



***Operating Instructions  
and Maintenance Manual***

***Machine: EPC-ETCHSTAR 650  
S/N. EPC 107011  
Date: 04-2007***

Manual code: EPC-M-107011

**Publication issued by:**

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## Introduction

The purpose of this manual is to provide the User with all the information required to permit the correct use of the system under the maximum safety conditions.

All the necessary activities for setting the system at work, as well as the daily and periodical activities to allow correct system operating process are described in the following pages.

This manual is structured in two main parts, the first part contains the general information regarding the complete system in itself, and the second part contains the specific technical information related to assemblies or modules composing the system.

The operator assigned to use the system is obliged to read the manual carefully before starting it up or carrying out whichever type of activity.

The operator must refer to the manual for any activities, ordinary or extraordinary, to be performed and in case of additional information required contact the nearest authorised representative or WISE s.r.l. directly.

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## 1. Manufacturer's data

### 1.1 Instructions for requesting interventions

Should the manual be found in some way not sufficiently exhaustive, Wise s.r.l. is always available for any additional information the customer may need regarding installation, operating procedures and maintenance operations.

In order to receive complete and rapid answers, the requests should be formulated in clear terms and always referring to the manual.

Each machine is supplied with an identification plate, described in the following pages, which has a Serial Number printed on it that univocally identifies the system. Do not forget to specify said number when formulating requests or orders.

All requests for either technical clarifications or interventions from Wise s.r.l. Technical Assistance Department, must be addressed to:

WISE s.r.l. Via Martinella 100/A

43010 Alberi Parma

Tel. 0521-649716

Fax. 0521-649717

e-mail: wise@wisecompany.it

### 1.2 Spare parts ordering instructions

The parts composing the system may over time be subject to wear and could therefore require replacing.

The Customer may purchase these parts through an appropriate purchase order.

In order to prevent mistakes, purchase orders must clearly indicate the reference number of the part needed, as well as the Serial Number of the system on which said part will be installed.

Requests and purchase orders for spare parts should be addressed to:

WISE s.r.l. Via Martinella 100/A

43010 Alberi Parma

Tel. 0521-649716

Fax. 0521-649717

e-mail: wise@wisecompany.it

In the event of parts replacing or complex maintenance operations, it is recommended to request the intervention of WISE s.r.l. Technical Assistance Department, which is available with qualified personnel, suitable tools and equipment.



#### **WARNING:**

It is compulsory to purchase and install exclusively original spare parts for the correct operation of the system. WISE s.r.l. shall not be held responsible for any damage caused by non compliance to this requirement.

## 2. System's technical specifications

### 2.1 Machines

Machine:	ETCHSTAR 850
Model:	ELO-CHEM ALKALINE SOLUTION
Serial N°:	EPC 107011
Fabrication year:	2007
Final use:	Modular machine for Alkaline etching solution in the manufacture of flat boards.

### 2.2 Diagrams and assembly drawings

Overall Dimensions DWG:	LEP 36112
Internal Cross Sections DWG:	LEP 36112
Other DWG:	-

### 2.3 Characteristics

#### Overall dimensions:

- Length (mm):	7070
- Maximum Width (mm):	2000
- Maximum Height (mm):	1400

#### Electrical cabinet:

- Length (mm):	1800
- Width (mm):	37000
- Height (mm):	1200

### 2.4 Installed energies and products

#### Electric power

Main line:	tri-phase net with grounded neutral
Power circuit:	400V ac – 50Hz – 32kW – 86A
Control circuit:	24V dc

#### Compressed air

Pressure:	6bars
Capacity (consumption):	negligible

**Caloric cooling energy**

**Etching Module**

Caloric energy (kcal): 5500  
 Inlet heating fluid temperature (°C): Max. 10, Min. 3  
 Minimum capacity (l/h): 1000

**Tin Strip Module**

Caloric energy (kcal): 3000  
 Inlet heating fluid temperature (°C): Max. 10, Min. 3  
 Minimum capacity (l/h): 700

**Note: EXOTHERMIC REACTION NON INCLUDED**

**Air exhaust:**

**MAIN ETCHING CHAMBER**

Type of connection:  
 Capacity (m3/h):  
 Pressure (mmH2O):

smooth PVC pipe Øe160 mm  
 from 200 to 400 in production with  
 closed hatches (to be defined  
 according with the process  
 requirement)  
 from 500 to 800 in maintenance with  
 hatches open.  
 from 50 to 100 (to be defined  
 according with the process  
 requirement)

**CHEMICAL and RINSE MODULES**

Type of connection:  
 Capacity (m3/h):  
 Pressure (mmH2O):

smooth PVC pipe Øi50 mm  
 from 200 to 400 (to be defined  
 according with the process  
 requirement)  
 from 50 to 100 (to be defined  
 according with the process  
 requirement)

**DRYER MODULE**

Type of connection:  
 Capacity (m3/h):  
 Pressure (mmH2O):

smooth SS pipe Øi110 mm  
 from 500 to 600 (to be defined  
 according with the process  
 requirement)  
 from 50 to 100 (to be defined  
 according with the process  
 requirement)

**Products:**

Mains water pressure/capacity (bar-l/h): 2+3 bar, 600+1200 l/h  
 Demineralised water pressure/capacity (bar-l/h): N.A.  
 Inflammable products: N.A.  
 Neutral gases: N.A.  
 Acids a/o bases: Alkaline etching solution, Nitric acid based tin stripper solution

Toxic products:

See products used safety advice, normally contained in the it's data sheet.

Other:

N.A.

## 2.5 Characteristics of permissible panels

### Dimensions

- Minimum length (mm):	200
- Maximum length (mm):	1000
- Minimum width (mm):	100
- Maximum width (mm):	650
- Minimum Thickness (mm):	0,1 (base material)
- Maximum Thickness(mm):	6

#### **NOTE:**

The above specified minimum thickness values are indicative, and depend on the type of boards to be processed. Correct values are determined only by practical testing.



### 3 Safety planning reference standards

#### 3.1 European Directives

EEC	89/392	Machines Directive
	91/368	
	93/44	
	93/68	
EEC	73/23	SAFETY FOR ELECTRICAL MATERIALS UTILISED AT LOW TENSION.

#### 3.2 Harmonized Regulations (machine directives)

UNI EN	292-1	Nov. 92	Machinery safety. Basic concepts, general design principles. Basic terminology and methodology.
UNI EN	292-2	Nov. 92	Machinery safety. Basic concepts, general design concepts. Specifications and technical principles.
UNI EN	292-2/A1	Dic. 95	Machinery safety. Basic concepts, general design concepts. Specifications and technical principles.
UNI EN	294	Lug. 94	Machinery safety. Safety gaps preventing to reach dangerous areas with upper limbs.
UNI EN	349	Giu. 94	Machinery safety. Minimum spaces to prevent crushing of body parts.
UNI EN	414	Gen. 93	Machinery safety. Rules for drawing up and editing safety regulations.
UNI EN	418	Gen. 94	Machinery safety. Emergency stop device, functional aspects. Design principles.
UNI EN	457	Gen. 93	Machinery safety. Danger acoustic signals. General design qualifications and tests.
UNI EN	563	Giu. 95	Machine safety. Surfaces contact temperature. Ergonomic data to define hot surfaces temperature limit values.
EN	614-1	95	Machinery safety. Design ergo metric principles. Part 1: terminology and general principles.
UNI EN	626-1	Set. 96	Machinery safety. Reduction of risk exposure deriving from machines emissions of dangerous materials. Part 1: principles and specifications for machines manufacturers.

UNI EN	626-2	94	Machinery safety. Reduction of risk exposure deriving from machines emissions of dangerous materials. Part 1: principles and specifications for machines manufacturers
UNI EN	818-1	Giu. 97	Short grid hoisting chain. Safety. General acceptance conditions.
UNI EN	818-2	Giu. 97	Short grid hoisting chain Safety. Medium tolerance chain for chain slings. Grade 8.
UNI EN	982	96	Machinery safety. Safety prescriptions for oleo hydraulic and pneumatic systems and components. Oleo hydraulics.
UNI EN	983	96	Machinery safety. Safety prescriptions for oleo hydraulic and pneumatic systems and components. Pneumatics.
UNI EN	1037	Apr. 97	Machinery safety. Unexpected starting prevention.
UNI EN	1070	Dic. 94	Machinery safety. Terminology.
UNI EN	1093-3	96	Machinery safety. Evaluation of the emissions of dangerous materials transported by air. Part 3: Emission capacity of a specific pollutant. Bench method testing with real pollutant.
UNI EN	1039-4	96	Machinery safety. Evaluation of the emissions of dangerous materials transported by air. Exhaust system dust collection efficiency. Tracers use method
EN ISO	3746	95	Acoustic. Determination of noise source sound power levels by means of sound pressure. Control method on reflecting surface by measurement on developing surface.
EN ISO	4871	96	Acoustic. Declaration of inspection of machines and equipment sound emission values.
EN ISO	11200	95	Acoustic. Machines and equipment noise emissions. Lines for sound pressure levels in working areas and other specific positions.
EN ISO	11201	95	Machines and equipment noise emissions. Sound pressure level measuring in working areas and other specific positions. Technical scheme method in sound field practically free over a reflecting surface.
EN ISO	11202	95	Acoustic. Sound pressure level measuring in working areas and other specific positions. Control method on site.
EN ISO	11203	95	Acoustical. Machines and equipment noise emissions. Determination of sound pressure levels in working areas and other specific positions.



EN ISO	11204	95	Acoustic. Machines and equipment noise emissions. Measurement of sound pressure levels in working areas and other specific positions. Method requiring environmental corrections.
UNI EN	31253	Mar. 97	Laser and Laser systems. Laser Devices. Mechanical interfaces
CEI EN	60204-1	Set.93	Machinery safety. Machines' electric system. Part 1: general rules.
DPR	547	1995	Health and safety regulations.



#### 4 Statement of compliance and identification plate



As set by the MACHINES DIRECTIVE each machine is accompanied by a statement of compliance.

Each machine is equipped with an identification plate, as described below, which is installed in an immovable way on a fixed part of the machine body.

			
Via Martinello 100/A 43010 Alberi (PR) Italy			
Tel. +39 0521 649716 Fax +39 0521 649717			
e-mail: wise@wisecompany.it			
MODEL	<input type="text"/>		
SERIAL N°	<input type="text"/>	YEAR	<input type="text"/>
V	<input type="text"/>	Hz	<input type="text"/>
kW	<input type="text"/>	A	<input type="text"/>

## 5 Symbols and their meanings

In order to assist the reader in the correct interpretation of the manual certain symbols have been used. Symbols and meaning of each one are described in the below table:

SYMBOL	DESCRIPTION
 <b>DANGER</b>	Failure of observance or non application of the message contained in the text block evidenced by the symbol "DANGER" may be cause of serious accidents endangering the worker's safety.
 <b>WARNING</b>	Failure of observance or non application of the message contained in the text block evidenced by the symbol "WARNING" may be cause of injury to personnel or damages to machines and components.

## 6 Responsibilities and safety prescriptions

### 6.1 Responsibilities

Wise s.r.l. shall not be held liable for any damages resulting from incorrect or improper use of the machines, from any utilisation of non original spare parts, from any tampering with or modification of the electric system and software in any of its parts or components.



#### **WARNING**

The responsibilities for the application and respect of the safety prescriptions described in the manual, rests with the technical personnel in charge of the machine's proper activities, who will ascertain that authorised personnel is qualified to perform the required activities, is aware of and accurately follows the prescriptions contained in this manual.

### 6.2 Definitions

#### **Work space**

Work space shall be defined as the protected volume delimited by safety covers and destined to the working operation of the machine.

#### **Authorised personnel**

Authorised personnel are those persons properly trained and appointed to perform the activities that constitute the proper way to operate the machine.

#### **Assigned personnel**

Though they may not materially participate in the work, authorised personnel are those persons who supervise others' work in quality of technician in charge.

#### **Transport, installation and commissioning**

Transport is a set of operations required to move the machines or part thereof.

Installation is the mechanical and electrical integration of the machine in a productive location or in a study location, in compliance with the specified requirements.

Commissioning is the activity of functional testing of the installed machine.

#### **Manual operation**

Manual operation is when the machine operates the single phases of a work cycle in manual mode, within the protected area with safety protections closed and with single phase dedicated push button.

#### **Automatic operation**

Automatic operation is the operating mode when the machines performs autonomously a programmed cycle, inside the protected area with safety protections closed and start-up carried out from the general push-button panel.

### ***Machine management***

Machine management is the sequence of operations that the assigned operating personnel is required to carry out to allow for the regular performance of the production activities.

### ***Incorrect use***

Incorrect use of the machine is the utilisation of the machine out of the limits specified in the technical documentation.

### ***Maintenance and repair***

Maintenance and repair is the periodical activity for testing and/or replacing of parts or components of the machine and is intended to identify the cause of failure and comes to completion with the restore of the machine to the original working conditions.

### ***Decommissioning and dismantling***

Decommissioning is the electrical and mechanical removal of the machine from a productive environment or from a study environment.

Dismantling is the demolition and disposal of the components which form the machine.

## **6.3 *Applicability of the Machines Directive:***

The series of rules contained in the Machines Directive must be applied in carrying out the below listed activities:

- Transport, installation and commissioning.
- Manual operation.
- Automatic operation
- Maintenance and repair
- Decommissioning and dismantling

## 7 Parts identification

Parts are described in the manual by drawings and photographs.

In the drawings, each part is identified by a position number. Each drawing is provided with a legend in which each position number is followed by the relative description and part reference number.

**EXAMPLE:**

DWG.	11111
POSITION	10
DESCRIPTION	GEAR
REF.	296022

In the photographs, each part is identified by a position number. Each photograph is provided with a legend in which every position is followed by a part reference number.

**EXAMPLE:**

POSITION	10
DESCRIPTION	GEAR
REF.	296022

The reference number consists of a numerical code formed by six numbers or alternatively an alphanumeric code composed of six numbers/two letters (example 296035/PP).



## 8 Installation



### **WARNING**

The location intended for the installation of the machine shall have all the requirements such as proper lighting, ventilation, etc, in compliance with the current local authority regulations.

### 8.1 Uncrating and positioning

Check the crating for shipping damage. Report any damage to the Wise s.r.l. Representative and notify the carrier with a written document, anyway before going ahead with unpacking, make sure that said document is accompanied by photographs of the reported damage.

Carefully unpack the machine as follows:

Remove the cover and the side-walls forming the crating

Remove the protection cover consisting of a transparent cellophane sheet.

Carry out a quick inspection of the machine for shipping damage, and in case of damage report it to the WISE s.r.l. Representative and notify the carrier in writing as above described.

The machine is fastened to the base of the packing (pallet) by means of threaded rods, which pass through the pallet and are screwed in the place of the machine's adjustable supporting feet, thus integrating with the machine as a single unit. As the machine is fixed firmly to the pallet to facilitate the transport to the assigned installation area, it is strongly recommended to remove the pallet at the last minute.

Lift the pallet for the sufficient space allowing to operate on the lower part of the access side to the fastening devices that shall have to be removed.

Before placing the machine on the floor, lift it from the pallet and install the adjustable supporting feet in the appropriate threaded housings.

Position the machine in the assigned space. The height of the operating level from the floor can be adjusted within a limited value of  $\pm 50$ mm by means of the adjustable supporting feet.

Accurately level the machine by using the transport system rollers as a reference and act on the adjustable supporting feet.

In case the machine has been divided in different parts for transport reasons, they will have to be assembled and all the necessary material such as bolts, gaskets and sealing are provided with the machine. As the machine cannot be moved once it has been assembled, it is necessary to accurately define the location of the first or last module making up the line and then position and connect the subsequent modules.

- The sequence of the modules is indicated by means of labels applied at the front end and back-end of each module, where the first letter "A" identifies the end of the

first module, the second letter "A" identifies the front of the second module, the first letter "B" identifies the end of the second module, the second letter "B" identifies the front of the third module and so on.

- Between the two vertical partition walls install a seal made of appropriate material. It is provided with the system and can be of either cylindrical or flat shape.
- Further to the above seal it is necessary to spread a uniform layer of proper sealing paste, supplied with the system.
- The fastening bolts provided with the system shall be installed and clamped to the related housings, making sure that no housing remains bolt free.

## 8.2 Electrical connections assembling

Restore the electric connections which have been disconnected for the shipment, the cables are numbered and shall be connected to the relative terminals carrying the same number.

If the machine is equipped with a separate electrical control panel, the connecting cables from machine to panel are included, and correspond to the length specified in the purchase order. The cables piping are not included and shall be installed by the Customer, in accordance with the country regulations or laws.

## 8.3 Utilities connecting

In order to facilitate connecting the machines' utilities, which have to be jointed on site, they are identified by labels with the relative description, for example "MAINS WATER INLET".

The piping or the connections between the different parts of the system, removed for shipment, are identified by labels reporting the same numbers, for example, the part of piping identified by number "1" shall be connected to the utility identified by the same number.

Connect all the system's utilities to mains connection on site making sure to use suitable material and dimension piping. WISE s.r.l. is available for all the information and clarifications required.



### **WARNING**

All the connection piping to utilities inlet must be equipped with manual safety valves allowing to intercept the incoming fluid in case of emergency.



### **WARNING**

All the connection piping to utilities outlet shall not be equipped with valves intercepting the outgoing fluid.



**WARNING**

All the connection piping to intake exhaust must be equipped with valves allowing flow rate regulation.

### 8.4 Connection to power mains

The machine's electrical system is designed to be powered 400V 50Hz tri-phase (other power supply characteristics can be configured upon request).

The correct power supply characteristics are reported in the below wiring diagram supplied with the system and on the yellow label located inside the electrical cabinet near the connecting terminal to power mains.

For the correct wiring dimensioning to be used for power mains connection, refer to the below table, except for different local specification rules.

A	16	20	30	35	50	70	90	110	134	170	205
mm <sup>2</sup>	1,5	2,5	4	6	10	16	25	35	50	70	95

As to power supply voltage, 10% tolerance is allowed, if variations exceed said value a voltage stabiliser needs to be installed. It can be supplied with the plant if variation is specified in the purchase order.



**WARNING**

The connection to power mains must be carried out by qualified personnel to avoid accidents which may endanger the personnel's safety and/or damage the system.

Use the proper wire dimensioning (see the above diagram), to connect the phases and earthing to the inlet terminals placed inside the electrical control panel.

It is advisable to install a safety switch before the control panel to allow to break the power supply to the machine.



**WARNING**

It is essential to check that the connection to power mains respects the phases sequence originally required in course of machine manufacturing, to allow the correct direction of rotation of the electrical motors installed.

Verify the direction of rotation of the motors in the following way:

- Rotate the main switch to the "ON" position.
- Activate for a few seconds one pump, one brush or one fan, however a motor which is not fed by means of an inverter.
- Verify whether the direction of rotation is congruent to the direction indicated by the arrow placed on the motor, if not exchange the phases.

## 2.1 Changing the rotation

When the inverter is connected at least there are two different possible rotation directions.

When the current inverter is the active device, you can easily change the direction of rotation when there are no loads on the motor. Change the setting parameter P100.

When the inverter is not active, you can change the rotation direction by changing the phase sequence of the motor supply. This can be done by changing the phase sequence of the supply.

## 2.2 Functional control

When the inverter is active, it is possible to change the rotation direction. This can be done by changing the setting parameter P100. It is possible to change the direction of rotation when there are no loads on the motor.

For all the motors with speed and speed set, it is possible to change the speed and direction of rotation. This can be done by changing the setting parameter P100.

When the inverter is active, it is possible to change the rotation direction. This can be done by changing the setting parameter P100.

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## 9. Preliminary testing

All the operational functions of the machine have been fully tested in the plant prior to delivery. It is however necessary to carry out some inspection and preliminary testing before starting the production cycle, in order to evidence and correct eventual problems due to transport and installation.

### 9.1 General inspection

Check that all covers or protections of moving parts are correctly installed: provide proper installation if necessary.

Check the correct performance of the safety devices, such as safety microswitches, that stop the machine when doors and covers are opened. Restore the correct functioning if necessary.

Verify whether all moving parts such as conveyor rollers and guides are correctly lodged in their housings and are in the correct position: put in right position if necessary.

### 9.2 Functional control

Start the transport system in manual mode and check the correct performance. Then load a test board on the input conveyor and verify whether it is correctly carried through the machine. If necessary correct the causes of board slippage or jamming.

Fill all the tanks with water and check for leakage. If necessary, contact the local Representative or WISE s.r.l. directly, so that correct repair operations are provided.

Start the recirculation pumps in manual mode and check the union joints for leakage. If necessary, remake the seal.

Check whether the spray nozzles' water jet is correct. It should appear flat, homogeneous and aimed at the free space in the middle of the two pair of rollers. Adjust the direction of spray, if necessary.

If included in the system, verify whether the temperature control system is working correctly:

- Select "Manual" cycle and press the "Start cycle" push button.
- Set the thermostat (or operator interface display) with a value higher than the currently displayed value.
- Verify whether power feeding to heating elements is correct.
- Set the thermostat (or operator interface display) with a lower value than the currently displayed value.
- Verify whether the solenoid valves, intercepting the cooling liquid flow, are open and that the flow is correct.

Check whether the feeding system of fresh solution(s) and rinsing water is working in the correct way.

Check spent/exhausted solution(s) and rinsing water systems and drain pipes for correct performance.

## 10. Safety

### 10.1 Safety protections

Emergency push-buttons are installed on the two opposite angles of the machine and also, if included, on the separate electrical cabinet. They are of red colour, identified by a yellow label and positioned in an easily accessed location. In case of emergency, when pressed, they immediately stop all the machine's operations.

The machine is equipped with fixed protections which prevent from reaching movable parts.

To facilitate regular operation activities, the parts requiring frequent maintenance or access are protected by covers or doors, which are fitted with microswitches stopping the machine if opened.



**DANGER**

It is absolutely forbidden to remove, alter, tamper with, disconnect any safety protections. WISE s.r.l. shall not be responsible for machine's safety in case of non compliance with this prohibition.

### 10.2 Personal safety equipment

Personnel assigned to machine operation and maintenance must be equipped with personal safety equipment such as gloves, safety goggles, shoes etc., allowing to protect them from all possible hazards deriving from the performance of their various activities.



**DANGER**

The clothing of personnel operating or performing maintenance must comply with the safety requirements established by EC Directives and country regulations and laws.

### 10.3 Noise

The maximum noise level value is maintained within the values defined in the EC Regulations.



## **11. Disposal**

Exhausted/waste solutions and slag produced by production, require disposal of the same, according to the instructions provided by the prime materials suppliers and however in compliance with the provision set out by the country Law.

At the end of the system's useful life it is required to provide for disposal in compliance with current national Laws.

It is recommended to contact concerns specialised in disposal matters.





### **13. Collection of the specific manuals of the modules making up the line.**

Following are the specific manuals of the modules which compose the line.

#### **13.1 List of the documents composing the manual:**

- ❖ *tp177B usermanual\_e 04-2007 v1.pdf*
- ❖ *EP-BANCALE DI CARICO-650-04-07.pdf*
- ❖ *EPC-650-ELOCHEM-EN-03-07.pdf*
- ❖ *EP651-650-EN-04-07.pdf*
- ❖ *PP633-RINSE MOD. L=990 5P-650-EN-04-07.pdf*
- ❖ *PP808-650-04-07.pdf*
- ❖ *PP401-A4-650-03-07.pdf*
- ❖ *PP639-CHEM SPRAY MOD. L=990 2FFM-A4-650-EN-04-07.pdf*
- ❖ *PP632-RINSE MOD. L=660 3P-650-EN-04-07.pdf*
- ❖ *CC-824-825-SPECIAL A4-650-EN-04-07.pdf*
- ❖ *ES-RULLI-FV-CON RULLI PER EP-650-06-06.pdf*
- ❖ *420-650-10-05.pdf*



## **SIMATIC HMI<sup>®</sup> TP177B**

**Electrical operation and maintenance manual**

Valid for:

Devstar, Etchstar, Stripstar, Chemstar, Solderstar  
(From April, 2007).

**Code: tp177B usermanual\_e 04-2007 v1.doc – Edition: 23 April 2007**

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## CHAPTER 8 : WORK WITH PAGES

### 8.1 GENERAL

The Machine is composed from several modules. Each module is numbered in ascending order beginning from Input conveyor.

The first line of each page contains Module number and description.

#### **Pumps identification:**

PUMP 3.2 means: Pump #2 of the Module 3.

## CHAPTER 1 : INTRODUCTION

All descriptions contained in this publication are not binding; therefore, we reserve the right to modify at any time machine parts and the supply of accessories that constitute an improvement or for constructive or commercial demands.

Management of the machine, entrusted to a PLC and an operator panel, has been designed so that the best results are ensured during operation, providing all the instructions contained in this manual are respected.

The system has been developed in a simple and intuitive way and the display is provided with on-line help pages. It is however, particularly important that personnel responsible for operation of the machine be prepared and for this reason this manual should be read with care.

The machine is supplied with a declaration of conformity whose value and warranty become null and void if modifications of any nature (including modifications to the software) are implemented unless supplied directly by the company and installed by specialised technical personnel.

## CHAPTER 2 : HANDLING

### 2.1 PACKING - UNPACKING

Take great care when handling the electrical and electronic apparatus, they are fragile. Do not place anything on top of the apparatus, this may damage them. Connect all units, which may have been disconnected for transportation as shown in the electrical drawing; exclusively qualified personnel must carry out this operation.

### 2.2 STORAGE

In the case of prolonged storage, leave the equipment where it is sheltered from rain, sunlight and wind in a location with average humidity between 30 and 95% with no condensation and a temperature of between  $-5^{\circ}\text{C}$  and  $50^{\circ}\text{C}$  ( $23\dots125^{\circ}\text{F}$ ).



## CHAPTER 3 : INSTALLATION

### 3.1 ENVIRONMENT

Do not install the electrical panel where it is:

- Continuously exposed to sunlight.
- In environments with fumes and/or corrosive liquids;
- Exposed to danger of explosion;
- Close to a source of heat;
- Close to an electromagnetic source.

For further details, refer to the table "Technical Data" of the electrical diagrams.

### 3.2 LAYING CABLES (optional)

If the electrical panel is placed apart, the interface wiring between the panel and the machine must be laid as follows by qualified technical personnel:

- If the wires are short, do not join or weld extra lengths
- In connecting the wires to the electrical panel, make sure that flow is guaranteed to a protection level equal to IP 54
- Place the wires in raceways or ducts in accordance with current standards
- Separate the command wires from the power wires

## CHAPTER 4 : GENERAL INFORMATION

### 4.1 BUTTON PANEL OVERVIEW

*Kerold servuell.*

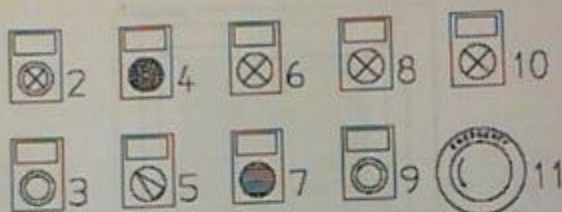


Fig. 4-1 - Button panel

General descriptions of push buttons

- 2 Cycle start
- 3 Cycle stop (not emergency)
- 4 Acoustic alarm
- 5 Available
- 6 Main
- 7 Available
- 8 Optical alarm
- 9 Emergency reset
- 10 Emergency on
- 11 Emergency button

## 4.2 OPERATOR PANEL TP177B OVERVIEW

TP177B Front view

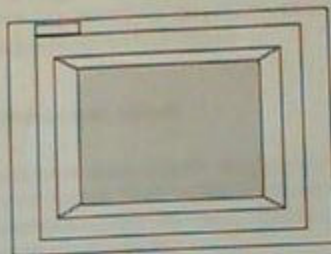


Fig. 4-2

TP177B is touch screen equipped than operated via buttons or a screen keyboard. The screen is used to observe the operating status of the machine and, at the same time, to intervene in the process parameters.

### 4.2.1 Operating touch elements

Touch elements are contact-sensitive operating elements such as buttons, input field, and message windows. Touch elements are operated by touching them, e.g. with a finger.

#### NOTE

Never use pointed or sharp object to operate the touch panels to prevent damage to the plastic surface.

### 4.2.2 Windows

#### Message window:

The window for alarm messages pops up whenever any alarm triggers. The system message window is displayed at a vacant position.

#### Help window:

The window for displaying configured pieces of Help text is shown at vacant position.

### 4.3 ENTERING VALUES

Values can be entered in input fields. Depending on how the field is configured, values can be entered as:

- Numeric value entry (e.g. temperature, pressure, speed).
- Alphanumeric value entry (e.g. password, data record name, modules name).
- Symbolic value entry (e.g. ON-OFF-STANDBY).

#### 4.3.1 Entering numeric / alphanumeric values

In order to enter values, the touch panel automatically displays a screen keyboard directly after touching an input field on the touch screen. Keys on the keyboard which are available for operation are highlighted as 3D keys, those not available are simply displayed as areas. After completing the input, the screen keyboard is automatically hidden.

Values are entered character by character using the buttons provided on the screen keyboard. Invalid characters are rejected and an error message appears. Confirm the value entered by pressing the **Enter** key or cancel the input by pressing **ESC**. The screen keyboard is closed in both cases.

**Decimals** If a numeric fields has been configured to contain digits behind decimal point, not entered digits behind decimal point will be padded with zeroes.

**Limit value check** Entered values are applied only if they are within the configured limits. If configured, lower and upper limit values are shown. If entered value is outside the limits, a system message pops up and entering is aborted.

#### 4.3.2 Entering symbolic values

1. Touch the required input field.
2. A selection list pops-up.
3. Select entry by touching it.
4. Selection window automatically closes.

## 4.4 MESSAGES

The following types of message are displayed on the TP:

- Alarm messages
- System messages.

### 4.4.1 Alarm messages

The occurrence of one or more alarms is signalled by:

- The ALARM light on button panel, (ref. 8 Fig. 4-1).
- Warning buzzer on button panel, (ref. 4 Fig. 4-1). Buzzer is silenced automatically after ten seconds.
- On operator panel a window pops up, indicating alarm message, which remain until **ACK** button is pressed.

Alarm messages have to be acknowledged on account of their urgency. You acknowledge an alarm message by pressing **ACK** button.

The window indicating the alarm messages will remain until **ACK** button is pressed.

At each new alarm the buzzer and window are activated once again.

#### Alarm message window:

Messages in the message window contain additional information about the message text – for example, the message number and date/time of message arrival.

The alarm message window (Fig. 4-3) is shown automatically whenever an alarm message is issued. When an alarm message is acknowledged, the alarm message window disappears if other alarm messages are not waiting.

You acknowledge an alarm message by pressing **ACK** button.

**NOTE:** Input is not possible while an alarm message is open.

Message number	Time	Date	Acknowledgment group	Number of unacknowledged messages
0000048	11:34:02	27.03.97	OGR 01	2
Boiler 25: Temperature 156 degrees				
Summon Shift Engineer, Phone.: 9456				

Fig. 4-3 - Alarm message window (example)

#### 4.4.2 Message history

Alarm message events are written in TP's archive in chronological order. Message events are the arrival, departure and acknowledgement of a message. Up to 512 events can be stored with the following information:

- Message number
- Message status identifier (**A** for arrived; **D** for departed; **K** for acknowledged)
- Date and Time of event
- Acknowledgement group
- Message text

0000049	K	11:32:00	27.03.97	QGR:01	Boiler pressure too high: 12.7 bar
0000049	KQ	11:33:20	27.03.97	QGR:01	Boiler pressure too high: **** bar
0000010	K	11:34:36	27.03.97	QGR:02	Oil supply stopped
0000010	KQ	11:35:18	27.03.97	QGR:02	Oil supply stopped

Fig. 4-4 - Alarm history (example)

in manual

## 4.4.3 Alarm page

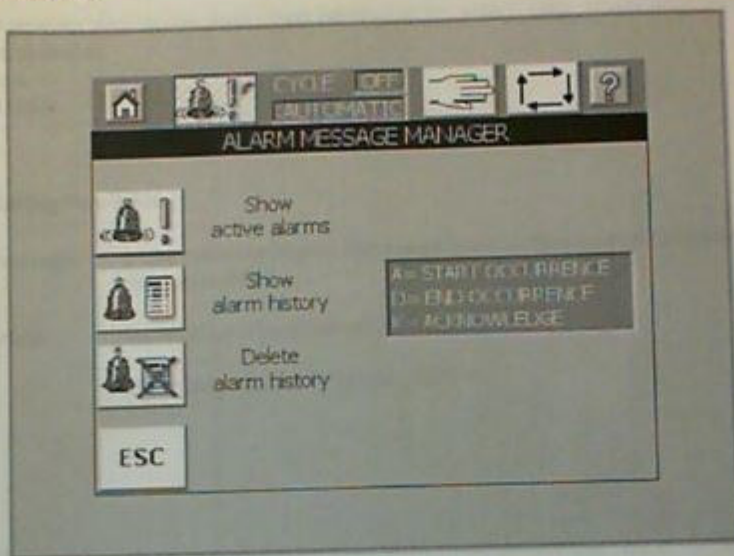



Fig. 4-5 – Alarm message manager page

You access this page by pressing  from any page. When this icon is flashing, alarms are present.

## 4.4.4 System messages

System messages display internal operating states of the TP. For example, they indicate failure or communication malfunctions.

You can close the system message window by pressing **ESC**.

Some system messages expect you to acknowledge them or to make a decision - for example a prompt for determining the further course of action.

## 4.5 HELP TEXT

Help text provides more details about object function on the screen. Texts are available for:

- Alarm messages.
- Screens.
- Input fields.

### 4.5.1 Calling Help texts

**Alarm message Help** In the Active or History alarm page; position the cursor on the message then press HELP.

**Screen Help** Press HELP. The Help text is displayed.

Close Help window by pressing ESC.



## CHAPTER 5 : P.L.C.

### 5.1 GENERAL INFORMATIONS

The logic of the machine's operation is fully managed by an electronic unit called PLC (Programmable Logic Controller), i.e. a sort of small computer programmed and able to activate, through an electromechanical interface, various units. Communication with the operator is provided by means of the Operator Panel TP177B.

#### 5.1.1 CPU overview

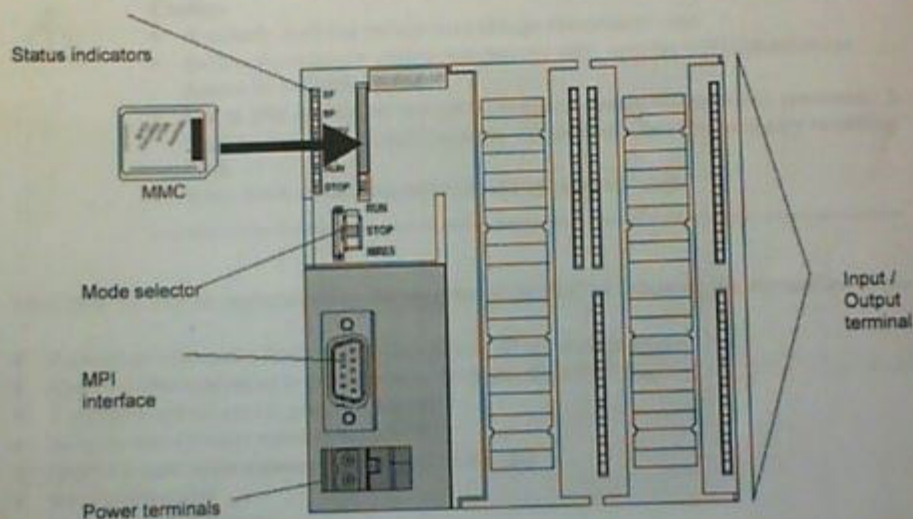


Fig. 5-1 - CPU overview

#### 5.1.2 CPU status indicators

○	SF	(red)	Hardware or software error.
○	BF	(red)	Bus error (only if profibus equipped)
○	DC5V	(green)	CPU 5V supply regular.
○	FRCE	(yellow)	Force job active.
○	RUN	(green)	CPU running.
○	STOP	(yellow)	CPU in STOP.

## 5.2 MEMORY CARD (MMC)

In the memory card is stored the application program. It is kept even in case of Power OFF.

### 5.2.1 Replacing Memory card (MMC)

#### Before changing the memory card

Before you change the memory card, please take note of the following:



#### Caution

- A suitably qualified person must change the memory card.
- Before proceeding to change the memory card, note the ESD Guidelines in Appendix A of this manual.
- Due to total erasing, all process parameters (speeds, temperatures, pressures...), machine and optional configuration, will be lost. Then it is necessary re-setting them.
- Write down all this data before to change memory card.

Modifications may be implemented on the program of the PLC by following the instructions below:

- Activate an emergency button and switch power off at the main switch
- Open the electrical panel to gain access to the front of the PLC (Fig. 5-1)
- Turn the mode selector to position "STOP"
- Remove the old micro memory card (MMC)
- Insert the new micro memory card (MMC) in the slot
- Switch power ON
- Perform the Total Erase:
  1. Turn selector to "MRES" and maintain in this position until LED "STOP" lights up a second time (about 3 sec.). The CPU then confirms the request for total erase.
  2. Within a further 3 sec. turn the selector to "MRES" position until the LED "STOP" starts to blink fast.
  3. When the CPU has finished erasing, LED "STOP" stops blinking and lights up.
- Turn the selector back to "RUN"
- Switch power OFF
- Close the electrical panel
- Switch the machine back ON at the main switch
- Now the PLC works with a new program
- Re-set process parameters, machine and optional configuration.

## CHAPTER 6 : PASSWORD PROTECTION

Password protection is configured for buttons, input fields in order to prevent operation of the TP177B by unauthorised personnel.

### 6.1 GROUP AUTHORIZATION LEVELS AND ACCESS PERMISSION

#### 6.1.1 Group authorization hierarchy

In the application are assigned hierarchically ascending group authorization levels from 0 to 9 to buttons and input fields. If you log on with a username and password of a certain group authorization level on the TP, you are authorised to execute functions at that and lower authorization levels.

#### 6.1.2 Group level 0

If authorization level 0 is configured for a function, you do not need a authorization to execute that function. To call a authorization level 0 function, you do not have to enter username and password. If you call a function that has been assigned to a higher level, the TP prompts you to enter username and password.

#### 6.1.3 Group levels 1-3

As function become increasingly important, authorization levels 1 to 3 are assigned to them. Only a user of the Administrators Group is responsible for create new users, assigning them a password and a group authorization level. Note that Administrators can assign more different combination of username and/or passwords to the same group authorization level.

As default the username/password assignment is the following:

LEVEL	GROUP	USER	PASSWORD
1	Operators (Users)	User1	111
2	Supervisors (Users2)	User2	222
3	Maintenance (Users3)	User3	333
9	Administrators	Admin	Ask WISE service

#### 6.1.4 Password level 9

Only the supervisor is authorised to access to the panel as Administrator and operate on it with authorization level 9 functions. He has access to all functions on the machine, including optional configuration, although he can perform password levels assignment.

## 6.2 PASSWORD MANAGEMENT SCREEN

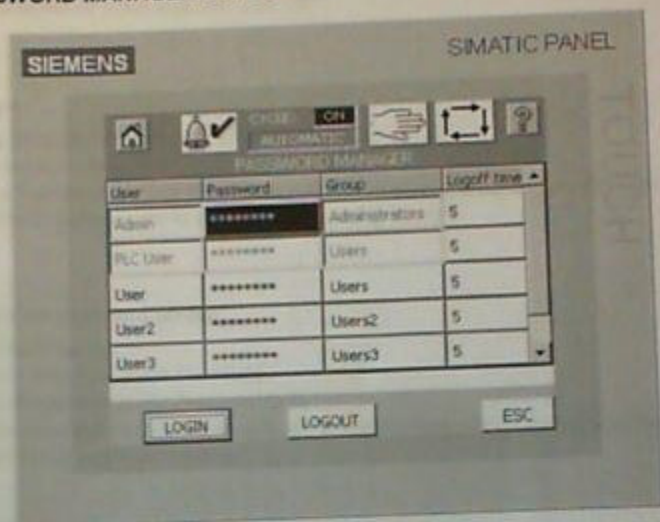


Fig. 6-1

The password screen makes the following functions available:

- Log-in / Log-out on the TP.
- Change password (every user can change his own)
- Change Logoff time (every user can change his own)

Administrators can also:

- View password list.
- Add new user, assign them new password and group level.
- Change password, group level or logoff time to each other user.
- Remove authorization for a user (set Group field to 'Unauthorized')

## 6.3 LOGGING In AND Out ON THE TP

### 6.3.1 Login

You can log in on the TP by means of

- The password screen
- Calling a function for which the current authorization level is too low. In this case the TP automatically prompts you to enter username and password.

### 6.3.2 Login on password screen

- Press LOGIN button.
- Enter your username in the *User* field
- Enter your password in the *Password* field
- If the username and password are valid, the corresponding group authorization level is displayed in the password window.

### 6.3.3 Automatic call

If an authorization level higher than the current is required, TP automatically prompts you in advance to enter a suitable username and password.

### 6.3.4 Logout

If the TP is not touched within 'Logoff time' of the current user minutes, the current authorization level is automatically set back to zero. You can also log-out from TP, by pressing LOGOUT button in password manager screen.

## **6.4 ACCESS GROUP LEVELS ASSIGNMENT (Only for Administrators)**

### **6.4.1 Creating a new access**

You can create up to fifty different access. To define and assign level to a access:

- Enter an unused username in User window field.
- Enter a password in Password window field.
- Select group authorization level (Operators, Supervisors, Maintenance or Administrators). The new password is saved on TP and is not lost even in case of power off.

### **6.4.2 Deleting an access**

- Select group 'Unauthorized' in Group window field for user you wish to delete.

### **6.4.3 Changing password**

Directly enter a new password in Password window field for user you wish to change.

### **6.4.4 Changing access group level**

- Select a different group in Group window field for user you wish to change.

### **6.4.5 Viewing access list**

- Go to password manager screen
- Password list window show password assigned to less or equal level than actual.

## CHAPTER 7 : MACHINE START-UP

Two functions mode are available: MANUAL cycle and AUTOMATIC cycle.

### 7.1 MANUAL CYCLE

This is enabled if the MAN button is pressed. When the main cycle is ON, the main start button is permanently lit.

It is possible to run and stop each motor/valve individually:

- Select MANUAL cycle
- Press START CYCLE button
- Go to Module page
- Control motor/valve by toggle operation pressing the corresponding button. Motors running are shown in background.

### 7.2 AUTOMATIC CYCLE

This is enabled if the AUTO button is pressed. When the main cycle is ON, the main start button flashes with machine empty; when processing boards, it remains lit.

Pressing START CYCLE, all motor/valves runs according to their selection mode. Motors running are shown in background.

#### 7.2.1 Start machine

Power the machine by turning the main switch on the electrical panel.

Before starting the machine, make sure that no emergency signal is activated, that all glass panels and doors are closed and that the emergency buttons (red, mushroom type with yellow background) are inactive. Check that all the operational parameters set on the operator panel are appropriate for the job to be done; verify that no unauthorised person is in the proximity of the machine.

Press the EMERGENCY RESET button (ref. 11 Fig. 4-1); select the type of cycle required for the job on the operator panel and press the START CYCLE button (ref. 2 Fig. 4-1).

**WARNING!** If the units powered by the thermostatic system are activated, they will function even if the main cycle is OFF.

#### 7.2.2 Stop machine

To stop the machine, press the STOP CYCLE button (ref. 3 Fig. 4-1).

### 7.3 EMERGENCY STOP

The machine is provided with emergency stop buttons (ref. 11 Fig. 4-1), placed in the machine's work zones at risk and also with sensors on the glass panels and certain doors.

An "emergency stop" prevails over all other functions and operations. When it is disengaged the machine does not start up again. A light (ref. 10 Fig. 4-1) signals that the device has been triggered.



---

**Warning**

- Serious injuries or death may occur if safety devices are in any way modified.
  - All responsibility is declined.
-



## 8.2 MAIN PAGE

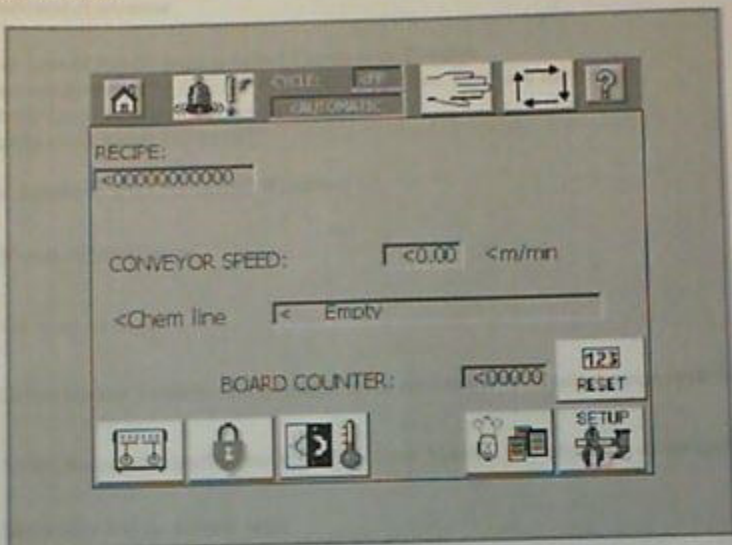


Fig. 8-1 – MAIN PAGE

Access gained at power-ON.

### 8.2.1 Permanent window

The upper part of MAIN page is called Permanent Window.  
It is permanently shown in EVERY OTHER PAGE too. Here are shown:  
The currently function mode: Automatic or Manual  
The currently cycle status: ON or OFF

*Functions accessible from Permanent Window:*



Return to MAIN page.



Go to alarm page.



Select Manual function mode. Switch from Automatic to Manual cause cycle to stop.



Select Automatic function mode. Switch from Manual to Automatic cause cycle to stop.




Show help text for current page.

## 8.2.2 Main page window

### In the rest of MAIN page:

The conveyor speed is shown.

The number of boards in machine is visualised; pressing reset button  counter may be zeroed.

The current recipe loaded into the PLC is displayed.

### Functions accessible from MAIN page:



Go to modules selection page.



Go to password manager page.



Go to daily / weekly heating table.



Go to data record processing page.



Go to set-up page.

## 8.3 MODULES SELECTION PAGES

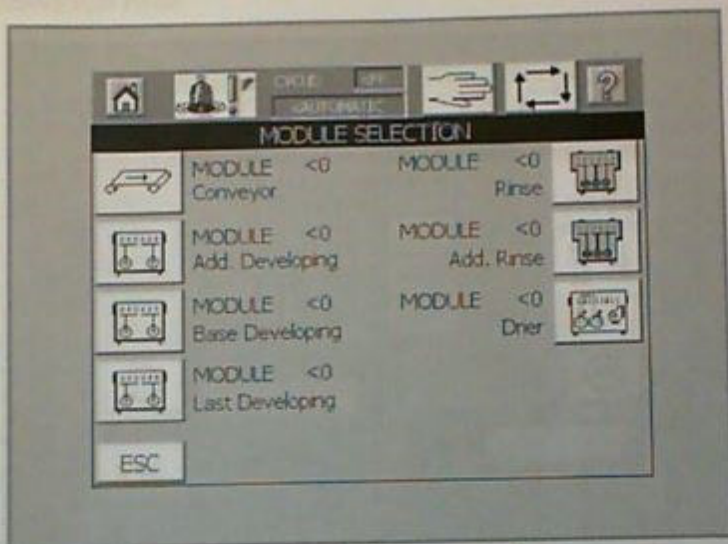


Fig. 8-2 - MODULE SELECTION PAGE

From this screens you can go to all module page.



Go to Module page. All present modules are numbered according to machine structure.

ESC

Return to Main page.

## 8.4 CONVEYOR PAGE

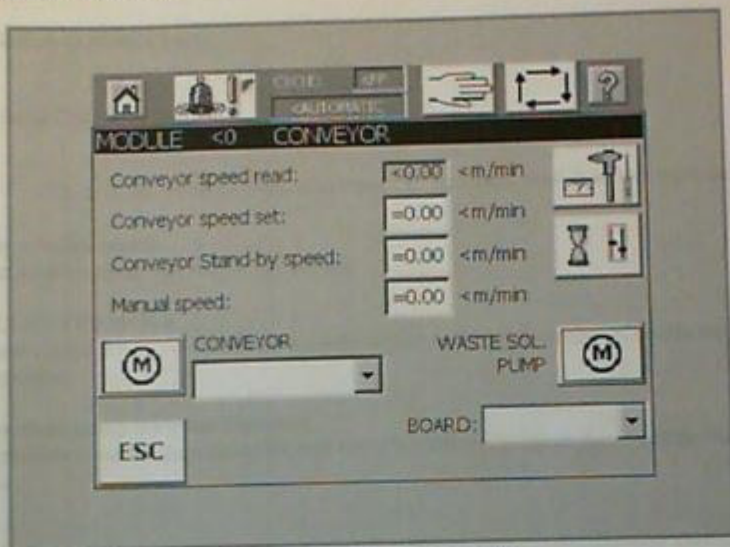


Fig. 8-3 – CONVEYOR PAGE


The actual conveyor speed is displayed.  
Set here conveyor speed for every function mode.


Set here Board type:

- FLEX            Blowers run in low pressure.
- RIGID         Blowers run in high pressure.

Functions available from CONVEYOR page.

ESC Return to Module page.

 Go to Calibration page.

 Go to Timers control page, where you can set timers relative to conveyor module:

- **Waste solution pump.**  
Waste solution pump will run for the set time.
- **BY-COUNTER system**  
The units set to BY-COUNTER will run for a set time after a set number of boards have entered the machine.
- **Gears rinse pump (only for Etchstar)**  
It is possible to set the duration of the first rinse, the interval between rinses and the successful rinses.

## 8.5 CALIBRATION PAGES

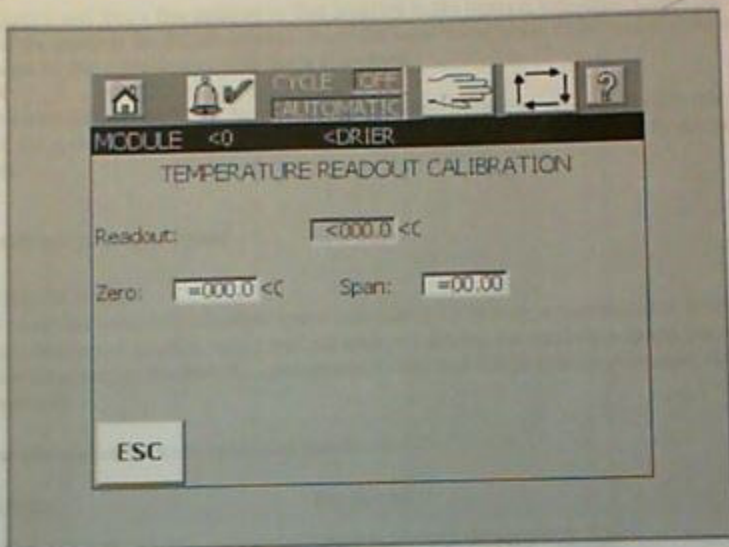


Fig. 8-4 – CALIBRATION PAGE

It is possible to calibrate the analogue readings as prescribed by ISO 9001 regulations. Before to calibrate, remember that:

$$Rdout = (Vm + Zero) \times Span$$

Where:

$Vm$  = PLC value measured

$Rdout$  = Readout value.

### 8.5.1 Calibrate temperature readings (optional)

- ZERO

Immerse a temperature probe in a solution with a temperature of about 20 °C / 68 °F determined with a precision thermometer. Compare the value indicated on the panel with the "real" value given by the precision thermometer. The difference is the ZERO value (positive or negative) which must be set on the panel.

- SPAN

Same procedure as used for the zero value but at the maximum process temperature. Modify the SPAN value until the temperature visualised on the panel coincides with the value detected by the precision thermometer.

### 8.5.2 Calibrate pressure readings (optional)

- ZERO

Stop the pumps and wait a few minutes so that pressure in the pipes is stabilised. Check the pressure of the pump in the READ column. Insert the same value in the ZERO column but with the opposite sign so that a pressure of 0.00 bar is visualised.

- SPAN

With a precision instrument, bring the probe to the maximum process pressure. Modify the SPAN value until the pressure value given on the panel coincides with the value detected by the precision instrument.

### 8.5.3 Calibrate conveyor speed

- MAXIMUM SPEED

You need to set the maximum conveyor speed scale on TP177B both in m/min and in ft/min.

**Remember.** Maximum speed is only a readout scale, modifying the maximum speed, you must change also frequency of the inverter – parameters P1082 and P2000 (for the procedure refer to the inverter manual).

Remember the relation between speed and frequency:

For meters/min:

For feet/min:

$$92 : 5.5 = \text{Newf} : \text{Max\_speed}$$

$$92 : 18.04 = \text{Newf} : \text{Max\_speed}$$

**Example:**

You wish to set a maximum speed of 4.00 m/min.

$$92 : 5.5 = \text{Newf} : 4.00 \quad \text{Follows that:} \quad \text{Newf} = \frac{92 \times 4.00}{5.5} = 66.91 \text{ Hz}$$

You must set inverter max frequency (P1082 and P2000) to 66.91 Hz.



## 8.6 GENERIC MODULE PAGE

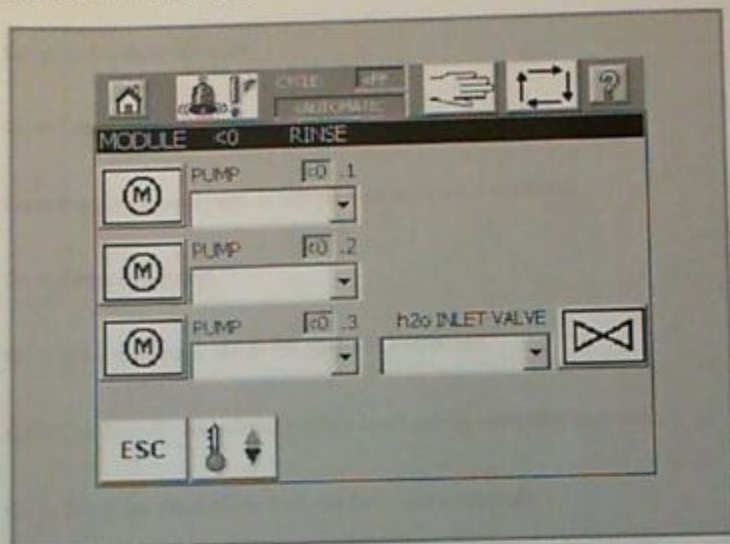


Fig. 8-5 – GENERIC MODULE PAGE

Here is described a rinse module, note that the concept is the same for others modules. In these pages, the operation mode in automatic cycle for each unit is set; solenoid valve, pump, exhaust...

## 8.6.1 Pumps and blowers

These units may have 3 operational modes;











OFF	Unit always switched off.
ON	Unit starts on cycle start.
STAND-BY	Unit starts in the presence of boards and stops after the last board has been processed.

## 8.6.2 Solution and water inlet

These units may have 4 standard operational modes;

OFF	Unit always switched off.
ON	Unit starts on cycle start.
STAND-BY	Unit starts in the presence of boards and stops after the last board has been processed.
BY-COUNTER	Unit starts after a set number of boards have transited and is active for a set time (see 8.4).
BY-CONDUCT_METER	Unit managed by a conductivity metre (only as an optional for Devstar and Stripstar).
BY-PH_METER	Unit managed by pH metre (only as an optional for Devstar).
BY-DENSITY	Unit starts with high-density value (only as an optional for Etchstar).
BY-DENSITY+pH	Unit starts with high-density value and/or low pH value (only as an optional for Etchstar).

*Functions available from generic MODULE page.*

- ESC Return to Modules selection.
-  Go to Temperature control page. (Only temperature controlled modules).
-  Go to Pressure control page. (Only pressure controlled modules).
-  Go to Timer adjust page.
-  Go to PH control page. (Only PH controlled modules).
-  Go to Conductivity control page. (Only conductivity controlled modules).
-  Go to Belt Filter page. (Only Stripstar Belt filter equipped).
-  Go to Screen filtration unit page. (Only Stripstar Screen filter equipped).
-  Run & stop motor or pump by toggle operation. When motor or pump running shown in background style.
-  Run & stop pump by toggle operation. When pump running shown in background style.
-  Open & close valve by toggle operation. When valve open shown in background style.

## 8.7 TEMPERATURE CONTROL

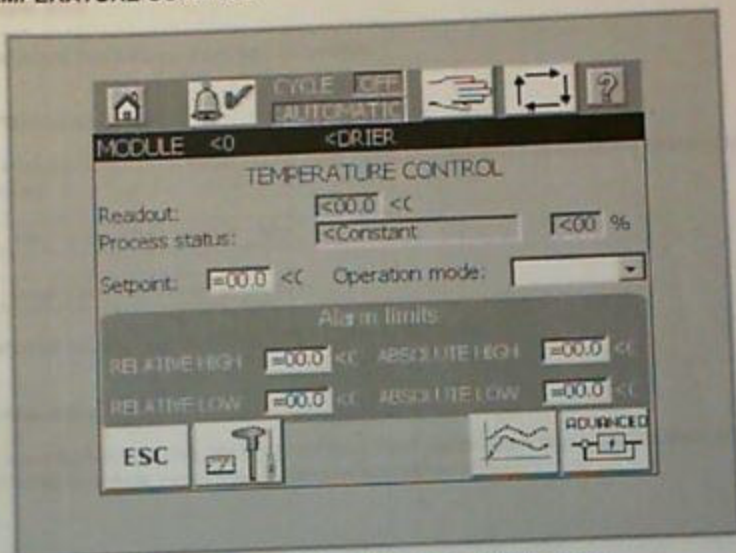


Fig. 8-6 – TEMPERATURE CONTROL PAGE

Here is described a drier module, note that the concept is the same for others modules.

The actual temperature of the tank or chamber is displayed ( $^{\circ}\text{C}$  or  $^{\circ}\text{F}$ );  
Set work temperature from  $0^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  or from  $32^{\circ}\text{F}$  to  $212^{\circ}\text{F}$ .

Three operational functions are available:

- |          |                                                                                                     |
|----------|-----------------------------------------------------------------------------------------------------|
| OFF      | Thermostat always inactive                                                                          |
| ON       | Thermostat active when cycle ON                                                                     |
| BY-TIMER | Thermostat active when cycle ON or during the hours of the days set in the sleep table (see 8.12.1) |

## 8.7.1 Viewing thermostat status:

- |          |                                                                                                                                   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------|
| CONSTANT | The heaters and cooling circuit are off;                                                                                          |
| HEATING  | The heaters are activated;                                                                                                        |
| COOLING  | The cooling circuit is activated;                                                                                                 |
| ALARM    | The thermostat is off due to an alarm caused either by detection of minimum level in the tank or by a temperature sensor failure. |

## 8.7.2 Alarm limit

You can work with two different alarm limit calculation.

### 8.7.2.1 Relative alarm limit

Enter a value in RELATIVE HIGH / LOW field. Alarm thresholds will be calculated relatively to setpoint as:

$$\text{Max\_temp} = \text{setpoint} + \text{relative\_high}$$

$$\text{Min\_temp} = \text{setpoint} - \text{relative\_low}$$

Alarm thresholds are displayed on ABSOLUTE HIGH / LOW fields.

### 8.7.2.2 Absolute alarm limit

Enter zero ( 0 ) in RELATIVE HIGH / LOW field, Enter desired alarm thresholds in ABSOLUTE HIGH / LOW field. Now these values will not change when setpoint change.

*Functions available from TEMPERATURE CONTROL page.*

ESC Return to specific module page.



Go to Calibration page.

## 8.8 PRESSURE CONTROL (optional)

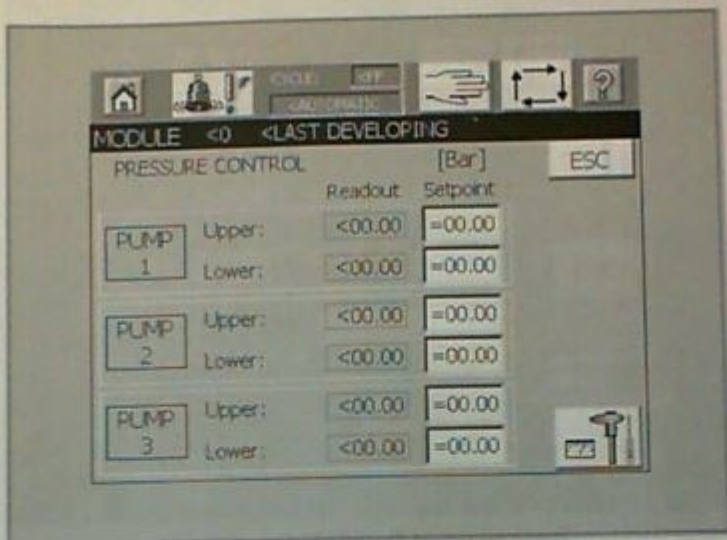


Fig. 8-7 – PRESSURE CONTROL

To enable automatic adjustment set the mode to ON.

The upper and lower pressures for each pump are given in the READOUT column; to one side it is possible to set the work pressure from 0.00 to 9.99 bar.

It is possible to set operational accuracy (0.02 to 0.20 bar).

Example:

Set-point: 2.00 bar

Accuracy: 0.05 bar

The system will maintain a constant pressure of  
 $(2.00 - 0.05 = 1.95 \text{ bar} - 2.00 + 0.05 = 2.05 \text{ bar})$   
 1.95–2.05 bar.

*Functions available from PRESSURE CONTROL page.*

ESC Return to specific module page.



Go to Calibration page.

## 8.9 PH METER (Etchstar optional)

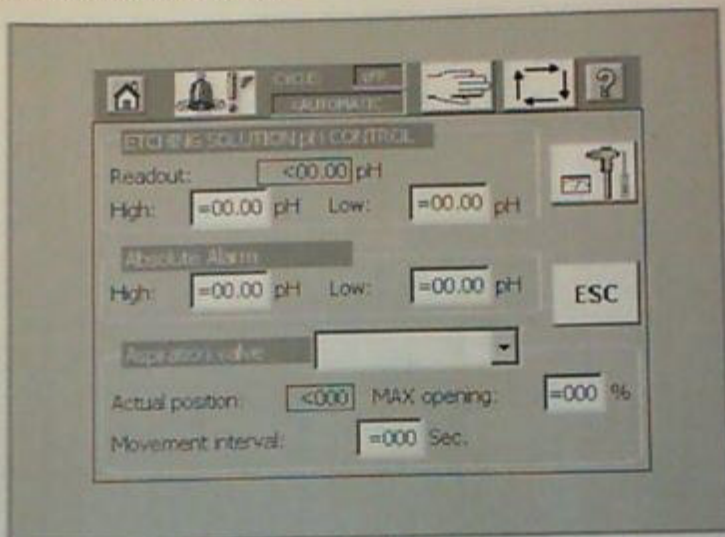


Fig. 8-8 - pH METER (Etchstar optional)

It is possible to set the exhaust fume valve in two ways:

- **Fixed opening** - It opens at the maximum set opening when the recirculation pump are running.
- **pH controlled** - It opens with a high pH value and closes with a low pH value at pre-set time intervals.

The real position of the valve is given as a percentage (0% completely closed, 100% completely open).

Further, it is possible to set the maximum opening as a percentage.

If the clean solution inlet pump is set "By density + ph", it is possible to set running and rest times of the pump itself.

*Functions available from pH-METER page.*

ESC Return to specific module page.



Go to Calibration page.

## 8.10 PH METER (Devstar optional)

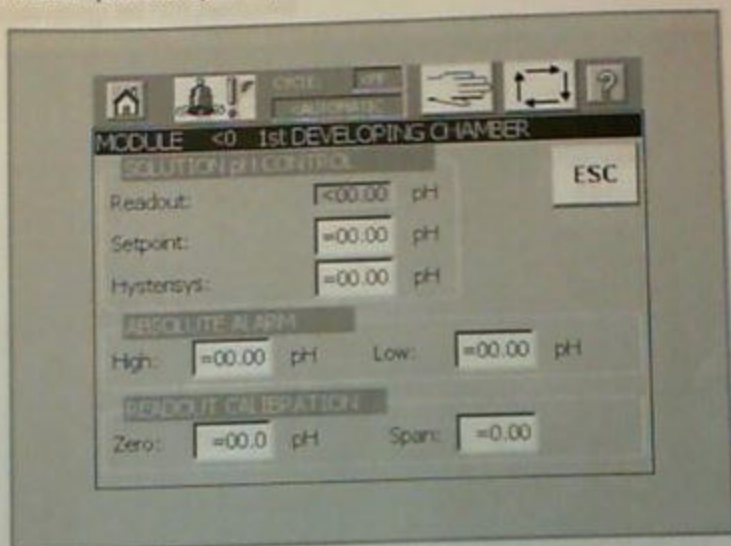


Fig. 8-9 – pH METER (Devstar optional)

In Devstar, pH meter can control water dosing pumps. Pumps run in case of value less than setpoint only when processing boards and first process pump running. HIGH, LOW alarm limit available.

*Functions available from pH METER page.*

**ESC** Return to Developing module page.

## 8.11 Conductivity METER (optional)

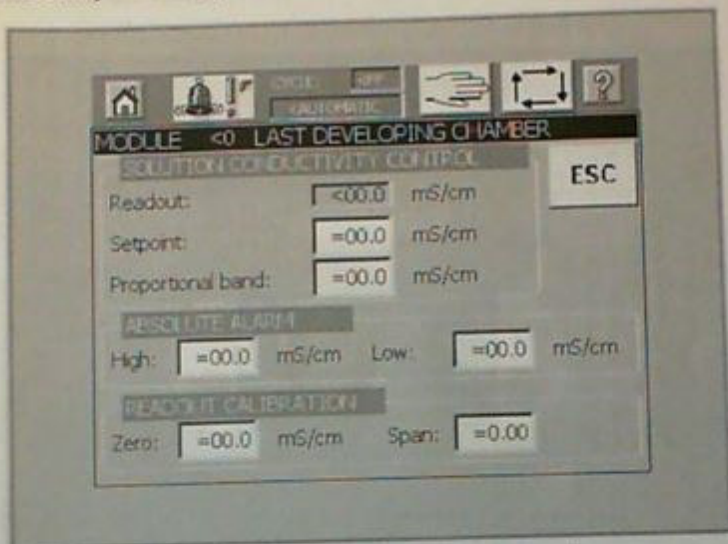


Fig. 8-10 – Conductivity METER (optional)

In Devstar, conductivity meter can control concentrated solution dosing pump. Pump run in case of value less than setpoint only when processing boards and last process pump running. HIGH, LOW alarm limit available.

## NOTE

Pump stroke are always controlled by PLC then Pump stroke must be set as **EXT**.

When pump is controlled in mode *BY CONDUCT*, stroke frequency depend by difference between readout and setpoint.

When pump is controlled in mode *ON* or *STAND BY* or *BY COUNTER* or *BY pH meter*, stroke frequency is fixed in solution inlet screen.

*Functions available from PRESSURE CONTROL page.*

**ESC** Return to Developing module page.



## 8.12 DAILY/WEEKLY TIMER

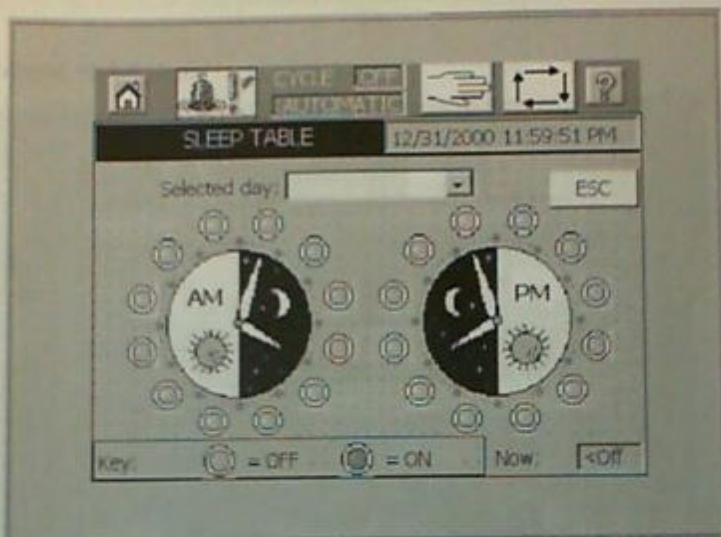


Fig. 8-11 - DAILY/WEEKLY TIMER PAGE

## 8.12.1 Sleep table

In this page you can set when enable or not temperature controls that have been set to BY TIMER. Note that you must fill seven tables (one per each day). The table shown is relative to selected day. The current date and time are visualised.

## 8.13 MACHINE SETUP PAGES

In this page user can configure setup parameters for machine function mode.

### 8.13.1 MACHINE SETUP page 1

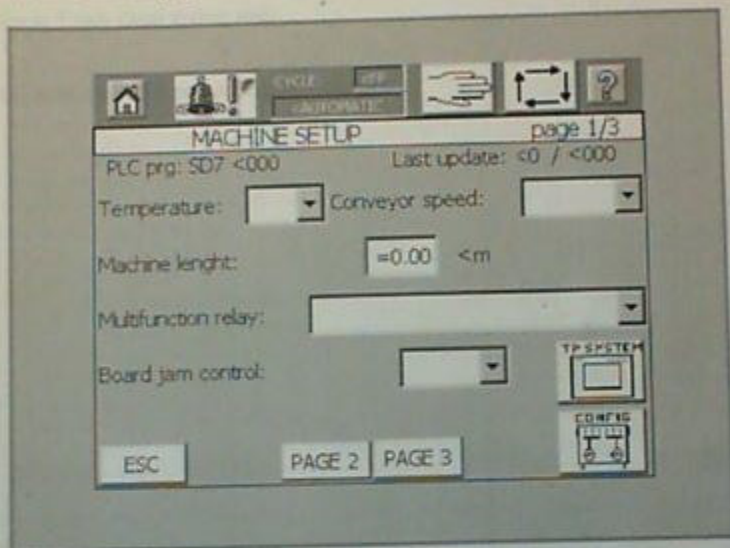


Fig. 8-12 – MACHINE SETUP PAGE 1

Here are shown name and date of PLC program version.

#### 8.13.1.1 Temperature scale

Choice of viewing temperature either in °C or in °F.

**Caution:** thermostat and alarm settings must be re configured accordingly.

#### 8.13.1.2 Conveyor speed scale

Choice of viewing conveyor speed either in m/min or in feet/min.

**Caution:** conveyor speed set must be re configured accordingly.

#### 8.13.1.3 Modules length

Set the machine length. PLC use this value to know when the last board has left the machine.

#### 8.13.1.4 Multifunction relay.

One free-tension relay contacts is available on electrical cabinet. Set here its operation.

#### 8.13.1.5 Board jam control (optional).

Able or not board jam control.

*Functions available from SETUP page 1:***ESC**

Return to Main page.



Go to Touch Panel system page.



Go to Machine optional configuration pages.

## 8.13.2 MACHINE SETUP page 2

### 8.13.2.1 Stop cycle with...

By selecting YES, it is possible to stop the machine both in manual and automatic if the following alarms occur:

- Thermal overload
- Maximum temperature alarm
- Minimum temperature alarm
- Minimum level alarm
- Board jam alarm
- Conductivity meter fault alarm (optional)
- PH meter fault alarm (optional)

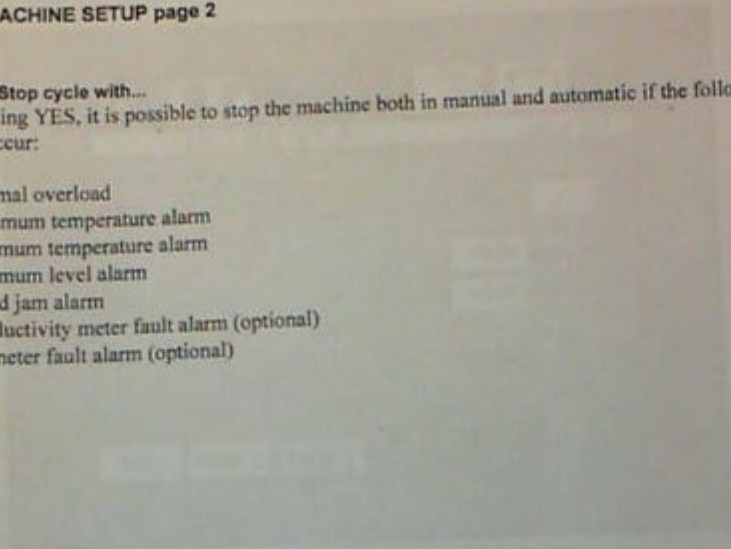


Fig. 8.13.2 - MACHINE SETUP page 2

## 8.13.3 MACHINE SETUP page 3

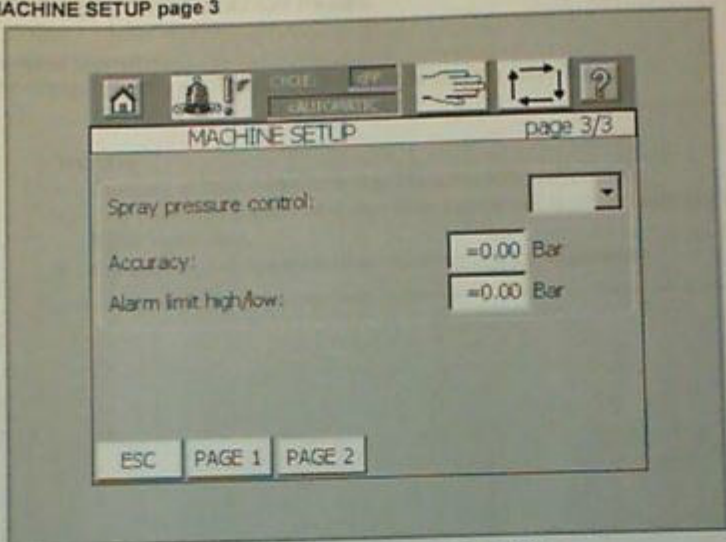


Fig. 8-13 – MACHINE SETUP PAGE 3

## 8.13.3.1 Pressure control mode (optional).

Able or not automatic spray pressure control.  
Set pressure alarm limit and regulation accuracy.

## 8.14 OPTIONALS CONFIGURATION PAGES

### Before changing parameters

Before you change optionals configuration, please take note of the following:




#### Warning

- Changing of these parameters may cause machine malfunction.
- Only trained people should access these parameters, however according with WISE technicians.
- The software configuration must match hardware configuration.



### 8.15.3 Touch screen calibration

Depending on the installation position and viewing angle, it is possible that a more or less strong parallax may occur when operating the TP177B. In order to prevent operating errors occurring as a result, the screen can be calibrated.


Press  to start the calibration process. Five calibration crosses appear in succession on the screen. Follow the instructions on the screen and touch each respective calibration cross as it appears.

Touch any point of the screen after the calibration process for the new calibration data to take effect.

OR, wait 30 seconds, to reject calibration and keep previous calibration data.


### 8.15.4 Display screen cleaning

Clean screen function, allows you screen cleaning while TP177B is turned ON. After function has been started, all input via the touch screen is deactivated for 30 seconds. The remaining time is indicated by a bar graph.


Press  to start the cleaning process. All input via the touch screen is deactivated for 30 seconds.

Clean the screen.

### 8.15.5 Change language

Press  to change language.

### 8.15.6 Windows® CE settings

Press  to open Windows® CE control panel.

#### Before changing parameters


Before you open control panel configuration, please take note of the following:



#### Warning

- Changing of these parameters may cause machine malfunction.
- Only trained people should access these parameters, however according with WISE technicians.

### 8.15.7 Exit application

Press  to terminate runtime and go to Windows® CE.



## CHAPTER 9 : DATA RECORD (Recipes)

### 9.1 DEFINITIONS

#### 9.1.1 Recipes

Recipes are combinations of variables. The purpose of a recipe is to transfer several items of data simultaneously to PLC.

Only one recipe is available, called as machine serial number. Its structure is fixed and cannot be modified by operator panel.

#### 9.1.2 Data Records

Data are assigned to the recipe on TP177B. A recipe which data have been assigned is called "Data Record". All Data Records are stored on the TP177B memory. Only the currently active Data Record is stored on the PLC. You can create up to 500 Data Records.

#### 9.1.3 Data Record name

You can assign an alphanumeric name to a Data Record.

## 9.2 EXAMPLE

Here a simple example of Recipe and Data Record:

Entry name	Data Record 1	Data Record 2	Data Record 3
NAME	Outerlayer	Hi speed	Innerlayer
Conveyor speed	2,00	3,00	2,00
Mod 2 temp	50,0	50,0	50,0
Pump2.1 mode	Stand By	Stand By	Stand By
Pump2.2 mode	Stand By	Stand By	Stand By
Pressure	2,5	3	1,5
...			
...			
Up blower mod	Stand By	Stand By	Stand By
Low blower mod	Stand By	Stand By	Stand By
Final drying mod	On	On	On

Recipe contains following process data:

- Conveyor speed
- Board type
- By counter board and time
- All motors/valve mode (OFF; ON; STAND BY)
- All temperature setting
- All pressure setting

### Note:

Symbolic entries are now allowed in Data Record edit window. Entering Motors Mode you may select directly the correct mode:

- OFF
- ON
- STAND BY
- BY COUNTER
- ecc.

## 9.3 DATA RECORD MANAGER SCREEN

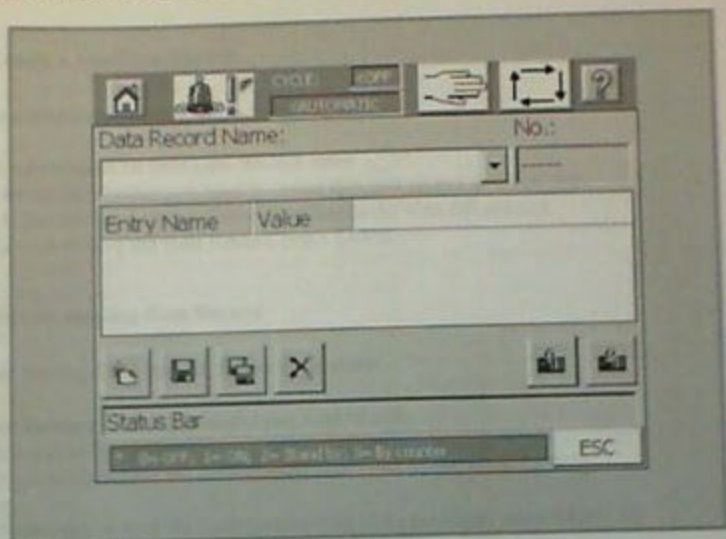


Fig. 9-1 - DATA RECORD MANAGER SCREEN

Initially there are no Data Records. They are created, edited and saved to a data medium directly to the TP177B by means of the Data Record Manager screen.

## 9.4 How to...

### 9.4.1 Create a new Data Record

To create a new Data Record, follow these steps:

- Enter a new name on field Data Record name
- You are asked whether you want to create this data record as a new one.
- This is the Recipe structure. Enter all values in the VALUE column.  
If you wish to save the Data Record, press SAVE.

### 9.4.2 Edit an existing Data Record

To edit an existing Data Record, follow these steps:

- Select the name of the data record you wish to edit.
- Modify values in the fields.
  - If you wish to save the Data Record with same name, press SAVE  
or
  - If you wish to save the Data Record with different name, press SAVE AS

### 9.4.3 Delete an existing Data Record

To delete an existing Data Record, follow these steps:

- Select the name of the data record you wish to edit.
- Press Data Record Delete button

### 9.4.4 Upload Data Record from PLC to TP177B

To upload Data Record, follow these steps:

- Press Data Record Upload button.

### 9.4.5 Download Data Record from TP177B to PLC

To download Data Record, follow these steps:

- Select the name of the data record you wish to download.
- Press Data Record Download button. The Data Record is copied from TP177B to PLC.

## CHAPTER 10 : CLEANING AND MAINTENANCE

The machine requires ordinary maintenance and to be kept clean to ensure correct operation.

1. Clean the whole surface of the electrical panel including the command and control components with a soft cloth and neutral, non-abrasive detergent.
2. In the case of control panels in painted iron (optional), check the structure periodically to see that no paint has been removed so exposing the part to rust and acids. If exposed areas are found, repair the damage as soon as possible.
3. Clean or replace the dust filters situated on the electrical cabinet to ensure adequate ventilation of the same to avoid overheating and damage to the internal apparatus. Replace filters every 7 days.
4. Make periodical checks that all the electrical apparatus is functioning correctly. Qualified personnel should effect this control every 30 days.

### 10.1 OPERATOR PANEL TP177B

Operator Panels TP177B are designed for low-maintenance operation.

Maintenance of the TP is limited to:

- Regular cleaning of the screen.

#### 10.1.1 Cleaning the screen

Clean the TP's screen at regular intervals with a damp cloth. If possible clean the device while it is turned off, if not, use screen clean function on system page. In this way you ensure that functions are not triggered if you inadvertently come into contact with the keyboard overlay. Use only water or a liquid detergent to damp the cloth. Never use aggressive solvents or scouring powder.

### 10.2 P.L.C.

PLC is designed for low-maintenance operation.

Maintenance of the PLC is limited to:

- Regular cleaning of the case.

#### 10.2.1 Cleaning the case

Clean the PLC's case at regular intervals with a damp cloth. Do not clean the device while it is turned on.

Use only water or a liquid detergent to damp the cloth. Never use aggressive solvents or scouring powder.

**IMPORTANT!**

Don't leave anything on the PLC cooling grid. This to avoid serious damages, overheating or burns.

## APPENDIX A: ESD GUIDELINES

### What does ESD mean?

Virtually all present-day modules incorporate highly integrated MOS devices or components. For technological reasons, these electronic components are very sensitive to overvoltages and, consequently, to electrostatic discharge:

These devices are referred to in German as *Elektrostatisch Gefährdete Bauelemente/Baugruppen*: "EGB"

The more frequent international name is:

"ESD" (Electrostatic Sensitive Device).

The following symbol on plates on cabinets, mounting racks or packages draws attention to the use of electrostatic sensitive devices and thus to the contact sensitivity of the assemblies concerned:



ESDs may be destroyed by voltages and energies well below the perception threshold of persons. Voltages of this kind occur as soon as a person who is not electrostatically discharged touches a device or an assembly. Devices exposed to such overvoltages cannot immediately be detected as defective in the majority of cases since faulty behaviour may occur only after a long period of operation.

### Precautions against electrostatic discharge

Most plastics are capable of carrying high charges and it is therefore imperative that they be kept away from sensitive components.

When handling electrostatic sensitive devices, make sure that persons, work places and packages are properly grounded.

### Handling ESD assemblies

A general rule is that assemblies should be touched only when this cannot be avoided owing to the work that has to perform on them. Under no circumstances should you handle printed-circuit boards by touching device pins or circuitry.

You should touch devices only if:

- You are grounded by permanently wearing an ESD wrist strap or
- You are wearing ESD shoes or ESD shoe-grounding protection straps in conjunction with an ESD floor.

Before you touch an electronic assembly, your body must be discharged. The simplest way of doing this is to touch a conductive, grounded object immediately beforehand – for example, bare metal parts of a cabinet, water pipe etc.

Assemblies should not be brought into contact with charge-susceptible and highly insulating materials such as plastic films, insulating table tops and items of clothing etc. containing synthetic fibers.

Assemblies should be deposited only on conductive surfaces (tables with an ESD coating, conductive ESD cellular material, ESD bags, ESD shipping containers).  
Do not place assemblies near visual display units, monitors or television sets (minimum distance to screen > 10 cm).

#### **Measuring and modifying ESD assemblies**

Perform measurements on ESD assemblies only when:

- The measuring instrument is grounded – for example, by means of a protective conductor – or
- The measuring head has been briefly discharged before measurements are made with a potential-free measuring instrument – for example, by touching a bare metal control cabinet.

When soldering, use only grounded soldering irons.

#### **Shipping ESD assemblies**

Always store and ship assemblies and devices in conductive packing – for example, metallized plastic boxes and tin cans.

If packing is not conductive, assemblies must be conductively wrapped before they are packed. You can use, for example, conductive foam rubber, ESD bags, domestic aluminium foil or paper (never use plastic bags or foils).

With assemblies containing fitted batteries, make sure that the conductive packing does not come into contact with or short-circuit battery connectors. If necessary, cover the connectors beforehand with insulating tape or insulating material.

