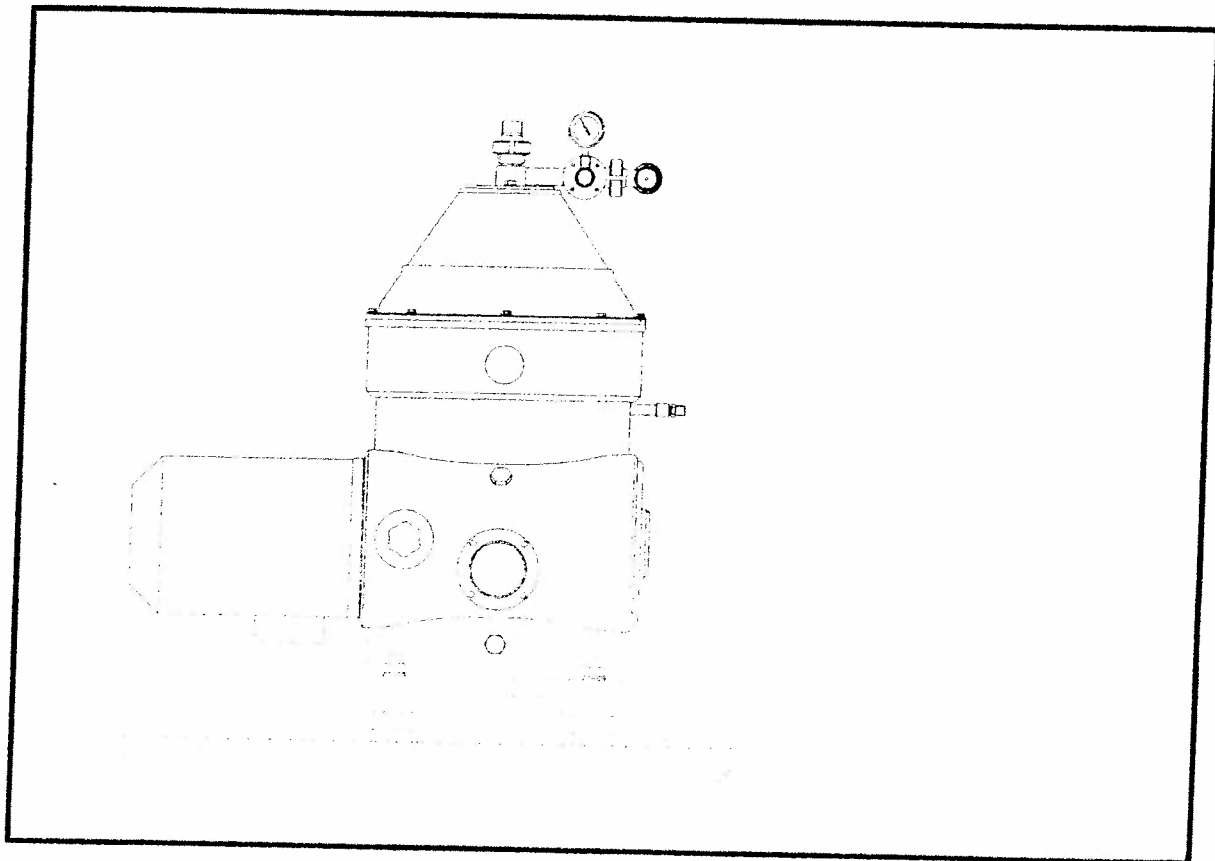




# SELF-CLEANING CENTRIFUGAL SEPARATOR SE 113TOV

## *USE AND MAINTENANCE MANUAL*



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## USE AND MAINTENANCE HANDBOOK

# Self-Cleaning Centrifugal Separator SE 113 TOV

## 1. HANDBOOK USE

### 1.1. How to read the Handbook

This handbook gives information for the installation, use and maintenance of centrifugal separator, model SE 113 TOV, for transformer oil purification.

The machine must be used in accordance with the Handbook specification: it is recommended to read it with great attention before installing and setting at work the machine, without leaving out anyone of the prescriptions reported and paying particular attention to the messages in the "text squares". The respect of the reported rules and recommendations permit a safe use and appropriate service.

The use and maintenance Handbook is an integrant part of the machine: it's necessary to conserve it complete and in a safe place during all the machine life, also when changing the machine user.

### 1.2. How to bring up-to-date the Handbook

It is recommended to bring constantly up-to-date this Handbook, integrating with eventual other amendments, additions or modifications coming from the manufacturer.

It's better that eventual annotations and remarks are inserted only in the space intentionally predisposed at the end of this Handbook.

**1.3. Handbook index**

<b>1. HANDBOOK USE</b>	<b>1-1</b>
1.1. HOW TO READ THE HANDBOOK .....	1-1
1.2. HOW TO BRING UP-TO-DATE THE HANDBOOK .....	1-1
1.3. HANDBOOK INDEX.....	1-2
<b>2. GENERAL INFORMATION</b>	<b>2-1</b>
2.1. MANUFACTURER AND MACHINE DATA .....	2-1
2.2. TECHNICAL SERVICE .....	2-1
2.3. GLOBAL ASPECTS OF SAFETY .....	2-1
2.3.1. INSTALLATION.....	2-1
2.3.2. WARNINGS FOR THE OPERATORS .....	2-1
2.3.3. MAINTENANCE PROGRAMS .....	2-2
2.3.4. INVOLVED OPERATORS AND TECHNICIANS .....	2-2
2.3.5. MAIN WORKING MODES.....	2-2
2.3.6. FORESEEABLE ERRORS AND INCORRECT BEHAVIOURS .....	2-3
2.3.7. LIST OF USED SYMBOLS AND WARNINGS.....	2-3
2.3.8. SAFETY PRESCRIPTIONS .....	2-3
2.4. USED TERMS AND ABBREVIATIONS .....	2-6
2.5. RESPONSIBILITY.....	2-6
<b>3. MACHINE DESCRIPTION</b>	<b>3-1</b>
3.1. GENERAL DESCRIPTION.....	3-1
3.2. OPERATING PRINCIPLES .....	3-1
3.3. TECHNICAL CARD.....	3-3
3.4. NOISE LEVEL .....	3-4
3.5. DESTINATION AND FORESEEN PLACE OF USE.....	3-4
3.6. IMPROPER USES AND CONTRA-INDICATIONS.....	3-4
<b>4. LIFTING, TRANSPORT, STORAGE</b>	<b>4-1</b>
4.1. MACHINE DELIVERY .....	4-1
4.2. PACKING AND UNPACKING .....	4-1
4.3. LIFTING AND TRANSPORT OF THE PACKED MACHINE .....	4-1
4.4. LIFTING AND TRANSPORT OF THE MACHINE WITHOUT PACKING.....	4-2
4.5. WAREHOUSE STORAGE .....	4-4
<b>5. INSTALLATION/PREPARATION TO START</b>	<b>5-1</b>
5.1. ENVIRONMENT .....	5-1
5.2. WORKING NECESSARY SPACE .....	5-2
5.3. EQUIPMENT .....	5-2
5.4. LOCATION AND ASSEMBLY ON PLACE .....	5-2
5.5. LUBRICATION .....	5-3
5.5.1. BEARINGS AND GEARS LUBRICATION.....	5-3
5.5.2. LUBRICATION OF THREADS AND CONTACT SURFACES OF THE BOWL PARTS.....	5-4
5.6. SYSTEMS CONNECTION .....	5-5
5.6.1. ELECTRICAL SYSTEM CONNECTION.....	5-5
5.6.2. HYDRAULIC CONNECTION FOR OPERATING WATER .....	5-6
5.6.3. SEPARATOR HYDRAULIC CONNECTION .....	5-7
5.6.4. PNEUMATIC SYSTEM CONNECTION.....	5-8

