of any kind.

Moreover, no information contained in this Manual should be interpreted as a modification or assertion of the terms of any contract with LPE.

This Manual and the information contained herein are subject to updating by LPE.

1.3 THIS MANUAL

1.3.1 Information about the Manual

See back of front cover.

1.3.2 Intended Users

All operators assigned to work with the machine, at each phase of its working life, except during assembly at LPE.

1.3.3 Using the Manual

This Manual is an integral part of the machinery herein described (see [1.5 - Machine Identification](#)) and should always be readily available to personnel in charge of using the machine.

All operators of the machine should be acquainted with the contents of this Manual.

The procedures and information contained in this Manual are designed for skilled technicians and engineers trained to carry out maintenance, software and troubleshooting activities on the machine.

This manual must be kept for the entire working life of the machine.

If the machine is sold to a third party, it must be sold with this manual.

**WARNING**

Do not use the machine using procedures different to those described in this manual.

Do not carry out operations different to those specifically indicated in this manual.

**WARNING**

In order to ensure the machine functions properly and safely, as well as reading and understanding this manual, all operations should be carried out by skilled personnel.

1.4 TYPOGRAPHICAL CONVENTIONS

Text in italics: indicates a reference to a title of a Chapter, section, subsection, paragraph, table or figure in this manual or in another reference document.

[3] or **[B]**: reference to a control device or indicator (for example, pushbuttons, selector switches and pilot lights) or to a component of the machine.

Pictograms are described in *SECTION 2 - SAFETY REQUIREMENTS*.

1.5 MACHINERY IDENTIFICATION

Model	Bubbler Cabinet
Serial Number	See the identification plate on the machine
Year of manufacture	See the identification plate on the machine

1.6 COMPLIANCE WITH EUROPEAN DIRECTIVES

The machinery is designed in compliance with applicable European Directives.

1.7 WARRANTY

LPE S.p.A machines have a 1 year warranty.

For further details about the warranty, please refer to the "warranty" section of the LPE quotation.

Any repairs or extraordinary maintenance carried out without the manufacturer's prior written authorisation during the warranty period shall automatically cancel the warranty.

1.8 LIABILITY

For safe use of the machine, it is essential to comply with the conditions listed in this manual.

LPE cannot be held liable for users, nor any other person, company or other body for any direct or indirect damage or loss due to the application of the instructions contained herein or for failure to abide by the safety regulations in force in the country of installation.

Do not modify the machinery or carry out any repairs or extraordinary maintenance without prior authorisation of LPE. In such cases LPE cannot be held responsible for the compliance with general safety standards.

Upon acceptance of the machine, the customer is fully responsible for the safety of the entire machine.

The use of special equipment not manufactured and installed by LPE can modify the operating conditions of the machinery; it is therefore necessary to submit any special equipment for acceptance by LPE S.p.A. Failure to comply with this procedure relieves LPE from any responsibility.

All special equipment directly installed by LPE is supplied with the necessary documents to comply with the safety standards in force.

Only use original LPE spare parts for maintenance work.

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2. SAFETY REQUIREMENTS

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2.1 GRAPHIC CONVENTIONS AND DEFINITIONS

2.1.1 Standard symbols

This instruction manual contains several symbols. Pictograms warn of hazards, obligations and prohibitions and comply with European directive 92/58/CEE:



WARNING SYMBOL - To warn personnel of situations that may require particular attention or caution. For example:



GENERAL WARNING - To warn personnel that if operations are not carried out in accordance with the safety requirements, this can cause possible injuries or damages to people or things.



PROHIBITION SYMBOLS - To warn personnel an operation is forbidden. For example:



NO ACCESS TO UNAUTHORISED PERSONS - To warn personnel it is prohibited to carry out maintenance, cleaning or lubrication with the machine running.



NO ACCESS - To warn personnel it is prohibited to enter an area.



MANDATORY SYMBOLS - To warn personnel that personal protective equipment must be used or a specific action carried out. For example:



WEAR PROTECTIVE GLOVES - To warn personnel protective gloves must be worn to carry out the work activities.



READ THE MANUAL - To warn personnel it is compulsory to read the manual before carrying out work activities.

2.1.2 Other symbols

In addition to standard symbols this instruction manual contains other symbols that further highlight the understanding or graphically highlight important information.



NOTE - To inform personnel of important information.



WARNING - To warn personnel that failure to abide by the information provided may cause damages to the machine.



OPERATIVE OR MACHINE OPERATOR - Identifies qualified personnel, i.e. with the required know-how for full manual operations. It is strictly forbidden for the operator to carry out the activities that are the sole responsibility of Service Engineers.



MECHANICAL SERVICE ENGINEER - An engineer qualified to operate the machine in normal operating conditions and carry out the necessary adjustments, maintenance and repair work on mechanical parts.



ELECTRICAL SERVICE ENGINEER OR TRAINED INDIVIDUAL An (electrically) skilled person that can operate the machine in normal working conditions and that can intervene in every electrical matter regarding required adjustments, maintenance interventions and repairs. Capable of working in the presence of energised electrical cabinets and connector blocks. Not qualified to intervene on mechanical parts.



HEAD OF DEPARTMENT or SAFETY REPRESENTATIVE - See Directive 89/391/EEC.



SPECIAL INTERVENTIONS - Maintenance interventions accompanied by this symbol must be carried out by the machine's manufacturer.



PORTABLE LAMPS - Always use portable lamps in case of cleaning, lubrication and maintenance operations in dark environments.

2.2 PERSONAL PROTECTIVE EQUIPMENT

In presence of one of the following symbols on the machine or in the Instruction Manual, it is compulsory to use appropriate personal protective equipment, since there is the risk of accidents.



WEAR PROTECTIVE GLOVES SUITABLE FOR THE WORK ACTIVITY

- HANDLING
- ADJUSTING
- CLEANING
- LUBRICATION
- MAINTENANCE



WEAR SAFETY SHOES

- OPERATORS
- SERVICE ENGINEERS



WEAR OVERALLS CLOSED AT THE WRISTS AND/OR WITHOUT FLAPPING PARTS

- OPERATORS
- SERVICE ENGINEERS



WEAR A PROTECTIVE HELMET

- OPERATORS
- SERVICE ENGINEERS



WEAR EAR PROTECTION

- OPERATORS
- SERVICE ENGINEERS



WEAR A GAS MASK

- OPERATORS
- SERVICE ENGINEERS



WEAR PROTECTIVE EYEWEAR

- OPERATORS
- SERVICE ENGINEERS

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2.3 WARNING PLATES OF RESIDUAL RISKS, PROHIBITIONS AND OBLIGATIONS

When the machine is running, it is totally segregated and safe for the operator. During ADJUSTMENTS, CLEANING, LUBRICATION and MAINTENANCE, hazardous situations may arise, since the operator is working in hazardous areas.

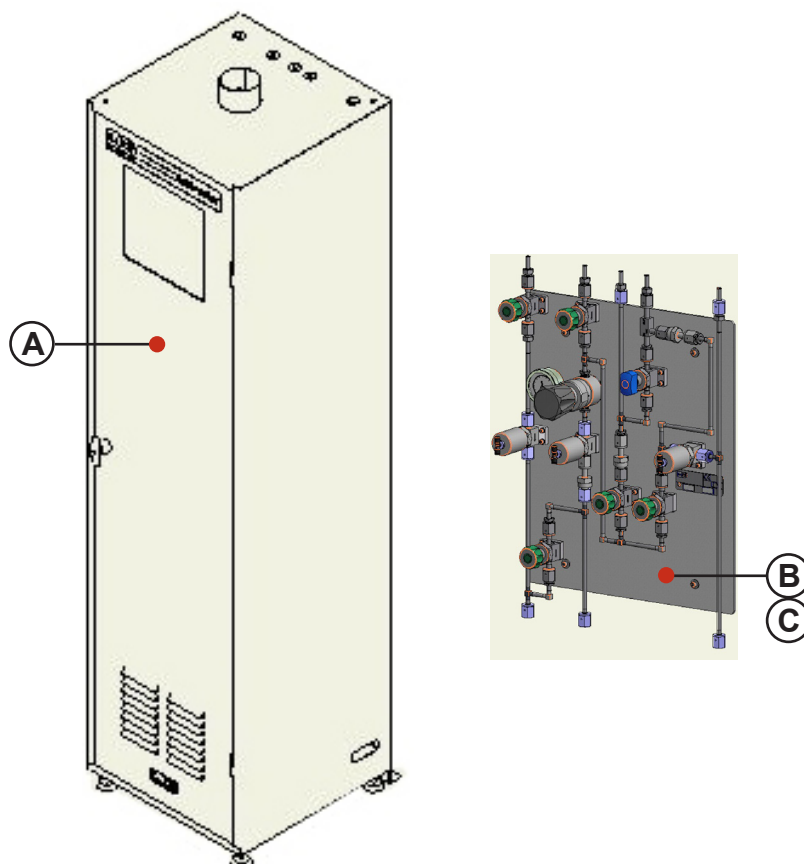
Wherever possible, LPE S.p.A. has protected further access, however in some areas subject to adjustments, cleaning, lubrication and maintenance it is not possible to provide further protection.




In these cases, LPE S.p.A. has affixed information plates near hazardous areas that warn of hazards, prohibition and obligations, which are also replicated throughout this manual.

ALWAYS ABIDE BY THESE PLATES AND INDICATIONS, AND REPLACE IMMEDIATELY IN CASE OF DAMAGE OR ILLEGIBILITY. THESE OPERATIONS SHOULD ONLY BE CARRIED OUT BY QUALIFIED OPERATORS.

The following table specifies the plate type, general and electrical hazards, meaning and position.

2.3.1 Layout of plates and description



Area	Pictogram	Meaning	Position
A		READ THE MANUAL	On cabinet door
B		DANGER OF DEATH FROM INHALATION OF TOXIC GASES	On discharge panel
		WEAR A GAS MASK	On discharge panel

2.4 GENERAL SAFETY REGULATIONS



WARNING

Always use a portable lamp in case of cleaning, lubrication and maintenance operations in dark environments.