## APPENDIX B: Siemens Worldwide

The SIMATIC Customer Support provides you with additional information about SIMATIC products through online services:

General current information can be obtained  
- in the Internet under <http://www.ad.siemens.de/simatic>





***Manuale di Istruzioni  
Uso e Manutenzione***

***Operating Instructions  
and Maintenance Manual***

***Modulo/Module:***

***EP BANCALE DI CARICO (PP) 650***

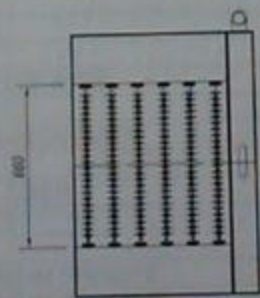
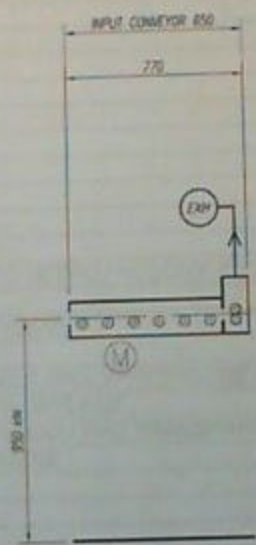
***EP INPUT CONVEYOR (PP) 650***

***Data/Date: 04-2007***

*Codice del Manuale  
Manual code*

*EP-BANCALE DI CARICO-650-04-07*

DWG. EP35105	EP INPUT CONVEYOR 650 (PP)
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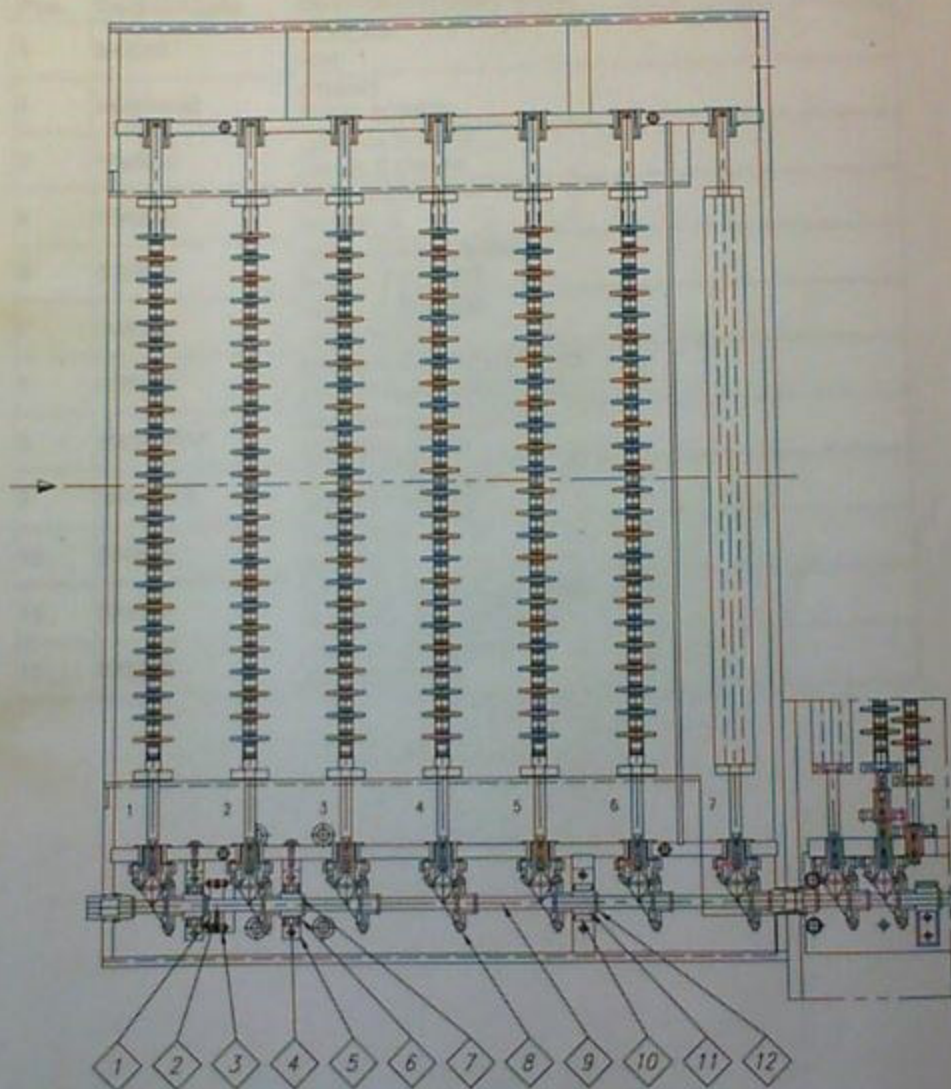
## TABELLA MATERIALI / MATERIALS TABLE

### SIGLE DEI MATERIALI PLASTICI E ELASTOMERI LIST OF PLASTIC AND RUBBER MATERIALS

CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
KR: KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
VI: VITON / VITON
VK: VULKOLLAN / VULKOLLAN

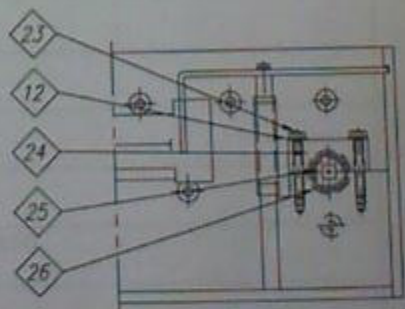
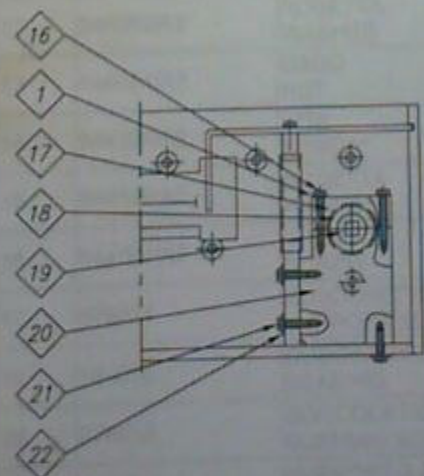
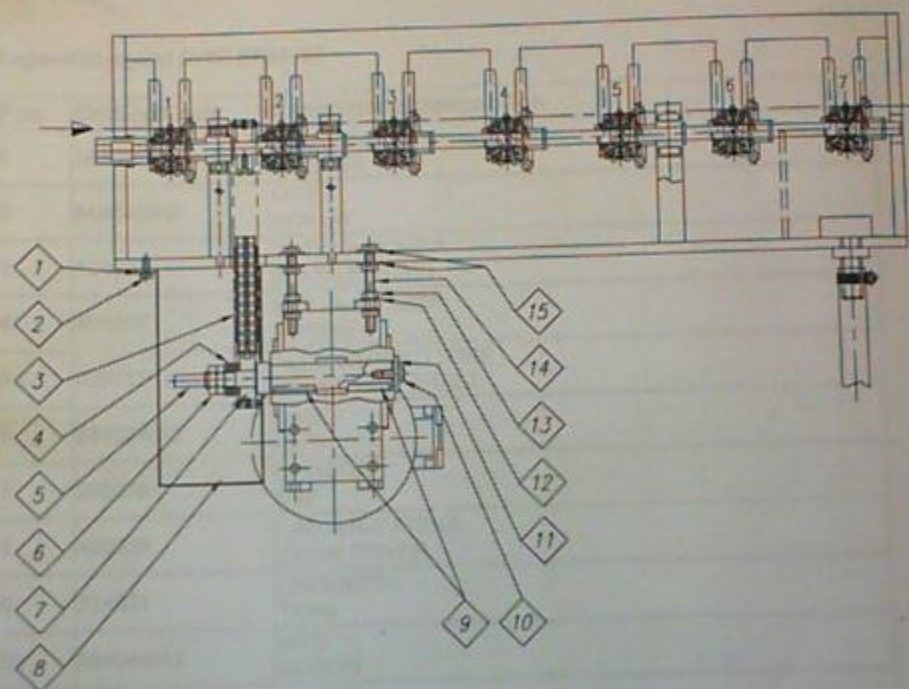
### SIGLE DEI MATERIALI METALLICI E FIBRE LIST OF METALLIC MATERIALS AND FIBERS

A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM



Legenda/Legend DWG.EP35106

Pos.	Codice/Code	Descrizione/Description
1	296080	CORONA RIM
2	844134/A2	GRANO GRUB SCREW
3	104022	CATENA DOPPIA DOUBLE CHAIN
4	164056	CUSCINETTO BEARING
5	676274	SUPPORTO ALBERO SHAFT SUPPORT
6	044020	ANELLO SEEGER SNAP RING
7	076033	BOCCOLA FORO QUADRO BUSHING SQUARE HOLE
8	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
9	026183/T1	ALBERO QUADRO SQUARE SHAFT
10	076018	BOCCOLA BUSHING
11	076017	BOCCOLA FORO QUADRO BUSHING SQUARE HOLE
12	036008	ANELLO DI FERMO LOCKING RING



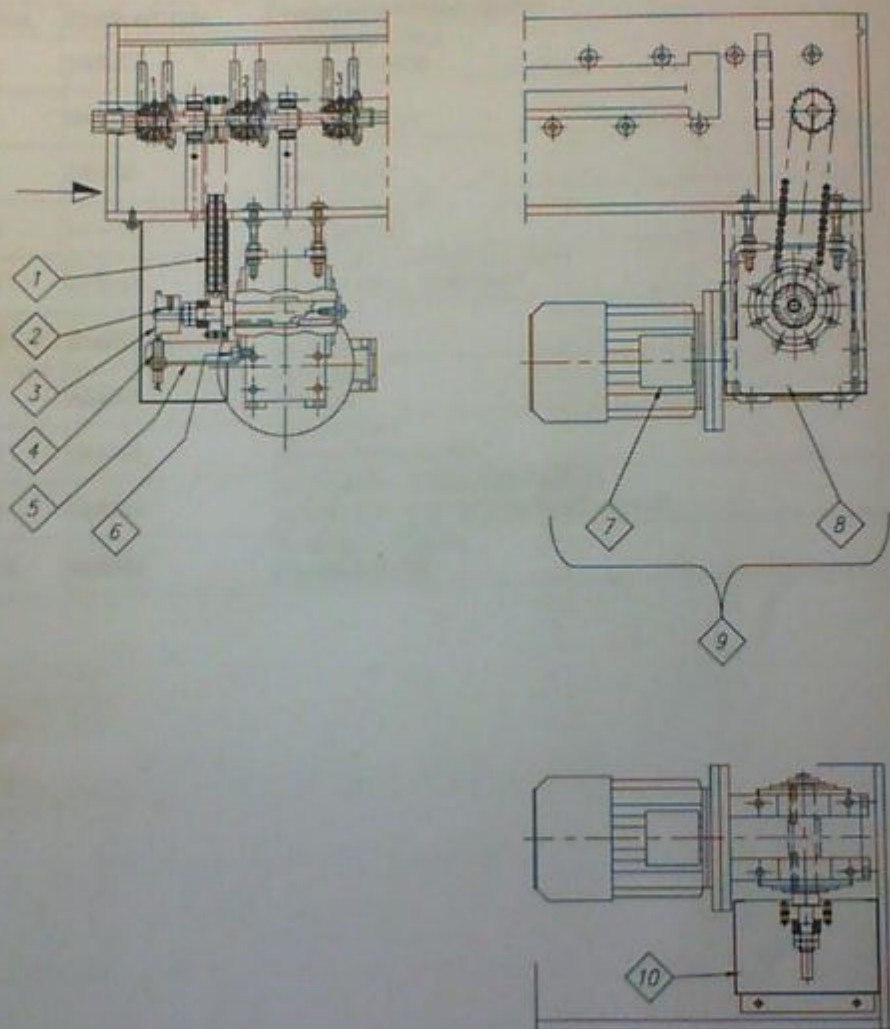
Legenda/Legend DWG.EP35107

Pos.	Codice/Code	Descrizione/Description
1	844095/A2	ROSETTA WASHER
2	844042/A2	VITE SCREW
3	104022	CATENA DOPPIA DOUBLE CHAIN
4	404002	MOLLA A TAZZA SPRING
5	026171	ALBERO RIDUTTORE REDUCTION SHAFT
6	844034/A2	DADO NUT
7	296079	CORONA RIM
8	486534	CARTER CATENA CHAIN COVER
9	334001	LINGUETTA TANG
10	844044/A2	VITE SCREW
11	844100/A2	ROSETTA WASHER
12	844062/A2	ROSETTA WASHER
13	844024/A2	DADO NUT
14	844329/A2	VITE SCREW
15	844149/A2	ROSETTA WASHER
16	844301/A2	VITE SCREW
17	676214	BLOCCHETTO SUPPORTO SUPPORT BLOCK
18	164056	CUSCINETTO BEARING
19	076033	BOCCOLA FORO QUADRO BUSHING SQUARE HOLE
20	676274	SUPPORTO ALBERO SHAFT SUPPORT



21	844040/A2	VITE SCREW
22	844061/A2	ROSETTA WASHER
23	844324/A2	VITE SCRERW
24	676232	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
25	076017	BOCCOLA FORO QUADRO BUSHING SQUARE HOLE
26	076018	BOCCOLA BUSHING

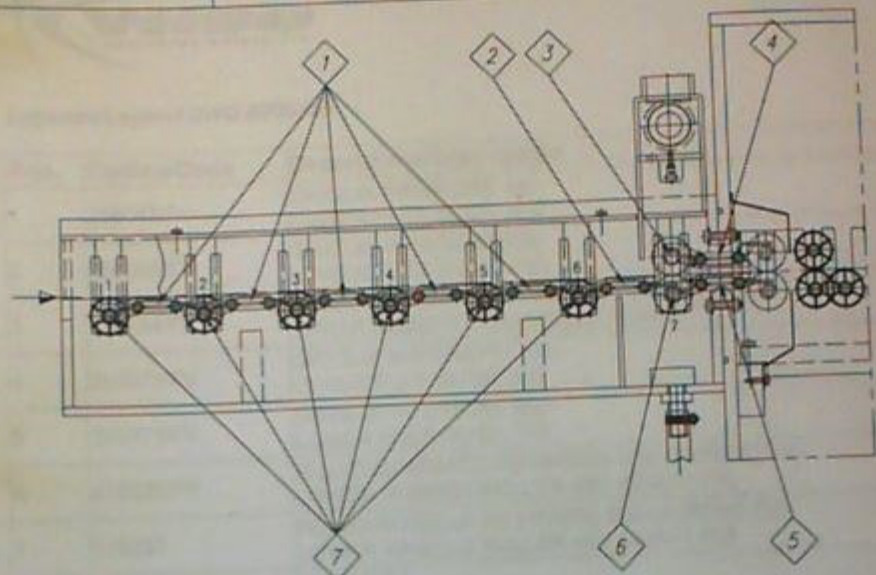




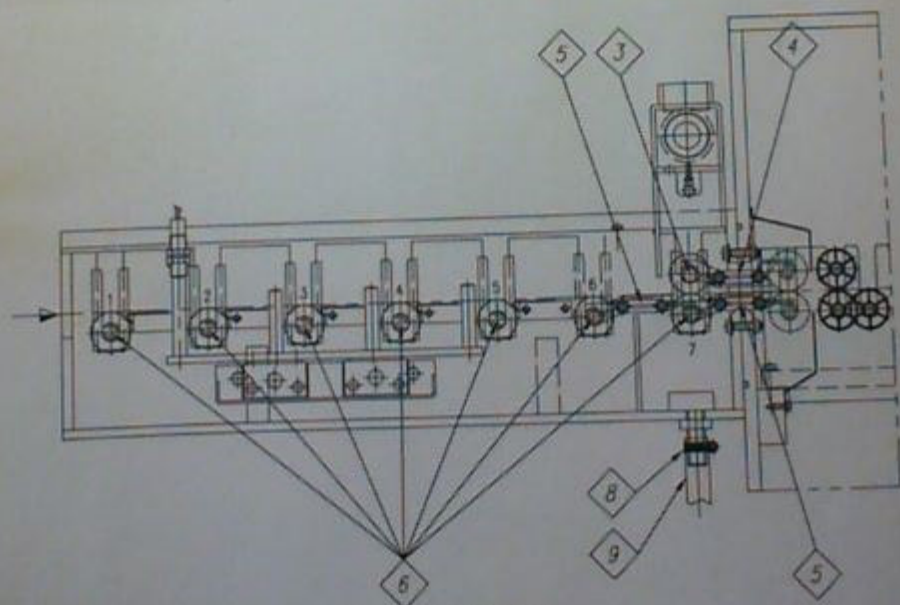
VERSIONE CON FOTOCPELLULA  
VERSION WITH PHOTO-CELL

Legenda/Legend DWG.EP35108

Pos.	Codice/Code	Descrizione/Description
1	104022	CATENA DOPPIA DOUBLE CHAIN
2	844057/A2	GRANO GRUB SCREW
3	296123	PIGNONE SPROCKET
4	-----	FOTOCELLULA PHOTO-CELL
5	676641	SUPPORTO FOTOCELLULA PHOTO-CELL SUPPORT
6	844218/A2	VITE SCREW
7	424047	MOTORE MOTOR
8	344093	RIDUTTORE REDUCTION-GEAR
9	434050	MOTORIDUTTORE COMPLETO COMPLETE MOTOREDUCTION-GEAR
10	486534	CARTER CATENA CHAIN COVER



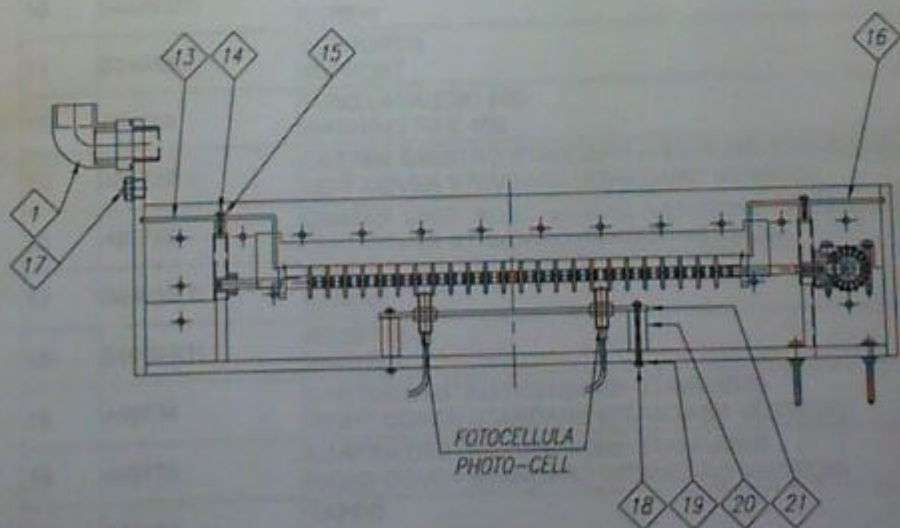
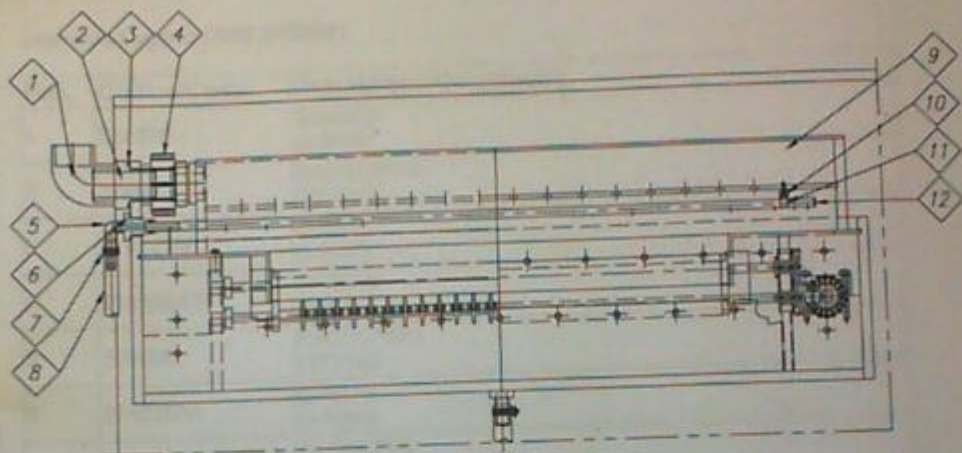
VERSIONE CON RULLI A ROTELLE  
VERSION WITH WHEELS ROLLERS



VERSIONE CON RULLI GOMMATI E SCENTRATORE  
VERSION WITH RUBBER ROLLERS AND BOARDS ALTERNATOR

Legenda/Legend DWG.EP35109

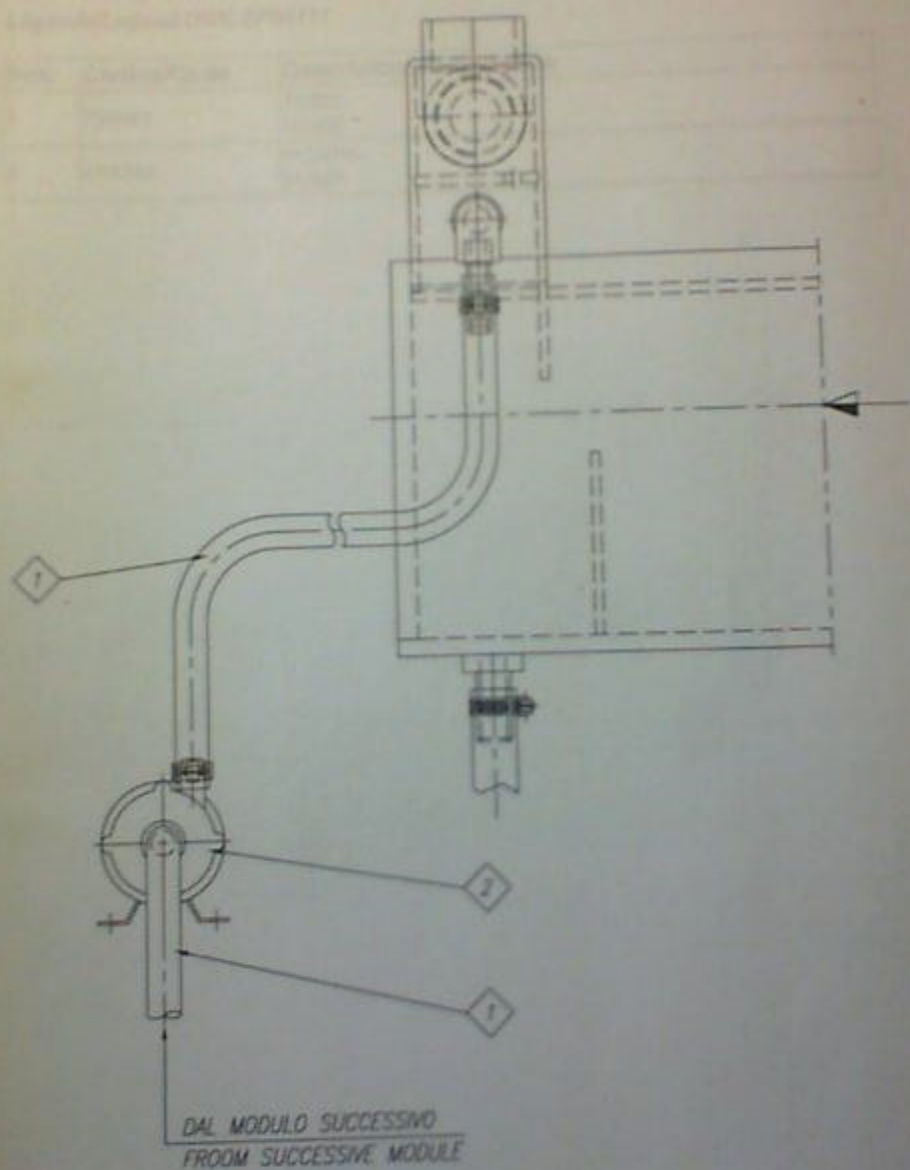
Pos.	Codice/Code	Descrizione/Description
1	256047/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
2	256055/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
3	016234/PP	RULLO GOMMATO SUPERIORE 650 (ALBERO FV) UPPER RUBBER ROLLER 650 (SHAFT FV)
4	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
5	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
6	016233/PP	RULLO GOMMATO INFERIORE 650 (ALBERO FV) LOWER RUBBER ROLLER 650 (SHAFT FV)
7	016237	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHELLS ROLLER 650 (SHAFT FV)
8	194009	FASCETTA CLAMP
9	794006	TUBO HOSE



Legenda/Legend DWG.EP35921

Pos.	Codice/Code	Descrizione/Description
1	534276	GOMITO ELBOW
2	766907	RACCORDO FITTING
3	274121/VI	O-RING O-RING
4	534106/EP	GHIERA RING NUT
5	766906	RACCORDO FITTING
6	274036/VI	O-RING O-RING
7	194008	FASCETTA CLAMP
8	794051	TUBO HOSE
9	766644	COLLETTORE ASPIRAZIONE 650 (VERSIONE STANDARD) EXHAUST MANIFOLD 650 (STANDARD VERSION)
9	766645	COLLETTORE ASPIRAZ. 650 (VERSIONE SPECULARE) EXHAUST MANIFOLD 650 (MIRROR VERSION)
10	844093/VI	VITE SCREW
11	534468	SUPPORTO SUPPORT
12	766648	TUBO LAVAGGIO 650 WASHING PIPE 650
13	486732	CARTER SINISTRO STANDARD (VERSIONE STANDARD) LEFT COVER STAVDARD (STANDARD VERSION)
13	486733	CARTER SINISTRO STANDARD (VERSIONE SPECULARE) LEFT COVER STAVDARD (MIRROR VERSION)
14	844015/VI	VITE SCREW
15	844095/VI	ROSETTA WASHER
16	486734	CARTER DESTRO (VERSIONE STANDARD) RIGHT COVER STANDARD (STANDARD VERSION)
16	486735	CARTER DESTRO (VERSIONE STANDARD) RIGHT COVER STANDARD (STANDARD VERSION)
17	534488	TAPPO PLUG

18	844040/T1	VITE SCREW
19	844095/A2	ROSETTA WASHER
20	176267	DISTANZIERE SPACER
21	676277	SUPPORTO FOTOCELLULE PHOTO CELLS SUPPORT

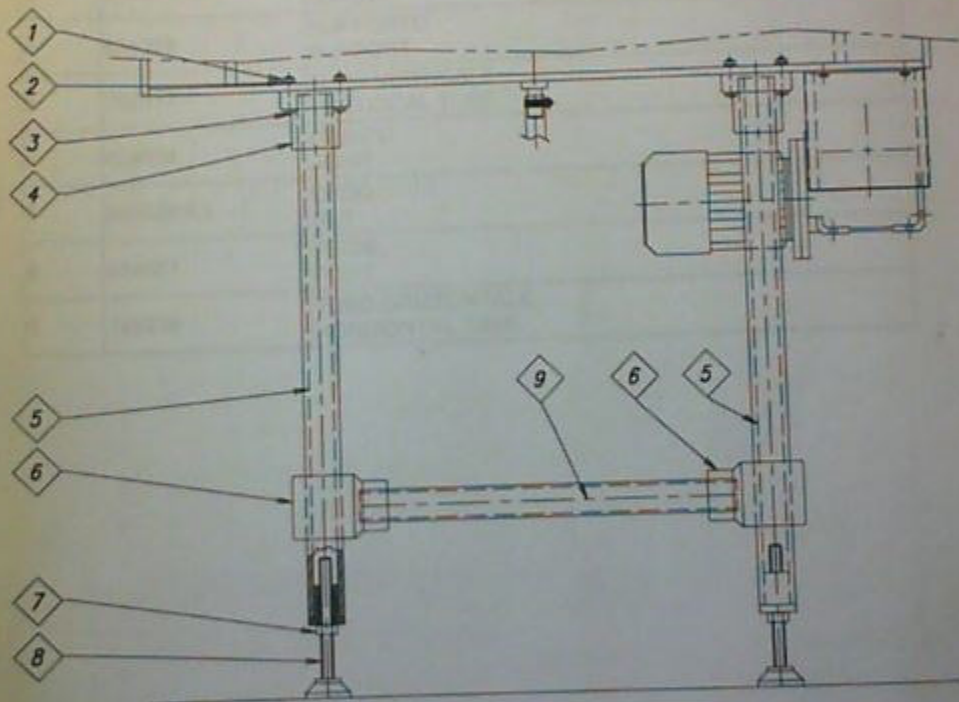






**Legenda/Legend DWG.EP35111**

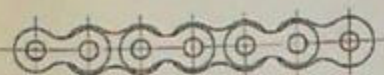
Pos.	Codice/Code	Descrizione/Description
1	794051	TUBO HOSE
2	474223	POMPA PUMP



Legenda/Legend DWG.EP35112

Pos.	Codice/Code	Descrizione/Description
1	844024/A2	DADO NUT
2	844062/A2	ROSETTA WASHER
3	844077/A2	VITE SCREW
4	454019	SUPPORTO SUPPORT
5	766317	TUBO VERTICALE VERTICAL TUBE
6	454004	GIUNTO JOINT
7	844028/A2	DADO NUT
8	454007	PIEDE FOOT
9	766316	TUBO ORIZZONTALE HORIZONTAL TUBE

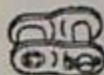
### SIMPLEX CHAIN



CHAIN



CONNECTING  
LINK

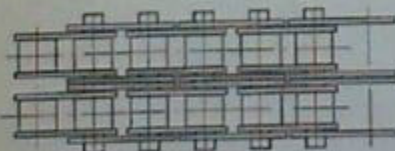
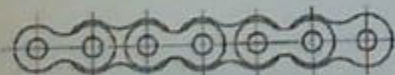


OFFSET  
LINK

#### CHAIN CHARACTERISTICS

PITCH	MATERIAL	REF. N°	REF. N°	REF. N°
3/8"	STEEL	104001	104002	104003
3/8"	S.S.	104007	104008	104009
1/2"	STEEL	104010	104011	104012
1/2"	S.S.	104004	104005	104006
5/8"	S.S.	104013	104014	104015
3/4"	S.S.	104016	104017	104018

### DUPLEX CHAIN



CHAIN



CONNECTING  
LINK



OFFSET  
LINK

#### CHAIN CHARACTERISTICS

PITCH	MATERIAL	REF. N°	REF. N°	REF. N°
3/8"	STEEL	104022	104023	104024
1/2"	STEEL	104025	104026	104027
1/2"	S.S.	104019	104020	104021



***Manuale di Istruzioni  
Uso e Manutenzione***

***Operating Instructions  
and Maintenance Manual***

***Modulo/Module:***

***ETCHSTAR 1 POMPA 650 (PP)  
(ELOCHEM)***

***ETCHSTAR 1 PUMP 650 (PP)  
(ELOCHEM)***

***Data/Date: 03-2007***

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<b>Section</b>	<b>page</b>
1. <i>Module technical specifications</i>	2
2. <i>Description</i>	3
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5. <i>Troubleshooting guide</i>	10
6. <i>Lists, drawings, photographs and spare parts</i>	22



## 1. Module technical specifications

### 1.1 Module

Module:	EPC ETCHSTAR 650
Model:	ALKALINE SOLUTION ELOCHEM
Final use:	Modular machine for alkaline etching solution in the manufacture of printed circuit boards or in general flat board.

### 1.2 Diagrams and drawings

Overall dimensions DWG:	EPC 35113
Internal cross sections DWG:	EPC 35113

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	1130
- Maximum width (mm):	1990
- Maximum height (mm):	1500

### 1.4 Installed energies and products

#### Electric power

Main line: see main manual.

#### Compressed air

Pressure: 6bar.  
Capacity (consumption): negligible.

#### Caloric cooling energy

Caloric energy (kcal): 5500 (EXOTHERMIC REACTION  
NON INCLUDED).

Inlet cooling fluid temperature (°C): Max. 10, Min. 3.

Minimum capacity (m<sup>3</sup>/h): 1

#### Products:

Mains water pressure/capacity(bar-l/h):	N.A.
Demineralised water pressure/capacity(bar-l/h):	N.A.
Inflammables:	N.A.
Neutral gases:	N.A.



## 2 Description

Etchstar is a modular machine for alkaline or acid etching solution in the manufacture of printed circuit boards.

The basic machine includes an entry conveyor and one etching sections.

The modular design offers the possibility to install additional etching or rinsing modules for more complex processing lines to meet all production requirements.

### 2.1 Main features

The machine consists in a monocoque self-supporting structure, made of polypropylene plates, appropriately assembled, drilled and welded, to its final shape. This individual characteristic provides the highest mechanical strength and chemical resistance.

Transparent side windows with double seals and safety interlocks for easy access and maintenance.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts, conveyor rollers and spray bars can be removed without using tools.

Conveyor system driven by internal torque bar and conical gears. Safety torque couple clutch installed to avoid damage in case of board jam.

Wheel rollers in the entry conveyor and in the spray sections, carbon fibre rollers with rubber sleeves at inlet and outlet of the chambers to minimise drag-out.

All sump bottoms are sloped to facilitate emptying and cleaning operations. Each sump is connected to a drain pump trough a valve, thus allowing selective emptying of all fluids.

All filter housings are installed outside of the machine body to give the possibility to check and easy remove the cartridges.

Catch filter baskets underneath lower spray manifolds in the etching sections.

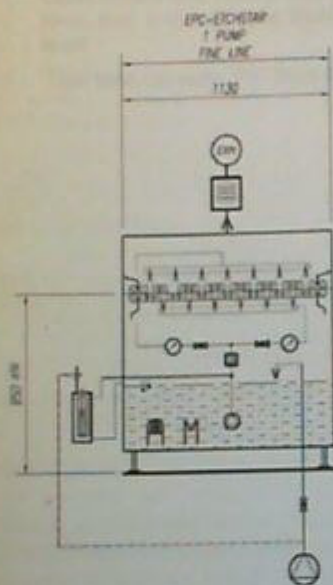
Valves and pressure gauges on pump outlets to upper and lower spray manifolds allow for selective pressure regulation.

Spray pipes are parallel to the direction of board transportation for more precise etching capability. This feature also allows for exact repositioning of the spray pipes after cleaning and maintenance operations.

Modular design to adopt additional modules in case of new production requirements.



## 2.2 Longitudinal section and top view



## 2.3 Description of the working stations

A. Etching chamber, 1130mm length, equipped with:

- One 4 kW pump with 500 micron PVC strainer at outlets. Higher grades of filtration are available upon request.
- Upper and lower spray manifold, with spray bars.
- Extra pump can be hooked up to an Intermittent spray module (optional extra).
- Extra pump can be use for re-circulation and filtration device.
- Alarm prevents the pump re-starting if the filter cartridge is not right positioned.
- Maximum spray pressure 3 bar approximately.
- One 6 kW titanium heaters.

- One titanium cooling coil controlled by solenoid valve.
- Temperature control by PLC.
- Level control with three points of intervention: drain of waste solution at working level, min. and max. level alarm and alarm with protection of heaters at minimum level.
- Total tank capacity: 500 litres approximately.



**WARNING**

The equipment is a high pressure system. Following an accident, the equipment may be damaged. The equipment is a high pressure system. Following an accident, the equipment may be damaged. The equipment is a high pressure system. Following an accident, the equipment may be damaged.

**2.1.1. Temperature control system**

The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve. The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve. The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve.

**2.1.2. Temperature control system**

The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve. The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve. The temperature control system is composed of a titanium cooling coil controlled by a solenoid valve.

**2.1.3. Temperature control system**

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## 3. Operation

### 3.1 Preliminary regulations

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.



#### **WARNING**

It is forbidden to use solution containing fluorine or product non compatible with the materials installed in the machinery. Wise s.r.l. shall not be held responsible for damages caused by the use non adequate products.

Particular attention must be pay using hydrochloric acid that must be fluorine free. Low quality hydrochloric acid should contain fluorine part.

WISE s.r.l. is available for supplying all the information required for the choice of the suitable product.

#### 3.1.1 *Conveyor speed regulation*

The panel transport system speed is visualised on the operator interface display which is also used to input the preset speed at the desired value. The electromechanical version machine shows the speed on a display and it can be adjusted by means of a potentiometer.

Speed adjustment should be adapted to the most critical phases of panel treatment, for example etching operations when there is a drastic speed variation according to the copper thickness.

#### 3.1.2 *Process solution temperature regulation*

The process solution temperature is regulated by a PLC and visualised on the operator interface display which is also used temperature setting at the desired set value. In the electromechanical machine version it is visualised and regulated by means of a thermostat also used to input the desired set value.

The temperature should be regulated according to the process and solution used. In order to determine the correct temperature, it is advisable to refer to the specifications provided by the supplier of the product used.

#### 3.1.3 *Regeneration solution flow regulation*

The processing solution and its degree of saturation represent two of the most important variables that can determine the finished product's quality constancy. It is therefore important to determine the regeneration fluid(s) flow rate(s) in the correct way:



### 3.1.3.1 Alkaline solution

If the machine is equipped with density control device, the right density setting should be adjusted moving the sensor installed on the densitometer. Low density, in presence of boards to be processed, activate the fresh solution feeding pump.

### 3.1.3.2 Acid solution

See the acid solution regeneration manual.

### 3.1.4 Exhaust flow rate regulation

Exhaust flow rate must be adjusted to maintain stable the pH solution value.

- In case of low pH exhaust flow rate must be reduced.
- In case of high pH exhaust flow rate must be increased.

## 3.2 Start up

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

## **4. Maintenance**

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### **4.1 Daily maintenance**

It is a set of daily activities ensuring the correct functionality of the system.

#### **4.1.1 Process solution**

Check the efficiency of the process solution each day. Renew or replace the solution if necessary.

#### **4.1.2 Filters**

Each day check the efficiency status of the filters installed on the pump delivery side. If necessary clean or replace them.

#### **4.1.3 Cleaning**

At the end of each working shift or however once each day, clean the machines externally avoiding to use abrasive materials or objects, a damp sponge is sufficient for the purpose.

For the alkaline version machine, inlet and outlet separating chamber, must be cleaned by spraying ammonia to dissolve incrustations.

### **4.2 Weekly maintenance**

It is a series of weekly activities ensuring the correct functionality of the system.

#### **4.2.1 Nozzles**

Each week check the status of the nozzles' efficiency. If necessary provide cleaning or replacement.

### **4.3 Monthly maintenance**

It is the series of monthly activities that ensure the correct functionality of the system.

#### **4.3.1 Transport system**

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.

#### **4.3.2 Seals**

Each month check the status seals of the covers, doors and filters. The sealing material is an elastomer which should appear elastic and without cracks. Replace if necessary.

#### 4.3.3 Piping

Check each month the efficiency status of the flexible connection tubes between pumps and various utilities. Replace if necessary.

#### 4.3.4 Heating elements

Check the efficiency of the heating elements through the measurement of the electrical input. If necessary replace the defective or unusable elements.

#### 4.3.5 Level gauges

Check the efficiency of the level gauges, which functionality can be prevented by the encrustations or dirt deposits. Clean or replace them if necessary.

#### 4.3.6 Lubrication

Lubricate the torque bar drive chain with grease. There are no particular prescriptions for the type of lubricant to be used which may be the commonly used for bearings.

### 4.4 Wear parts mandatory replacement programme

<i>Activities description</i>	<i>Frequency in work hours</i>
Processing sections cartridge filters	500
Low pressure nozzles	3000
Roller support inserts	3000

## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE srl technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

#### 5.1.2 *Noise level*

Verify the functionality of the centrifugal pumps:

- Check whether the mechanical parts composing it (bearings, impellor, mechanical seal) are worn or damaged. If required replace defective parts.
- Check the level of the liquid inside the tank, the pump should appear completely under water head. Restore the correct level if necessary.

## 5.2 Etching

### 5.2.1 *Insufficient Etching*

Check fresh solution from feeding system to machine which is flow should be able to keep the right concentration of copper, hydrochloric acid and hydrogen peroxide. If required provide the necessary corrective actions.

Check the quality of the fresh solution and if required provide the necessary corrective actions.

Verify that spray pressure is within the required process values and, if necessary, check as follows:

- The status of the filters installed on delivery side of the recirculation pumps. Clean or replace if necessary.
- Check the efficiency and correct functionality of the recirculation pumps. If required repair or replace the defective pump.

Check the spraying tubes and relative nozzles for deposits or encrustations. For this purpose there is a dedicate cycle "NOZZLE CHECK" see display interface operator manual. In addition to the nozzle check inspection it is also helpful to carry out an hydraulic check by feeding each tube with fresh water from mains, ensuring the status of the same. If necessary, restore the correct functionality of the tubes and the nozzles.

Check the status of the spraying nozzles' orifice. In addition to the visual inspection make a hydraulic check by feeding each single tube with mains water thus allowing to verify the spray jet of each nozzle, which should appear regular and flat, and with the below described dispersion angle:

- Process sections nozzles 60°

Replace the nozzles if worn.

The characteristics of the panel to be processed as for example, very small line and space, make the etching operation more difficult, if required provide the necessary corrective regulation.

If the above listed should not be sufficient, contact the local Representative otherwise take direct contact with the technical assistance of WISE s.r.l.

### 5.2.2 *Centrifugal pumps' running problems*

**Pressure loss or reduction:**

- In the event of a newly installed pump check the direction of rotation, usually indicated by an arrow placed on the pump. If necessary, invert one phase of the power supply to invert the direction of rotation.
- Verify the pump ducts for foreign particles or encrustations. Remove the cause of obstruction.
- If the pressure loss is revealed with a certain delay after pump start-up, the cause could be attributed to the presence of foam in the fluid being pumped, which is the



cause of the cavitations phenomenon. Said phenomenon other than being harmful to the pump itself, also drastically reduces the operating pressure. Check the fluid and if it is the case activate all the necessary actions to minimise foam formation.

- Verify that all spraying nozzles are present and the wear status of their orifices. If required, install the missing nozzles or replace worn nozzles.
- Verify the spray manifolds or tubes for cracks, holes or other irregularity causing possible leakage in the spray manifolds or tubes. Repair or replace damaged parts.
- Verify the pressure display apparatus. If necessary repair or replace it.

**Too elevated electrical absorption.**

- Verify that all the spraying nozzles are installed and the wear status of their orifices. If necessary, install the missing nozzles or replace the worn ones.
- Verify the presence of cracks, holes or irregularities that may cause leakage in the spraying tubes or manifolds. Repair or replace damaged parts.

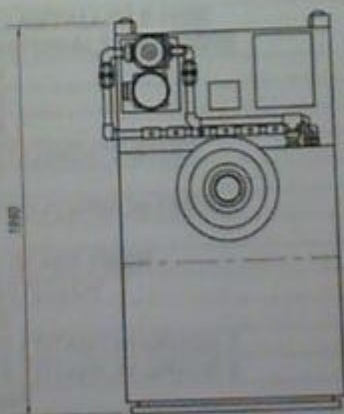
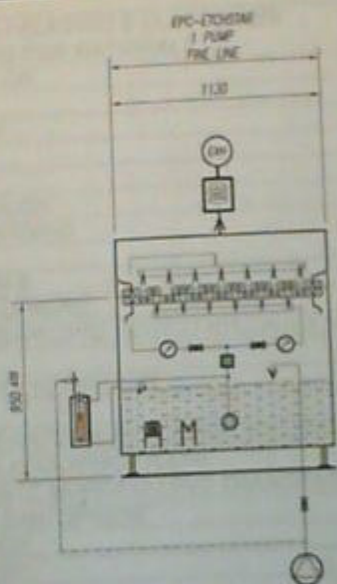
## **6. Lists, drawings, photographs and spare parts.**

Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

### **6.1 Drawings and spare parts lists**

DWG. EPCJ5113

EPCSTAR 650 1P FINE LINE (PP)



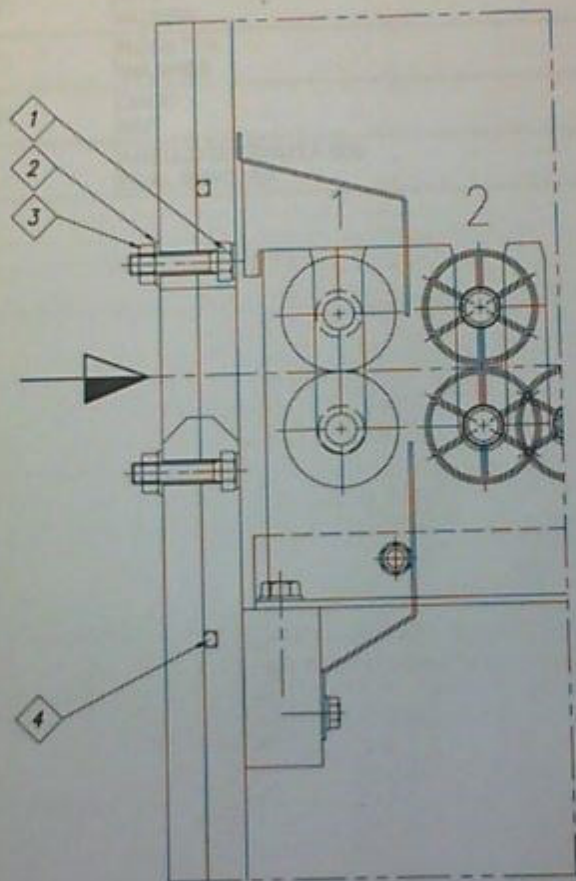
## TABELLA MATERIALI / MATERIALS TABLE

### SIGLE DEI MATERIALI PLASTICI E ELASTOMERI LIST OF PLASTIC AND RBR MATERIALS

CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
R : KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
V : VITON / VITON
K : VULKOLLAN / VULKOLLAN

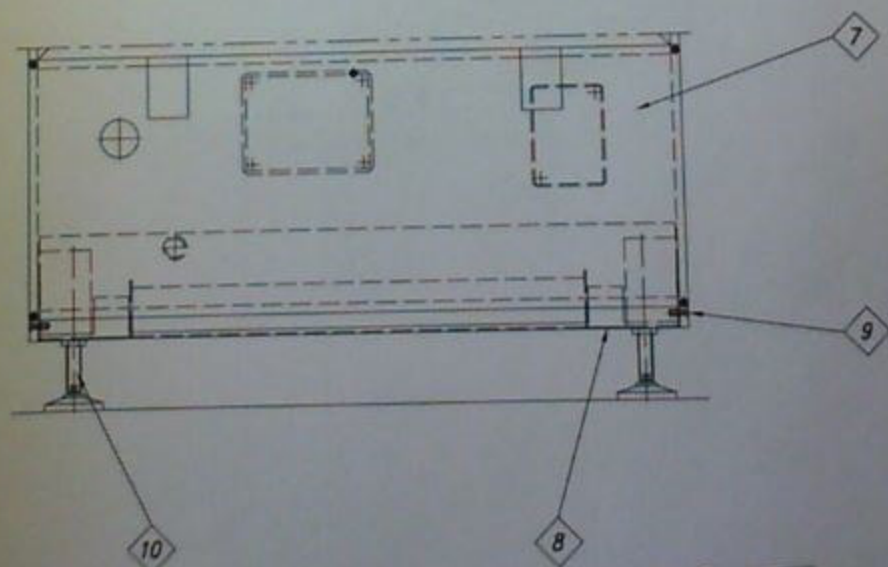
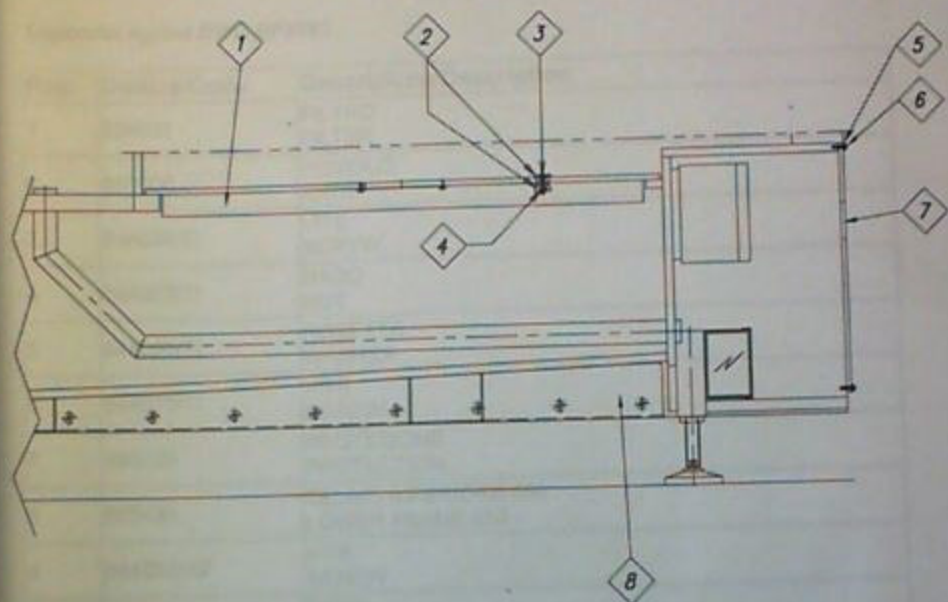
### SIGLE DEI MATERIALI METALLICI E FIBE LIST OF METALLIC MATERIALS AND FIBRS

A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM



**Legenda Legend DWG.EP3592**

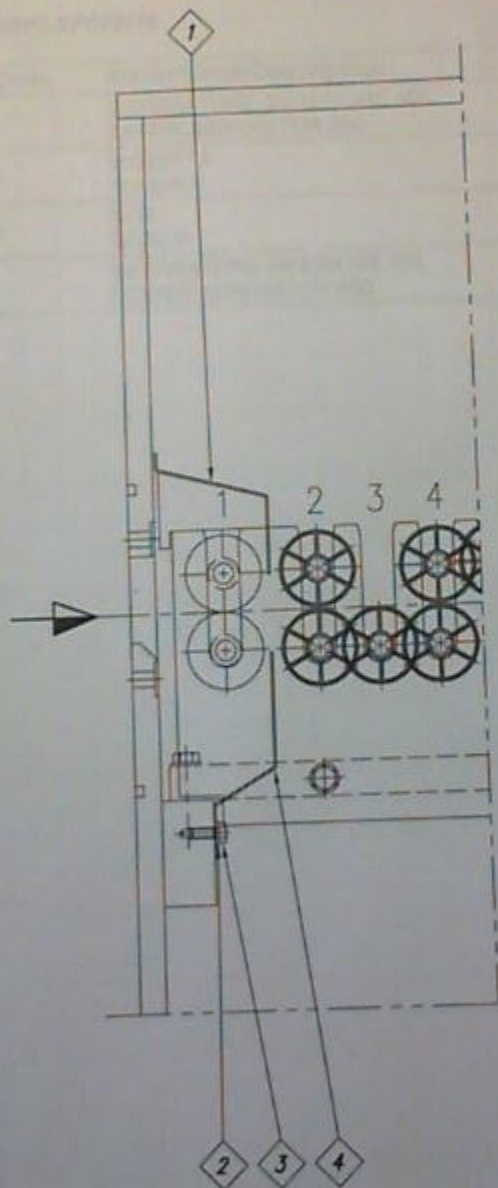
Pos.	Codice/Code	Descrizione/Description
1	844046/T1	VITE SCREW
2	844062/T1	ROSETTA WASHER
3	844024/T1	DADO NUT
4	276041	ANELLO DI TENUTA 650 SEAL RING 650



**Legenda Legend DWG.EP3593**

Pos.	Codice/Code	Descrizione/Description
1	206031	FILTRO FILTER
2	856006	POMOLO KNOB
3	844088/TI	VITE SCREW
4	844023/TI	DADO NUT
5	844095/TI	ROSETTA WASHER
6	844015/TI	VITE SCREW
7	486720	PROTEZIONE PROTECTION
8	666433	TELAIO INFERIORE 650 LOWER FRAME 650
9	844055/A2	VITE SCREW
10	454001	PIEDE FOOT

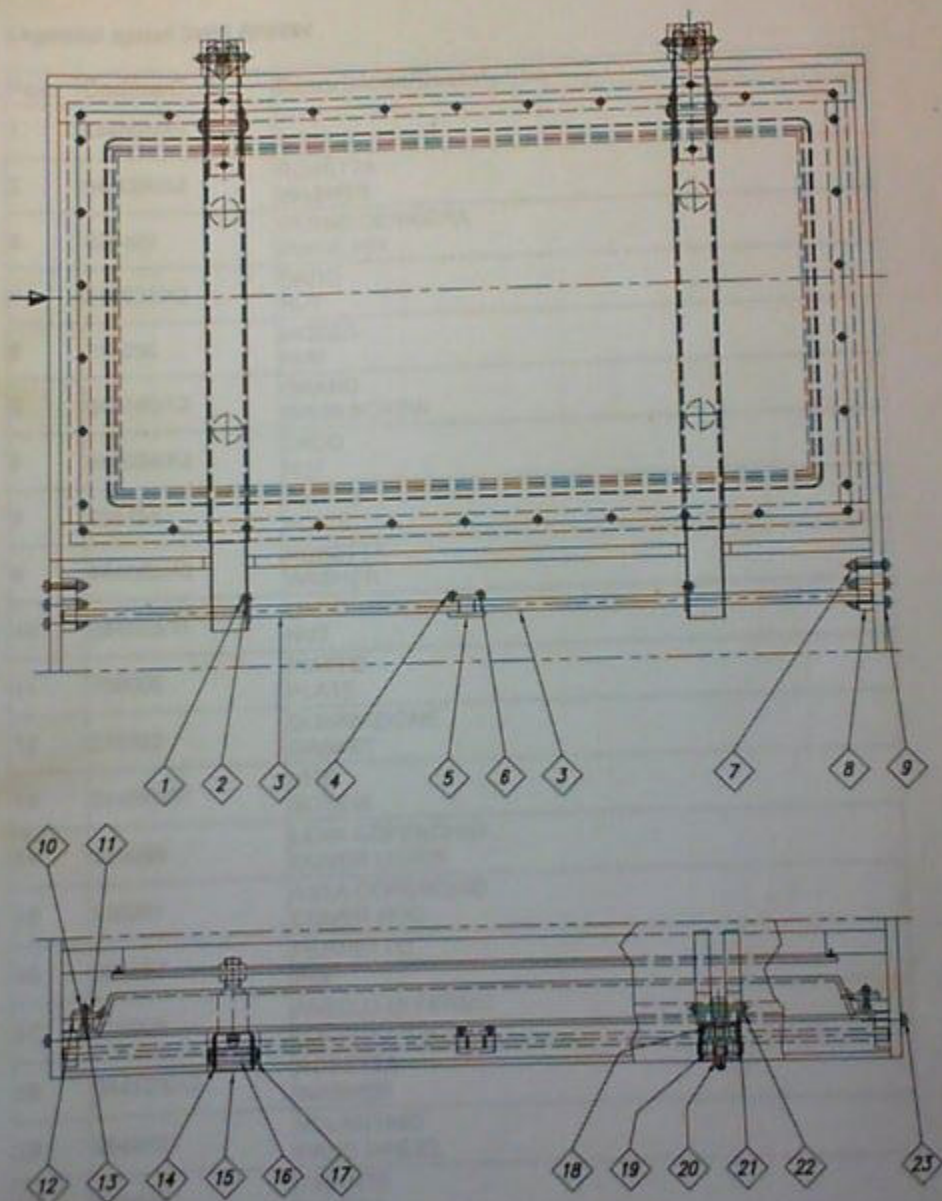






LegendaLegend DWG.EPC35116

Pos.	Codice/Code	Descrizione/Description
1	616230	SEPARATORE SUPERIORE 650 UPPER SEPARATOR 650
2	644095/T1	ROSETTA WASHER
3	644042/T1	VITE SCREW
4	616228	SEPARATORE INFERIORE 650 LOWER SEPARATOR 650

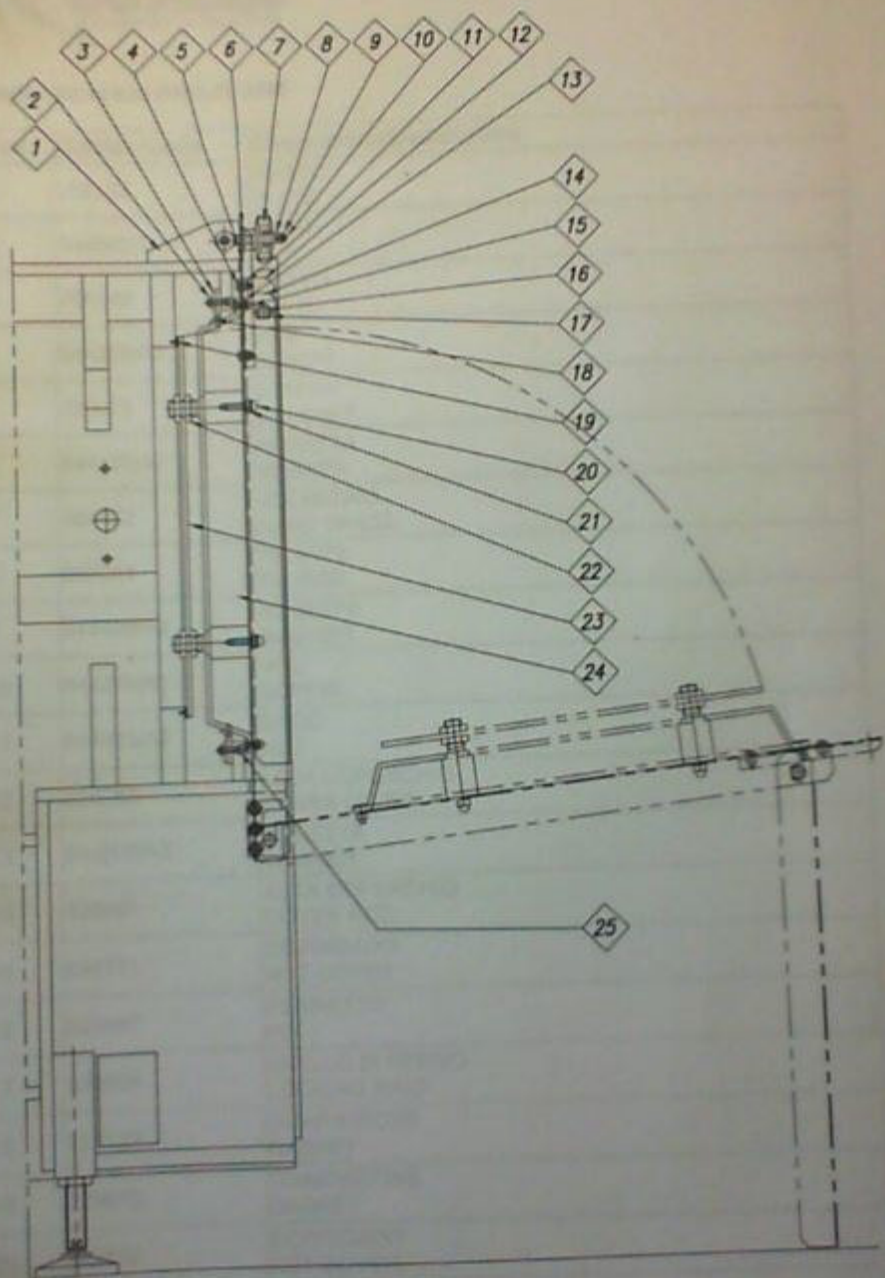


Legenda Legend DWG.EP3594

Pos.	Codice/Code	Descrizione/Description
1	844090/A2	VITE SCREW
2	844095/A2	ROSETTA WASHER
3	026499	PERNO CERNIERA HINGE PIN
4	844023/A2	DADO NUT
5	216258	MOZZO HUB
6	844140/A2	GRANO GRUB SCREW
7	844024/A2	DADO NUT
8	756194	PIATTO PLATE
9	844062/A2	ROSETTA WASHER
10	844023/T1	DADO NUT
11	756006	PIATTO PLATE
12	276122	GUARNIZIONE GASKET
13	844040/T1	VITE SCREW
14	326060	LEVA COPERCHIO COVER LEVER
15	326061	ASTA COPERCHIO COVER ROD
16	026497	PERNETTO PIN
17	036008	ANELLO DI FERMO LOCKING RING
18	844153/A2	ROSETTA WASHER
19	854052	VOLANTINO HAND WHEEL
20	866044	TIRANTE TIE ROD



21	026495	PERNETTO PER CERNIERA HINGE PIN
22	046001	ANELLO ELASTICO ELASTIC RING
23	844323/A2	VITE SCREW

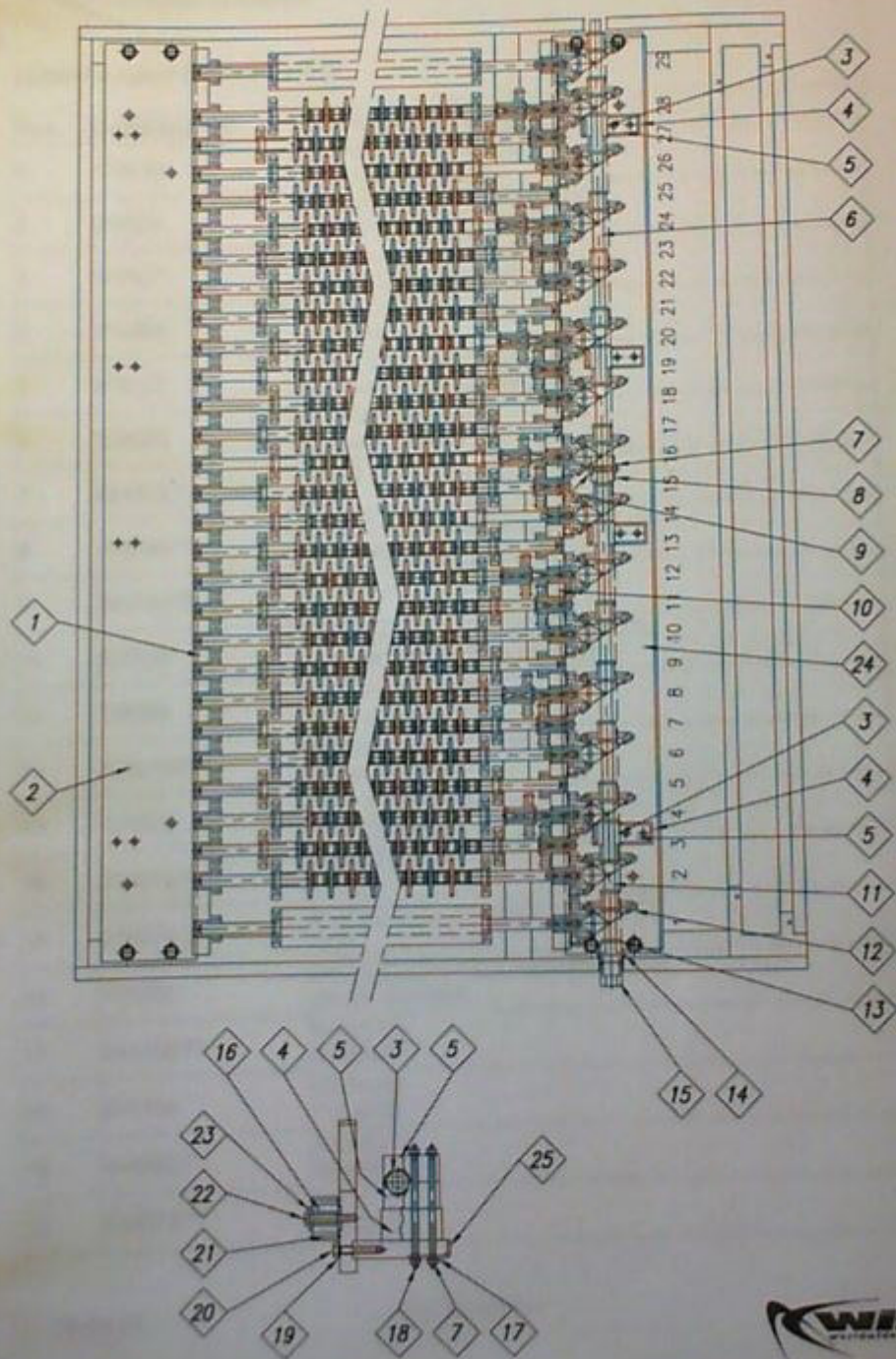


Legenda Legend DWG.EP3595

Pos.	Codice/Code	Descrizione/Description
1	756193	PIATTO PLATE
2	844023/T1	DADO NUT
3	756149	PIATTO PLATE
4	844298/A2	VITE SCREW
5	326071	STAFFA BRACKET
6	844153/A2	ROSETTA WASHER
7	854052	VOLANTINO HAND WHEEL
8	866044	TIRANTE TIE ROD
9	844400/A2	ROSETTA WASHER
10	844276/A2	VITE SCREW
11	844023/A2	DADO NUT
12	326060	LEVA COPERCHIO COVER LEVER
13	844095/A2	ROSETTA WASHER
14	326061	ASTA COPERCHIO COVER ROD
15	844101	COPRIDADO NUT COVER
16	026497	PERNETTO PIN
17	036008	ANELLO DI FERMO LOCKING RING
18	276122	GUARNIZIONE GASKET
19	276015	GUARNIZIONE GASKET
20	844102	COPRIDADO NUT COVER

21	844320/A2	VITE SCREW
22	846048	DADO NUT
23	156206	COPERCHIO INTERNO INTERNAL COVER
24	156205	COPERCHIO COVER
25	844040/T1	VITE SCREW





**Legenda Legend DWG.EPC35118**

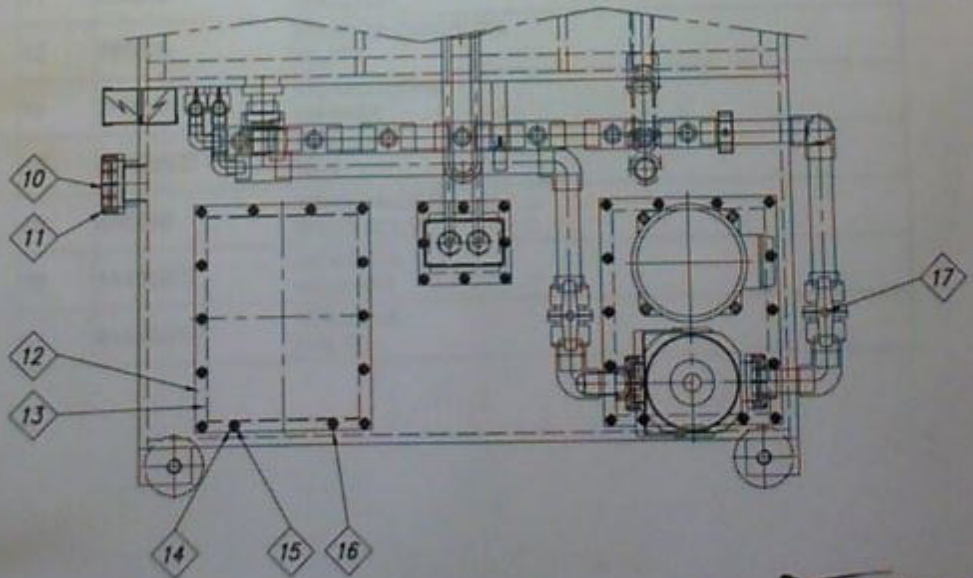
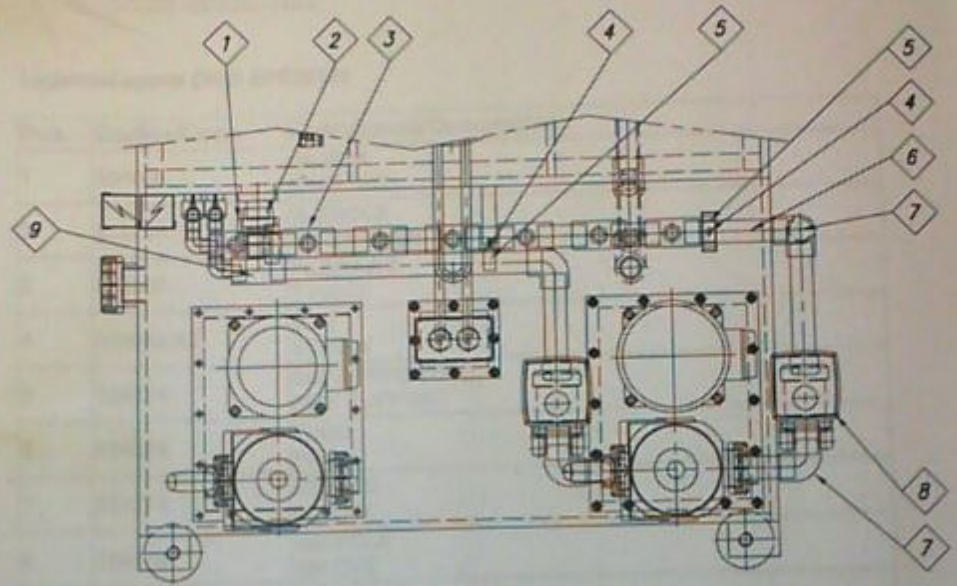
Pos.	Codice/Code	Descrizione/Description
1	676636	SUPPORTO LATO FOLLE IDLE SIDE SUPPORT
2	676634	SUPPORTO LONGITUDINALE LONGITUDINAL SUPPORT
3	076017	BOCCOLA FORO QUADRO BUSHING SQUARE HOLE
4	176258	DISTANZIERE SPACER
5	676637	SUPPORTO ALBERO QUADRO SQUARE SHAFT SUPPORT
6	026399	ALBERO QUADRO SQUARE SHAFT
7	844023/TI	DADO NUT
8	216146/TI	MOZZO ALBERO QUADRO SQUARE SHAFT HUB
9	844088/TI	VITE SCREW
10	676635	SUPPORTO LATO MOTORIZZATO MOTORIZED SIDE SUPPORT
11	026398	ALBERO QUADRO SQUARE SHAFT
12	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
13	036008	ANELLO DI FERMO LOCKING RING
14	274013/VI	V-RING V-RING
15	216024/TI	MOZZO COLLEGAMENTO ALBERI HUB
16	176257	DISTANZIERE PER INGRANAGGIO GEAR SPACER
17	844095/TI	ROSETTA WASHER
18	846168	TIRANTE TIE ROD
19	844062/TI	ROSETTA WASHER
20	844077/TI	VITE SCREW

21	296048	INGRANAGGIO GEAR
22	844064/TI	VITE SCREW
23	846044	RONDELLA WASHER
24	676704	SUPPORTO LONGITUDINALE LONGITUDINAL SUPPORT
25	676705	SOSTEGNO SUPPORT



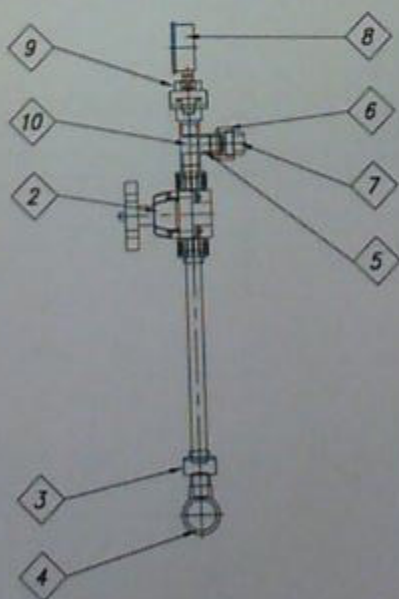
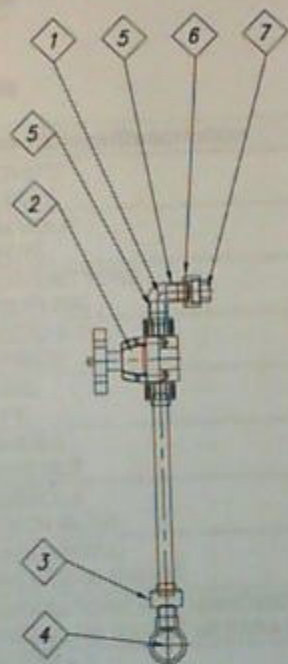
**Legenda Legend DWG.EPC35119**

Pos.	Codice/Code	Descrizione/Description
1	016234/PP	RULLO GOMMATO SUPERIORE 650 (ALBERO FV) UPPER RUBBER ROLLER 650 (SHAFT FV)
2	016312	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEELS ROLLER 650 (SHAFT FV)
3	016317/FV	RULLO A ROTELLE 650 (ALBERO FV) WHEELS ROLLER 650 (SHAFT FV)
4	016233/PP	RULLO GOMMATO INFERIORE 650 (ALBERO FV) LOWER RUBBER ROLLER 650 (SHAFT FV)
5	016311	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEELS ROLLER 650 (SHAFT FV)
6	016245	RULLO ROTELLE 650 (ALBERO FV) WHEELS ROLLER 650 (SHAFT FV)
7	016315	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEELS ROLLER 650 (SHAFT FV)



Legenda Legend DWG.EPC35120

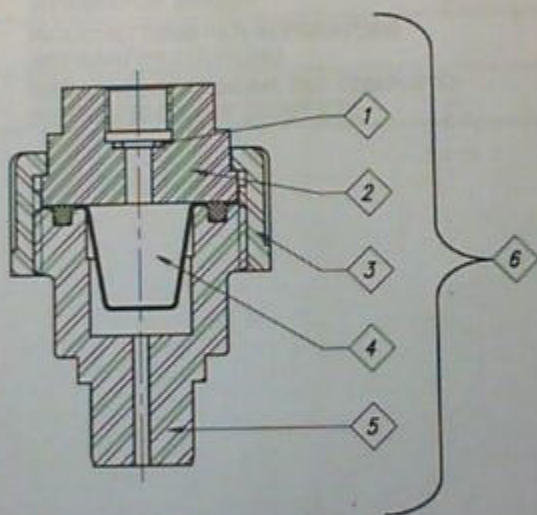
Pos.	Codice/Code	Descrizione/Description
1	534006	GHIERA RING NUT
2	534152	BUSSOLA UNION BUSH
3	534396	PEZZO A T T PIECE
4	844042/A2	VITE SCREW
5	534474	SUPPORTO TUBO PIPE SUPPORT
6	604214	TUBO PIPE
7	534274	GOMITO ELBOW
8	184116	VALVOLA VALVE
9	534361	PEZZO A T T PIECE
10	766657	TAPPO PLUG
11	534230	GHIERA RING NUT
12	756001	PIASTRA CHIUSURA PLATE
13	276047	GUARNIZIONE GASKET
14	844024/TI	DADO NUT
15	846169	PRIGIONIERO STUD BOLT
16	844062/TI	ROSETTA WASHER
17	814133/EP	VALVOLA VALVE





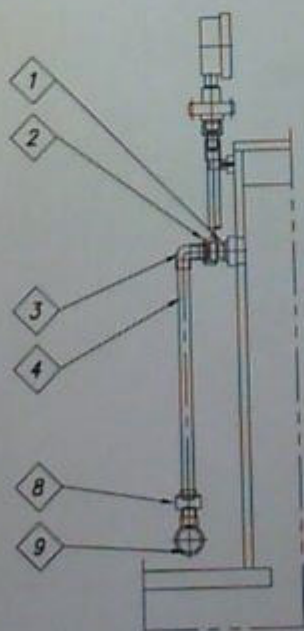
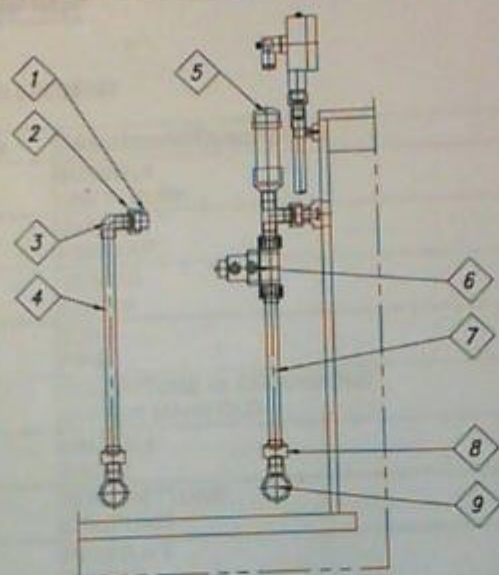
**LegendaLegend DWG.EP3596**

Pos.	Codice/Code	Descrizione/Description
1	534270	GOMITO ELBOW
2	814164	VALVOLA VALVE
3	534078/EP	BOCCHETTONE COUPLING
4	534396	PEZZO A T T PIECE
5	766033	TUBO PIPE
6	534003	GHIERA RING NUT
7	534149	BUSSOLA UNION BUSH
8	354028	MANOMETRO PRESSURE GAUGE
9	766032/VI	SEPARATORE PER MANOMETRO PRESSURE GAUGE SEPARATOR
10	534358	PEZZO A T T PIECE



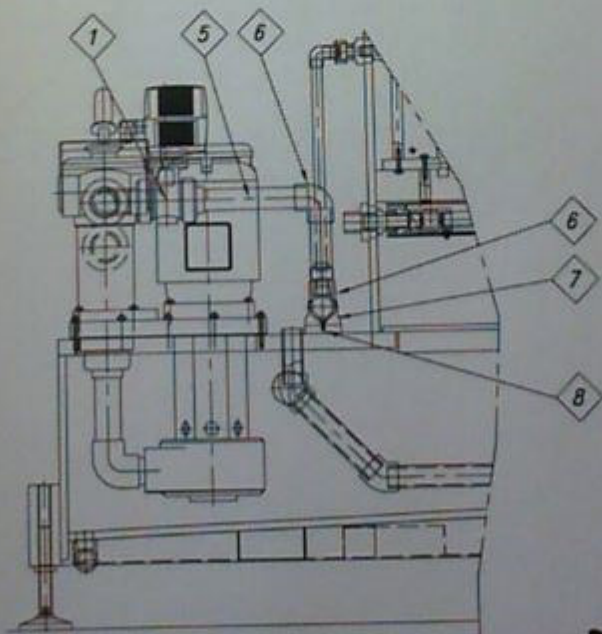
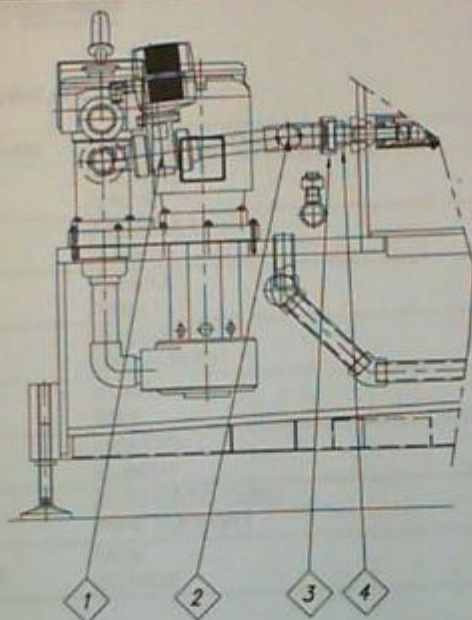
Legenda Legend DWG.ESD35100

Pos.	Codice/Code	Descrizione/Description
1	274054/VI	O-RING O-RING
2	216018/PC	FLANGIA PORTAMANOMETRO FLANGE
3	534004	GHIERA PER BOCCHETTONE COUPLING RING NUT
4	276028/VI	GUARNIZIONE PER SEPARATORE SEPARATOR GASKET
5	766031	BOCCHETTONE PER SEPARATORE SEPARATOR COUPLING
6	766032/VI	SEPARATORE MANOMETRO COMPLETO PRESSURE GAUGE COMPLETE



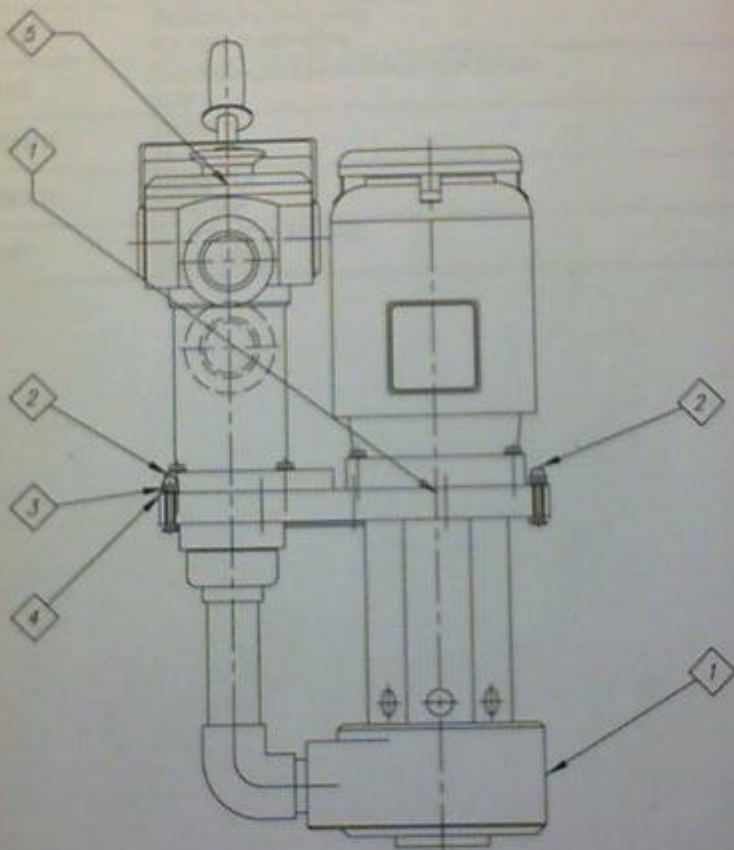
**LegendaLegend DWG.EPC35122**

Pos.	Codice/Code	Descrizione/Description
1	534149	BUSSOLA UNION BUSH
2	534003	GHIERA RING NUT
3	534270	GOMITO ELBOW
4	604210	TUBO PIPE
5	766035	COLLETORE DI ESPANSIONE BUFFER MANIFOLD
6	184122	VALVOLA VALVE
8	534078/EP	BOCCHETTONE COUPLING
9	534396	PEZZO A T T PIECE



Legenda/Legend DWG.EPC35123

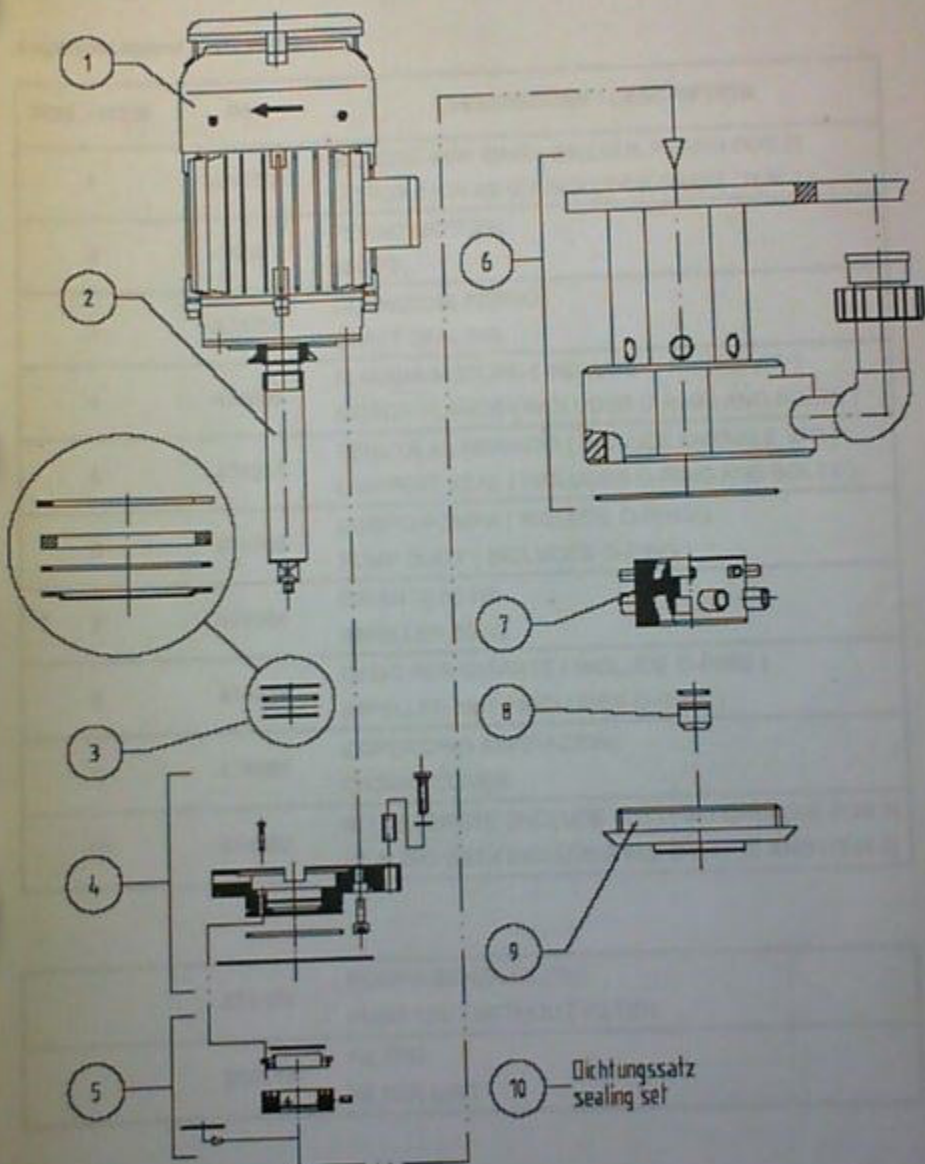
Pos.	Codice/Code	Descrizione/Description
1	184116	VALVOLA VALVE
2	534361	PEZZO A T T PIECE
3	534006	GHIERA RING NUT
4	534152	BUSSOLA UNION BUSH
5	604214	TUBO PIPE
6	534274	GOMITO ELBOW
7	534474	SUPPORTO TUBO PIPE SUPPORT
8	844042/A2	VITE SCREW