<b>6.</b>	<b>BOWL AND INLET-OUTLET FLOW UNIT</b>	<b>6-1</b>
6.1.	BOWL ASSEMBLY .....	6-1
6.2.	INLET-OUTLET FLOW UNIT ASSEMBLY .....	6-8
6.3.	ADJUSTMENT OF PUMP POSITION .....	6-11
6.4.	INLET-OUTLET FLOW UNIT DISASSEMBLY .....	6-11
6.5.	BOWL DISASSEMBLY .....	6-12
6.6.	BOWL VALVES .....	6-13
6.7.	HYDRAULIC SYSTEM FOR OPENING-CLOSING THE BOWL .....	6-15
6.8.	BOWL BLOCKING SYSTEM .....	6-17
<b>7.</b>	<b>MACHINE START</b>	<b>7-1</b>
7.1.	WARNINGS.....	7-1
7.2.	SAFETY SYSTEMS DESCRIPTION .....	7-1
7.2.1.	PROJECT DEVICES.....	7-1
7.2.2.	SHIELDS.....	7-1
7.2.3.	WARNING BILL-STICKINGS.....	7-1
7.3.	CONTROL, REGULATION AND SIGNALING DEVICES .....	7-3
7.3.1.	CONTROLS AND SIGNALS .....	7-3
7.3.2.	REGULATION DEVICES .....	7-4
7.4.	FUNCTIONAL STOP OF SEPARATOR.....	7-5
7.5.	EMERGENCY STOP .....	7-6
7.6.	ENERGY SOURCES DISCONNECTION .....	7-6
7.7.	PRELIMINARY CHECK.....	7-6
7.8.	STARTING UP INSTRUCTIONS .....	7-7
<b>8.</b>	<b>MACHINE USE</b>	<b>8-1</b>
8.1.	PERSONNEL TASKS.....	8-1
8.2.	SET-UP AND ADJUSTMENTS .....	8-1
8.2.1.	WARNINGS .....	8-1
8.3.	DISCHARGE CYCLE .....	8-2
8.4.	ORDINARY MAINTENANCE .....	8-4
8.5.	SEPARATOR CHEMICAL CLEANING.....	8-4
<b>9.</b>	<b>GEAR</b>	<b>9-1</b>
9.1.	DISASSEMBLY OF THE VERTICAL SHAFT (TAB. 06) .....	9-1
9.2.	ASSEMBLY OF THE VERTICAL SHAFT (TAB. 06).....	9-1
9.3.	DISASSEMBLY OF THE HORIZONTAL SHAFT (TAB. 07) .....	9-2
9.4.	ASSEMBLY HORIZONTAL SHAFT (TAB 07).....	9-2
<b>10.</b>	<b>MAINTENANCE</b>	<b>10-1</b>
10.1.	REMARKS .....	10-1
10.2.	CORRECTIVE AND PREVENTIVE MAINTENANCE .....	10-1
10.3.	TROUBLESHOOTING.....	10-3
<b>11.</b>	<b>DESACTIVATION RESALE</b>	<b>11-1</b>
11.1.	DISASSEMBLY SCRAPPING .....	11-1
11.2.	COMPONENTS AND MATERIALS ELIMINATION .....	11-1
11.3.	RESALE .....	11-1
<b>12.</b>	<b>SPARE PARTS</b>	<b>12-1</b>

**13. DRAWINGS AND DIAGRAMS**

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## 2. GENERAL INFORMATION

### 2.1. Manufacturer and machine data

Manufacturer: SEITAL S.r.l.  
Via delle Prese, 14  
36014 Santorso (VI) - ITALY  
tel. (++39) - 0445540232  
fax (++39) - 0445540214

Machine: Model SE 113 TOV  
Description: Machine for transformer oil purification.  
Type: Self-cleaning

Machine manufacturing N.: 101885  
Bowl manufacturing N.: T01536  
Manufacturing year: 2011

### 2.2. Technical service

The routine and extraordinary maintenance must be performed in accordance with the instructions of this Handbook. For the cases not considered and for every kind of assistance, it's recommended to directly contact the manufacturer with reference to the data reported on the plate fixed on the machine frame:

- Machine model
- Manufacturing N.
- Manufacturing year

The correct reference guarantees fast and precise answers.

In case the machine maintenance has been made not in conformity with the provided instructions, with not original spare parts or without written authorization of the manufacturer, or in a manner that compromise the integrity or modify the characteristics of the machine, SEITAL will consider itself exempted from every responsibility regarding people safety and the defective working of the machine. Every unauthorized intervention invalidates the guarantee contractually defined.

### 2.3. Global aspects of safety

This chapter describes the safety and prevention measures due to the user.

#### 2.3.1. Installation

For the installation and environmental cautions refer to Chapter 5.

#### 2.3.2. Warnings for the operators

The user is the responsible of the utilization of the operation manual in the following content:  
Read attentively the operation manual before using the machine for the first time, during the machine operation and maintenance, verifying their fitness to the required job.

### 2.3.3. Maintenance programs

For a machine correct working it's necessary to follow the use, cleaning and routine maintenance prescriptions, as well as the indications regarding preventive, corrective and scheduled maintenance reported at the § 10.2 of this Handbook.

### 2.3.4. Involved operators and technicians

List of the qualifications of employed personnel.

#### Simple operator

Perform the functions needed for the normal working of the machine:

- working efficiency control and adjusting by manual valves, good operation check;
- execution of cleaning cycle;
- interventions that involve small disassemblies, as gaskets replacements of external ducts, etc.;
- lubricant oil change and check.

#### Mechanical technician

He operates when relevant machine disassemblies are necessary or in case of an evident trouble. He performs every mechanical repair/regulation, but doesn't operate on electrical systems under voltage.

#### Electrician

He operates in every working condition and at every protection level. He performs every repair/regulation of electrical systems, also when voltage is present, respecting the specific safety standards.

### 2.3.5. Main working modes

#### Normal operation

Prescribed state:	Mounted shields, all safety devices connected.
Forbidden state:	Safety devices disconnected, supplies sectioned.
Type and number of employers:	one, operator.
Residual risks:	none

#### Extraordinary maintenance (mechanical intervention)

Prescribed state:	electrical supply sectioned and blocked,
Forbidden state:	supplies not sectioned.
Type and number of employers:	max. two, qualified mechanical technician.
Residual risks:	none.

#### Extraordinary maintenance (electrical intervention)

Prescribed state:	supplies not sectioned
Forbidden state:	electrician not qualified, removed shields, two operators
Type and number of employers:	one, qualified electrician.
Residual risks:	danger of electrocution due to normal voltage inside the electric panel.

### 2.3.6. Foreseeable errors and incorrect behaviours

To avoid eventual errors and/or mistakes, it's necessary that operating procedures and danger warnings reported in this Handbook, are well known from the whole personnel.

### 2.3.7. List of used symbols and warnings

The symbols used as stickers on the machine, to point out the dangers during use and maintenance are described at § 7.2.3.

In the following pages of the Handbook the relevant information regarding safety are shown into suitable square with the notice "ATTENTION".

#### ATTENTION

This notice want to recall the attention of the reader on danger zones or movements.

### 2.3.8. Safety prescriptions

In the following pages are indicated the important safety precautions to observe in machine use.

#### General prescriptions:

- a) Cure the operating space around the machine, which must be free from obstacles, clean and adequately lighted.
- b) Every machine intervention must be performed by authorized personnel and with the prescribed operators number.
- c) Eliminate every dangerous condition for safety before using the machine and always inform the maintenance responsible about any eventual working trouble.
- d) It is forbidden productive operation with safety devices disconnected or fixed shields removed.
- e) Do not let the machine with disassembled shields.
- f) It is forbidden any modification for adjustment of objects/devices not provided by the manufacturer. Use only SEITAL spare parts.
- g) **Do not execute weldings and flame heating on the bowl parts.**
- h) Never use the machine if damaged.
- i) To guarantee the safety and correct working of the separator, it must be connected only with power and control panel specifically supplied by SEITAL.
- j) In case power and control panel has not been supplied with separator SEITAL will consider itself exempted from every responsibility regarding people safety and the defective working of the machine.
- k) The electric panel must always be closed.
- l) The key to open electric panel must be entrusted to a specialized and learned person or to a responsible of the department in which the machine works
- m) Before initial start up, perform every check reported in § 7.2.1
- n) The maximum operating speed allowed for the bowl is 3000 rpm
- o) Never inspect or fix the separator with a bowl installed
- p) Never start the machine



- q) Always carry out chemical cleaning at the working end and, in case of long dwell, clean bowl carefully (see § 5.5.1).
- r) If unusual vibration occurs:
- increase immediately the liquid feed (product or water) to a maximum;
  - switch off the motor, but leave the program control on;
  - apply the brake;
  - after the bowl has stopped completely, dismantle, clean and check all parts carefully;
  - evaluate all the possible causes of troubles reported in § 10.3.6;
  - do not operate until the cause of vibration has been located and eliminated.

**ATTENTION**

Do not disassemble any part of the separator or of the inlet-outlet flow unit before the bowl is completely standstill.

CHECK THE BOWL MOTION STATE LOOKING THROUGH THE CIRCULAR SIGHT GLASS OBTAINED ON THE FRAME (see fig 2.1).

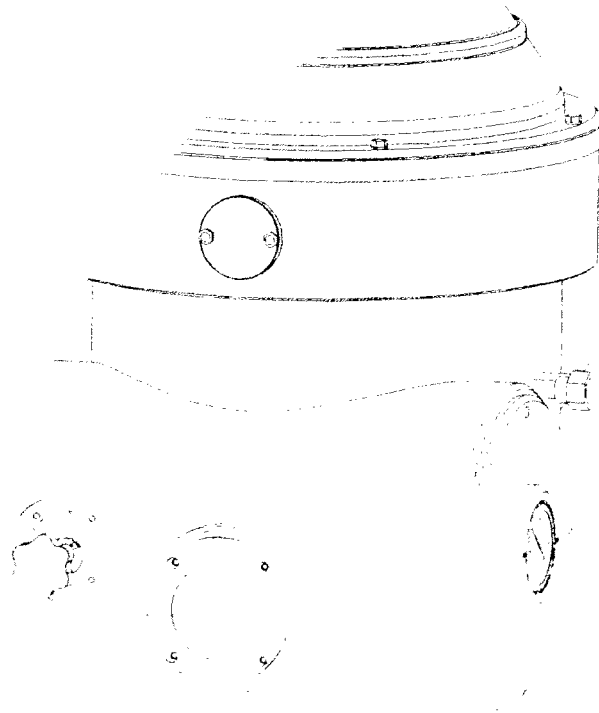


Fig. 2.1

Safety prescriptions for mechanical technician

- a) To prevent unbalances that can lead to serious damages, the user must follow the assembly with the most care and avoid shocks and stresses on the separator parts.
- b) After every maintenance intervention or regulation be sure that tools or other extraneous bodies in the machine moving parts, to avoid damages to the machine and/or troubles to the personnel.
- c) Do not allow to unauthorized personnel to work on the machine.
- d) Never insert the body, limbs or fingers in the articulated or sharp opening of machine parts without shields.
- e) Do not use gasoline or inflammable solvents like detergent, but always use authorized, not inflammable and not toxic commercial solvents.
- f) Periodically check the erosion/corrosion of the bowl and particularly of the following parts:
  - upper edge of moving ram,
  - nylon gasket in the bowl hood,
  - bowl wall portions near the product discharge holes in the bowl body.