2.4.1 Definitions

- **DANGER ZONE** means any zone within and/or around machinery in which an exposed person is subject to a risk to his health or safety; (as described in 98/37/CE directive annex I par. 1.1.1).
- **HAZARDOUS SITUATION** is any situation in which a person is subject to at least one hazard (as described in EN ISO 12100/1 section. 3.9).
- **MACHINE IN MAINTENANCE MODE OR UNDER FORMAT CHANGE** is the machine mode used by the customer's maintenance service engineer to adjust, regulate and carry out maintenance work with the guards open. Access to this mode is only possible using the GUI (Graphical User Interface) via a dedicated form and by means of a password ("Maintenance level"). In these modes:
 - The reactor can be started with the guards open in all internal parts of the machine.
 - All auxiliary services remain active (lamp power plugs, 230V portable tools and lighting system).
 - The machine remains energised.
 - There is voltage to the main connecting terminals, inside the main electrical cabinet
 - Hot spots should be allowed to cool to room temperature
 - In the tower light, the yellow and red light are switched on
- **MACHINE IN ZERO-ENERGY MODE** the machine mode used by the customer's maintenance service engineer for special maintenance. In this mode:
 - the main circuit breaker is positioned to "0" and not to "1"
 - the compressed air is disconnected and the shut off valve to the plant lines are positioned to O/OFF/CLOSED.
 - all energy is at zero.
 - there is voltage to the main connecting terminals, inside the main electrical cabinet
 - Hot spots should be allowed to cool to room temperature
 - affix a padlock to the main circuit breaker and keep the door to the electrical cabinet closed (the Safety Rep is responsible for both these keys)

2.4.2 REQUIREMENTS

1. The cabinet must be installed in closed rooms and equipped with all the systems foreseen by the laws in force in the country of installation, or outside.
2. Prior to installing the cabinet in all its parts, the customer must ensure that the floor where the cabinet is installed is suitably level, that is can support the weight and that the technological arrangements are in place (see SECTION 3 – TECHNICAL PARTICULARS) (fig. 2.1).

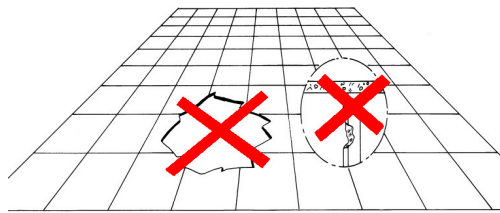


fig. 2.1

3. In any case, the customer must abide by the instructions contained in the document "INSTALLATION SPECIFICATIONS" sent prior to delivery of the cabinet.
4. Carefully read all the safety regulations contained in this Instruction Manual and in particular the instructions regarding:
 - warning, prohibition and obligation plates;
 - operative or machine operator;
 - mechanical maintenance engineer;
 - electrical maintenance engineer or trained individual;
 - function of SAFETY DEVICES;
 - setting up;
 - maintenance.

5. It is the customer's duty to check that the mains electricity network where the cabinet is installed is equipped with a suitable earth connection, sufficient for the absorbed power failing which the customer must adapt its own system (fig. 2.2).

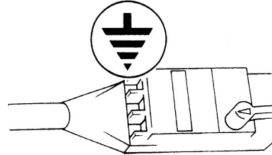


fig. 2.2

6. For handling operations of the unpacked machine, please refer to Part 7 "TRANSPORT, HANDLING AND INSTALLATION" of this manual. In any case, never lift the machine from the rollers, housing or projecting parts (fig. 2.3).

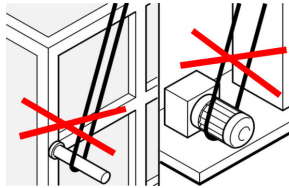


fig. 2.3

**MANDATORY**

Personnel assigned to the transport, positioning phases, must always wear protective gloves, protective footwear and helmet.

7. Be very careful of projecting parts during these phases:

- transport;
- positioning;
- installation;
- assembly of safety devices;
- format changeover.

**MANDATORY**

Danger of crashes against head and upper limbs. Always wear a safety helmet.

8. The installation, assembly, setting up and extraordinary maintenance of the machine should only be conducted by the Engineers of LPE S.p.A., since they are fully trained on the procedures and equipment (fig. 2.4).



fig. 2.4

9. For maintenance, cleaning, lubrication operations, place the entire system in ZERO ENERGY MODE (except where stated otherwise), enclose the area and warn of work in progress by positioning a warning sign on the circuit breaker and on the safety devices (fig. 2.5).



fig. 2.5

10. Never rest against or sit on any part of the cabinet whether it is working or stopped. (fig. 2.6).



fig. 2.6

12. Affix a warning sign "MAINTENANCE IN PROGRESS" to the outside of the door.



fig. 2.7

13. Do not place or rest containers of liquids on top of the cabinet. (fig. 2.8).

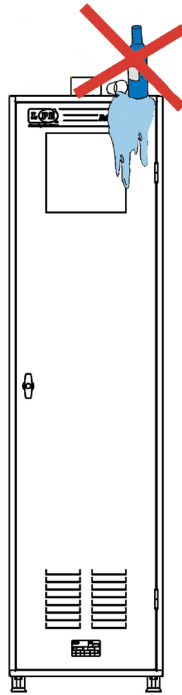


fig. 2.8

14. The key to the electrical cabinet must always and only be kept by the Customer's Safety Rep, where the cabinet is installed. It is also the Safety Rep's duty to entrust other authorised personnel with all the keys (fig. 2.9).

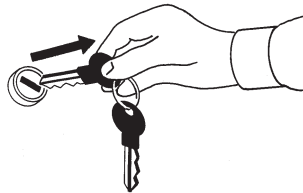


fig. 2.9

15. Never stand near the cabinet when in operation (fig. 2.10).



fig. 2.10

16. The operations of adjustment, maintenance, cleaning and/or replacement or other interventions on the cabinet or its accessories should only be conducted by the customer's Maintenance Engineer, who must always work with utmost care and attention. Always entrust maintenance, adjustments or any other operations that do not fall within duties assigned by the Head of Department, exclusively to assigned personnel (Maintenance Engineer).
17. Do not, for any reason, tamper with or inhibit the locks of the cabinet door or other safety devices, and do not use the locks for purposes different to those defined and for which they are installed. Periodically ensure the locks are in good working order.
18. Setting up, cleaning and maintenance work should be meticulously carried out by a SINGLE PERSON, NEVER SEVERAL PERSONS, (except where otherwise specified).
19. In addition to explicit obligations, where possible, always make available protective eyewear, protective gloves, protective footwear and any other personal protective equipment required by the situation. Furthermore, always wear work overalls closed at the wrists and always tie back long hair. (fig. 2.11)



fig. 2.11

20. In any case, do not wear flapping and/or ripped items and/or clothes (necklaces, watches, bracelets, scarves, headscarves, ties, etc.) (fig. 2.12).

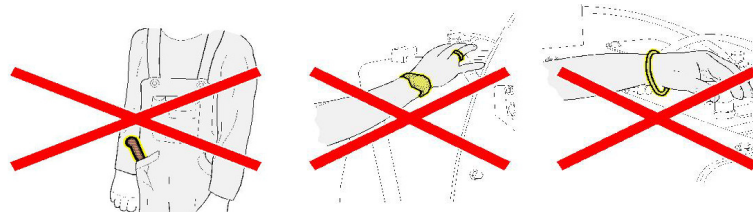


fig. 2.12



MANDATORY

Remember, after each cleaning, lubrication, adjustment and maintenance intervention, all safety devices should be reset and reassemble and/or close all safety covers, make sure nobody is working on the inside of the machine.

21. The operator must take care that the area and floor surrounding the machine is always clean to prevent slipping and subsequent crashes and/or the floor is dry and clean (fig. 2.13).

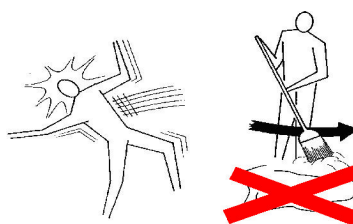


fig. 2.13

**WARNING -**

It is very important to read this Instruction Manual carefully.

For safety reasons, the bubbler must be used between the pressure range and temperature values for which it was designed (≤ 4 bar ; $17 \div 20$ °C).

When in operation, the system contains H₂ (flammable and exploding materials) and chlorosilane that can generate HCl fumes, in the event of leakages the bubbler must be enclosed in a degassing cabinet of adequate size.

(see dwg. - The cabinet is NOT PART OF THE SUPPLY). It is advisable to equip the cabinet with an exhaust system and leak detector.

2.5 SAFETY DEVICES ADOPTED ON THE MACHINE

The cabinet is equipped with the following safety devices.

2.5.1 Cabinet lock

Key lock (fig. 2.14).

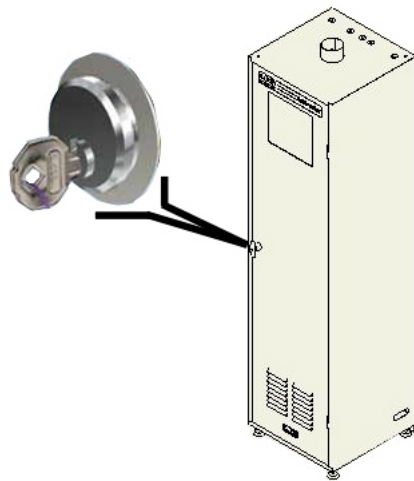


fig. 2.14

2.5.2 Safety guards

Front door (interlocking safety guard in compliance with UNI EN ISO 13857/UNI EN 349/UNI EN 953 Parts 3.6 and 5.4.8. (fig. 2.14)

2.7 SPARE PARTS

If it is necessary to replace worn and/or broken parts, use only and exclusively original LPE S.p.A spare parts. To request spare parts and for the order procedure, refer to the attached Spare Parts List (fig. 2.15).

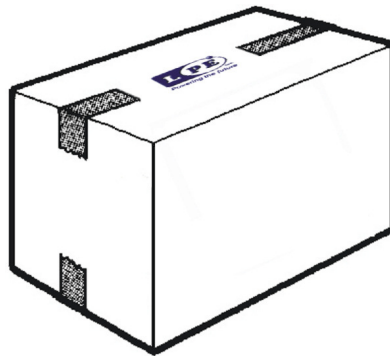


fig. 2.15

3. TECHNICAL INFORMATION+

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3.1 TECHNICAL INFORMATION

For all technical information and specifications, refer to Part 4 "Drawings and Attachments".