**Legenda Legend DWG.ESC3033**

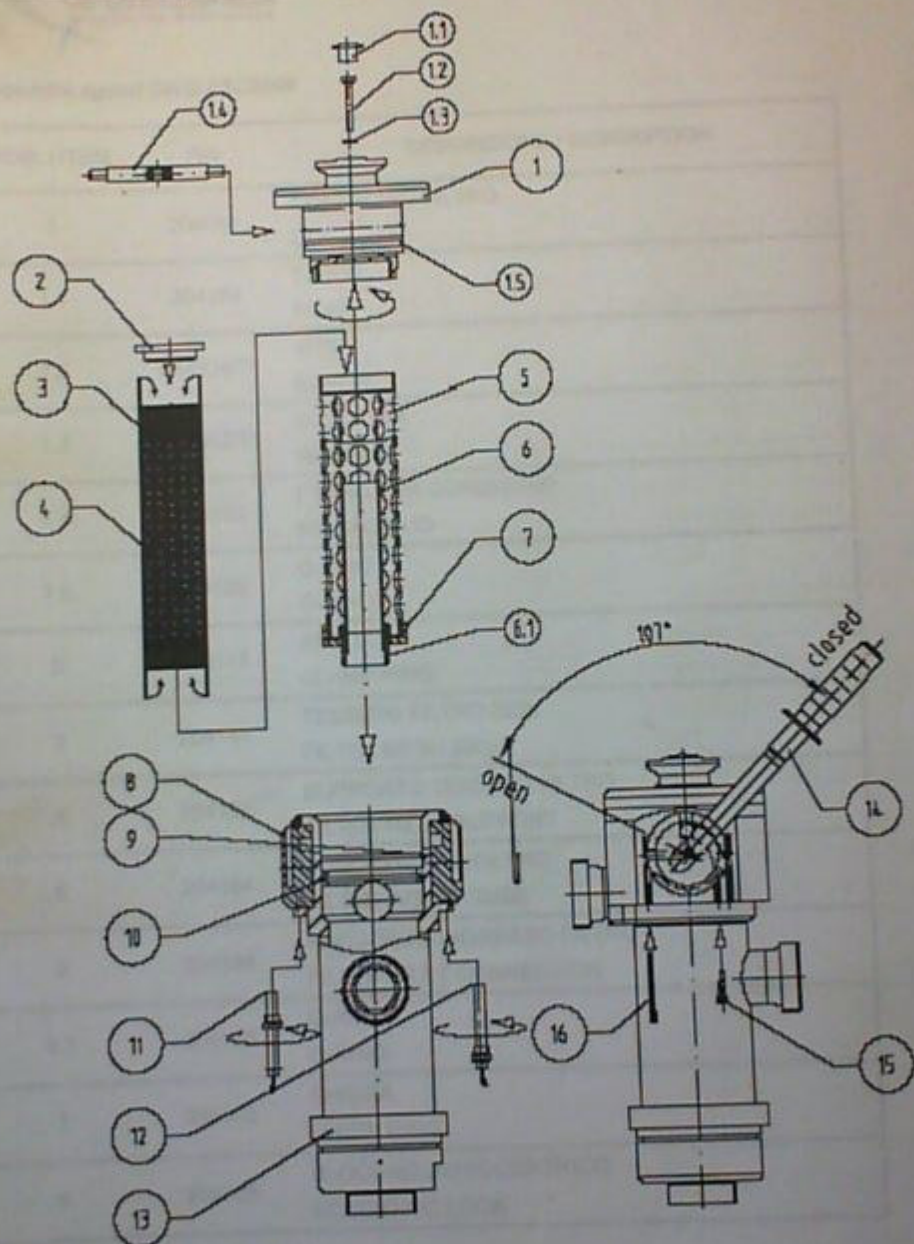
Pos.	Codice/Code	Descrizione/Description
1	474017	POMPA-FILTRO 50Hz FILTER-PUMP 50Hz
1	474018	POMPA-FILTRO 60Hz FILTER-PUMP 60Hz
2	844102	COPRIDADO ESAGONALE PER DADO CAP
3	844024/TI	DADO NUT
4	844062/TI	ROSETTA WASHER
5	204141	CARTUCCIA FILTRO CARTRIDGE



**Legenda Legend DWG.ESD3508**

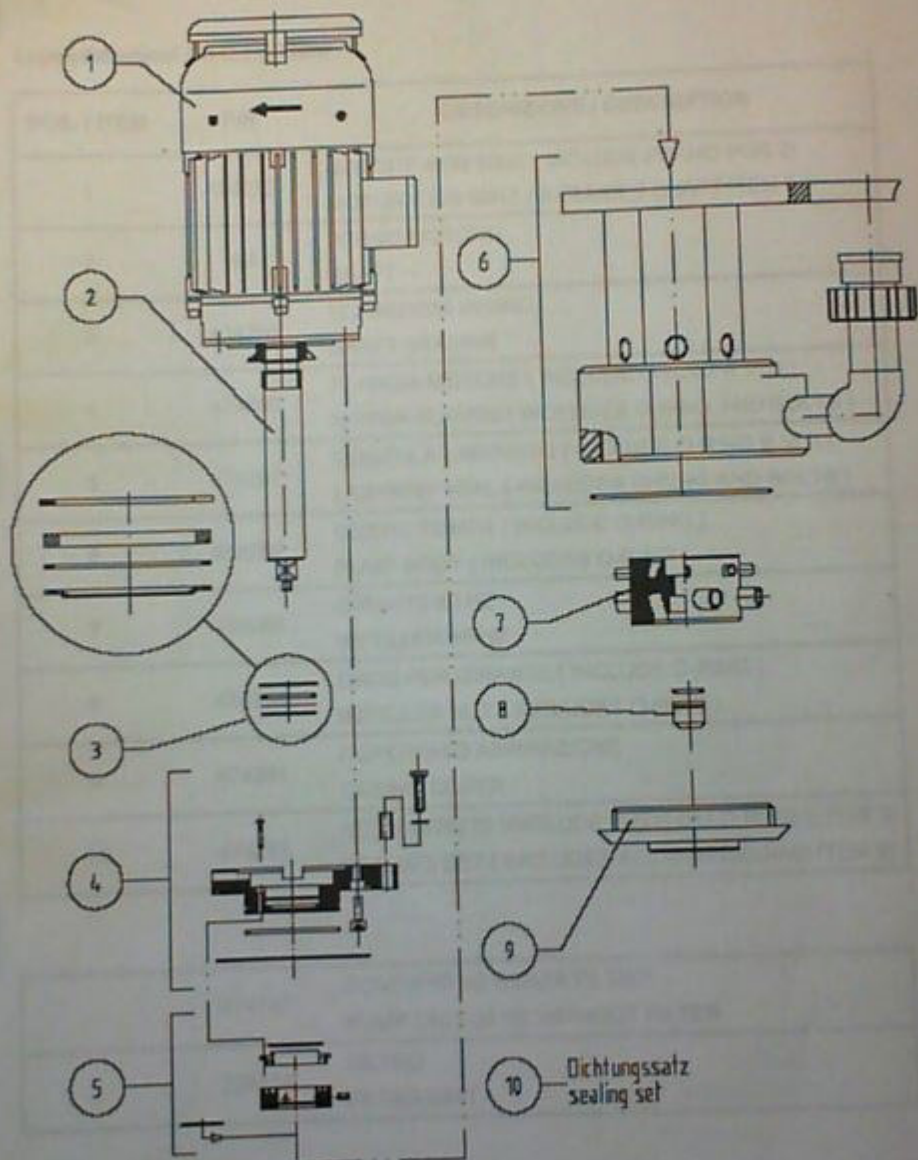
POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	424072	MOTORE 4KW 50HZ ( INCLUDE PERNO POS 2 ) MOTOR 4 KW 50HZ ( INCLUDES SHAFT ITEM 2 )
2	N/A	PERNO MOTORE SHAFT
3	474256	GURNIZIONI PERNO SHAFT SEALING
4	474260	FLANGIA MOTORE ( INCLUDE O-RING E VITI ) MOTOR FLANGE ( INCLUDES O-RING AND BOLTS )
5	474257	TENUTA A LABIRINTO ( INCLUDE O-RING E VITI ) LABYRINT SEAL ( INCLUDES O-RING AND BOLTS )
6	474258	CORPO POMPA ( INCLUDE O-RING ) PUMP BODY ( INCLUDES O-RING )
7	474064	GIRANTE 50 HZ IMPELLER 50 HZ
8	474259	DADO PER GIRANTE ( INCLUDE O-RING ) IMPELLER NUT ( INCLUDES O-RING )
9	474251	COPERCHIO ASPIRAZIONE CASING COVER
10	474262	KIT DI TENUTE (INCLUDE TUTTI GLI O-RING E POS 3) SEALING SET ( INCLUDES ALL O-RINGS AND ITEM 3 )

	474166	POMPA SENZA FILTRO PUMP UNIT WITHOUT FILTER
	204114	FILTRO FILTER UNIT



POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	204064	COPERCHIO FILTRO LID
1.1	204184	TAPPO PLUG
1.2	844324/TI	VITE SCREW
1.3	844062/TI	RONDELLA WASHER
1.4	204132	PERNO PER COPERCHIO ROD FOR LID
1.5	204129	O-RING O-RING
2	204117	ANELLO CLAMP RING
3	204141	TESSUTO FILTRO 200 $\mu$ FILTER MESH 200 $\mu$
4	204181	SUPPORTO TESSUTO FILTRO FILTER MESH SUPPORT
5	204194	TUBO INSERTO FILTRO FILTER INSERT TUBE
6	204196	RACCORDO INGRESSO FILTRO FILTER INLET CONNECTION
6.1	204128	O-RING O-RING
7	204106	GHIERA UNION RING
8	204108	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK

9	204107	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK
10	204129	O-RING O-RING
11	204173	SENSORE PER ECCENTRICO - CORTO - SENSOR FOR ECCENTRIC LOCK - SHORT -
12	204173	SENSORE PER COPERCHIO -LUNGO - SENSOR FOR LID - LONG -
13	204087	CORPO FILTRO FILTER BODY
14	204124	MANIGLIA HANDLE
15	204198	VITE PER ECCENTRICO SCREW FOR ECCENTRIC LOCK
16	204178	PERNETTO PER ECCENTRICO PIN FOR ECCENTRIC LOCK



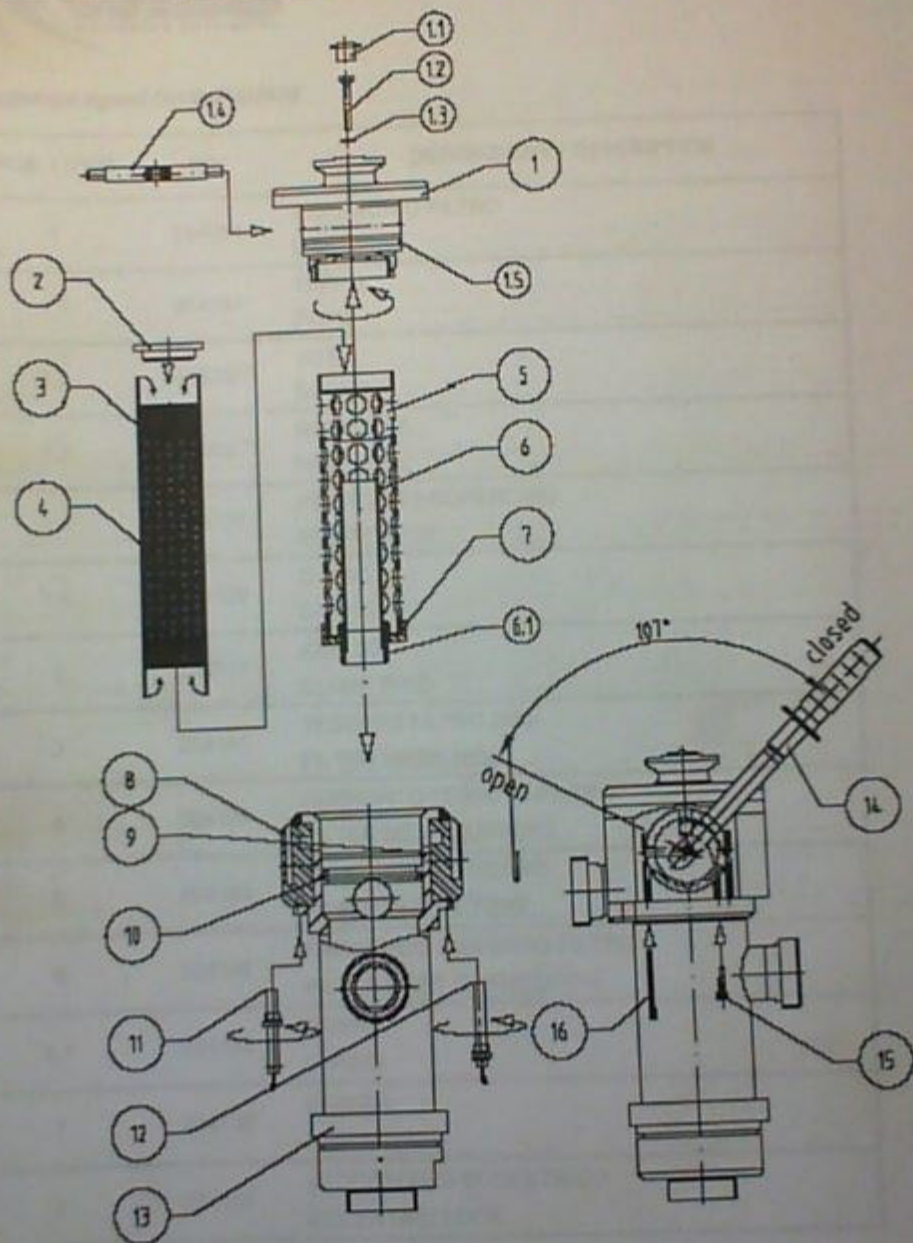


Legenda Legend DWG.ESD3508

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	424073	MOTORE 4KW 60HZ ( INCLUDE PERNO POS 2) MOTOR 4 KW 60HZ ( INCLUDES SHAFT ITEM 2 )
2	N/A	PERNO MOTORE SHAFT
3	474256	GURNIZIONI PERNO SHAFT SEALING
4	474260	FLANGIA MOTORE ( INCLUDE O-RING E VITI ) MOTOR FLANGE ( INCLUDES O-RING AND BOLTS )
5	474257	TENUTA A LABIRINTO ( INCLUDE O-RING E VITI ) LABYRINT SEAL ( INCLUDES O-RING AND BOLTS )
6	474258	CORPO POMPA ( INCLUDE O-RING ) PUMP BODY ( INCLUDES O-RING )
7	474066	GIRANTE 60 HZ IMPELLER 60 HZ
8	474259	DADO PER GIRANTE ( INCLUDE O-RING ) IMPELLER NUT ( INCLUDES O-RING )
9	474261	COPERCHIO ASPIRAZIONE CASING COVER
10	474262	KIT DI TENUTE (INCLUDE TUTTI GLI O-RING E POS 3) SEALING SET ( INCLUDES ALL O-RINGS AND ITEM 3 )

474167	POMPA 60 HZ SENZA FILTRO PUMP UNIT 60 HZ WITHOUT FILTER
204114	FILTRO FILTER UNIT

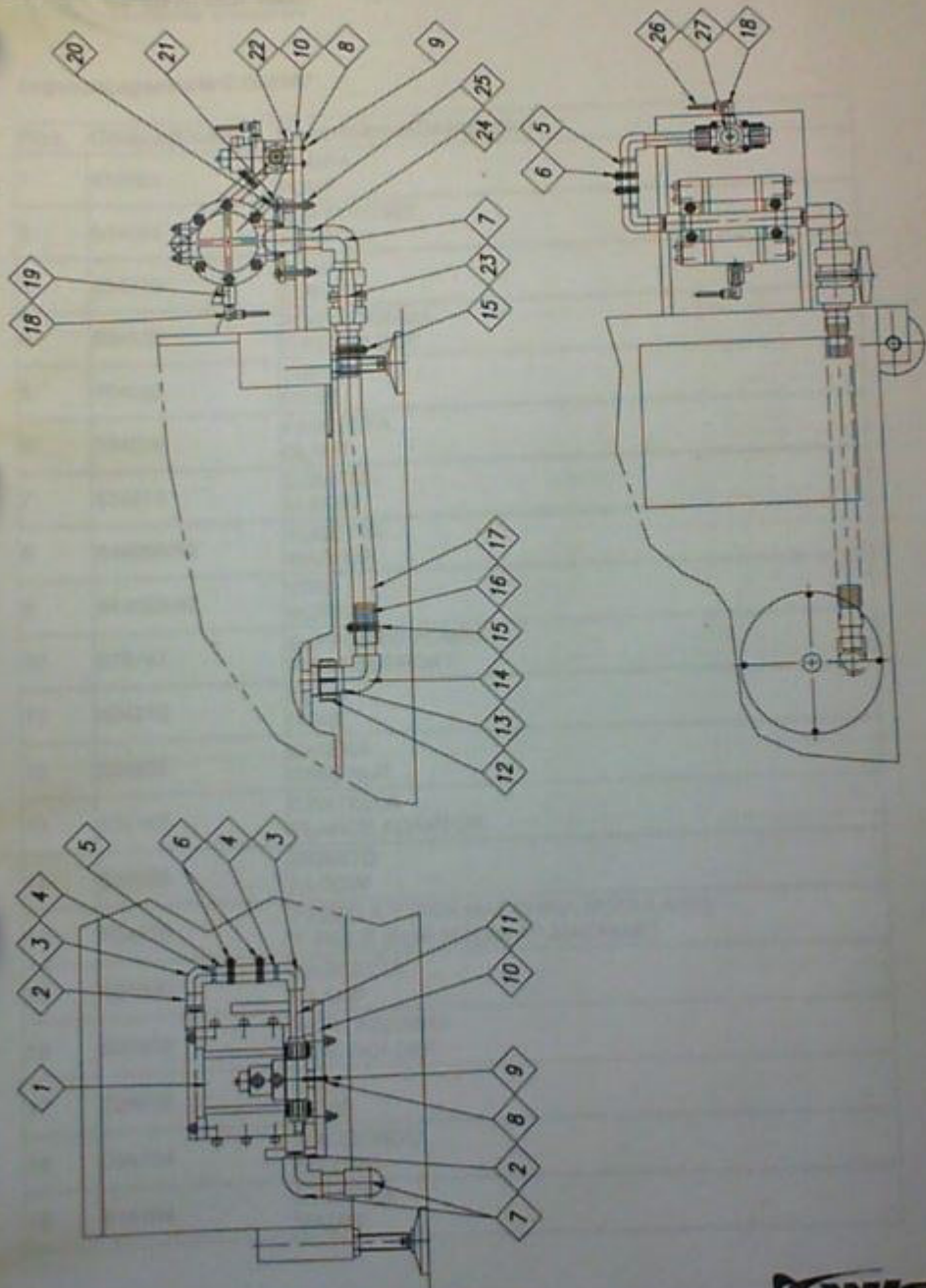




Legenda Legend DWG.ESD3508

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	204064	COPERCHIO FILTRO LID
1.1	204184	TAPPO PLUG
1.2	844324/TI	VITE SCREW
1.3	844062/TI	RONDELLA WASHER
1.4	204132	PERNO PER COPERCHIO ROD FOR LID
1.5	204129	O-RING O-RING
2	204117	ANELLO CLAMP RING
3	204141	TESSUTO FILTRO 200 $\mu$ FILTER MESH 200 $\mu$
4	204181	SUPPORTO TESSUTO FILTRO FILTER MESH SUPPORT
5	204194	TUBO INSERTO FILTRO FILTER INSERT TUBE
6	204196	RACCORDO INGRESSO FILTRO FILTER INLET CONNECTION
6.1	204128	O-RING O-RING
7	204106	GHIERA UNION RING
8	204108	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK

9	204107	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK
10	204129	O-RING O-RING
11	204173	SENSORE PER ECCENTRICO - CORTO - SENSOR FOR ECCENTRIC LOCK - SHORT -
12	204173	SENSORE PER COPERCHIO -LUNGO - SENSOR FOR LID - LONG -
13	204097	CORPO FILTRO FILTER BODY
14	204124	MANIGLIA HANDLE
15	204198	VITE PER ECCENTRICO SCREW FOR ECCENTRIC LOCK
16	204178	PERNETTO PER ECCENTRICO PIN FOR ECCENTRIC LOCK



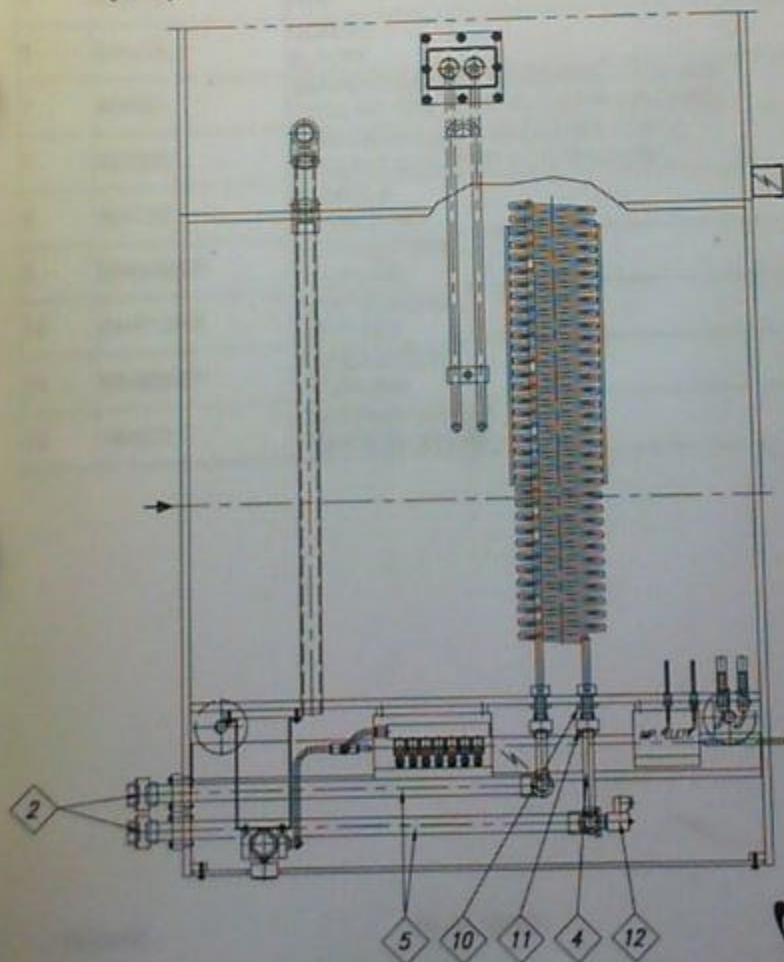
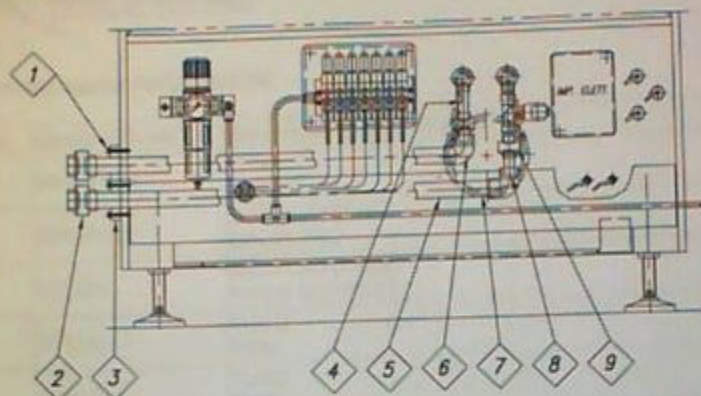
16-04-07

EPC-M-107011

Legenda Legend DWG.EP3597

Pos.	Codice/Code	Descrizione/Description
1	474161	POMPA PUMP
2	534043	ADATTATORE ADAPTER
3	534270	GOMITO ELBOW
4	534405	PORTAGOMMA PIPE HOLDER
5	794053	TUBO HOSE
6	194009	FASCETTA CLAMP
7	534273	GOMITO ELBOW
8	844096/A2	ROSETTA WASHER
9	844099/A2	VITE SCREW
10	676747	SUPPORTO POMPA PUMP SUPPORT
11	604210	TUBO HOSE
12	534236	GHIERA RING NUT
13	534185	CARTELLA FLANGE ADAPTOR
14	534305	GOMITO ELBOW
14	534378	PEZZO A T (PER MACCHINA MODULARE) T PIECE (FOR MODULAR MACHINE)
15	194020	FASCETTA CLAMP
16	534519	PORTAGOMMA PIPE HOLDER
17	794058	TUBO HOSE
18	394154	RACCORDO FITTING
19	814154	VALVOLA VALVE

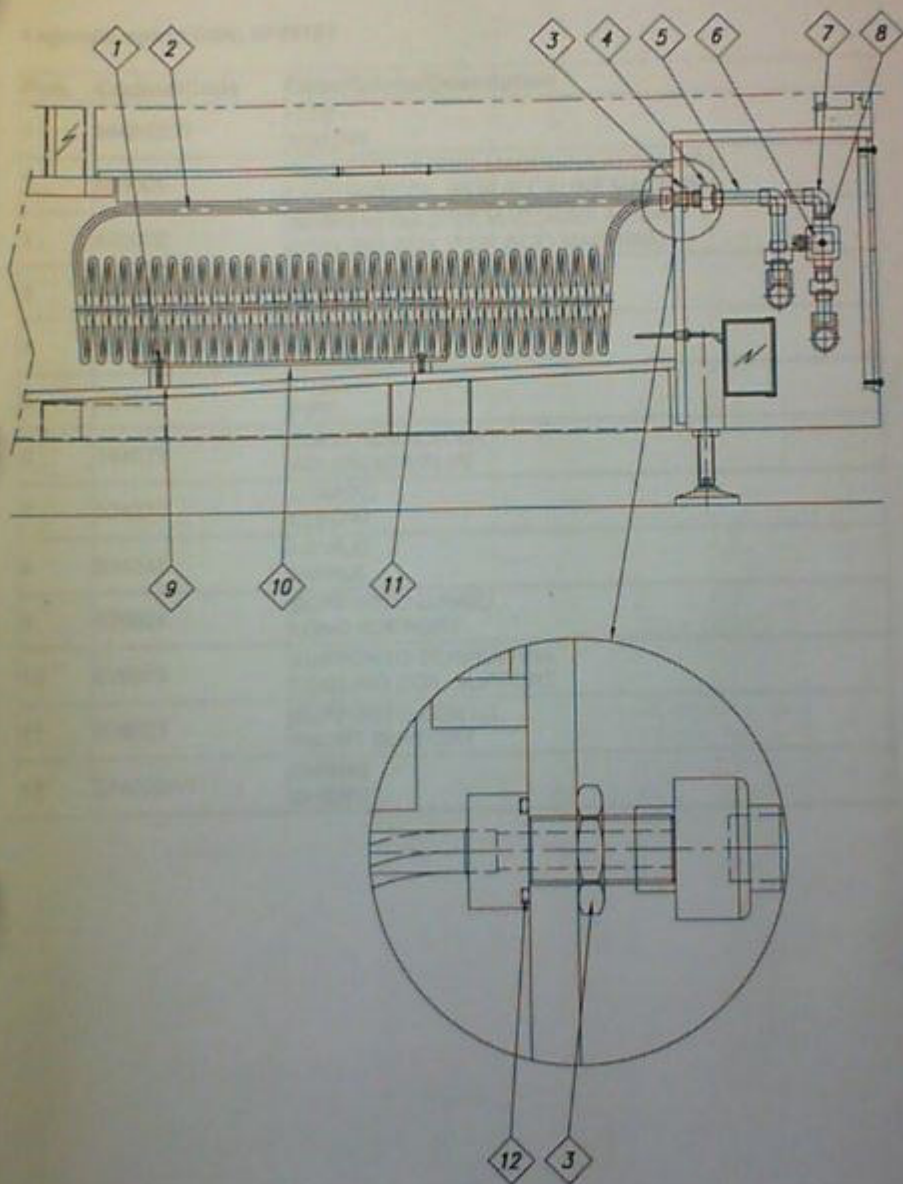
20	844325/A2	VITE SCREW
21	844062/A2	ROSETTA WASHER
22	176129	DISTANZIERE SPACER
23	814132/EP	VALVOLA VALVE
24	604213	TUBO PIPE
25	844124/A2	DADO NUT
26	794005	TUBO HOSE
27	184123	VALVOLA VALVE



Legenda Legend DWG.EP35126

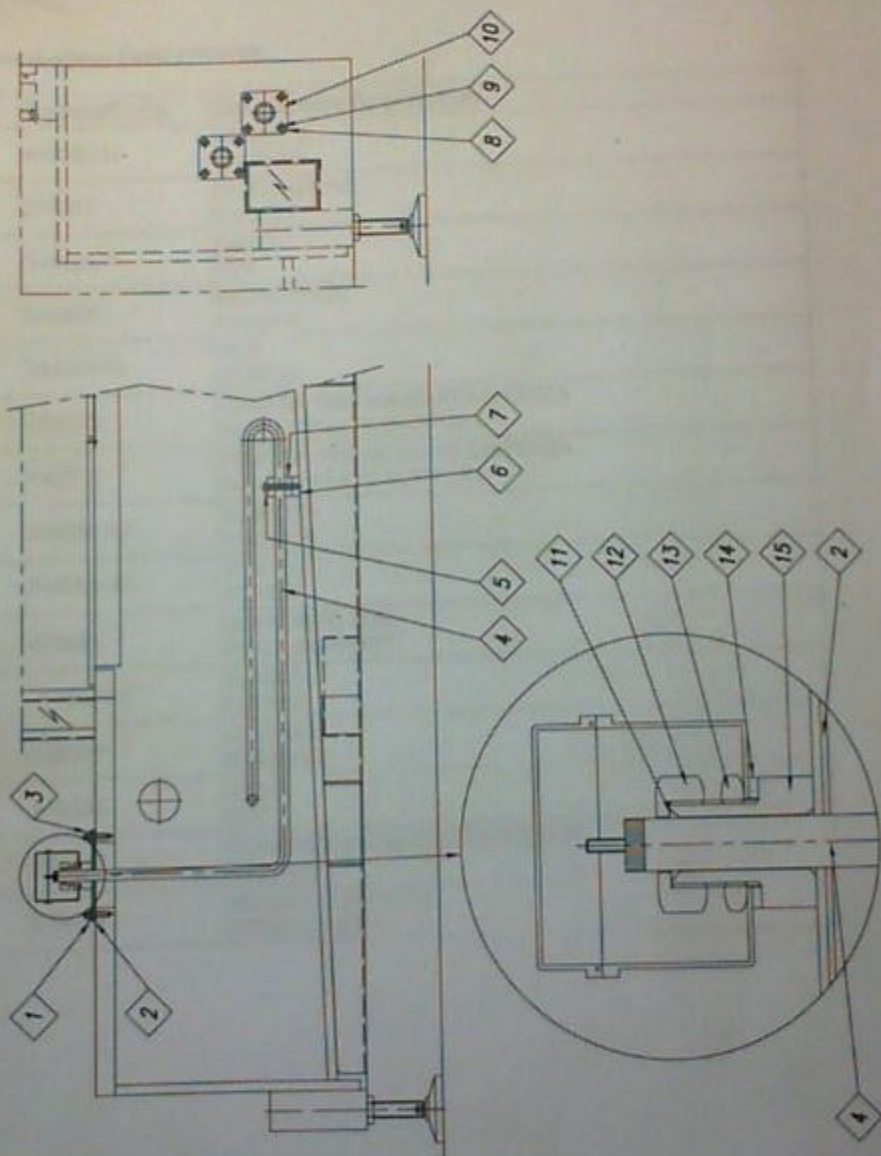
Pos.	Codice/Code	Descrizione/Description
1	844091/A2	VITE SCREW
2	534081/EP	BOCCHETTONE COUPLING
3	676621	SUPPORTO TUBI PIPES SUPPORT
4	604210	TUBO PIPE
5	604213	TUBO PIPE
6	534273	GOMITO ELBOW
7	626001	SERPENTINA (PER MACCHINA ALCALINA) COOLING COIL (FOR ALKALINE MACHINE)
7	626002	SERPENTINA (PER MACCHINA ACIDA) COOLING COIL (FOR ACID MACHINE)
8	534130	BUSSOLA UNION BUSH
9	534078/EP	BOCCHETTONE COUPLING
10	844011/A2	CONTRODADO LOCK NUT
11	534068/EP	BOCCHETTONE COUPLING
12	184077	ELETTROVALVOLA SOLENOID VALVE





Legenda Legend DWG.EP35127

Pos.	Codice/Code	Descrizione/Description
1	844045/T1	VITE SCREW
2	626001	SERPENTINA (PER MACCHINA ALCALINA) COOLING COIL (FOR ALCALINE MACHINE)
2	626002	SERPENTINA (PER MACCHINA ACIDA) COOLING COIL (FOR ACID MACHINE)
3	844011/A2	CONTRODADO NUT
4	534068/EP	BOCCHETTONE COUPLING
5	604210	TUBO PIPE
6	184077	ELETTROVALVOLA SOLENOID VALVE
7	534270	GOMITO ELBOW
8	534343	NIPPLO NIPPLE
9	676624	SUPPORTO LUNGO LONG SUPPORT
10	676079	SUPPORTO SERPENTINA COOLING COIL SUPPORT
11	676623	SUPPORTO CORTO SHORT SUPPORT
12	274039/VI	O-RING O-RING



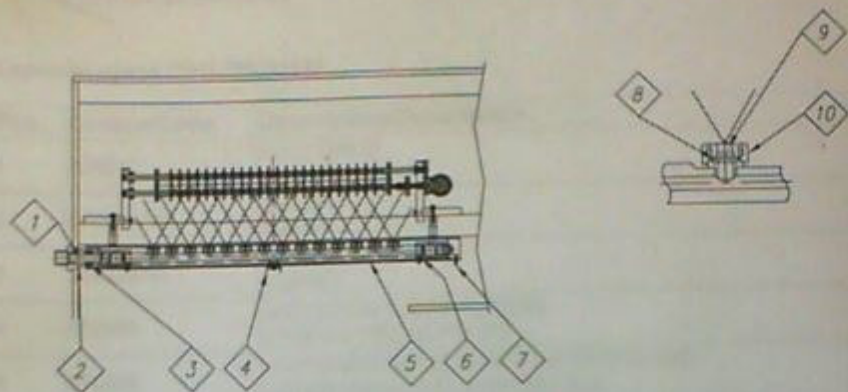
Legenda Legend DWG.EP35128

Pos.	Codice/Code	Descrizione/Description
1	844062/T1	ROSETTA WASHER
2	276051	GUARNIZIONE GASKET
3	844024/T1	DADO NUT
4	546009	RESISTENZA HEATER
5	844323/T1	VITE SCREW
6	756113	PIASTRA FISSAGGIO RESISTENZA HEATER PLATE SUPPORT
7	756112	PIASTRA FISSAGGIO RESISTENZA HEATER PLATE SUPPORT
8	844095/A2	ROSETTA WASHER
9	844091/A2	VITE SCREW
10	676621	SUPPORTO TUBI PIPES SUPPORT
11	274067/VI	O-RING O-RING
12	846105	GHIERA RING NUT
13	846104	DADO NUT
14	276050	GUARNIZIONE MOZZO FILETTATO GASKET
15	216094	MOZZO FILETTATO THREAD HUB



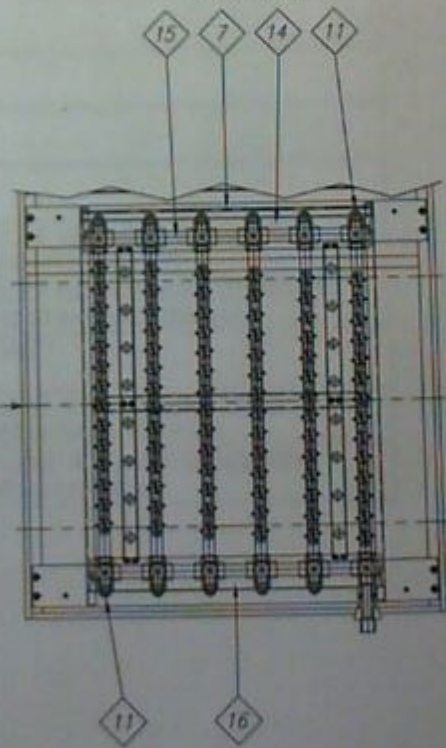
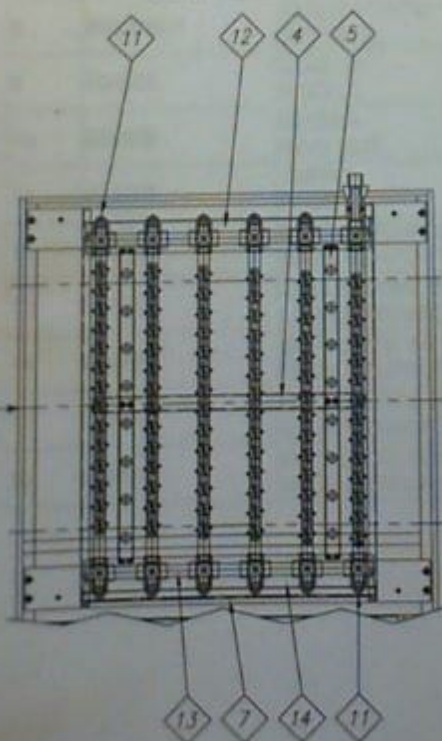
LegendaLegend DWG.EP3598

Pos.	Codice/Code	Descrizione/Description
1	676744	SUPPORTO SUPERIORE 650 UPPER SUPPORT 650
2	676742	SUPPORTO INFERIORE 650 LOWER SUPPORT 650
3	844016/T1	VITE SCREW
4	844062/T1	ROSETTA WASHER



VERSIONE STANDARD  
STANDARD VERSION

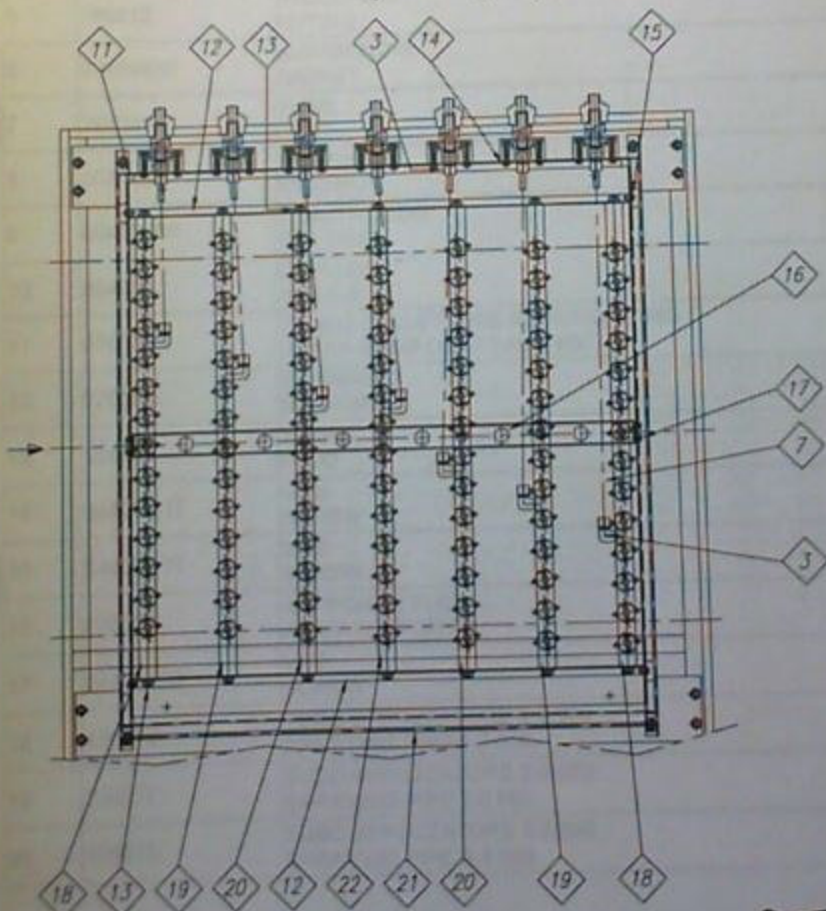
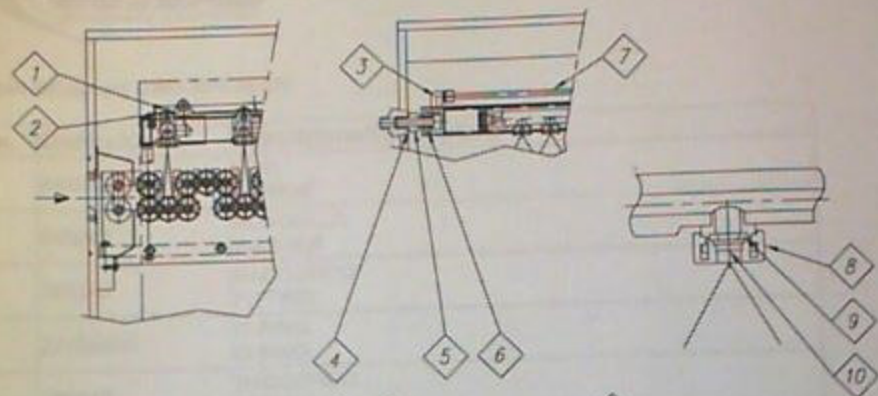
VERSIONE SPECULARE  
MIRROR VERSION



Legenda Legend DWG.EPC35130

Pos.	Codice/Code	Descrizione/Description
1	766510	RACCORDO FITTING
2	274027/VI	O-RING O-RING
3	274328/VI	GUARNIZIONE GASKET
4	676498	SOSTEGNO TUBI INFERIORI LOWER PIPES SUPPORT
5	676205	SOSTEGNO COLLETTORE INFERIORE 650 LOWER MANIFOLD SUPPORT 650
6	844094/VI	VITE SCREW
7	656171	CAVALLOTTA U SHAPE PLATE
8	804026/VI	TENUTA DADO NUT SEAL
9	804035	UGELLO NOZZLE
10	804009	GHIERA RING NUT
11	534488	TAPPO PLUG
12	676500	SUPPORTO POSTERIORE VERSIONE STANDARD BACK SUPPORT STANDARD VERSION
13	136261	COLLETTORE INFERIORE 650 VERSIONE STANDARD LOWER MANIFOLD 650 STANDARD VERSION
14	676499	SUPPORTO ANTERIORE FRONT SUPPORT
15	136262	COLLETTORE INFERIORE 650 VERSIONE SPECULARE LOWER MANIFOLD 650 MIRROR VERSION
16	676501	SUPPORTO POSTERIORE VERSIONE SPECULARE BACK SUPPORT MIRROR VERSION



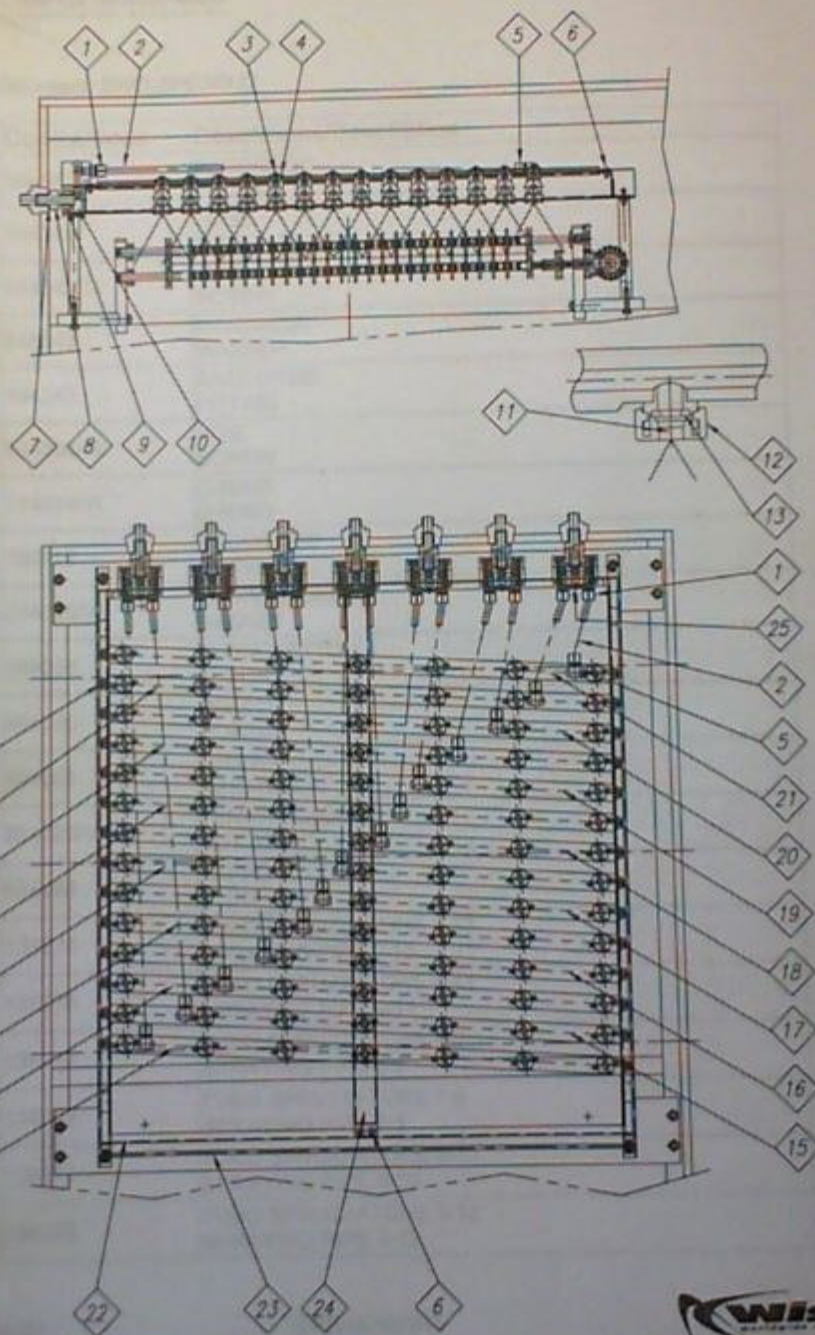


Legenda Legend DWG.EPC35131

Pos.	Codice/Code	Descrizione/Description
1	844042/TI	VITE SCREW
2	846043	RONDELLA WASHER
3	394243	RACCORDO FITTING
4	274044/VI	O-RING O-RING
5	766512	RACCORDO FITTING
6	274046/VI	GUARNIZIONE GASKET
7	794041	TUBO PIPE
8	804009	GHIERA RING NUT
9	804026/VI	TENUTA DADO NUT SEAL
10	804035	UGELLO NOZZLE
11	676630	TELAIO COLLETTORE SUPERIORE 650 UPPER MANIFOLD FRAME 650
12	676505	SUPPORTO SUPPORT
13	534489	TAPPO PLUG
14	844091/TI	VITE SCREW
15	844094/TI	VITE SCREW
16	676504	SUPPORTO TUBI PIPES SUPPORT
17	844041/TI	VITE SCREW
18	136076	TUBO SPRUZZATORE 1-7 650 SPRAYING PIPE 1-7 650
19	136077	TUBO SPRUZZATORE 2-6 650 SPRAYING PIPE 2-6 650
20	136078	TUBO SPRUZZATORE 3-5 650 SPRAYING PIPE 3-5 650



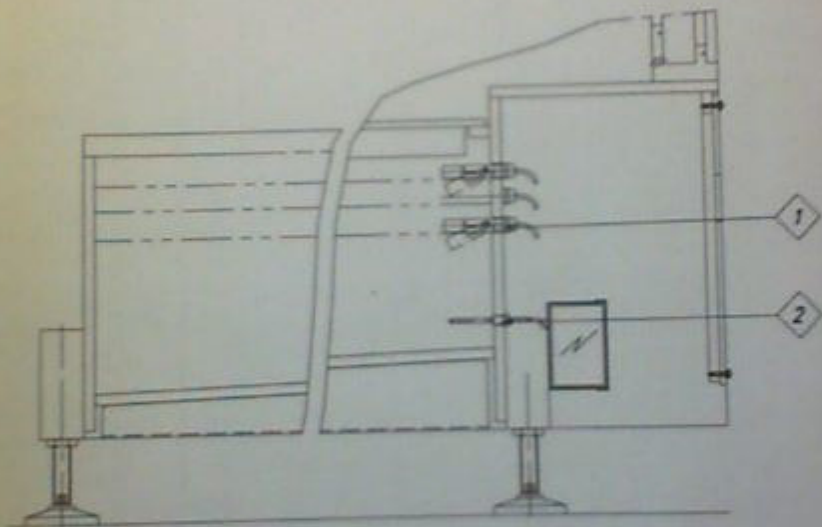
21	656198	CAVALLOTTA U-SHAPE PLATE
22	136079	TUBO SPRUZZATORE 4 650 SPRAYING PIPE 4 650



Legenda Legend DWG.EPC35132

Pos.	Codice/Code	Descrizione/Description
1	394187	RACCORDO FITTING
2	794041	TUBO PIPE
3	844042/TI	VITE SCREW
4	846043	RONDELLA WASHER
5	394243	RACCORDO FITTING
6	844094/TI	VITE SCREW
7	274044/VI	O-RING O-RING
8	766512	RACCORDO FITTING
9	274046/VI	GUARNIZIONE GASKET
10	066036	BLOCCHETTO BLOCK
11	804035	UGELLO NOZZLE
12	804009	GHIERA RING NUT
13	804026/VI	TENUTA DADO NUT SEAL
14	534489	TAPPO PLUG
15	136274	TUBO SPRUZZATORE 2-13 SPRAYING PIPE 2-13
16	136276	TUBO SPRUZZATORE 4-11 SPRAYING PIPE 4-11
17	136278	TUBO SPRUZZATORE 6-9 SPRAYING PIPE 6-9
18	136279	TUBO SPRUZZATORE 7-8 SPRAYING PIPE 7-8
19	136277	TUBO SPRUZZATORE 5-10 SPRAYING PIPE 5-10
20	136275	TUBO SPRUZZATORE 3-12 SPRAYING PIPE 3-12

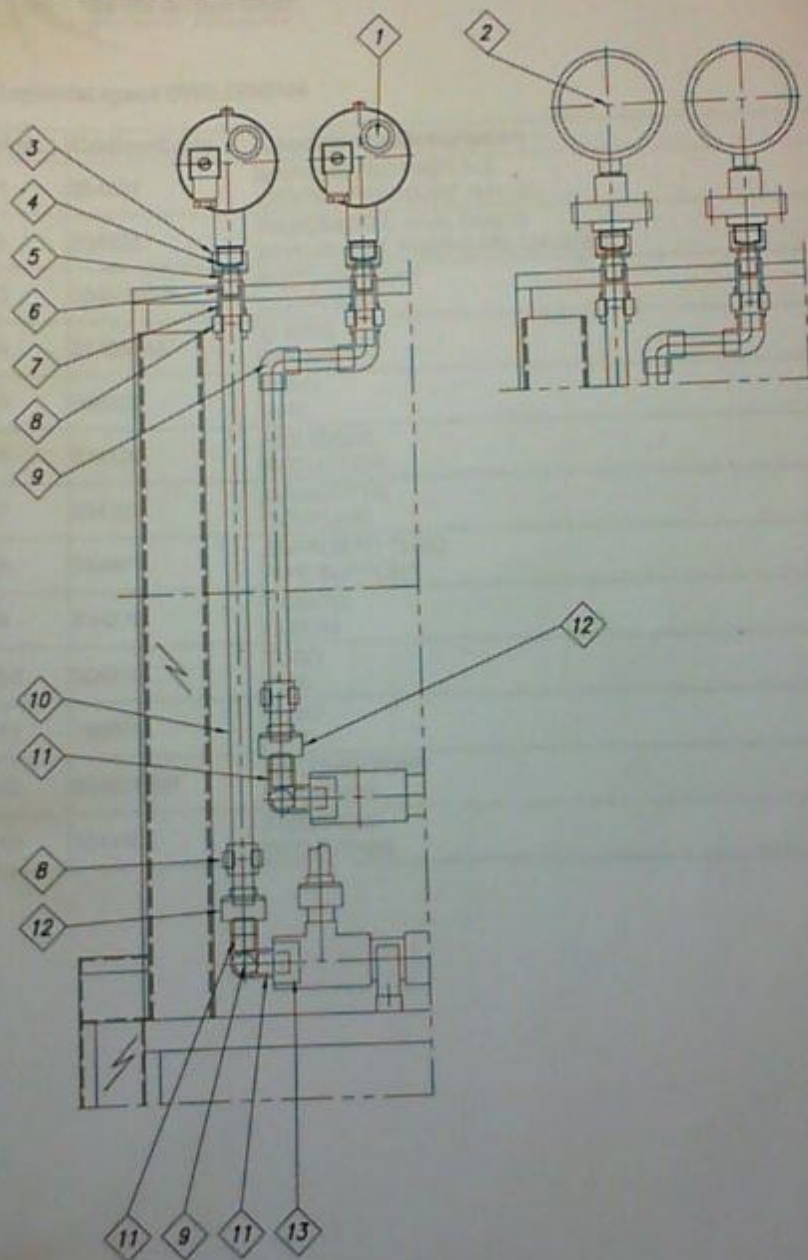
21	136273	TUBO SPRUZZATORE 1-14 SPRAYING PIPE 1-14
22	676630	TELAIO COLLETTORE SUPERIORE 650 UPPER MANIFOLD FRAME 650
23	656198	CAVALLOTTA U-SHAPE PLATE
24	676632	SUPPORTO 650 SUPPORT 650
25	846106	TAPPO PLUG



**Legenda Legend DWG.EP35133**

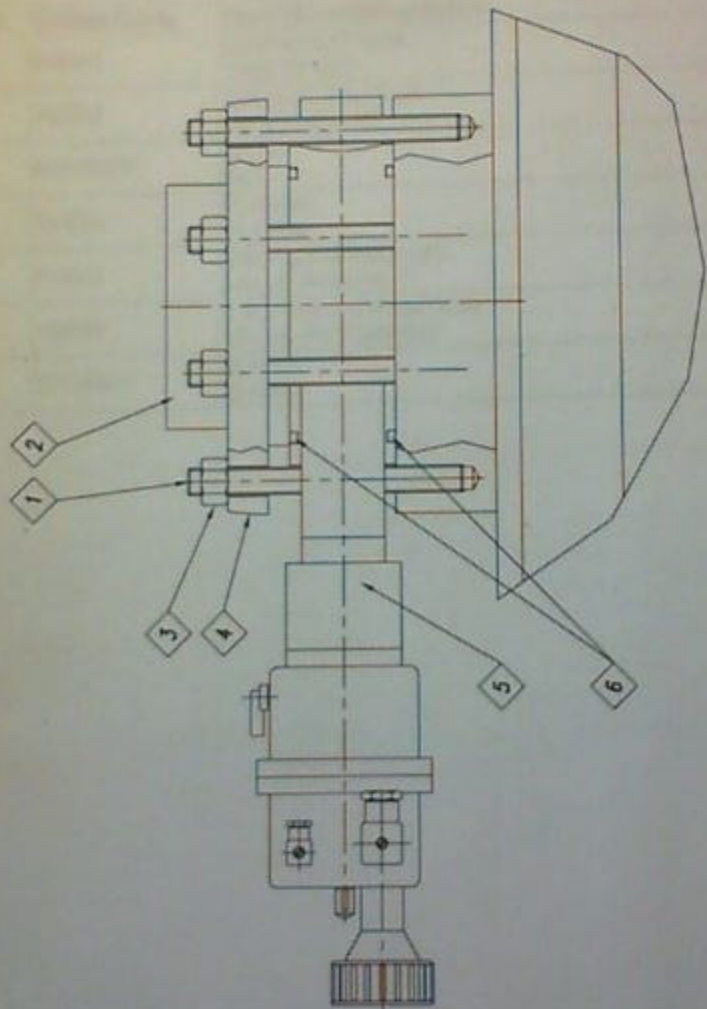
Pos.	Codice/Code	Descrizione/Description
1	344011	LIVELLOSTATO LEVEL SWITCH
2	354057	SONDA PROBE





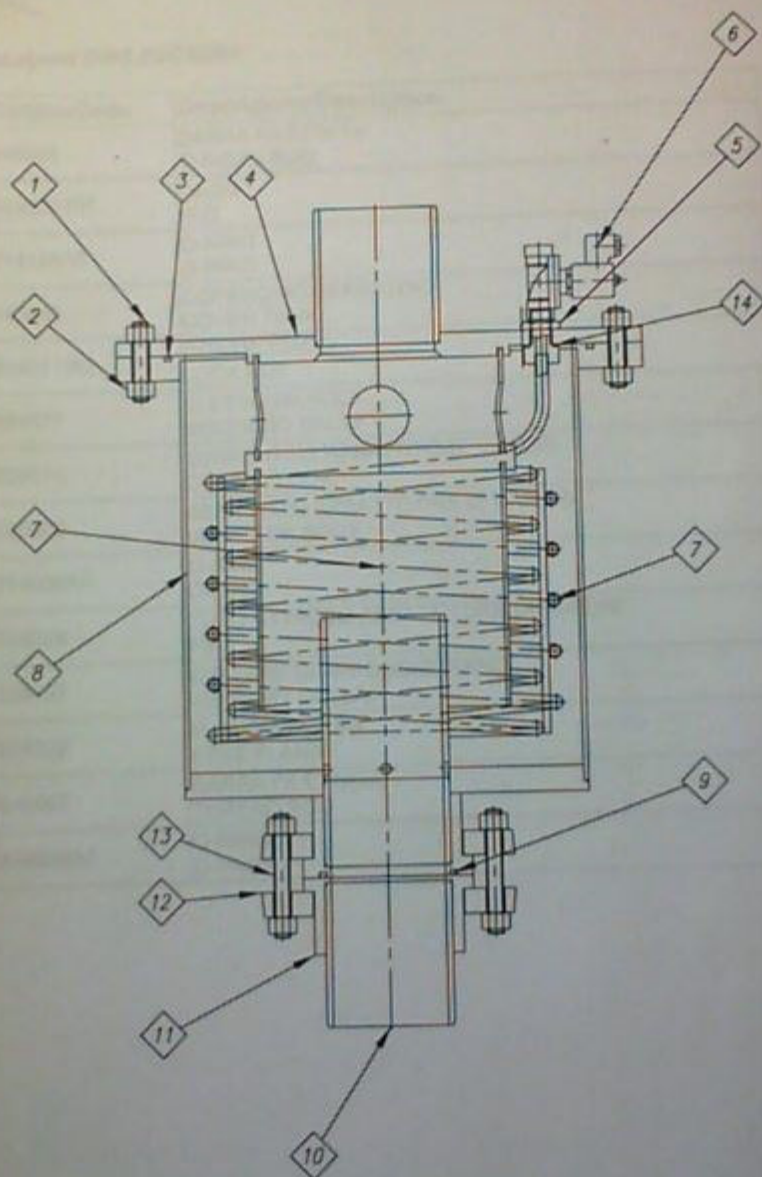
**LegendaLegend DWG.EP35134**

Pos.	Codice/Code	Descrizione/Description
1	354027	MANOMETRO DIGITALE DIGITAL PRESSURE GAUGE
2	354026	MANOMETRO ANALOGICO ANALOGICAL PRESSURE GAUGE
3	534077/EP	BOCCHETTONE COUPLING
4	274064/VI	O-RING O-RING
5	766228	TUBO PIPE
6	534126	RIDUZIONE REDUCTION
7	534323	MANICOTTO COUPLING
8	534471	SUPPORTO TUBO PIPE SUPPORT
9	534270	GOMITO ELBOW
10	604210	TUBO PIPE
11	766033	TUBO PIPE
12	534078/EP	BOCCHETTONE COUPLING
13	534133	RIDUZIONE REDUCTION



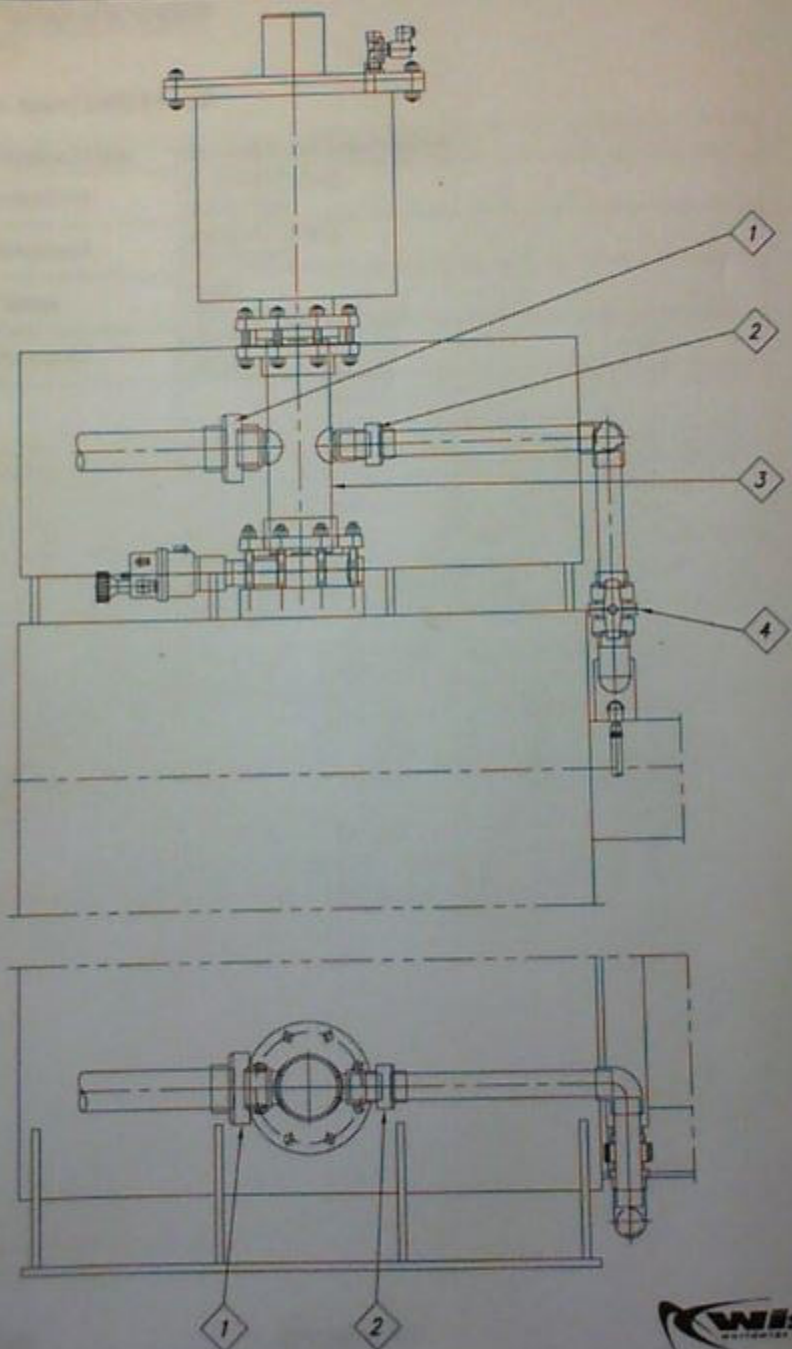
Legenda Legend DWG.EP3599

Pos.	Codice/Code	Descrizione/Description
1	846167	BARRA FILETTATA THREAD ROD
2	766282	COLLARE VALVOLA VALVE COLLAR
3	844028/PP	DADO NUT
4	534222	FLANGIA FLANGE
5	814025	VALVOLA (MANUALE) VALVE (MANUAL)
5	184046	VALVOLA (AUTOMATICA) VALVE (AUTOMATIC)
6	274366/VI	O-RING O-RING



Legenda Legend DWG.ESC30380

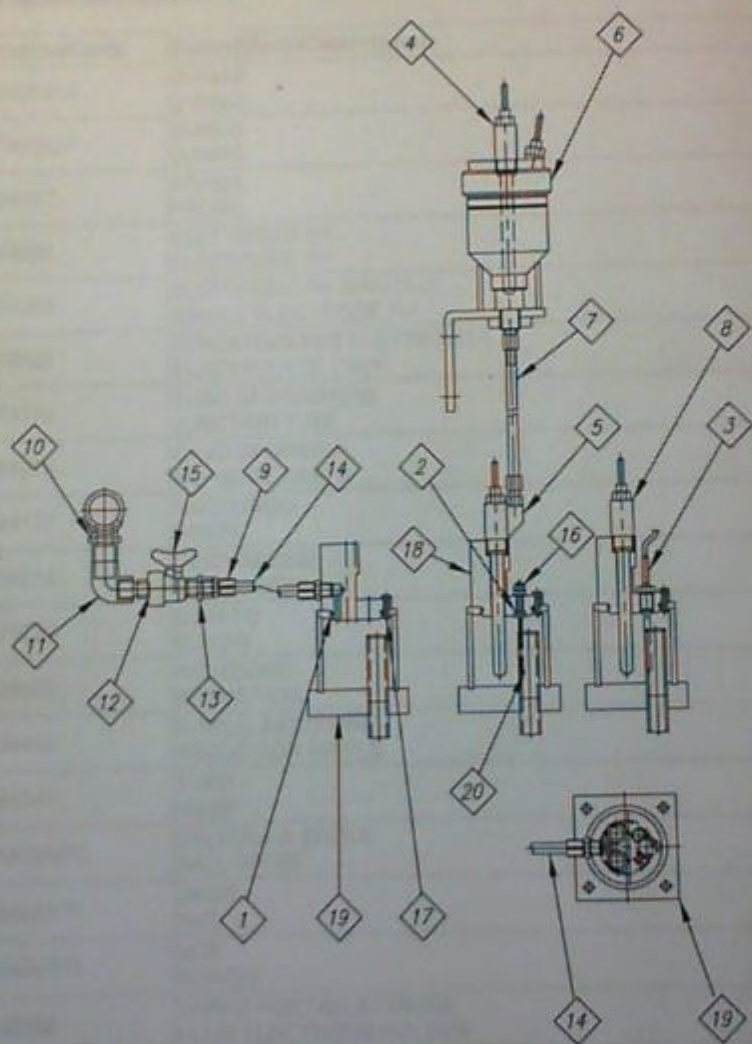
Pos.	Codice/Code	Descrizione/Description
1	846096	BARRA FILETTATA THREAD ROD
2	844028/PP	DADO NUT
3	274186/VI	O-RING O-RING
4	146049	COPERCHIO SERBATOIO COVER TANK
5	844011/A2	CONTRODADO LOCK NUT
6	184077	ELETROVALVOLA SOLENOID VALVE
7	626010	SERPENTINA ABBATTITORE VAPORI COOLING COIL
8	826009	SERBATOIO ABBATTITORE DI VAPORI DEMISTER BODY
9	274038/VI	O-RING O-RING
10	766209	TUBO ATTACCO ABBATTITORE DI VAPORI PIPE
11	534197	COLLARE DI APPOGGIO PIANO SUPPORT COLLAR
12	534222	FLANGIA LIBERA FREE FLANGE
13	846097	BARRA FILETTATA THREAD ROD
14	274039/VI	O-RING O-RING



**Legenda** Legend DWG.EP3590

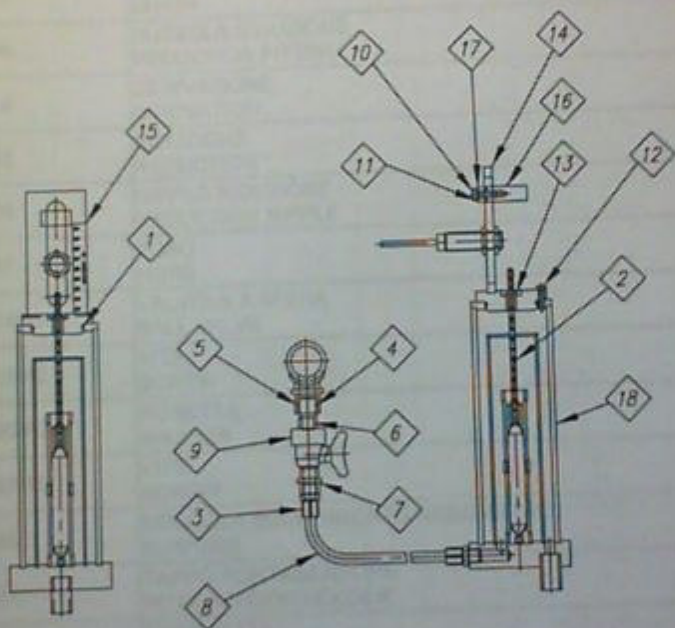
Pos.	Codice/Code	Descrizione/Description
1	534087/EP	BOCCHETTONE COUPLING
2	534084/EP	BOCCHETTONE COUPLING
3	766904	TUBO PIPE
4	814134/EP	VALVOLA VALVE





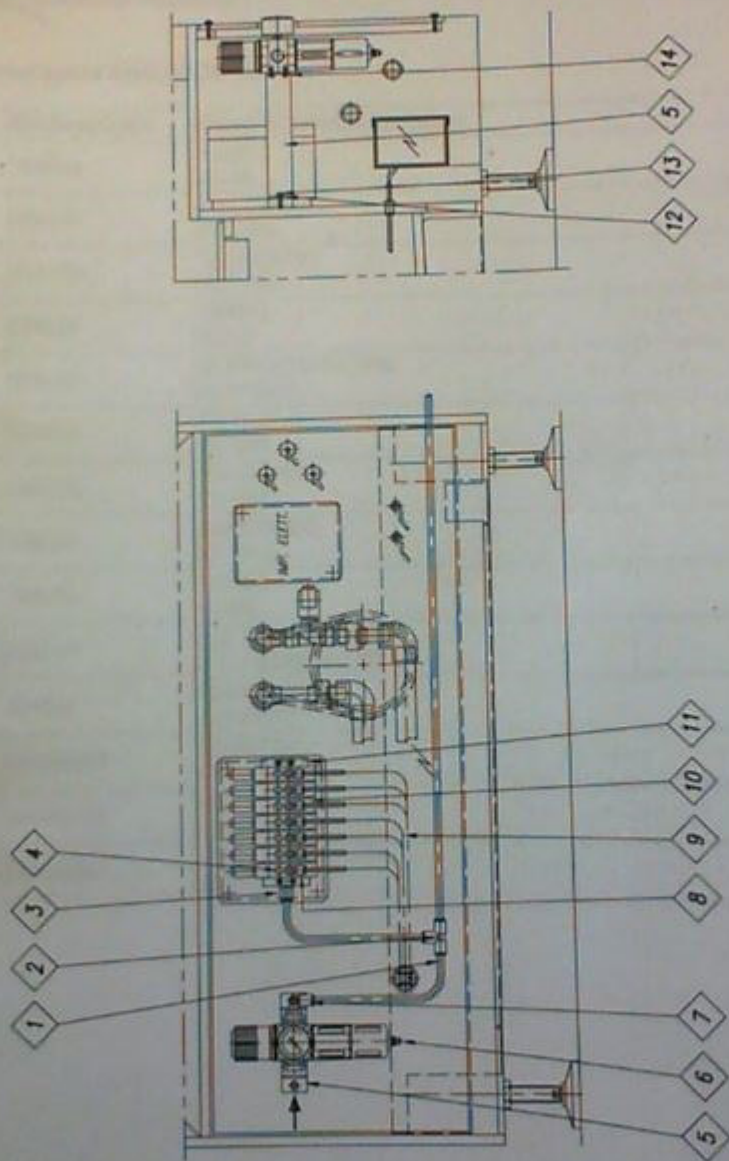
Legenda/Legend DWG.ESC30383

Pos.	Codice/Code	Descrizione/Description
1	274093/VI	O-RING O-RING
2	274054/VI	O-RING O-RING
3	354057	SONDA PROBE
4	364398	ELETTRODO PH ELECTRODE PH
5	364399	ELETTRODO PH SINGOLO SINGLE ELECTRODE PH
6	374009	SERBATOIO PER ELETTROLITA ELECTROLYTE TANK
7	374179	TUBO DI GIUNZIONE JUNCTION TUBE
8	364274	CAVO DI MISURA MEASURE CABLE
9	394187	RACCORDO UNION
10	534214	DERIVAZIONE DERIVATION
11	534270	GOMITO ELBOW
12	534498	RIDUZIONE REDUCTION
13	534499	NIPPLO RIDUZIONE REDUCTION NIPPLE
14	794041	TUBO HOSE
15	814024/PC	VALVOLA A SFERA BALL VALVE
16	844023/VI	DADO NUT
17	844287/VI	VITE SCREW
18	146052	TAPPO PORTAELETTRODI PLUG ELECTRODE HOLDER
19	826011	SCATOLA PER PH-METRO PH-METER TANK
20	846100	VITE DI MASSA SCREW



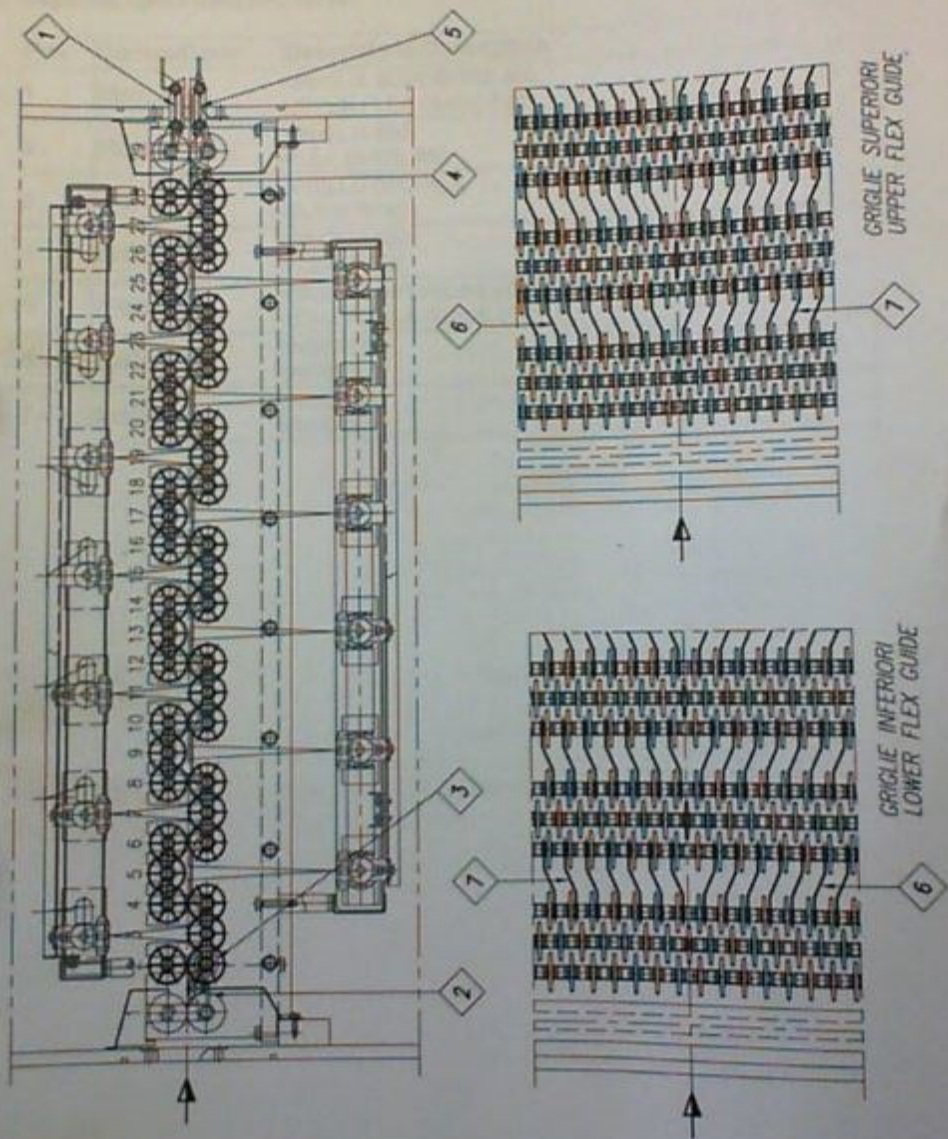
Legenda Legend DWG.ESC30384

Pos.	Codice/Code	Descrizione/Description
1	274093/VI	O-RING O-RING
2	304020	AREOMETRO AEROMETER
3	394187	RACCORDO UNION
4	534126	BUSSOLA RIDUZIONE REDUCTION FITTING
5	534214	DERIVAZIONE DERIVATION
6	534498	RIDUZIONE REDUCTION
7	534499	NIPPLO RIDUZIONE REDUCTION NIPPLE
8	794041	TUBO HOSE
9	814024/VI	VALVOLA A SFERA BALL VALVE
10	844015/A2	VITE SCREW
11	844095/A2	ROSETTA WASHER
12	844287/VI	VITE SCREW
13	076036	BOCCOLA SCORRIMENTO AREOMETRO BUSHING
14	146051	TAPPO PORTASENORE PLUG SENSOR HOLDER
15	376003	TARGHETTA PLATE
16	756026	PIATTO ARRESTO AREOMETRO PLATE
17	756027	PIASTRINA DI FISSAGGIO FIXING PLATE
18	826010	SCATOLA PER DENSIMETRO DENSIMETER BOX



**Legenda** Legend DWG.EPC35138

Pos.	Codice/Code	Descrizione/Description
1	794032	TUBO HOSE
2	394145	RACCORDO FITTING
3	394175	RACCORDO FITTING
4	524008	TAPPO PLUG
5	656196	SUPPORTO FILTRO SUPPORT
6	394117	FILTRO FILTER
7	394150	RACCORDO FITTING
8	394009	RACCORDO FITTING
9	794005	TUBO HOSE
10	394017	ELETTROVALVOLA SOLENOID VALVE
11	394015	SUPPORTO SUPPORT
12	844095/A2	ROSETTA WASHER
13	844042/A2	VITE SCREW
14	844098/A2	VITE SCREW



## Legenda Legend DWG.EPC35139

Pos.	Codice/Code	Descrizione/Description
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	256083/FV	GRIGLIA 650 FLEX GUIDE 650
3	036006	ANELLO DI GUIDA GUIDE RING
4	256085/FV	GRIGLIA 650 FLEX GUIDE
5	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
6	256233	INSERTO INSERT
7	256234	INSERTO INSERT





**Manuale di Istruzioni  
Usa e Manutenzione**

**Operating Instructions  
and Maintenance Manual**

**Modulo/Module:**

**INTERMITTENT SPRAY L=660 (650)**

**Data/Date: 04-2007**

*Codice del Manuale  
Manual code*

EP651-650-EN-04-07

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2. <i>Description</i>	4
3. <i>Operation</i>	6
4. <i>Maintenance</i>	7
5. <i>Troubleshooting guide</i>	9
6. <i>Lists, drawings, photographs and spare parts</i>	12

## 1. Module technical specifications

### 1.1 Module

Module:	INTERMITTENT SPRAY MODULE 650
Model:	L=660, 1 PUMP
Final use:	Module for spraying chemistry in the fabrication of printed circuit boards, utilised at the end of the etching machine, in order to compensate the puddle effect that generally appears on the upper side of the panels.

### 1.2 Diagrams and drawings

Overall dimensions DWG:	EP635-35923
Internal cross sections DWG:	EP635-35923
Other DWG:	N.A.

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	660
- Maximum width (mm):	1280
- Maximum height (mm):	1200
- Net weight (kg):	80

### 1.4 Installed energies and products

#### Electric power

Main line:	see main manual
Power circuit:	see main manual
Control circuit :	see main manual

#### Compressed air

Pressure (bar):	from 6 to 8
Consumption (m <sup>3</sup> /h):	negligible

#### Caloric heating energy

Caloric energy (kcal):	N.A.
Inlet heating fluid temperature (°C):	Max. N.A., Min. N.A.
Minimum capacity (l/h):	N.A.

#### Caloric cooling energy

Caloric energy (kcal):	1850
Inlet cooling fluid temperature (°C):	from 3 to 10
Minimum capacity (m <sup>3</sup> /h):	0,3



**Air exhaust:**

Type of connection:

Capacity (m3/h):

Pressure (mmH2O):

smooth PVC pipe  $\varnothing$ 50 mm  
from 10 to 20 (to be defined  
according with the process  
requirement)  
from 50 to 100 (to be defined  
according with the process  
requirement)

**Products:**

Mains water pressure/capacity(bar-l/h):

Demineralised water pressure/capacity(bar-l/h):

Inflammables:

Neutral gases:

Acids and/or bases:

Toxic products:

Other:

N.A.

N.A.

N.A.

N.A.

Etching solution

Etching solution

N.A.

## **2 Description**

Module for spraying chemistry in the fabrication of printed circuit boards, utilised at the end of the etching machine, in order to compensate the puddle effect that generally appears on the upper side of the panels.

The encoder connected to the PLC of the Etchstar gives a signal for the perfect positioning of the boards at any time inside the etching chamber. In this way the module will be able to work "ON - OFF" in relation of the panel size in order to reduce the puddle effect and increase etching uniformity.

Four "buffer cylinders" are also fitted at the input of the spray pipes to compensate and maintain constant pressure at the pipe itself, when the valve is switched on and off.

This function is possible due to PLC selectivity controls of the four spray bars.

This module is suited for etching production.

### **2.1 Main features**

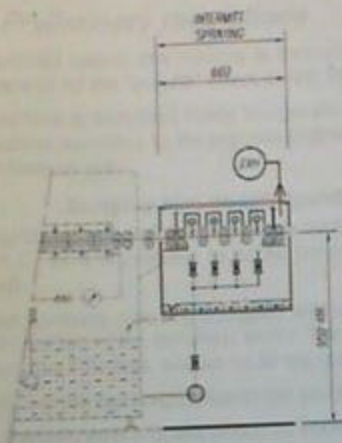
The machine consists in a monocoque self-supporting structure, made of PP plates, appropriately assembled, drilled, bent and welded, to its final shape.

The line-up and type of nozzles ensure perfectly uniform treatment.

The upper part of the processing chamber is sealed by openable temperate glass covers, facilitating the access to the treatment areas.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts, conveyor rollers and spray bars can be removed without using tools.

## 2.2 Longitudinal section



## 2.3 Description of the working station

- Squeegee rollers at inlet and outlet of the module.
- One vertical pump 2,2kW installed on the main etching body.
- Four upper bayonet spray bars with bayonet nozzles.
- Spray pressure roughly 1,8 bar.
- Air exhaust duct at the outlet.

## 3 Operation

### 3.1 Preliminary regulations

As explained before this module is conceived to reduce the defects, of the panel upper side, caused by the "puddle" effect during the etching process.

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.

#### 3.1.1 Spraying pipe on-off regulation

Each spraying pipe solution feeding is controlled by a pneumatic membrane valve, driven by a PLC, so it is possible to spray the board to be treated selectively in a portion pre selected.

The four spraying pipe are equipped with a different quantity of nozzles, in order to cover different portion of the conveyor width. The first pipe is get ready to cover the largest width the second a little less, and so on till the last.

To carry out the right regulation of the on-off system proceed as follows:

- Partially etch a board of 600 by 600mm 1ounce copper, by using only the etching module, intermittent spray module must be off.
- Measure the copper thickness of the partially etched board, each 60 by 60mm, and write the values.
- Repeat the operation by using only the first pipe of the intermittent module, the spraying position must be defined according to the value measured and set on the display interface operator.
- Repeat the operation by using the first and the second pipes of the intermittent module, and so on till the last.

#### 3.1.1 Spraying pipe pressure regulation

It is possible to regulate the spraying pressure by means of a ball valve installed on the delivery side of the pump, the operating pressure is shown in a pressure gauge.

### 3.2 Start up

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

## 4. Maintenance

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### 4.1 Daily maintenance

It is a set of daily activities ensuring the correct functionality of the system.

#### 4.1.1 Filter

Each day check the efficiency status of the filter installed on the pump delivery side. If necessary clean or replace them.

### 4.2 Weekly maintenance

It is a series of weekly activities ensuring the correct functionality of the system.

#### 4.2.1 Nozzles

Each week check the status of the nozzles' efficiency. If necessary provide cleaning or replacement.

#### 4.2.2 Cleaning

Each weekend clean the machines externally avoiding to use abrasive materials or objects, a damped sponge is sufficient for the purpose.



#### **WARNING**

It is forbidden to use highly aggressive products or not compatible with the materials installed in the machinery. Wise s.r.l. shall not be held responsible for damages caused by the use non adequate products.

WISE s.r.l. is available for supplying all the information required for the choice of the suitable product or detergent.