Consult SEITAL SERVICE if one or more of the following observations are made after a deep check:

- the largest depth of the trace exceeds 1 mm,
- the bottom radius of the erosion trace is less than 1 mm in the narrowest point, or coarse scratches are present,
- defects presumably caused by corrosion are present.

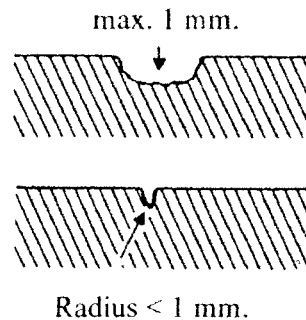


Figure 2.2

Safety prescriptions for the electrician

- a) Check efficiency of earthing connections and be sure they are realized in accordance with local regulations.
- b) Before every intervention on electrical components, verify the supply mains are disconnected.
- c) After every intervention on electric panel, close and block it with the door lock of the main switch, before connecting the mains supply and start the machine.
- d) In case of accident due to electric current immediately cut the supply to electric mains then disjoin the injured (usually he lose consciousness) from the parts under voltage. If this need an excessive time, drive away the injured using insulating material as a wood or pvc stick, cloth, leather.

**ATTENTION**

**Electrocution danger**

This procedure is dangerous, do not touch the injured means to be struck by lightning

#### 2.4. Used terms and abbreviations

The measurement units adopted in this Handbook are in conformity with the International System of measurement units SI.

Terms not used currently and present in this Handbook.

- Sludges: solid residuals obtained from separation process. They accumulate in the external part of the bowl called sludge chamber.
- Operating liquid: oil that fulfill the chamber under the moving ram and that, appropriately discharged by valves placed in the bowl body, permit the opening of the bowl and the sludge discharge.

#### 2.5. Responsibility

The non conformity to the instructions of this use and maintenance Handbook exempt the manufacturer from every responsibility.

For every date not included or deducible from the following pages, it's recommended to directly consult the manufacturer.

### **3. MACHINE DESCRIPTION**

#### **3.1. General description**

The SE 113 TOV is a centrifugal separator for transformer oil purification.

The machine is constituted by a cast-iron frame, painted or coated by stainless steel, on which are installed the following components:

- two shafts with a couple of helicoidal gears with orthogonal axes, a centrifugal clutch, ball bearings, etc.
- motor
- manual brake
- tachometer
- Plexiglas sight glass to check the movement of the gear (bowl) and to check the oil level
- bowl
- anular cyclone collecting the sludge discharge and the bowl protection cover
- inlet-outlet flow unit
- device for operating liquid injection in the bowl.

The supply includes also a set of special spanners for the bowl.

#### **3.2. Operating principles**

The product flows (fig 3.1) into the bowl through feed pipe (1) and into the distributor (2) it undergoes acceleration until it reaches the bowl rotating speed. The distributor (2) conveys the product to the disks stack (3) where the clarification takes place. The great number of disks divides the internal space of the bowl into many thin layers which make more efficient the cleaning. The clarified product flows through the disks stack and reach the upper chamber of the bowl. Here a fixed centripetal pump (4) conveys it under pressure to the outlet pipe line (5).

The separated solids are collected in the peripheral part of the bowl (6) and they are periodically and automatically discharged through the discharge holes (7) to maintain the required separation efficiency. The moving ram (8) is kept in the closed position by the pressure produced by the oil in the chamber (9). Injecting the oil (11) into the opening valve (10) the chamber (9) is emptied, the piston goes down and the solids are immediately ejected. By interrupting the oil (11) and injecting the closing oil (12) into the chamber (9), the moving ram goes back to the closed position.

By setting the timers it is possible to adjust the discharge quantity and the time between each discharge. Two automatic, independent operation cycles may be selected "separation/partial discharge" and "washing/partial discharge". The discharge of solids collected in the bowl does not involve the stopping of the separating process: actually it takes place at the rated revolving speed and without interrupting the product feeding. The ejected sediments are collected into an outer annular chamber where they are drained away by gravity through a pipe.

The cycle timing controls, as well the automatic closing of the bowl, during the starting up phase of the separator and allows the presetting for partial discharges manually controlled.

Bowl feeding is carried out through a closed pipe line with outlets of the product under pressure, by means of one centripetal pump and without seal gaskets between fixed parts and rotating parts. On inlet-outlet pipe lines are inserted valves and instrumentation necessary to control and regulate the separator (micrometric adjusting valves, butterfly valves, sanitary pressure gauge, sample cocks, etc.).

- 1 - Feed
- 2 - Distributor
- 3 - Disks stack
- 4 - Centripetal pump
- 5 - Clear product outlet
- 6 - Solids chamber
- 7 - Discharge holes
- 8 - Moving ram
- 9 - Closing chamber
- 10 - Opening valve
- 11 - Opening oil
- 12 - Closing oil

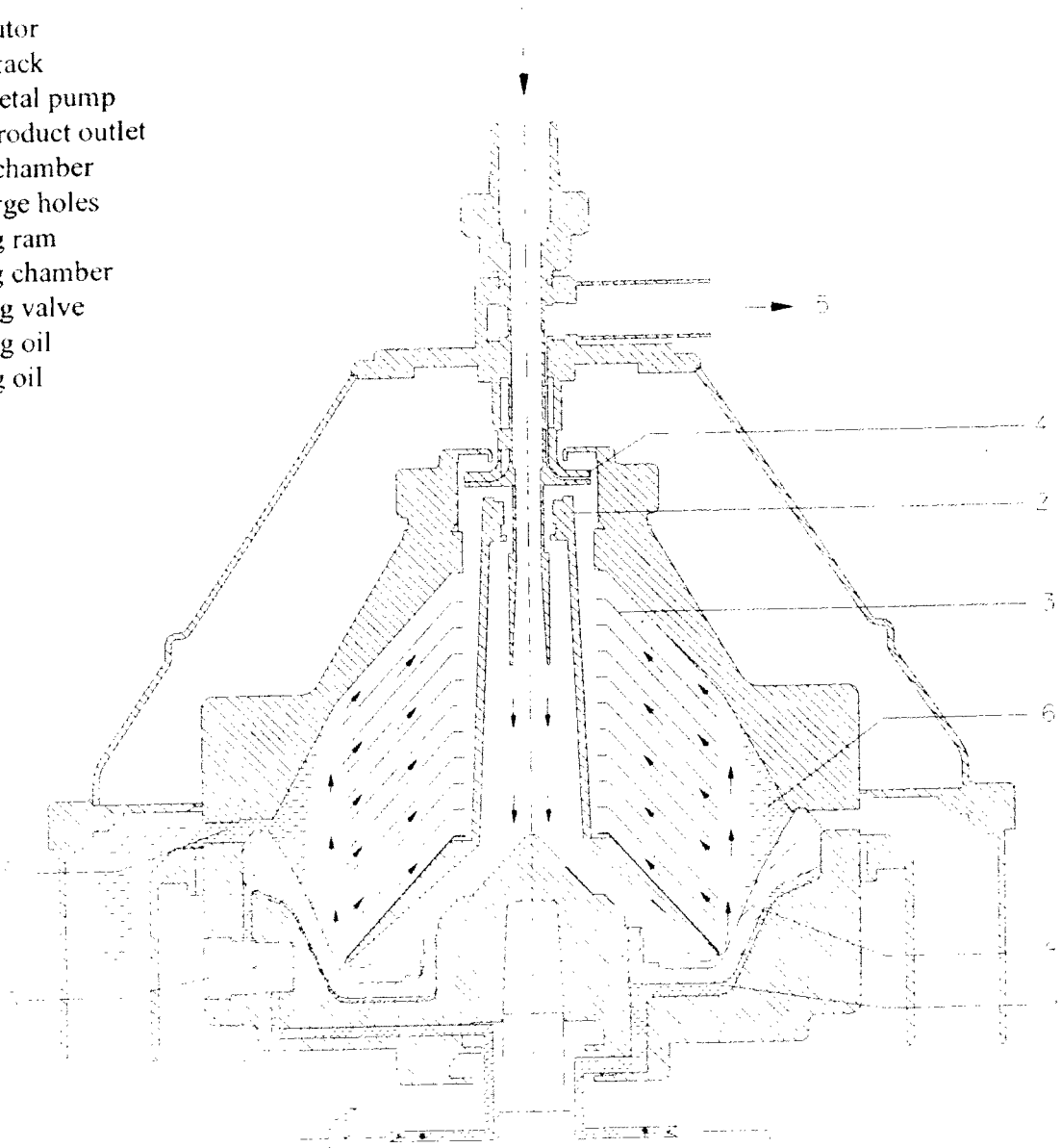


Figure 3.1

### 3.3. Technical card

Overall dimensions of the complete unit (ref. Tab. 20):

Width:	820 mm.
Length:	998 mm.
Height:	1.114 mm.