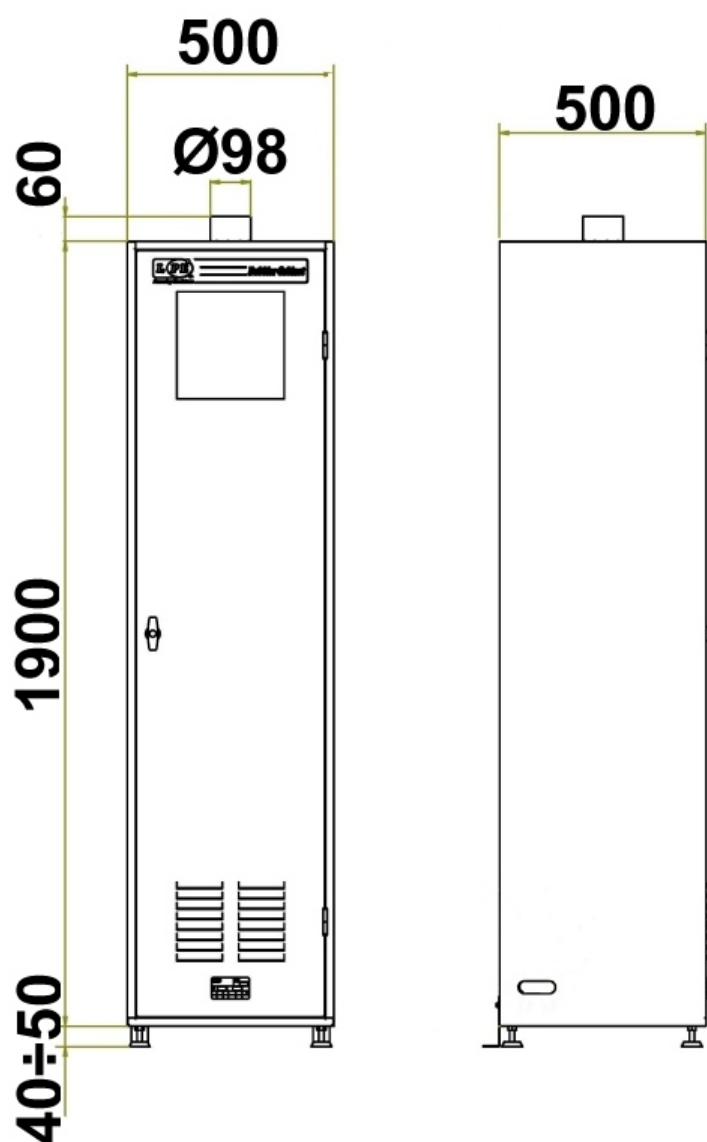


fig. 3.1

Information	M.U.	DATA
Weight	Kg	65
Overall height	mm	2010
Overall length/width	mm	500x500

3.1.1 Construction

3.1.1.A Inside tubing

AISI 316 - electropolished - 1/4 " size

3.1.1.B Valves group

Mounted on bubbler top-

Manual valves: Tescom diaphragm valve, 1/4 turn, AISI 316

Pneumatic valve: Nupro bellow valve, normally closed - AISI 316

Gas & liquid connections: VCR 1/4"

Welding: orbital welding

3.1.2 Services & Connections

3.1.2.A Gas connection and tubing

VCR type, face seal - male/female - see dwg. RE4196

Tubes H2 and Mix: 1/4 " st.st. connected to reactor

Liquid Chlorosilane: 1/4 " st.st. connected to main drum

coaxial line recommended for liquid chlorosilane

Pneumatics: 1/8" plastic tube, connected to Control Box - 5 meters supplied

3.1.2.B Level sensor

see Control Box specifications

3.2 TECHNICAL DESCRIPTION

3.2.1 Main function

The function of the cabinet is to house the bubbler.

3.3.3 Component list

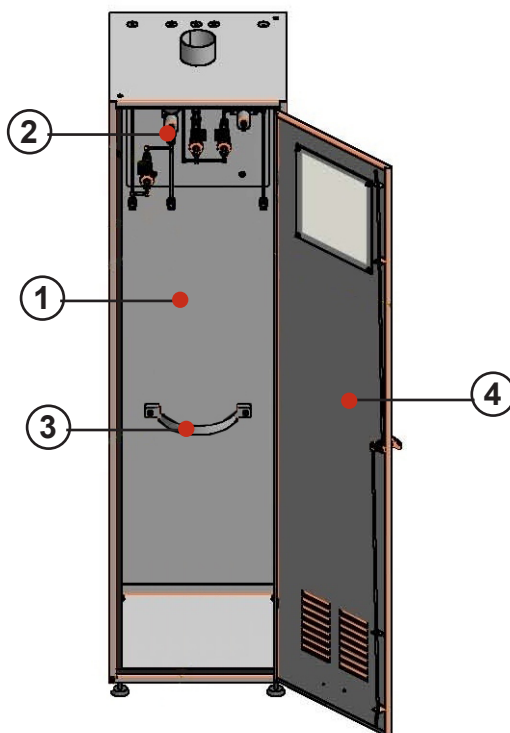


fig. 3.2

Ref	Item	Description
1	CABINET	Sheet metal structure.
2	REACTOR DISCHARGE PANEL	Discharge panel for transformation of the hydrogen and TCS liquid into a gaseous mixture.
3	BUBBLER RETAINER BAND	Bubbler retainer band
4	DOOR	Opening/closing

4. DIAGRAMS AND ATTACHMENTS

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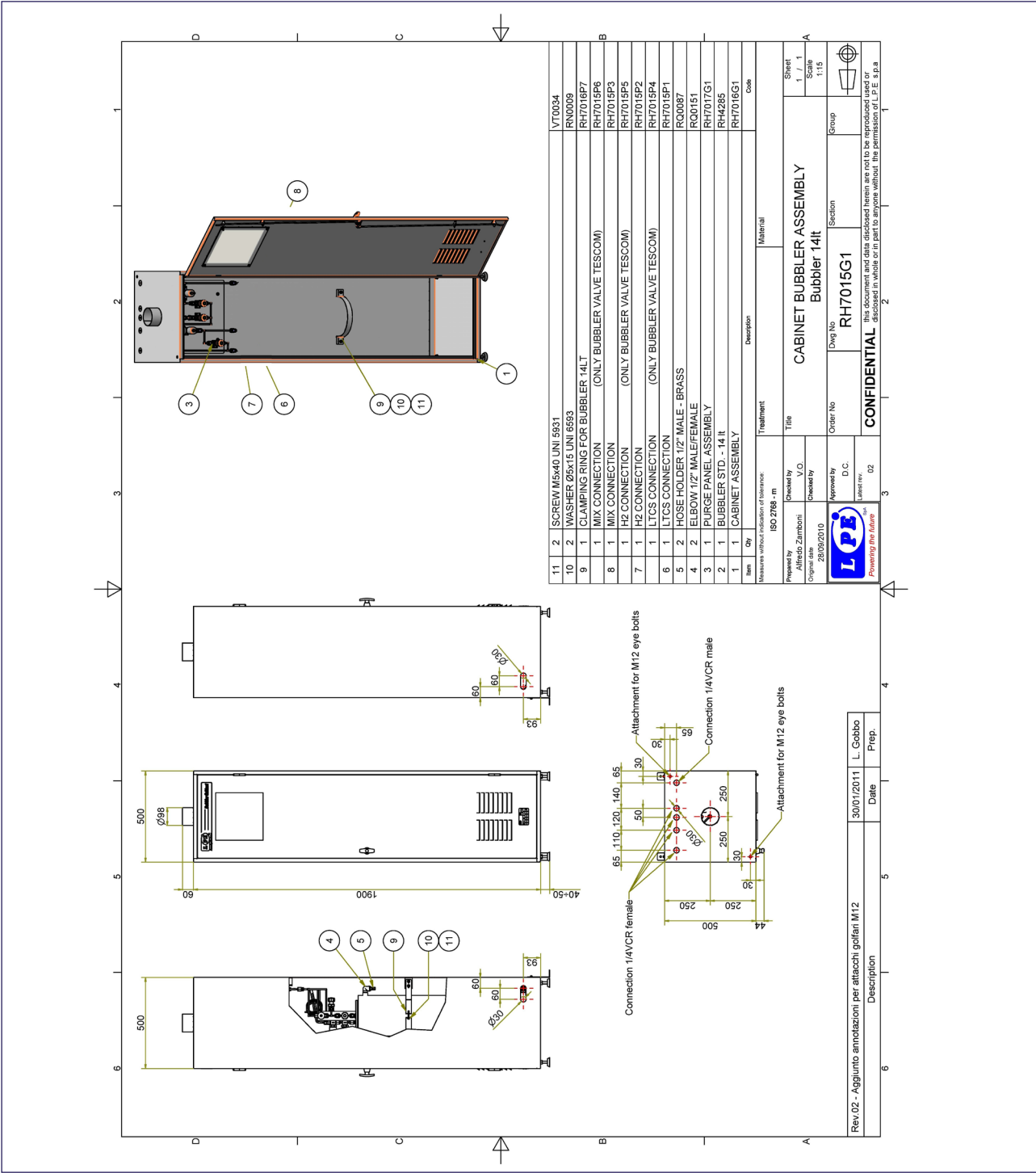
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4.1 INTRODUCTION