### 4.3 Monthly maintenance

It is the series of monthly activities that ensure the correct functionality of the system.

#### 4.3.1 Transport system

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.





## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE srl technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

#### 5.1.2 *Noise level*

Verify the functionality of the centrifugal pumps:

- Check whether the mechanical parts composing it (bearings, impellor) are worn or damaged. If required replace defective parts.
- Check the level of the liquid inside the tank, the pump should appear completely under water head. Restore the correct level if necessary.

### 5.2 Treatment

#### 5.2.1 *Insufficient treatment*

Check the quality of the solution and if required provide the necessary corrective actions.

Verify that spray pressure is within the required process values and, if necessary, check as follows:

- The status of the filter installed on delivery side of the recirculation pump. Clean or replace if necessary.
- Check the efficiency and correct functionality of the recirculation pump. If required repair or replace the pump.

Check the spraying tubes and relative nozzles for deposits or encrustations. For this purpose there is a dedicate cycle "NOZZLE CHECK" see display interface operator manual. In addition to the nozzle check inspection it is also helpful to carry out an hydraulic check by feeding each tube with fresh water from mains, ensuring the status of the same. If necessary, restore the correct functionality of the tubes and the nozzles.

Check the status of the spraying nozzles' orifice. In addition to the visual inspection make a hydraulic check by feeding each single tube with mains water thus allowing to verify the spray jet of each nozzle, which should appear regular and flat, and with the below described dispersion angle:

- Process sections nozzles 60°

Replace the nozzles if worn.

The characteristics of the panel to be processed as for example, very small line and space, make the etching operation more difficult, if required provide the necessary corrective regulation.

If the above listed should not be sufficient, contact the local Representative otherwise take direct contact with the technical assistance of WISE s.r.l.

### 5.2.2 *Excess of encrustations*

During operations calcareous formation may be possible, which is commonly eliminated by performing the washing cycle afore described. The formation of encrustations can be reduced by feeding softened water to the washing sections.



#### **WARNING**

The use of demineralised water could damage some components installed in the machinery. WISE s.r.l. will not be held responsible for any damages caused by the use of demineralised water.

WISE s.r.l. is available for all the information and eventual modifications required for the use of demineralised water.

### 5.2.3 *Centrifugal pumps' running problems*

**Pressure loss or reduction:**

- In the event of a newly installed pump check the direction of rotation, usually indicated by an arrow placed on the pump. If necessary, invert one phase of the power supply to invert the direction of rotation.
- Verify the pump ducts for foreign particles or encrustations. Remove the cause of obstruction.
- If the pressure loss is revealed with a certain delay after pump start-up, the cause could be attributed to the presence of low level of the fluid being pumped, which is the cause of the cavitations phenomenon. That phenomenon drastically reduces the operating pressure. Check the liquid level and if it is the case activate all the necessary actions to eliminate the problem.
- Verify that all spraying nozzles are present and the wear status of their orifices. If required, install the missing nozzles or replace worn nozzles.
- Verify the spray manifolds or tubes for cracks, holes or other irregularity causing possible leakage in the spray manifolds or tubes. Repair or replace damaged parts.
- Verify the pressure display apparatus. If necessary repair or replace it.

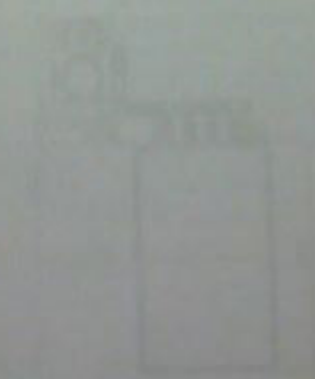
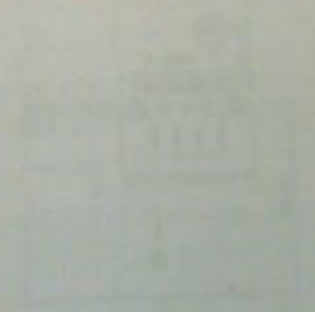
**Too elevated electrical absorption.**

- Verify that all the spraying nozzles are installed and the wear status of their orifices. If necessary, install the missing nozzles or replace the worn ones.
- Verify the presence of cracks, holes or irregularities that may cause leakage in the spraying tubes or manifolds. Repair or replace damaged parts.

## **6. Lists, drawings, photographs and spare parts.**

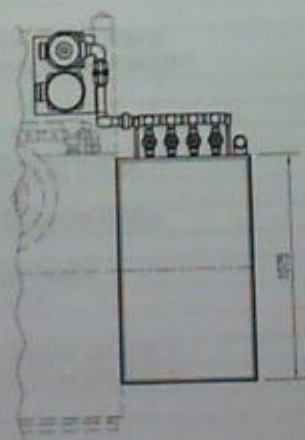
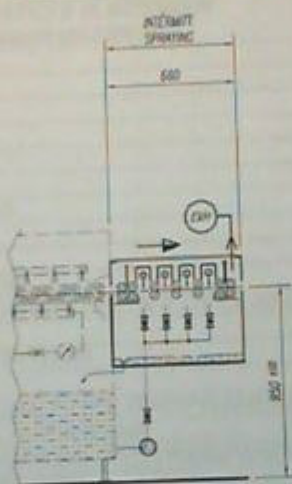
Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

### **6.2 Drawings and spare parts lists**



DWG.EP651-3592J

INTERMITTENT SPRAY 650



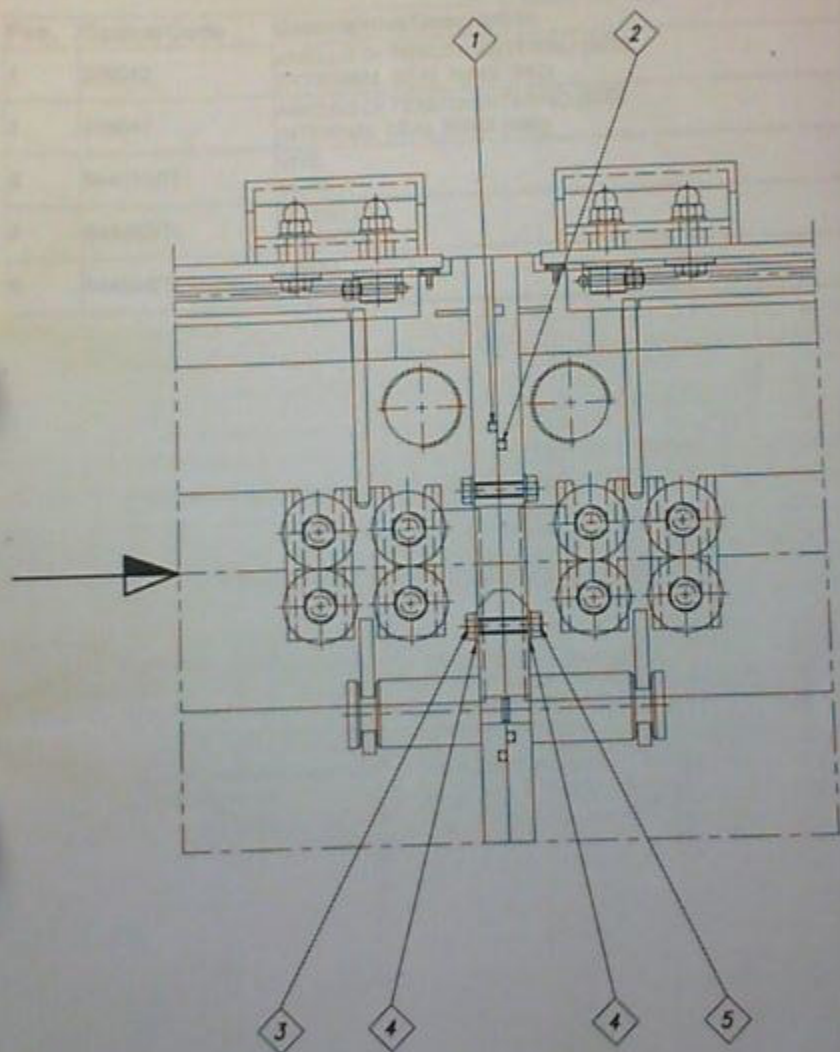
## TABELLA MATERIALI / MATERIALS TABLE

### SIGLE DEI MATERIALI PLASTICI E ELASTOMERI LIST OF PLASTIC AND RUBBER MATERIALS

CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
KR: KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
VI: VITON / VITON
VK: VULKOLLAN / VULKOLLAN

### SIGLE DEI MATERIALI METALLICI E FIBRE LIST OF METALLIC MATERIALS AND FIBERS

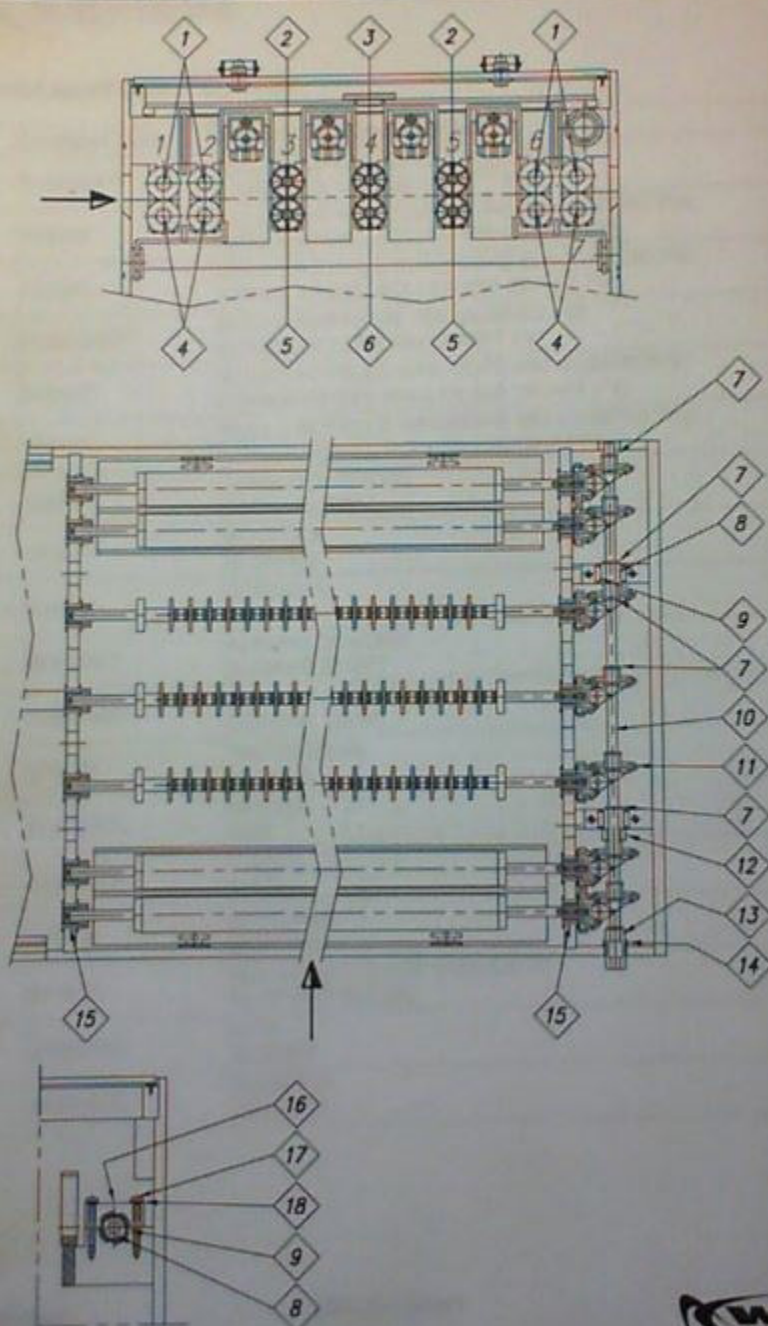
A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM





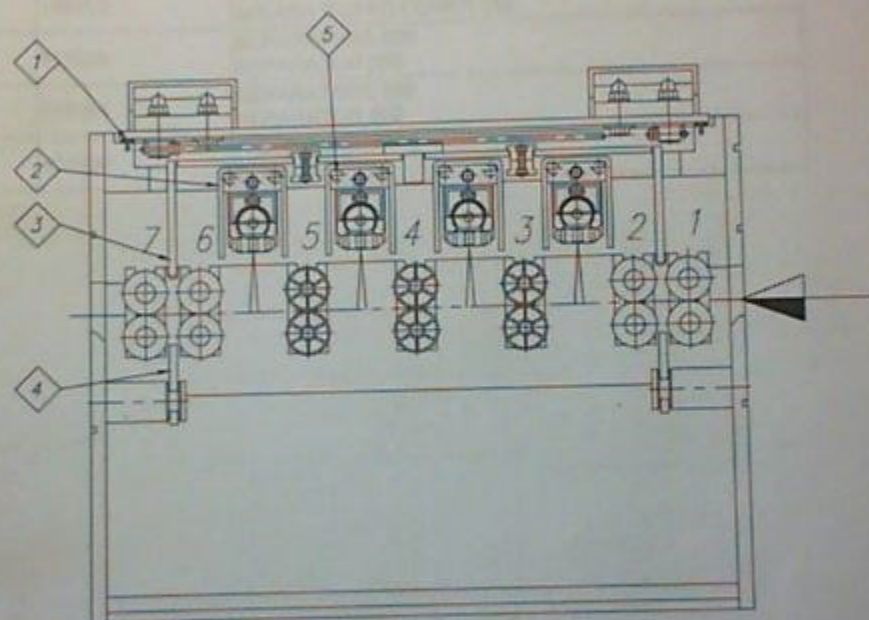
**Legenda/Legend DWG.EP35922**

Pos.	Codice/Code	Descrizione/Description
1	276042	ANELLO DI TENUTA ESTERNO (650) EXTERNAL SEAL RING (650)
2	276041	ANELLO DI TENUTA INTERNO (650) INTERNAL SEAL RING (650)
3	844016/TI	VITE SCREW
4	844062/TI	ROSETTA WASHER
5	844024/TI	DADO NUT



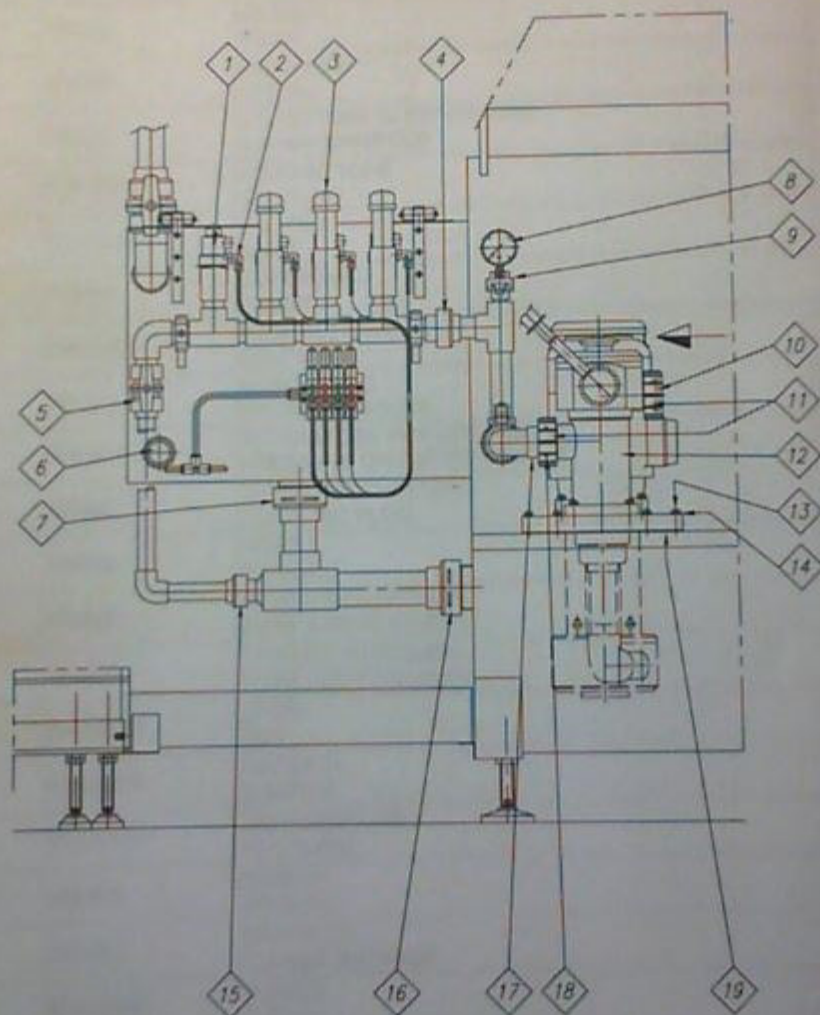
**Legenda/Legend DWG.EP651-35924**

Pos.	Codice/Code	Descrizione/Description
1	016234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
2	016238	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEEL ROLLER 650 (SHAFT FV)
3	016242	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEEL ROLLER 650 (SHAFT FV)
4	016233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)
5	016237	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEEL ROLLER 650 (SHAFT FV)
6	016241	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEEL ROLLER 650 (SHAFT FV)
7	036008	ANELLO DI FERMO LOCKING RING
8	076017	BOCCOLA BUSHING
9	076018	BOCCOLA BUSHING
10	026162/TI	ALBERO QUADRO SQUARE SHAFT
11	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
12	176107	DISTANZIERE SPACER
13	216024/TI	MOZZO HUB
14	274013/VI	V-RING V-RING
15	076034	BOCCOLA BUSHING
16	676232	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
17	844324/TI	VITE SCREW
18	844062/TI	ROSETTA WASHER



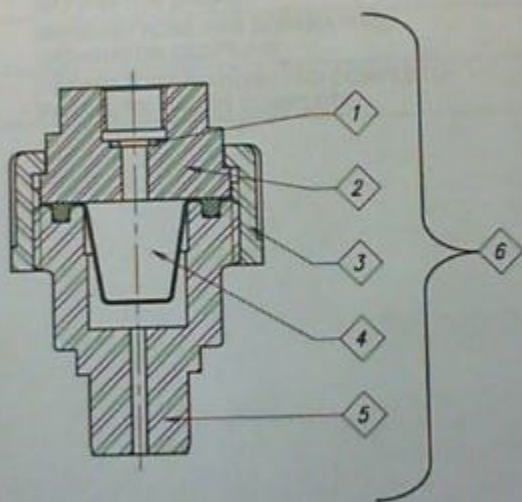
**Legenda/Legend DWG.EP651-35925**

Pos.	Codice/Code	Descrizione/Description
1	276015/EP	GUARNIZIONE GASKET
2	156202	COPERCHIO PARASPRUZZI 650 SPASH GUARD COVER 650
3	616259	SEPARATORE 650 SEPARATOR 650
4	616261	SEPARATORE 650 SEPARATOR 650
5	466068	PIOLO SUPPORTO SUPPORT PIN



**Legenda/Legend DWG.EP651-35926**

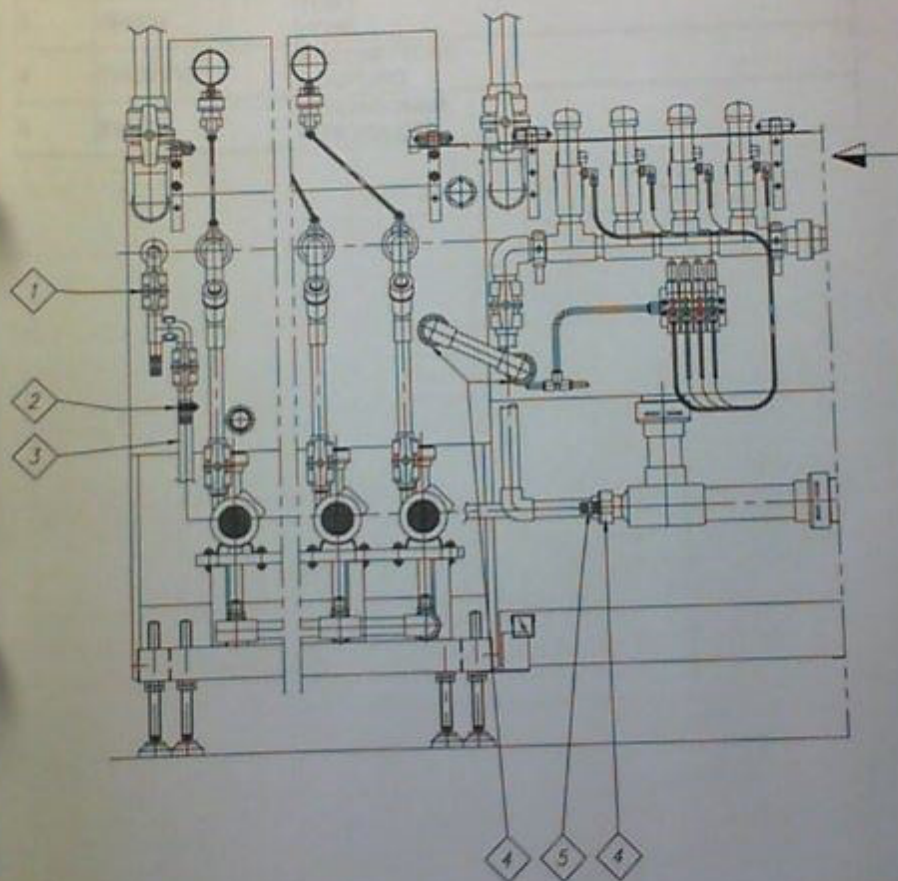
Pos.	Codice/Code	Descrizione/Description
1	184122	VALVOLA VALVE
2	394169	RACCORDO FITTING
3	766233	COLLETORE DI ESPANSIONE BUFFER MANIFOLD
4	534082/VI	BOCCHETTONE COUPLING
5	814132/EP	VALVOLA VALVE
6	766937	COPERCHIO COVER
7	534086/VI	BOCCHETTONE COUPLING
8	354028	MANOMETRO PRESSURE GAUGE
9	766032/VI	SEPARATORE PER MANOMETRO PRESSURE GAUGE SEPARATOR
10	766232	TAPPO BOCCHETTONE COUPLING PLUG
11	534229	GHIERA RING NUT
12	474230	POMPA E FILTRO 50Hz PUMP AND FILTER 50Hz
12	474232	POMPA E FILTRO 60Hz PUMP AND FILTER 60Hz
13	844024/VI	DADO NUT
14	844062/VI	ROSETTA WASHER
15	534081/VI	BOCCHETTONE COUPLING
16	534008	GHIERA RING NUT
17	534193	CARTELLA FLANGE ADAPTOR
18	274123/VI	O-RING O-RING
19	276047	GUARNIZIONE BASAMENTO POMPA PUMP BAE GASKET





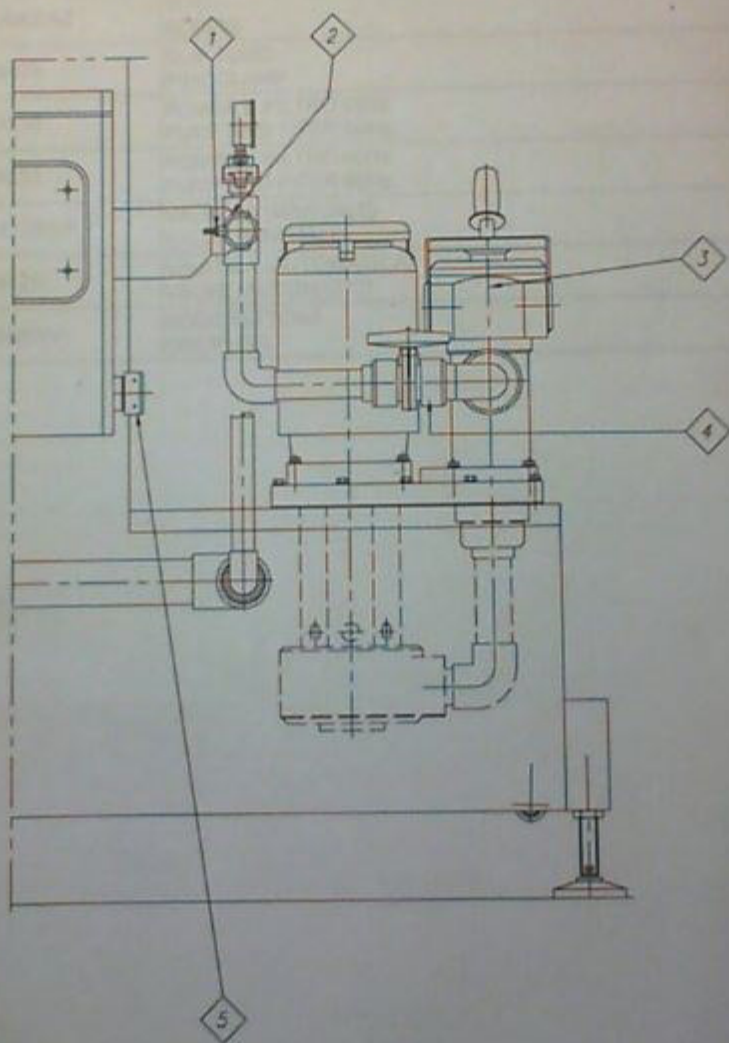
**Legenda/Legend DWG.ESD35100**

Pos.	Codice/Code	Descrizione/Description
1	274054/VI	O-RING O-RING
2	216018/PC	FLANGIA PORTAMANOMETRO FLANGE
3	534004	GHIERA PER BOCCHETTONE COUPLING RING NUT
4	276028/VI	GUARNIZIONE PER SEPARATORE SEPARATOR GASKET
5	766031	BOCCHETTONE PER SEPARATORE SEPARATOR COUPLING
6	766032/VI	SEPARATORE MANOMETRO COMPLETO PRESSURE GAUGE COMPLETE



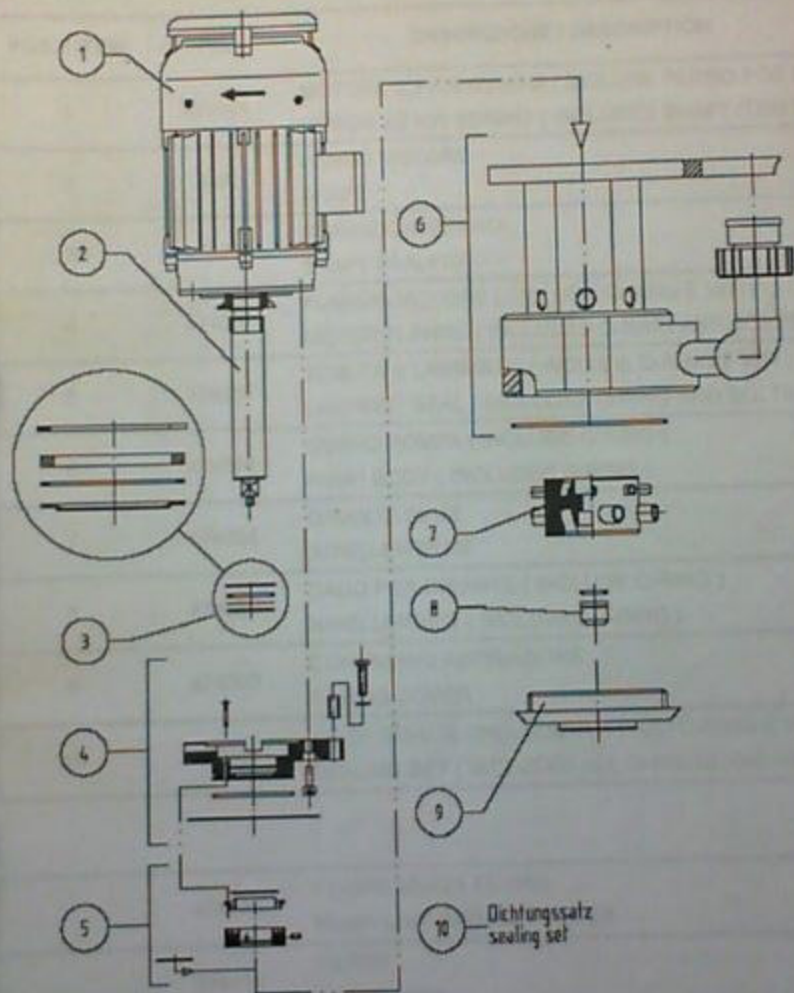
**Legenda/Legend DWG.EP651-35927**

Pos.	Codice/Code	Descrizione/Description
1	814130/EP	VALVOLA VALVE
2	194009	FASCETTA CLAMP
3	794006	TUBO HOSE
4	534081/VI	BOCCHETTONE COUPLING
5	534405	PORTAGOMMA PIPE HOLDER



**Legenda/Legend DWG.EP651-35928**

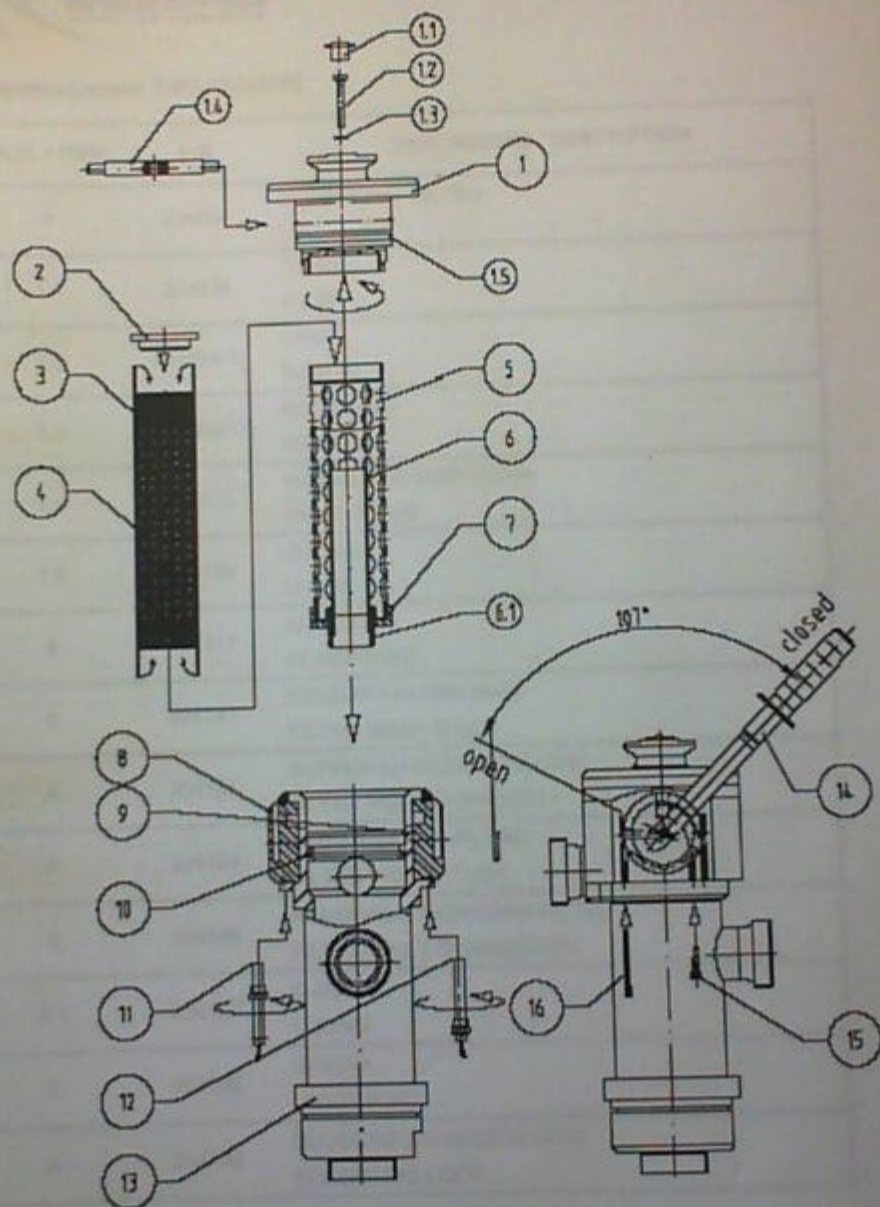
Pos.	Codice/Code	Descrizione/Description
1	844042/A2	VITE SCREW
2	534474	CLIP TUBO PIPE CLAMP
3	474230	POMPA E FILTRO 50Hz PUMP AND FILTER 50Hz
3	474232	POMPA E FILTRO 60Hz PUMP AND FILTER 60Hz
4	814133/EP	VALVOLA (MANUALE) VALVE (MANUAL)
4	184128	VALVOLA (AUTOMATICA) VALVE (AUTOMATIC)
5	534081/VI	BOCCHETTONE COUPLING



Legenda/Legend DWG.ESD35256

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	424101	MOTORE 2,2 KW 50/60HZ ( INCLUDE PERNO POS 2) MOTOR 2,2 KW 50/60HZ ( INCLUDES SHAFT ITEM 2 )
2	N/A	PERNO MOTORE SHAFT
3	474256	GURNIZIONI PERNO SHAFT SEALING
4	474357	FLANGIA MOTORE ( INCLUDE O-RING E VITI ) MOTOR FLANGE ( INCLUDES O-RING AND BOLTS )
5	474257	TENUTA A LABIRINTO ( INCLUDE O-RING E VITI ) LABYRINT SEAL ( INCLUDES O-RING AND BOLTS )
6	474358	CORPO POMPA ( INCLUDE O-RING ) PUMP BODY ( INCLUDES O-RING )
7	474354	GIRANTE 50 HZ IMPELLER 50 HZ
8	474359	DADO PER GIRANTE ( INCLUDE O-RING ) IMPELLER NUT ( INCLUDES O-RING )
9	474360	COPERCHIO ASPIRAZIONE CASING COVER
10	474361	KIT DI TENUTE ( INCLUDE TUTTI GLI O-RING E POS 3 ) SEALING SET ( INCLUDES ALL O-RINGS AND ITEM 3 )

474332	POMPA SENZA FILTRO PUMP UNIT WITHOUT FILTER
204114	FILTRO FILTER UNIT

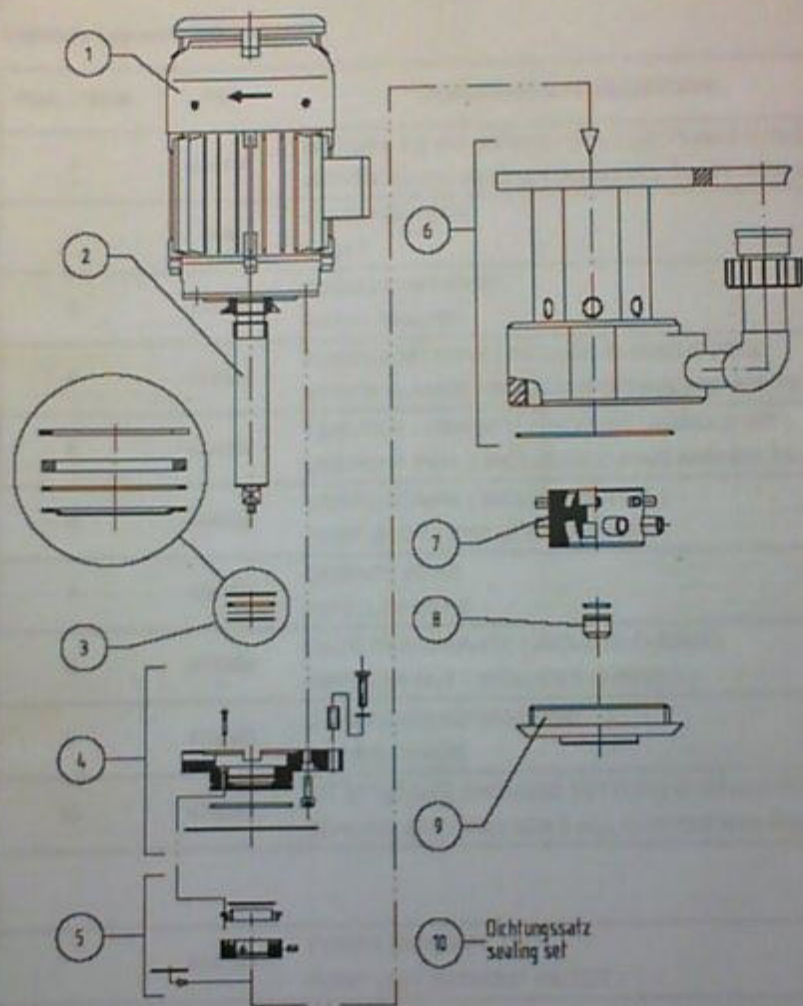




Legenda/Legend DWG.ESD35095

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	204064	COPERCHIO FILTRO LID
1.1	204184	TAPPO PLUG
1.2	844324/TI	VITE SCREW
1.3	844062/TI	RONDELLA WASHER
1.4	204132	PERNO PER COPERCHIO ROD FOR LID
1.5	204129	O-RING O-RING
2	204117	ANELLO CLAMP RING
3	204141	TESSUTO FILTRO 200 $\mu$ FILTER MESH 200 $\mu$
4	204181	SUPPORTO TESSUTO FILTRO FILTER MESH SUPPORT
5	204194	TUBO INSERTO FILTRO FILTER INSERT TUBE
6	204196	RACCORDO INGRESSO FILTRO FILTER INLET CONNECTION
6.1	204128	O-RING O-RING
7	204106	GHIERA UNION RING
8	204108	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK

9	204107	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK
10	204129	O-RING O-RING
11	204173	SENSORE PER ECCENTRICO - CORTO - SENSOR FOR ECCENTRIC LOCK - SHORT -
12	204173	SENSORE PER COPERCHIO -LUNGO - SENSOR FOR LID - LONG -
13	204097	CORPO FILTRO FILTER BODY
14	204124	MANIGLIA HANDLE
15	204198	VITE PER ECCENTRICO SCREW FOR ECCENTRIC LOCK
16	204178	PERNETTO PER ECCENTRICO PIN FOR ECCENTRIC LOCK

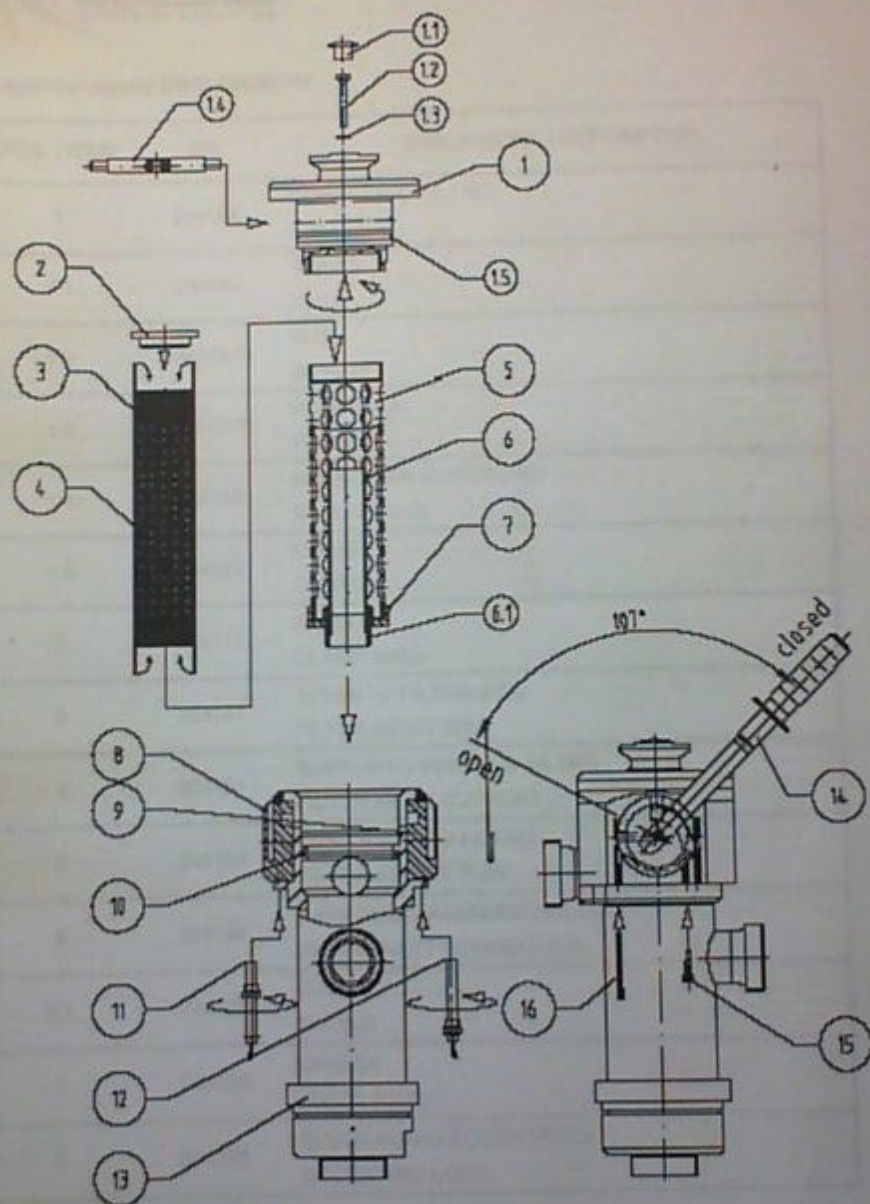




Legenda/Legend DWG.ESD35257

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	424101	MOTORE 2,2 KW 50/60HZ ( INCLUDE PERNO POS 2) MOTOR 2,2 KW 50/60HZ ( INCLUDES SHAFT ITEM 2 )
2	N/A	PERNO MOTORE SHAFT
3	474256	GURNIZIONI PERNO SHAFT SEALING
4	474357	FLANGIA MOTORE ( INCLUDE O-RING E VITI ) MOTOR FLANGE ( INCLUDES O-RING AND BOLTS )
5	474257	TENUTA A LABIRINTO ( INCLUDE O-RING E VITI ) LABYRINT SEAL ( INCLUDES O-RING AND BOLTS )
6	474358	CORPO POMPA ( INCLUDE O-RING ) PUMP BODY ( INCLUDES O-RING )
7	474355	GIRANTE 60 HZ IMPELLER 60 HZ
8	474359	DADO PER GIRANTE ( INCLUDE O-RING ) IMPELLER NUT ( INCLUDES O-RING )
9	474360	COPERCHIO ASPIRAZIONE CASING COVER
10	474361	KIT DI TENUTE (INCLUDE TUTTI GLI O-RING E POS 3) SEALING SET ( INCLUDES ALL O-RINGS AND ITEM 3)

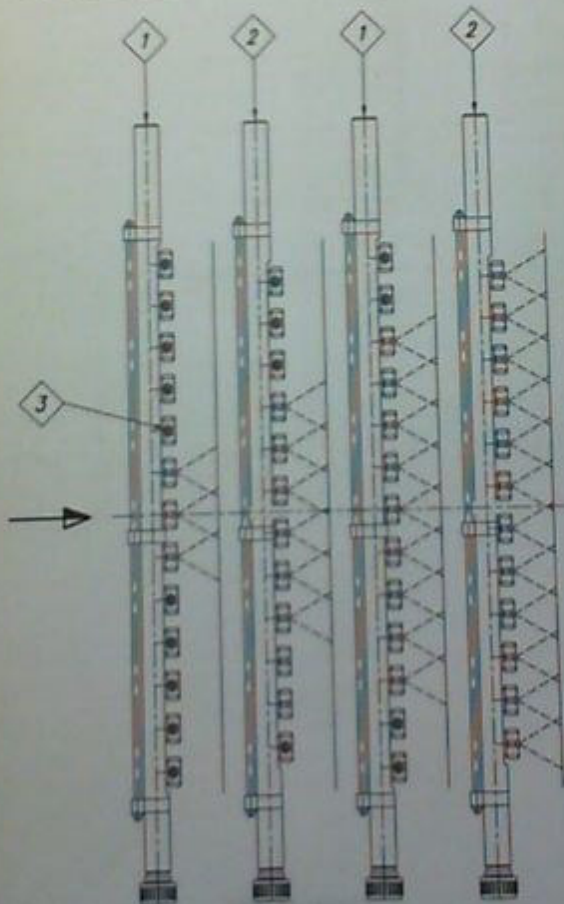
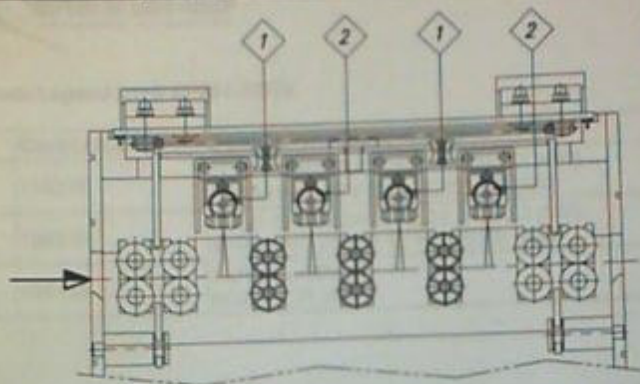
474333	POMPA SENZA FILTRO PUMP UNIT WITHOUT FILTER
204114	FILTRO FILTER UNIT



Legenda/Legend DWG.ESD35095

POS. / ITEM	P/N	DESCRIZIONE / DESCRIPTION
1	204064	COPERCHIO FILTRO LID
1.1	204184	TAPPO PLUG
1.2	844324/TI	VITE SCREW
1.3	844062/TI	RONDELLA WASHER
1.4	204132	PERNO PER COPERCHIO ROD FOR LID
1.5	204129	O-RING O-RING
2	204117	ANELLO CLAMP RING
3	204141	TESSUTO FILTRO 200 $\mu$ FILTER MESH 200 $\mu$
4	204181	SUPPORTO TESSUTO FILTRO FILTER MESH SUPPORT
5	204194	TUBO INSERTO FILTRO FILTER INSERT TUBE
6	204196	RACCORDO INGRESSO FILTRO FILTER INLET CONNECTION
6.1	204128	O-RING O-RING
7	204106	GHIERA UNION RING
8	204108	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK

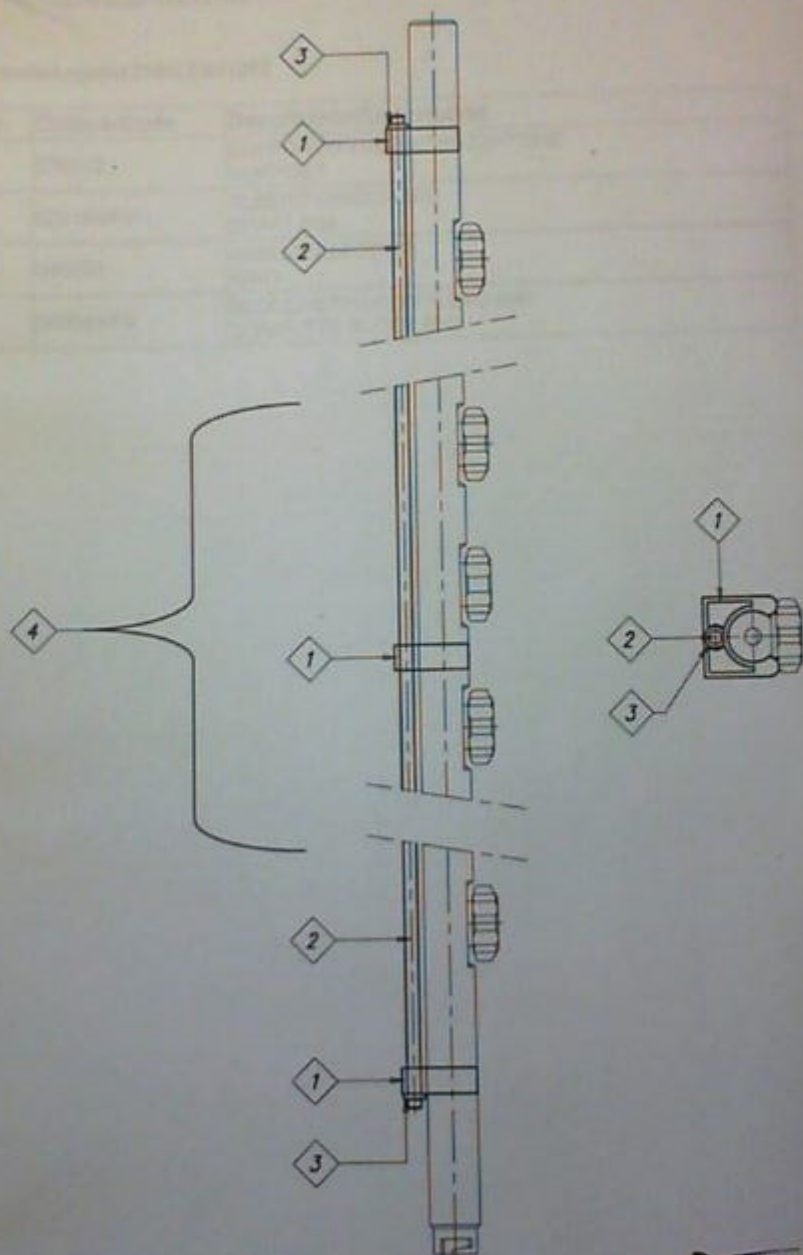
9	204107	BLOCCAGGIO ECCENTRICO ECCENTRIC LOCK
10	204129	O-RING O-RING
11	204173	SENSORE PER ECCENTRICO - CORTO - SENSOR FOR ECCENTRIC LOCK - SHORT -
12	204173	SENSORE PER COPERCHIO -LUNGO - SENSOR FOR LID - LONG -
13	204097	CORPO FILTRO FILTER BODY
14	204124	MANIGLIA HANDLE
15	204198	VITE PER ECCENTRICO SCREW FOR ECCENTRIC LOCK
16	204178	PERNETTO PER ECCENTRICO PIN FOR ECCENTRIC LOCK





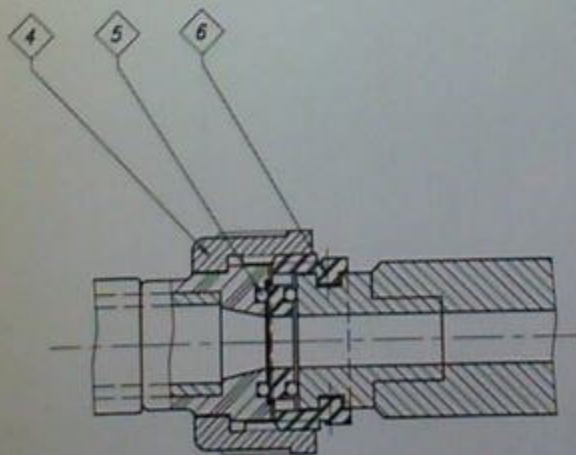
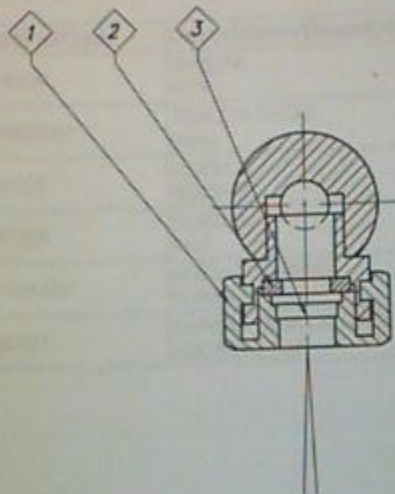
## Legenda/Legend DWG.EP651-35929

Poa.	Codice/Code	Descrizione/Description
1	136375	TUBO SPRUZZATORE 13 UGELLI (650) SPRAYING PIPES 13 NOZZLES (650)
2	136376	TUBO SPRUZZATORE 12 UGELLI (650) SPRAYING PIPES 12 NOZZLES (650)
3	136135	TAPPO UGELLO NOZZLE PLUG



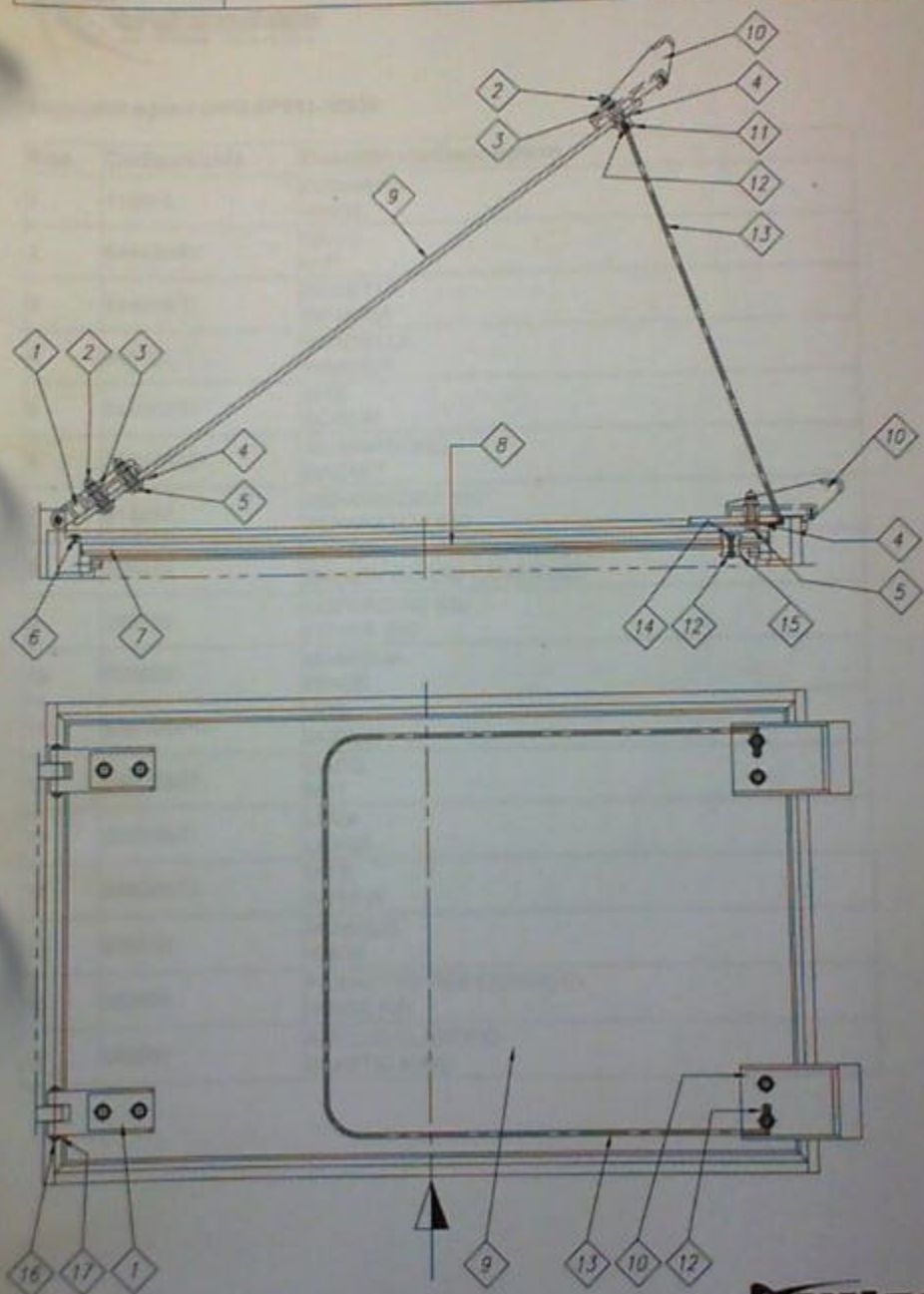
**Legenda/Legend DWG.ES31282**

Pos.	Codice/Code	Descrizione/Description
1	676312	SUPPORTO TUBO SPRUZZATORE SUPPORT
2	026186/FV	ALBERO GRIGLIA 650 SHAFT 650
3	046001	ANELLO ELASTICO RING
4	066041/FV	BLOCCHETTO COMPLETO 650 COMPLETE BLOCK 650



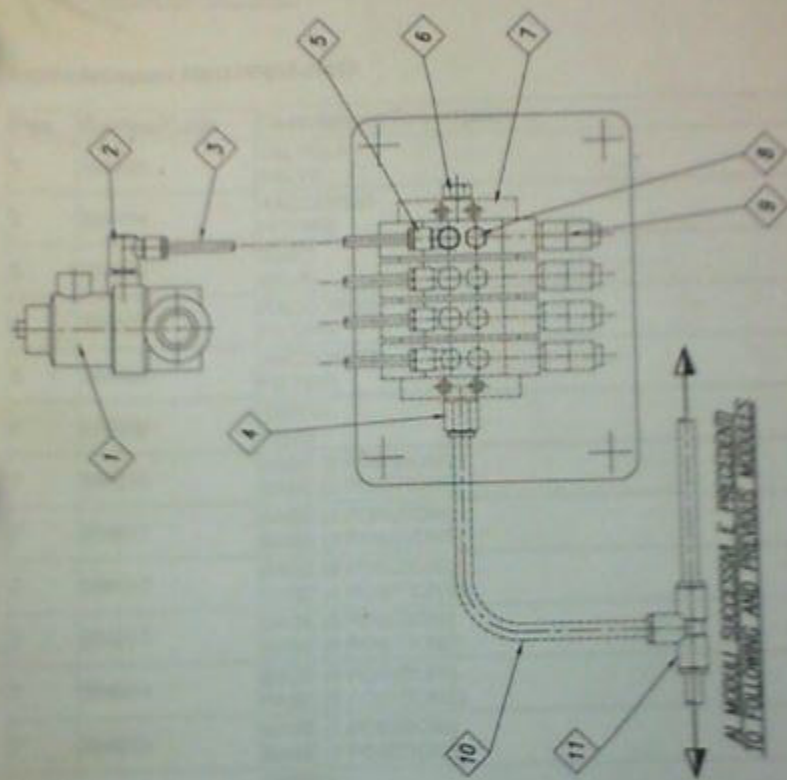
**Legenda/Legend DWG.ES31284**

Pos.	Codice/Code	Descrizione/Description
1	804009	GHIERA NUT
2	804026/VI	TENUTA DADO SEAL
3	804035	UGELLO NOZZLE
4	534003	GHIERA NUT
5	274064/VI	ANELLO O-RING O-RING
6	766181	GHIERA DI BLOCCAGGIO LOCKING NUT

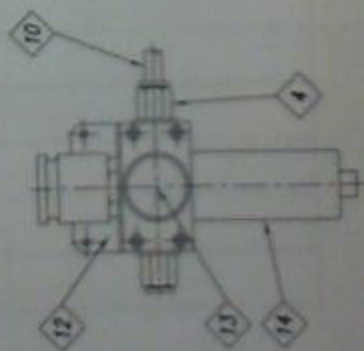


Legenda/Legend DWG.EP651-35930

Pos.	Codice/Code	Descrizione/Description
1	116015	CERNIERA HINGE
2	844106/PF	DADO NUT
3	844018/TI	ROSETTA WASHER
4	846101	RONDELLA WASHER
5	844242/TI	VITE SCREW
6	276015/EP	GUARNIZIONE GASKET
7	616257	SEPARATORE 650 SEPARATOR 650
8	156213	COPERCHIO PARASPRUZZI 650 SPASH GUARD COVER 650
9	156196	COPERCHIO 650 COVER 650
10	856020	MANIGLIA HINGE
11	846196/PC	VITE SCREW
12	844023/TI	DADO NUT
13	326058/TI	LEVA LEVER
14	844040/TI	VITE SCREW
15	856006	POMOLO KNOB
16	026495	PERNETTO PER CERNIERA HINGE PIN
17	046001	ANELLO ELASTICO ELASTIC RING



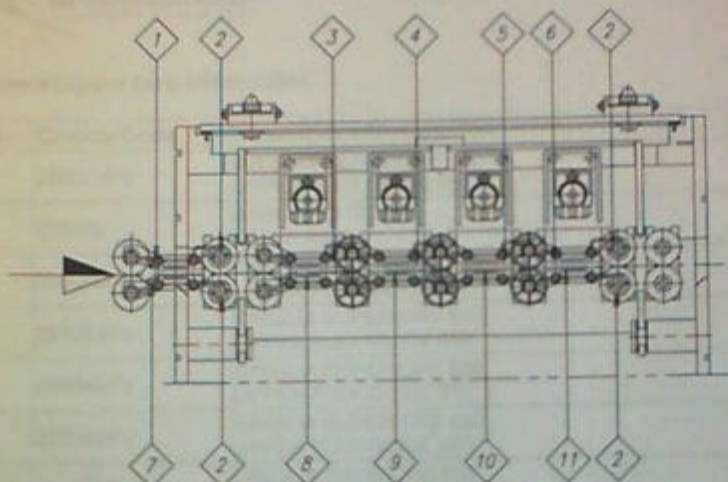
IN MODEL SUCCESSOR, E. PROCEEDING  
TO FOLLOWING AND THROUGH WALLS



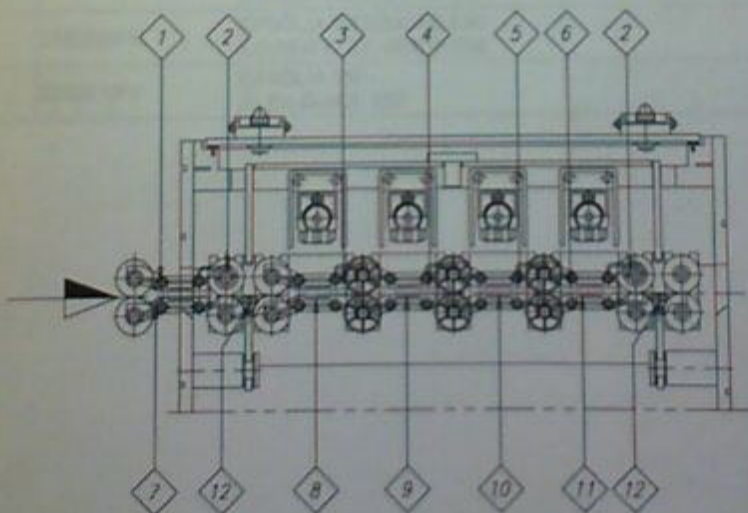


Legenda/Legend DWG.PP645-35835

Pos.	Codice/Code	Descrizione/Description
1	184123	VALVOLA VALVE
2	394154	RACCORDO FITTING
3	794005	TUBO HOSE
4	394175	RACCORDO FITTING
5	394009	RACCORDO FITTING
6	524009	TAPPO PLUG
7	394010	BASE (2 POSIZIONI) BASE (2 POSITIONS)
7	394011	BASE (3 POSIZIONI) BASE (3 POSITIONS)
7	394012	BASE (4 POSIZIONI) BASE (4 POSITIONS)
7	394013	BASE (5 POSIZIONI) BASE (5 POSITIONS)
7	394014	BASE (6 POSIZIONI) BASE (6 POSITIONS)
7	394015	BASE (7 POSIZIONI) BASE (7 POSITIONS)
8	524008	TAPPO PLUG
9	394017	ELETTOVALVOLA SOLENOID VALVE
10	794032	TUBO HOSE
11	394145	RACCORDO FITTING
12	394005	STAFFA SUPPORT
13	354007	MANOMETRO PRESSURE GAUGE
14	394002	FILTRO REGOLATORE REGULATOR FILTER



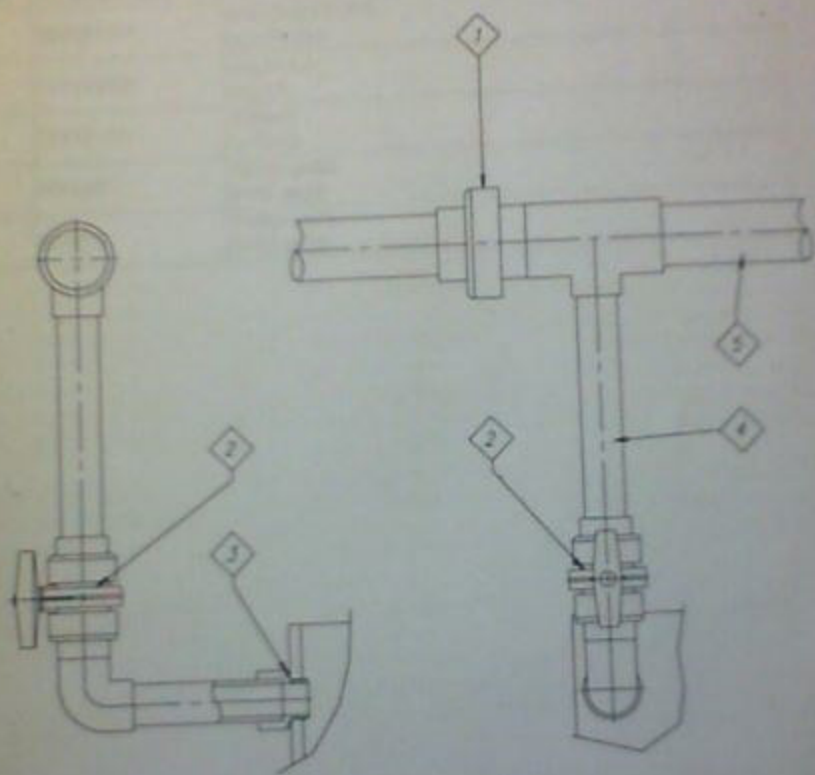
GRIGLIE PER SCHEDE SPESS  
 FLEX GUIDE FOR THICK BOARDS



GRIGLIE PER SCHEDE SOTTILI  
 FLEX GUIDE FOR THIN BOARDS

**Legenda/Legend DWG.EP651-35931**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	036006	ANELLO DI GUIDA GUIDE RING
3	256065/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
4	256053/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
5	256049/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
6	256061/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
7	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
8	256063/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
9	256051/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
10	256047/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
11	256059/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
12	256081/FV	GRIGLIA 650 FLEX GUIDE 650



Legenda/Legend DWG.PP644-35806

Pos.	Codice/Code	Descrizione/Description
1	534087/EP	BOCCHETTONE COUPLING
2	814134/EP	VALVOLA VALVE
3	274121/M	O-RING O-RING
4	604205	TUBO øø50 PIPE øø50
5	604206	TUBO øø75 PIPE øø75



**Manuale di Istruzioni  
Usa e Manutenzione**

**Operating Instructions  
and Maintenance Manual**

**Modulo/Module:  
PP RINSE MODULE L=990 5P 650**

**Data/Date: 04-2007**

*Codice del Manuale  
Manual code*

*PP633-RINSE MOD. L=990 5P-650-EN-04-07*

## Table of contents

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3. Operation	6
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6. Lists, drawings, photographs and spare parts	14

## 1. Module technical specifications

### 1.1 Module

Module:	RINSE MODULE L=990, 5 PUMPS, 5 CHAMBERS
Model:	850
Final use:	SPRAYING RINSE OF PRINTED CIRCUIT BOARD WITH WATER

### 1.2 Diagrams and drawings

Overall dimensions DWG:	PP633-35940
Internal cross sections DWG:	PP633-35940
Other DWG:	N.A.

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	990
- Maximum width (mm):	1600
- Maximum height (mm):	1200
- Net weight (kg):	150

### 1.4 Installed energies and products

#### Electric power

Main line:	SEE MAIN MANUAL
Power circuit:	SEE MAIN MANUAL
Control circuit :	SEE MAIN MANUAL

#### Compressed air

Pressure:	N.A.
Capacity (consumption):	N.A.

#### Caloric heating energy

Caloric energy (kcal):	N.A.
Inlet heating fluid temperature (°C):	Max. N.A., Min. N.A.
Minimum capacity (l/h):	N.A.

#### Caloric cooling energy

Caloric energy (kcal):	N.A.
Inlet cooling fluid temperature (°C):	N.A.
Minimum capacity (l/h):	N.A.

#### Air exhaust:

Type of connection:	smooth PVC pipe $\varnothing$ 50 mm
---------------------	-------------------------------------





Capacity (m3/h):

from 10 to 20 (to be defined according with the process requirement)

Pressure (mmH2O):

from 50 to 100 (to be defined according with the process requirement)

**Products:**

Mains water pressure/capacity(bar-l/h):

3bar 600l/h

Demineralised water pressure/capacity(bar-l/h):

N.A.

Inflammables:

N.A.

Neutral gases:

N.A.

Acids and/or bases:

N.A.

Toxic products:

N.A.

Other:

N.A.

## 2 Description

Rinse Module is a unit employed for spraying rinse of printed circuit boards, for example rinse after stripping of tin lead.

The water cycle avails of a sequence of washing operations and filters, thus making Module suitable to wash panels by using a very low quantity of water.

### 2.1 Main features

The machine consists in a monocoque self-supporting structure, made of PP plates, appropriately assembled, drilled, bent and welded, to its final shape. A stainless steel basement ensures trouble free life even after several years of use.

The line-up and type of nozzles ensure perfectly uniform treatment.

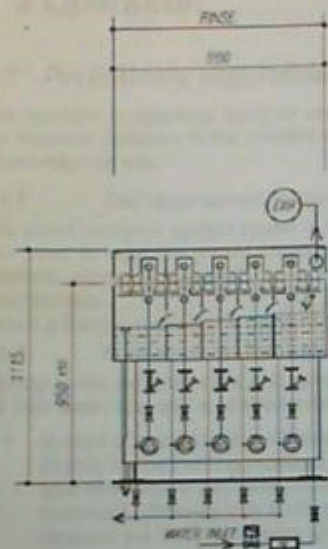
The water cycle provides panel treatment by countercurrent washing. The water is fed into the last washing section and cascades backwards through the preceding chambers to the first one, where it evacuates by overflow.

A solenoid valve intercepting water inlet, opens in automatic mode, in the presence of panels to be treated, thus minimising water consumption.

The upper part of the washing chambers are sealed by openable temperate glass covers, facilitating the access to the treatment areas.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts, conveyor rollers and spray bars can be removed without using tools.

## 2.2 Longitudinal section



## 2.3 Description of the working stations

- A. Three rinse spray chambers, 660mm length, equipped with:
- One pair of squeegee rollers at inlet and outlet.
  - Five magnetic driven pumps feeding the spraying pipes.
  - Screen filter installed on the delivery side of each pump.
  - The compensation water is fed from mains directly to the last section tank by means of a flow meter intercepted by a solenoid valve controlled by the presence of panels to be treated.
  - Excess water evacuates by overflow from the first rinse chamber.

## **3 Operation**

### **3.1 Preliminary regulations**

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.

#### **3.1.1 Conveyor speed regulation**

The panel transport system speed is visualised on the operator interface display which is also used to input the preset speed at the desired value. The electromechanical version machine shows the speed on a display and it can be adjusted by means of a potentiometer.

Speed adjustment should be adapted to the most critical phases of panel treatment.

#### **3.1.2 Rinsing water flow rate regulation**

Rinsing water rationalisation and saving is performed by a solenoid valve that intercepts the inlet water flow and is opened automatically by the presence of panels to be treated.

- In case of direct feeding of the spray banks, the water flow regulation is determined directly by the feeding pressure and load drop induced by the spray nozzles. The type and relative diameter of the nozzles' orifice have been selected to ensure treatment efficiency with feeding pressure between 2 and 3 bars. If the pressure exceeds the maximum value we recommend to mount at water mains a pressure reducing valve and relative gauge to the water mains.
- If the spray banks are fed by a recirculation pump, the flow is aimed directly into the tank by means of a flow meter followed by a valve visualising and regulating the water flow rate. Fresh water flow rate from mains must be adjusted in relation to process type. In order to find the proper compromise between savings and treatment efficiency, we recommend to carry out a first regulation which provides a very high compensation flow rate that will be reduced in the following days until the correct balance is found.

### **3.2 Start up**

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

## **4. Maintenance**

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### **4.1 Daily maintenance**

It is a set of daily activities ensuring the correct functionality of the system.

#### **4.1.1 Filters**

Each day check the efficiency status of the filters installed on the pump delivery side. If necessary clean or replace them.

#### **4.1.2 Cleaning**

At the end of each working shift or however once each day, clean the machines externally avoiding to use abrasive materials or objects, a dampened sponge is sufficient for the purpose.

Empty the rinsing sections tanks which will be filled up at the following work shift start-up.

### **4.2 Weekly maintenance**

It is a series of weekly activities ensuring the correct functionality of the system.

#### **4.2.1 Nozzles**

Each week check the status of the nozzles' efficiency. If necessary provide cleaning or replacement.

#### **4.2.2 Cleaning**

Each weekend clean the machines externally avoiding to use abrasive materials or objects, a dampened sponge is sufficient for the purpose.

Empty the rinsing sections tanks and wash them internally by means of water jet. We recommend to install a flexible tube connected to water mains near the machinery, in order to facilitate this operation.

Possibly, there could be calcareous formation or residues of the products utilised. If necessary provide removal of the same by following the below described procedure, which has been widely experienced and found very effective, and does not damage the machinery:

- Fill the tanks to be treated with acid solution based on sulphuric acid at 2+3%, warm the solution up to 30°C, then activate and run the pumps for 15+30 minutes.
- Empty the tanks and fill them with water, activate the pumps for 15 minutes then empty the tanks.

- Fill the tanks again, this time with an alkaline solution based by sodium peroxide at 2+3%, warm up the solution to 40°C, then activate the pumps for 15+30 minutes.
- Empty the tanks and fill them with water, activate the pumps for 15 minutes, then empty the tanks. Repeat the operation.



**WARNING**

It is forbidden to use highly aggressive products or not compatible with the materials installed in the machinery. Wise s.r.l. shall not be held responsible for damages caused by the use non adequate products.

WISE s.r.l. is available for supplying all the information required for the choice of the suitable product or detergent.

### **4.3 Monthly maintenance**

It is the series of monthly activities that ensure the correct functionality of the system.

#### **4.3.1 Transport system**

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.

#### **4.3.2 Pumps**

The horizontal magnetic driven centrifugal pumps are equipped with bushing which are subject to wear and exceeding the acceptability limit will cause breakage of the pump. Provide monthly checking and replace the damaged parts, if necessary.

A specific manual is enclosed for other types of pumps which need more complex maintenance, for example diaphragm pumps.

#### **4.3.3 Seals**

Each month check the status seals of the covers, doors and filters. The sealing material is an elastomer which should appear elastic and without cracks. Replace if necessary.

#### 4.4 Wear parts mandatory replacement programme

Activities description	Frequency in work hours
Processing sections cartridge filters	1500
Low pressure nozzles	3000
Centrifugal pumps bushing	3000
Roller support inserts	3000

## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE srl technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

#### 5.1.2 *Noise level*

Verify the functionality of the centrifugal pumps:

- Check whether the mechanical parts composing it (bearings, impellor) are worn or damaged. If required replace defective parts.
- Check the level of the liquid inside the tank, the pump should appear completely under water head. Restore the correct level if necessary.



## 5.2 Washing

### 5.2.1 *Insufficient washing*

Check water feeding from mains to machine which pressure and flow should be as described under section 2.4 PRODUCTS. If required provide the necessary corrective actions.

Check the quality of the water quality and if required install appropriate depurating systems.

Verify if there is excess of solution transfer between the process section and the wash section, by checking the below listed:

- Check the conveyor system rollers which separate the above said sections are positioned in the correct way inside their housings. If necessary, restore the correct condition.
- Check the status of the conveyor system rollers that separate the above said sections. If damaged repair or replace them.
- Check that section passage safety protections are present and installed in the proper way. If required restore the correct condition of the same.
- Check the spraying nozzles' jets that should be aimed in the free space between the two pairs of rollers and are not directly to the separating protections. If required modify the direction of the jets.

The water connection system from tanks to wash sections, provides water transfer by overflow contrariwise to the direction of the flow of the panel to be processed, thus ensuring minor water contamination in the last washing section, which should be practically clean. Check the pollution status of the water in the washing sections and if necessary increase the water renewal.

Verify that spray pressure is within the required process values and, if necessary, check as follows:

- The status of the filters installed in front and at the back of the recirculation pumps. Clean or replace if necessary.
- Check the efficiency and correct functionality of the recirculation pumps. If required repair or replace the defective pump.

Check the spraying tubes and relative nozzles for deposits or encrustations. In addition to the visual inspection it is also helpful to carry out an hydraulic check by feeding each tube with fresh water from mains, ensuring the status of the same. If necessary, restore the correct functionality of the tubes and the nozzles.

Check the status of the spraying nozzles' orifice. In addition to the visual inspection make a hydraulic check by feeding each single tube with mains water thus allowing to verify the spray jet of each nozzle, which should appear regular and flat, and with the below described dispersion angle:

- Low pressure rinsing sections nozzles 60+90°

Replace the nozzles if worn.

The characteristics of the panel to be processed as for example, very small holes on high thickness plates, make the washing operation more difficult:

- Reduce the conveyor speed.

If the above listed should not be sufficient, contact the local Representative otherwise take direct contact with the technical assistance of WISE s.r.l.

### 5.2.2 *Excess of encrustations*

During operations calcareous formation may be possible, which is commonly eliminated by performing the washing cycle afore described. The formation of encrustations can be reduced by feeding softened water to the washing sections.



#### **WARNING**

The use of demineralised water could damage some components installed in the machinery. WISE s.r.l. will not be held responsible for any damages caused by the use of demineralised water.

WISE s.r.l. is available for all the information and eventual modifications required for the use of demineralised water.

### 5.2.3 *Centrifugal pumps' running problems*

Pressure loss or reduction:

- In the event of a newly installed pump check the direction of rotation, usually indicated by an arrow placed on the pump. If necessary, invert one phase of the power supply to invert the direction of rotation.
- Verify the pump ducts for foreign particles or encrustations. Remove the cause of obstruction.
- If the pressure loss is revealed with a certain delay after pump start-up, the cause could be attributed to the presence of foam in the fluid being pumped, which is the cause of the cavitations phenomenon. Said phenomenon other than being harmful to the pump itself, also drastically reduces the operating pressure. Check the fluid and if it is the case activate all the necessary actions to minimise foam formation.
- Verify that all spraying nozzles are present and the wear status of their orifices. If required, install the missing nozzles or replace worn nozzles.
- Verify the spray manifolds o tubes for cracks, holes or other irregularity causing possible leakage in the spray manifolds or tubes. Repair or replace damaged parts.
- Verify the pressure display apparatus. If necessary repair or replace it.

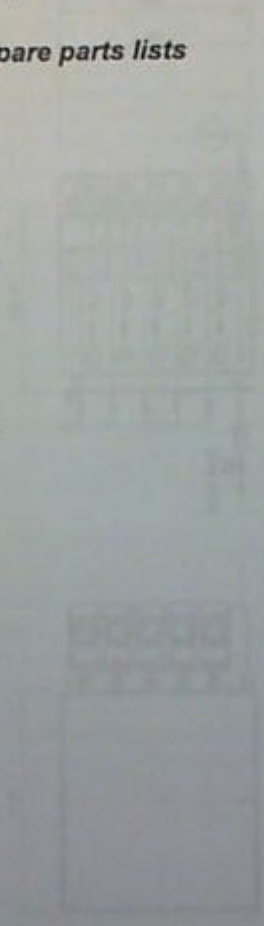
Too elevated electrical absorption.

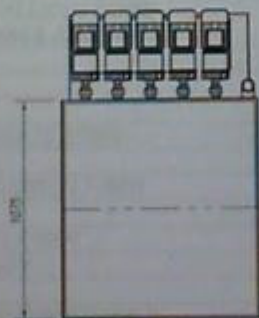
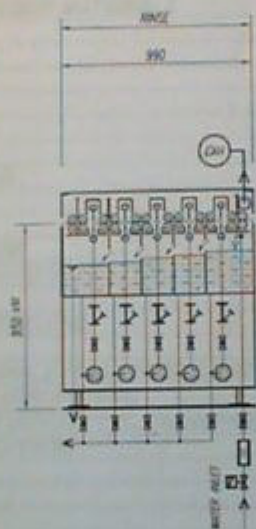
- Verify that all the spraying nozzles are installed and the wear status of their orifices. If necessary, install the missing nozzles or replace the worn ones.
- Verify the presence of cracks, holes or irregularities that may cause leakage in the spraying tubes or manifolds. Repair or replace damaged parts.