Weights:

Bowl weight:	95 kg.
Separator net weight:	470 kg.

Operating features:

Hydraulic capacity:	5.000 l/h
*Product capacity:	2.300 l/h
Solids chamber capacity:	1,7 l
Bowl speed:	9.600 r.p.m.
Motor speed:	1.740 r.p.m.

Product and process features:

Maximum product density:	1,1 kg/dm <sup>3</sup>
Maximum sludge density:	1,35 kg/dm <sup>3</sup>
Maximum product temperature:	110 °C
Process temperature:	40 ÷ 50 °C

Electrical system features:

Motor power:	5,5 kW
Voltage:	3 x 400/690 V
Auxiliary components voltage:	24 Ac/Dc
Frequency:	60 Hz
System:	three-phase+earth
Motor protection level:	IP 55
Electric panel protection level:	IP 65
Operation:	electro-mechanical

Hydraulic system features:

*Required feeding pressure necessary for a machine working at maximum capacity:	1,2 bar
*Maximum outlet pressure:	4,5 bar
Minimum feeding pressure for operating liquid:	2 bar
Operating water consumption for each discharge:	5 l

For the environmental condition refer to the paragraph 5.1.

(\*) These data depend on the specific application. The actual capacity and the degree of separation depend on the characteristics of the product and on physical parameters of the process.

spacers of inlet/outlet flow (ref. § 5.3):

- $\varnothing$  inlet thickness: 10 mm
- $\varnothing$  outlet thickness: 10 mm
- $\varnothing$  inlet thickness: 10 mm

### 3.4. Noise level

The machine has been subjected to a noise emission test with reference to the noise test code included in Annex A of the standard prEN 12505.

The determination of noise emission values (sound pressure level) has been done with empty machine, rotating at the operating speed. Care has been taken to ensure that the any electrical conduits, piping or air ducts which are connected to the machine do not radiate significant amount of sound energy.

The measurement has been done at 1,0 m. in front of the machine and 1,6 m. above the floor.

A-weighted time-averaged emission sound pressure level: 76±2 dBA

### 3.5. Destination and foreseen place of use.

The machine must exclusively operate inside a closed place, which must possess features in conformity with the prescription of this Manual (see § 5.1).

The floor must be plane, without asperities, sufficiently solid to avoid sinkings.

### 3.6. Improper uses and contra-indications

- Never use the machine to separate liquids which have different characteristics (density, temperature, corrosion, etc.) from those specified.
- The bowl has not to rotate at a higher speed than the maximum operating speed (9.600 rpm).
- The bowl has not to rotate empty. It is allowed to put into rotation the empty bowl for a period of 15 min. only in starting phase.
- Never elude or disactivate the safety shields.
- Never use the machine if it is damaged.
- Use only SEITAL spare parts.
- Do not connect the machine to an electric panel that is not specifically supplied by SEITAL.

<p style="text-align: center;"><b>ATTENTION</b> Avoid water jets on the motor.</p>
--

Every use different from the specified, not included o deducible from this manual, it is considered "NOT ALLOWED".

## **4. LIFTING, TRANSPORT, STORAGE**

### **4.1. Machine delivery**

The whole material is accurately checked from the manufacturer before the forwarding.  
For transport and lifting operation the bowl is separated from the rest of the machine; this to preserve the integrity of the rotating parts of the machine.

When receiving the goods check the machine has not been damaged during transport or that the eventual package has not been tampered with subsequent removal of internal parts. Verify therefore that data desumed from the accompanying documents correspond to forwarding data.

When disassembling it is advised to accurately sieve the packing, to avoid that parts, missing at first sight, are not remained in the packing material.

If damages or missing parts are noticed, immediately inform the carrier and the manufacturer showing photographic documentation.

### **4.2. Packing and unpacking**

The packing conditions are defined with the customer in relation with the distance and the chosen mean of transport. The machine can be transported without packing.

In case of packing this is constituted by a wood box.

The machine parts must be assured to the level ground (by brackets or other) to prevent every horizontal and vertical movement.

The sheets affixed outside the packing contain the following information:

- Manufacturer
- Address
- Gross weight
- Case dimensions
- Means of lifting
- Lifting points

#### *UNPACKING*

Carry the packed machine closest the place selected for installation.

Remove the plastic protection to free the machine.

*Conditions of packing elimination (if present):*

Wood: not pollutant material, to correctly recycle.

Plastic: pollutant material to not burn (toxic fumes) neither waste in the environment;  
eliminate in accordance with the law in force in the user country.

### **4.3. Lifting and transport of the packed machine**

To lift the packing can be used the following means:

- Lift truck;
- bridge crane, crane or hoist with sling



**LIFT TRUCK**

Use a lift truck with:

- capacity higher than the weight of the machine+packing (reported outside the case);
- fork with length higher than 1500 mm.

Insert the forks under the level ground in central position, where signed by the suitable triangles on the case (fig. 4.1), and keep them at the maximum distance one from the other.

**SLING**

Must be used ropes or bands in good conditions (neither damaged nor deteriorated) having guaranteed capacity higher than the weight of the machine+packing (reported outside the case).

Pass the two ropes outside the "case feet" to avoid the sliding of the ropes towards the centre of the case (fig. 4.2).

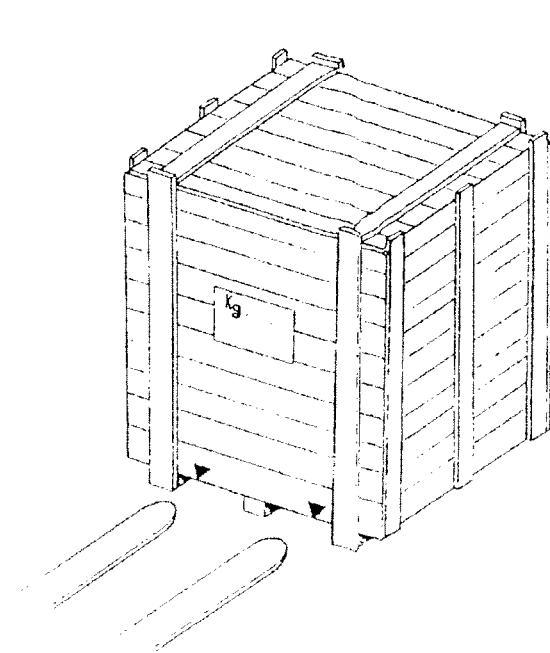


Figure 4.1

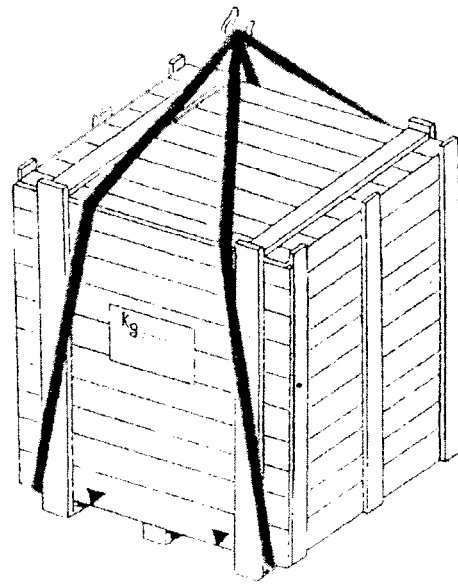


Figure 4.2

#### 4.4. Lifting and transport of the machine without packing

##### ATTENTION

##### Danger of damaging the machine during transport

The machine transport on the road must be performed without the bowl or road. Damaging of the critical shaft position will be wrong.

To lift the separator use two heavy ropes and a bridge crane (type or brand having guaranteed capacity higher than the weight of the machine) ab. 170 kg.

Pass the two ropes under the frame, and adjust their length in order to have the lifting point on the center-of-gravity vertical line (one rope must be placed inside the frame foot on motor side, the other one on the opposite side); then lift the whole.

**To lift the bowl** (fig. 4.3) a particular procedure must be followed:

- screw on the bowl (2) the threaded rod with nut (1), used for disks compression;
- apply on the nut (provided with handles) the lifting ropes having guaranteed capacity higher than the weight of the bowl (ab. 95 kg)
- lift the whole with a bridge crane, crane or hoist.