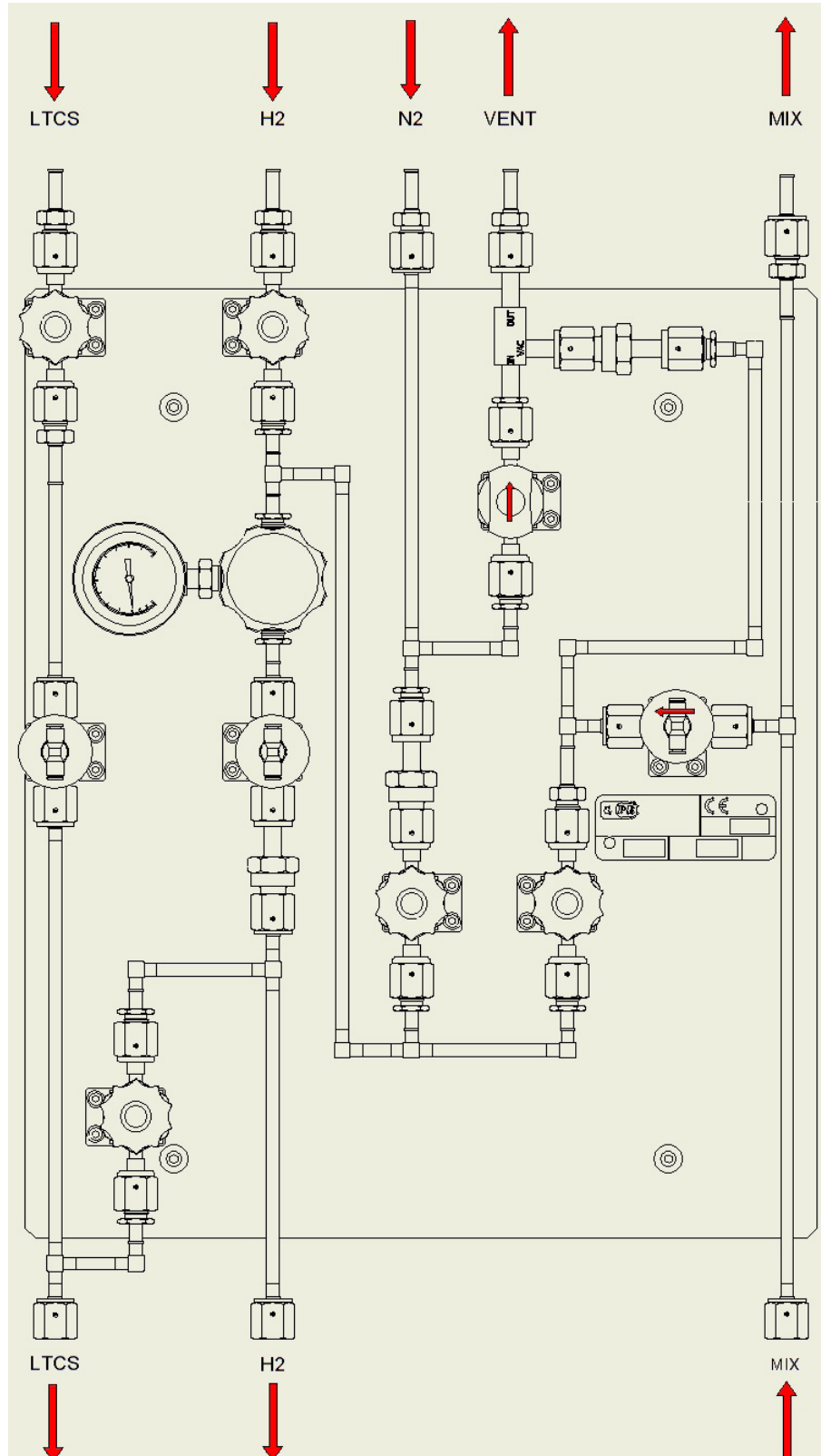
This section contains all the documentation supplied with the delivery of the cabinet: layout, reactor discharge diagram, which complete this Instruction Manual, to use during the setting up and maintenance work.

All layouts, diagrams, drawings and manuals in question are grouped in the file "Attachments" section 4.

4.2 MACHINE LAYOUT



4.3 DISCHARGE DIAGRAM



5. CUSTOMER SERVICE INFORMATION

Contents of this Section

5.1 ADDRESS, TELEPHONE NUMBERS & CONTACTS - - - - - 2

5.1 ADDRESS, TELEPHONE NUMBERS & CONTACTS

For any information or any need for intervention, please contact LPE S.p.A.

COMPANY NAME	LPE S.p.A.
ADDRESS	Via Falzarego, 8 20021 Baranzate (Milano) Italy
PHONE	++39 02 3834151
FAX	++39 02 38306118
E-MAIL	info@lpe-epi.com
WEBSITE	www.lpe-epi.com
CONTACT	Customer Service Manager Mr. E. Bonanno enzo.bonanno@lpe-epi.com
	Sales Manager Mr. L. Porru luca.porru@lpe-epi.com
	Chief Executive Officer Eng. F. Preti francopreti@lpe-epi.com

6. DISMANTLING AND DISPOSAL OF THE MACHINE

Contents of this Section

6.1	DISMANTLING - - - - -	3
6.2	DISPOSAL - - - - -	4

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6.1 DISMANTLING

At the end of its working life, the Cabinet must be decommissioned, so that it is not used for purposes other than its intended purpose, and to recycle its parts and materials. The following general rules must be applied.

1. The machine should be safely deactivated and dismantled to reduce the risk of crashes with moving parts or stored energies. In particular, disconnection of the services must be carried out abiding by the instructions and warnings described in *SECTION 7 – TRANSPORT, HANDLING AND INSTALLATION*
2. Before dismantling, operators must read and fully understand the Safety Regulations (*SECTION 2 – SAFETY REQUIREMENTS*) described at the beginning of this Instruction Manual and use the prescribed personal protective equipment (protective gloves, safety shoes, work overalls, protective gloves, gas mask, etc)



NOTE

When dismantling, separate the different materials.

3. To dismantle the machine, CAREFULLY follow the procedure below.



WARNING

Danger of electrocution, cutting, crashing, impacts, injuries and contact with toxic materials.

- Disconnect the service connections:
 - gas line inlets: before disconnecting, all lines must be purged with inert gas for at least 24 hours.
 - Disconnect the internal connections:
 - all device connectors;
 - all safety devices
 - Dismantle the frame
4. The company, LPE S.p.A., **cannot accept responsibility** for any damages to things or people arising from reuse of parts in ways other than the original intended use by LPE S.p.A.
 5. Return the machine identification plate (fig. 6.1) to LPE S.p.A.

		Via Falzarego, 8 20021 Bollate Milano ITALY			
Model	<input type="text"/>				
Serial Number	<input type="text"/>				
Year of the Construction	<input type="text"/>				

fig. 6.1

6.2 DISPOSAL

After completely dismantling the machine, dispose all items at appropriate waste disposal firms. All polluting materials such as oils and greases, production wastes, raw materials remnants, etc should be disposed of responsibly (fig 6.2).

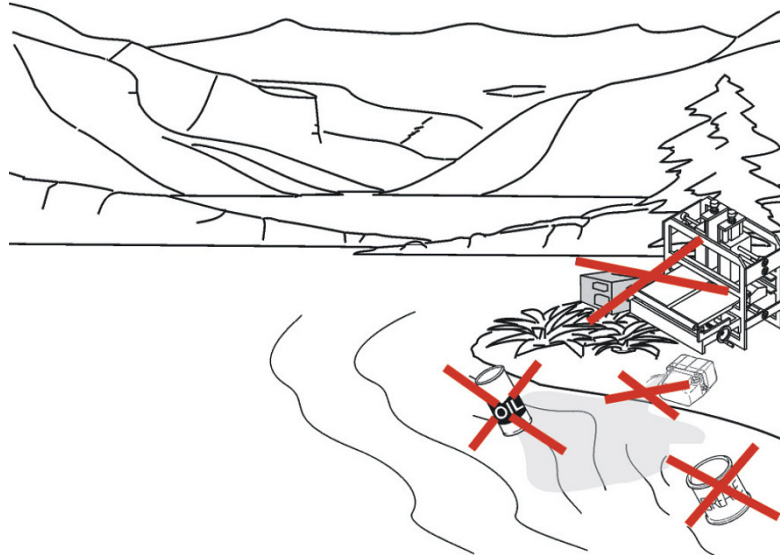


fig 6.2

7 TRANSPORT, HANDLING AND INSTALLATION

Contents of this Section

7.1	INSTALLATION PREPARATION - - - - -	3
7.2	HANDLING THE PACKAGED CABINET - - - - -	7
7.2.1	<i>Handling the crates with a fork lift truck</i>	9
7.2.2	<i>Handling the crates with a bridge crane and cables</i>	10
7.2.3	<i>Handling with a crane or hoist</i>	11
7.3	NOTES AFTER HANDLING, BEFORE CONNECTING THE SERVICES- - - -	12
7.4	DISPOSAL OF PACKAGING - - - - -	12
7.5	INSTALLATION PREPARATIONS - - - - -	13
7.6	INSTRUCTIONS FOR POSITIONING AND CONNECTIONS - - - - -	14
7.6.1	<i>Positioning.</i>	14
7.6.2	<i>Instructions for the connections.</i>	15

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7.1 INSTALLATION PREPARATION



CAUTION

Danger of crushing, collisions, abrasions and cuts. Personnel assigned with handling the machine must read the Safety Requirements at the beginning of this manual (Section 2), wear work overalls, protective gloves, protective shoes and helmet.



CAUTION

Always handle the cabinet as explained in this section; in any case never sling the machine as shown in the figure or on the projecting parts (fig. 7.1).

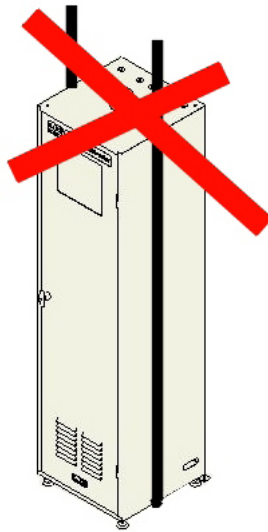


fig. 7.1

The following pages describe how to behave in all the cases listed.

1. As a rule and as per the contract, an LPE S.p.A. Engineer should always be present upon arrival of the packaged items. The instructions in Section 7 – HANDLING – should be used as a note if handling parts of the packaged machine, unpacking and transporting unpacked machine parts is carried out without the supervision of the Engineer in question.
2. Before positioning all the machine parts, make sure that the surface on which they are placed and all the connections comply with the specifications forwarded previously.
3. As, during assembly, it may be necessary to access high parts always use a suitable safety ladder. (fig. 7.2).



fig. 7.2

4. If using metallic cables or chains also for slinging, remember to protect painted and machined parts with cardboard, wood or cloths during handling (fig. 7.3).

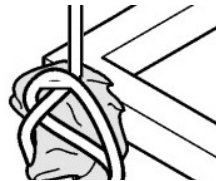


fig. 7.3

5. When handling, the person assigned to operate the means of transport must ensure that **NOBODY IS NEAR THE CABINET**. Activities of lifting, handling and unpacking the unit should be entrusted exclusively to personnel expert in this type of work (fork lift truck drivers or crane operators) (fig. 7.4).

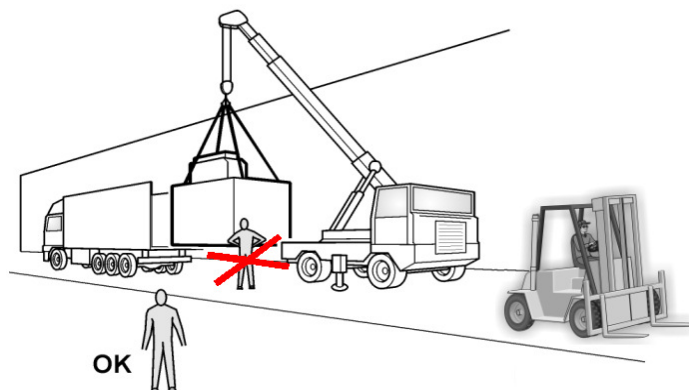


Fig. 7.4



CAUTION

Danger of falling and/or tripping and crushing. Position barriers or, in some form, prevent access to all personnel unauthorised to carry out handling operations or unaware of the dangers connected to this phase. **NEVER REMOVE THE BARRIERS UNTIL THE POSITIONING AND FASTENING OPERATIONS OF THE UNITS HAVE BEEN COMPLETED** (fig. 7.5).