## **6. Lists, drawings, photographs and spare parts.**

Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

### **6.2 Drawings and spare parts lists**

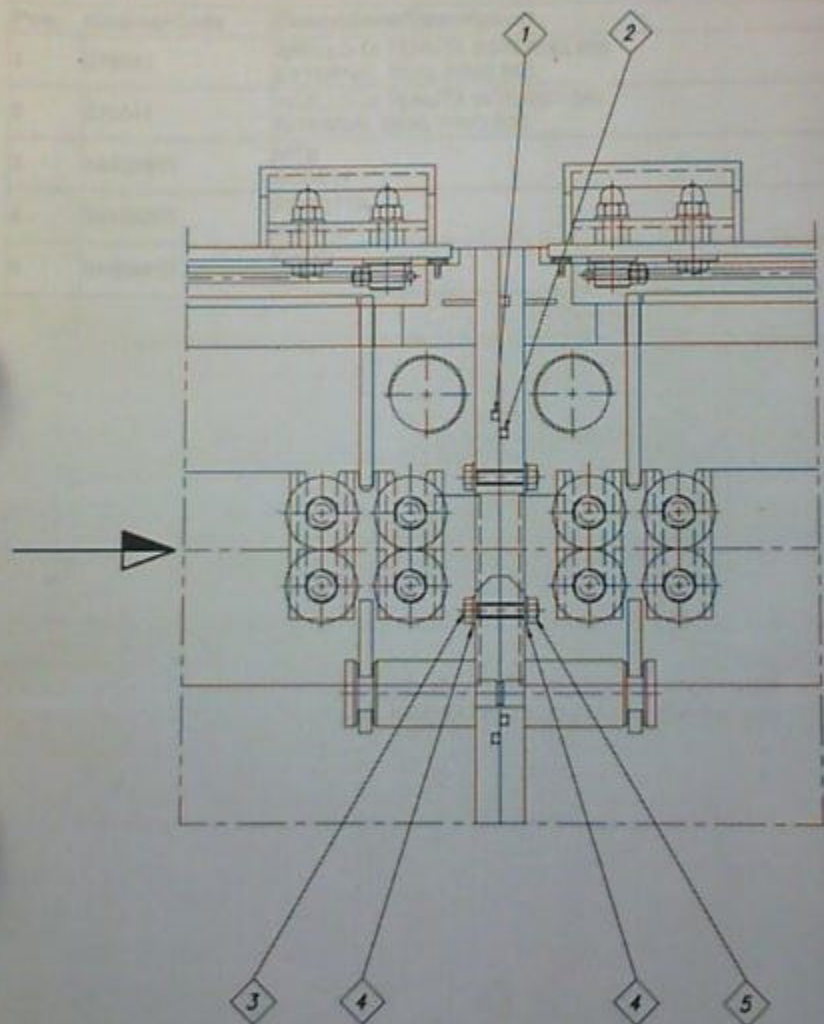




## TABELLA MATERIALI / MATERIALS TABLE

<b>SIGLE DEI MATERIALI PLASTICI E ELASTOMERI</b>
<b>LIST OF PLASTIC AND RUBBER MATERIALS</b>
CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
KR: KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
VI: VITON / VITON
VK: VULKOLLAN / VULKOLLAN

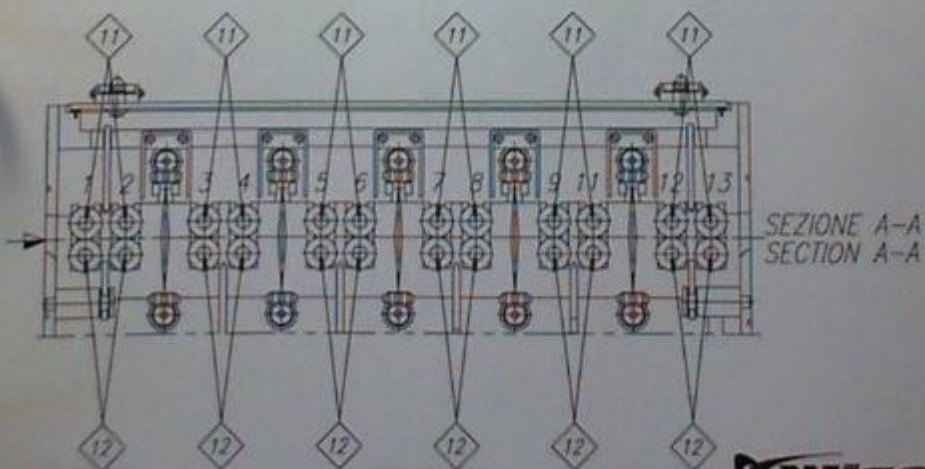
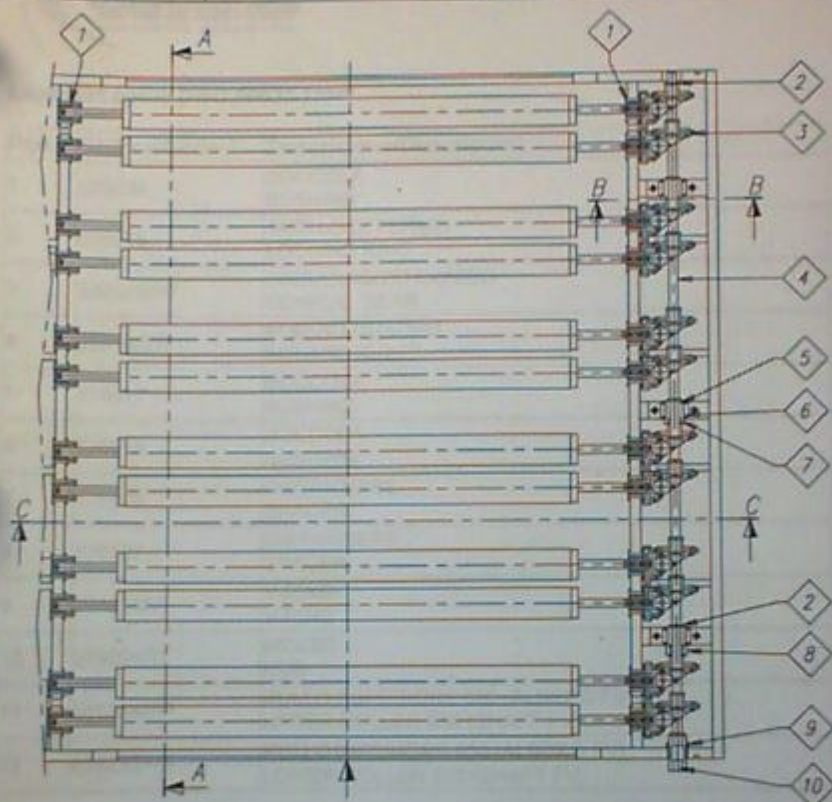
<b>SIGLE DEI MATERIALI METALLICI E FIBRE</b>
<b>LIST OF METALLIC MATERIALS AND FIBERS</b>
A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM



## Legenda/Legend DWG.PP644-35793

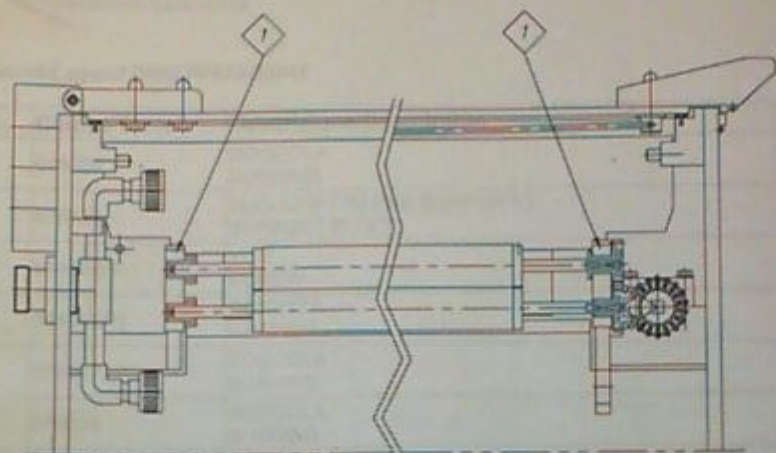
Pos.	Codice/Code	Descrizione/Description
1	278042	ANELLO DI TENUTA ESTERNO 650 EXTERNAL SEAL RING 650
2	278041	ANELLO DI TENUTA INTERNO 650 INTERNAL SEAL RING 650
3	844018/TI	VITE SCREW
4	844062/TI	ROSETTA WASHER
5	844024/TI	DADO NUT



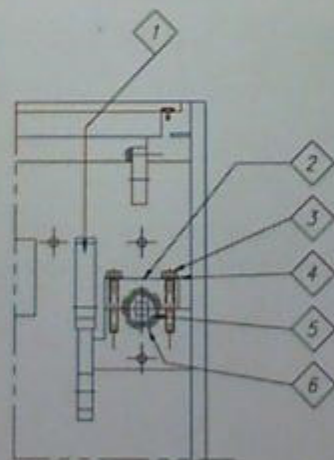


Legenda/Legend DWG.PP633-35941

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	036008	ANELLO DI FERMO LOCKING RING
3	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
4	026163/TI	ALBERO QUADRO SQUARE SHAFT
5	076017	BOCCOLA BUSHING
6	076018	BOCCOLA BUSHING
7	176106	DISTANZIERE SPACER
8	176107	DISTANZIERE SPACER
9	274013/VI	V-RING V-RING
10	216024/TI	MOZZO HUB
11	016234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
12	016233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)



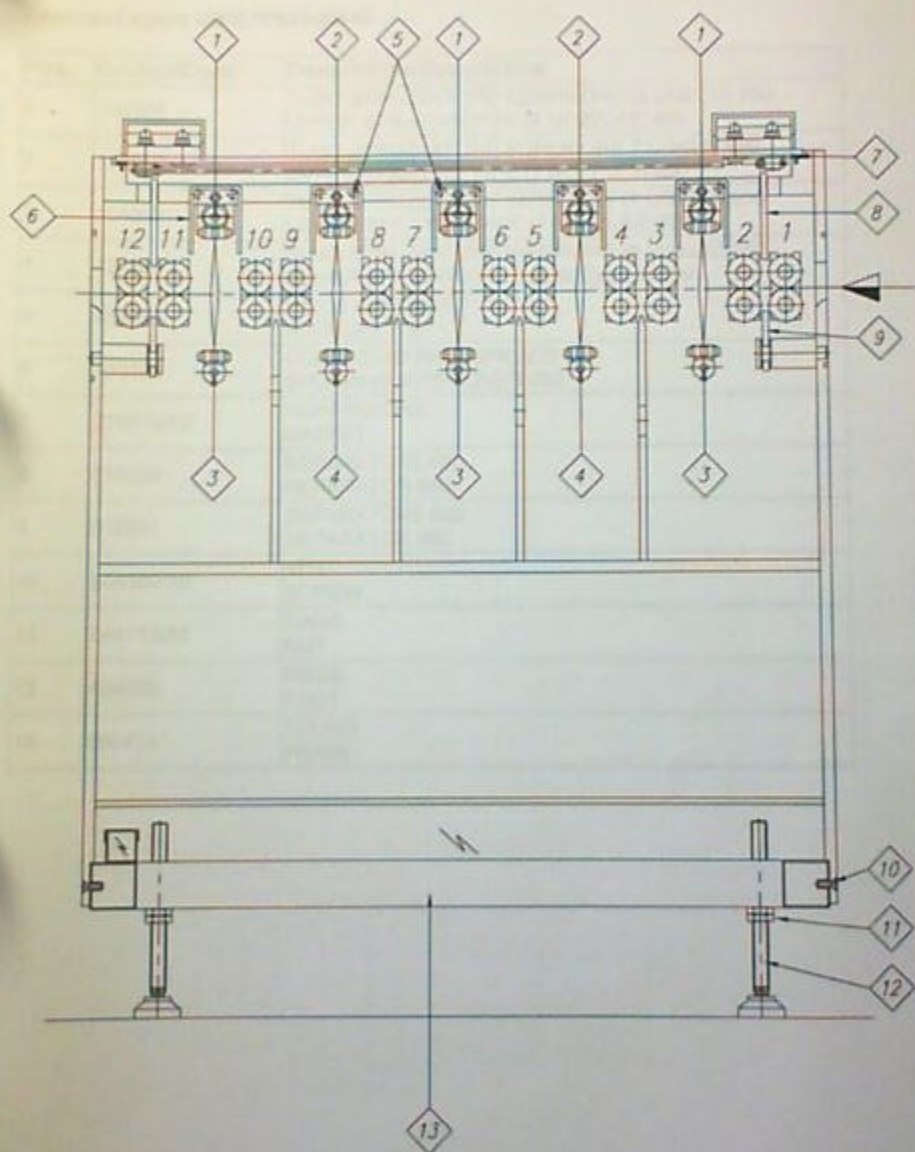
SEZIONE C-C  
SECTION C-C



SEZIONE B-B  
SECTION B-B

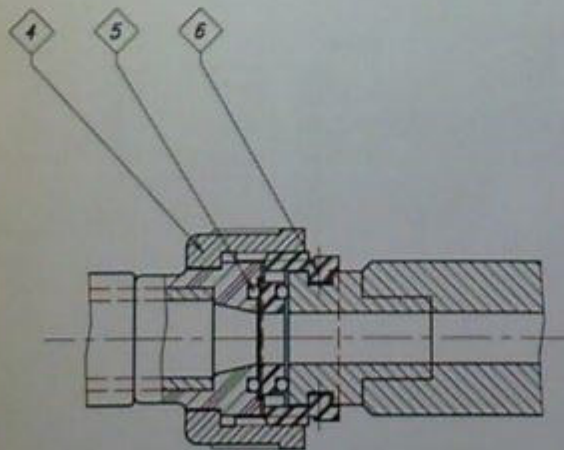
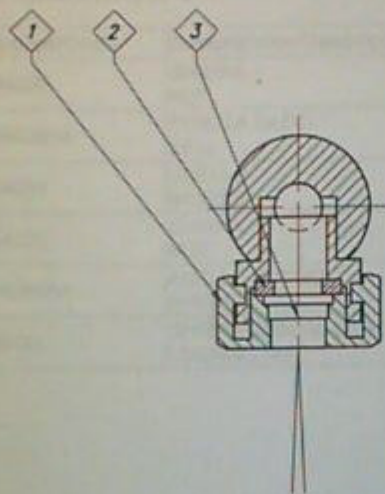
**Legenda/Legend DWG.PP633-35942**

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	676422	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
3	844324/T1	VITE SCREW
4	844062/T1	ROSETTA WASHER
5	076017	BOCCOLA BUSHING
6	076018	BOCCOLA BUSHING



Legenda/Legend DWG.PP633-35943

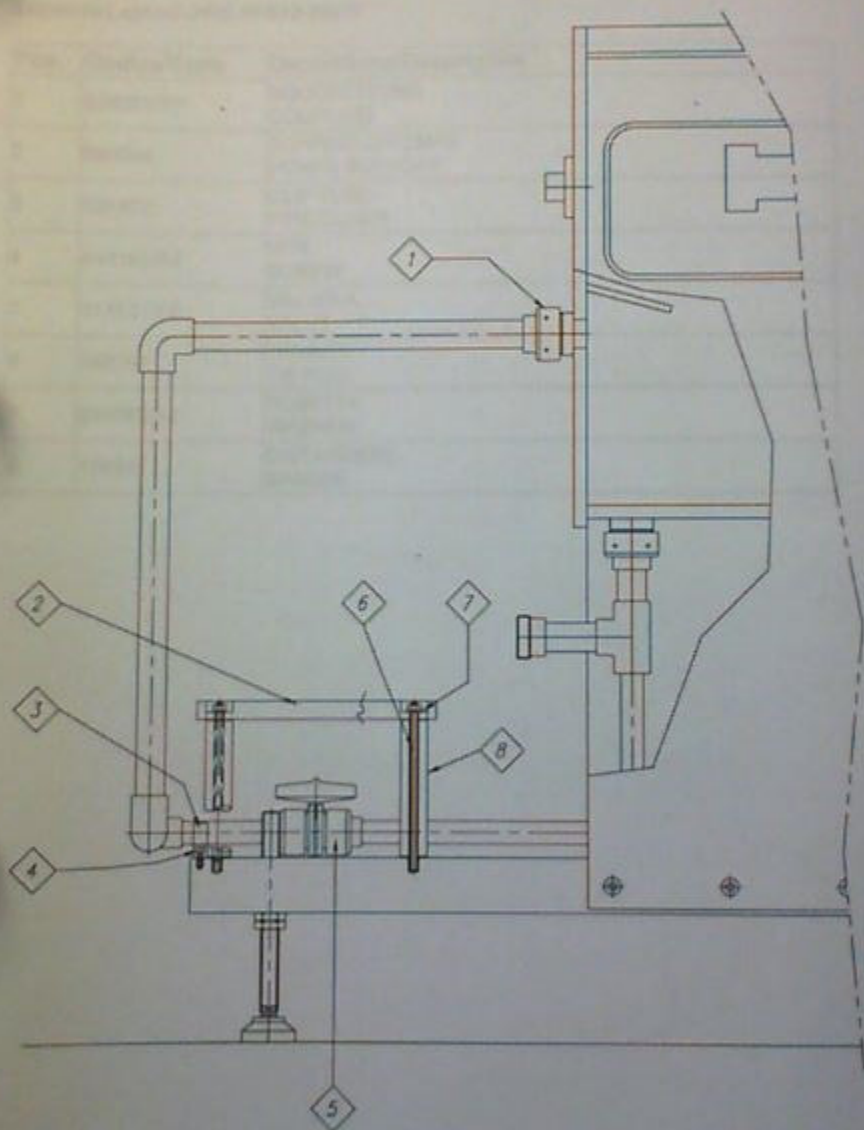
Pos.	Codice/Code	Descrizione/Description
1	136368	TUBO SPRUZZATORE SUPERIORE (8 UGELLI) 650 UPPER SPRAYING PIPE (8 NOZZLES) 650
2	136367	TUBO SPRUZZATORE SUPERIORE 7 UGELLI 650 UPPER SPRAYING PIPE (7 NOZZLES) 650
3	136363	TUBO SPRUZZATORE INFERIORE (7 UGELLI) 650 LOWER SPRAYING PIPE (7 NOZZLES) 650
4	136364	TUBO SPRUZZATORE INFERIORE (8 UGELLI) 650 LOWER SPRAYING PIPE (8 NOZZLES) 650
5	466068	PIOLO SUPPORTO SUPPORT PIN
6	156202	COPERCHIO PARASPRUZZI 650 SPLASH GUARD COVER 650
7	276015/EP	GUARNIZIONE GASKET
8	616259	SEPARATORE 650 SEPARATOR 650
9	616261	SEPARATORE 650 SEPARATOR 650
10	844359/A2	VITE SCREW
11	844113/A2	DADO NUT
12	454020	PIEDE FOOT
13	666432	TELAIO FRAME



**Legenda/Legend DWG.ES31284**

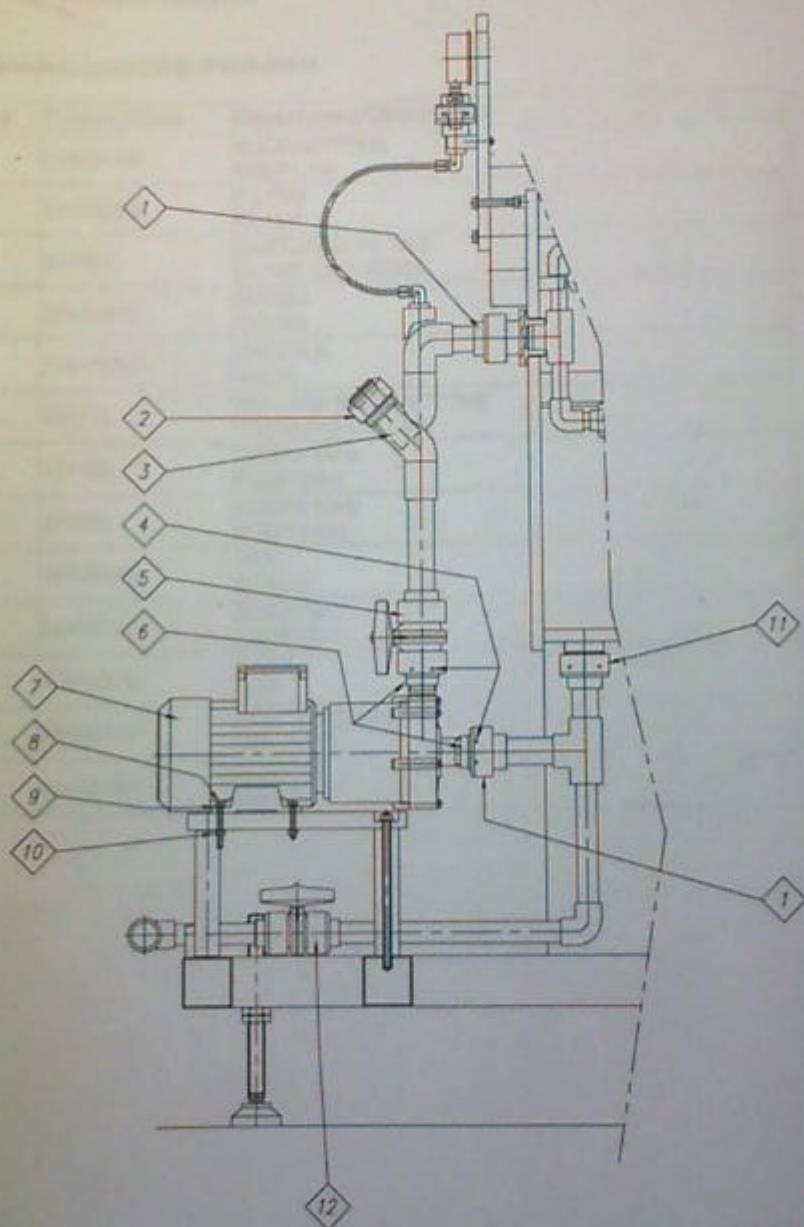
Pos.	Codice/Code	Descrizione/Description
1	804009	GHIERA NUT
2	804026/VI	TENUTA DADO SEAL
3	804035	UGELLO NOZZLE
4	534003	GHIERA NUT
5	274064/VI	ANELLO O-RING O-RING
6	766181	GHIERA DI BLOCCAGGIO LOCKING NUT





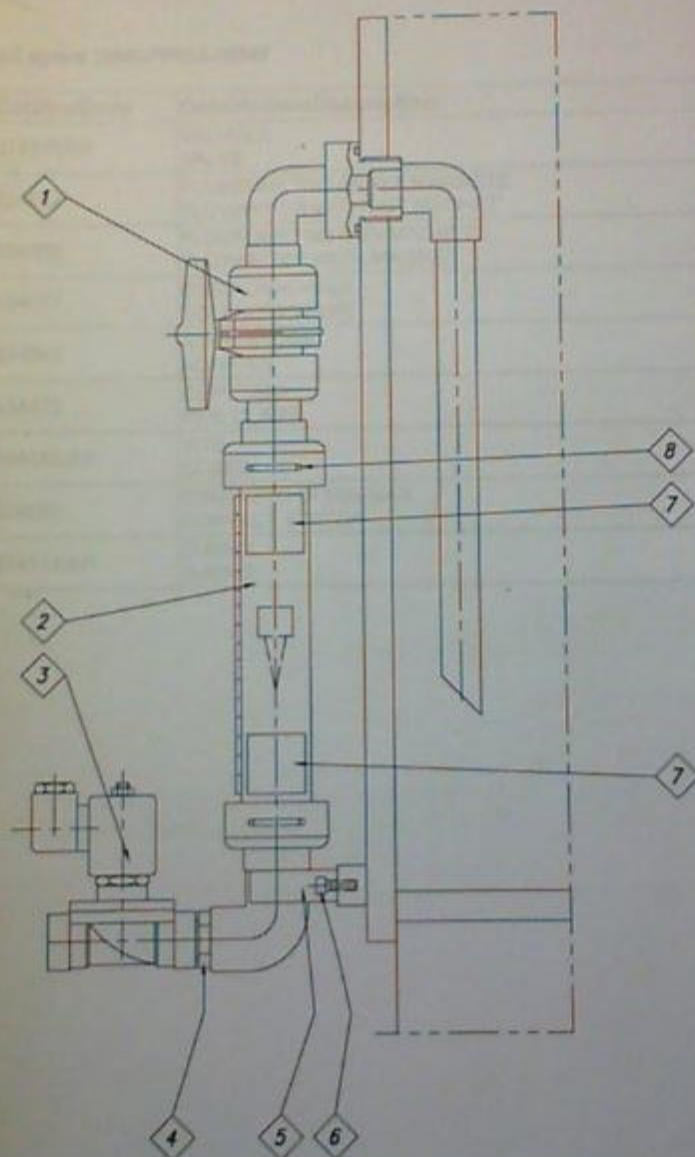
**Legenda/Legend DWG.PP632-35937**

Pos.	Codice/Code	Descrizione/Description
1	534081/EP	BOCCHETTONE COUPLING
2	666044	SUPPORTO POMPE PUMPS SUPPORT
3	534472	CLIP TUBO PIPE CLAMP
4	844193/A4	VITE SCREW
5	814131/EP	VALVOLA VALVE
6	846197	TIRANTE TIE ROD
7	844062/A2	ROSETTA WASHER
8	176311	DISTANZIERE SPACER



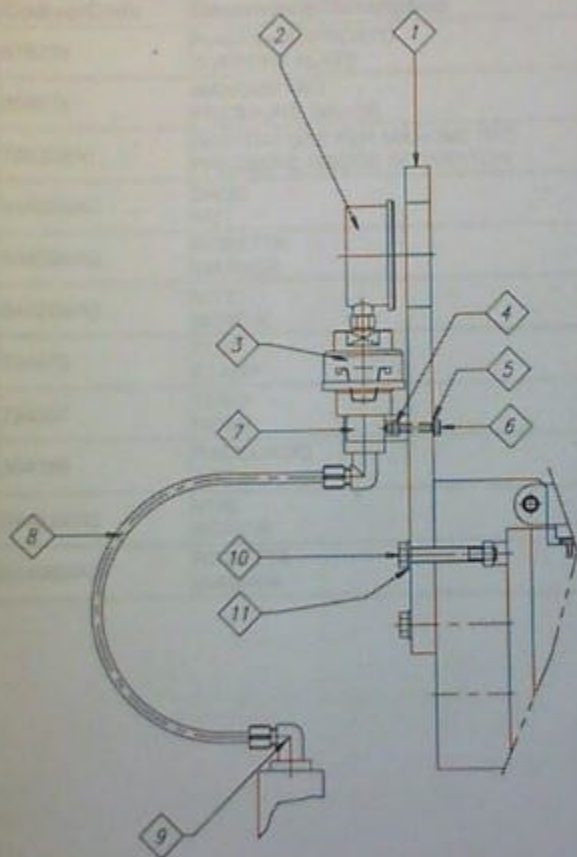
Legenda/Legend DWG.PP633-35944

Pos.	Codice/Code	Descrizione/Description
1	534081/EP	BOCCHETTONE COUPLING
2	204202/EP	FILTRO FILTER
3	204003	CARTUCCIA FILTRO FILTER CARTRIDGE
4	274076/VI	O-RING O-RING
5	814132/EP	VALVOLA VALVE
6	766111	COLLARE BOCCHETTONE COUPLING COLLAR
7	474169	POMPA 50Hz PUMP 50Hz
7	474170	POMPA 50Hz PUMP 60Hz
8	844091/A2	VITE SCREW
9	844095/A2	ROSETTA WASHER
10	844023/A2	DADO NUT
11	534081/EP	BOCCHETTONE COUPLING
12	814131/EP	VALVOLA VALVE



**Legenda/Legend DWG.PP633-35945**

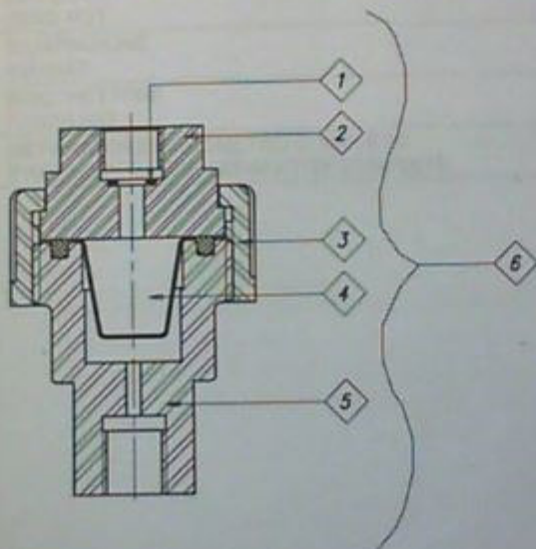
Pos.	Codice/Code	Descrizione/Description
1	814130/EP	VALVOLA VALVE
2	224082	FLUSSOMETRO SENZA MAGNETE FLOWMETER WITHOUT MAGNET
2	224083	FLUSSOMETRO CON MAGNETE FLOWMETER WITH MAGNET
3	184077	ELETRIVALVOLA SOLENOID VALVE
4	534045	ADATTATORE ADAPTER
5	534473	CLIP TUBO PIPE CLAMP
6	844193/A4	VITE SCREW
7	224085	CONTATTO DI MIN-MAX CONTACT SWITCH
8	274101/EP	O-RING O-RING



**Legenda/Legend DWG.PP632-35938**

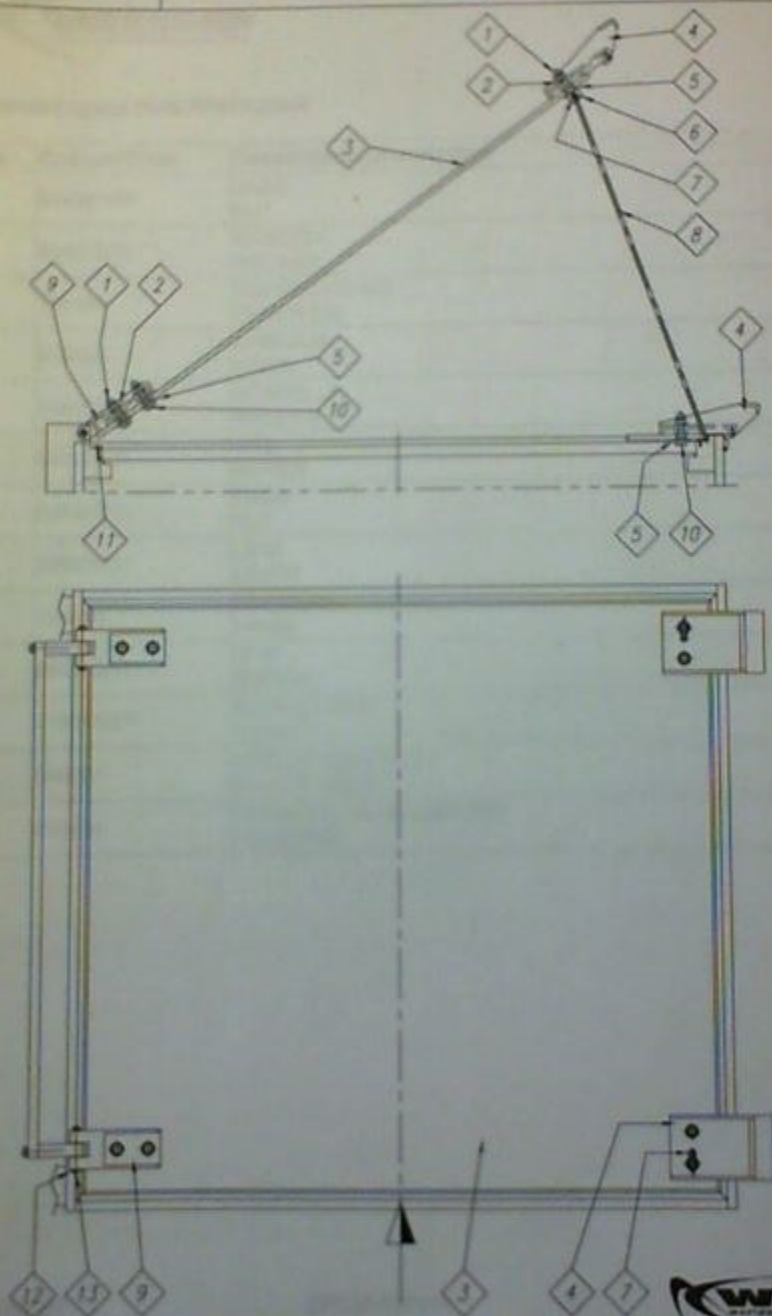
Pos.	Codice/Code	Descrizione/Description
1	676736	PIASTRA SUPPORTO SUPPORT PLATE
2	354018	MANOMETRO PRESSURE GAUGE
3	766322/V1	SEPARATORE PER MANOMETRO PRESSURE GAUGE SEPARATOR
4	844022/A2	DADO NUT
5	844096/A2	ROSETTA WASHER
6	844289/A2	VITE SCREW
7	534472	CLIP CLAMP
8	794037	TUBO HOSE
9	394169	RACCORDO FITTING
10	844324/A2	VITE SCREW
11	844062/A2	ROSETTA WASHER





**Legenda/Legend DWG.701-32994**

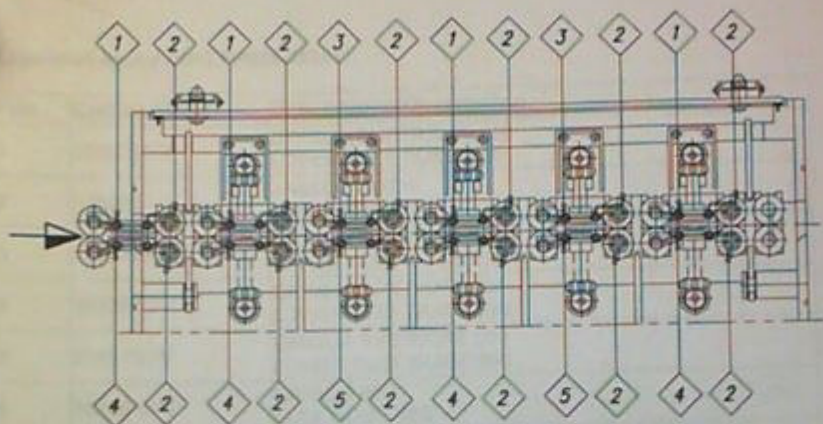
Pos.	Codice/Code	Descrizione/Description
1	274054/V1	O-RING O-RING
2	216018/PC	FLANGIA PORTAMANOMETRO PRESSURE GAUGE FLANGE
3	534004	GHIERA RING NUT
4	276028/V1	GUARNIZIONE GASKET
5	766321	BOCCHETTONE COUPLING
6	766322/V1	SEPARATORE MANOMETRO COMPLETO PRESSURE GAUGE SEPARATOR COMPLETE



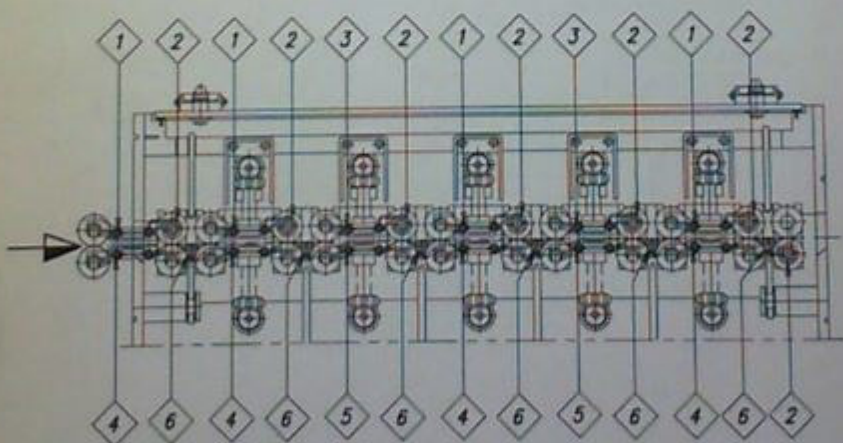


Legenda/Legend DWG PP633-35946

Pos.	Codice/Code	Descrizione/Description
1	844097/PF	DADO NUT
2	844018/TI	ROSETTA WASHER
3	158198	COPERCHIO 850 COVER 850
4	858020	MANIGLIA HINGE
5	846101	RONDELLA WASHER
6	846196/TI	VITE SCREW
7	844023/TI	DADO NUT
8	326059/TI	LEVA LEVER
9	116015	CERNIERA HINGE
10	844242/TI	VITE SCREW
11	276015/EP	GUARNIZIONE GASKET
12	046001	ANELLO ELASTICO ELASTIC RING
13	025495	PERNETTO PER CERNIERA HINGE PIN



GRIGLIE INFERIORI E SUPERIORI PER SCHEDE SPESS  
 LOWER AND UPPER FLEX GUIDE FOR THICK BOARDS



GRIGLIE INFERIORI E SUPERIORI PER SCHEDE SOTTILI  
 LOWER AND UPPER FLEX GUIDE FOR THIN BOARDS

**Legenda/Legend DWG.PP633-35947**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	036006	ANELLO GUIDA GUIDE RING
3	256077/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
4	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
5	256075/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
6	256081/FV	GRIGLIA 650 FLEX GUIDE 650



**Manuale di Istruzioni  
Usò e Manutenzione**

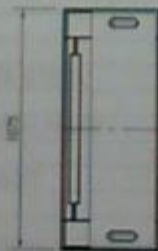
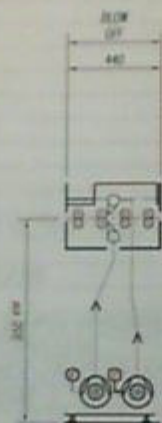
**Operating Instructions  
and Maintenance Manual**

**Modulo/Module:  
BLOW OFF L=440 PP 650**

**Data/Date: 04-2007**

DWG. PP35948

PP BLOW OFF 650

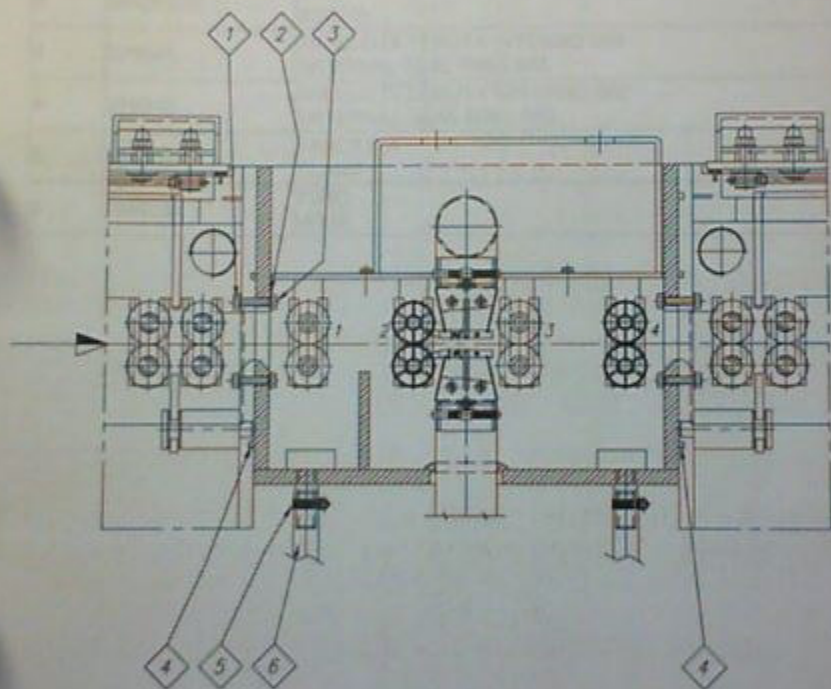




## TABELLA MATERIALI / MATERIALS TABLE

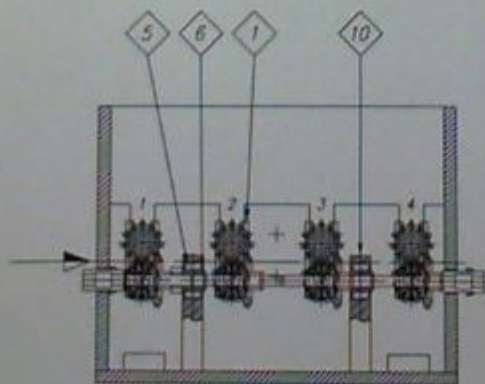
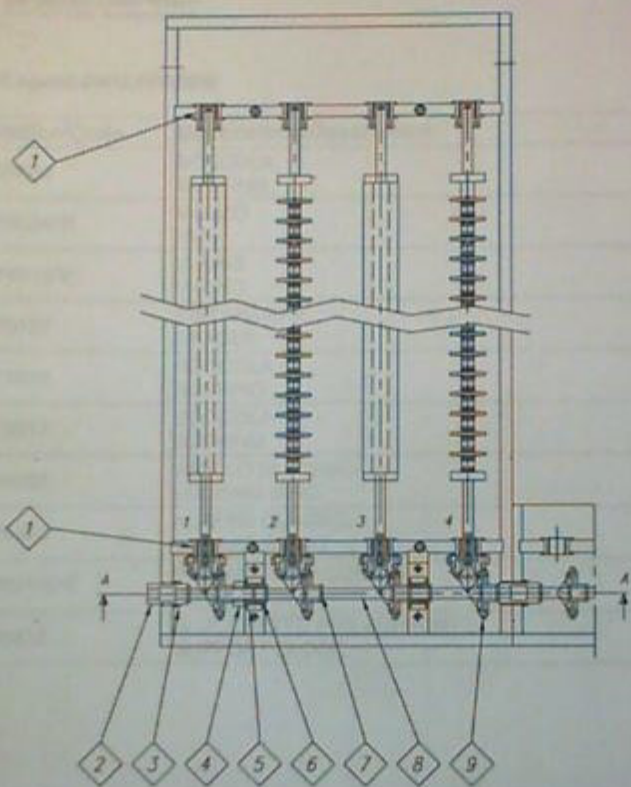
SIGLE DEI MATERIALI PLASTICI E ELASTOMERI
LIST OF PLASTIC AND RUBBER MATERIALS
CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
KR: KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
VI: VITON / VITON
VK: VULKOLLAN / VULKOLLAN

SIGLE DEI MATERIALI METALLICI E FIBRE
LIST OF METALLIC MATERIALS AND FIBERS
A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM



**Legenda/Legend DWG.PP35949**

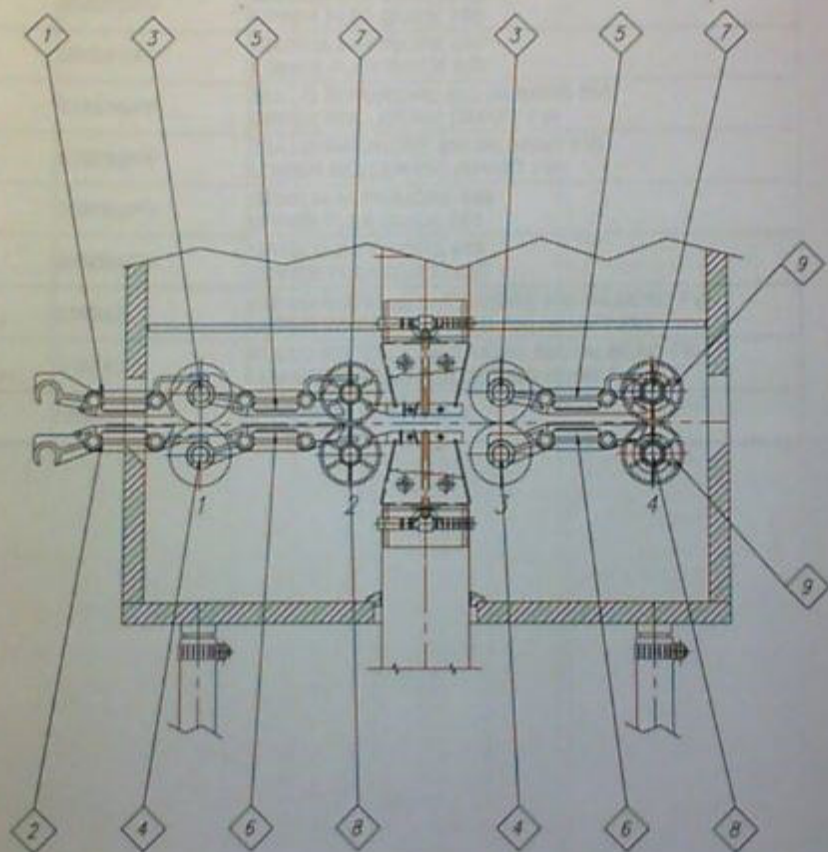
Pos.	Codice/Code	Descrizione/Description
1	844024/TI	DADO NUT
2	844062/TI	ROSETTA WASHER
3	844075/TI	VITE SCREW
4	276041	ANELLO DI TENUTA INTERNO 650 INTERNAL SEAL RING 650
4	276042	ANELLO DI TENUTA ESTERNO 650 EXTERNAL SEAL RING 650
5	194009	FASCETTA CLAMP
6	794006	TUBO HOSE



SEZIONE A-A  
SECTION A-A

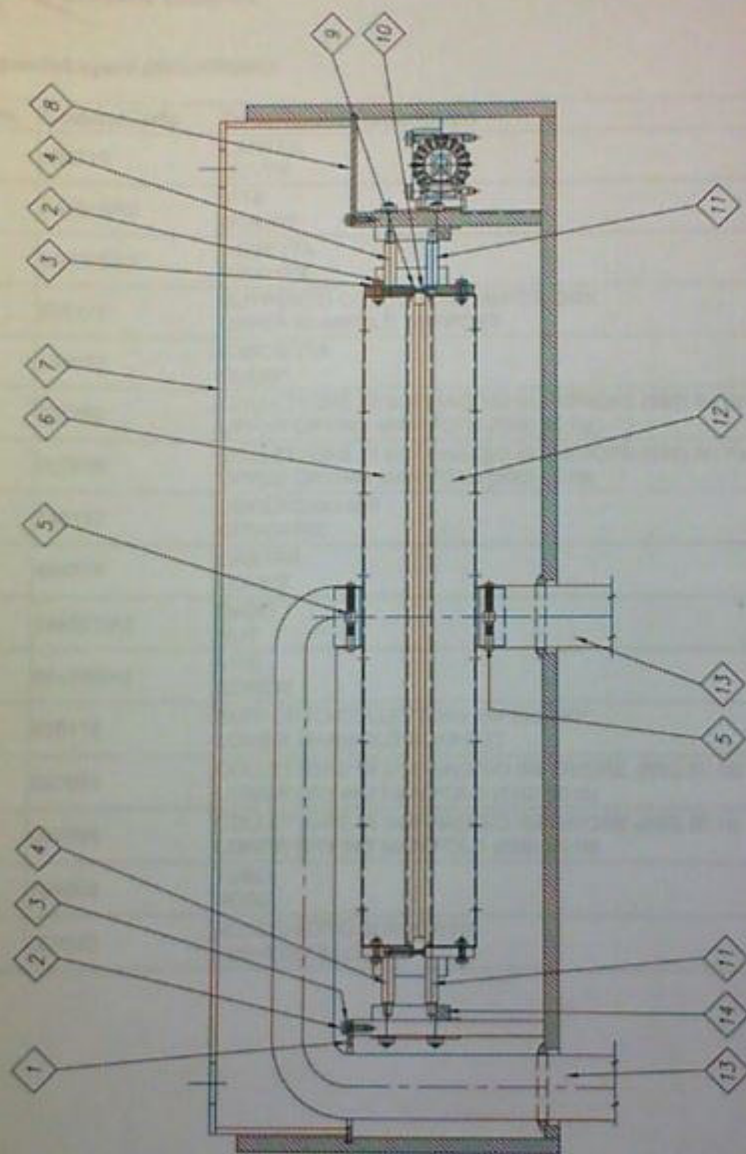
Legend/Legend DWG.PP35850

Pos.	Codice/Code	Descrizione/Description
1	078004	BOCCOLA BUSHING
2	218024/T1	MOZZO HUB
3	274013/M	V-RING V-RING
4	178107	DISTANZIERE SPACER
5	078018	BOCCOLA BUSHING
6	078017	BOCCOLA BUSHING
7	036008	ANELLO DI FERMO LOCKING RING
8	026496	ALBERO QUADRO SQUARE SHAFT
9	298018/PP	INGRANAGGIO CONICO CONICAL GEAR
10	878422	BLOCCETTO PER SUPPORTO SUPPORT BLOCK



**Legenda/Legend DWG.PP35951**

Pos.	Codice/Code	Descrizione/Description
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
3	016234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
4	016233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)
5	256065/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
6	256063/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
7	016242	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEELS ROLLER 650 (SHAFT FV)
8	016241	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEELS ROLLER 650 (SHAFT FV)
9	036006	ANELLO DI GUIDA GUIDE RING

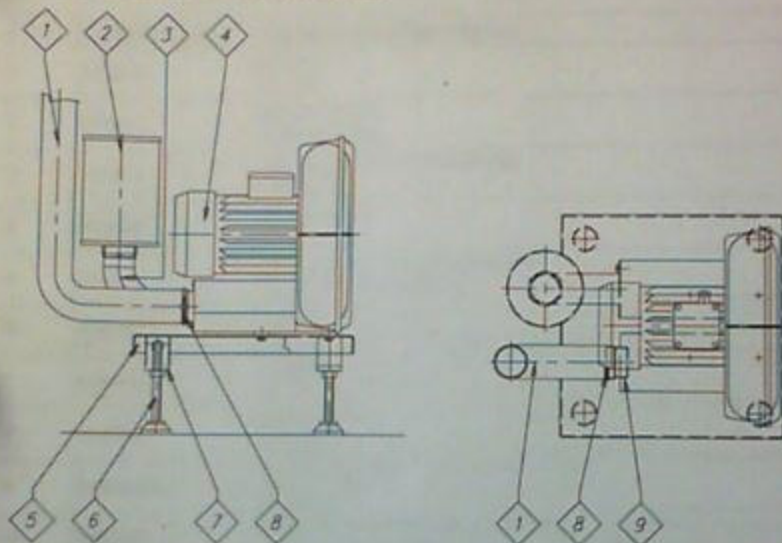




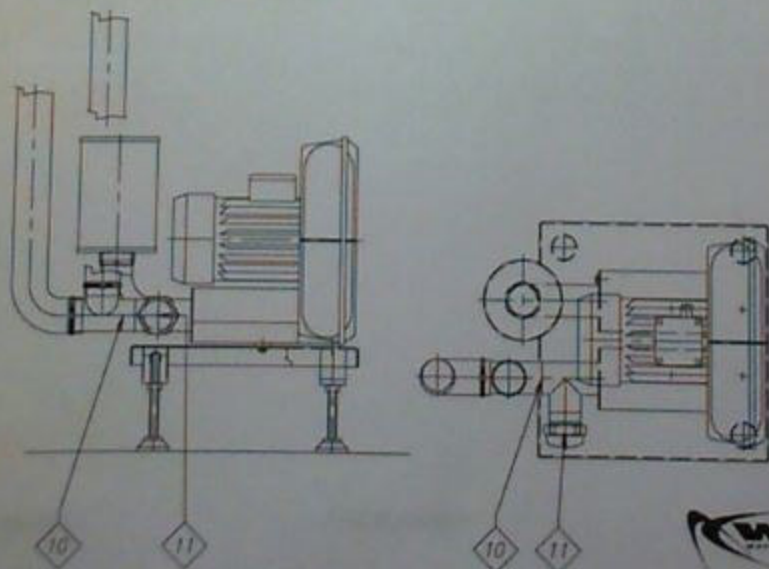
Legenda/Legend DWG.PP35952

Pos.	Codice/Code	Descrizione/Description
1	486719	CARTER COVER
2	844015/A2	VITE SCREW
3	844095/A2	ROSETTA WASHER
4	656117	SUPPORTO COLLETTORE SUPERIORE UPPER MANIFOLD SUPPORT
5	194022	FASCIETTA CLAMP
6	007092	COLLETTORE DI SOFFIAGGIO SUPERIORE (650) 50 Hz UPPER DRYING MANIFOLD (650) 50 Hz
6	007096	COLLETTORE DI SOFFIAGGIO SUPERIORE (650) 60 Hz UPPER DRYING MANIFOLD (650) 60 Hz
7	146133	COPERCHIO 650 COVER 650
8	486718	CARTER COVER
9	844021/A2	DADO NUT
10	844280/A2	VITE SCREW
11	656116	SUPPORTO COLLETTORE INFERIORE LOWER MANIFOLD SUPPORT
12	007090	COLLETTORE DI SOFFIAGGIO INFERIORE (650) 50 Hz LOWER DRYING MANIFOLD (650) 50 Hz
12	007094	COLLETTORE DI SOFFIAGGIO INFERIORE (650) 60 Hz LOWER DRYING MANIFOLD (650) 60 Hz
13	794002	TUBO HOSE
14	066040	BLOCCHETTO SUPPORTO SUPPORT BLOCK

VERSIONE CON DUE SOFFIANTI  
VERSION WITH TWO BLOWERS



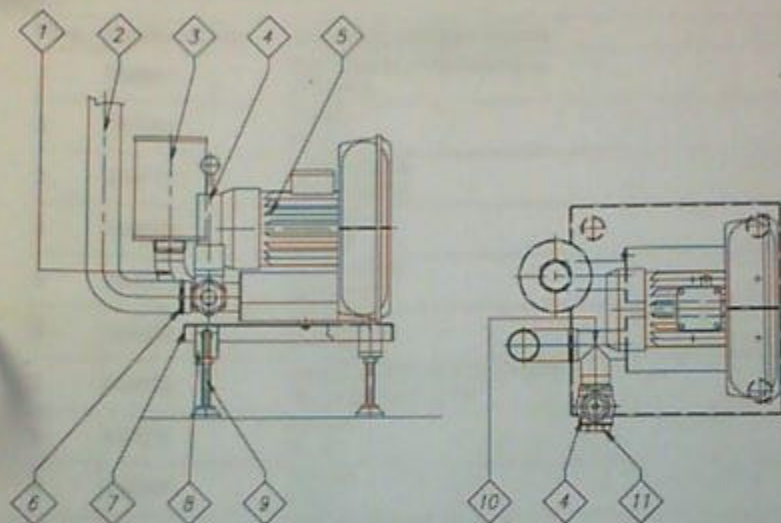
VERSIONE CON UN SOFFIANTE  
VERSION WITH ONE BLOWER



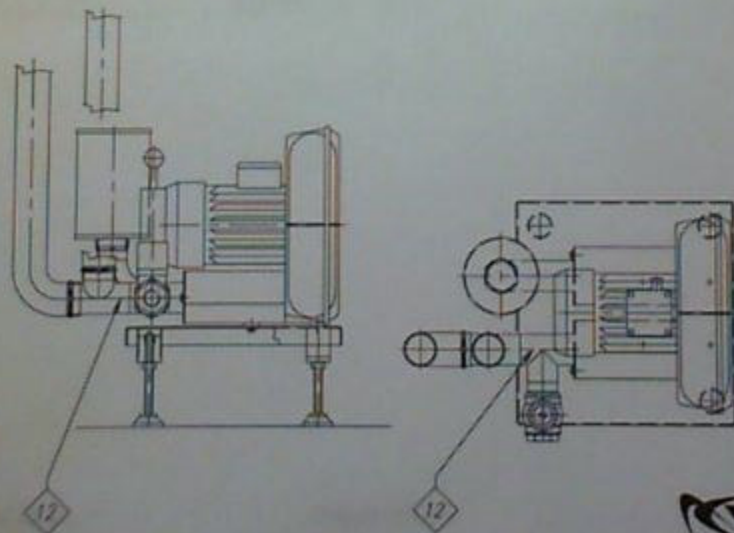
**Legenda/Legend DWG.808-31239**

Pos.	Codice/Code	Descrizione/Description
1	794002	TUBO HOSE
2	834011	CARTUCCIA CARTRIDGE
3	766061	RACCORDO ASPIRAZIONE FITTING
4	834006	SOFFIANTE BLOWER
5	666010	BASAMENTO VENTILATORE BLOWER SUPPORT
6	454007	PIEDE FOOT
7	454009	TAPPO PLUG
8	194022	FASCIETTA CLAMP
9	514039/A2	TRONCHETTO STUB PIPE
10	766348	RACCORDO MANDATA DOPPIO DOUBLE FITTING
11	534160	CALOTTA CAP

VERSIONE CON DUE SOFFIANTI  
VERSION WITH TWO BLOWERS

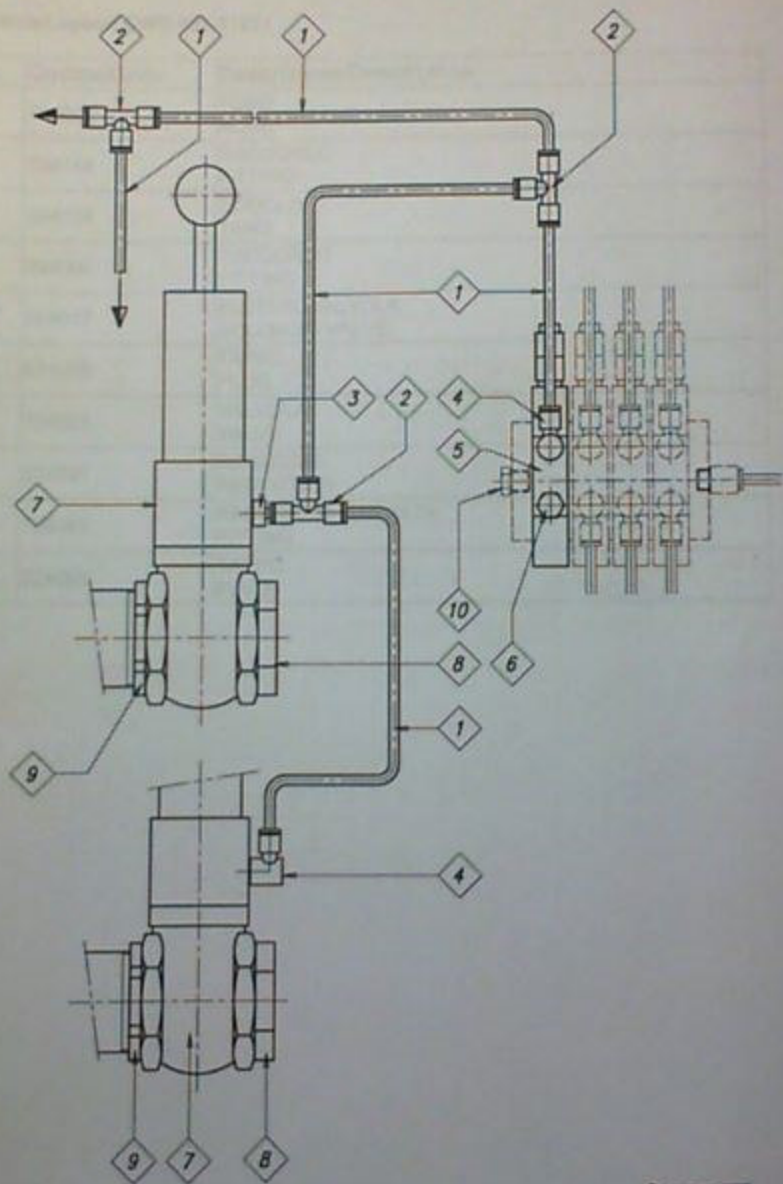


VERSIONE CON DUE SOFFIANTI  
VERSION WITH ONE BLOWER



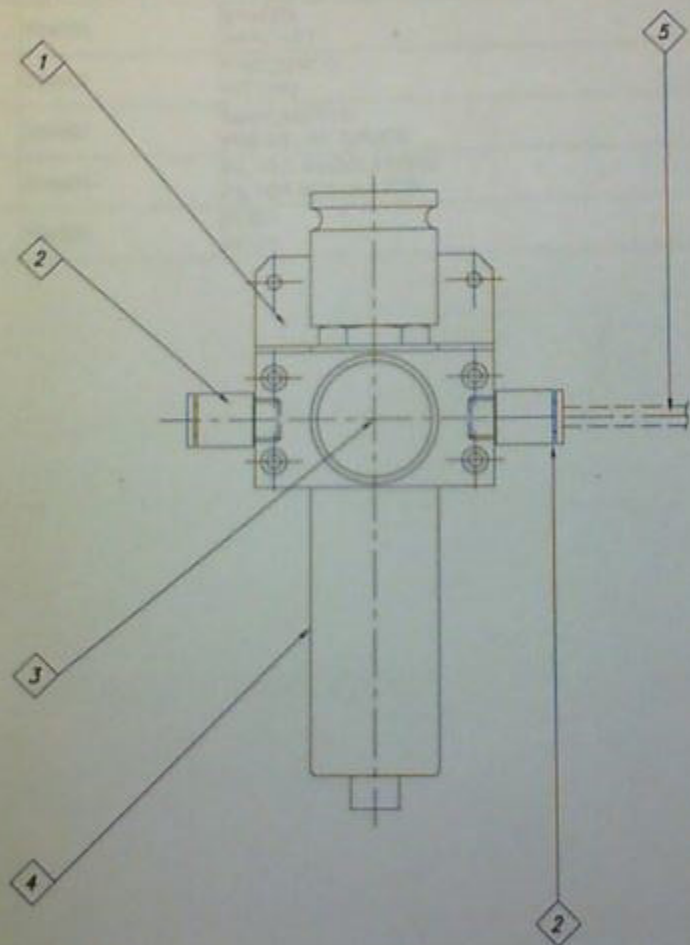
Legenda/Legend DWG.808-31240

Pos.	Codice/Code	Descrizione/Description
1	766001	RACCORDO ASPIRAZIONE FITTING
2	794002	TUBO HOSE
3	834011	CARTUCCIA CARTRIDGE
4	154025	VALVOLA VALVE
5	834006	SOFFIANTE BLOWER
6	194022	FASCETTA CLAMP
7	666010	SASAMENTO VENTILATORE BLOWER SUPPORT
8	454006	TAPPO PLUG
9	454007	PIEDE FOOT
10	766062	RACCORDO MANDATA FITTING
11	534501	RIDUZIONE REDUCTION
12	766348	RACCORDO MANDATA DOPPIO DOUBLE FITTING



**Legenda/Legend DWG.801-31221**

Pos.	Codice/Code	Descrizione/Description
1	794005	TUBO HOSE
2	394148	RACCORDO FITTING
3	394064	CODOLO TANG
4	394009	RACCORDO FITTING
5	394017	ELETTROVALVOLA SOLENOID VALVE
6	524008	TAPPO PLUG
7	184025	VALVOLA VALVE
8	534501	RIDUZIONE REDUCTION
9	766062	RACCORDO MANDATA FITTING
10	524009	TAPPO PLUG







**Legenda/Legend DWG.PF35244**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	394005	STAFFA BRACKET
2	394007	RACCORDO FITTING
3	354007	MANOMETRO PRESSURE GAUGE
4	394002	FILTRO REGOLATORE FILTER REGULATOR
5	794005	TUBO HOSE



***Manuale di Istruzioni  
Uso e Manutenzione***

***Operating Instructions  
and Maintenance Manual***

***Modulo/Module:***

***PP BANCALE DI CARICO 650***

***PP INPUT CONVEYOR 650***

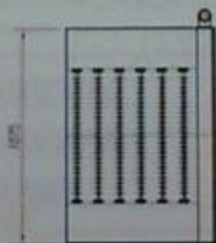
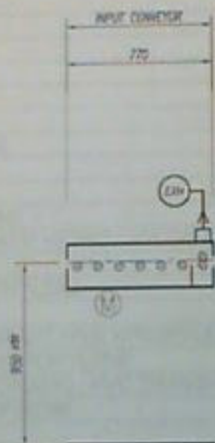
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*Codice del Manuale  
Manual code*

*PP401-650-03-07*

DWG. PP35767

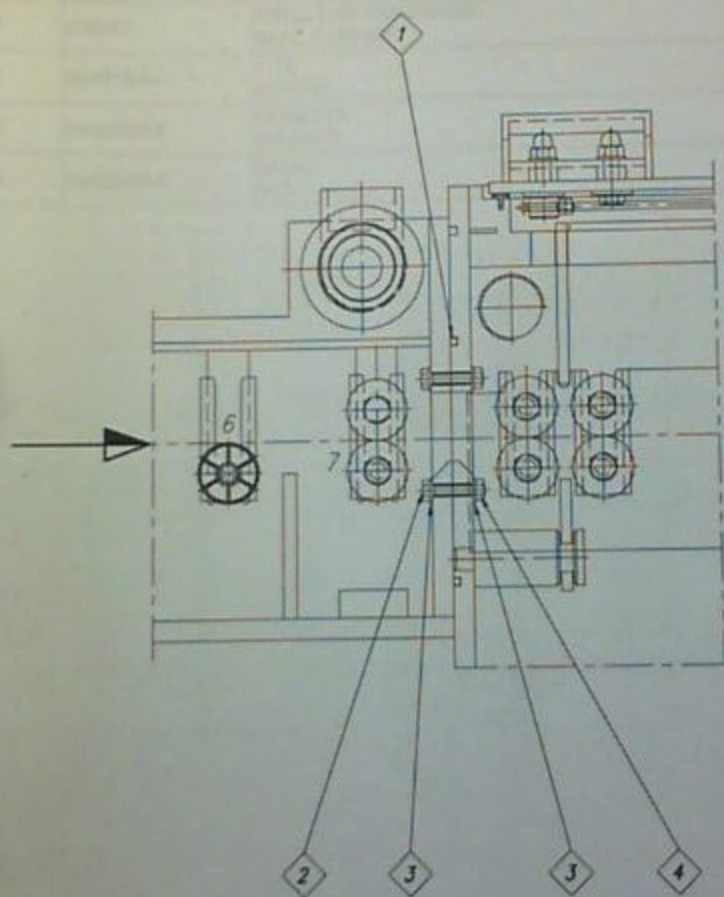
PP INPUT CONVEYOR L=770 (850)



## TABELLA MATERIALI / MATERIALS TABLE

SIGLE DEI MATERIALI PLASTICI E ELASTOMERI
LIST OF PLASTIC AND RUBBER MATERIALS
CA CARILON / CARILON
CP PVC-C / PVC-C
DE DELRIN / DELRIN
EP EPDM / EPDM
FE FEP / FEP
HY HYPALON / HYPALON
KR KRATON-G / KRATON-G
MA MAFIL / MAFIL
N6 NYLON 6 / NYLON 6
NB NEOPRENE / NEOPRENE
NV NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC PVC / PVC
PE POLIETILENE / POLYETHYLENE
PF PVDF / PVDF
PN POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP POLIPROPILENE / POLYPROPYLENE
PV PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA SANTOPRENE / SANTOPRENE
SI SILICONE / SILICON
TE TEFLON / TEFLON
VI VITON / VITON
VK VULKOLLAN / VULKOLLAN

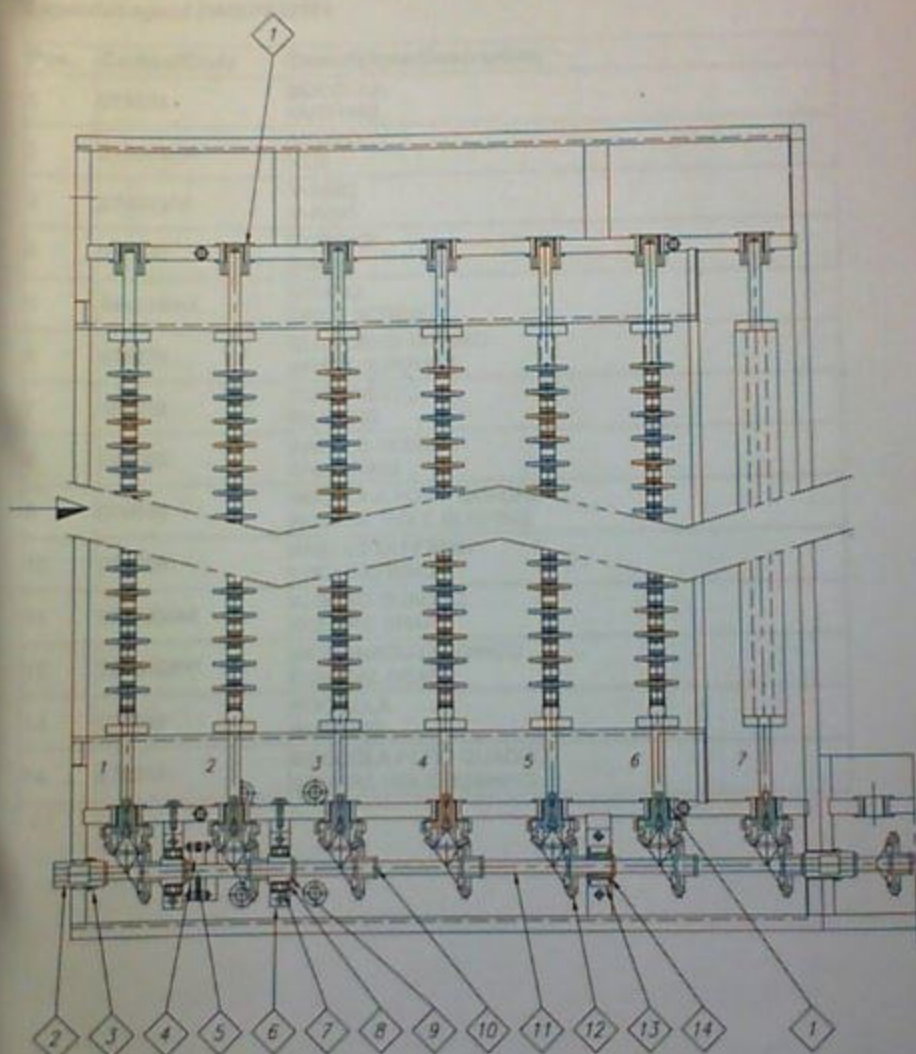
SIGLE DEI MATERIALI METALLICI E FIBRE
LIST OF METALLIC MATERIALS AND FIBERS
A2 AISI 304 / AISI 304
A3 AISI 303 / AISI 303
A4 AISI 316 / AISI 316
AZ ACCIAIO ZINCATO / ZINCATE STEEL
CU RAME / COPPER
FC FIBRA DI CARBONIO / CARBON FIBER
FO FE 00 / IRON
FV FIBRA DI VETRO / GLASS FIBER
HA HASTELLOY / HASTELLOY
OT OTTONE / BRASS
T2 TITANIO GRADO 2 / TITANIUM GRADE 2
T5 TITANIO GRADO 5 / TITANIUM GRADE 5
TI TITANIO / TITANIUM





Legenda/Legend DWG.PP35788

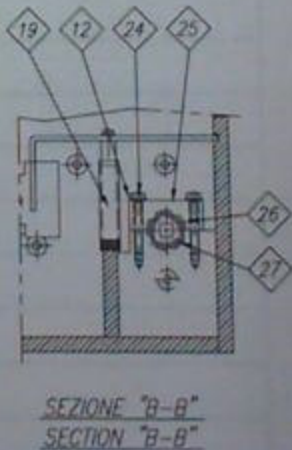
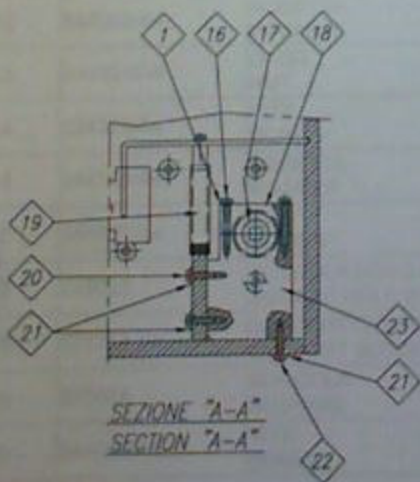
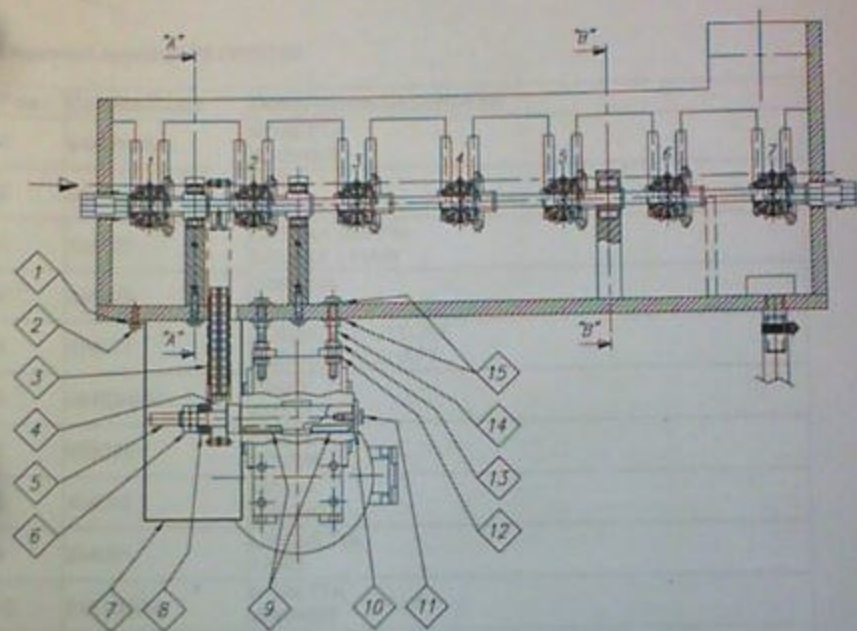
Pos.	Codice/Code	Descrizione/Description
1	276041	ANELLO DI TENUTA 650 SEAL RING 650
2	844016/A4	VITE SCREW
3	844062/A4	ROSETTA WASHER
4	844024/A4	DADO NUT



Legenda/Legend DWG.PP35789

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	216024/A4	MOZZO HUB
3	274013/VI	V-RING V-RING
4	296080	CORONA RIM
5	844134/A4	GRANO GRUB SCREW
6	676274	SUPPORTO ALBERO SHAFT SUPPORT
7	164056	CUSCINETTO BEARING
8	044020	ANELLO SEEGER SNAP RING
9	076033	BOCCOLA FORO QUADRO SQUARE HOLE BUSHING
10	036008	ANELLO DI FERMO LOCKING RING
11	026183/A4	ALBERO QUADRO SQUARE SHAFT
12	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
13	076018	BOCCOLA BUSHING
14	076017	BOCCOLA FORO QUADRO SQUARE HOLE BUSHING



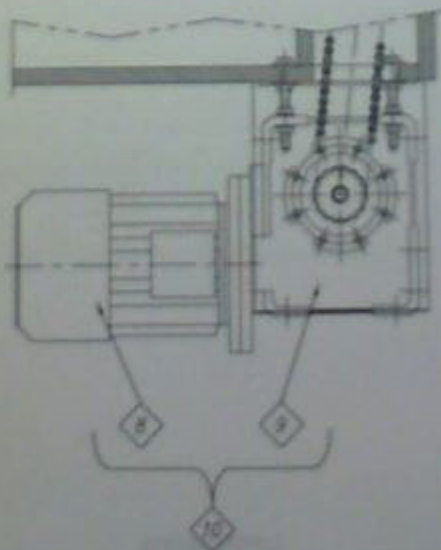
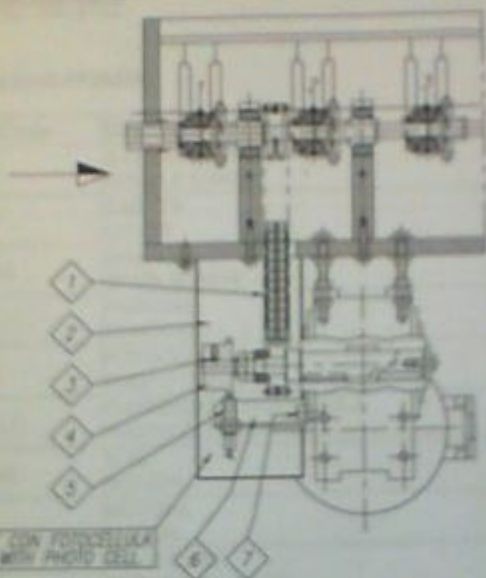


Legenda/Legend DWG.PP35790

Pos.	Codice/Code	Descrizione/Description
1	844095/A4	ROSETTA WASHER
2	844015/A4	VITE SCREW
3	104022	CATENA DOPPIA DOUBLE CHAIN
4	296079	CORONA RIM
5	026171	ALBERO RIDUTTORE REDUCTION SHAFT
6	844034/A4	DADO NUT
7	486534	CARTER COVER
8	404002	MOLLA SPRING
9	334001	LINGUETTA TANG
10	844100/A4	ROSETTA WASHER
11	844044/A4	VITE SCREW
12	844062/A4	ROSETTA WASHER
13	844024/A4	DADO NUT
14	844329/A4	VITE SCREW
15	844149/A4	ROSETTA WASHER
16	844301/A4	VITE SCREW
17	076033	BOCCOLA FORO QUADRO SQUARE HOLE BUSHING
18	676214	BLOCCHETTO SUPPORTO SUPPORT BLOCK
19	076034	BOCCOLA BUSHING
20	844040/A4	VITE SCREW

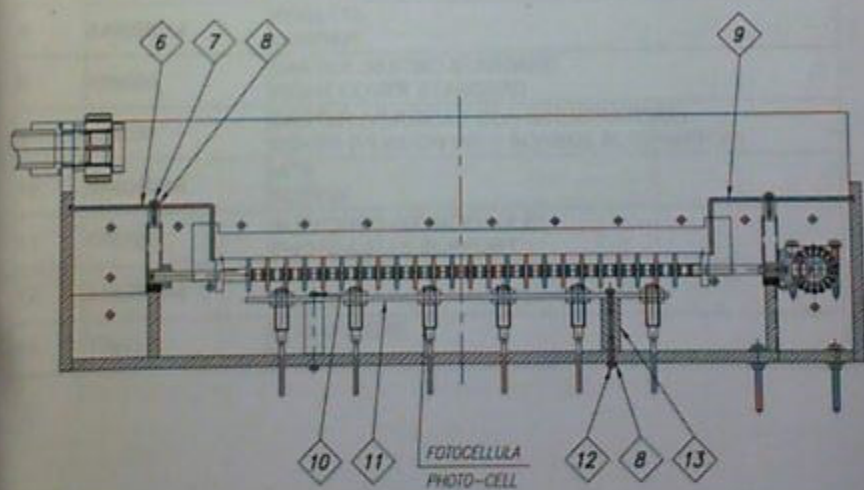
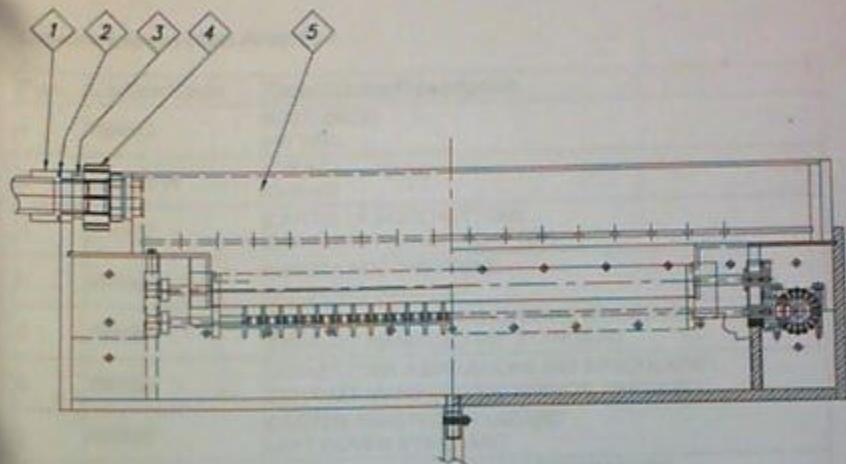


21	844081/A4	ROSETTA WASHER
22	844088/A4	VITE SCREW
23	876274	SUPPORTO ALBERO SHAFT SUPPORT
24	844324/A4	VITE SCREW
25	876422	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
26	076018	BOCCOLA BUSHING
27	076017	BOCCOLA FORO QUADRO SQUARE HOLE BUSHING



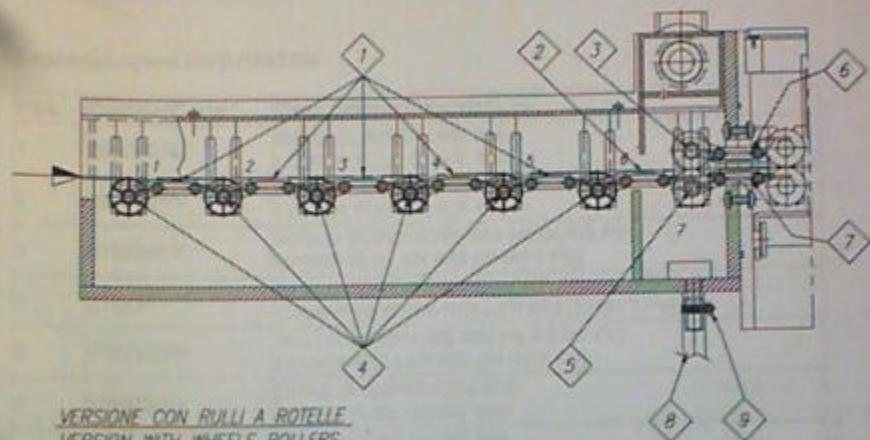
**Legenda/Legend DWG.PP35328**

Pos.	Codice/Code	Descrizione/Description
1	104022	CATENA DOPPIA DOUBLE CHAIN
2	488534	CARTER COVER
3	844057/A2	GRANO GRUB SCREW
4	206123	PIGNONE SPROCKET
5	-----	FOTOCELLULA PHOTO CELL
6	678641	SUPPORTO FOTOCELLULA PHOTO CELL SUPPORT
7	644218/A2	VITE SCREW
8	424047	MOTORE MOTOR
9	434093	RIDUTTORE REDUCTION GEAR
10	434090	MOTORIDUTTORE COMPLETO MOTOREDUCTION GEAR COMPLETE

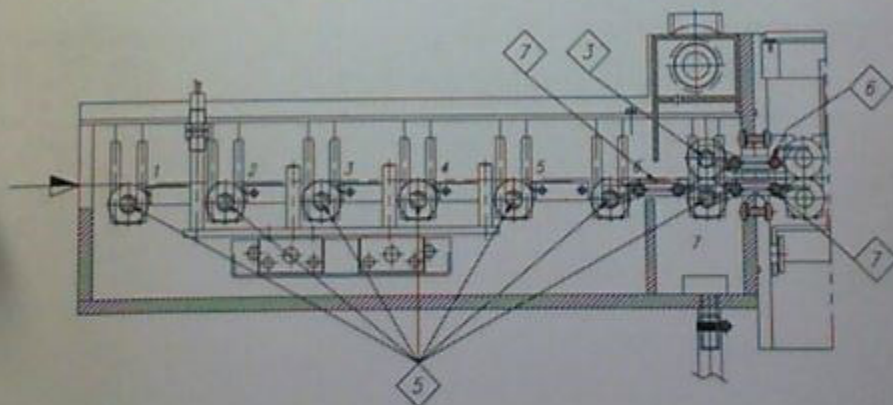


Legenda/Legend DWG.PP35791

Pos.	Codice/Code	Descrizione/Description
1	766883	RACCORDO FITTING
2	274121/V1	O-RING O-RING
3	534172	CARTELLA BOCCHETTONE COUPLING FLANGE ADAPTOR
4	534007	GHIERA BOCCHETTONE COUPLING RING NUT
5	766881	COLLETTORE ASPIRAZIONE 650 STANDARD EXHAUST MANIFOLD 650 STANDARD
5	766882	COLLETTORE ASPIRAZIONE 650 SPECULARE EXHAUST MANIFOLD 650 MIRROR VERSION
6	486685	CARTER SINISTRO STANDARD LEFT COVER STANDARD
6	486687	CARTER (VERSIONE CON SCENTRATORE) COVER (VERSION WITH BOARDS ALTERNATOR)
7	844015/A4	VITE SCREW
8	844095/A4	ROSETTA WASHER
9	486686	CARTER DESTRO STANDARD RIGHT COVER STANDARD
9	486687	CARTER (VERSIONE CON SCENTRATORE) COVER (VERSION WITH BOARDS ALTERNATOR)
10	844040/A4	VITE SCREW
11	676789	SUPPORTO FOTOCELLULE PHOTO-CELLS SUPPORT
12	844300/A4	VITE SCREW
13	176137	DISTANZIERE SPACER



VERSIONE CON RULLI A ROTELLE  
VERSION WITH WHEELS ROLLERS

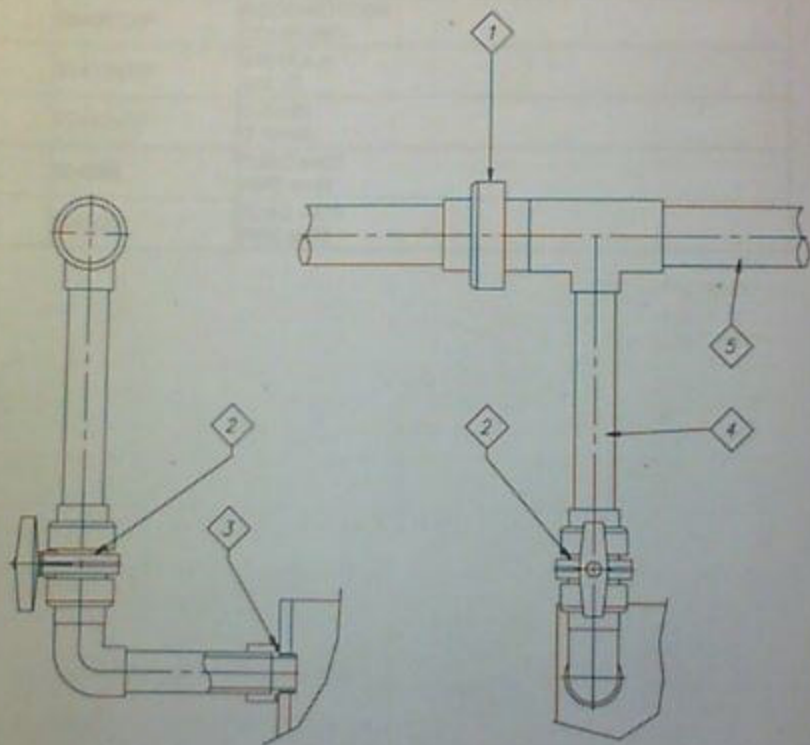


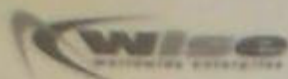
VERSIONE CON RULLI E SCENTRATORE  
VERSION WITH ROLLER AND BOARDS ALTERNATOR



Legenda/Legend DWG.PP35330

Pos.	Codice/Code	Descrizione/Description
1	256047/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
2	256055/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
3	016234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
4	016237	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEELS ROLLER 650 (SHAFT FV)
5	016233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)
6	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
7	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
8	794006	TUBO HOSE
9	194009	FASCETTA CLAMP

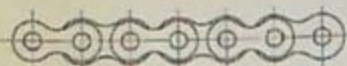




Legenda/Legend DWG.PP644-35806

Pos.	Codice/Code	Descrizione/Description
1	534087/EP	BOCCHETTONE COUPLING
2	814134/EP	VALVOLA VALVE
3	274121/V1	O-RING O-RING
4	804205	TUBO øx50 PIPE øx50
5	804206	TUBO øx75 PIPE øx75

### SIMPLEX CHAIN



CHAIN



CONNECTING  
LINK

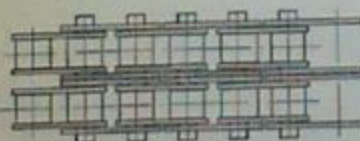
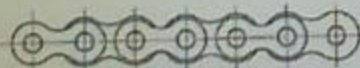


OFFSET  
LINK

#### CHAIN CHARACTERISTICS

PITCH	MATERIAL	REF. N°	REF. N°	REF. N°
3/8"	STEEL	104001	104002	104003
3/8"	S.S.	104007	104008	104009
1/2"	STEEL	104010	104011	104012
1/2"	S.S.	104004	104005	104006
5/8"	S.S.	104013	104014	104015
3/4"	S.S.	104016	104017	104018

### DUPLEX CHAIN



CHAIN



CONNECTING  
LINK



OFFSET  
LINK

#### CHAIN CHARACTERISTICS

PITCH	MATERIAL	REF. N°	REF. N°	REF. N°
3/8"	STEEL	104022	104023	104024
1/2"	STEEL	104025	104026	104027
1/2"	S.S.	104019	104020	104021



***Manuale di Istruzioni  
Usa e Manutenzione  
Operating Instructions  
and Maintenance Manual***

***Modulo/Module:  
CHEM SPRAY MOD. L=990 2FFM (650)***

***Data/Date: 04-2007***

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<b>Section</b>	<b>page</b>
1. <i>Module technical specifications</i>	2
2. <i>Description</i>	4
3. <i>Operation</i>	6
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5. <i>Troubleshooting guide</i>	11
6. <i>Lists, drawings, photographs and spare parts</i>	14

## 1. Module technical specifications

### 1.1 Module

Module:	CHEM SPRAY MODULE L=990
Model:	2 PUMPS 650
Final use:	SPRAYING TREATMENT OF PRINTED CIRCUIT BOARD WITH CHEMICAL SOLUTION

### 1.2 Diagrams and drawings

Overall dimensions DWG:	PP639-35953
Internal cross sections DWG:	PP639-35953
Other DWG:	N.A.

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	990
- Maximum width (mm):	1875
- Maximum height (mm):	1200
- Net weight (kg):	200

### 1.4 Installed energies and products

#### Electric power

Main line:	see main manual
Power circuit:	see main manual
Control circuit :	see main manual

#### Compressed air

Pressure:	6bar
Capacity (consumption):	negligible

#### Caloric heating energy

Caloric energy (kcal):	N.A.
Inlet heating fluid temperature (°C):	Max. N.A., Min. N.A.
Minimum capacity (l/h):	N.A.