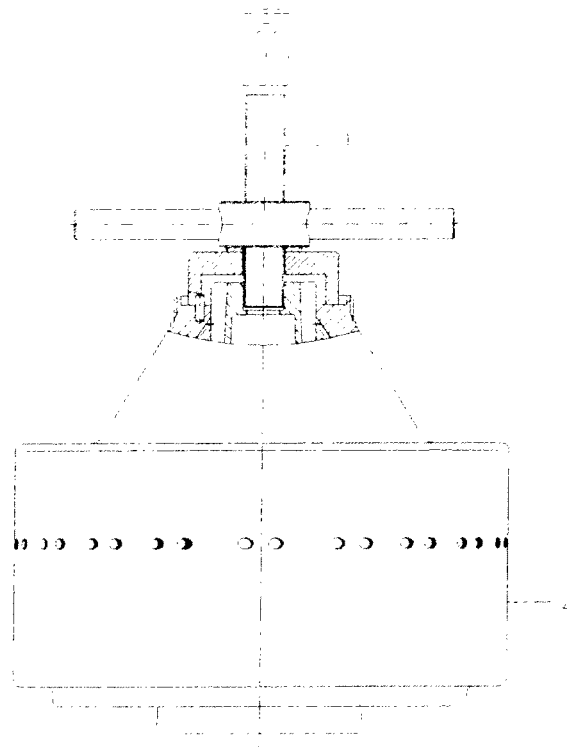


Figure 4.3

**ATTENTION**

**Danger of machine turnover**

**Danger of impact and squashing for people**

During lifting and transport must be used great caution to avoid injury to people and things

This operation must be performed by expert personnel.

Verify that nobody is exposed to a risk in danger zone.

**WHEN LIFTING ALL THE AREA SURROUNDING THE MACHINE MUST BE  
CONSIDERED DANGER ZONE**

careful steps, such separation, are not completely fixed. It's better to gently lift and avoid any kind of bump. The lifting must be performed with caution, by short impulses. Stop for a moment lower than possible during movements, both for a better load stability, and for a better visibility.

The manufacturer does not answer about breakages due to the transport of the machine after the delivery.

All the elements that are potentially moveable or not resistant to his weight must be securely fixed to the machine to prevent dangerous disjunctions or unbalancings.

For the machine not packed is prescribed a covered transport.

#### **4.5. Warehouse storage**

The machine storage, with or without packing, must be done in a place which has the humidity and temperature conditions reported in § 5.1.

If the machine remains unused for a long time (more than 3 months), perform the following operations:

- accurately clean the separator;
- dry with clothes and greased all the bowl parts and the unpainted parts of the machine, to avoid corrosions;
- keep the bowl in a dry place;
- to avoid the gaskets become brittle, preserve them in a cool, dry, dark and dust-sheltered place;
- discharge lubricant oil and accurately clean the gear chamber;
- disconnect the inlet-outlet pipes of the product and plug them;
- close the operating liquid cocks and check that losses are not present.

When starting the machine follow the instructions reported in al Chap. 7 and in §5.5.1.

## 5. INSTALLATION/PREPARATION TO START

### 5.1. Environment

The machine works inside a covered factory, with steady temperature, limitedly exposed to dust and humidity.

Except for different specification in order established, the machine has been designed and tested to regularly work in the environmental conditions reported below.

If the conditions are very unsteady, the means and characteristics of air-conditioning will have to be fixed.

#### *ALTITUDE*

The altitude of the place where the machine will be installed have not to be higher than 1000 m from sea level.

#### *TEMPERATURE*

Minimum room temperature: +10°C

Maximum room temperature: +40°C

#### *ATMOSPHERIC CONDITIONS*

The electric equipment can correctly work in atmospheric conditions with relative humidity not higher than 50% and temperature of 40°C, and at 90% with temperature not higher than 20°C (without condensate).

#### *LIGHTING*

The factory lighting system is considered very important for the safety of people and of work quality. It is for the customer to know the standards regarding accident prevention and work health in force in his country. These standards define the responsibilities of the work place manager, who must guarantee a good efficiency of plants and consequently of machines.

In Italy this argument is regulated by a ministerial decree which clearly fix the average level of prescribed lighting.

The lighting is measured in lux (1lux = 1lumen/mq).

Minimum necessary lighting: it has to guarantee the correct perception of symbols and marks (from 300 to 500 lux).

Maximum lighting: it has to avoid the operator dazzling.

#### *ATMOSPHERE WITH EXPLOSION AND OR FIRE RISK*

When machinery used in atmosphere with explosion and/or fire risk are is requested, the necessary procedures must be previously agreed between the parties, in compliance with regulations (CEI 62.2, CEE n° 89/392 + subsequent amendments).

The standard machine SEITAL 100 is not intended to work in environments with atmosphere with explosion and/or fire risk.

The customer/user must absolutely verify, during installation, the risk is present. Any equipment different from the prescribed one can cause dangerous situation to people.

## 5.2. Working necessary space

The choice of the place or space suitable for the laying of the machine is important for the quality of the work (maintenance, safety, etc.).

Fix the boundaries of the area for the operator, foreseeing areas sufficient for normal operation, maintenance and release.

The free space will be the space indicated in Tab. 22.

This area must be good-lighted and ventilate.

The environment and operating conditions have not to be a hindrance for the access to the machine controls. The machine operation must be guaranteed, including also the maintenance activities.

## 5.3. Equipment

The machine normal equipment includes:

- Set of special spanners for the bowl.
- Set of spare parts (gaskets, disks, etc.).

## 5.4. Location and assembly on place

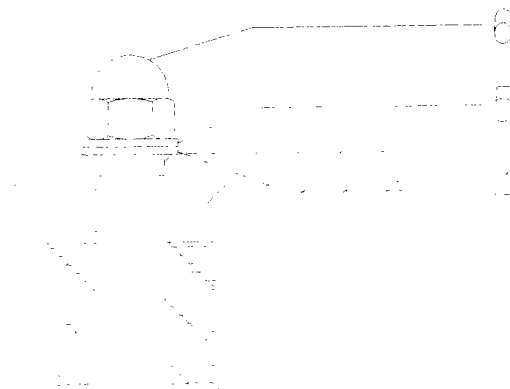
Move the machine without bowl to avoid damaging vertical shaft and/or ball bearings.

To lift separator follow instructions reported § 4.4.

Weld the four feet in a horizontal plane and then put the four shock absorbers on the feet (fig. 5.1)

Lift the frame and put it over the shock absorbers. Check the correct resting of all shock absorbers.

- 1 - Feet to weld
- 2 - Shock absorber
- 3 - Frame foot
- 4 - Nylon washer
- 5 - Washer
- 6 - Cap nut



The frame plane (B) must be horizontal (fig. 5.2). In order to obtain this, adjust the screwing of cap nuts, which must be screwed without tightening, to have always a good working of the shock absorbers.

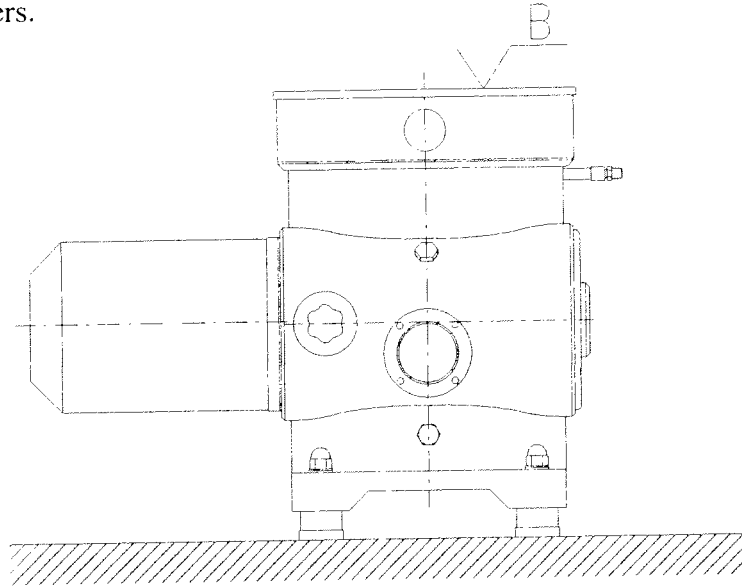


Figure 5.2

## 5.5. Lubrication

### 5.5.1. Bearings and gears lubrication

All the separator bearings and gears are splash lubricated.

#### *OIL LEVEL*

***The separator is delivered without lubricating oil.*** Before the first starting it is necessary to fill the gear housing with the lubricant of separator equipment. After the filling, the oil must be at a level just over the mark on the sight glass (fig. 5.3). During operation, the oil level has never to fall below the mark.

***Check the oil level every day before the starting up*** and check presence of water from time to time loosening oil drain plug and drawing a sample. If this is “white coffee coloured” (emulsion symptom), change immediately the oil.

- 1 - Oil supply plug
- 2 - Oil drain plug
- 3 - Sight glass
- A - Oil level with standstill machine

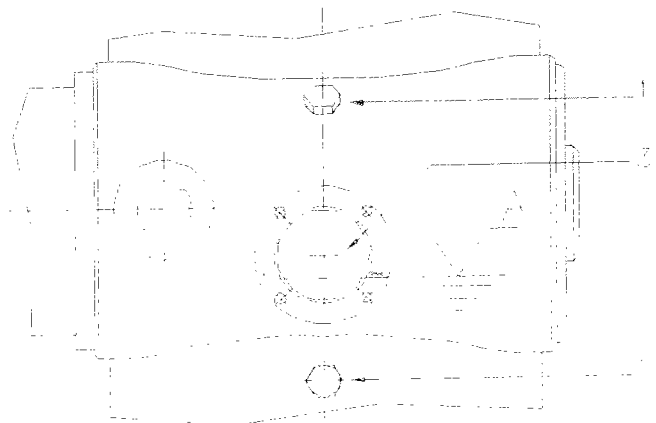


Figure 5.3

**ATTENTION****Danger of injury or burning**

It is peremptorily forbidden to perform the oil change or supply when the machine is still rotating.