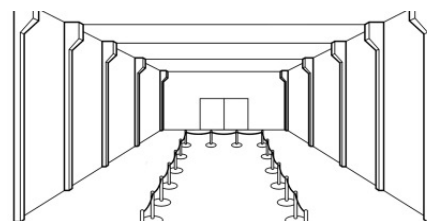


Fig. 7.5

6. As a rule, LPE S.p.A. shall supply the cabinet inside containers or crates.
7. Clean the area bordering the installation area of the cabinet, to prevent slipping, tripping or falling.

**CAUTION**

Danger of crushing. The various components, inside the containers and crates, for transport reasons, are secured and spaced with wooden elements. These connections (iron wires and battens) and the linings should not be removed upon opening the top of the containers and crates. There is a danger of crushing due to loads moving.

8. These connections should be removed when removing each component. For this reason, the person in charge of removal and slinging activities of components must wear protective shoes, gloves and helmet and work with utmost care and attention.
9. Before handling the cabinet, make sure that all the feet are in the fully up position and do not stick out. They may be damaged or create hazardous situations during handling.
10. The cabinet can be handled when packed, according to circumstances, with cables or chains, fork lift trucks, brackets, eyebolts, bridge cranes, or other means as described in the following chapters.
11. Handling the unpacked cabinet is permitted only using a fork lift truck or transpallet, as described in the following chapters
12. The cabinet is designed to operate in a clean room. Therefore, the environment conditions for its processing must comply with the laws in force. If installed inside an industrial building, the building must be well lit and have a solid and flat floor.
13. The work areas must be fitted with systems that provide artificial lighting for protect the health and safety of workers. Lighting in the rooms must comply with the laws in force in the country in which the cabinet is installed and must, in any case:
 - be uniform and guarantee good visibility throughout the rooms;
 - not create dangerous reflections;
 - enable, as much as possible, maintenance interventions specified in this manual to be carried out safely
14. The flooring should be sufficiently level and capable of supporting the cabinet (fig. 7.6) See packing list (Kg) for weight details.

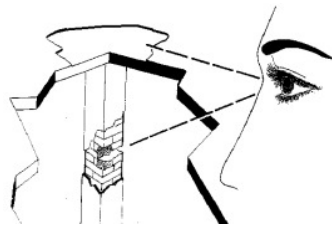


fig. 7.6

15. Ensure there is sufficient space for maintenance interventions. The cabinet should be installed according to the indications shown in the layout attached to Section 4 and Section 3.

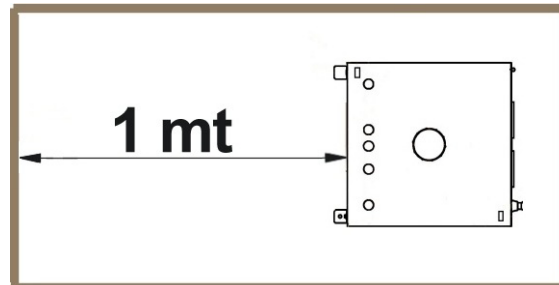


fig. 7.7



NOTE

LPE S.p.A. recommends these as minimum spaces for maintenance interventions.

16. The cabinet should not be installed immediately near a thoroughfare area (especially people).
17. The work area should never be occupied, so that, NOTHING AND NOBODY interferes with the free movement of the operator.



FORBIDDEN

Access to the work area is forbidden to unauthorised persons not directly assigned with operating the machine. This prohibition is necessary to prevent dangers due to carelessness or negligence whilst working. The operator is therefore advised to always keep the work area free from any equipment and forbid access to unauthorised personnel, in order to obtain the ideal safety conditions to operate the machine.

IF THESE CONDITIONS DO NOT EXIST, ARRANGE SAID CONDITIONS PRIOR TO INSTALLATION.

7.2 HANDLING THE PACKAGED CABINET

When delivered packaged, the cabinet may be in a crate [1] or on a pallet [2] (fig 7.8).

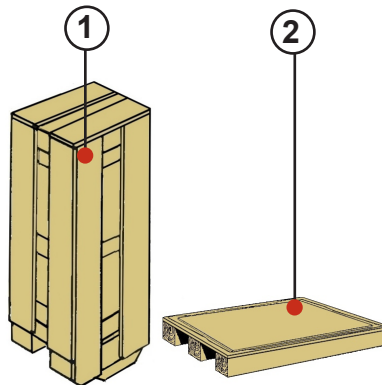


fig. 7.8



MANDATORY

To handle the crates with fork lift trucks, follow the instructions described in point 7.2.2; to handle the crates using a bridge crane or cables, follow the instructions in point 7.2.3.



CAUTION

If machine parts are not unpacked immediately, store packaged parts in a dry and covered area (fig. 7.9).

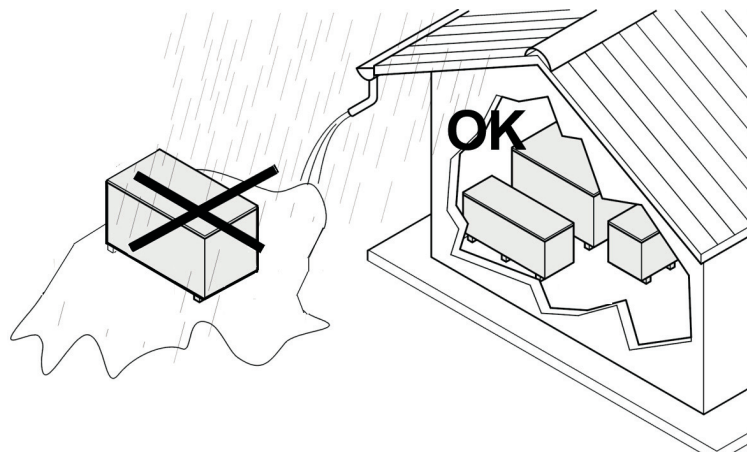


fig. 7.9



NOTE

Normally, all parts are shipped in crates. The components purchased are shipped in their original packaging.

i

NOTE

The necessary handling instructions are affixed to the outside of the packaging (fig. 7.10).

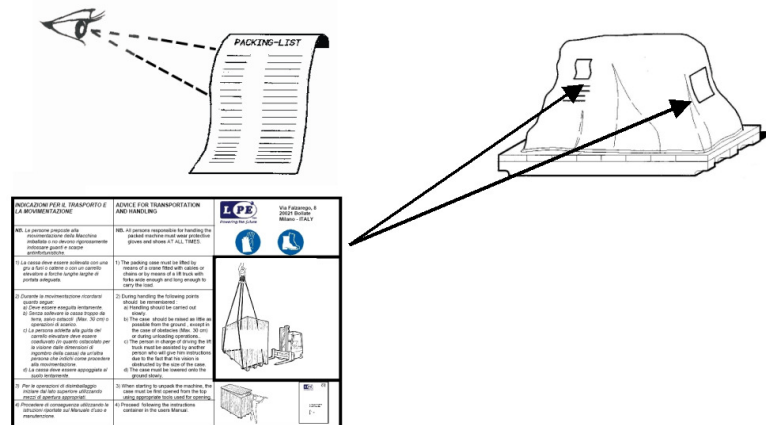


fig. 7.10

7.2.1 Handling the crates with a fork lift truck

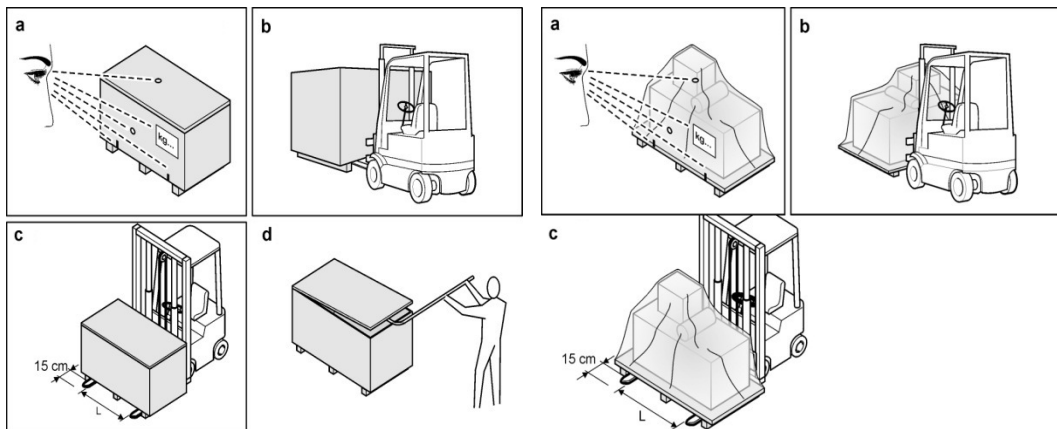


fig. 7.11

When handling the crates with the aid of a fork lift truck, refer to the above figure and proceed as indicated below:

1. abide by the instructions on the crate (especially the position of the forks and the barycentre): note that the position of the forks is the widest possible [a] (fig. 7.12)

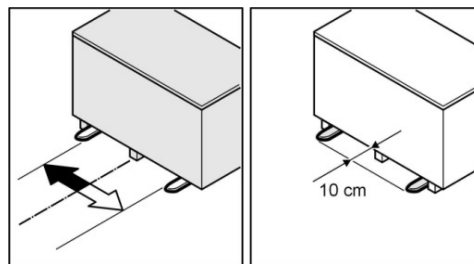


fig. 7.12

2. use a fork lift truck of adequate capacity; the forks should project from the crate by at least 10cm. [b]
3. slowly move the crate, at a minimum height from the ground (max. 20cm), assisted by a helper if vision is hindered.
4. position delicately on the ground [c]
5. to open the crate, use appropriate equipment (crowbar for example), starting from the lid [d].