#### Caloric cooling energy

Caloric energy (kcal):	2500 (EXOTHERMIC REACTION NON INCLUDED)
Inlet cooling fluid temperature (°C):	Max. 10, Min. 3
Minimum capacity (l/h):	600



**Air exhaust:**

Type of connection:

Capacity (m<sup>3</sup>/h):

smooth PVC pipe  $\varnothing$ 50 mm  
from 10 to 20 (to be defined  
according with the process  
requirement)

Pressure (mmH<sub>2</sub>O):

from 50 to 100 (to be defined  
according with the process  
requirement)

**Products:**

Mains water pressure/capacity(bar-l/h):

Demineralised water pressure/capacity(bar-l/h):

Inflammables:

Neutral gases:

Acids and/or bases:

Toxic products:

Other:

N.A.

N.A.

N.A.

N.A.

see product employed data sheets

see product employed data sheets

N.A.





## 2 Description

The Chem spray module is a unit employed for spraying treatment of printed circuit boards in general for example stripping of tin lead.

### 2.1 Main features

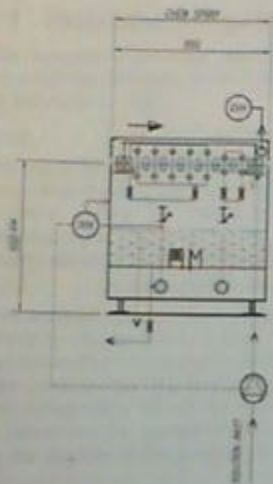
The machine consists in a monobloc self-supporting structure, made of PP plates, appropriately assembled, drilled, bent and welded, to its final shape. A stainless steel basement ensures trouble free life even after several years of use.

The line-up and type of nozzles ensure perfectly uniform treatment.

The upper part of the washing chambers are sealed by openable temperate glass covers, facilitating the access to the treatment areas.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts: conveyor rollers and spray bars can be removed without using tools.

## 2.2 Longitudinal section



## 2.3 Description of the working stations

A. Chem spray chamber, 990mm length, equipped with:

- One pair of squeegee rollers at inlet and outlet.
- Two magnetic driven pumps feeding the spraying pipes and forced fluid manifold.
- Screen filter installed on the delivery side of each pump.
- Five pairs of spraying pipes equipped with nozzles.
- Two couple of forced fluid manifold.
- One 3kW eaters controlled by a thermostat.
- One cooling coils: the cooling liquid is intercepted by solenoid valves driven by thermostat.

## 3 Operation

### 3.1 Preliminary regulations

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.

#### 3.1.1 Conveyor speed regulation

The panel transport system speed is visualised on the operator interface display which is also used to input the preset speed at the desired value. The electromechanical version machine shows the speed on a display and it can be adjusted by means of a potentiometer.

Speed adjustment should be adapted to the most critical phases of panel treatment.

#### 3.1.2 Process solution temperature regulation

The process solution temperature is regulated by a PLC and visualised on the operator interface display which is also used temperature setting at the desired set value. In the electromechanical machine version it is visualised and regulated by means of a thermostat also used to input the desired set value.

The temperature should be regulated according to the process and solution used. In order to determine the correct temperature, it is advisable to refer to the specifications provided by the supplier of the product used.



**WARNING:**

Max temperature allowed is 50°C (122,00°F) do not exceed this value. WISE s.r.l. shall not be held responsible for any damage caused by non compliance to this requirement.

#### 3.1.3 Compensation solution flow regulation

The processing solution and its degree of saturation represent two of the most important variables that can determine the finished product's quality constancy. It is therefore important to determine the compensation fluid(s) flow rate(s) in the correct way:

- If the machine is fed with ready made solution a contact is available, which commutes in presence of boards to be processed and can be used to activate the fresh solution feeding device (not supplied) as for example a pump or a solenoid valve.
- If the machine is equipped by an automatic density control system of the process solution, by means of a density meter, which provides the feed of ready made solution, in addition to the density meter one metering pump is installed.

### 3.2 Start up

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

#### 3.2.1 Daily requirements

3.2.1.1 **Check the water level** and the correct functionality of the system.

#### 3.2.1.2 **Check the pressure**

Check the efficiency of the pressure regulator each day. Pressure is normally set between 2 and 3 bar.

#### 3.2.1.3 **Check the oil level**

Check the oil level according to the oil level indicator in the oil tank. Change the oil when the oil level is low.

#### 3.2.1.4 **Check the air filter**

Check the air filter according to the air filter indicator in the air filter tank. Change the air filter when the air filter is dirty.

#### 3.2.2 Weekly requirements

3.2.2.1 **Check the water level** and the correct functionality of the system.

#### 3.2.2.2 **Check the pressure**

Check the efficiency of the pressure regulator. Change the pressure regulator when the pressure is low.

#### 3.2.2.3 **Check the oil level**

Check the oil level according to the oil level indicator in the oil tank. Change the oil when the oil level is low.

Check the air filter according to the air filter indicator in the air filter tank. Change the air filter when the air filter is dirty.

Check the water level and the efficiency of the pressure regulator. Change the pressure regulator when the pressure is low.

Check the air filter according to the air filter indicator in the air filter tank. Change the air filter when the air filter is dirty.

## **4. Maintenance**

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### **4.1 Daily maintenance**

It is a set of daily activities ensuring the correct functionality of the system.

#### **4.1.1 Process solution**

Check the efficiency of the process solution each day. Renew or replace the solution if necessary.

#### **4.1.2 Filters**

Each day check the efficiency status of the filters installed on the pump delivery side. If necessary clean or replace them.

#### **4.1.3 Cleaning**

At the end of each working shift or however once each day, clean the machines externally avoiding to use abrasive materials or objects, a dampened sponge is sufficient for the purpose.

### **4.2 Weekly maintenance**

It is a series of weekly activities ensuring the correct functionality of the system.

#### **4.2.1 Nozzles**

Each week check the status of the nozzles' efficiency. If necessary provide cleaning or replacement.

#### **4.2.2 Cleaning**

Each weekend clean the machines externally avoiding to use abrasive materials or objects, a dampened sponge is sufficient for the purpose.

Empty the process sections tanks and wash them internally by means of water jet. We recommend to install a flexible pipe connected to water mains near the machinery, in order to facilitate this operation.

Possibly, there could be calcareous formation or residues of the products utilised. If necessary provide removal of the same by following the below described procedure, which has been widely experienced and found very effective, and does not damage the machinery:

- Fill the tanks to be treated with acid solution based on sulphuric acid at 2+3%, warm the solution up to 30°C, then activate and run the pumps for 15+30 minutes.

- Empty the tanks and fill them with water, activate the pumps for 15 minutes then empty the tanks.
- Fill the tanks again, this time with an alkaline solution based by sodium peroxide at 2+3%, warm up the solution to 40°C, then activate the pumps for 15+30 minutes.
- Empty the tanks and fill them with water, activate the pumps for 15 minutes, then empty the tanks. Repeat the operation.



**WARNING**

It is forbidden to use highly aggressive products or not compatible with the materials installed in the machinery. Wise s.r.l. shall not be held responsible for damages caused by the use non adequate products.

WISE s.r.l. is available for supplying all the information required for the choice of the suitable product or detergent.

### **4.3 Monthly maintenance**

It is the series of monthly activities that censure the correct functionality of the system.

#### **4.3.1 Transport system**

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.

#### **4.3.2 Pumps**

The horizontal magnetic driven centrifugal pumps are equipped with bushing which are subject to wear and exceeding the acceptability limit will cause breakage of the pump. Provide monthly checking and replace the damaged parts, if necessary.

A specific manual is enclosed for other types of pumps which need more complex maintenance, for example diaphragm pumps.

#### **4.3.3 Seals**

Each month check the status seals of the covers, doors and filters. The sealing material is an elastomer which should appear elastic and without cracks. Replace if necessary.

#### **4.3.4 Piping**

Check each month the efficiency status of the flexible connection tubes between pumps and various utilities. Replace if necessary.

#### **4.3.5 Heating elements**

Check the efficiency of the heating elements through the measurement of the electrical input. If necessary replace the defective or unusable elements.

#### 4.3.6 Level gauges

Check the efficiency of the level gauges, which functionality can be prevented by the encrustations or dirt deposits. Clean or replace them if necessary.

#### 4.4 Wear parts mandatory replacement programme

<i>Activities description</i>	<i>Frequency in work hours</i>
Processing sections screen filters	1500
Low pressure nozzles	3000
Centrifugal pumps bushing	3000
Roller support inserts	3000

## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE srl technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

#### 5.1.2 *Noise level*

Verify the functionality of the centrifugal pumps:

- Check whether the mechanical parts composing it (bearings, impeller) are worn or damaged. If required replace defective parts.
- Check the level of the liquid inside the tank, the pump should appear completely under water head. Restore the correct level if necessary.
- Check for eventual foam formation. If present in large quantity it causes the cavitations phenomenon. If required, dose appropriate antifoam products or verify the quantity of the feeding water.



## 5.2 Treatment

### 5.2.1 *Insufficient treatment*

Check fresh solution feeding to machine. If required provide the necessary corrective actions.

Check the quality of the feeding fresh solution. If required provide the necessary corrective actions.

Verify if there is excess of water transfer between the rinsing section and the process section, by checking the below listed:

- Check the conveyor system rollers which separate the above said sections are positioned in the correct way inside their housings. If necessary, restore the correct condition.
- Check the status of the conveyor system rollers that separate the above said sections. If damaged repair or replace them.
- Check that section passage safety protections are present and installed in the proper way. If required restore the correct condition of the same.
- Check the spraying nozzles' jets that should be aimed in the free space between the two pairs of rollers and are not directly to the separating protections. If required modify the direction of the jets.

Verify that spray pressure is within the required process values and, if necessary, check as follows:

- The status of the filters installed on the delivery side of the recirculation pumps. Clean or replace if necessary.
- Check the efficiency and correct functionality of the recirculation pumps. If required repair or replace the defective pump.

Check the spraying tubes and relative nozzles for deposits or encrustations. In addition to the visual inspection it is also helpful to carry out an hydraulic check by feeding each tube with fresh water from mains, ensuring the status of the same. If necessary, restore the correct functionality of the tubes and the nozzles.

Check the status of the spraying nozzles' orifice. In addition to the visual inspection make a hydraulic check by feeding each single tube with mains water thus allowing to verify the spray jet of each nozzle, which should appear regular and flat, and with the below described dispersion angle:

- Process sections nozzles 60+90°

Replace the nozzles if worn.

The characteristics of the panel to be processed as for example, very strong oxidation, make the board cleaning operation more difficult:

- Reduce the conveyor speed.
- Increase the spray pressure of each pump to the maximum level.

If the above listed should not be sufficient, contact the local Representative otherwise take direct contact with the technical assistance of WISE s.r.l.

### 5.2.2 Excess of encrustations

During operations calcareous formation may be possible, which is commonly eliminated by performing the washing cycle afore described. The formation of encrustations can be reduced by feeding softened water to the washing sections.



#### **WARNING**

The use of demineralised water could damage some components installed in the machinery. WISE s.r.l. will not be held responsible for any damages caused by the use of demineralised water.

WISE s.r.l. is available for all the information and eventual modifications required for the use of demineralised water.

### 5.2.3 Centrifugal pumps' running problems

Pressure loss or reduction:

- In the event of a newly installed pump check the direction of rotation, usually indicated by an arrow placed on the pump. If necessary, invert one phase of the power supply to invert the direction of rotation.
- Verify the pump ducts for foreign particles or encrustations. Remove the cause of obstruction.
- If the pressure loss is revealed with a certain delay after pump start-up, the cause could be attributed to the presence of foam in the fluid being pumped, which is the cause of the cavitations phenomenon. Said phenomenon other than being harmful to the pump itself, also drastically reduces the operating pressure. Check the fluid and if it is the case activate all the necessary actions to minimise foam formation.
- Verify that all spraying nozzles are present and the wear status of their orifices. If required, install the missing nozzles or replace worn nozzles.
- Verify the spray manifolds or tubes for cracks, holes or other irregularity causing possible leakage in the spray manifolds or tubes. Repair or replace damaged parts.
- Verify the pressure display apparatus. If necessary repair or replace it.

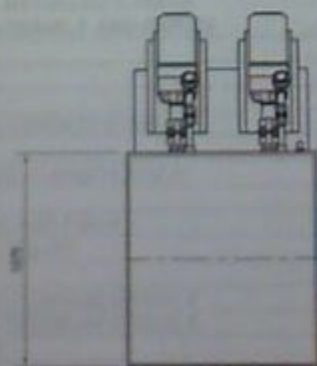
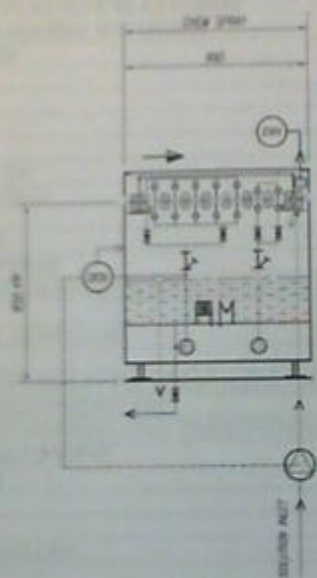
Too elevated electrical absorption:

- Verify that all the spraying nozzles are installed and the wear status of their orifices. If necessary, install the missing nozzles or replace the worn ones.
- Verify the presence of cracks, holes or irregularities that may cause leakage in the spraying tubes or manifolds. Repair or replace damaged parts.

## **6. Lists, drawings, photographs and spare parts.**

Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

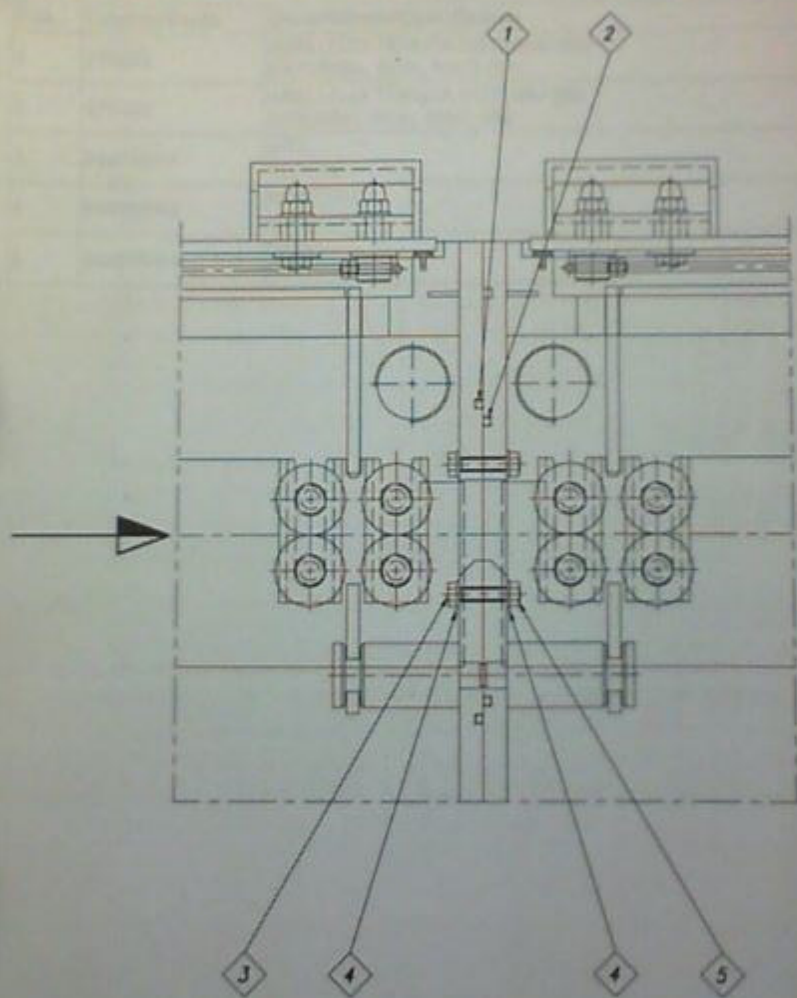
### **6.2 Drawings and spare parts lists**



## TABELLA MATERIALI / MATERIALS TABLE

<b>SIGLE DEI MATERIALI PLASTICI E ELASTOMERI</b>
<b>LIST OF PLASTIC AND RUBBER MATERIALS</b>
CA: CARILON / CARILON
CP: PVC-C / PVC-C
DE: DELRIN / DELRIN
EP: EPDM / EPDM
FE: FEP / FEP
HY: HYPALON / HYPALON
KR: KRATON-G / KRATON-G
MA: MAFIL / MAFIL
N6: NYLON 6 / NYLON 6
NB: NEOPRENE / NEOPRENE
NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED
PC: PVC / PVC
PE: POLIETILENE / POLYETHYLENE
PF: PVDF / PVDF
PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL
PP: POLIPROPILENE / POLYPROPYLENE
PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT
SA: SANTOPRENE / SANTOPRENE
SI: SILICONE / SILICON
TE: TEFLON / TEFLON
VI: VITON / VITON
VK: VULKOLLAN / VULKOLLAN

<b>SIGLE DEI MATERIALI METALLICI E FIBRE</b>
<b>LIST OF METALLIC MATERIALS AND FIBERS</b>
A2: AISI 304 / AISI 304
A3: AISI 303 / AISI 303
A4: AISI 316 / AISI 316
AZ: ACCIAIO ZINCATO / ZINCATE STEEL
CU: RAME / COPPER
FC: FIBRA DI CARBONIO / CARBON FIBER
FO: FE 00 / IRON
FV: FIBRA DI VETRO / GLASS FIBER
HA: HASTELLOY / HASTELLOY
OT: OTTONE / BRASS
T2: TITANIO GRADO 2 / TITANIUM GRADE 2
T5: TITANIO GRADO 5 / TITANIUM GRADE 5
TI: TITANIO / TITANIUM



**Legenda/Legend DWG.PP644-35793**

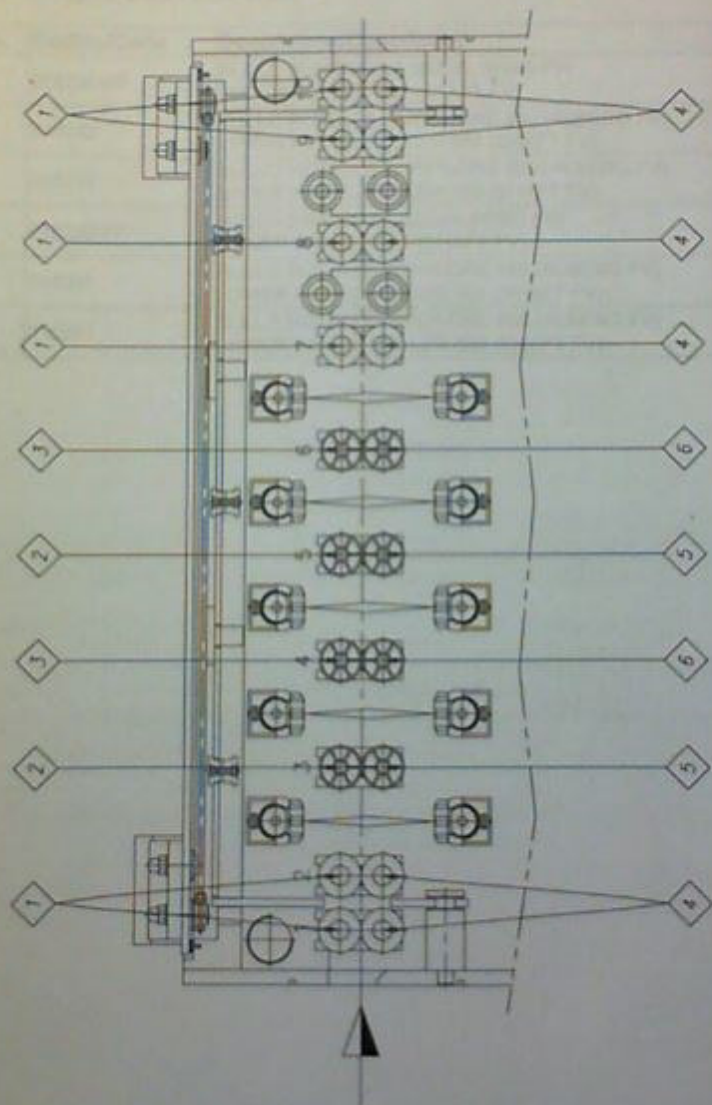
Pos.	Codice/Code	Descrizione/Description
1	276042	ANELLO DI TENUTA ESTERNO 650 EXTERNAL SEAL RING 650
2	276041	ANELLO DI TENUTA INTERNO 650 INTERNAL SEAL RING 650
3	844016/A4	VITE SCREW
4	844062/A4	ROSETTA WASHER
5	844024/A4	DADO NUT





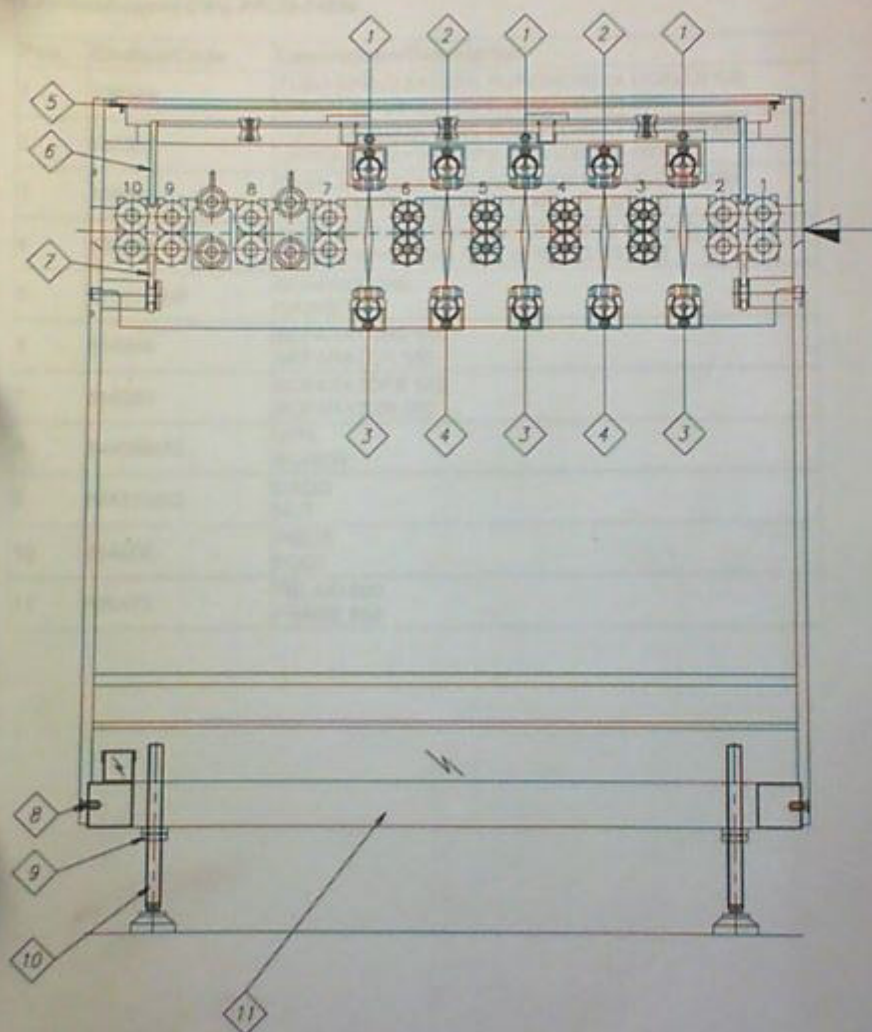
Legenda/Legend DWG.PP639-35954

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
3	036008	ANELLO DI FERMO LOCKING RING
4	076017	BOCCOLA BUSHING
5	076018	BOCCOLA BUSHING
6	026252/A4	ALBERO QUADRO SQUARE SHAFT
7	176106	DISTANZIERE SPACER
8	176107	DISTANZIERE SPACER
9	274013/VI	V-RING V-RING
10	216024/A4	MOZZO HUB
11	676422	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
12	844324/A4	VITE SCREW
13	844062/A4	ROSETTA WASHER



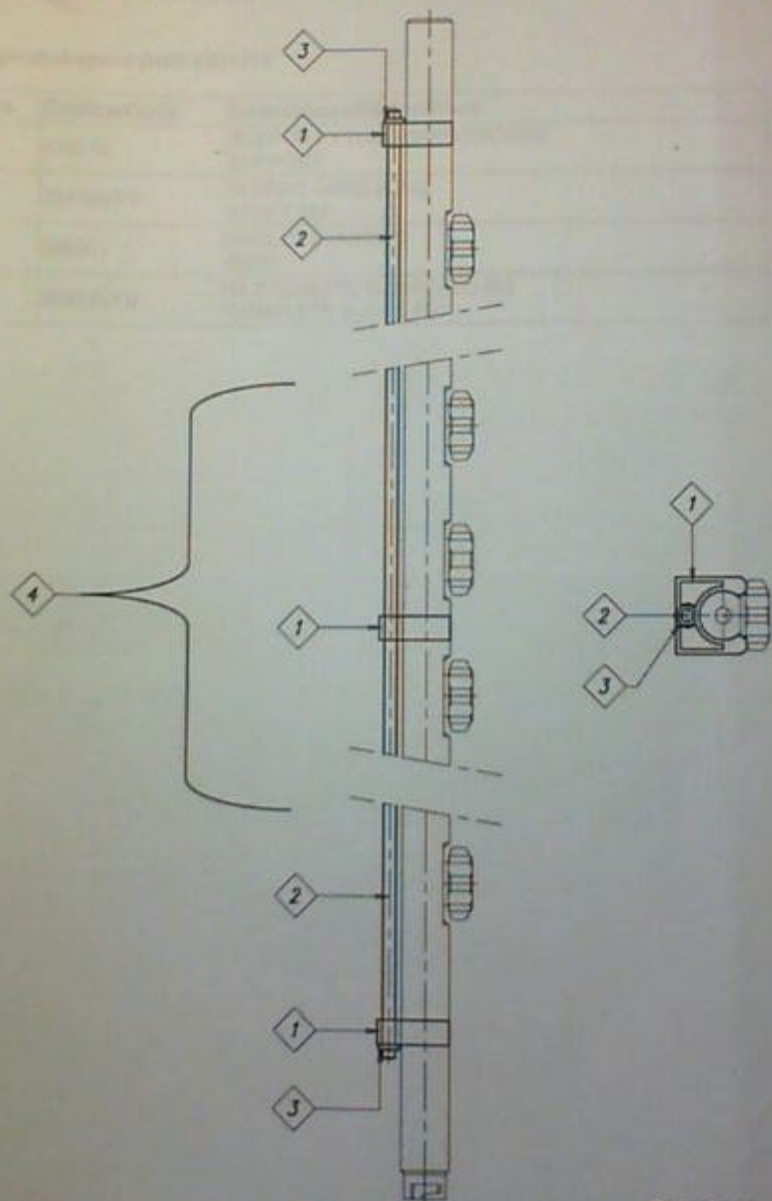
**Legenda/Legend DWG.PP639-35955**

Pos.	Codice/Code	Descrizione/Description
1	016234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
2	016242	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEEL ROLLER 650 (SHAFT FV)
3	016238	RULLO ROTELLE SUPERIORE 650 (ALBERO FV) UPPER WHEEL ROLLER 650 (SHAFT FV)
4	016233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)
5	016241	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEEL ROLLER 650 (SHAFT FV)
6	016237	RULLO ROTELLE INFERIORE 650 (ALBERO FV) LOWER WHEEL ROLLER 650 (SHAFT FV)



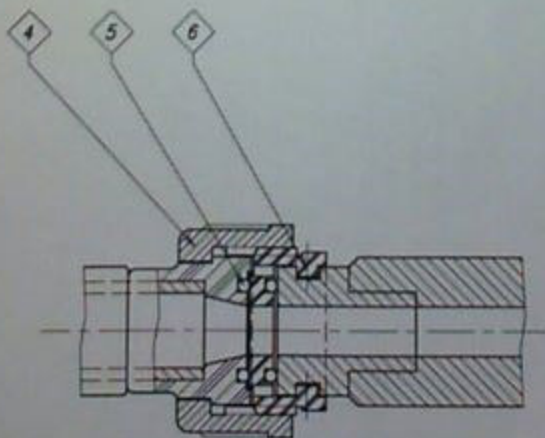
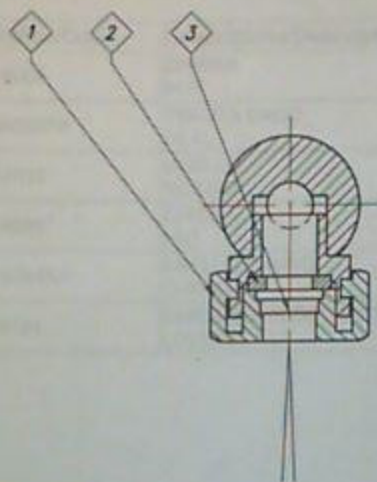
Legenda/Legend DWG.PP639-35956

Pos.	Codice/Code	Descrizione/Description
1	136368	TUBO SPRUZZATORE SUPERIORE (8 UGELLI) 650 UPPER SPRAYING PIPE (8 NOZZLES) 650
2	136367	TUBO SPRUZZATORE SUPERIORE (7 UGELLI) 650 UPPER SPRAYING PIPE (7 NOZZLES) 650
3	136363	TUBO SPRUZZATORE INFERIORE (7 UGELLI) 650 LOWER SPRAYING PIPE (7 NOZZLES) 650
4	136364	TUBO SPRUZZATORE INFERIORE (8 UGELLI) 650 LOWER SPRAYING PIPE (8 NOZZLES) 650
5	276015/EP	GUARNIZIONE GASKET
6	616259	SEPARATORE 650 SEPARATOR 650
7	616261	SEPARATORE 650 SEPARATOR 650
8	844359/A2	VITE SCREW
9	844113/A2	DADO NUT
10	454020	PIEDE FOOT
11	666473	TELAIO 650 FRAME 650



**Legenda/Legend DWG.ES31282**

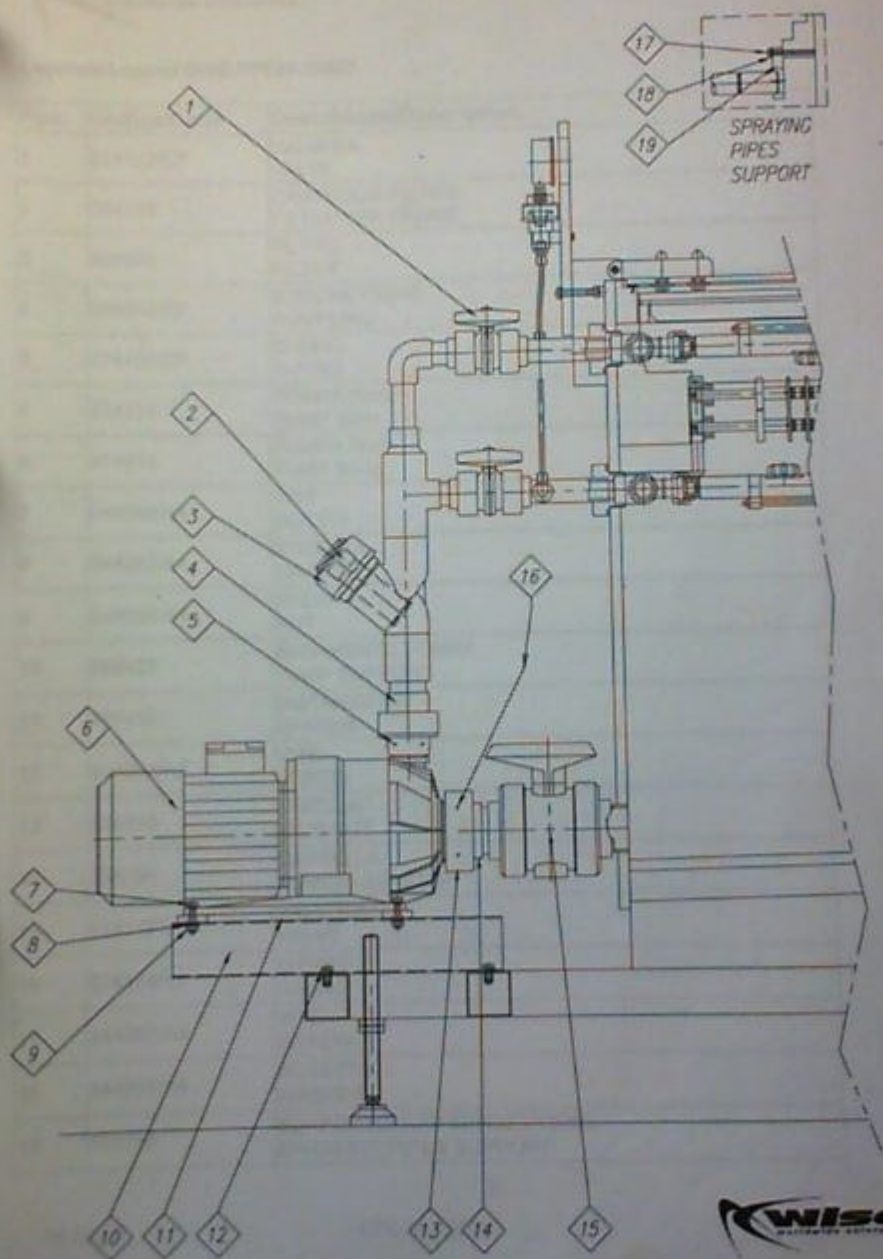
Pos.	Codice/Code	Descrizione/Description
1	676312	SUPPORTO TUBO SPRUZZATORE SUPPORT
2	026186/FV	ALBERO GRIGLIA 650 SHAFT 650
3	046001	ANELLO ELASTICO RING
4	066041/FV	BLOCCHETTO COMPLETO 650 COMPLETE BLOCK 650





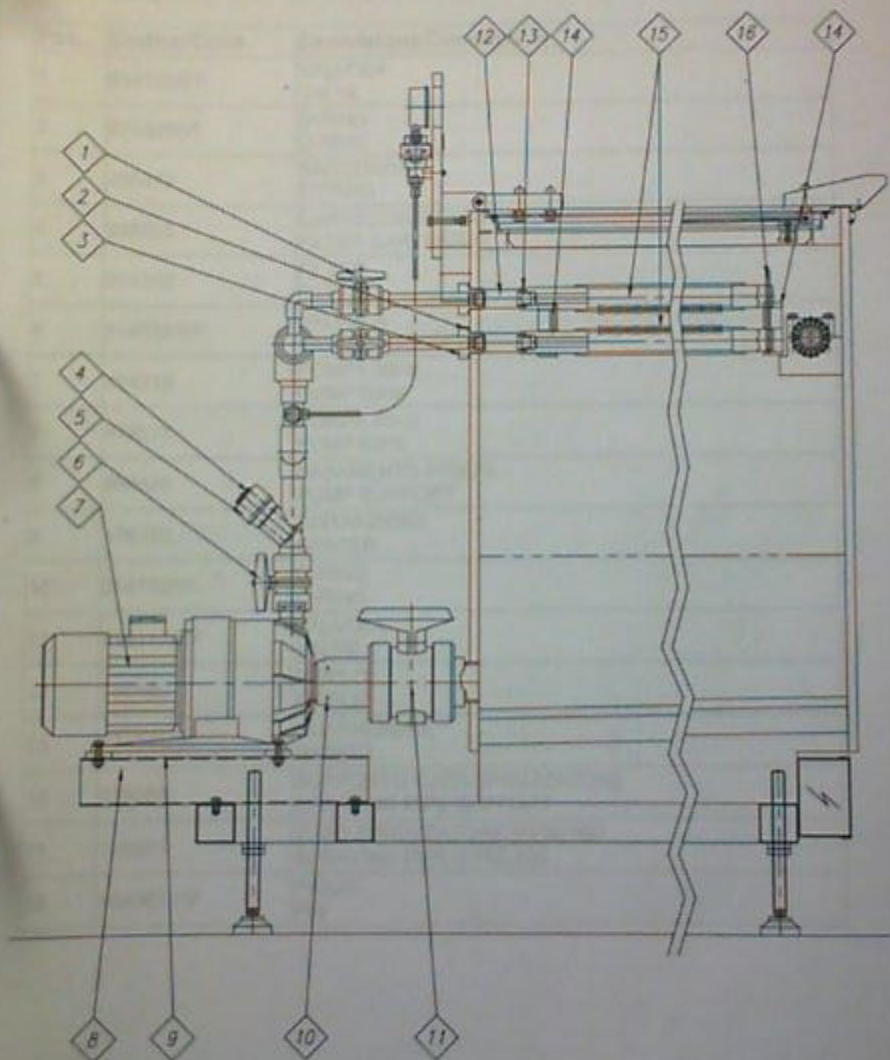
**Legenda/Legend DWG.ES31284**

Pos.	Codice/Code	Descrizione/Description
1	804009	GHIERA NUT
2	804028/VI	TENUTA DADO SEAL
3	804035	UGELLO NOZZLE
4	534003	GHIERA NUT
5	274064/VI	ANELLO O-RING O-RING
6	766181	GHIERA DI BLOCCAGGIO LOCKING NUT



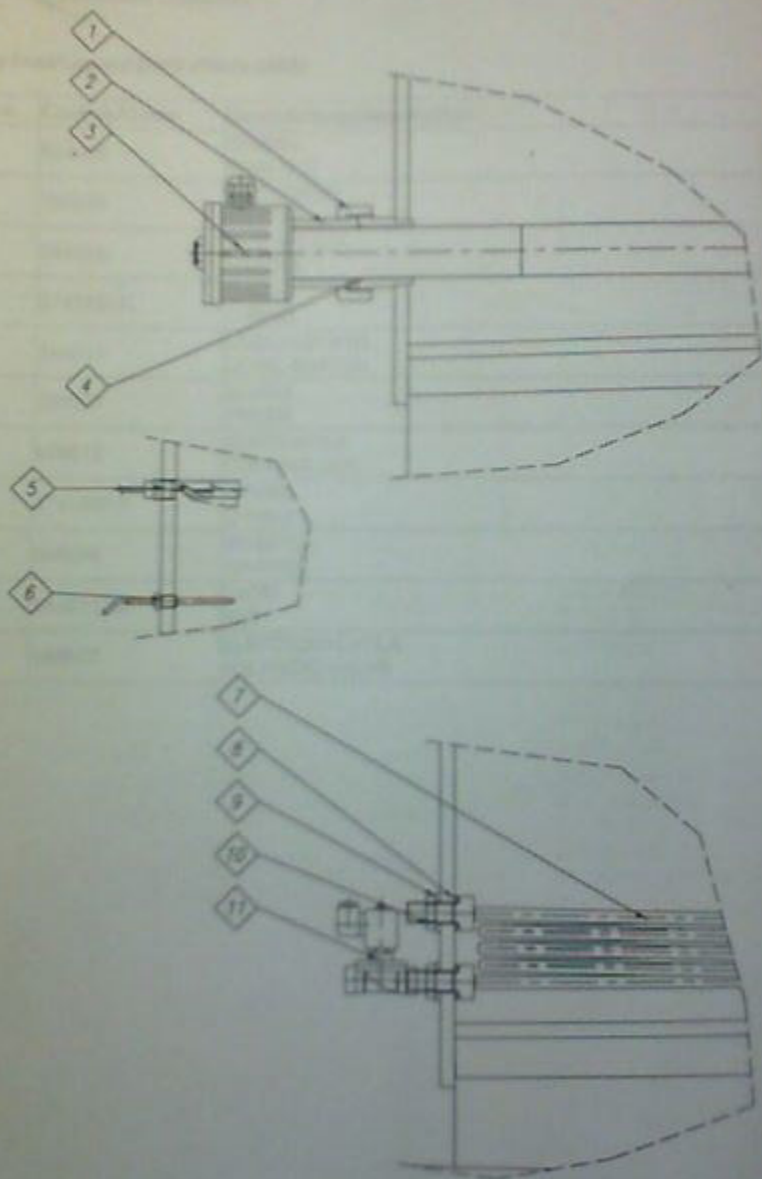
**Legenda/Legend DWG.PP639-35957**

Pos.	Codice/Code	Descrizione/Description
1	814132/EP	VALVOLA VALVE
2	204153	CARTUCCIA FILTRO FILTER CARTRIDGE
3	204094	FILTRO FILTER
4	534084/EP	BOCCHETTONE COUPLING
5	274105/EP	O-RING O-RING
6	474218	POMPA 50Hz PUMP 50Hz
6	474219	POMPA 60Hz PUMP 60Hz
7	844046/A4	VITE SCREW
8	844062/A4	ROSETTA WASHER
9	844024/A4	DADO NUT
10	666425	BASAMENTO POMPA PUMP SUPPORT
11	176150	DISTANZIERE SPACER
12	844044/A2	VITE SCREW
13	534230	GIRELLA RING NUT
14	534194	CARTELLA FLANGE ADAPTOR
15	814117/EP	VALVOLA VALVE
16	274174/V1	O-RING O-RING
17	844088/A4	VITE SCREW
18	844095/A4	ROSETTA WASHER
19	676758	SUPPORTO TUBI SPRUZZATORI SPRAYING PIPES SUPPORT



**Legenda/Legend DWG.PP639-35958**

Pos.	Codice/Code	Descrizione/Description
1	814130/EP	VALVOLA VALVE
2	274048/VI	O-RING O-RING
3	766919	RACCORDO FITTING
4	204003	CARTUCCIA FILTRO FILTER CARTRIDGE
5	204202	FILTRO FILTER
6	814132/EP	VALVOLA VALVE
7	474216	POMPA 50Hz PUMP 50Hz
7	474217	POMPA 60Hz PUMP 60Hz
8	666425	BASAMENTO POMPA PUMP SUPPORT
9	176150	DISTANZIERE SPACER
10	274132/VI	O-RING O-RING
11	814117/EP	VALVOLA VALVE
12	766480	NIPPLO NIPPLE
13	274345/VI	GUARNIZIONE GASKET
14	076094	SUPPORTO TUBO SPRUZZATORE SPRAYING PIPE SUPPORT
15	136351	TUBO SPRUZZATORE (FFM) 650 SPRAYING PIPE (FFM) 650
16	466067/FV	PIOLO PIN



**Legenda/Legend DWG.PP639-35959**

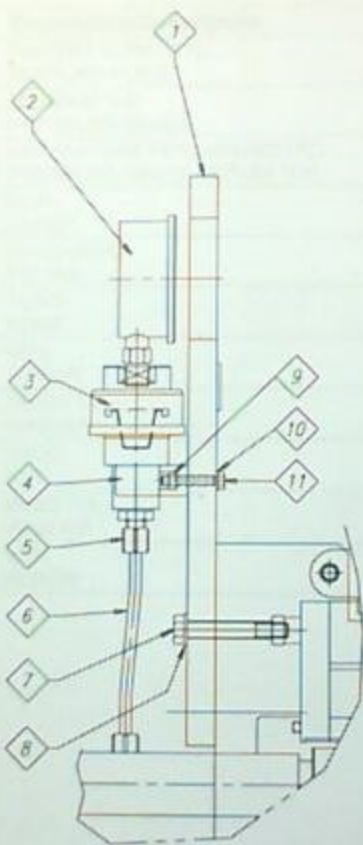
Pos.	Codice/Code	Descrizione/Description
1	534008	GHIERA RING NUT
2	766334	RACCORDO FITTING
3	544023	RESISTENZA HANDLE
4	274143/V1	O-RING O-RING
5	344011	LIVELLOSTATO LEVEL-SWITCH
6	354057	SONDA PROBE
7	626012	SERPENTINA COOLING COIL
8	274039/V1	O-RING O-RING
9	646076	ROSETTA WASHER
10	644011/A2	DADO NUT
11	184077	ELETTRIVALVOLA SOLENOID VALVE





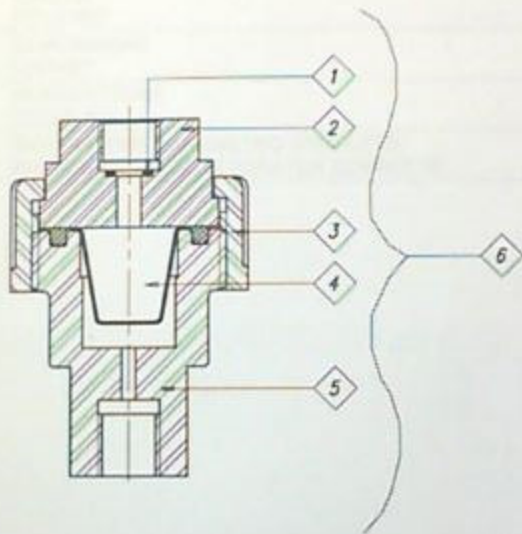
Legenda/Legend DWG.PP638-35903

Pos.	Codice/Code	Descrizione/Description
1	534081/EP	BOCCHETTONE COUPLING
2	534473	CLIP TUBO PIPE CLAMP
3	544193/A4	VITE SCREW
4	514132/EP	VALVOLA VALVE



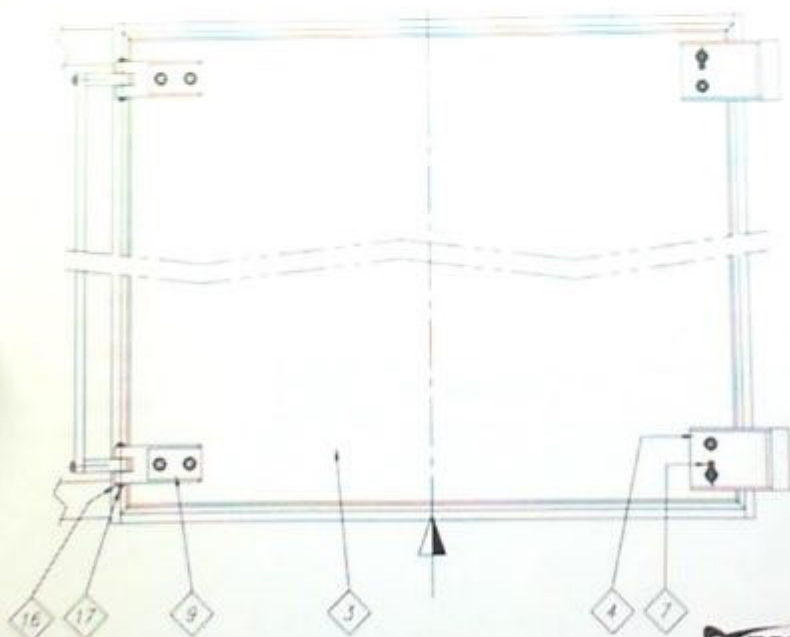
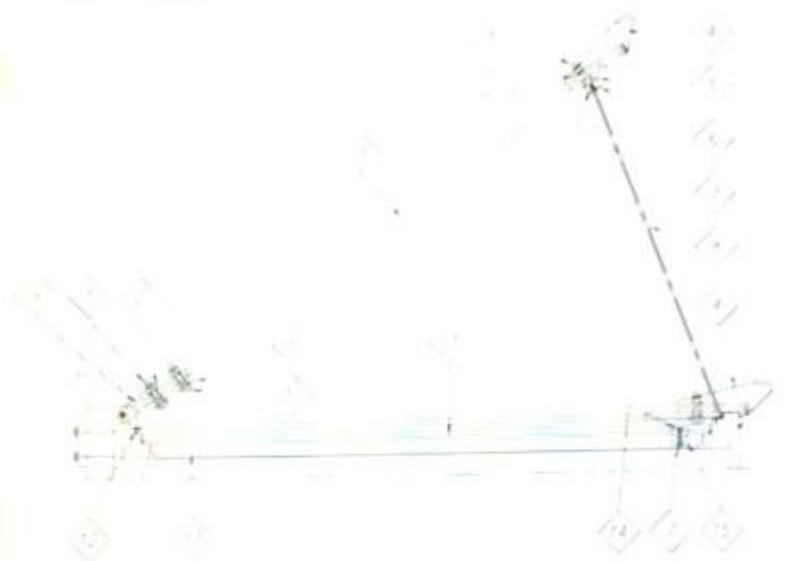
Legenda/Legend DWG.PP639-35960

Pos.	Codice/Code	Descrizione/Description
1	676759	PIASTRA SUPPORTO SUPPORT PLATE
2	354018	MANOMETRO PRESSURE GAUGE
3	766322/VI	SEPARATORE PER MANOMETRO PRESSURE GAUGE SEPARATOR
4	534472	CLIP CLAMP
5	394188	RACCORDO FITTING
6	794037	TUBO HOSE
7	844324/A2	VITE SCREW
8	844062/A2	ROSETTA WASHER
9	844022/A2	DADO NUT
10	844096/A2	ROSETTA WASHER
11	844289/A2	VITE SCREW



Legenda/Legend DWG.701-32994

Pos.	Codice/Code	Descrizione/Description
1	274054/VI	O-RING O-RING
2	216018/PC	FLANGIA PORTAMANOMETRO PRESSURE GAUGE FLANGE
3	534004	GHIERA RING NUT
4	278028/VI	GUARNIZIONE GASKET
5	766321	BOCCHETTONE COUPLING
6	766322/VI	SEPARATORE MANOMETRO COMPLETO PRESSURE GAUGE SEPARATOR COMPLETE



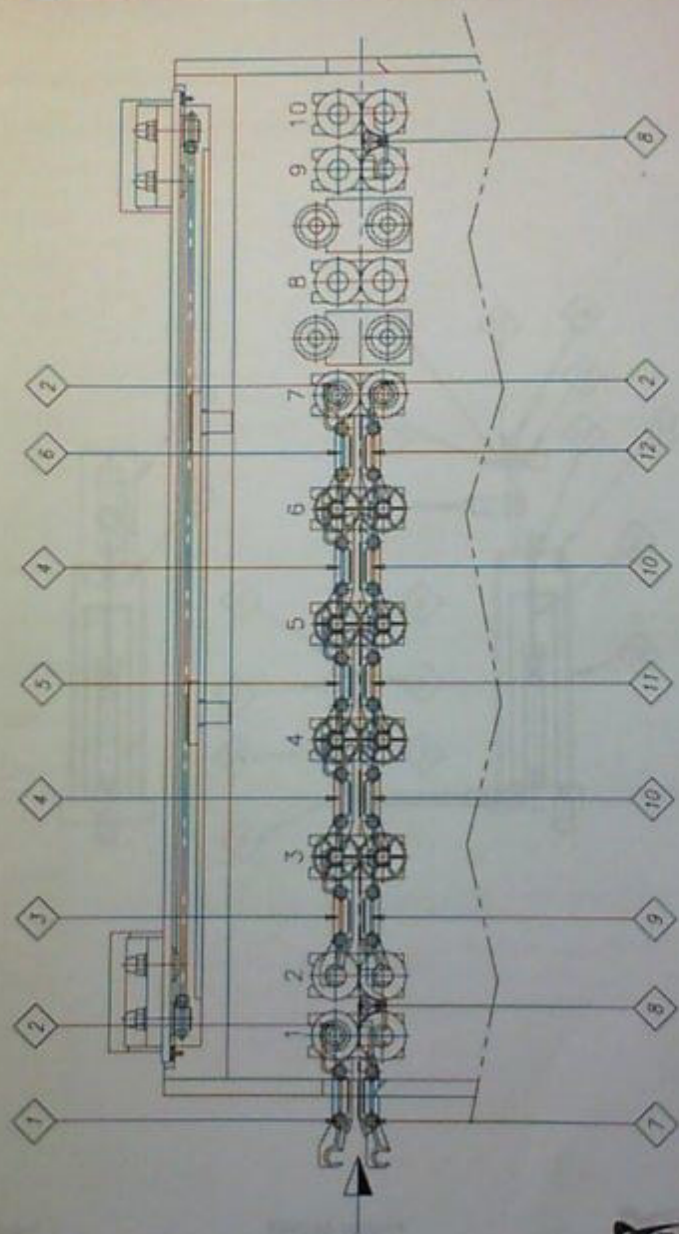
Legenda/Legend DWG.PP639-35961

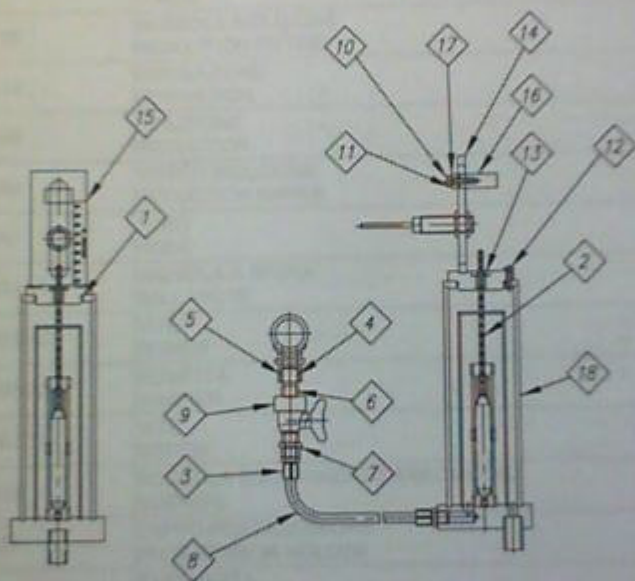
Pos.	Codice/Code	Descrizione/Description
1	844097/A4	DADO NUT
2	844018/A4	ROSETTA WASHER
3	156198	COPERCHIO 650 COVER 650
4	856020	MANIGLIA HANDLE
5	846101	RONDELLA WASHER
6	846196/A4	VITE SCREW
7	844023/A4	DADO NUT
8	326059/A4	LEVA LEVER
9	116015	CERNIERA HINGE
10	844242/A4	VITE SCREW
11	156209	COPERCHIO PARASPRUZZI 650 SPASH GUARD COVER 650
12	276015/EP	GUARNIZIONE GASKET
13	616257	SEPARATORE 650 SEPARATOR 650
14	844040/A4	VITE SCREW
15	856006	POMOLO KNOB
16	046001	ANELLO ELASTICO ELASTIC RING
17	026495	PERNETTO PER CERNIERA HINGE PIN

Legenda/Legend DWG.PP639-35962

Pos.	Codice/Code	Descrizione/Description
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	036006	ANELLO DI GUIDA GUIDE RING
3	256085/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
4	256053/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
5	256049/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
6	256057/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
7	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
8	256081/FV	GRIGLIA 650 FLEX GUIDE 650
9	256063/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
10	256051/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
11	256047/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
12	256055/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650

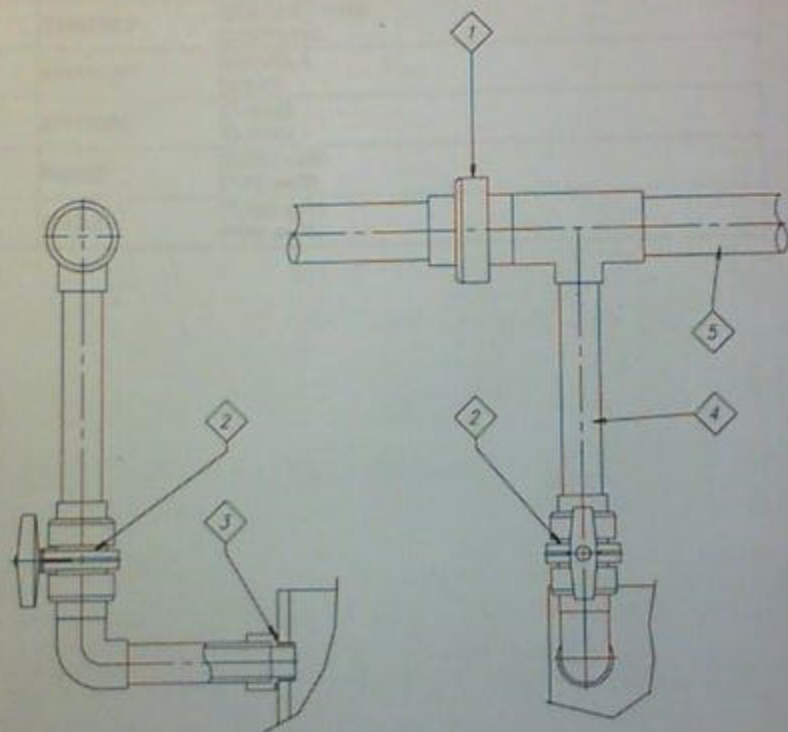






**Legenda/Legend DWG.ESC30384**

Pos.	Codice/Code	Descrizione/Description
1	274093/V1	O-RING O-RING
2	304020	AREOMETRO AEROMETER
3	394187	RACCORDO UNION
4	534126	BUSSOLA RIDUZIONE REDUCTION FITTING
5	534214	DERIVAZIONE DERIVATION
6	534498	RIDUZIONE REDUCTION
7	534499	NIPPLO RIDUZIONE REDUCTION NIPPLE
8	794041	TUBO HOSE
9	814024/V1	VALVOLA A SFERA BALL VALVE
10	844015/A2	VITE SCREW
11	844095/A2	ROSETTA WASHER
12	844287/T1	VITE SCREW
13	076036	BOCCOLA SCORRIMENTO AREOMETRO BUSHING
14	146051	TAPPO PORTASENSORE PLUG SENSOR HOLDER
15	376003	TARGHETTA PLATE
16	756026	PIATTO ARRESTO AREOMETRO PLATE
17	756027	PIASTRINA DI FISSAGGIO FIXING PLATE
18	826010	SCATOLA PER DENSIMETRO DENSIMETER BOX



**Legenda/Legend DWG.PP644-35806**

Pos.	Codice/Code	Descrizione/Description
1	534087/EP	BOCCHETTONE COUPLING
2	814134/EP	VALVOLA VALVE
3	274121/VI	O-RING O-RING
4	604205	TUBO øø50 PIPE øø50
5	604206	TUBO øø75 PIPE øø75



***Manuale di Istruzioni  
Uso e Manutenzione  
Operating Instructions  
and Maintenance Manual***

***Modulo/Module:  
PP RINSE MODULE L=660 3P 650***

***Data/Date: 04-2007***

*Codice del Manuale  
Manual code*

*PP632-RINSE MOD. L=660 3P-650-EN-04-07*

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4. <i>Maintenance</i>	8
5. <i>Troubleshooting guide</i>	11
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## 1 Module technical specifications

### 1.1 Module

Module:	RINSE MODULE L=660, 3 PUMPS, 3 CHAMBERS
Model:	650
Final use:	SPRAYING RINSE OF PRINTED CIRCUIT BOARD WITH WATER

### 1.2 Diagrams and drawings

Overall dimensions DWG:	PP632-35952
Internal cross sections DWG:	PP632-35952
Other DWG:	N.A.

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	660
- Maximum width (mm):	1600
- Maximum height (mm):	1200
- Net weight (kg):	150

### 1.4 Installed energies and products

#### Electric power

Main line:	SEE MAIN MANUAL
Power circuit:	SEE MAIN MANUAL
Control circuit :	SEE MAIN MANUAL

#### Compressed air

Pressure:	N.A.
Capacity (consumption):	N.A.

#### Caloric heating energy

Caloric energy (kcal):	N.A.
Inlet heating fluid temperature (°C):	Max. N.A., Min. N.A.
Minimum capacity (l/h):	N.A.

#### Caloric cooling energy

Caloric energy (kcal):	N.A.
Inlet cooling fluid temperature (°C):	N.A.
Minimum capacity (l/h):	N.A.

#### Air exhaust:

Type of connection:	smooth PVC pipe $\varnothing$ 50 mm
---------------------	-------------------------------------



## 2 Description

Rinse Module is a unit employed for spraying rinse of printed circuit boards, for example rinse after stripping of tin lead.

The water cycle avails of a sequence of washing operations and filters, thus making Module suitable to wash panels by using a very low quantity of water.

### 2.1 Main features

The machine consists in a monocoque self-supporting structure, made of PP plates, appropriately assembled, drilled, bent and welded, to its final shape. A stainless steel basement ensures trouble free life even after several years of use.

The line-up and type of nozzles ensure perfectly uniform treatment.

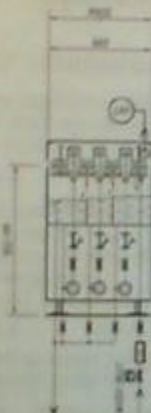
The water cycle provides panel treatment by countercurrent washing. The water is fed into the last washing section and cascades backwards through the preceding chambers to the first one, where it evacuates by overflow.

A solenoid valve intercepting water inlet, opens in automatic mode, in the presence of panels to be treated, thus minimising water consumption.

The upper part of the washing chambers are sealed by openable temperate glass covers, facilitating the access to the treatment areas.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts, conveyor rollers and spray bars can be removed without using tools.

## 2.2 Longitudinal section



## 2.3 Description of the working stations

- A. Three rinse spray chambers, 660mm length, equipped with:
- One pair of squeegee rollers at inlet and outlet.
  - Three magnetic driven pumps feeding the spraying pipes.
  - Screen filter installed on the delivery side of each pump.
  - The compensation water is fed from mains directly to the last section tank by means of a flow meter intercepted by a solenoid valve controlled by the presence of panels to be treated.
  - Excess water evacuates by overflow from the first rinse chamber.

## **3 Operation**

### **3.1 Preliminary regulations**

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.

#### **3.1.1 Conveyor speed regulation**

The panel transport system speed is visualised on the operator interface display which is also used to input the preset speed at the desired value. The electromechanical version machine shows the speed on a display and it can be adjusted by means of a potentiometer.

Speed adjustment should be adapted to the most critical phases of panel treatment.

#### **3.1.2 Rinsing water flow rate regulation**

Rinsing water rationalisation and saving is performed by a solenoid valve that intercepts the inlet water flow and is opened automatically by the presence of panels to be treated.

- In case of direct feeding of the spray banks, the water flow regulation is determined directly by the feeding pressure and load drop induced by the spray nozzles. The type and relative diameter of the nozzles' orifice have been selected to ensure treatment efficiency with feeding pressure between 2 and 3 bars. If the pressure exceeds the maximum value we recommend to mount at water mains a pressure reducing valve and relative gauge to the water mains.
- If the spray banks are fed by a recirculation pump, the flow is aimed directly into the tank by means of a flow meter followed by a valve visualising and regulating the water flow rate. Fresh water flow rate from mains must be adjusted in relation to process type. In order to find the proper compromise between savings and treatment efficiency, we recommend to carry out a first regulation which provides a very high compensation flow rate that will be reduced in the following days until the correct balance is found.

### **3.2 Start up**

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

## **4. Maintenance**

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### **4.1 Daily maintenance**

It is a set of daily activities ensuring the correct functionality of the system.

#### **4.1.1 Filters**

Each day check the efficiency status of the filters installed on the pump delivery side. If necessary clean or replace them.

#### **4.1.2 Cleaning**

At the end of each working shift or however once each day, clean the machines externally avoiding to use abrasive materials or objects, a damped sponge is sufficient for the purpose.

Empty the rinsing sections tanks which will be filled up at the following work shift start-up.

### **4.2 Weekly maintenance**

It is a series of weekly activities ensuring the correct functionality of the system.

#### **4.2.1 Nozzles**

Each week check the status of the nozzles' efficiency. If necessary provide cleaning or replacement.

#### **4.2.2 Cleaning**

Each weekend clean the machines externally avoiding to use abrasive materials or objects, a damped sponge is sufficient for the purpose.

Empty the rinsing sections tanks and wash them internally by means of water jet. We recommend to install a flexible tube connected to water mains near the machinery, in order to facilitate this operation.

Possibly, there could be calcareous formation or residues of the products utilised. If necessary provide removal of the same by following the below described procedure, which has been widely experienced and found very effective, and does not damage the machinery:

- Fill the tanks to be treated with acid solution based on sulphuric acid at 2+3%, warm the solution up to 30°C, then activate and run the pumps for 15+30 minutes.
- Empty the tanks and fill them with water, activate the pumps for 15 minutes then empty the tanks.

- Fill the tanks again, this time with an alkaline solution based by sodium peroxide at 2+3%, warm up the solution to 40°C, then activate the pumps for 15+30 minutes.
- Empty the tanks and fill them with water, activate the pumps for 15 minutes, then empty the tanks. Repeat the operation.



**WARNING**

It is forbidden to use highly aggressive products or not compatible with the materials installed in the machinery. Wise s.r.l. shall not be held responsible for damages caused by the use non adequate products.

WISE s.r.l. is available for supplying all the information required for the choice of the suitable product or detergent.

### **4.3 Monthly maintenance**

It is the series of monthly activities that censure the correct functionality of the system.

#### **4.3.1 Transport system**

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.

#### **4.3.2 Pumps**

The horizontal magnetic driven centrifugal pumps are equipped with bushing which are subject to wear and exceeding the acceptability limit will cause breakage of the pump. Provide monthly checking and replace the damaged parts, if necessary.

A specific manual is enclosed for other types of pumps which need more complex maintenance, for example diaphragm pumps.

#### **4.3.3 Seals**

Each month check the status seals of the covers, doors and filters. The sealing material is an elastomer which should appear elastic and without cracks. Replace if necessary.

#### 4.4 Wear parts mandatory replacement programme

Activities description	Frequency in work hours
Processing sections cartridge filters	1500
Low pressure nozzles	3000
Centrifugal pumps bushing	3000
Roller support inserts	3000

## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE s.r.l. technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

#### 5.1.2 *Noise level*

Verify the functionality of the centrifugal pumps:

- Check whether the mechanical parts composing it (bearings, impellor) are worn or damaged. If required replace defective parts.
- Check the level of the liquid inside the tank, the pump should appear completely under water head. Restore the correct level if necessary.

## 5.2 Washing

### 5.2.1 *Insufficient washing*

Check water feeding from mains to machine which pressure and flow should be as described under section 2.4 PRODUCTS. If required provide the necessary corrective actions.

Check the quality of the water quality and if required install appropriate depurating systems.

Verify if there is excess of solution transfer between the process section and the wash section, by checking the below listed:

- Check the conveyor system rollers which separate the above said sections are positioned in the correct way inside their housings. If necessary, restore the correct condition.
- Check the status of the conveyor system rollers that separate the above said sections. If damaged repair or replace them.
- Check that section passage safety protections are present and installed in the proper way. If required restore the correct condition of the same.
- Check the spraying nozzles' jets that should be aimed in the free space between the two pairs of rollers and are not directly to the separating protections. If required modify the direction of the jets.

The water connection system from tanks to wash sections, provides water transfer by overflow contrariwise to the direction of the flow of the panel to be processed, thus ensuring minor water contamination in the last washing section, which should be practically clean. Check the pollution status of the water in the washing sections and if necessary increase the water renewal.

Verify that spray pressure is within the required process values and, if necessary, check as follows:

- The status of the filters installed in front and at the back of the recirculation pumps. Clean or replace if necessary.
- Check the efficiency and correct functionality of the recirculation pumps. If required repair or replace the defective pump.

Check the spraying tubes and relative nozzles for deposits or encrustations. In addition to the visual inspection it is also helpful to carry out an hydraulic check by feeding each tube with fresh water from mains, ensuring the status of the same. If necessary, restore the correct functionality of the tubes and the nozzles.

Check the status of the spraying nozzles' orifice. In addition to the visual inspection make a hydraulic check by feeding each single tube with mains water thus allowing to verify the spray jet of each nozzle, which should appear regular and flat, and with the below described dispersion angle:

- Low pressure rinsing sections nozzles 60°-90°



Replace the nozzles if worn.

The characteristics of the panel to be processed as for example, very small holes on high thickness plates, make the washing operation more difficult:

- Reduce the conveyor speed.

If the above listed should not be sufficient, contact the local Representative otherwise take direct contact with the technical assistance of WISE s.r.l.

### 5.2.2 *Excess of encrustations*

During operations calcareous formation may be possible, which is commonly eliminated by performing the washing cycle afore described. The formation of encrustations can be reduced by feeding softened water to the washing sections.



#### **WARNING**

The use of demineralised water could damage some components installed in the machinery. WISE s.r.l. will not be held responsible for any damages caused by the use of demineralised water.

WISE s.r.l. is available for all the information and eventual modifications required for the use of demineralised water.

### 5.2.3 *Centrifugal pumps' running problems*

Pressure loss or reduction:

- In the event of a newly installed pump check the direction of rotation, usually indicated by an arrow placed on the pump. If necessary, invert one phase of the power supply to invert the direction of rotation.
- Verify the pump ducts for foreign particles or encrustations. Remove the cause of obstruction.
- If the pressure loss is revealed with a certain delay after pump start-up, the cause could be attributed to the presence of foam in the fluid being pumped, which is the cause of the cavitations phenomenon. Said phenomenon other than being harmful to the pump itself, also drastically reduces the operating pressure. Check the fluid and if it is the case activate all the necessary actions to minimise foam formation.
- Verify that all spraying nozzles are present and the wear status of their orifices. If required, install the missing nozzles or replace worn nozzles.
- Verify the spray manifolds or tubes for cracks, holes or other irregularity causing possible leakage in the spray manifolds or tubes. Repair or replace damaged parts.
- Verify the pressure display apparatus. If necessary repair or replace it.

Too elevated electrical absorption.



- Verify that all the spraying nozzles are installed and the wear status of their orifices. If necessary, install the missing nozzles or replace the worn ones.
- Verify the presence of cracks, holes or irregularities that may cause leakage in the spraying tubes or manifolds. Repair or replace damaged parts.

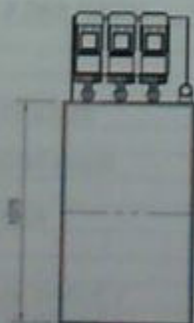
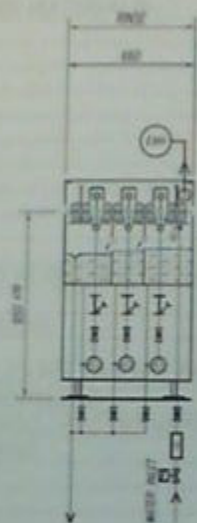
## **6. Lists, drawings, photographs and spare parts.**

Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

### **6.2 Drawings and spare parts lists**

DWG\_PRL32-35832

RINZE MODULE 650



## TABELLA MATERIALI / MATERIALS TABLE

### SIGLE DEI MATERIALI PLASTICI E ELASTOMERI

#### LIST OF PLASTIC AND RUBBER MATERIALS

CA: CARILON / CARILON

CP: PVC-C / PVC-C

DE: DELRIN / DELRIN

EP: EPDM / EPDM

FE: FEP / FEP

HY: HYPALON / HYPALON

KR: KRATON-G / KRATON-G

MA: MAFIL / MAFIL

N6: NYLON 6 / NYLON 6

NB: NEOPRENE / NEOPRENE

NV: NYLON 6,6 30% CARICATO VETRO / NYLON 6,6 30% FIBER GLASS LOADED

PC: PVC / PVC

PE: POLIETILENE / POLYETHYLENE

PF: PVDF / PVDF

PN: POLIPROPILENE NATURALE / POLYPROPYLENE NATURAL

PP: POLIPROPILENE / POLYPROPYLENE

PV: PVC TRASPARENTE MORBIDO / PVC TRANSPARENT SOFT

SA: SANTOPRENE / SANTOPRENE

SI: SILICONE / SILICON

TE: TEFLON / TEFLON

VI: VITON / VITON

VK: VULKOLLAN / VULKOLLAN

### SIGLE DEI MATERIALI METALLICI E FIBRE

#### LIST OF METALLIC MATERIALS AND FIBERS

A2: AISI 304 / AISI 304

A3: AISI 303 / AISI 303

A4: AISI 316 / AISI 316

AZ: ACCIAIO ZINCATO / ZINCATE STEEL

CU: RAME / COPPER

FC: FIBRA DI CARBONIO / CARBON FIBER

FO: FE 00 / IRON

FV: FIBRA DI VETRO / GLASS FIBER

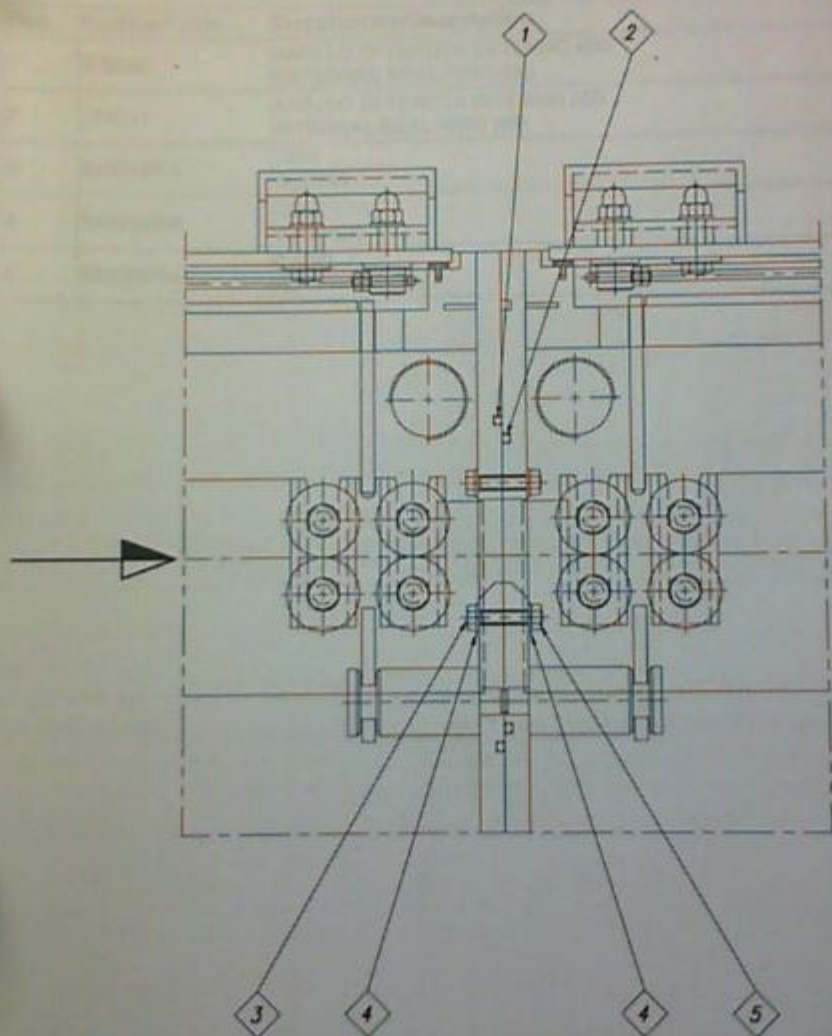
HA: HASTELLOY / HASTELLOY

OT: OTTONE / BRASS

T2: TITANIO GRADO 2 / TITANIUM GRADE 2

T5: TITANIO GRADO 5 / TITANIUM GRADE 5

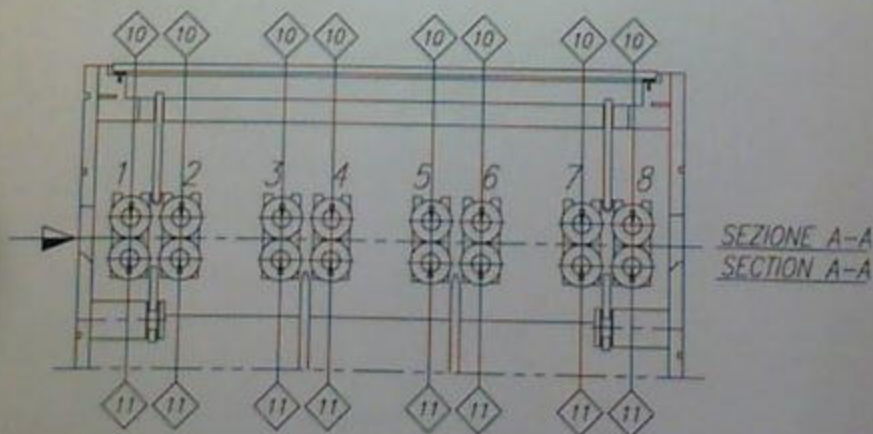
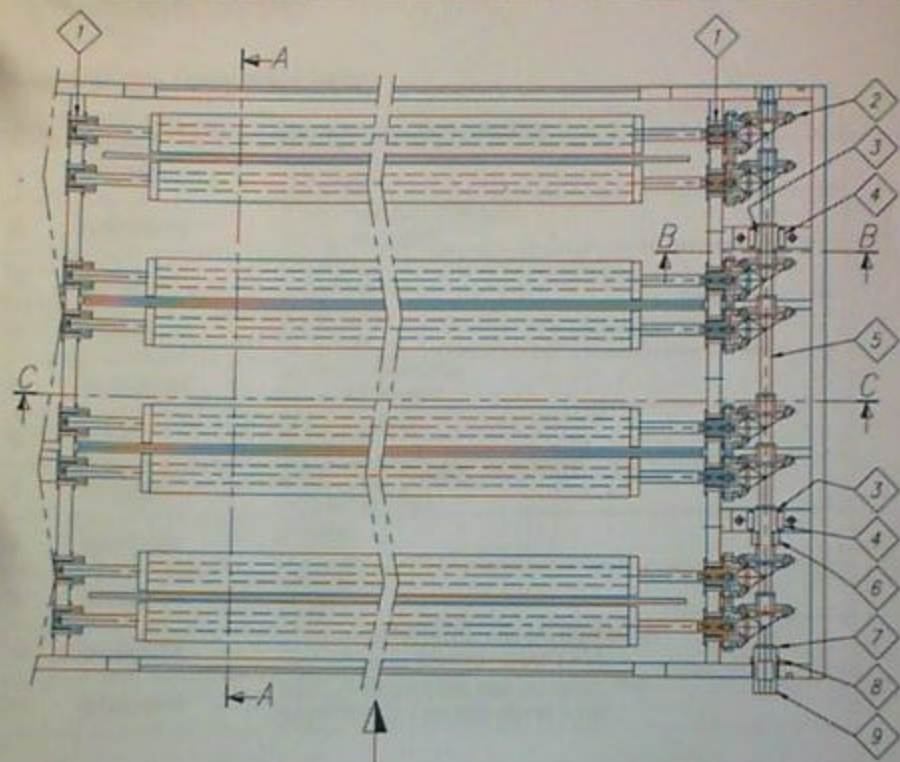
TI: TITANIO / TITANIUM





Legenda/Legend DWG.PP644-35793

Pos.	Codice/Code	Descrizione/Description
1	276042	ANELLO DI TENUTA ESTERNO 650 EXTERNAL SEAL RING 650
2	276041	ANELLO DI TENUTA INTERNO 650 INTERNAL SEAL RING 650
3	844016/A4	VITE SCREW
4	844062/A4	ROSETTA WASHER
5	844024/A4	DADO NUT

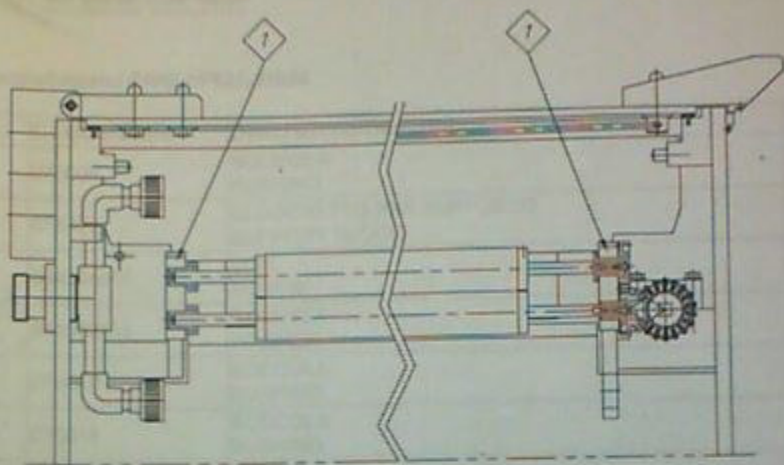


PER LE ALTRE SEZIONI VEDERE DISEGNO PP632-359.34  
 FOR OTHER SECTIONS SEE DRAWING PP632-359.34

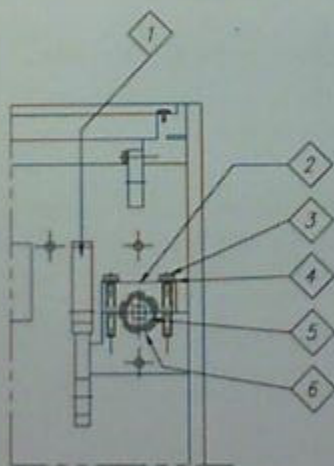


Legenda/Legend DWG.PP632-35933

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
3	076017	BOCCOLA BUSHING
4	076018	BOCCOLA BUSHING
5	026236/A4	ALBERO QUADRO SQUARE SHAFT
6	176107	DISTANZIERE SPACER
7	036008	ANELLO DI FERMO LOCKING RING
8	274013/VI	V-RING V-RING
9	218024/A4	MOZZO HUB
10	018234/PP	RULLO SUPERIORE 650 (ALBERO FV) UPPER ROLLER 650 (SHAFT FV)
11	018233/PP	RULLO INFERIORE 650 (ALBERO FV) LOWER ROLLER 650 (SHAFT FV)



SEZIONE C-C  
SECTION C-C



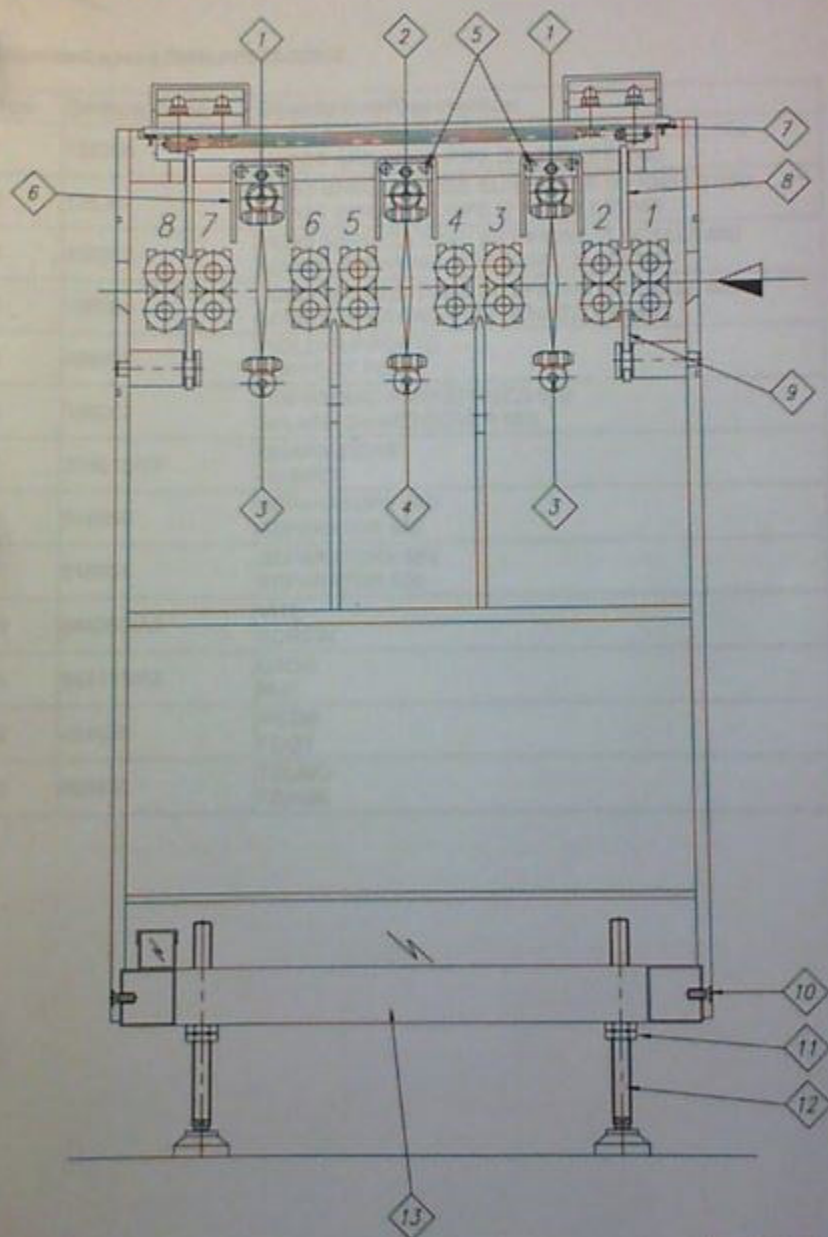
SEZIONE B-B  
SECTION B-B

PER LE SEZIONI VEDERE DISEGNO PP632-35933  
FOR SECTIONS SEE DRAWING PP632-35933



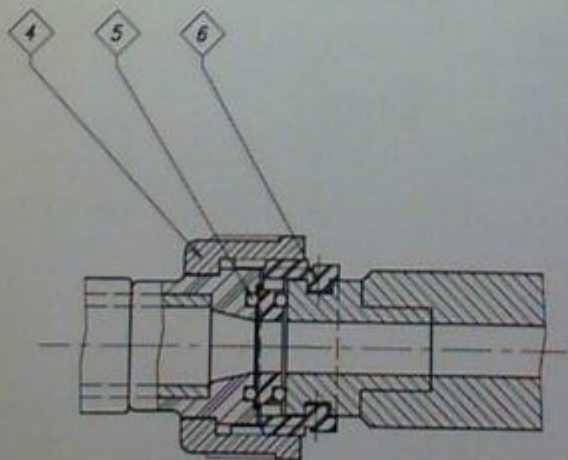
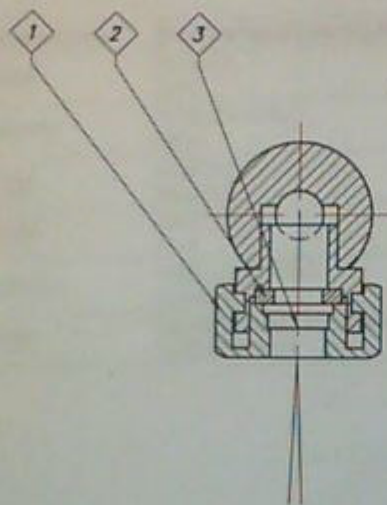
Legenda/Legend DWG.PP632-35934