*TYPE OF OIL*

Always use mineral, non-corrosive oil EP type with the following characteristics:

Viscosity: - 220 cSt at 40°C, corresponding to ISO VG 220.

- 18,7 cSt at 100°C.

Viscosity index: 95.

Density: 0.895 kg/l, at 15°C.

**ATTENTION****Danger of gears and ball bearings damaging.**

It is peremptorily forbidden the use of syntetic oil.

**Oil satisfying the previous qualifications:****AGIP Blasia 220**

API DT-220

BP Energol GR-P 220

CASTROL Alpha SP 220

ELF Reductelf SP 220

ESSO Spartan EP 220

GULF EP Lubricant HD 220

IP Mellana oil 220

MOBIL Mobilgear 630

Q8 Goya 220

SHELL Omala oil 220

TAMOIL Carter EP lubricant 220

TEXACO Meropa 220

TOTAL Carter EP 220

*OIL CHANGE*

The first time change the oil after 300 operating hours and then once every 750 operating hours; however never let pass a period longer than 12 months (check the effective working time of the machine, reading the value reported in the hour counter placed inside the electric panel). In seasonal operation the oil change must be performed before every operating period. The used oil must be collected in a suitable tank and eliminate as specified by the local regulations.

Whenever changing oil, accurately clean gear housing and remove all metal particles fouled in the internal walls and corners of gear chamber. Do not use downy rags or cotton waste. Clean sight glass.

*AFTER LONG REST OF SEPARATOR*

After visually checking the condition of gears inside gear housing, it is advisable to change oil and lubricate the upper ball bearing spraying some oil from below.

**5.5.2. Lubrication of threads and contact surfaces of the bowl parts**

When assembling the bowl it is advised to apply a thin lubricant layer on threads and contact surfaces of bowl components such as bowl body, bowl head, lock rings, etc.

**It is recommended the use of the following lubricants:**

for food industry

- Molykote D (white paste)
- Molykote DX (white paste)
- Kluber Grease KSB 8

for chemical industry

- Molykote G
- Molykote G Rapid

In addition, other pastes or greases with the same properties may be used.

**5.6. Systems connection**

**5.6.1. Electrical system connection**

**ATTENTION**  
**Electrocution danger**

The electrical connection must be performed by the electrician (that is informed about the risks connected to the intervention and knows as avoid them).

The wiring diagram is put inside the electric panel. If this is not, immediately contact the manufacturer.

The user has to predispose a suitable isolating switch of the electric line upstream the machine, in addition to effective protection advices against overcurrents/indirect contacts.

When connecting, verify that:

- the supply mains correspond to the voltage and frequency indicated in the wiring diagram supplied with the machine; a wrong voltage supply could damage the electric panel equipment;
- the supply mains is provided with suitable earth connecting system;
- the electrical power supply of the separator motor is designed relating to starting current (approximately  $1,5 \div 2$  times the nominal current of the motor).

Instructions for electrical system connection:

- Perform the connection to the electric mains with great caution, without voltage in the mains and respecting the safety prescription and local regulations.
- It is advisable to install the control panel near the machine, to assure a fast intervention in case of danger.
- When connecting the phases to the isolating switch terminals, inside the electric panel, put in the suitable seat the yellow-coloured protection cover.
- Always use waterproof conduits on motor terminal board inlet.
- It's absolutely forbidden the mains connection without grounding.

Before assembling the bowl, check direction of rotation by a "short" motor starting. The correct direction of motor rotation is indicated by the arrow on separator frame, corresponding to the clockwise rotation of vertical shaft (see from above).

**ATTENTION**  
**Generic danger**

If the power and control panel has not been supplied with separation, the electrical connection has to be made respecting the safety prescriptions and local regulations.



**5.6.2. Hydraulic connection for operating water**

**OPERATING LIQUID QUALITY REQUIREMENTS**

Purify oil at temperature of  $37^{\circ}\text{C} \div 60^{\circ}\text{C}$   
Viscosity = 7cSt at  $40^{\circ}\text{C}$  = 50 SUS at  $100^{\circ}\text{F}$

The connection must be carried out according to Fig. 5.4.  
The pressure reducer, separated from the machine, must be 2 meters from solenoid valve set at most. It reduces and stabilizes pressure of operating liquid to ensure evenness of partial discharges. Pressure reducer must be regulated at  $2 \div 2,5$ .  
Before assembling bowl, check correct electrohydraulic connection by simulating a discharge. First of all, turn on the opening/closing ball valves until having a regular liquid flow from the holes of the operating liquid injector (06.280.0 - Tab. 06). Then turn them off and press the discharge button on electric panel. A spray of liquid get out from the upper part of the operating liquid injector and after a few seconds a short splash of liquid get out from the lower part of it. After 10 ÷ 15 seconds the upper spray of liquid stops. Repeat this procedure two or three times and if this doesn't happen, check electrical connection.  
During discharge the minimum pressure must be higher than 1,5 bar.

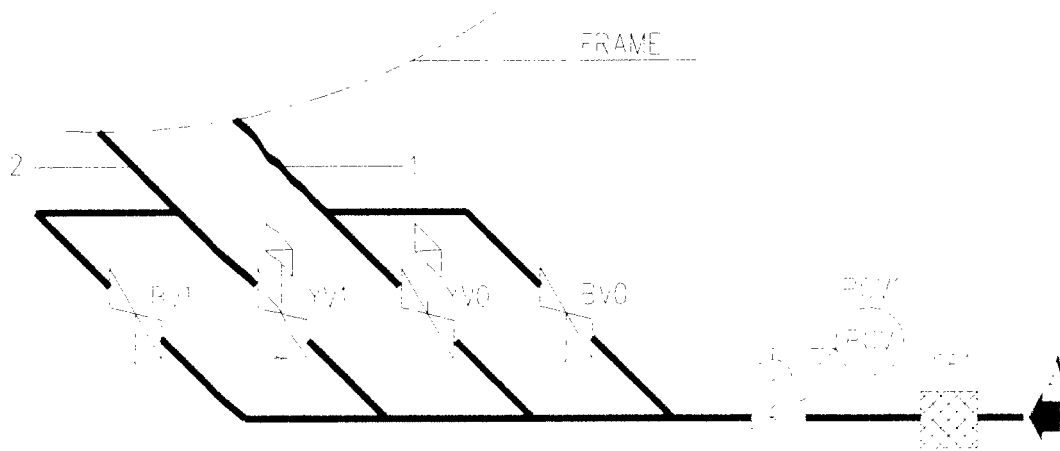


Figure 5.4

- 1 - Closing liquid
- 2 - Opening liquid
- CF1 - Cartridge filter
- PCV1 - Pressure reducer
- BV0 - Closing liquid ball valve (emergency)
- YV0 - Closing liquid solenoid valve
- YV1 - Opening liquid controlled ball valve (discharge)
- BV1 - Opening liquid ball valve (emergency)
- A - Liquid from source tank

### 5.6.3. Separator hydraulic connection

The separator must be connected to the plant predisposed by the user following the indications of the scheme of Tab. 21. All the pipe unions must be well fastened. It is advisable to connect the separator to the plant by pipes which length is not more than 1 m. to facilitate the disassembly of the connections when dismantling the bowl. Therefore, avoid connections (to another machine, to the wall, etc.) that rigidly constrain the inlet-outlet unit of the machine; this could increase vibrations level.

The solids discharge, if totally connected by a pipe, must have a sight glass that allow to see eventual leakages. The sludge elimination plant must be realized in such a way that a counterpressure is avoided inside it, preventing the sludge draining (fig. 5.5). These are the features that it must have:

- 1) sufficiently large pipes without sharp bends and shrinkages;
- 2) horizontal length absence;
- 3) sludges must be able to freely drain into the collecting tank.