7.2.2 Handling the crates with a bridge crane and cables

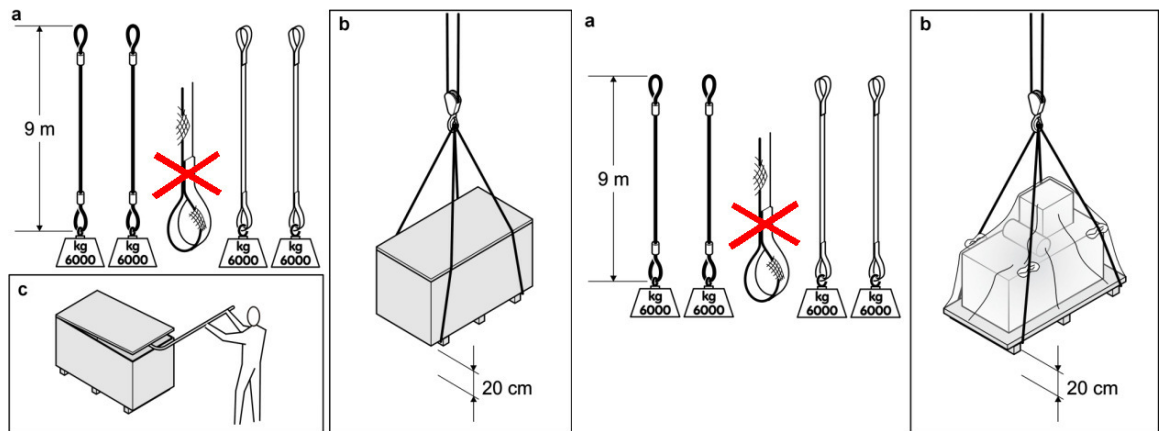


fig. 7.13

When handling the crates with a bridge crane and cables, refer to the figure above (fig. 7.13), and proceed as indicated below:

1. use two cables or chains of a minimum length of 9m and minimum capacity of 6,000Kg each, using the eyelets at either end that should show no signs of wear **[a]**
2. sling the crate following the instructions shown on the outside (position of the cables, barycentre and weight) **[b]**
3. slowly move the crate, at a minimum height from the ground (max. 20cm), assisted by a helper if vision is hindered **[c]**
4. position delicately on the ground **[d]**
5. to open the crate, use appropriate equipment (crowbar for example), starting from the lid **[e]**.

7.2.3 Handling with a crane or hoist

Once the cables are in position, use the two eyebolts screwed to the lid of the cabinet, always abiding by the following principles:

1. use two cables or chains of a minimum length of 4 metres and minimum capacity of 1000 Kg each, with eyelets at either end that should show no signs of wear (fig. 7.14);

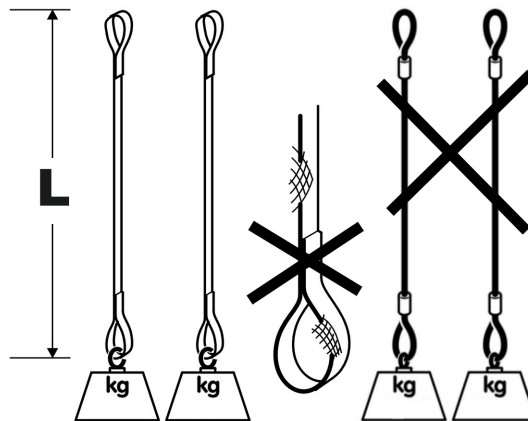


fig. 7.14

2. Before connecting the cables for lifting, check the eyebolts are secure (fig. 7.15);
3. Insert the cable hook in the hole of the eyebolt; make sure it is screwed tightly to prevent it escaping (fig. 7.15);

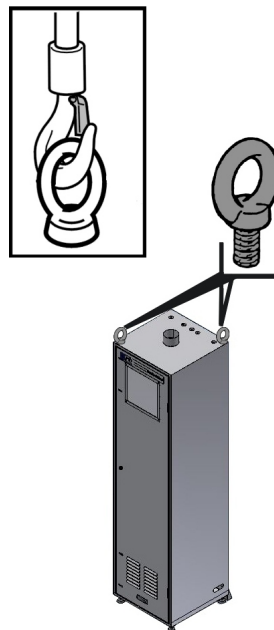


fig. 7.15

2. sling the cabinet;
3. watch the barycentre position;
4. slowly move the cabinet, at a minimum height from the ground (max. 20 cm.), assisted by a helper if vision is hindered;
5. position delicately on the ground.

7.3 NOTES AFTER HANDLING, BEFORE CONNECTING THE SERVICES

Once the handling of the cabinet is complete and all the necessary parts are positioned near the installation site, wait for the LPE S.p.A. Engineer to carry out all the checks before installation.

7.4 DISPOSAL OF PACKAGING

The disposal of waste packaging materials should be carried out in compliance with the regulations in force in the User's country, taking into consideration the nature of the materials:

- *straps, nails and metallic parts;*
- *wooden planks and plywood;*
- *plastic materials (protective sheeting, moisture barrier bags).*



NOTE

Dispose of packaging responsibly. (fig. 7.16).

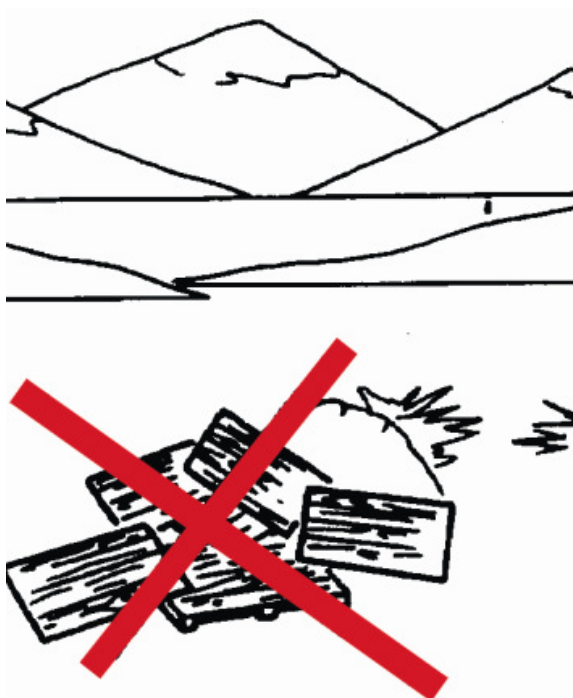


fig. 7.16

7.5 INSTALLATION PREPARATIONS

Follow the instructions in document "INSTALLATION SPECIFICATION" forwarded prior to shipping the cabinet.

**CAUTION**

If these conditions do not exist, arrange said conditions prior to installation.

7.6 INSTRUCTIONS FOR POSITIONING AND CONNECTIONS

7.6.1 Positioning



FORBIDDEN

Positioning and connecting the cabinet should only be carried out by the customer's Engineers specially trained for this type of intervention or by LPE S.p.A. Engineers. It is forbidden for other Engineers to carry out these interventions.

Before positioning the cabinet, bear in mind these indications:

1. to transport to other rooms, use appropriate trolleys. Use suitable equipment to position the trolleys (crowbar for example).



CAUTION

These trolleys should be positioned next to the uprights or shoulders, never only on the crossbeams (fig. 7.17)

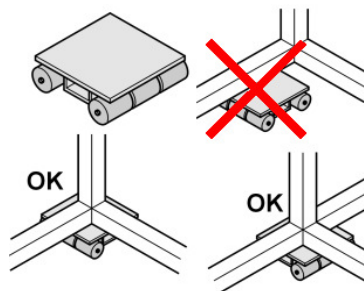


fig. 7.17

2. Remove the plastic protective film only before positioning the unit (fig. 7.18)



fig. 7.18

3. Before proceeding further, carefully clean the various parts using a soft cloth (fig. 7.19)



fig. 7.19

4. LPE S.p.A. Engineers will assemble the machine.
5. Adjust the screw nuts and lock nuts of the adjustable feet (fig. 7.20), to adjust the machine to a height of approximately 40-50mm from the ground. Once in position, secure the rear brackets.

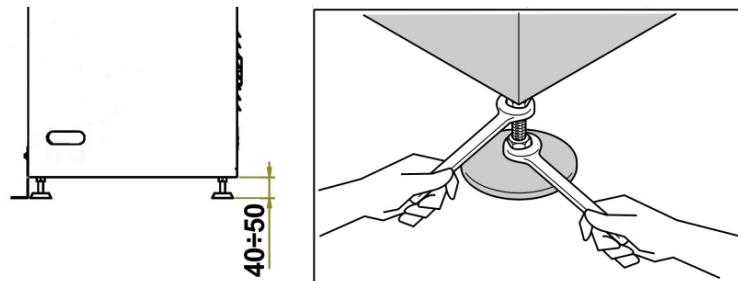


fig. 7.20

7.6.2 Instructions for the connections



CAUTION

Connections to the services should only ever be carried out by LPE S.p.A. Engineers. The Engineer should ensure that, whilst making the connections, nobody remains in the area surrounding the machine and near energy sources.

1. Make the connections with the help of the relevant diagrams.
2. *Once the interventions of this section are completed, the LPE Engineer should consult the diagrams and mechanical drawings of Section 4 – DIAGRAMS AND ATTACHMENTS -, in order to*
 - make the connections to the pneumatic system and gas system as shown in section 3 Technical Particulars;

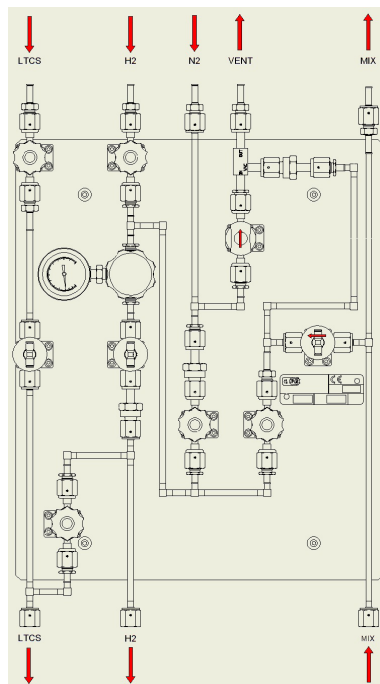


fig. 7.21

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8. CONTROL DEVICES

Contents of this Section

8.1	INTRODUCTION - - - - -	3
8.2	GAS PANEL ASSEMBLY - - - - -	3

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8.1 INTRODUCTION

Here follows descriptions of the machine panel controls.