Pos.	Codice/Code	Descrizione/Description
1	076034	BOCCOLA BUSHING
2	676422	BLOCCHETTO PER SUPPORTO SUPPORT BLOCK
3	844324/A4	VITE SCREW
4	844062/A4	ROSETTA WASHER
5	076017	BOCCOLA BUSHING
6	076018	BOCCOLA BUSHING



**Legenda/Legend DWG.PP632-35935**

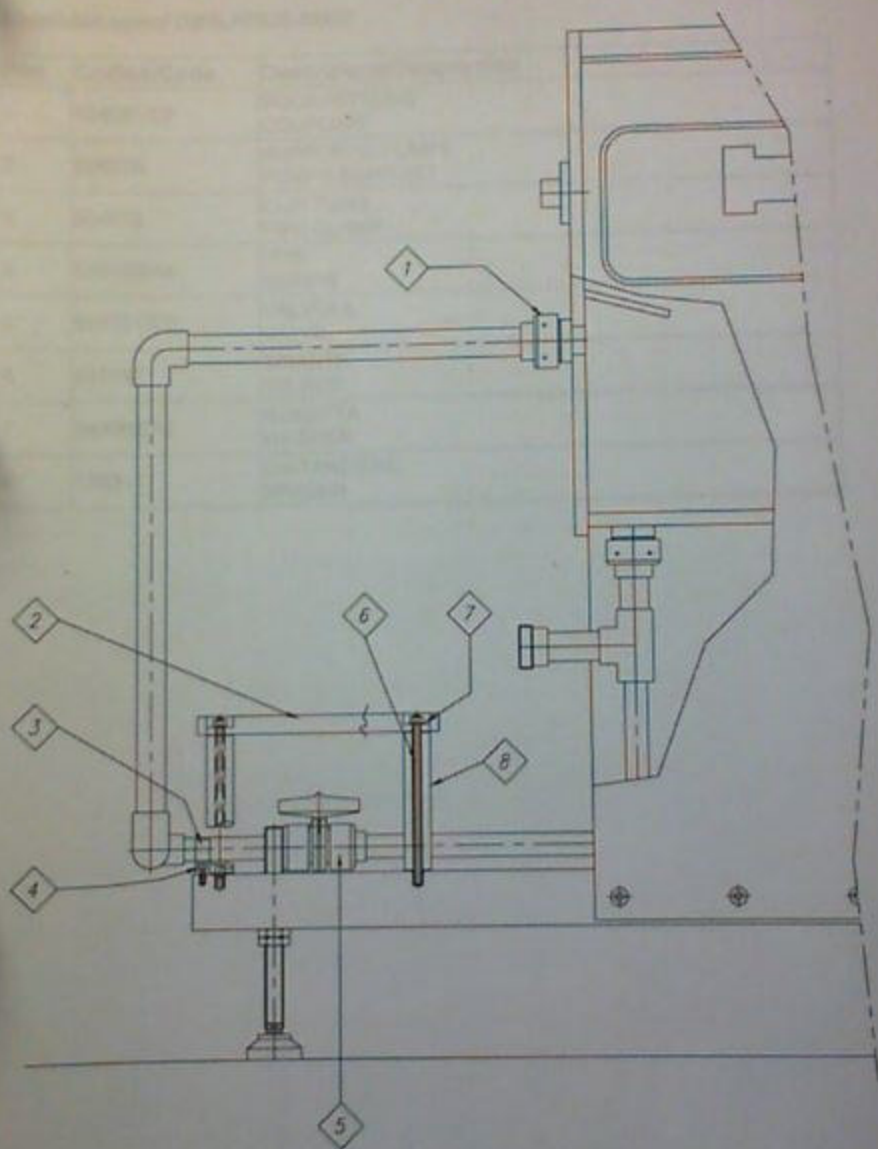
Pos.	Codice/Code	Descrizione/Description
1	136368	TUBO SPRUZZATORE SUPERIORE (8 UGELLI) 650 UPPER SPRAYING PIPE (8 NOZZLES) 650
2	136367	TUBO SPRUZZATORE SUPERIORE (7 UGELLI) 650 UPPER SPRAYING PIPE (7 NOZZLES) 650
3	136363	TUBO SPRUZZATORE INFERIORE (7 UGELLI) 650 LOWER SPRAYING PIPE (7 NOZZLES) 650
4	136364	TUBO SPRUZZATORE INFERIORE (8 UGELLI) 650 LOWER SPRAYING PIPE (8 NOZZLES) 650
5	466068	PIOLO SUPPORTO SUPPORT PIN
6	156202	COPERCHIO PARASPRUZZI 650 SPLASH GUARD COVER 650
7	276015/EP	GUARNIZIONE GASKET
8	616259	SEPARATORE 650 SEPARATOR 650
9	616261	SEPARATORE 650 SEPARATOR 650
10	844359/A2	VITE SCREW
11	844113/A2	DADO NUT
12	454020	PIEDE FOOT
13	666430	TELAIO FRAME





Legenda/Legend DWG.E531284

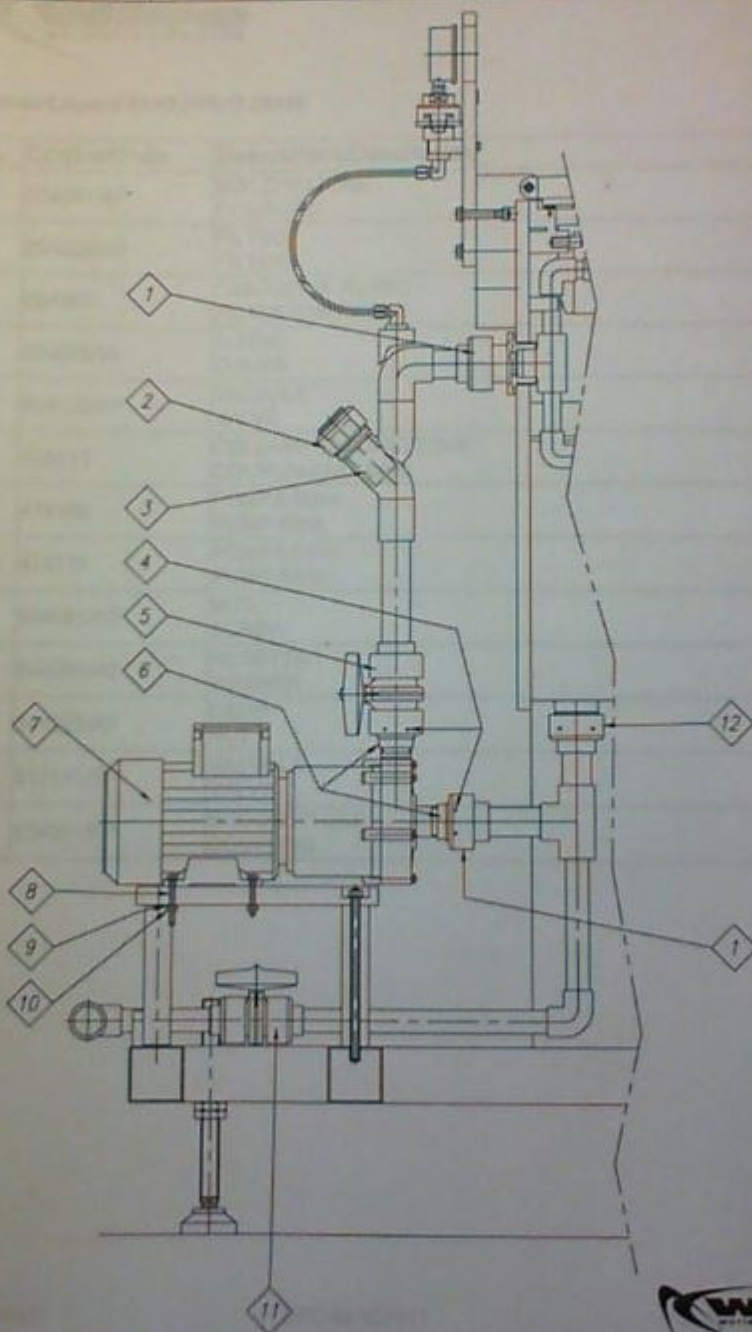
Pos.	Codice/Code	Descrizione/Description
1	804009	GHIERA NUT
2	804026/VI	TENUTA DADO SEAL
3	804035	UGELLO NOZZLE
4	534003	GHIERA NUT
5	274064/VI	ANELLO O-RING O-RING
6	766181	GHIERA DI BLOCCAGGIO LOCKING NUT





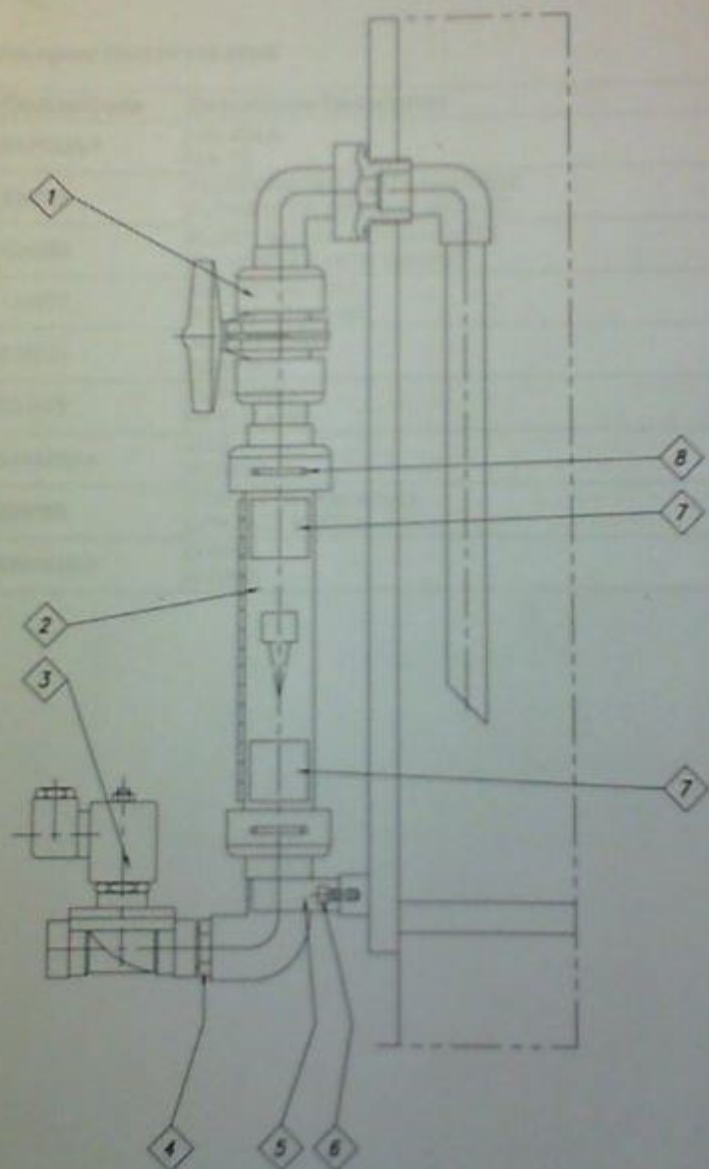
**Legenda/Legend DWG.PP632-35937**

Pos.	Codice/Code	Descrizione/Description
1	534081/EP	BOCCHETTONE COUPLING
2	666076	SUPPORTO POMPE PUMPS SUPPORT
3	534472	CLIP TUBO PIPE CLAMP
4	844193/A4	VITE SCREW
5	814131/EP	VALVOLA VALVE
6	848197	TIRANTE TIE ROD
7	844062/A2	ROSETTA WASHER
8	176311	DISTANZIERE SPACER



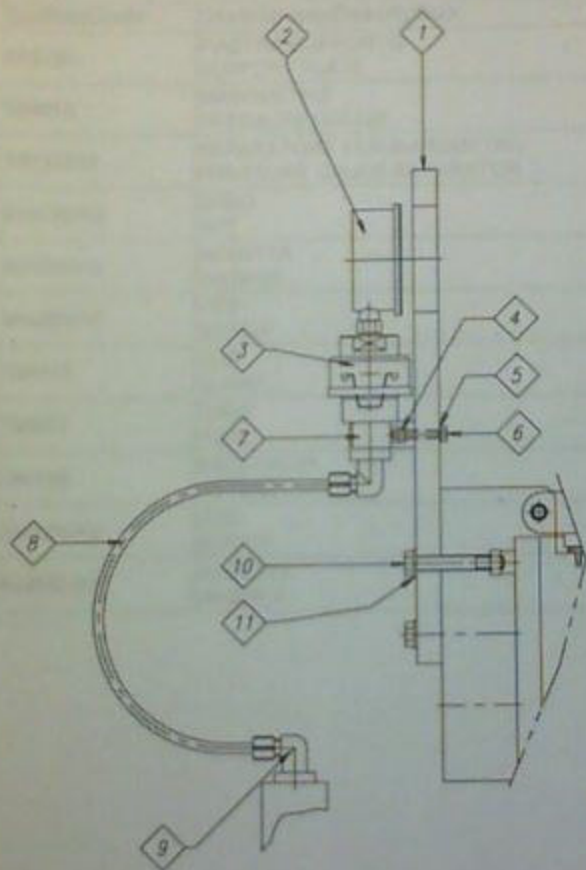
Legenda/Legend DWG.PP632-35936

Pos.	Codice/Code	Descrizione/Description
1	534081/EP	BOCCHETTONE COUPLING
2	204202/EP	FILTRO FILTER
3	204003	CARTUCCIA FILTRO FILTER CARTRIDGE
4	274076/VI	O-RING O-RING
5	814132/EP	VALVOLA VALVE
6	766111	COLLARE BOCCHETTONE COUPLING COLLAR
7	474169	POMPA 50Hz PUMP 50Hz
7	474170	POMPA 50Hz PUMP 60Hz
8	844091/A2	VITE SCREW
9	844095/A2	ROSETTA WASHER
10	844023/A2	DADO NUT
11	814131/EP	VALVOLA VALVE
12	534081/EP	BOCCHETTONE COUPLING



Legenda/Legend DWG.PP633-35945

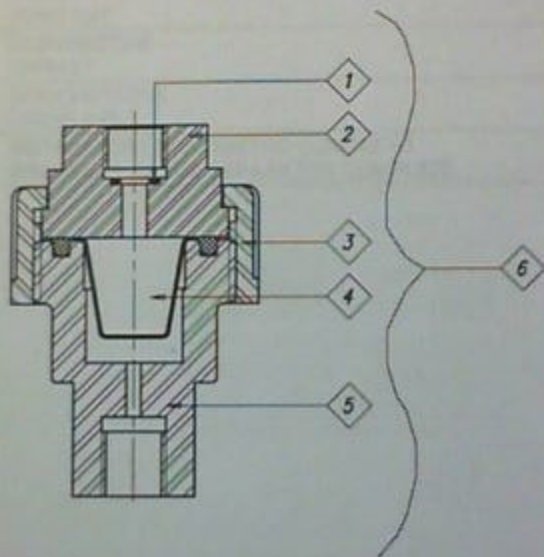
Pos.	Codice/Code	Descrizione/Description
1	814130/EP	VALVOLA VALVE
2	224082	FLUSSOMETRO SENZA MAGNETE FLOWMETER WITHOUT MAGNET
2	224083	FLUSSOMETRO CON MAGNETE FLOWMETER WITH MAGNET
3	184077	ELETROVALVOLA SOLENOID VALVE
4	534045	ADATTATORE ADAPTER
5	534473	CLIP TUBO PIPE CLAMP
6	844193/A4	VITE SCREW
7	224085	CONTATTO DI MIN-MAX CONTACT SWITCH
8	274101/EP	O-RING O-RING





Legenda/Legend DWG.PP632-35938

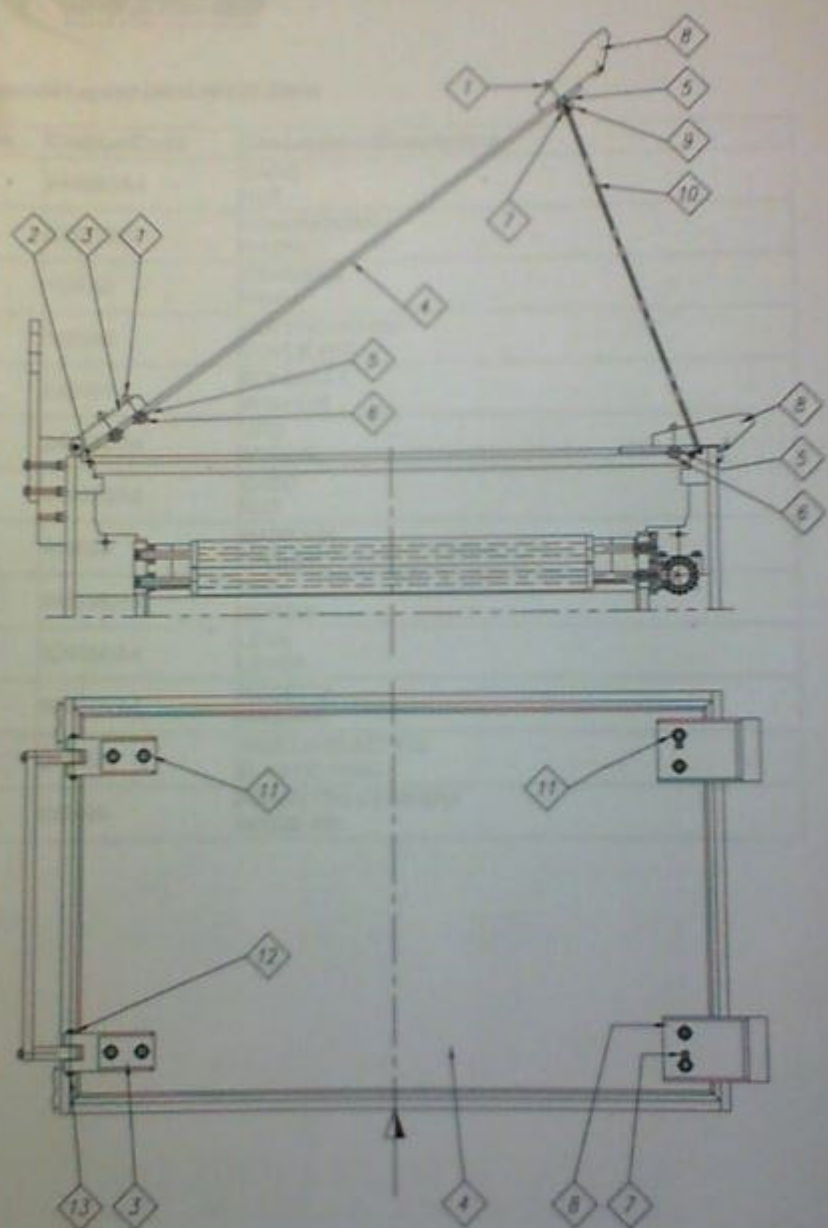
Pos.	Codice/Code	Descrizione/Description
1	676736	PIASTRA SUPPORTO SUPPORT PLATE
2	354018	MANOMETRO PRESSURE GAUGE
3	766322/VI	SEPARATORE PER MANOMETRO PRESSURE GAUGE SEPARATOR
4	844022/A2	DADO NUT
5	844096/A2	ROSETTA WASHER
6	844289/A2	VITE SCREW
7	534472	CLIP CLAMP
8	794037	TUBO HOSE
9	394169	RACCORDO FITTING
10	844324/A2	VITE SCREW
11	844062/A2	ROSETTA WASHER





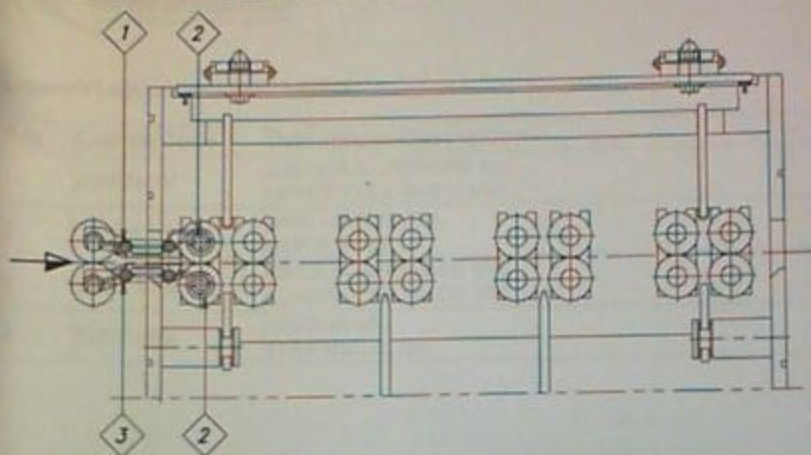
**Legenda/Legend DWG.701-32994**

Pos.	Codice/Code	Descrizione/Description
1	274054/VI	O-RING O-RING
2	216018/PC	FLANGIA PORTAMANOMETRO PRESSURE GAUGE FLANGE
3	534004	GHIRA RING NUT
4	276028/VI	GUARNIZIONE GASKET
5	766321	BOCCHETTONE COUPLING
6	766322/VI	SEPARATORE MANOMETRO COMPLETO PRESSURE GAUGE SEPARATOR COMPLETE

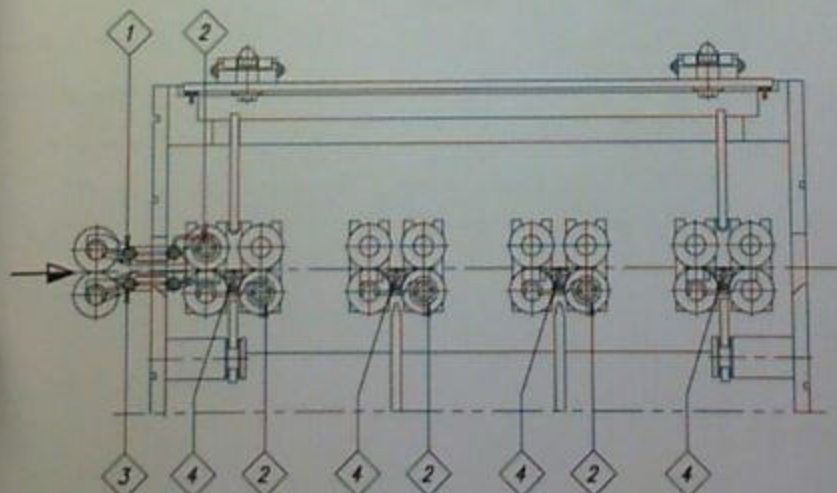


**Legenda Legend DWG PP633-35818**

Pos.	Codice/Code	Descrizione/Description
1	844097/A4	DADO NUT
2	276015/EP	GIARNIZIONE GASKET
3	116015	CERNIERA HINGE
4	156196	COPERCIO 650 COVER 650
5	848101	RONDELLA WASHER
6	844242/A4	VITE SCREW
7	844023/A4	DADO NUT
8	858020	MANIGLIA HANDLE
9	848196/A4	VITE SCREW
10	326056/A4	LEVA LEVER
11	844018/A4	ROSETTA WASHER
12	046001	ANELLO ELASTICO ELASTIC RING
13	026495	PERNETTO CERNIERA HINGE PIN



GRIGLIE INFERIORI E SUPERIORI PER SCHEDE SPESSE  
LOWER AND UPPER FLEX GUIDE FOR THICK BOARDS



GRIGLIE INFERIORI E SUPERIORI PER SCHEDE SOTTILI  
LOWER AND UPPER FLEX GUIDE FOR THIN BOARDS

**Legenda/Legend DWG.PP632-35939**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	256073/FV	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	036006	ANELLO DI GUIDA GUIDE RING
3	256071/FV	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
4	256081/FV	GRIGLIA 650 FLEX GUIDE 650



**Manuale di Istruzioni  
Usò e Manutenzione**

**Operating Instructions  
and Maintenance Manual**

**Modulo/Module:  
MINI DRYER FLEX (650)**

**Data/Date: 04-2007**

## Module Tech Table of contents

Section	page
1. Module technical specifications	2
2. Description	4
3. Operation	6
4. Maintenance	7
5. Troubleshooting guide	9
6. Lists, drawings, photographs and spare parts	12

### 1.2. General characteristics

#### 1.2.1. Description of module

Module type	1001
Resolution (dot pitch)	1024
Resolution (mm)	1024
Refresh rate	60

### 1.4. Technical drawings and products

#### 1.4.1. General view

Module type	1001
Resolution (dot pitch)	1024
Resolution (mm)	1024
Refresh rate	60
Module type	1001
Resolution (dot pitch)	1024
Resolution (mm)	1024
Refresh rate	60
Module type	1001
Resolution (dot pitch)	1024
Resolution (mm)	1024
Refresh rate	60

## 1. Module technical specifications

### 1.1 Module

Module:	MINI DRYER 650
Model:	CC-825-25
Final use:	FLAT BOARD DRYING

### 1.2 Diagrams and drawings

Overall dimensions DWG:	CC 31468
Internal cross sections DWG:	CC 31468
Other DWG:	----

### 1.3 Characteristics

#### Dimensions and weight:

- Length (mm):	660
- Maximum width (mm):	1310
- Maximum height (mm):	1300
- Net weight (kg):	200

### 1.4 Installed energies and products

#### Electric power

Main line:	see main manual
Power circuit:	see main manual
Control circuit :	see main manual

#### Compressed air

Pressure:	6bar
Capacity (consumption):	negligible

#### Caloric heating energy

Caloric energy (kcal):	N.A
Inlet heating fluid temperature (°C):	Max. N.A., Min. N.A.
Minimum capacity (l/h):	N.A

#### Caloric cooling energy

Caloric energy (kcal):	N.A
Inlet cooling fluid temperature (°C):	Max. N.A ;Min. N.A
Minimum capacity (l/h):	N.A





**Air exhaust:**

Type of connection:	smooth Stainless steel pipe Ø110mm
Capacity (m <sup>3</sup> /h):	from 400 to 500 (to be defined according with the process requirement)
Pressure (mmH <sub>2</sub> O):	from 50 to 100 (to be defined according with the process requirement)

**Products:**

Mains water pressure/capacity (bar-l/h):	N.A.
Demineralised water pressure/capacity (bar-l/h):	N.A.
Inflammables:	N.A.
Neutral gases:	N.A.
Acids and/or bases:	N.A.
Toxic products:	N.A.
Other:	N.A.

## 2 Description

Drystar is a drying unit employed after all printing circuit boards process.

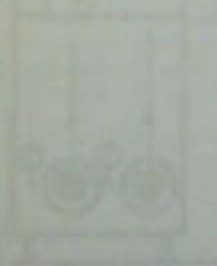
Type of blowers and special air knives make Drystar suitable to completely dry panels.

### 2.1 Main features

The machine consists in a monocoque self-supporting structure, made of AISI 304 stainless steel plates, appropriately assembled, drilled, bent and welded, to its final shape. This individual characteristic provides the highest mechanical strength and atmospheric resistance.

Minimised time required for preventive maintenance and repair operations, easy access to the main mechanical parts, conveyor rollers and air knives can be removed without using tools.

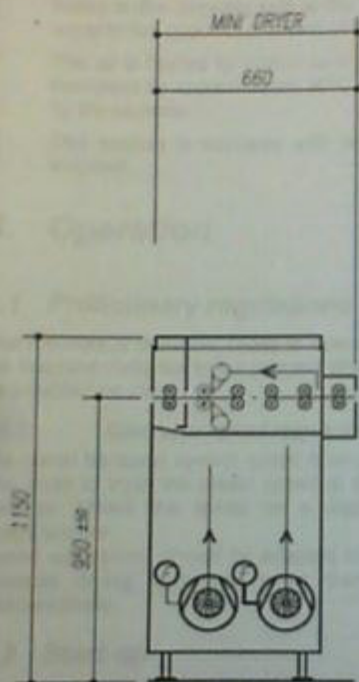
Perfect efficiency of the drying system is ensured by the particular design of the blow manifolds and the compressors feeding them. The circulated air, preliminarily filtered by filter cartridges installed on the intake side of the compressors, allows perfect cleaning of the processed boards.



### 2.2 Characteristics of the working machine

- 1. Working width: 2000 mm
- 2. Working speed: 2000 mm/min
- 3. Two compressors, one for each side of the machine
- 4. Two blow manifolds, one for each side of the machine
- 5. Two blow manifolds, one for each side of the machine
- 6. Two blow manifolds, one for each side of the machine
- 7. Two blow manifolds, one for each side of the machine
- 8. Two blow manifolds, one for each side of the machine

## 2.2 Longitudinal section



## 2.3 Description of the working stations

A. Drying section, 660mm length, equipped with:

- One pair of squeegee rollers.
- Two ring blowers feeding a pair of blow manifolds.
- Two filters for idle condition, installed on the ring blowers suction side.

The ring blowers provide a large amount of air to two separate manifolds located, one in the lower side and the other in the upper side of the conveyor. Due to the

particular holes of the air knives in the manifold, the air outlet is directed to the opposite side of the panel movements.

Such air flow, combined with wheel rollers in the incoming side and solid cylindrical rollers in the outgoing side of the manifold, generates an air stream that forces the water to the opposite direction of the conveyor.

The air is heated by friction as it passes through the blower, temperature of the air increases by approximately 30°C with respect to the temperature of the air taken in by the blowers.

This section is equipped with an air exhaust duct but no blower for exhaust is included.

### **3. Operation**

#### **3.1 Preliminary regulations**

The machine is delivered ready to operate, however all the regulations required to adapt the machine variables to the process characteristics and type of panels to be treated must be provided on site.

##### **3.1.1 Conveyor speed regulation**

The panel transport system speed is visualised on the operator interface display which is also used to input the preset speed at the desired value. The electromechanical version machine shows the speed on a display and it can be adjusted by means of a potentiometer.

Speed adjustment should be adapted to the most critical phases of panel treatment, for example drying operations when there is a drastic speed variation according to thickness/hole.

#### **3.2 Start up**

Once the preliminary regulations have been carried out the machine is ready to operate.

Select "AUTOMATIC" operating mode and press the "START CYCLE" button.

When all the processing parameters are within the operational values required, proceed to production start up.

## **4. Maintenance**

The machine does not require particular maintenance operations to ensure it works properly, however it is recommended to follow the below preventive maintenance programme in order to optimize the efficiency of the machine.

### **4.1 Daily maintenance**

It is a set of daily activities ensuring the correct functionality of the system.

#### **4.1.1 Cleaning**

At the end of each working shift or however once each day, clean the machines externally avoiding to use abrasive materials or objects, a damped sponge is sufficient for the purpose.

Empty the rinsing sections tanks which will be filled up at the following work shift start-up.

### **4.2 Weekly maintenance**

It is a series of weekly activities ensuring the correct functionality of the system.

#### **4.2.1 Air filters**

Each week check the status of the efficiency of the filters installed on the ring blowers in the drying sections. Replace if necessary.



#### **WARNING**

Air filter clogged will cause air blower motor overheating.

#### **4.2.2 Squeegee rollers**

Each week check the wear status of the spongy squeegee rollers in the drying section. Replace if dirty or worn.

#### **4.2.3 Cleaning**

Each weekend clean the machines externally avoiding to use abrasive materials or objects, a damped sponge is sufficient for the purpose.

Exhaust inside the drying chamber to remove dust particles.

### **4.3 Monthly maintenance**

It is the series of monthly activities that ensure the correct functionality of the system.

#### 4.3.1 Transport system

Check the wear status of all the parts composing the conveyor system, for example the rollers, their supports and the gears. Replace if worn.

#### 4.3.2 Piping

Check each month the efficiency status of the flexible connection tubes between blowers and air knife. Replace if necessary.

### 4.4 Wear parts mandatory replacement programme

Activities description	Frequency in work hours
Drying section cartridge filters	500
Roller support inserts	3000

## 5. Troubleshooting guide

### 5.1 General

#### 5.1.1 *The panels loaded do not leave the machine*

Check whether the conveyor system rollers are correctly positioned in their housing. Restore the correct condition if necessary.

Check whether the conveyor guides for thin panels are correctly positioned in their housing. Restore the correct condition if necessary.

Check the conveyor system for foreign particles which may hinder the passage of the panels. If necessary remove the cause.

Check whether the gear coupling and/or drive chain sprocket is transmitting the motion to the conveyor system rollers in the correct way. The rollers should rotate correctly. If necessary replace damaged parts.

Check whether the panels are loaded inside the machine within the useful passage section. If required, adjust the position of the lead-in side guides located on the input conveyor.

Check the adherence degree of the conveyor rollers, which is significantly reduced if particular greasy process products are utilised. If required, consult the local Representative or WISE s.r.l. technical assistance.

Check the processed panels: particular irregular flatness "warping" can be cause of panel slippage or blocking. If required consult the local Representative otherwise the Technical Assistance Department of WISE s.r.l. directly.

Check whether the processed panels' sizes comply with the specifications described under section 2.5 CHARACTERISTICS OF PERMISSIBLE PANELS. In the event of non compliance, some modification to the transport system could be required and in that case consult the local Representative or directly the technical assistance of WISE s.r.l.

### 5.2 Drying

#### 5.2.1 *Insufficient drying*

Check the drying manifolds blowing orifices, and if clogged clean them. The manifolds can be decomposed in two parts in order to facilitate the cleaning operation.

Check the installed position of the drying manifolds with respect to the work level:

- The lower manifold dispersion plate should be positioned 2mm lower than the work level.
- The upper manifold dispersion plate should be positioned 2mm higher than the upper part of the maximum width panel to be processed.

Check the pipes connecting the compressors to the drying manifolds. They should be correctly connected and cut or crack free. If required restore the connection or provide replacement.

Verify the filters installed on the exhaust side of the compressors. If required replace them.

Verify the pneumatic valve installed on the compressors' delivery to reduce its pressure in case of a system processing thin panels. During the working cycle of rigid panels process said valve should be on the closed position and when processing thin panels the same should be on the open position. Air discharge is regulated through an outlet plug with orifice, by reducing its size the drying manifold outlet air pressure increases. If necessary, restore the correct functioning of the valve and/or modify the diameter of the outlet orifice.

The characteristics of the panel to be treated as for instance very small holes on a plate having high width render the drying operation more difficult:

- Reduce the conveyor speed.

Should the above explained operations be insufficient, it could be that the panel to be processed may have characteristics that do not allow for complete drying, in which case the local Representative should be contacted, otherwise contact the technical assistance of WISE s.r.l. directly.

#### **5.2.2 Oxidation or stains on processed panels**

Virgin copper is known to be chemically very active and oxidises easily and for this reason the panels leaving the drying section could present some oxidation marks:

Squeegee rollers made of spongy material can be installed at the drying section inlet. If they are present in the system, verify the conservation status and the efficiency of the spongy material. If necessary replace the sponge stocking or replace the original rollers with stockings type made of spongy material. If necessary, contact the local Representative or the technical assistance department of WISE s.r.l. directly.

A possible cause of the above stated could be the quality of the washing water with too low pH or elevated content of salts. If necessary, feed the machine with softened water.

#### **5.2.3 The drying temperature is too high**



#### **WARNING**

The maximum operating temperature permitted is 60°C, higher temperature could damage some components installed in the system, and WISE s.r.l. shall not be held liable, caused by improper use of the system.

Malfunctioning of the compressors provokes anomalous elevation of the circulated air:

- Check the drying manifolds blowing orifices and if clogged provide clean them. The manifolds can be decomposed in two parts in order to facilitate cleaning operations.



- Verify the filters installed on the intake side of the compressors. If necessary replace them.

**5.2.4**      *The air blower's electrical absorption is too elevated*

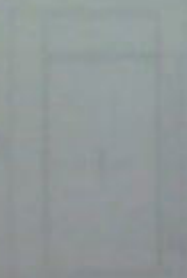
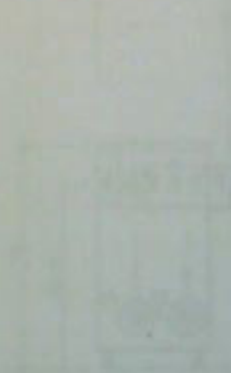
The air blower must be used within an operative curve, determined by the manufacturer in the course of the project, and therefore the drying manifolds have been dimensioned as to guarantee that the air blower operate within said curve:

- Check the drying manifolds blowing orifices and if clogged provide clean them. The manifolds can be decomposed in two parts in order to facilitate cleaning operations.
- Verify the filters installed on the intake side of the compressors. If necessary, replace them.

## **6. Lists, drawings, photographs and spare parts.**

Following are the drawings and/or photographs which schematise the machine as a whole and allow to identify the spare parts.

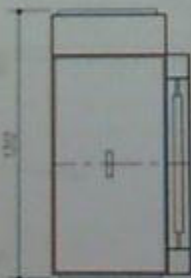
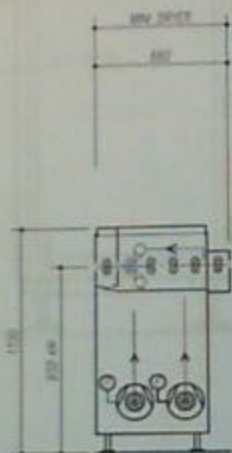
### **6.1 Drawings and spare parts lists**

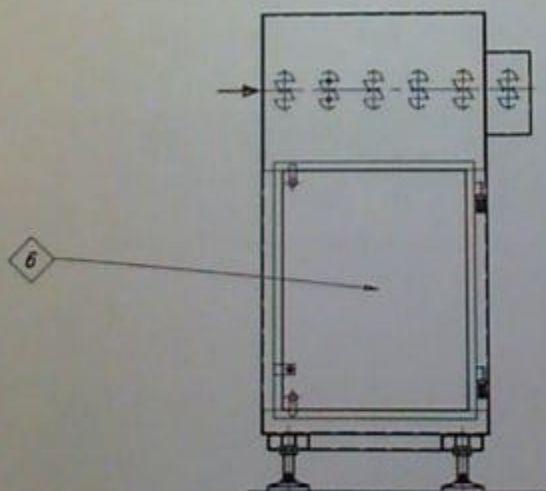
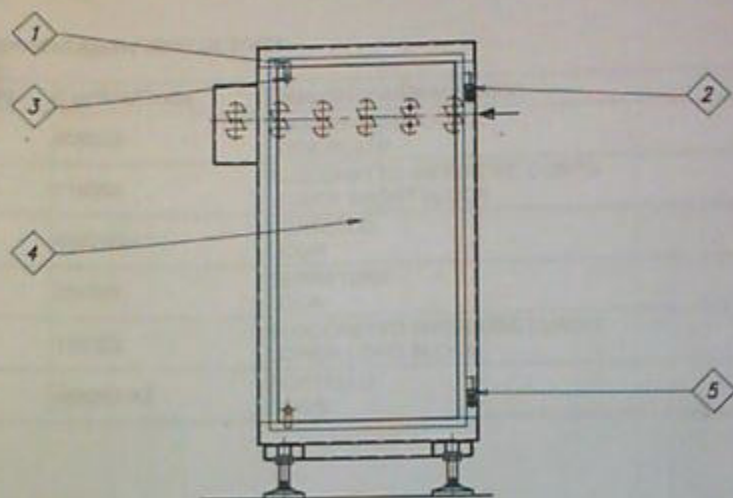


PC 1000000

DWG. CC31458

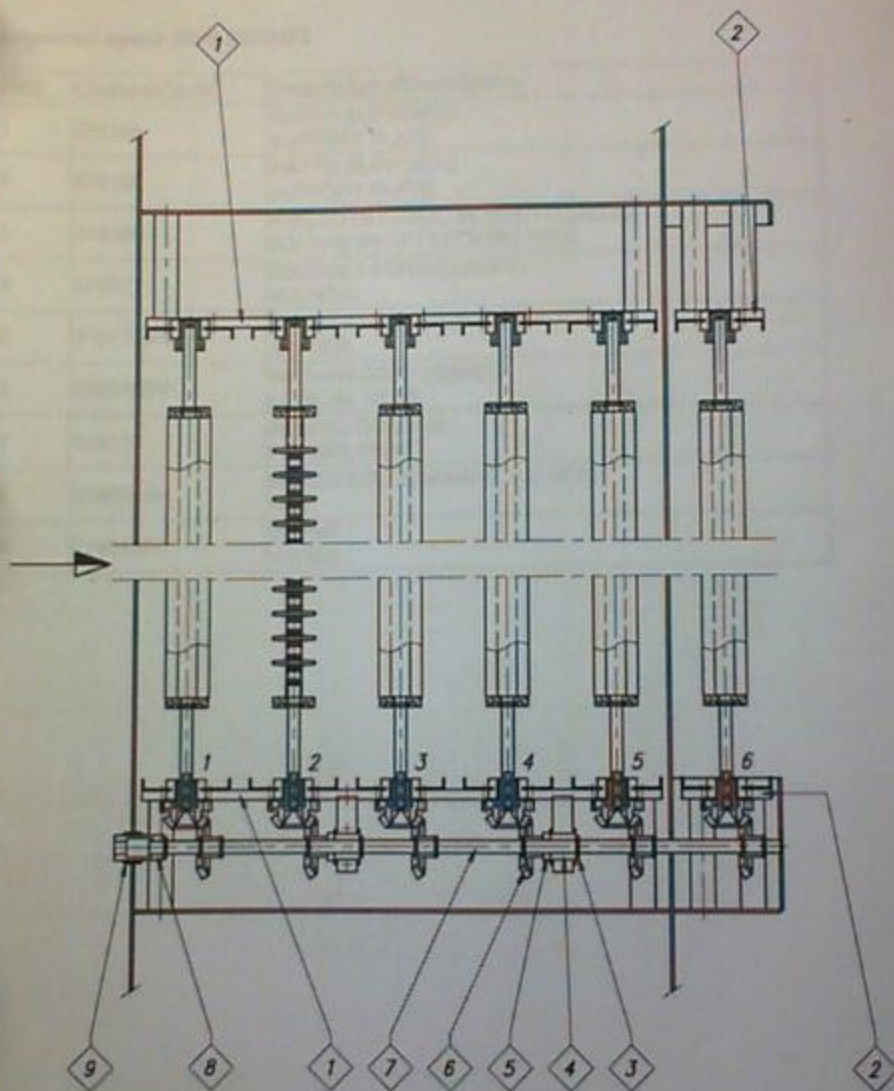
MIN DRYER FLEX 850





**Legenda/Legend DWG.CC31474**

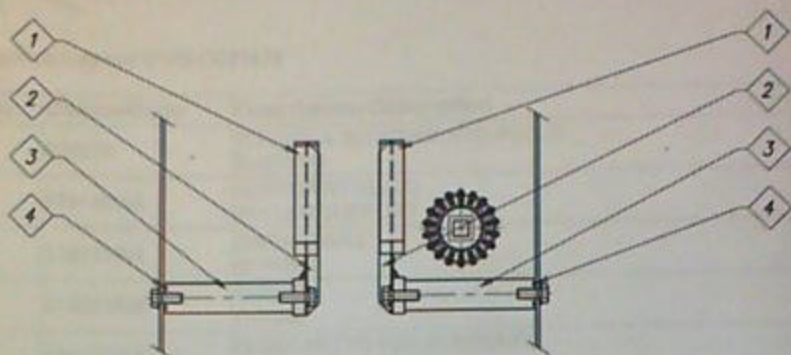
Pos.	Codice/Code	Descrizione/Description
1	456033	PIASTRA SERRATURA LOCK PLATE
2	116004	BLOCCHETTO INFERIORE CORTO LOWER SHORT BLOCK
4	486209/A2	PORTELLO DOOR
3	854001	SERRATURA LOCK
5	116003	BLOCCHETTO INFERIORE LUNGO LOWER LONG BLOCK
6	486267/A2	PORTELLO DOOR



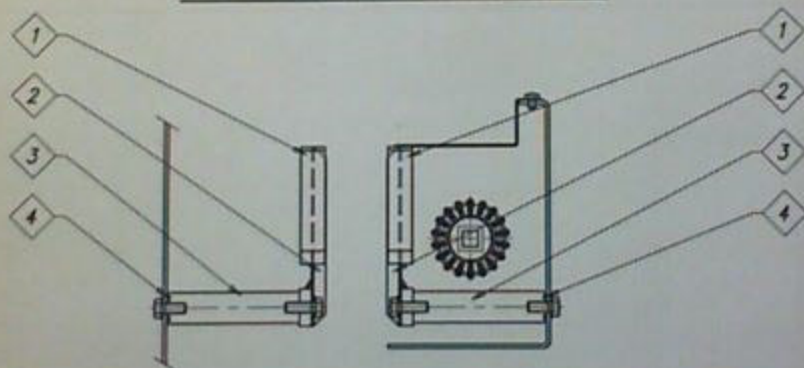
Legenda/Legend DWG.CC31475

Pos.	Codice/Code	Descrizione/Description
1	676165	PIATTO SUPPORTO SUPPORT PLATE
2	676166	PIATTO SUPPORTO SUPPORT PLATE
3	036008	ANELLO DI FERMO ALBERO QUADRO SQUARE SHAFT LOCKING RING
4	076017	BOCCOLA FORO QUADRO BUSHING
5	176110/A4	DISTANZIERE PER INGRANAGGIO SPACER
6	296019/PP	INGRANAGGIO CONICO CONICAL GEAR
7	026173	ALBERO QUADRO SQUARE SHAFT
8	216024/A4	MOZZO COLLEGAMENTO ALBERI HUB
9	274013/VI	V-RING V-RING

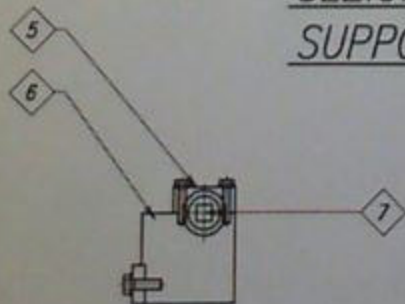
SEZIONE SUPPORTO 6  
SUPPORT SECTION 6



SEZIONE SUPPORTI 1:5  
SUPPORT SECTION 1:5



SEZIONE SUPPORTO 6  
SUPPORT SECTION 6





**Legenda/Legend DWG.CC31476**

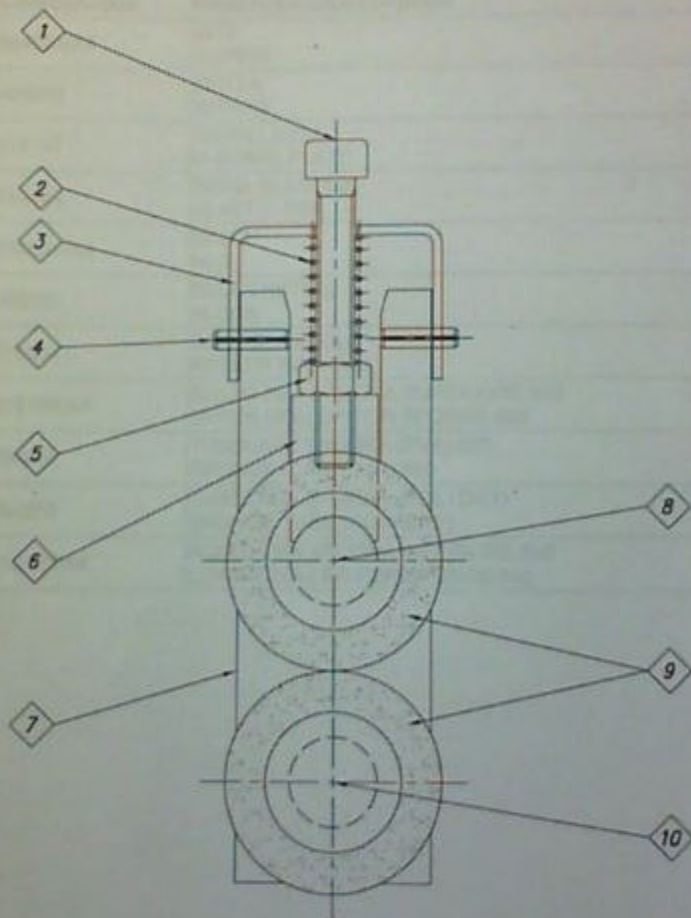
Pos.	Codice/Code	Descrizione/Description
1	076026	BOCCOLA SCORRIMENTO RULLO BUSHING
2	676140/A4	SUPPORTO RULLO ROLLER SUPPORT
3	176111/A4	DISTANZIERE SPACER
4	274067/NB	O-RING O-RING
5	676133/A4	BLOCCHETTO PER SUPPORTO BLOCK
6	676132/A4	SUPPORTO ALBERO SHAFT SUPPORT
7	076017	BOCCOLA FORO QUADRO BUSHING





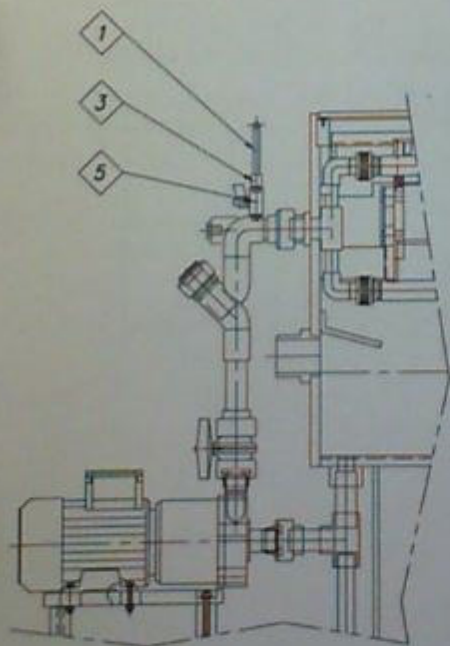
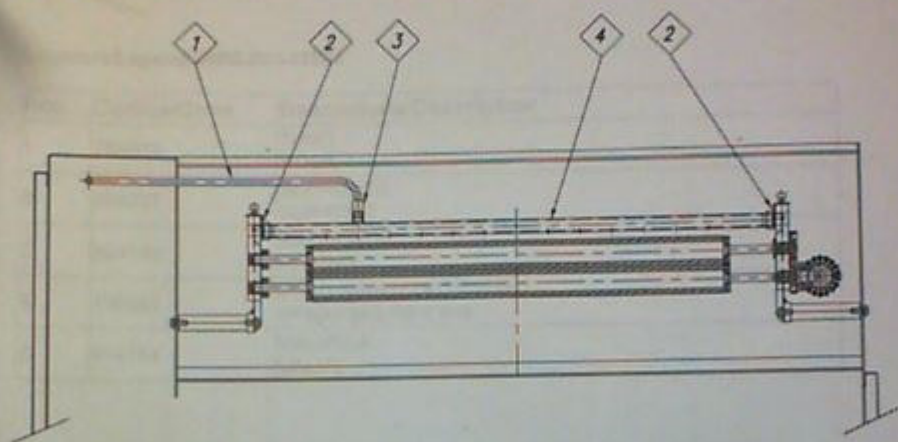
Legenda/Legend DWG. CC31477

Pos.	Codice/Code	Descrizione/Description
1	016084/PP	RULLO SUPERIORE 650 (ALBERO AISI 316) UPPER ROLLER 650 (SHAFT AISI 316)
2	016092	RULLO ROTELLE SUPERIORE 650 (ALBERO AISI 316) UPPER WHEELS ROLLER 650 (SHAFT AISI 316)
3	016083/PP	RULLO INFERIORE 650 (ALBERO AISI 316) LOWER ROLLER 650 (SHAFT AISI 316)
4	016091	RULLO ROTELLE INFERIORE 650 (ALBERO AISI 316) LOWER WHEELS ROLLER 650 (SHAFT AISI 316)



Legenda/Legend DWG.MS35555

Pos.	Codice/Code	Descrizione/Description
1	844084/A4	VITE SCREW
2	406008	MOLLA SPRING
3	656147	CAVALLOTTA U-SHAPE PLATE
4	044064	SPINA ELASTICA ELASTIC PIN
5	844024/A4	DADO NUT
6	066032	BLOCCHETTO BLOCK
7	076054	BOCCOLA RULLO ROLLER BUSHING
8	016109/A4	RULLO PER SPUGNA SUPERIORE 650 UPPER ROLLER FOR SPONGE 650
9	084001	TUBOLARE SPUGNA (PVA) 650 SPONGE TUBE (PVA) 650
9	084009	TUBOLARE SPUGNA (POLYDRY) SPONGE TUBE (POLYDRY)
10	016107/A4	RULLO PER SPUGNA INFERIORE 650 LOWER ROLLER FOR SPONGE 650



**Legenda/Legend DWG.801-35894**

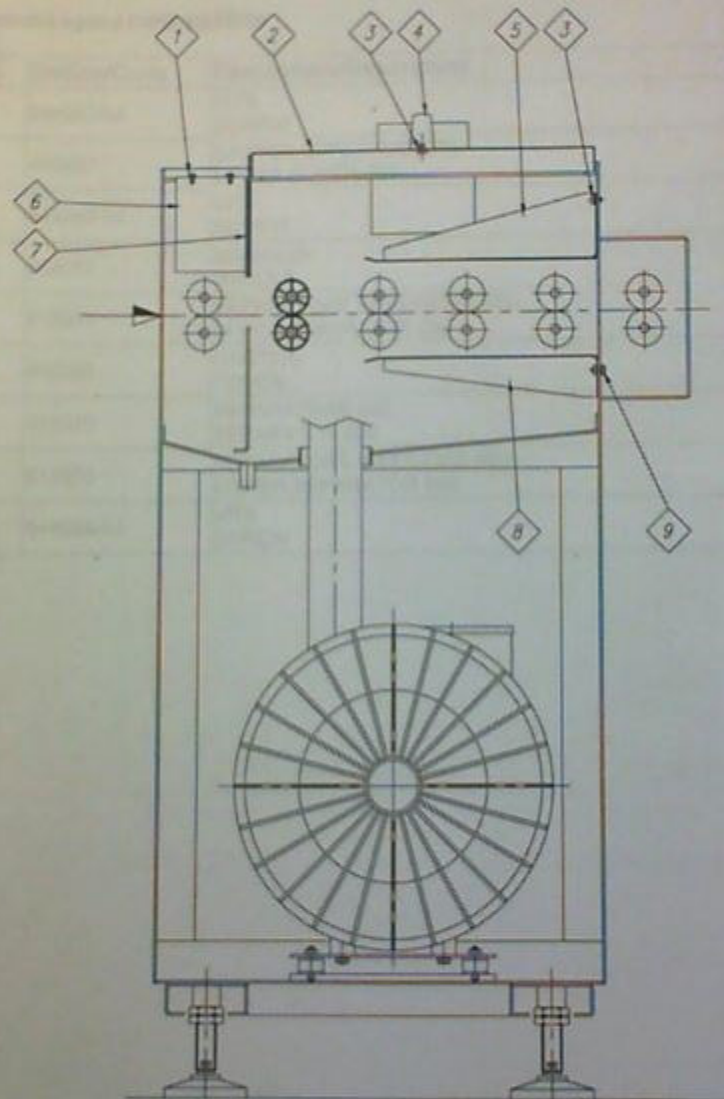
Pos.	Codice/Code	Descrizione/Description
1	794032	TUBO HOSE
2	656237	SUPPORTO SUPPORT
3	524143	RACCORDO FITTING
4	136381	TUBO SPRUZZATORE 650 SPRAYING PIPE 650
5	814154	VALVOLA VALVE





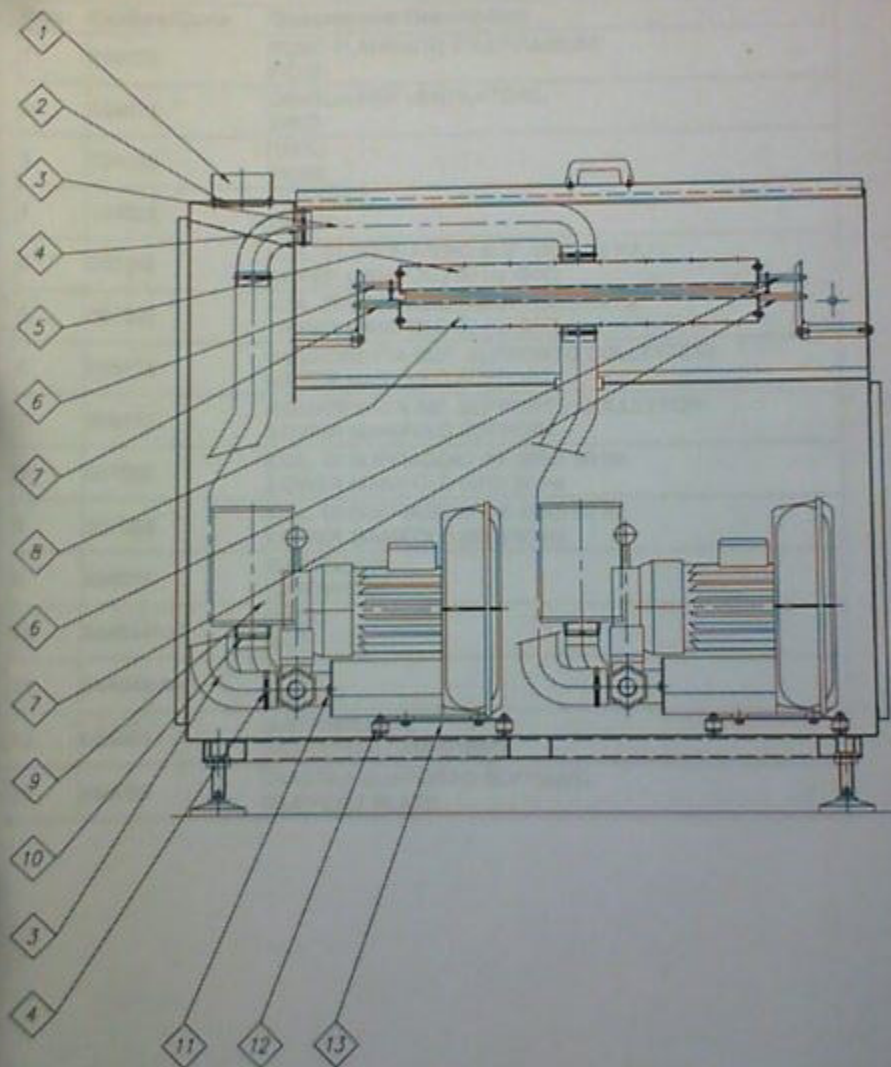
**Legenda/Legend DWG.CC31479**

Pos.	Codice/Code	Descrizione/Description
1	256077/A4	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
2	256073/A4	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
3	256065/A4	GRIGLIA SUPERIORE 650 UPPER FLEX GUIDE 650
4	256075/A4	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
5	256063/A4	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
6	256071/A4	GRIGLIA INFERIORE 650 LOWER FLEX GUIDE 650
7	036006	ANELLO GUIDA GUIDE RING



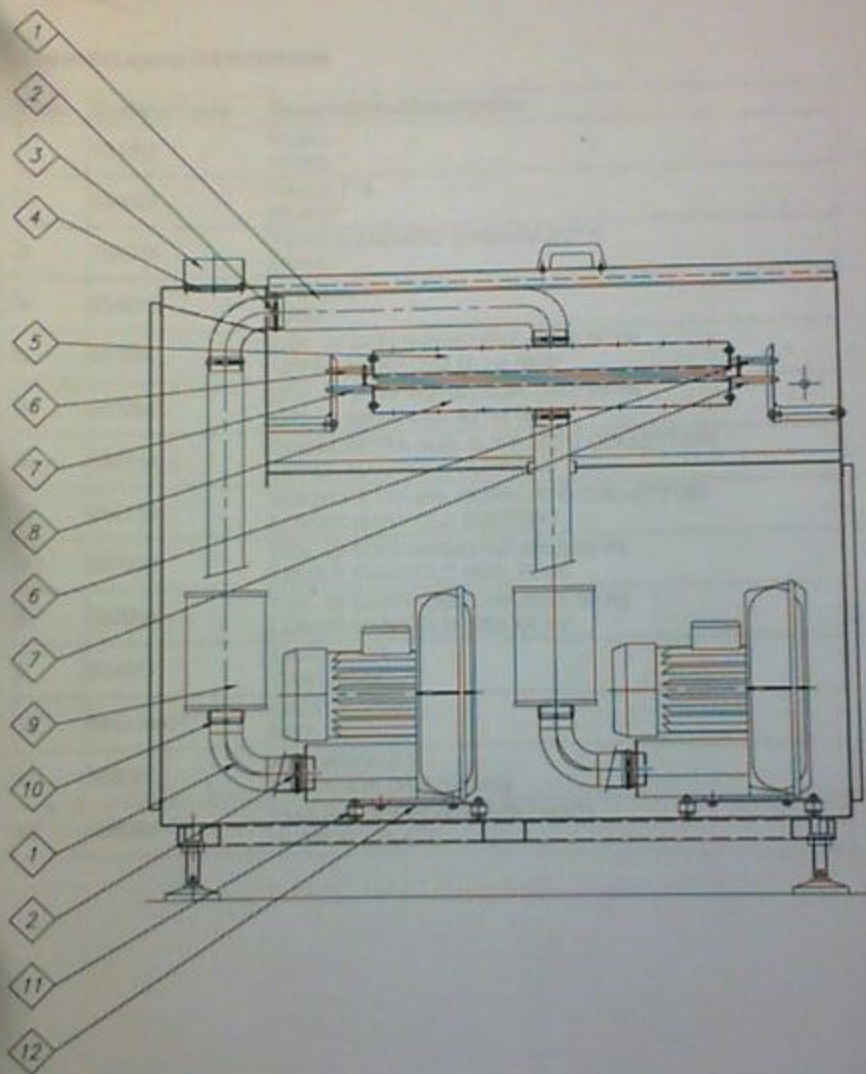
**Legenda/Legend DWG.MS35556**

Pos.	Codice/Code	Descrizione/Description
1	844092/A4	VITE SCREW
2	486627	CARTER SUPERIORE 650 UPPER COVER 650
3	844090/A4	VITE SCREW
4	854017	MANIGLIA HANDLE
5	616077	SEPARATORE SUPERIORE 650 UPPER SEPARATOR 650
6	486626	CARTER COVER
7	616073	SEPARATORE 650 SEPARATOR 650
8	616075	SEPARATORE INFERIORE 650 LOWER SEPARATOR 650
9	844094/A4	VITE SCREW



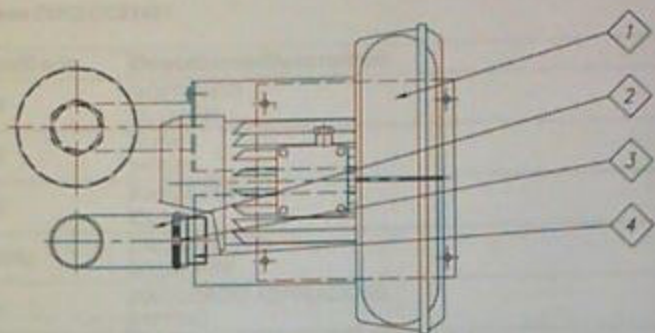
Legenda/Legend DWG.CC35895

Pos.	Codice/Code	Descrizione/Description
1	766075	TUBO FLANGIATO D'ASPIRAZIONE HOSE
2	834071	GRIGLIA PER VENTILATORE GRID
3	794002	TUBO HOSE
4	194022	FASCIETTA CLAMP
5	007092	COL. DI SOFFIAGGIO SUP. (650) 50 Hz UPPER MANIFOLD 50 Hz (650)
5	007096	COL. DI SOFFIAGGIO SUP. (650) 60 Hz UPPER MANIFOLD 60 Hz (650)
6	656114	SQUADRETTA SUP. SUPPORTO COLLETTORI UPPER MANIFOLD SUPPORT
7	656113	SQUADRETTA INF. SUPPORTO COLLETTORI LOWER MANIFOLD SUPPORT
8	007090	COL. DI SOFFIAGGIO INF. (650) 50 Hz LOWER MANIFOLD (650) 50 Hz
8	007094	COL. DI SOFFIAGGIO INF. (650) 60 Hz LOWER MANIFOLD (650) 60 Hz
9	834011	CARTUCCIA CARTRIDGE
10	844014/OT	DADO NUT
11	844044/A4	VITE SCREW
12	056001	ANTIVIBRANTE VIBRATION DAMPENING
13	456050	PIASTRA SUPPORTO SOFFIANTI SUPPORT PLATE

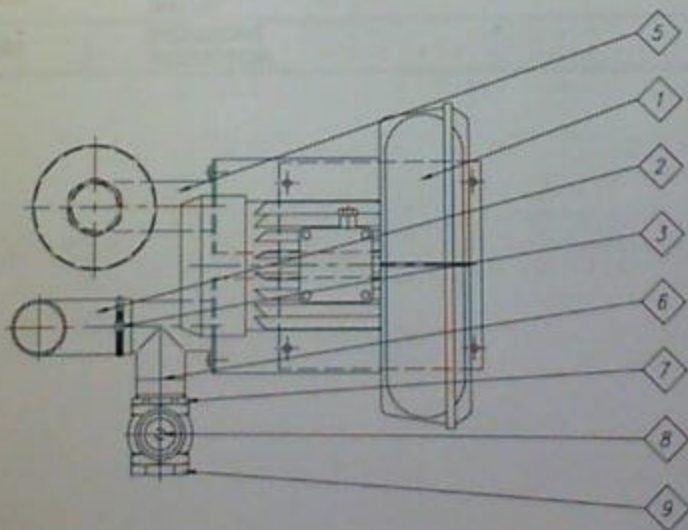


Legenda/Legend DWG.CC35896

Pos.	Codice/Code	Descrizione/Description
1	794002	TUBO HOSE
2	194022	FASCETTA CLAMP
3	766075	TUBO FLANGIATO D'ASPIRAZIONE HOSE
4	834071	GRIGLIA GRID
5	007092	COL. DI SOFFIAGGIO SUP. (650) 50 Hz UPPER MANIFOLD 50 Hz (650)
5	007096	COL. DI SOFFIAGGIO SUP. (650) 60 Hz UPPER MANIFOLD 60 Hz (650)
8	656114	SQUADRETTA SUP. SUPPORTO COLLETTORI UPPER MANIFOLD SUPPORT
7	656113	SQUADRETTA INF. SUPPORTO COLLETTORI LOWER MANIFOLD SUPPORT
8	007090	COL. DI SOFFIAGGIO INF. (650) 50 Hz LOWER MANIFOLD (650) 50 Hz
8	007094	COL. DI SOFFIAGGIO INF. (650) 60 Hz LOWER MANIFOLD (650) 60 Hz
9	834011	CARTUCCIA CARTRIDGE
10	844014/OT	DADO NUT
11	056001	ANTIVIBRANTE VIBRATION DAMPENING
12	456050	PIASTRA SUPPORTO SOFFIANTI SUPPORT PLATE



MONTAGGIO VENTILATORI x SCHEDE SPESSE  
 BLOWER ASSEMBLY FOR THICK BOARDS

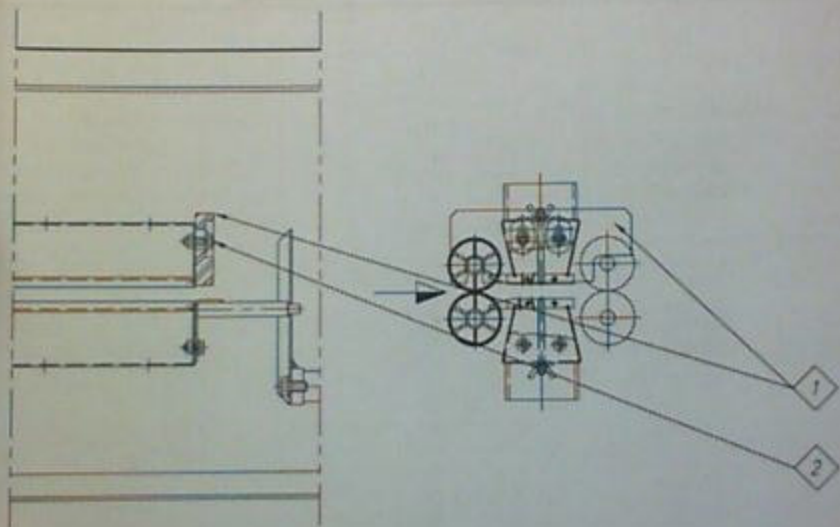


MONTAGGIO VENTILATORI x SCHEDE SOTTILI  
 BLOWER ASSEMBLY FOR THIN BOARDS



Legenda/Legend DWG.CC31487

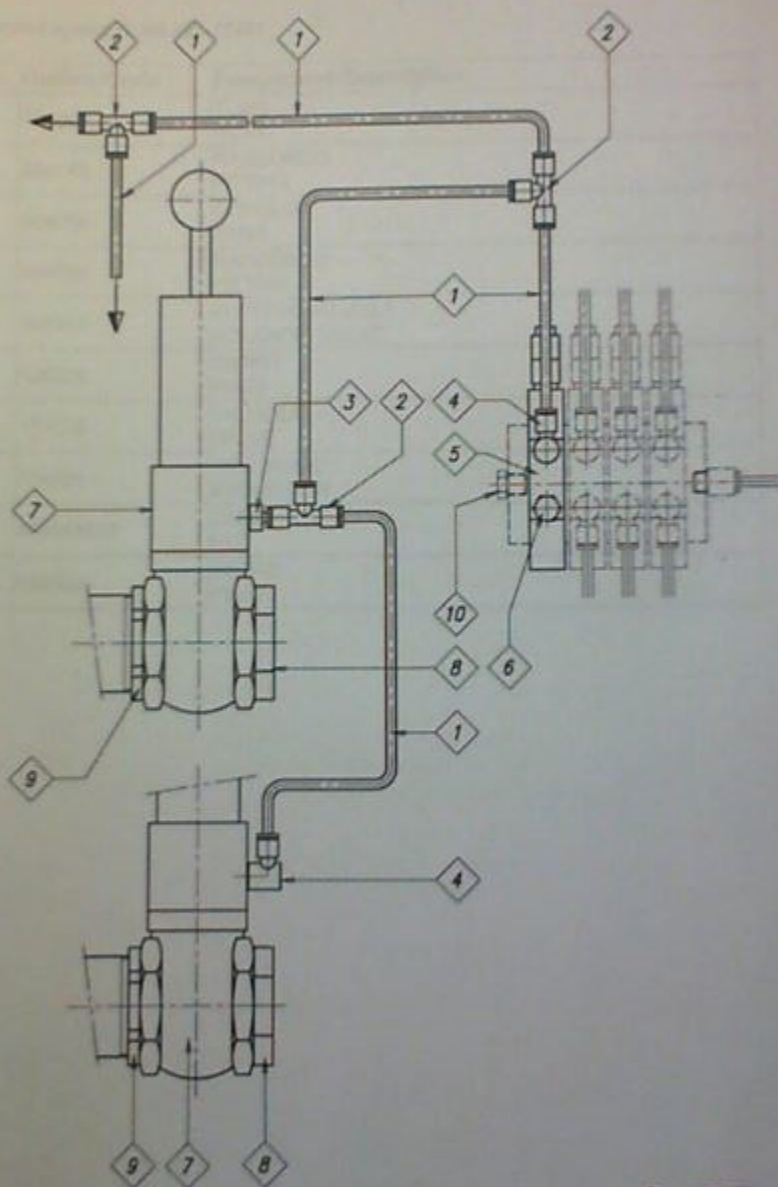
Pos.	Codice/Code	Descrizione/Description
1	834006	SOFFIANTE BLOWER
2	794002	TUBO HOSE
3	194022	FASCETTA CLAMP
4	514039/A2	TRONCHETTO STUB PIPE
5	766061	RACCORDO ASPIRAZIONE FITTING
6	766062	RACCORDO MANDATA (STANDARD) FITTING (STANDARD)
6	766236	RACCORDO MANDATA (SPECULARE) FITTING (MIRROR)
7	844014/OT	DADO NUT
8	184025	VALVOLA VALVE
9	534501	RIDUZIONE REDUCTION





**Legenda/Legend DWG CC35897**

Pos.	Codice/Code	Descrizione/Description
1	676480	SUPPORTO COLLETTORE SUP LATO DESTRO UPPER MANIFOLD SUPPORT RIGHT SIDE
1	676479	SUPPORTO COLLETTORE SUP LATO SINISTRO UPPER MANIFOLD SUPPORT LEFT SIDE
2	844352/A2	VITE SCREW



Legenda/Legend DWG.801-31221

Pos.	Codice/Code	Descrizione/Description
1	794005	TUBO HOSE
2	394148	RACCORDO FITTING
3	394064	CODOLO TANG
4	394009	RACCORDO FITTING
5	394017	ELETTROVALVOLA SOLENOID VALVE
6	524008	TAPPO PLUG
7	184025	VALVOLA VALVE
8	534501	RIDUZIONE REDUCTION
9	844014/OT	DADO NUT
10	524009	TAPPO PLUG



***Manuale di Istruzioni  
Uso e Manutenzione***

***Operating Instructions  
and Maintenance Manual***

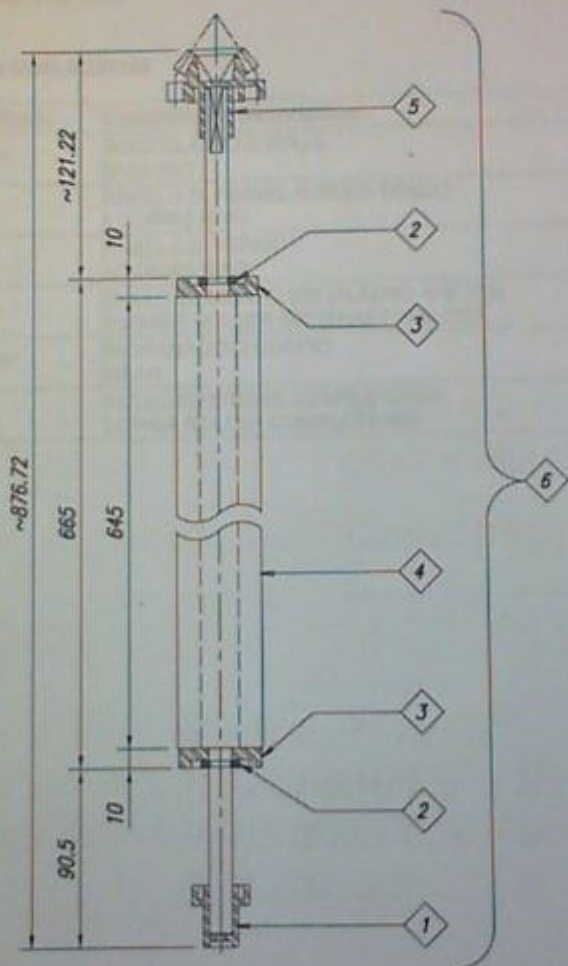
***Modulo/Module:***

***RULLI 650 FV + RULLI A4 PER DRYER  
ROLLERS 650 FV + ROLLERS A4 FOR  
DRYER***

***Data/Date: 06-06***

*Codice del Manuale  
Manual code*

*ES-RULLI-FV-CON RULLI PER EP-650-10-05*

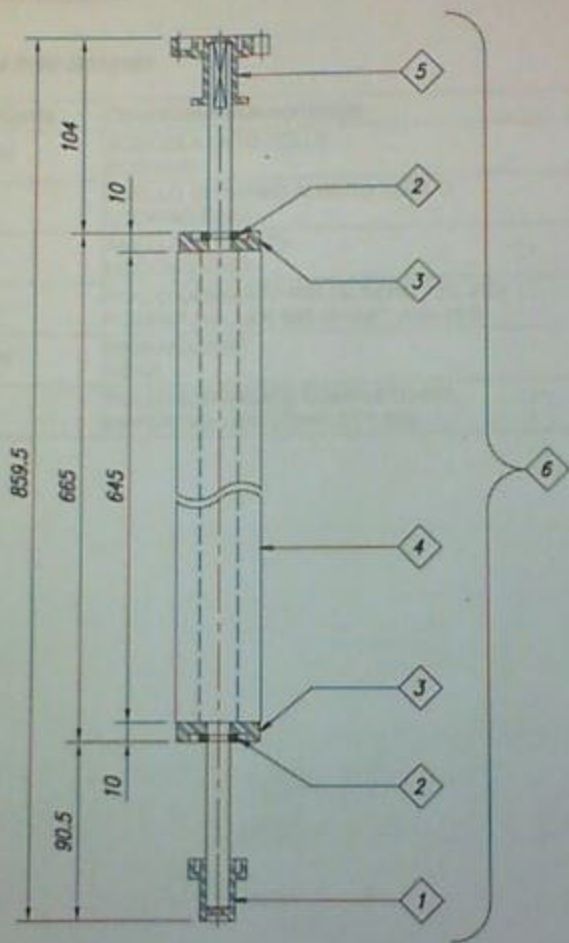


.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

**Legenda/Legend DWG.MS32106**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
3	036010	ANELLO DI FERMO LOCKING RING
4	446041/--	RULLO GOMMATO 650 (ALBERO AISI 316) RUBBER ROLLER 650 (SHAFT AISI 316)
5	296021/PF	INGRANAGGIO DOPPIO GEAR
6	016083/--	RULLO INFERIORE COMPLETO 650 LOWER ROLLER COMPLETE 650

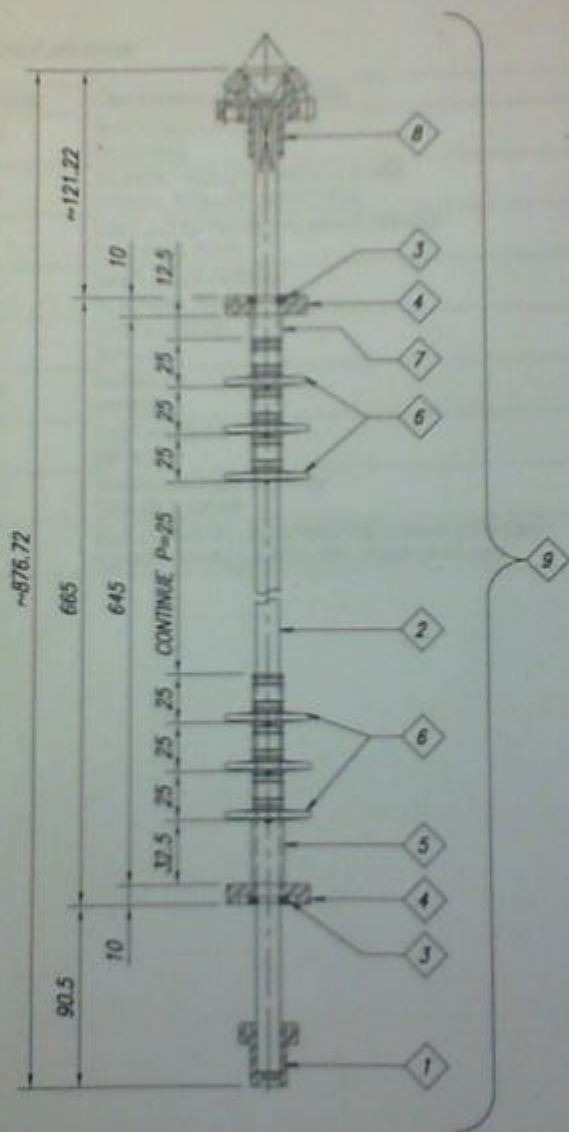




.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

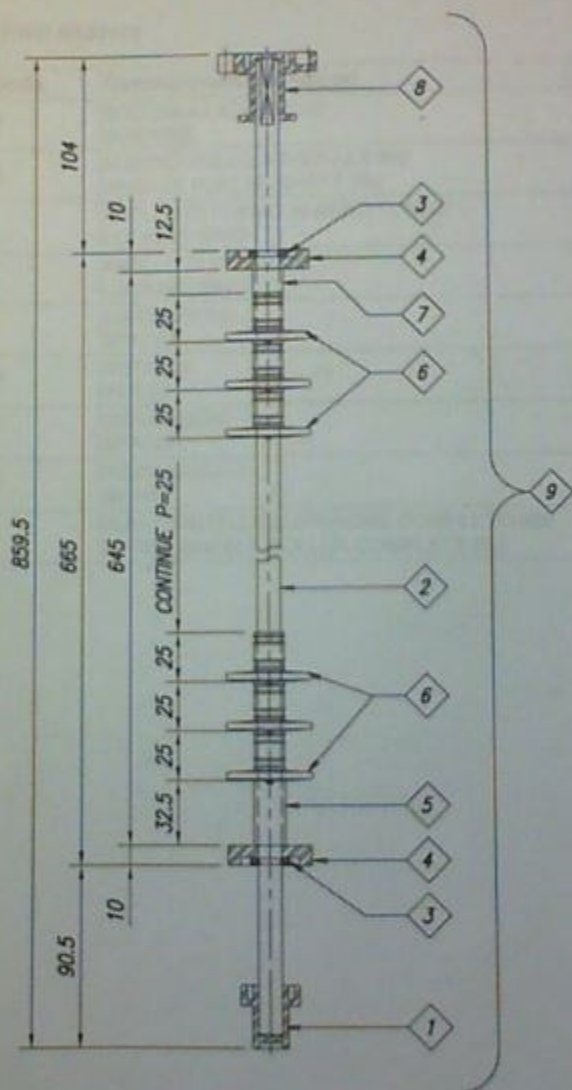
**Legenda/Legend DWG.MS32107**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
3	036010	ANELLO DI FERMO LOCKING RING
4	446041/--	RULLO GOMMATO 650 (ALBERO AISI 316) RUBBER ROLLER 650 (SHAFT AISI 316)
5	296022/PF	INGRANAGGIO GEAR
6	016084/--	RULLO SUPERIORE COMPLETO 650 UPPER ROLLER COMPLETE 650



**Legenda/Legend DWG. MS32108**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/A4	ALBERO RULLO A ROTELLE 650 WHEEL ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	298021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016087	RULLO ROTELLE INFERIORE COMPLETO 650 LOWER WHEELS ROLLER COMPLETE 650



Legenda/Legend DWG.MS32109

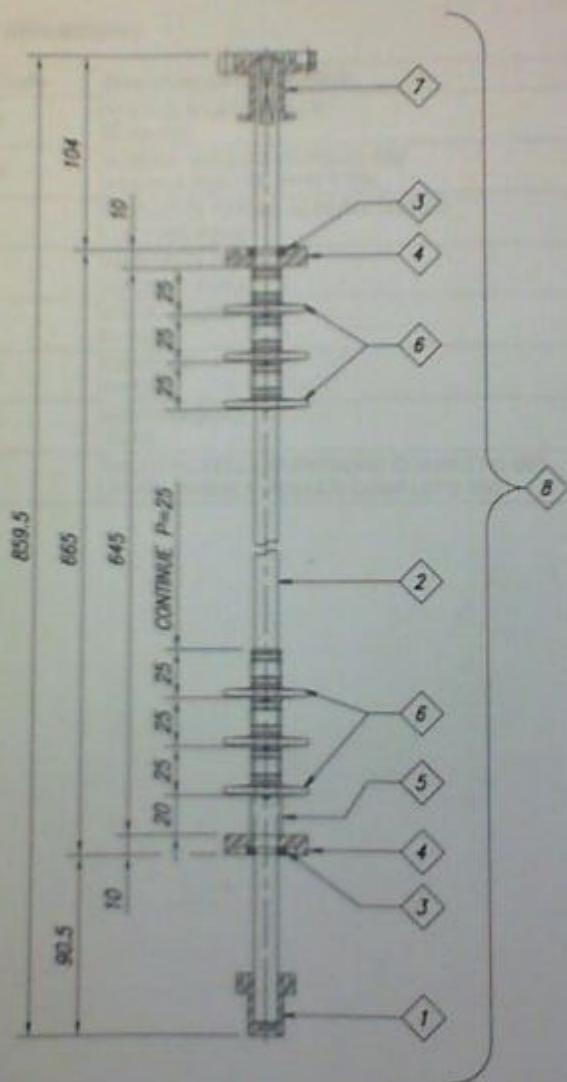
Pos.	Codice/Code	Descrizione/Description
1	078009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/A4	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	296022/PF	INGRANAGGIO GEAR
9	016088	RULLO ROTELLE SUPERIORE COMPLETO 650 UPPER WHEELS ROLLER COMPLETE 650