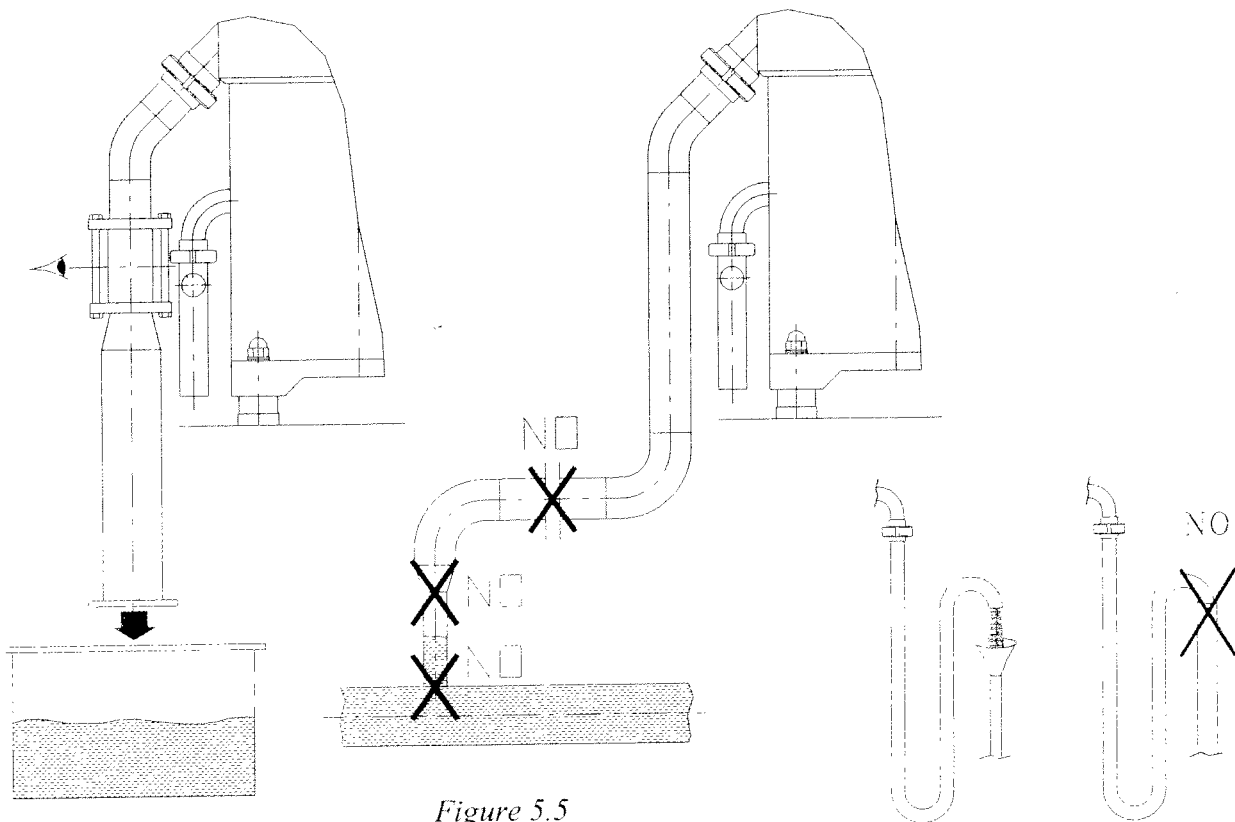


Figure 5.5

The eventually present drain traps (cover discharge, operating liquid discharge, etc.) have not to be totally connected by pipes, to check eventual leakages (fig. 5.6). These precautions must be adopted to avoid that some liquid (oil, product or sludges) could flow in the upper part of the frame braking the rotating bowl and/or drain in the gear chamber damaging the bearings.

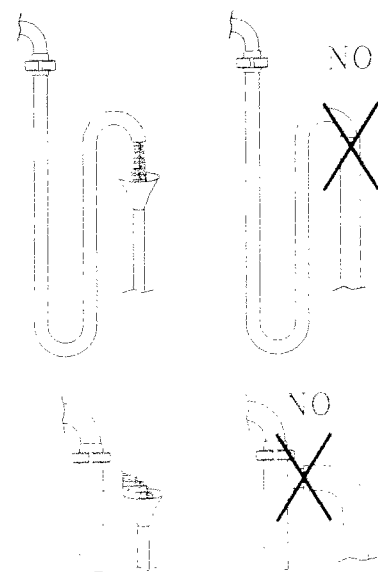


Figure 5.6

#### 5.6.4. Pneumatic system connection

If the machine has pneumatic components the connection to the pneumatic system must be predisposed. The system features are reported in § 3.3.

The user has to predispose a suitable cock upstream the machine pneumatic system, that guarantee the cut out of the compressed air in case of emergency.

When connecting, verify that:

- air pressure is in the limits reported in § 3.3;
- connecting pipes are constrained to supports near the pipe unions; this to avoid injuries due to unexpected disjunction of the pipe from the union.

## 6. BOWL AND INLET-OUTLET FLOW UNIT

The bowl is supplied separately from the rest of the machine, so before setting at work it must be dismantled and assembled on vertical shaft in the frame. The bowl, rotating at high speed, is subjected at high stress that could compromise the operating safety of separator in case the bowl has been improperly assembled and cleaned. In *Figure 6.1* are shown all the main pieces of the bowl.

- 1 - Bowl body
- 2 - OR gasket - bowl body
- 3 - OR gasket - bowl body nut
- 4 - Bowl body nut
- 5 - Gasket - moving ram
- 6 - Moving ram
- 7 - Distributor
- 8 - Bottom disk
- 9 - Intermediate disk
- 10 - Upper disk
- 11 - Nylon gasket - bowl hood
- 12 - OR gasket - bowl hood
- 13 - Bowl hood
- 14 - Big lock ring
- 15 - Gasket
- 16 - Finned cover
- 17 - Small lock ring
- 18 - OR gasket - bowl hood

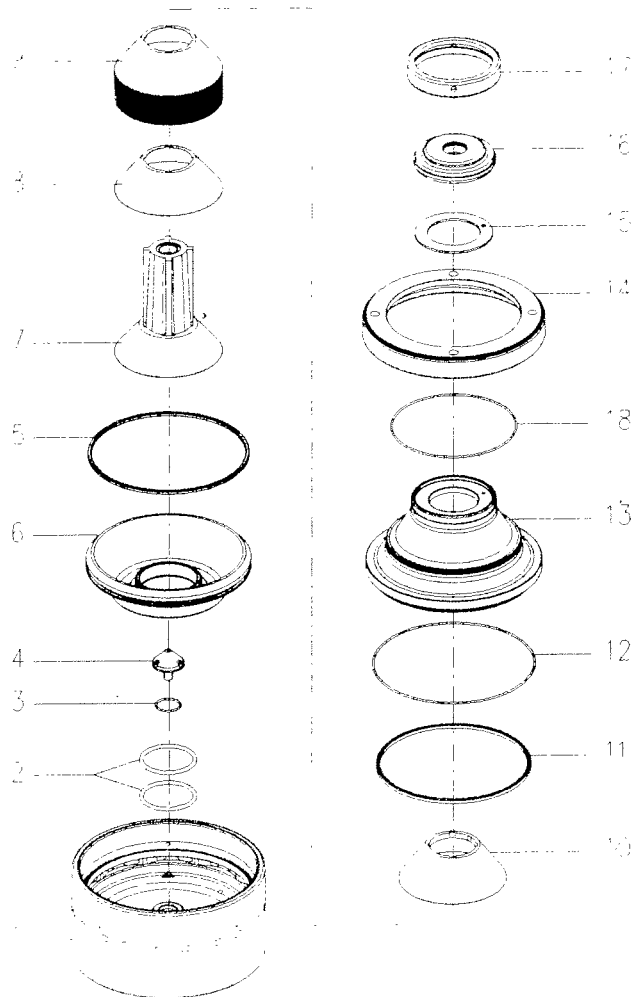


Figure 6.1

### 6.1. Bowl assembly

In bowl assembly follow in detail the procedure indicated below and pay particular attention to the following warnings:

**ATTENTION**  
Generic danger

The bowl may not be started before it has been completely assembled.

• Carefully clean all parts, surfaces and gaskets and do not smear any oil or grease on threads and surfaces subject to rubbing.  
• Check presence of all gaskets on new bowl too.

- Every part must be correctly positioned; almost all bowl parts have an angular position fixed by pins or feather keys - except for threaded parts and gaskets (Figure 6.1 - parts 2, 3, 4, 5, 11, 12, 14, 17, 18).
- During assembly verify that shear rags are not present on various pieces and that foreign objects do not remain inside the bowl.
- Bowl body nut and bowl lock rings have left-handed threads.
- Always use our special spanners and particularly the spanner for disks compression.
- After screwing big lock ring, check the disks compression.  
It's possible that disk set is insufficiently compressed and this may cause anomalous vibration of the bowl. In this case add some disks.

- 1) Clean and wipe dry the conical part of the vertical shaft and carefully clean also the inside of the bowl hub to assure proper fitting.  
By the threaded rod (09.060.0), and the nut (09.070.0), insert the **bowl body** (Fig. 6.2). Follow these indications.

- fasten threaded rod (1) on the bowl body.
- Acting on nut handles (2), lift the bowl body by hand or by hoist and slowly place it down on the conical part of the vertical shaft. Use great caution to not damage the coupling surfaces.

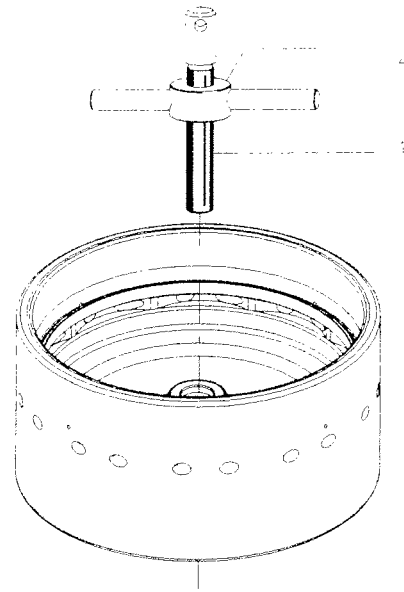


Figure 6.2

- 2) Carefully clean the grooves of bowl hub and insert the **OR gaskets** (Fig. 6.1 - part 2).