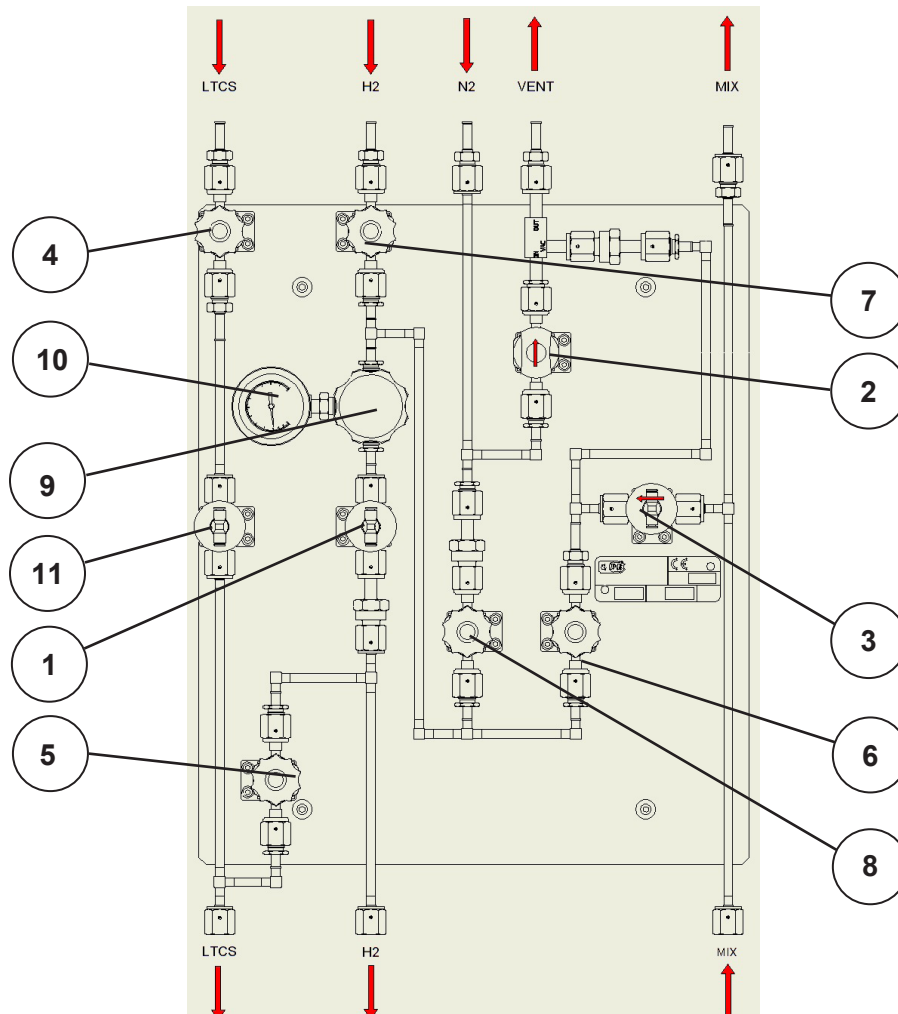
The panels shown are standard panels or, in any case, the most complete. Each control, even if located in a different position to the one shown, always has the same written function.

8.2 GAS PANEL ASSEMBLY



MANDATORY

Open Section 9 for easy reference to the layout of the pneumatic control panels. Open Section 4 - "Gas Diagram".



REF.	CONTROL DESCRIPTION
1	PNEUMATIC VALVE H2-IN Open/Close Hydrogen.
2	TRICKLE MANUAL VALVE Ensure purge.
3	PNEUMATIC VALVE Bubbler depressurization while refilling.
4	MANUAL VALVE Open LTCS.
5	MANUAL VALVE Open bypass H2-LTCS.
6	MANUAL VALVE Open Nitrogen.
7	MANUAL VALVE Open Hydrogen.
8	MANUAL VALVE Open Nitrogen.
9	H ₂ PRESSURE REGULATOR
10	H ₂ PRESSURE GAUGE
11	PNEUMATIC VALVE Open LTCS



CAUTION

The valves referenced in 2, 5, 6 and 8 are closed during normal operations, and must be operated only during maintenance. Maintenance operations are performed only by trained people

9. POSITION OF CONTROL DEVICES

Refer to chapter 8 of this manual.

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10 SOFTWARE REFERENCE GUIDE (GUI)

The cabinet is not equipped with software devices.

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11. SWITCH-ON AND START-UP

Contents of this Section

11.1 INTRODUCTION - - - - - 3

11.2 OPERATION - - - - - 4

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11.1 INTRODUCTION

Adjustments to the entire machine have been carried out by LPE S.p.A. Engineers who have checked and disassembled the machine at the production site.

Upon making the adjustments and at the production start-up phases, the LPE S.p.A. Engineer should be **assisted** by the customer's operator and, if necessary, by the customer's Mechanical and Electrical Engineers. In any case, the adjustments and start-up should be carried out by a **single person**, either the LPE Engineer or the customer's Engineer.



MANDATORY

Read *SECTION 8 – CONTROL DEVICES*, *SECTION 9 – POSITION OF CONTROL DEVICES* for a better understanding of the control panel functions.

The adjustments described herein reflect the operations carried out by LPE Engineers, phase by phase. Therefore, this chapter describes all the procedures to follow, in case further adjustments are required in the future



WARNING AND OBLIGATION

Generic danger. Carefully read all *SECTION 2 – SAFETY REQUIREMENTS*, and in particular:

- Definitions of:
 - operator or machinery conductor
 - mechanical service engineer
 - electrical service engineer or trained individual
 - warning plates of residual risks, prohibitions and obligations.
 - personal protective equipment

11.2 OPERATION

Operation procedure (process)

Valve (1) open

Valve (2) closed

Valve (3) closed

Valve (4) open

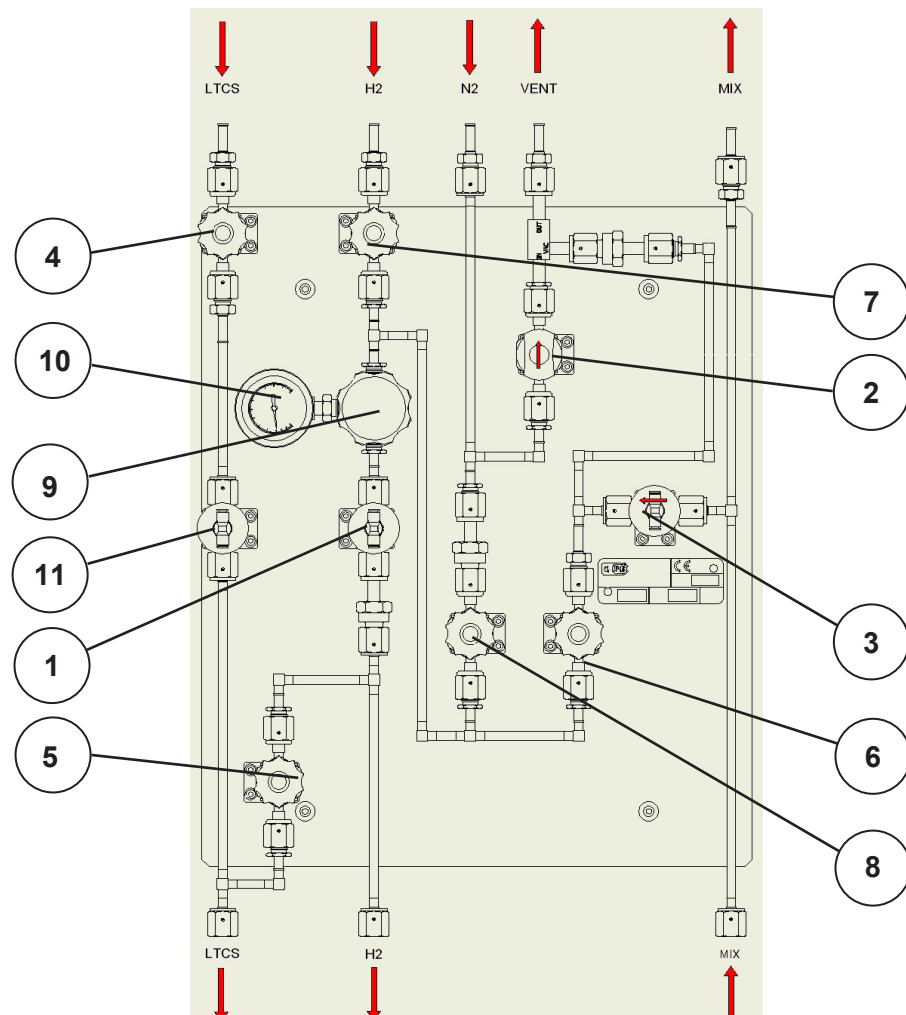
Valve (5) closed

Valve (6) closed

Valve (7) open

Valve (8) closed

Valve (11) closed



Open pneumatic valve (1) to enable the flow. The hydrogen flows to the bubbler at a pressure that ranges from 0.7 bar to 1 bar.

A mixture of LTCS and H₂ flows from the Mix line directly to the reactor.
After the deposition cycle is completed, close the pneumatic valve (1).

Based on the duration of the operating cycle, it will be necessary to reintegrate the LTCS.
The refilling procedure is as follows:.

Valve (1) closed
Valve (2) open
Valve (3) closed
Valve (4) open
Valve (5) closed
Valve (6) closed
Valve (7) open
Valve (8) closed
Valve (11) open

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12. MACHINE STOP

The cabinet is not equipped with a stop device.

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13. ALARM LIST

The cabinet is not equipped with a machine-operator interface device.

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14. MAINTENANCE, CLEANING AND LUBRICATION

Contents of this Section

- 14.1 INTRODUCTION - - - - - 3
 - 14.1.1 Using the manual 3
 - 14.1.2 General warnings, obligations and prohibitions 4
 - 14.1.3 Types of maintenance 5
- 14.2 PLANNED MAINTENANCE - - - - - 6
 - 14.2.1 Every month. 6
 - 14.2.2 Every 6 months 8

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14.1 INTRODUCTION

The following maintenance operations reflect the manner in which the Engineer of LPE S.p.A. will behave, phase by phase. These are therefore procedures to abide by if it is necessary to carry out any future setting-up or maintenance operations.

If the machine is adjusted on a continual basis as described in the setting-up (part 11), clean) there will be no need for other maintenance interventions, except those stated as follows.

Remember that the maintenance interventions should be carried out correctly, they can reduce to a minimum the stop times following a failure. A repair carried out promptly can prevent further deterioration.

Any maintenance, lubrication and cleaning operations should be carried out with the Load & Unload logic machine (except where indicated otherwise); wearing PPE and allowing hot parts to cool to room temperature.



NOTE

In case of spare parts requests, always use the spare parts list sent with this User and Maintenance Manual. Only use original spare parts. In case of need, contact LPE S.p.A.

14.1.1 Using the manual



MANDATORY

Each operator assigned with maintenance, cleaning or lubrication operations must have a copy of the manual readily available for easy reference.

The manual is an irreplaceable tool for the Maintenance Engineer. Before any operation, carefully read:

- *Section 2-Safety requirements*
- *Section 8-Control devices*
- *Section 9-Position of control devices*

In particular, the following should be understood:

- function of the emergency pushbutton
- definitions of:
 - maintenance status and zero energy status;
 - warning plates of residual risks, prohibitions and obligations;
 - personal protective equipment.
- how to switch the machine to ZERO ENERGY STATUS, an essential condition to carry out all the operations safely
- which Personal Protective Equipment (PPE) to wear.