Legenda/Legend DWG.MS32110

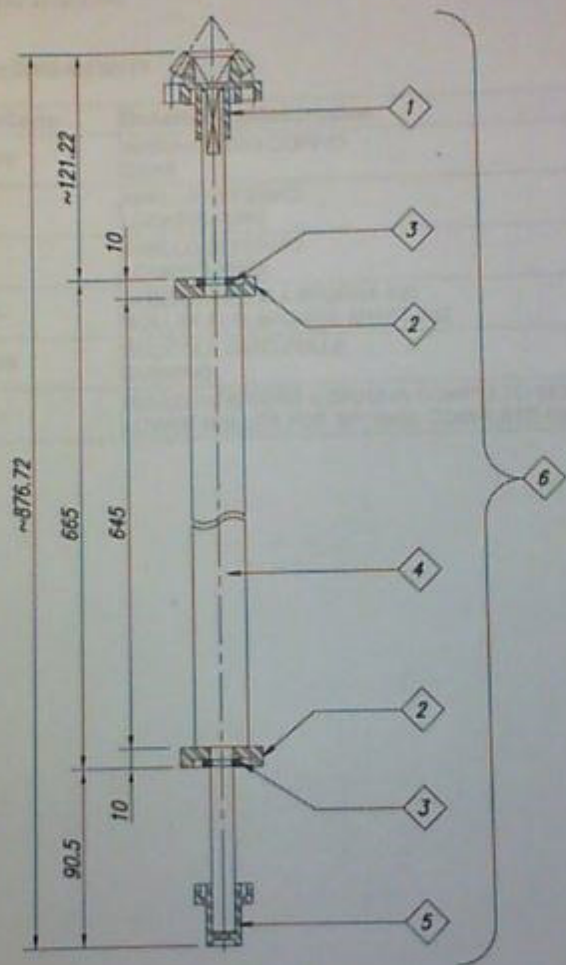
Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/A4	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	296021/PF	INGRANAGGIO DOPPIO GEAR
8	016091	RULLO ROTELLE INFERIORE COMPLETO 650 LOWER WHEELS ROLLER COMPLETE 650





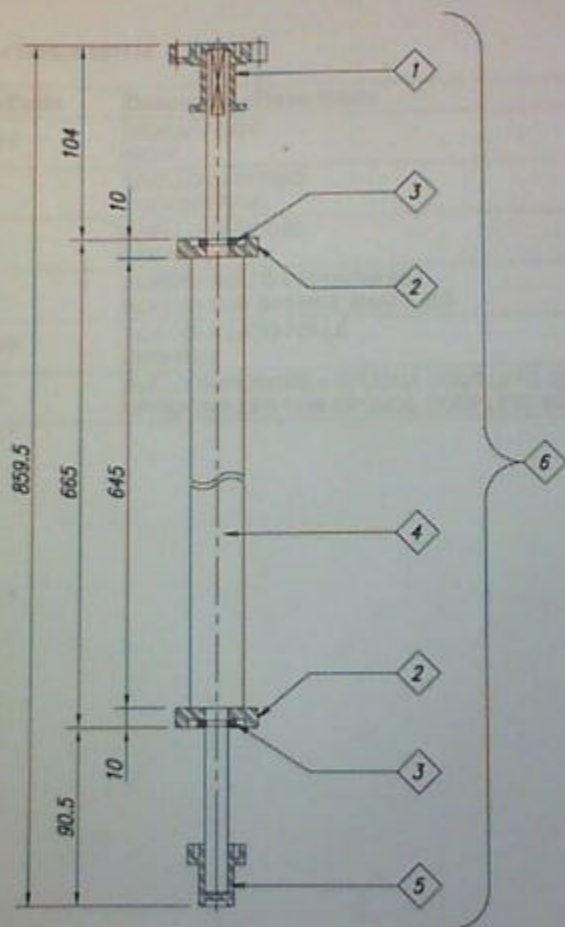
**Legenda/Legend DWG.MS32111**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/A4	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	296022/PF	INGRANAGGIO GEAR
8	016092	RULLO ROTELLE SUPERIORE COMPLETO 650 UPPER WHEELS ROLLER COMPLETE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../T1	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

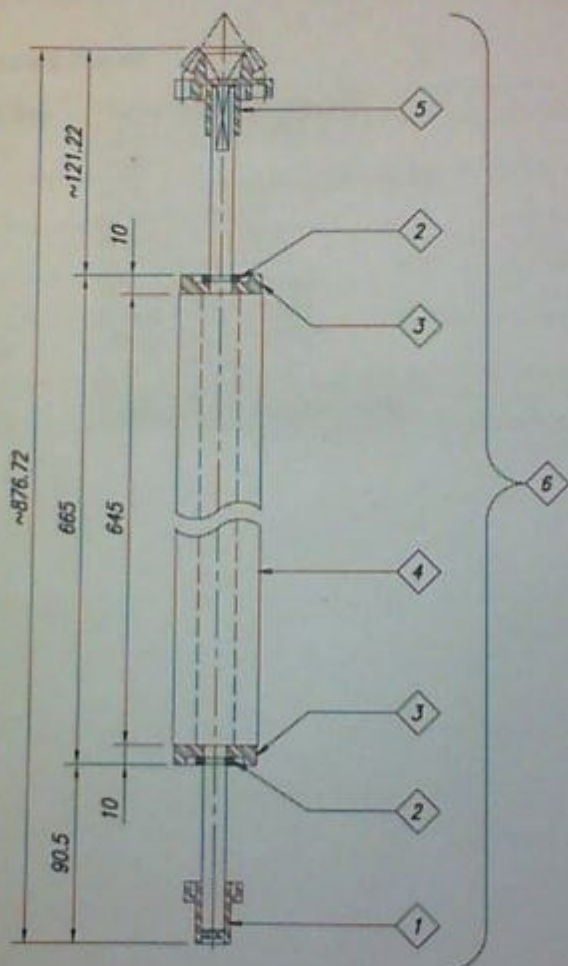




.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

**Legenda/Legend DWG.MS32116**

Pos.	Codice/Code	Descrizione/Description
1	296022/PF	INGRANAGGIO GEAR
2	036010	ANELLO DI FERMO LOCKING RING
3	036009	ANELLO DI FERMO LOCKING RING
4	026177/--	ALBERO RULLO x SPUGNA 650 ROLLER FOR SPONGE SHAFT 650
5	076009/PF	BOCCOLA LATO FOLLE BUSHING
6	016109/--	RULLO SUPERIORE x SPUGNA COMPLETO 650 UPPER ROLLER FOR SPONGE COMPLETE 650

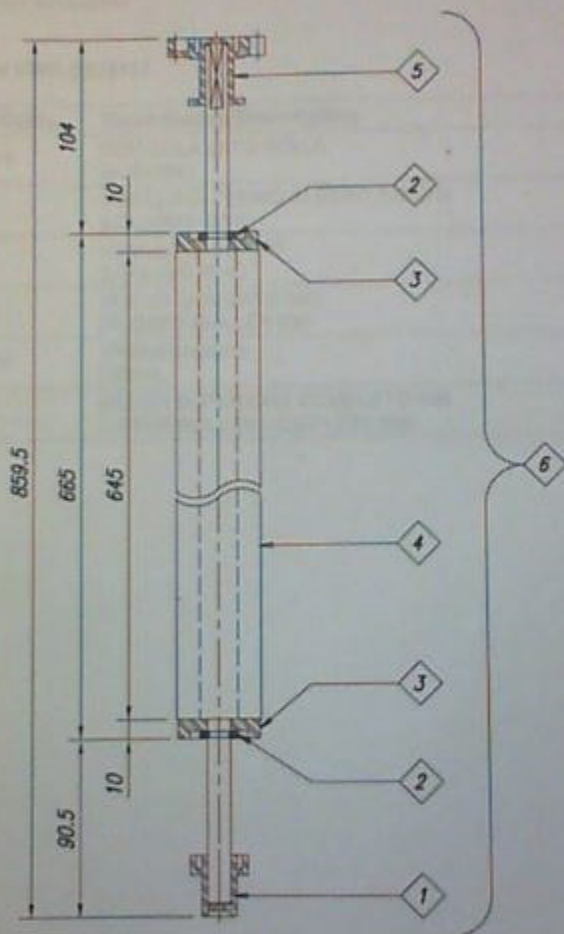


.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

Legenda/Legend DWG.ES34181

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
2	036010	ANELLO DI FERMO LOCKING RING
4	446093/--	RULLO GOMMATO 650 RUBBER ROLLER 650
5	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
6	016233/--	RULLO INFERIORE COMPLETO 650 LOWER ROLLER COMPLETE 650

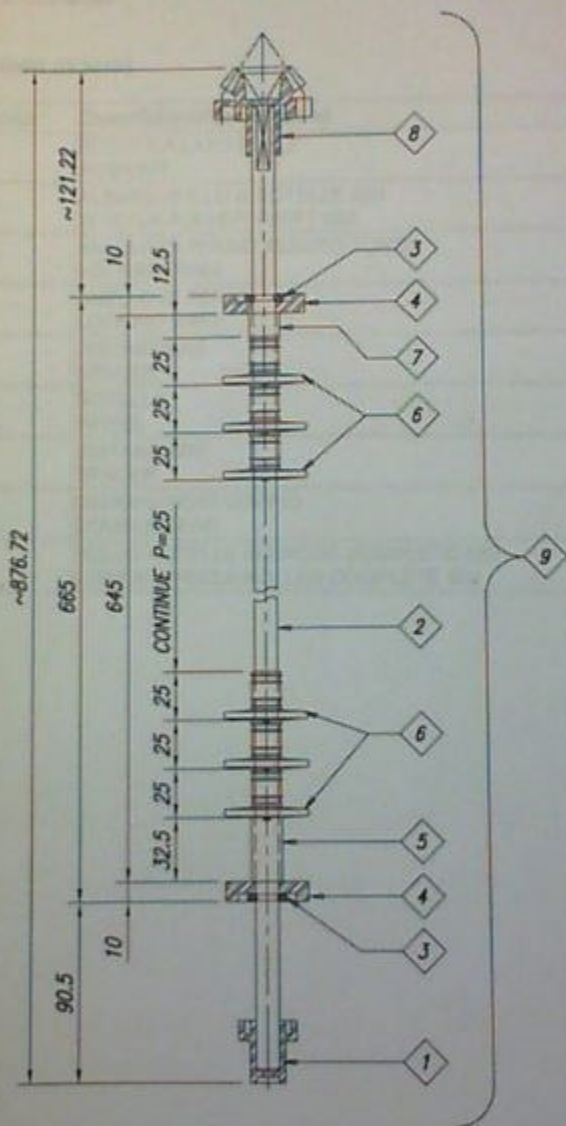




.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 6

**Legenda/Legend DWG.ES34183**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
3	036010	ANELLO DI FERMO LOCKING RING
4	446093/--	RULLO GOMMATO 650 RUBBER ROLLER 650
5	296022/PF	INGRANAGGIO GEAR
6	016234/--	RULLO SUPERIORE COMPLETO 650 UPPER ROLLER COMPLETE 650



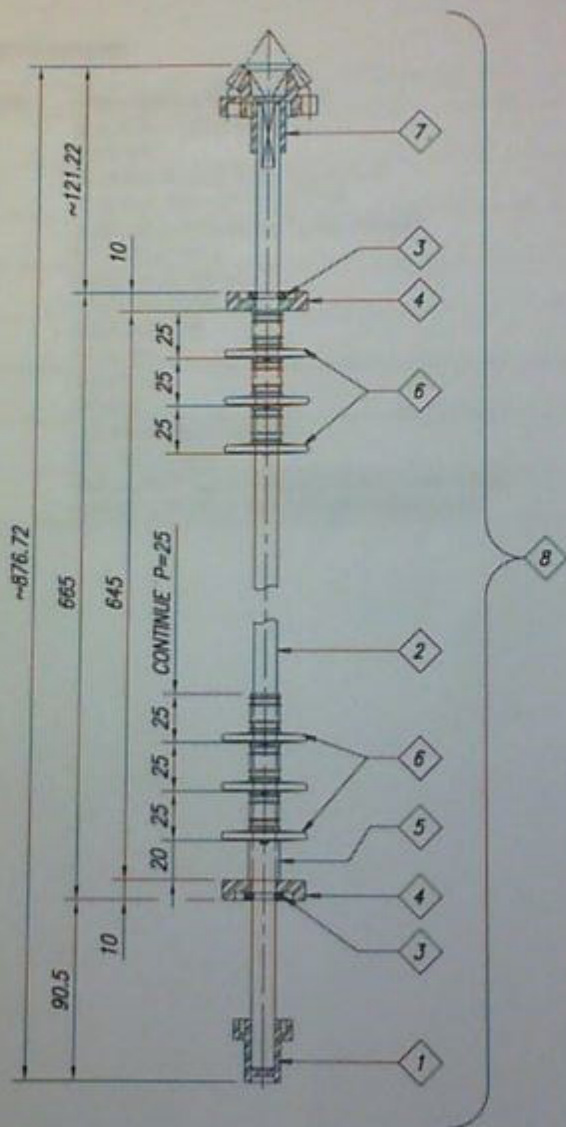
**Legenda/Legend DWG.ES34185**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016237	RULLO ROTELLE INERIORE COMPLETO 650 LOWER WHEELS ROLLER COMPLETE 650



Legenda/Legend DWG.ES34187

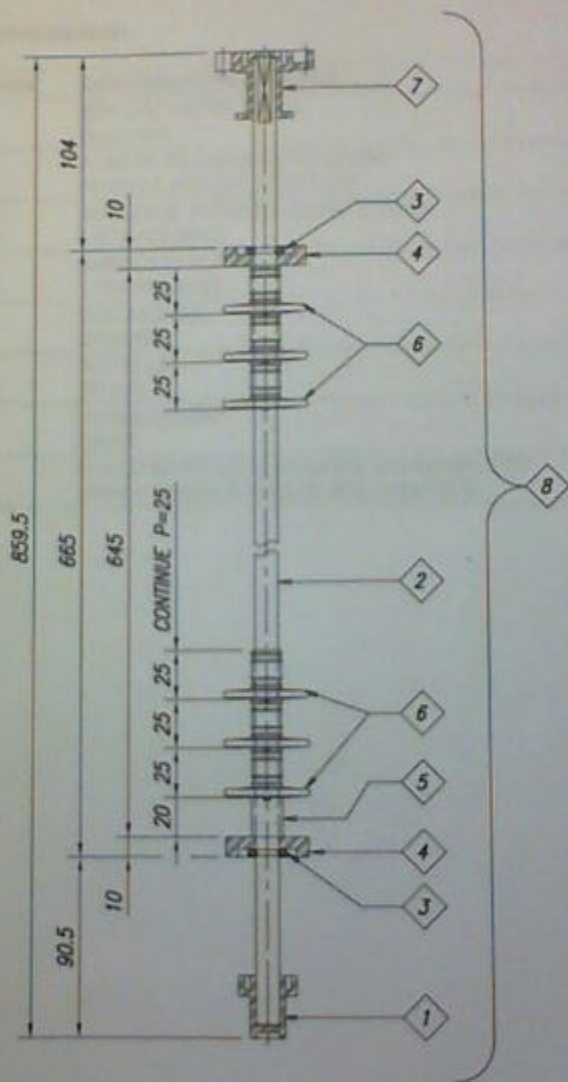
Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	296022/PF	INGRANAGGIO GEAR
9	016238	RULLO ROTELLE SUPERIORE COMPLETO 650 UPPER WHEELS ROLLER COMPLETE 650



Legenda/Legend DWG.ES34189

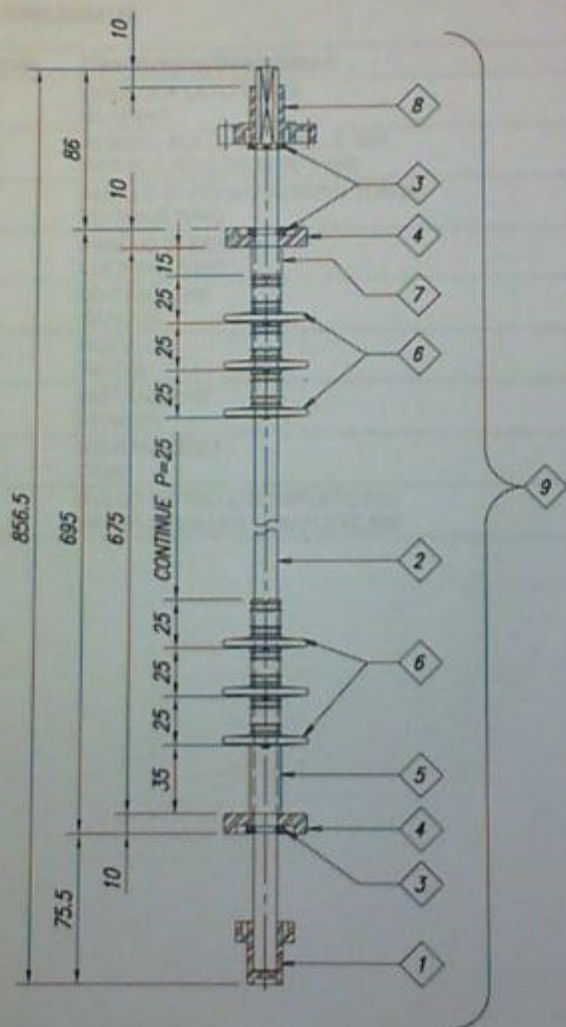
Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
8	016241	RULLO ROTELLE INFERIORE 650 COMPLETO LOWER WHEELS ROLLER 650 COMPLETE





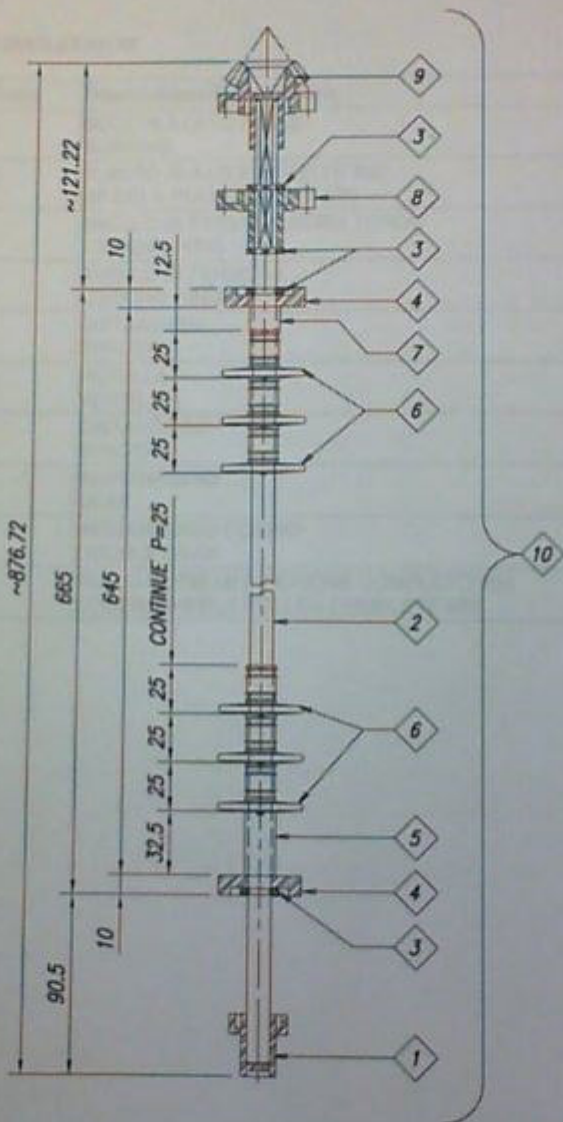
Legenda/Legend DWG.ES34191

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	296022/PF	INGRANAGGIO GEAR
8	016242	RULLO ROTELLE SUPERIORE 650 COMPLETO UPPER WHEELS ROLLER 650 COMPLETE



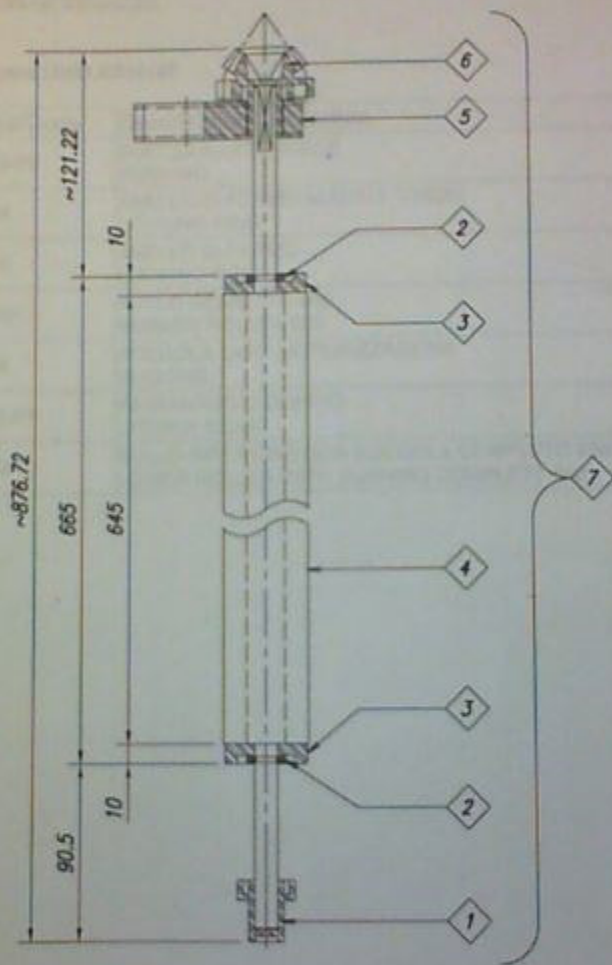
**Legenda/Legend DWG.ES34193**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026055/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176044	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176042	DISTANZIERE SPACER
8	296049/PF	INGRANAGGIO GEAR
9	016245	RULLO ROTELLE COMPLETO 650 WHEELS ROLLER COMPLETE 650



**Legenda/Legend DWG.ES34195**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026057/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	296049/PF	INGRANAGGIO GEAR
9	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
10	016247	RULLO ROTELLE INFERIORE COMPLETO 650 LOWER WHEELS ROLLER COMPLETE 650



.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 7

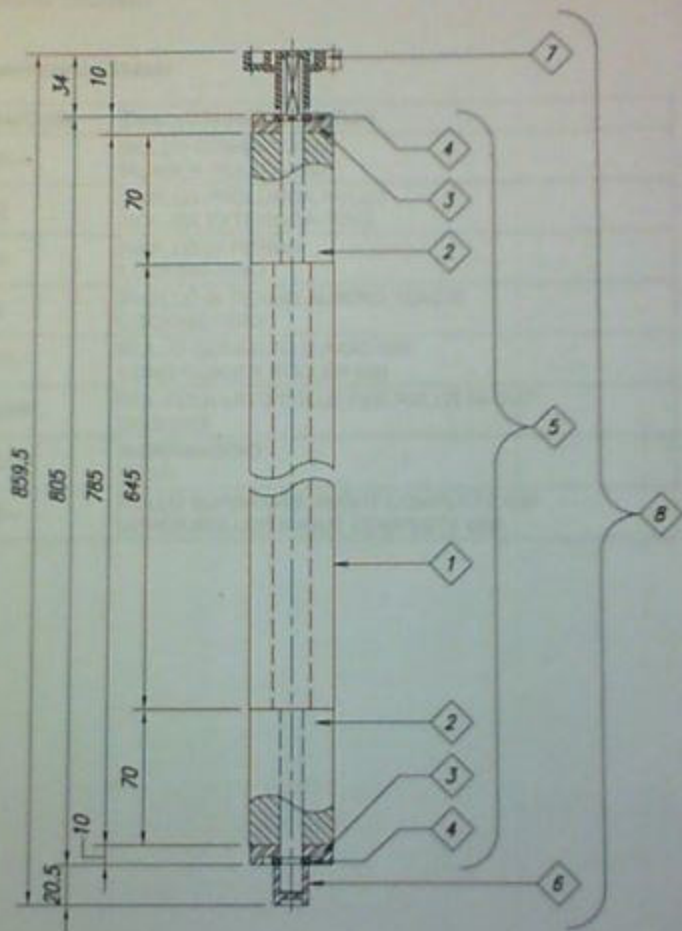
Legenda/Legend DWG.ES34197

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
3	036010	ANELLO DI FERMO LOCKING RING
4	446093/--	RULLO GOMMATO 650 RUBBER ROLLER 650
5	076058	BOCCOLA LATO MOTORIZZAZIONE BUSHING
6	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
7	016249/--	RULLO INFERIORE CON BOCCOLA COMPLETO 650 LOWER ROLLER WITH BUSHING COMPLETE 650



**Legenda/Legend DWG.ES34199**

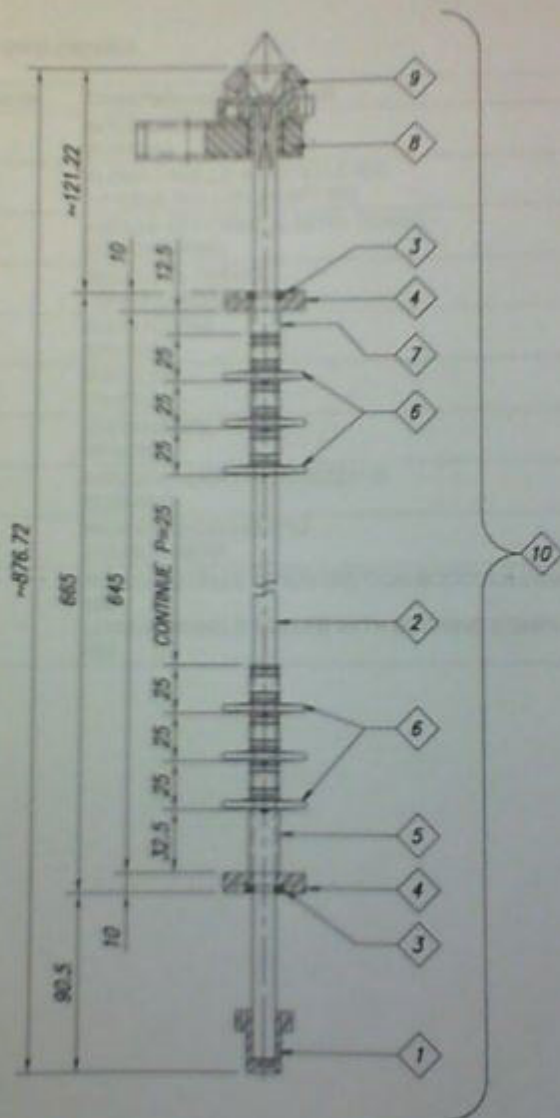
Pos.	Codice/Code	Descrizione/Description
1	446095/--	RULLO GOMMATO 650 RUBBER ROLLER 650
2	446082	ANELLO PROLUNGA RULLO ROLLER EXTENSION RING
3	036010	ANELLO DI FERMO LOCKING RING
4	036006	ANELLO DI FERMO ALBERO TONDO LOCKING RING
5	446097/--	RULLO GOMMATO LUNGO 650 LONG RUBBER ROLLER 650
6	076030/PF	BOCCOLA LATO FOLLE PER RULLO IN-OUT BUSHING
7	076058	BOCCOLA LATO MOTORIZZATO BUSHING
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016251/--	RULLO INFERIORE IN/OUT COMPLETO 650 LOWER ROLLER IN/OUT COMPLETE 650



.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1-5-8

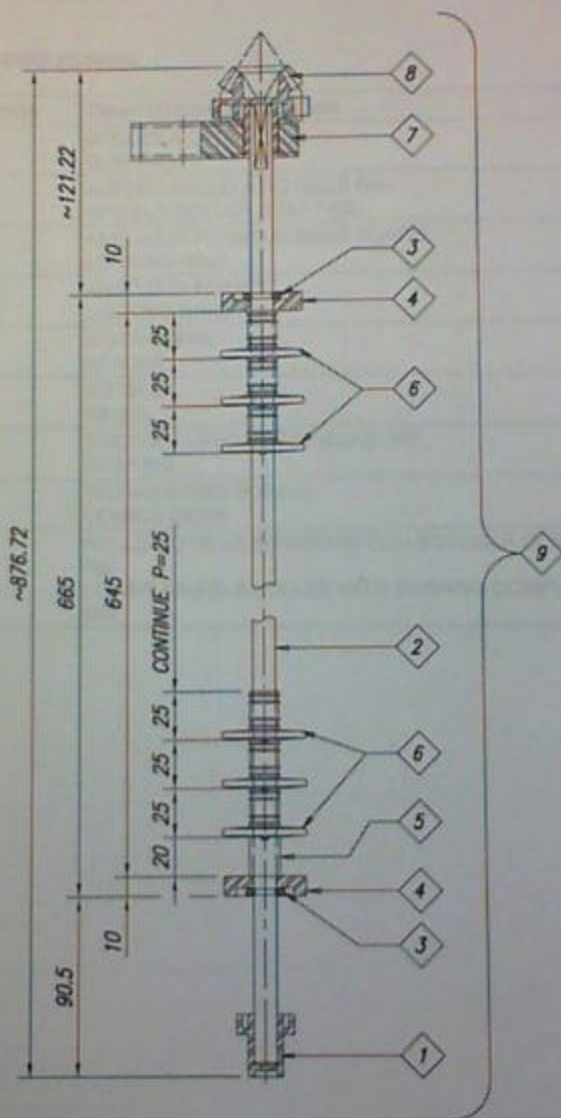
**Legenda/Legend DWG.ES34201**

Pos.	Codice/Code	Descrizione/Description
1	446095/--	RULLO GOMMATO 650 RUBBER ROLLER 650
2	446082	ANELLO PROLUNGA RULLO ROLLER EXTENSION RING
3	036010	ANELLO DI FERMO LOCKING RING
4	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
5	446097/--	RULLO GOMMATO LUNGO 650 LONG RUBBER ROLLER 650
6	076030/PF	BOCCOLA LATO FOLLE PER RULLO IN-OUT BUSHING
7	296103/PF	INGRANAGGIO GEAR
8	016252/--	RULLO SUPERIORE IN/OUT COMPLETO 650 UPPER ROLLER IN/OUT COMPLETE 650



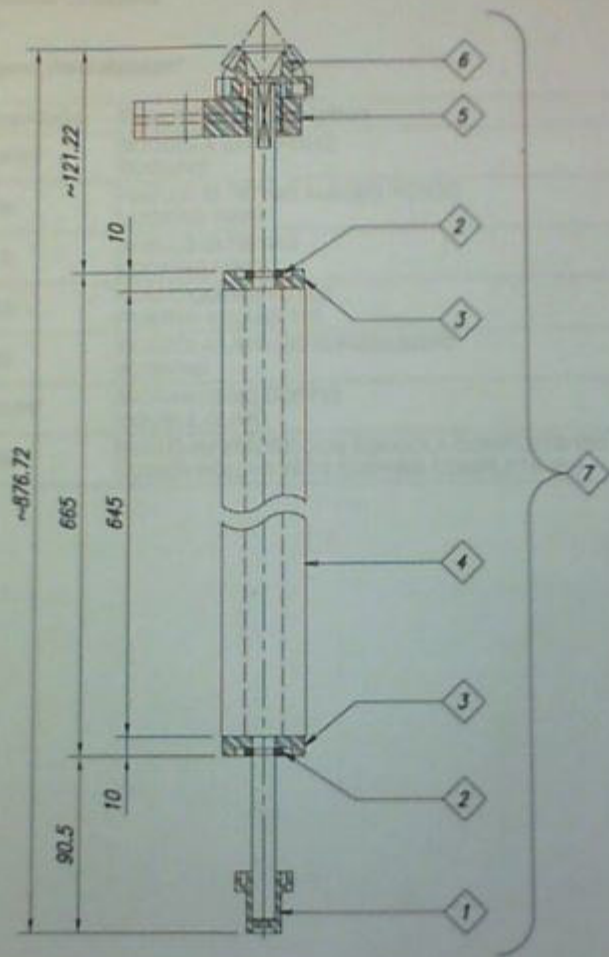
**Legenda/Legend DWG.ES34203**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	076058	BOCCOLA LATO MOTORIZZATO BUSHING
9	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
10	016255	RULLO ROTELLE INFERIORE CON BOCCOLA COMPLETO 650 LOWER WHEELS ROLLER WITH BUSHING COMPLETE 650



Legenda/Legend DWG.ES34205

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	076058	BOCCOLA LATO MOTORIZZAZIONE BUSHING
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016257	RULLO ROTELLE INFERIORE CON BOCCOLA COMPLETO 650 LOWER WHEELS ROLLER WITH BUSHING COMPLETE 650

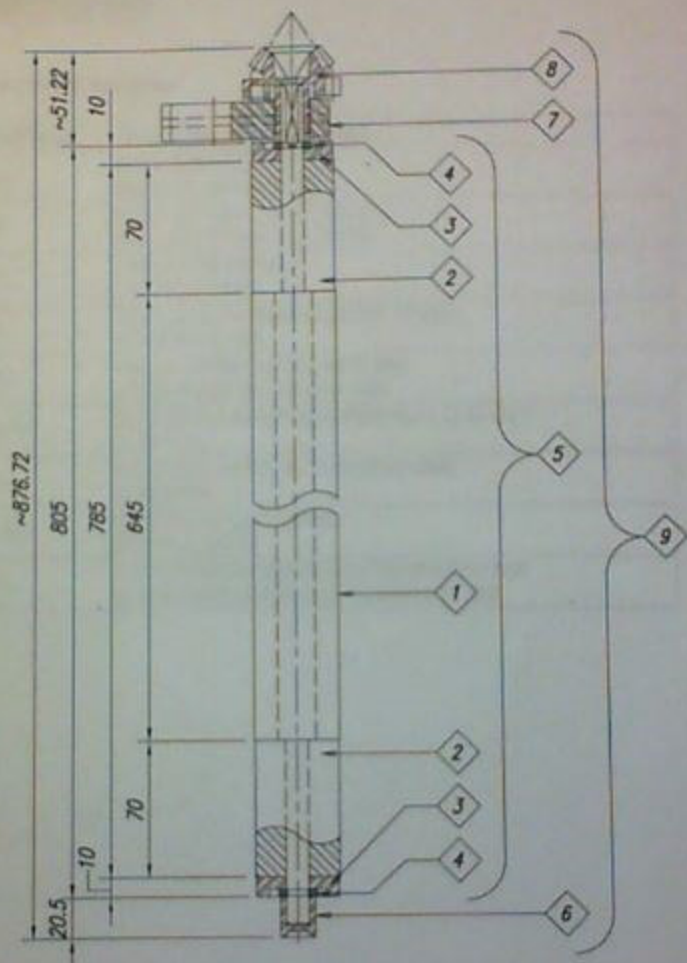


.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 4 AND 7



**Legenda/Legend DWG.MS34207**

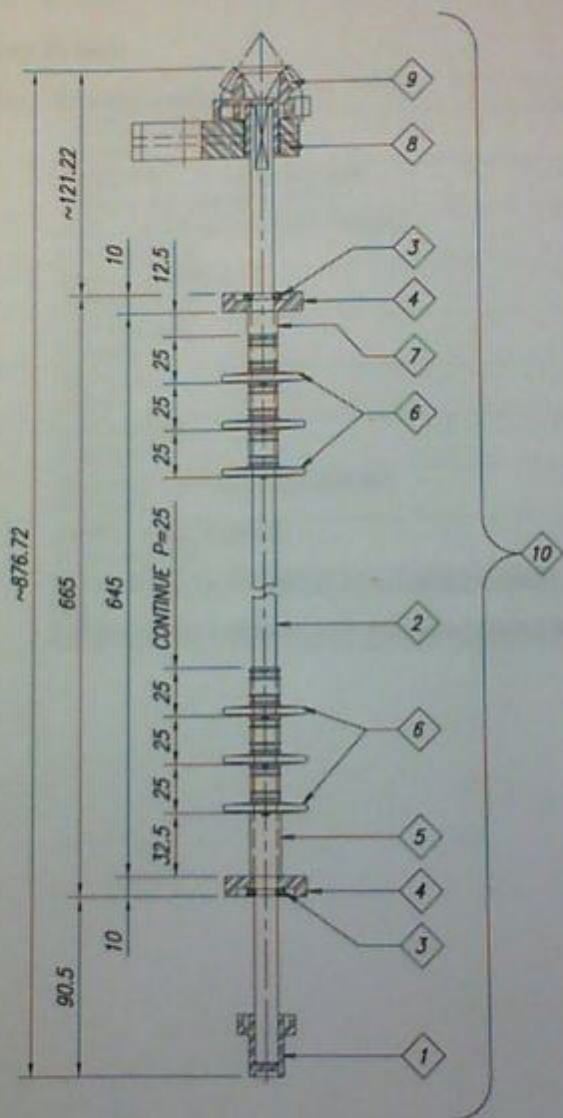
Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
3	036010	ANELLO DI FERMO LOCKING RING
4	446093/--	RULLO GOMMATO 650 RUBBER ROLLER 650
5	076063	BOCCOLA LATO MOTORIZZAZIONE BUSHING
6	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
7	016259/--	RULLO INFERIORE CON BOCCOLA COMPLETO 650 LOWER ROLLER WITH BUSHING COMPLETE 650



.../VI	VITON
.../TE	TEFLON
.../PP	POLYPROPYLENE
.../PE	POLYETHYLENE
.../EP	EPDM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1-5-9

**Legenda/Legend DWG.M534209**

Pos.	Codice/Code	Descrizione/Description
1	446095/-	RULLO GOMMATO 650 RUBBER ROLLER 650
2	446082	ANELLO PROLUNGA RULLO ROLLER EXTENSION RING
3	036010	ANELLO DI FERMO LOCKING RING
4	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
5	446097/-	RULLO GOMMATO LUNGO 650 LONG RUBBER ROLLER 650
6	076030/PF	BOCCOLA LATO FOLLE PER RULLO IN-OUT BUSHING
7	076063	BOCCOLA LATO MOTORIZZAZIONE BUSHING
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016261/-	RULLO INFERIORE IN/OUT COMPLETO 650 LOWER ROLLER IN/OUT COMPLETE 650



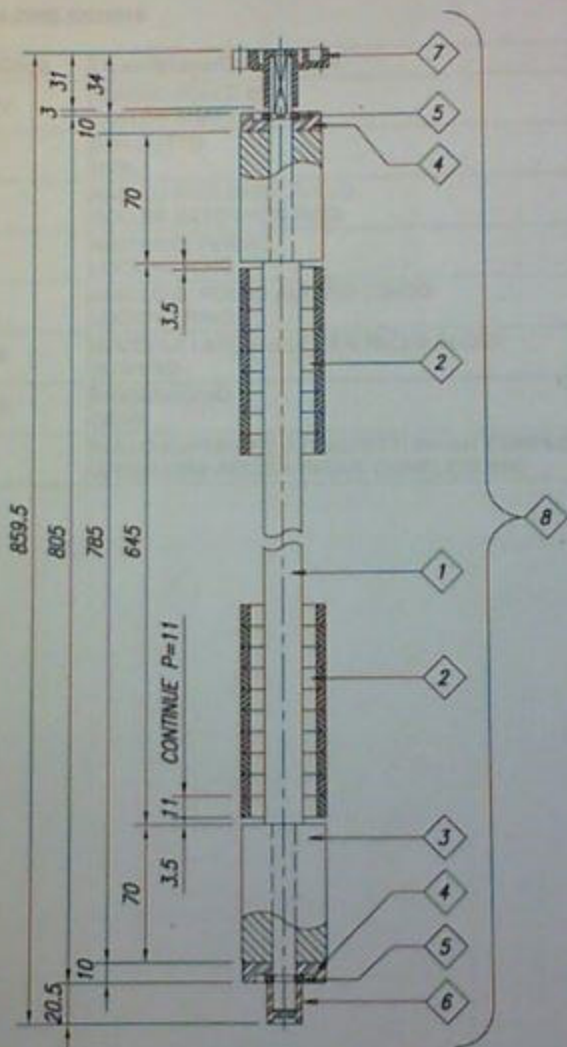
**Legenda/Legend DWG.MS34211**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176041	DISTANZIERE SPACER
8	076083	BOCCOLA LATO MOTORIZZAZIONE BUSHING
9	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
10	016263	RULLO ROTELLE INFERIORE CON BOCCOLA COMPLETO 650 LOWER WHEELS ROLLER WITH BUSHING COMPLETE 650



**Legenda/Legend DWG.MS34213**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO RULLO A ROTELLE 650 WHEELS ROLLER SHAFT 650
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176045	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	076063	BOCCOLA LATO MOTORIZZAZIONE BUSHING
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016265	RULLO ROTELLE INFERIORE CON BOCCOLA COMPLETO 650 LOWER WHEELS ROLLER WITH BUSHING COMPLETE 650





**Legenda/Legend DWG.ES34215**

Pos.	Codice/Code	Descrizione/Description
1	026344/FV	ALBERO RULLO 650 ROLLER SHAFT 650
2	576026	DISCHETTO DISK
3	446082	ANELLO PROLUNGA RULLO ROLLER EXTENSION RING
4	036010	ANELLO DI FERMO LOCKING RING
5	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
6	076030/PF	BOCCOLA LATO FOLLE PER RULLO IN-OUT BUSHING
7	296103/PF	INGRANAGGIO GEAR
8	016273	RULLO SUPERIORE A DISCHETTI IN/OUT COMPLETO 650 UPPER DISK ROLLER IN/OUT COMPLETE 650



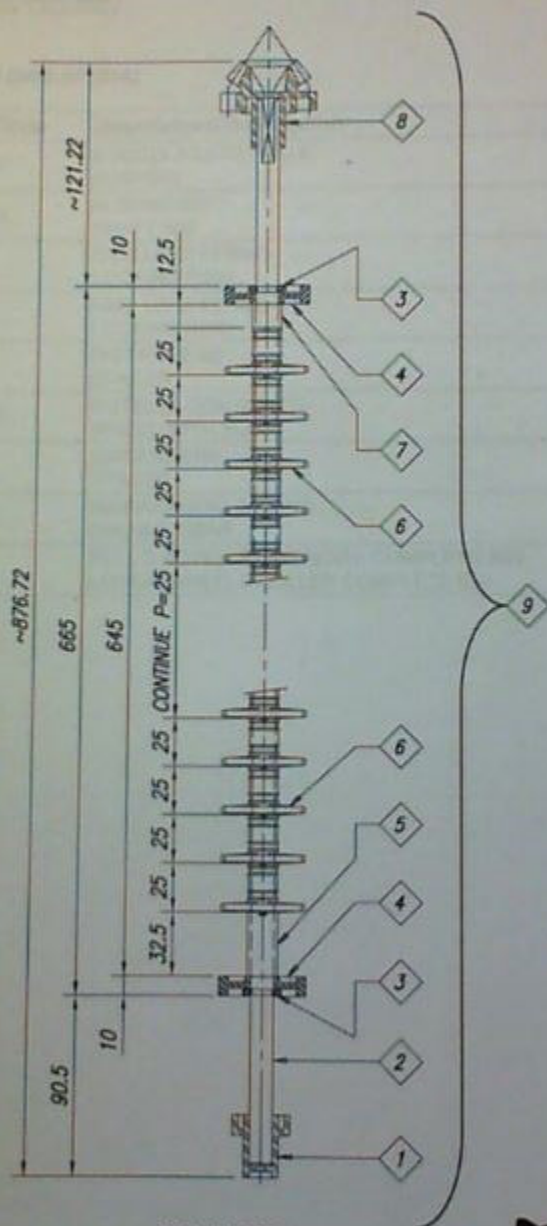
Legenda/Legend DWG.EP35140

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO 650 SHAFT 650
3	036009	ANELLO DI FERMO LOCKING RING
4	036049	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA CON MOZZO WHEEL WITH HUB
7	176041	DISTANZIERE SPACER
8	296022/PF	INGRANAGGIO GEAR
9	016312	RULLO ROTELLE SUPERIORE COMPLETO 650 UPPER WHEELS ROLLER COMPLETE 650



**Legenda/Legend DWG.EP35141**

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026400/FV	ALBERO 650 SHAFT 650
3	036009	ANELLO DI FERMO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176044	DISTANZIERE SPACER
6	576001/PP	ROTELLA CON MOZZO WHEEL WITH HUB
7	176042	DISTANZIERE SPACER
8	016317/FV	RULLO A ROTELLE COMPLETO 650 WHEEL ROLLER COMPLETE 650



## Legenda/Legend DWG.EP35142

Pos.	Codice/Code	Descrizione/Description
1	076009/PF	BOCCOLA LATO FOLLE BUSHING
2	026053/FV	ALBERO 650 SHAFT 650
3	036009	ANELLO DI FERMO LOCKING RING
4	036049	ANELLO DI FERMO LOCKING RING
5	176043	DISTANZIERE SPACER
6	576001/PP	ROTELLA CON MOZZO WHEEL WITH HUB
7	176041	DISTANZIERE SPACER
8	296021/PF	INGRANAGGIO DOPPIO DOUBLE GEAR
9	016311	RULLO ROTELLE INFERIORE COMPLETO 650 LOWER WHEELS ROLLER COMPLETE 650



**Manuale di Istruzioni  
Uso e Manutenzione**

**Operating Instructions  
and Maintenance Manual**

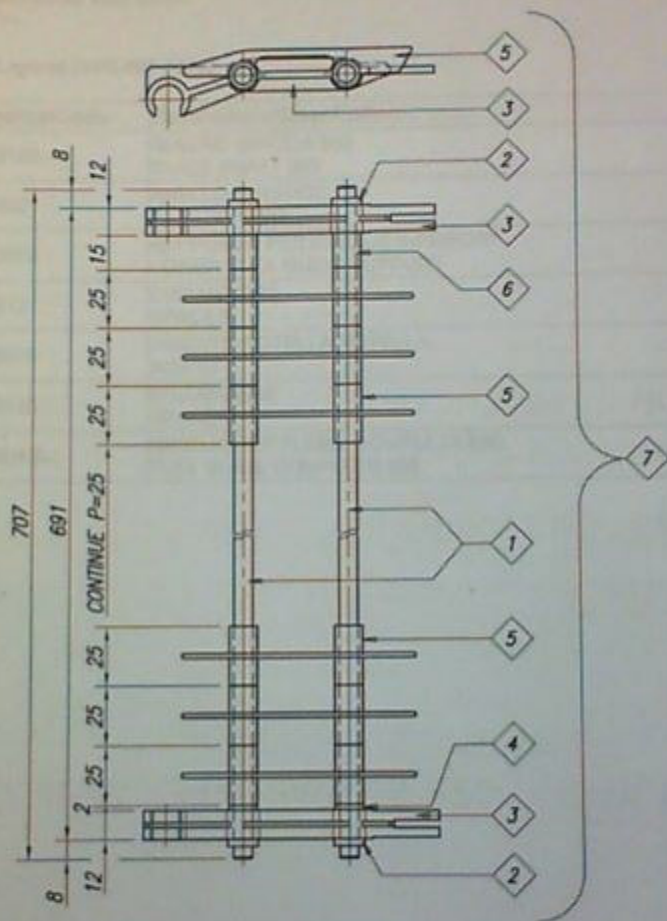
**Modulo/Module:  
GRIGLIE 650 / FLEX GUIDE 650**

**Data/Date: 10-05**

Codice del Manuale  
Manual code

420-650-10-05





.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

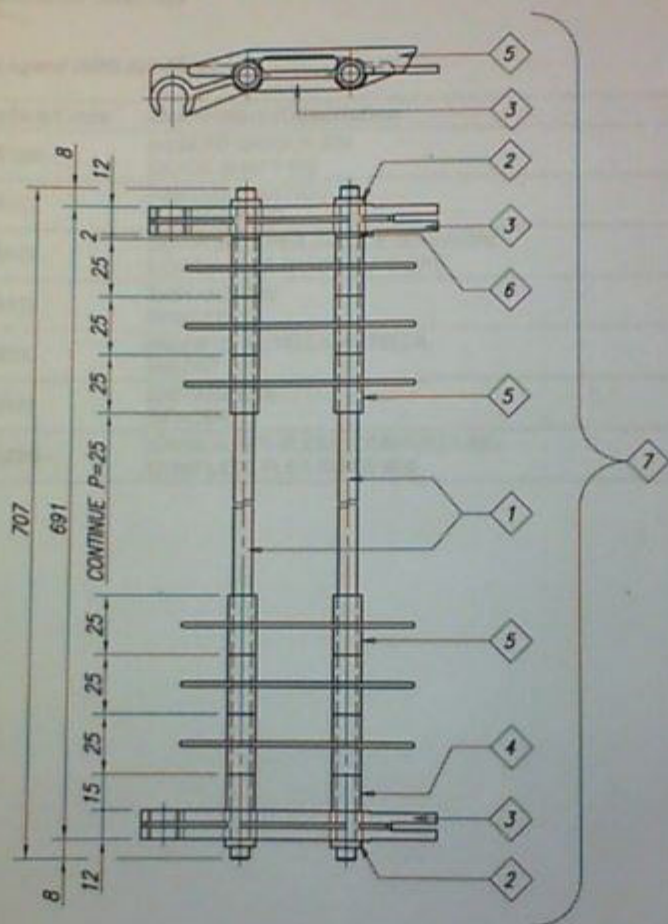
Legenda/Legend DWG.420-30457

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256003	INSERTO ROTELLA-ROTELLA INSERT
6	176123	DISTANZIERE SPACER
7	256047/--	GRIGLIA PER FLESS. COMPLETA 650 FLEX GUIDE COMPLETE 650



**Legenda/Legend DWG.420-30459**

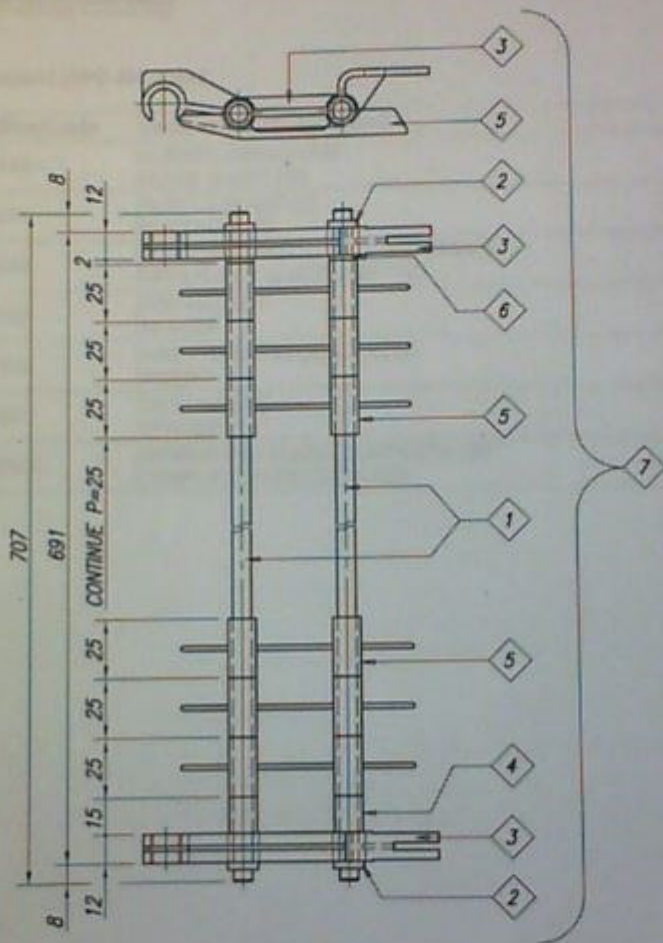
Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256003	INSERTO ROTELLA-ROTELLA INSERT
6	176123	DISTANZIERE SPACER
7	256049/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30461**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256003	INSERTO ROTELLA-ROTELLA INSERT
6	176121	DISTANZIERE SPACER
7	256051/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

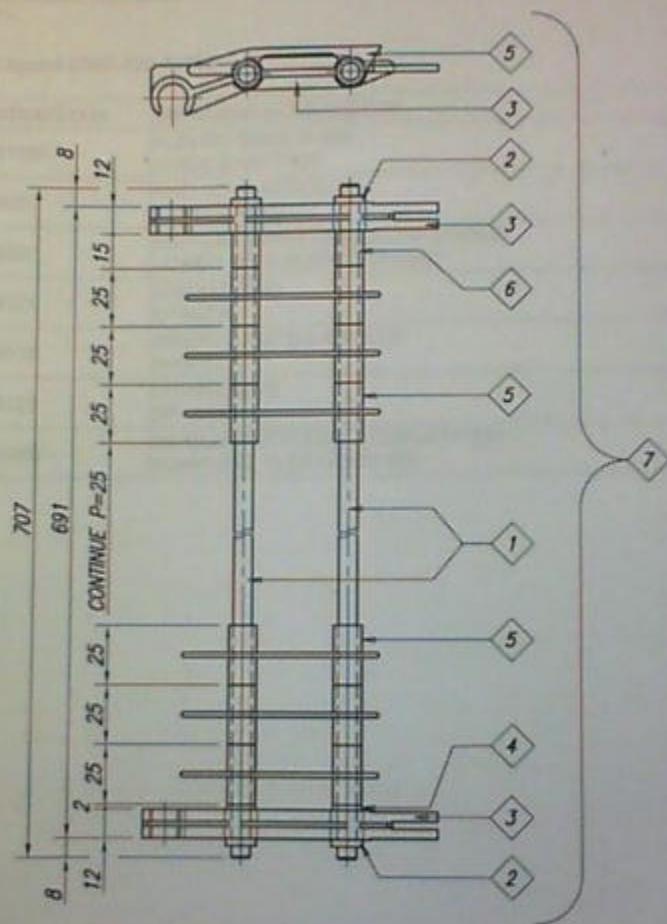


.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

Legenda/Legend DWG.420-30463

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256003	INSERTO ROTELLA-ROTELLA INSERT
6	176121	DISTANZIERE SPACER
7	256053/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

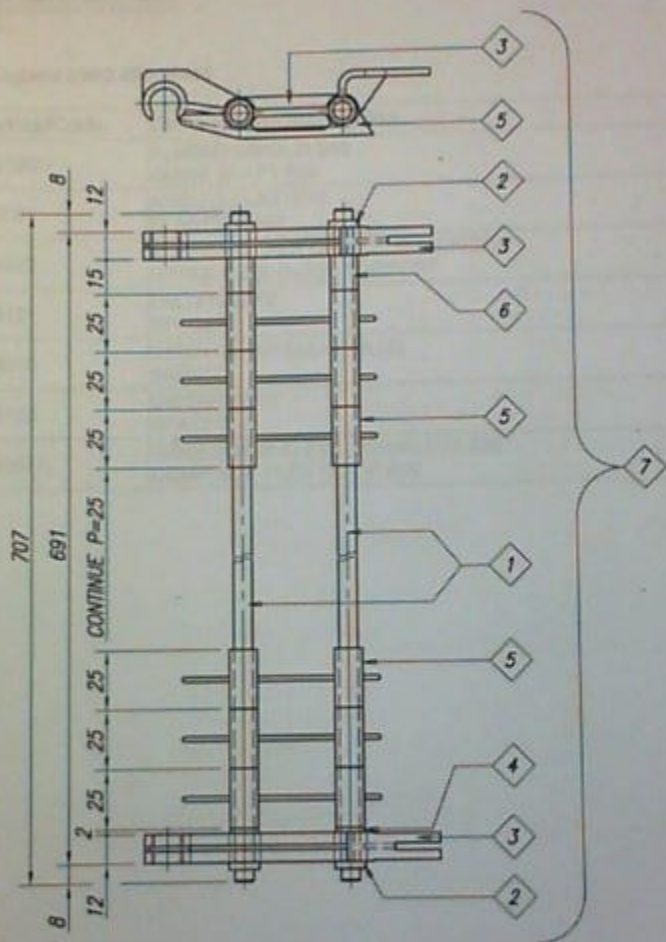




.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30466**

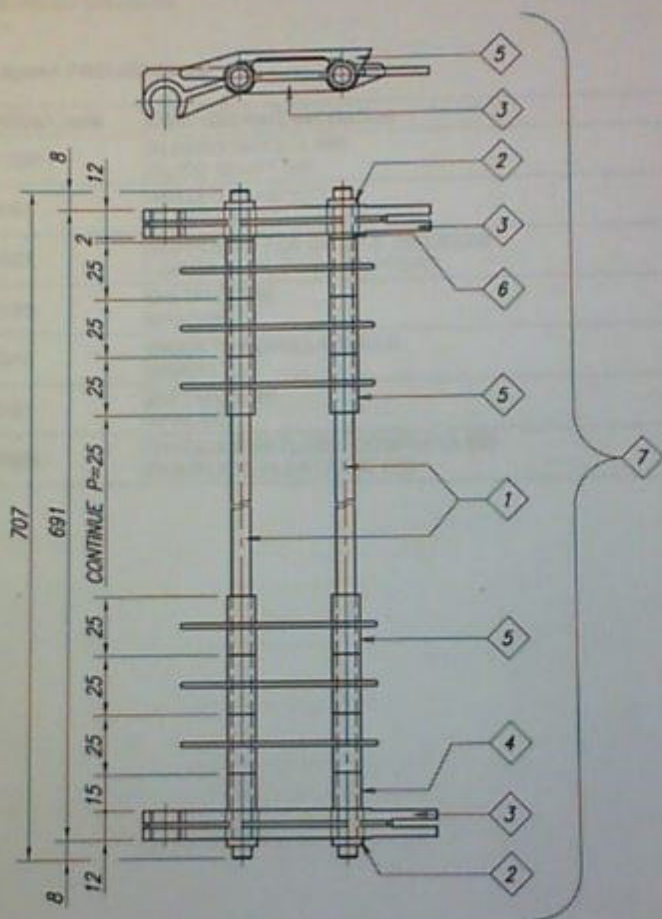
Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256010	INSERTO ROTELLA-RULLO INSERT
6	176123	DISTANZIERE SPACER
7	256055/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30468**

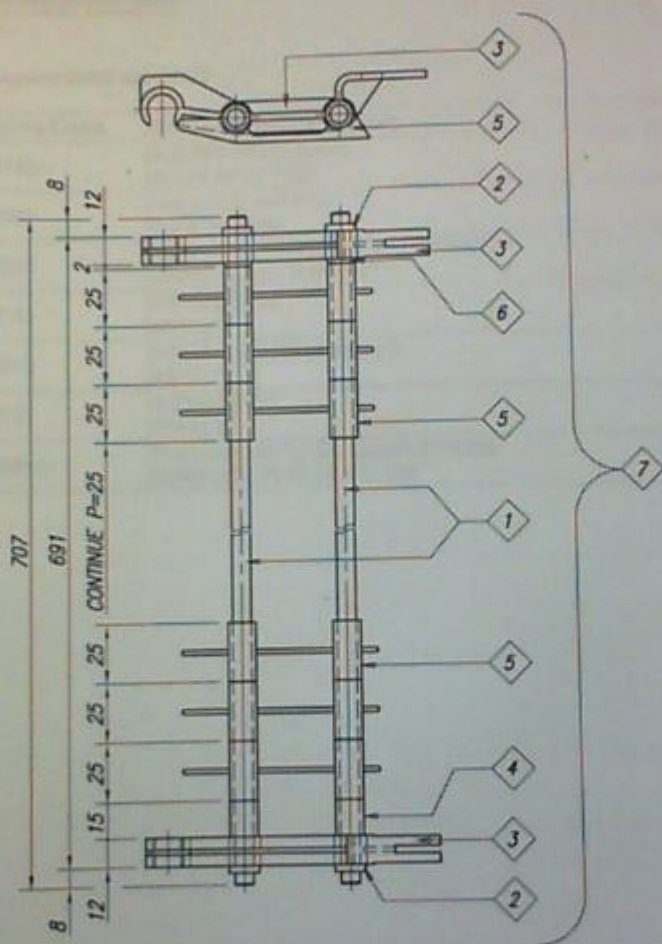
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1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256010	INSERTO ROTELLA-RULLO INSERT
6	176123	DISTANZIERE SPACER
7	256057/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30470**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256010	INSERTO ROTELLA-RULLO INSERT
6	176121	DISTANZIERE SPACER
7	256059/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

Legenda/Legend DWG.420-30472

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256010	INSERTO ROTELLA-RULLO INSERT
6	176121	DISTANZIERE SPACER
7	256061/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650





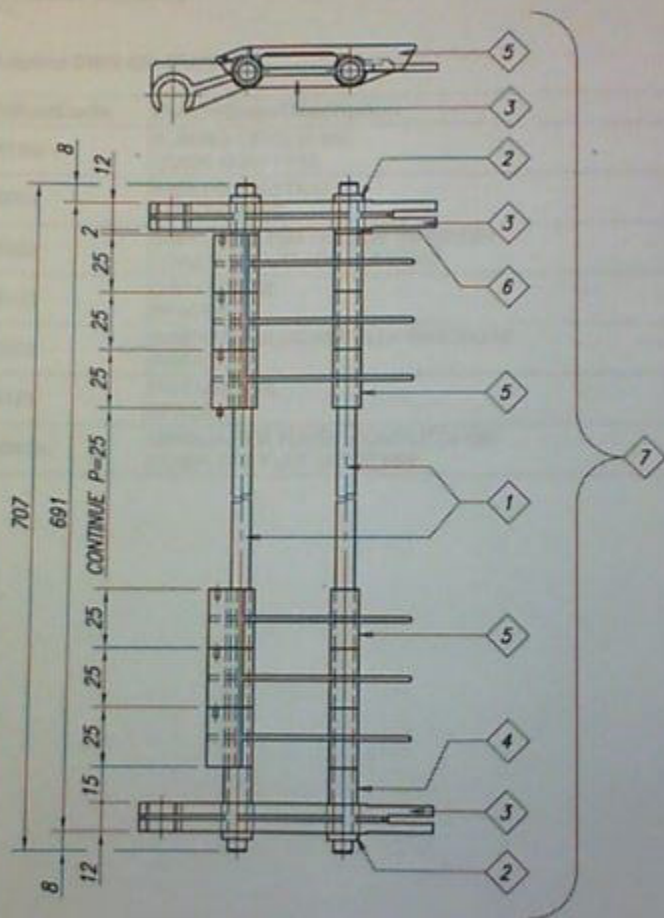
Legenda/Legend DWG.420-30474

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	048001	ANELLO ELASTICO ELASTIC RING
3	678022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256001	INSERTO RULLO-ROTELLA INFERIORE INSERT
6	176123	DISTANZIERE SPACER
7	256063/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



**Legenda/Legend DWG.420-30476**

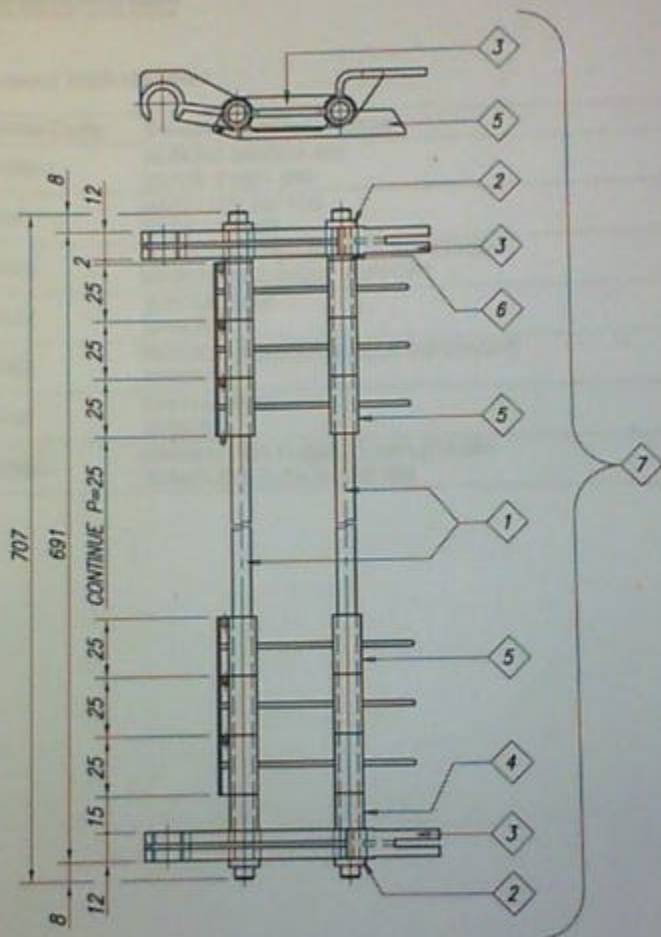
Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256002	INSERTO RULLO-ROTELLA SUPERIORE INSERT
6	176123	DISTANZIERE SPACER
7	256065/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

Legenda/Legend DWG.420-30478

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256001	INSERTO RULLO-ROTELLA INFERIORE INSERT
6	176121	DISTANZIERE SPACER
7	256067/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

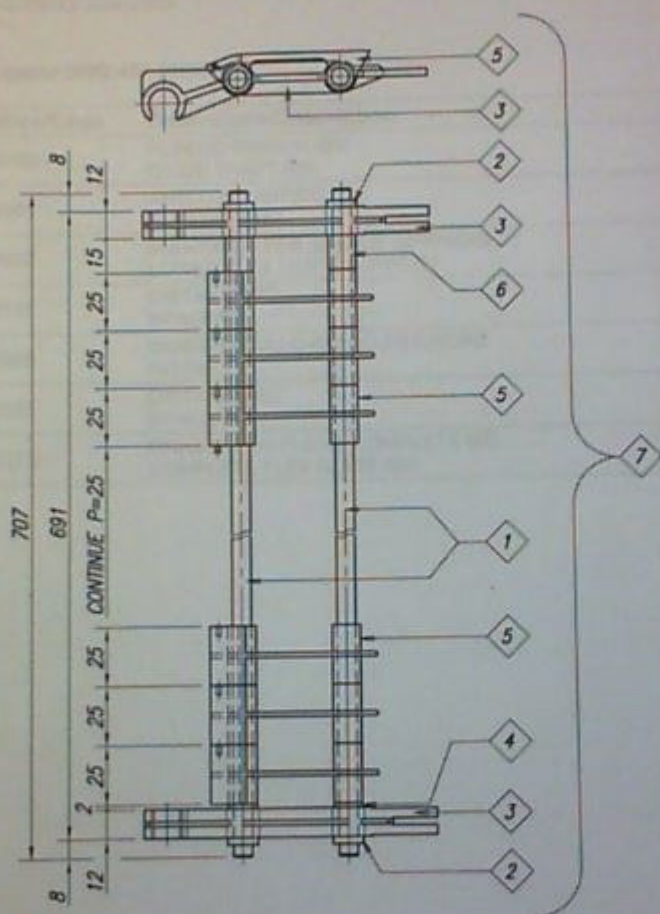


.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30480**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256002	INSERTO RULLO-ROTELLA SUPERIORE INSERT
6	176121	DISTANZIERE SPACER
7	256069/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

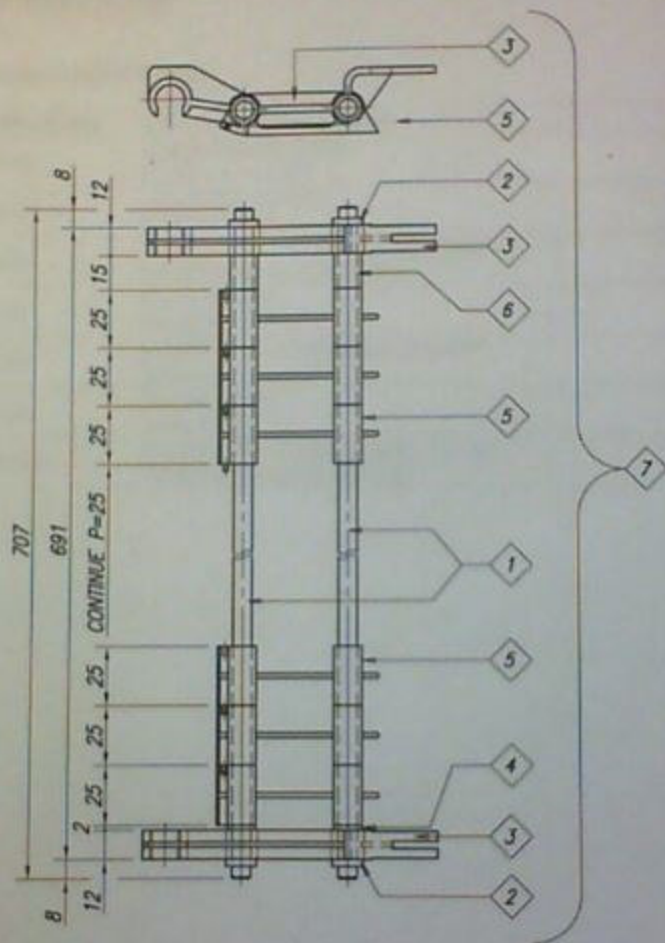




.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30483**

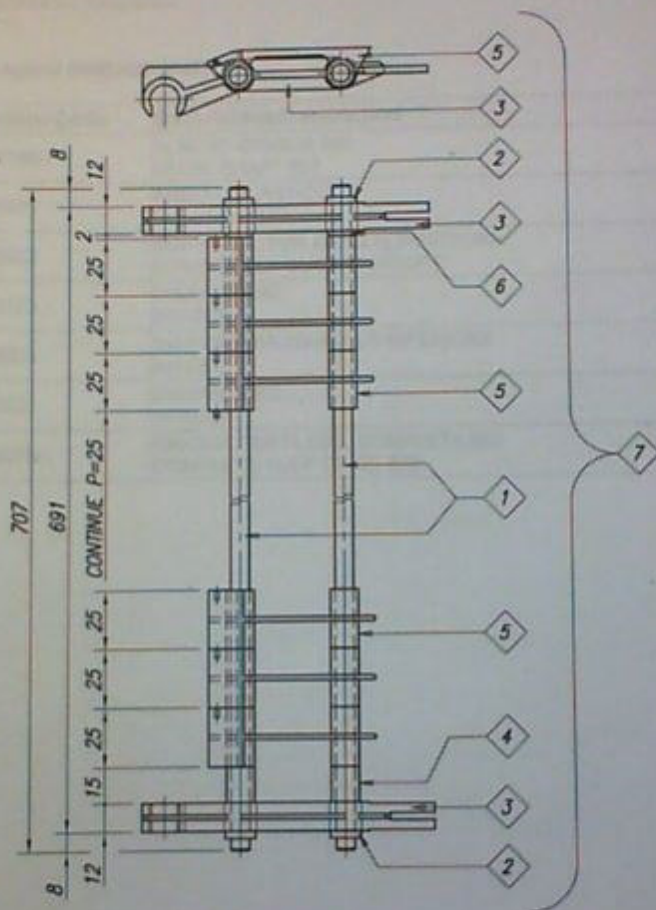
Pos.	Codice/Code	Descrizione/Description
1	028186/-	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	048001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256006	INSERTO RULLO-RULLO INFERIORE INSERT
6	176123	DISTANZIERE SPACER
7	256071/-	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30485**

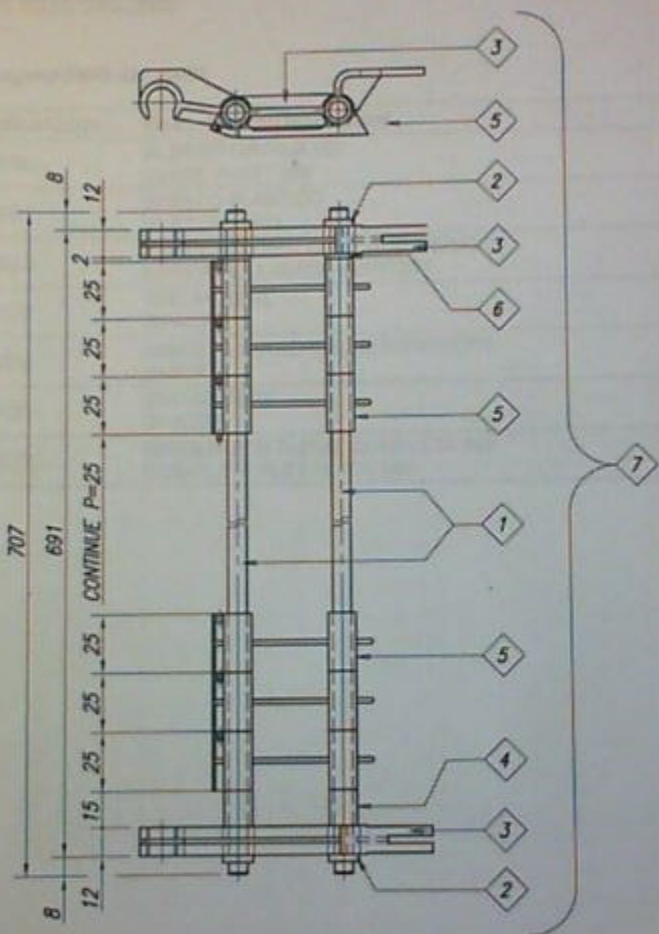
Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176121	DISTANZIERE SPACER
5	256009	INSERTO RULLO-RULLO SUPERIORE INSERT
6	176123	DISTANZIERE SPACER
7	256073/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30487**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676022	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256008	INSERTO RULLO-RULLO INFERIORE INSERT
6	176121	DISTANZIERE SPACER
7	256075/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

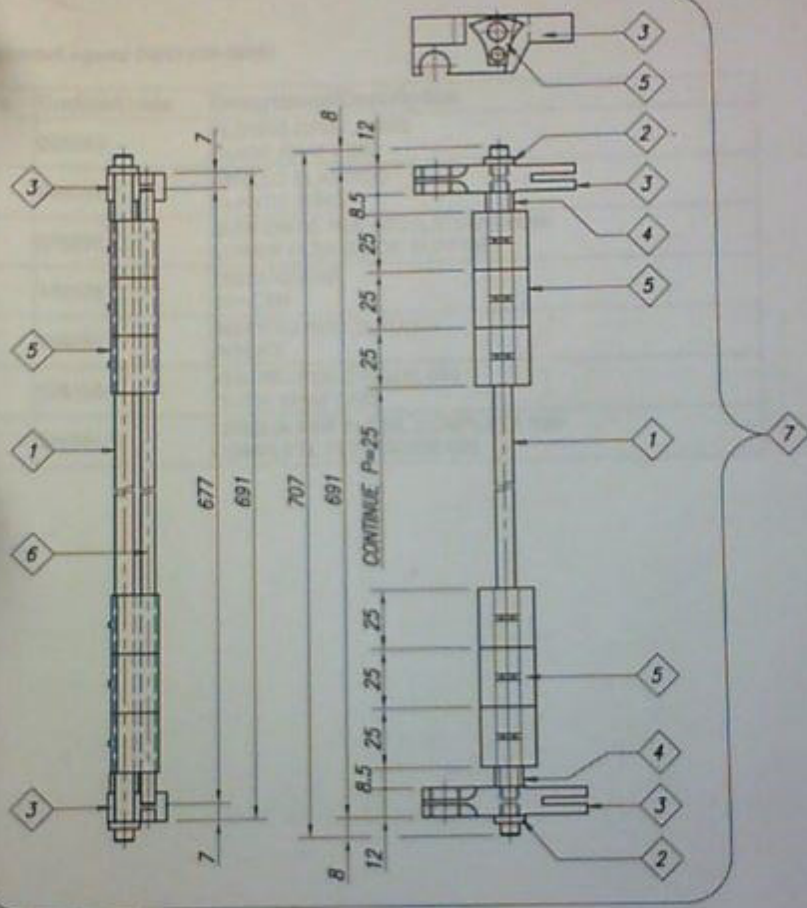


.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 7

**Legenda/Legend DWG.420-30489**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676023	SUPPORTO PER GRIGLIE SUPERIORI UPPER FLEX GUIDE SUPPORT
4	176123	DISTANZIERE SPACER
5	256009	INSERTO RULLO-RULLO SUPERIORE INSERT
6	176121	DISTANZIERE SPACER
7	256077/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650





.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1-6-7



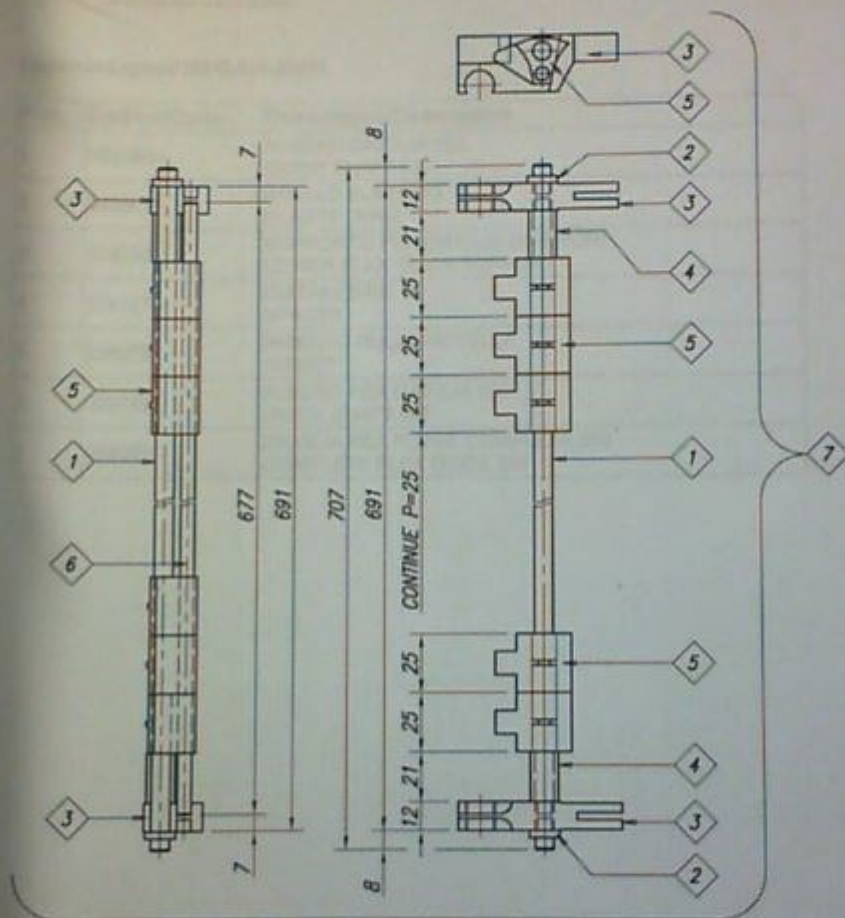
**Legenda/Legend DWG.420-30491**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676230	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176125	DISTANZIERE SPACER
5	256080	INSERTO RULLO-RULLO INSERT
6	026188/--	ALBERO PER GRIGLIA 650 GUIDE SHAFT 650
7	256081/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



**Legenda/Legend DWG.420-30493**

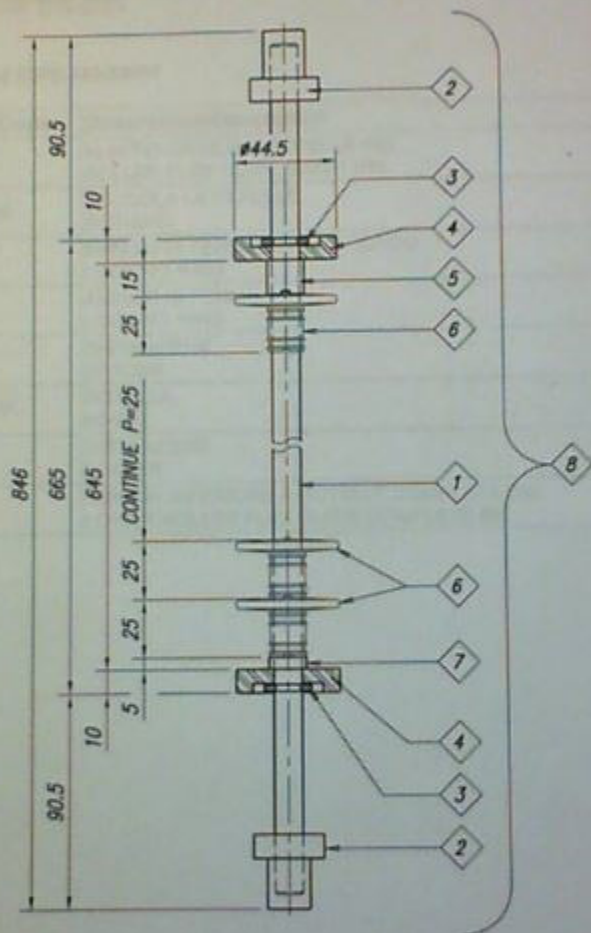
Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676230	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176127	DISTANZIERE SPACER
5	256079	INSERTO RULLO-ROTELLA INSERT
6	026188/--	ALBERO PER GRIGLIA 650 GUIDE SHAFT 650
7	256083/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650



.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1-6-7

**Legenda/Legend DWG.420-30495**

Pos.	Codice/Code	Descrizione/Description
1	026186/--	ALBERO GRIGLIA 650 GUIDE SHAFT 650
2	046001	ANELLO ELASTICO ELASTIC RING
3	676230	SUPPORTO PER GRIGLIE INFERIORI LOWER FLEX GUIDE SUPPORT
4	176127	DISTANZIERE SPACER
5	256079	INSERTO RULLO-ROTELLA INSERT
6	026188/--	ALBERO PER GRIGLIA 650 GUIDE SHAFT 650
7	256085/--	GRIGLIA PER FLESS. COMPLETA 650 COMPLETE FLEX GUIDE 650

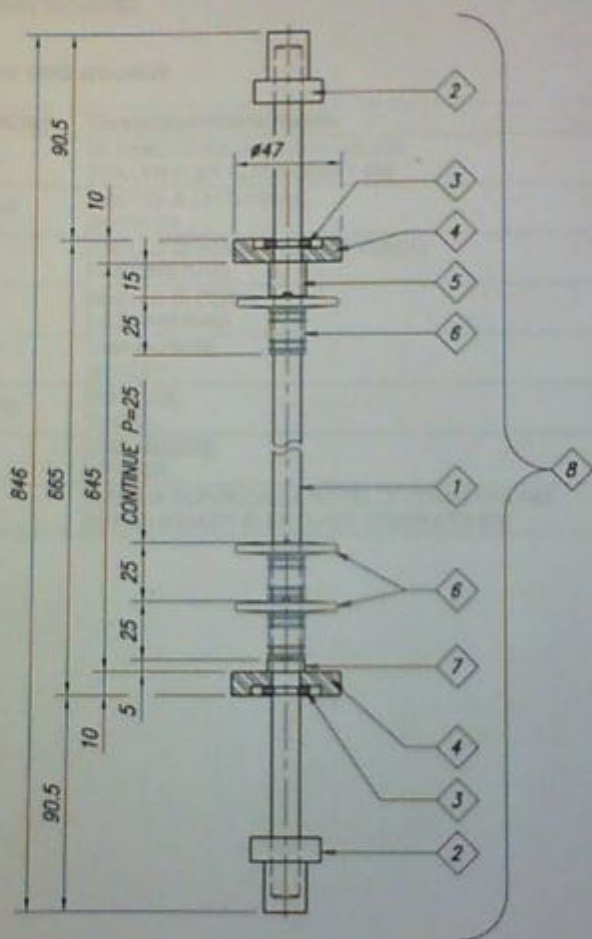


.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 8

**Legenda/Legend DWG.420-34037**

Pos.	Codice/Code	Descrizione/Description
1	026346/--	ALBERO GRIGLIA A ROTELLE 650 ROLLER FLEX GUIDE SHAFT 650
2	076009/PF	BOCCOLA LATO FOLLE BUSHING
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036010	ANELLO DI FERMO LOCKING RING
5	176042	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176207	DISTANZIERE SPACER
8	256215/--	GRIGLIA INFERIORE A ROTELLE COMPLETA 650 LOWER ROLLER FLEX GUIDE COMPLETE 650





.../FV	FIBER GLASS
.../FC	CARBON FIBER
.../A4	STAINLESS STEEL AISI 316
.../A2	STAINLESS STEEL AISI 304
.../TI	TITANIUM
REF.	MATERIAL SPECIFICATIONS FOR POSITIONS 1 AND 8

**Legenda/Legend DWG.420-34039**

<b>Pos.</b>	<b>Codice/Code</b>	<b>Descrizione/Description</b>
1	026346/--	ALBERO GRIGLIA A ROTELLE 650 ROLLER FLEX GUIDE SHAFT 650
2	076009/PF	BOCCOLA LATO FOLLE BUSHING
3	036009	ANELLO DI FERMO ALBERO TONDO LOCKING RING
4	036062	ANELLO DI FERMO LOCKING RING
5	176042	DISTANZIERE SPACER
6	576001/PP	ROTELLA WHEEL
7	176207	DISTANZIERE SPACER
8	256230/--	GRIGLIA SUPERIORE A ROTELLE COMPLETA 650 UPPER ROLLER FLEX GUIDE COMPLETE 650