Always use the official diagrams shown in *Section 4 – Diagrams and Attachments*.

14.1.2 General warnings, obligations and prohibitions



CAUTION

Enclose the area and state work is in progress by placing a sign on the cutout switch and on the barriers "WORK IN PROGRESS" "DO NOT SWITCH ON".



CAUTION

Remember to watch the lights on the control boards.



MANDATORY

Any maintenance, repair or replacement operation not described in this manual should only be carried out by the customer's Maintenance Engineer or by an LPE S.p.A. Engineer.



MANDATORY

After completing maintenance work, it is mandatory to reassemble the fixed safety guards.



MANDATORY

Only use equipment suitable for the maintenance work.



FORBIDDEN

It is forbidden to carry out maintenance work with moving machine parts.



FORBIDDEN

Dispose of parts contaminated by gas, simple equipment and air filters responsibly, always contact authorised companies (fig. 14.1).

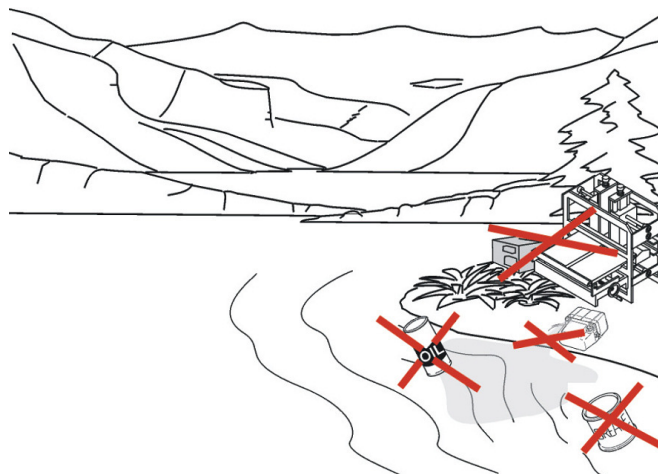


fig. 14.1

14.1.3 Types of maintenance

Based on the operating hours, maintenance interventions can be classified thus:

- planned maintenance: maintenance interventions at preset frequencies (for example lubrication or replacement of consumables);
- occasional maintenance: interventions carried out at the occurrence of a malfunction and/or accidental failure (for example the replacement of a fuse or lamp).

Based on the technical/economical importance or intervention frequency, maintenance can be distinguished into the following types:

- routine maintenance: simple interventions, mainly of modest difficulty and expense;
- extraordinary maintenance: repair and/or replacement interventions of technical and financial importance, necessary following rare or unforeseen failures and that require the presence of skilled personnel of LPE S.p.A. or the actual Customer.

Preventive inspections that allow totally safe use of the machine.

Abide by the frequencies and intervention method indicated in this manual.

14.2 PLANNED MAINTENANCE



CAUTION

Replace worn parts immediately.

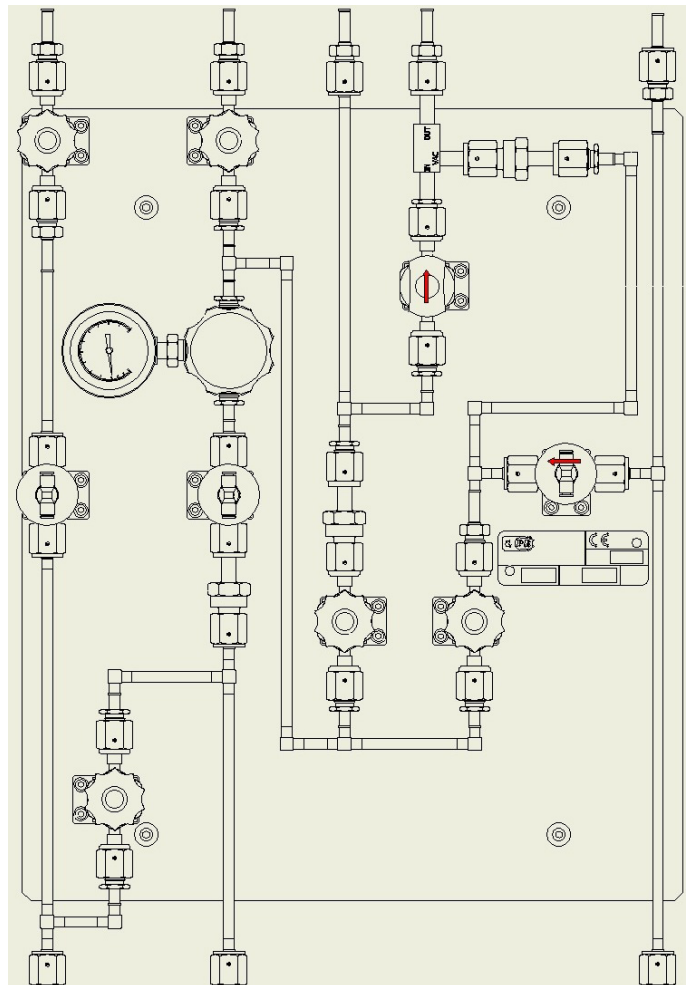
To guarantee complete efficiency of the entire machine, it is necessary to abide by the schedules and methods indicated as follows.

The inspections closely linked to maintenance work are:

- inspection of efficiency of safety devices;
- inspection of integrity, efficiency and securing of safety guards;
- replacement of gaskets;

14.2.1 Every month

1. Inspect for leaks in the gas system. Refer to the *diagram attached to Section 4.*



2. Clean the outside and inside of the cabinet using a soft dry cloth fig. (14.1).

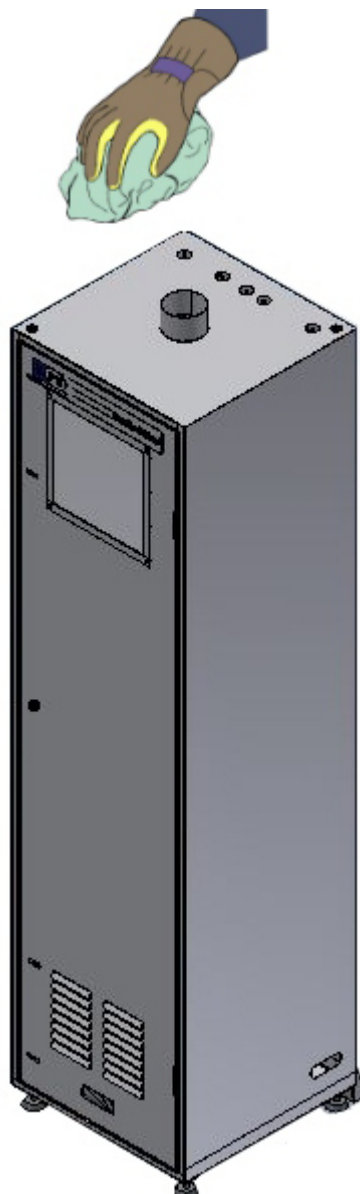


fig. 14.1

14.2.2 Every 6 months

1. Inspect the efficiency of all the safety guards, micro switches, and legibility of warning plates of residual risks, prohibitions and obligations:
 - **Door:** ensure that the supports are intact, that the locks function correctly, that glass parts are intact. Keep the outside of the safety guards clean; always make sure the hinges and locks work efficiently (fig. 14.2).

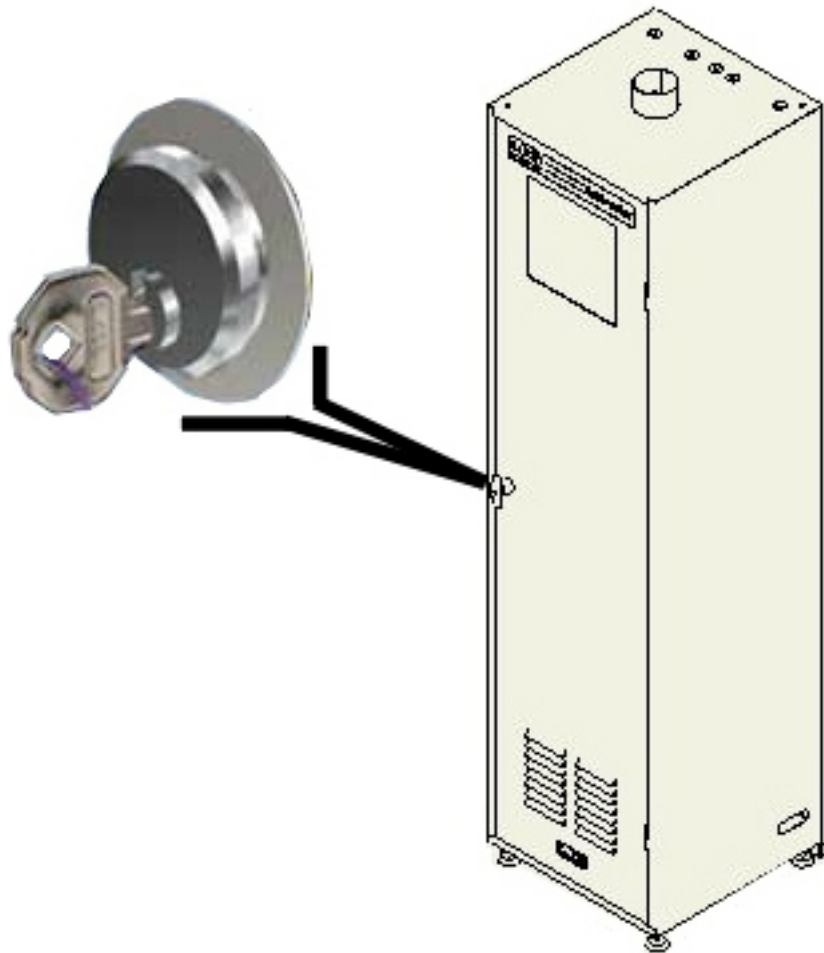


fig. 14.2

- **Lock:** ensure that the lock is correctly fitted and functions correctly and that no parts can cause a malfunction (fig. 14.2).
- **Warning plates of residual risks, prohibitions and obligations:** ensure these plates are legible, show no signs of wear and are intact.
-



NOTE

Contact LPE S.p.A. immediately to request spare parts. Any new components that replace faulty ones shall have identical technical features and the same level of performance; safety components are certified and belong to the same class as the original component that is replaced.

Bubbler Cabinet - MAN0065 - REV.00 - 18/03/2013



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