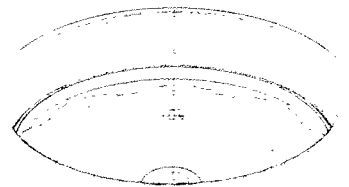


Figure 6.3

- 3) Insert the OR gasket (Fig. 6.1 part 4) on **bowl body nut** and then, by the spanner (09.185.0) fasten the piece that has left handed thread (Fig. 6.4). By the hammer (09.030.0) give some blows to the spanner to be sure that the nut is well fixed.

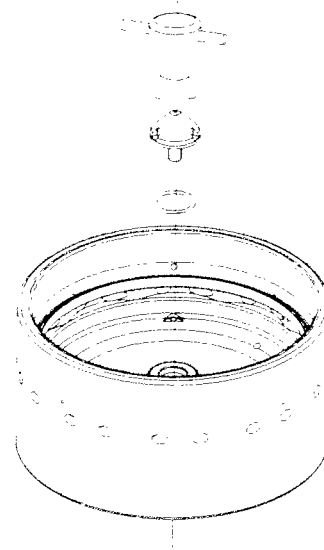
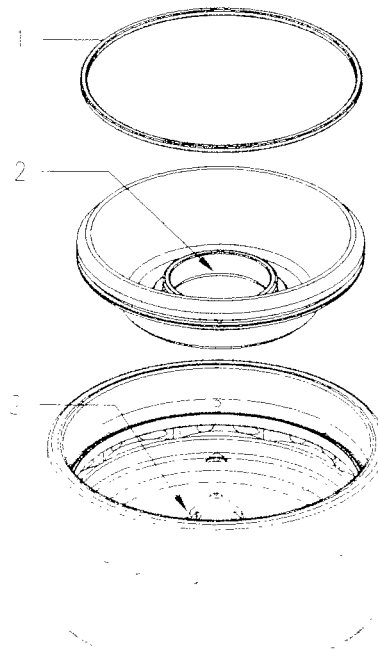


Figure 6.4

- 4) Carefully clean the groove on the moving ram and apply the rubber gasket (Fig. 6.5 - part 1) using a plastic hammer. Inserting the gasket, pay attention that the surface in contact with bowl body has not shear rags. Be sure that the external surface of the gasket does not protrude from the groove.



- 5) Smear antiscuff grease on the coupling surfaces of the bowl hub and the moving ram (Fig. 6.5 - part 2).

Figure 6.5

6) By the spanner (09.120.0), insert the **moving ram** (Fig. 6.6). Proceed as explained below.

- Fasten spanner body (1) on the moving ram.
- Slightly screw threaded rod (2) until the threaded part length outside the spanner body is  $4 \div 5$  mm.
- Lift the moving ram by hand or by hoist and place it down on the bowl body.
- Take care that the "0" marks of the two pieces are aligned, so that the three guide pins of the bowl body enter correctly into the corresponding holes in the moving ram.
- Slightly unscrew the threaded rod until the ram is completely placed on his seat. Could be necessary give some plastic hammer blows on the upper edge of the threaded rod (2) and/or make swinging the ram acting on the rod.
- The moving ram should be now in the position indicated in Fig. 6.5. The most internal part of the ram must be at about 3 mm. under the hub of bowl body. This position will be easily reached if the steps from 3) to 6) have been correctly made.

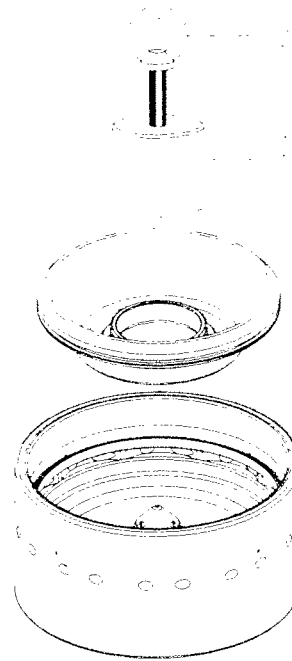


Figure 6.6

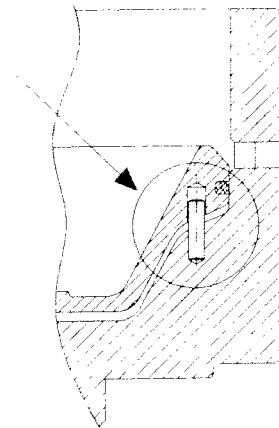
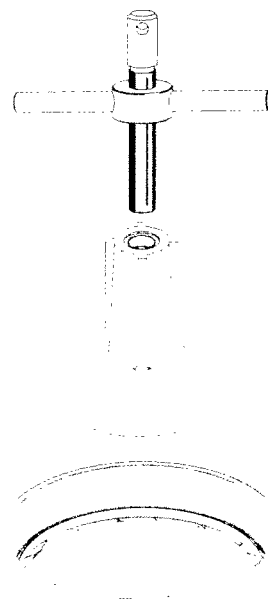


Figure 6.7



7) By the spanner (09.060.0 + 09.070.0), screwed in the threaded hole present on the upper edge of the **distributor**, lift the piece and place it down on his seat. Check the guide pin on the bowl body correctly rest on the suitable seat (note the distributor as, but the whole piece is not completely resting on the bowl body (Fig. 6.8).

Figure 6.8

- 8) Insert the **disks**. The disks can be inserted in the distributor only in one way. As shown in Fig. 6.9, over the distributor is marked a big "0" that must be aligned with "0" marks of the bowl body and sliding piston, and a small "o" which indicates the angular position of disks insertion. The disk must be inserted in such a way that the small slot (1) made on the internal upper edge of the disk is at the right of the distributor fin marked with "O".

Insert:

- the bottom disk (Fig. 6.1 - part 8) that distinguishes itself by having spacers on both surfaces;
- the intermediate disks (Fig. 6.1 - 9);
- the upper disk (Fig. 6.1 - 10) having higher thickness.

**Take care to not change the sequence of the disks.**

- 9) After carefully cleaning the grooves, insert the **nylon gasket** and the **OR gaskets** on the bowl hood (Fig. 6.10/A - parts 11, 12 and 18). To apply the nylon gasket, turn the bowl hood upside down and fit the gasket over the groove; then start inserting it slightly giving blows with a plastic hammer. This operation must be made striking, uniformly on the circumference, the gasket in one point and just after in the opposite one.

When gasket has been uniformly inserted, take a small piece of the older gasket and, after placing it over the new one, give on it some plastic hammer blows until it enter of about 1 mm. under the bowl hood seal surface (see Fig. 6.10/B).

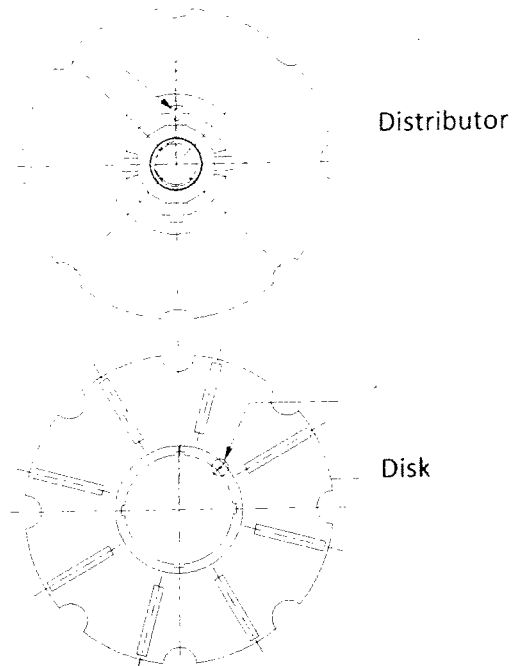


Figure 6.9

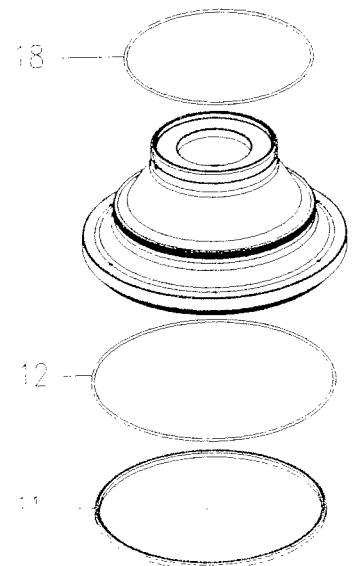


Figure 6.10/A

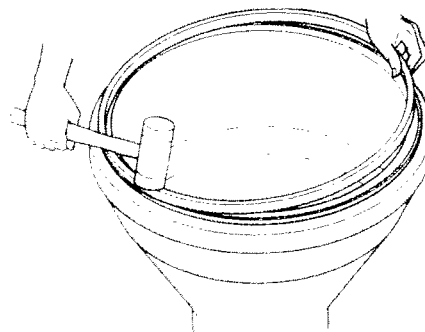


Figure 6.10/B



- 10) Carefully clean the conical coupling surfaces of bowl body and bowl hood.
- 11) By the spanner (09.110.0), place down the **bowl hood** (Fig. 6.11). Proceed as explained below.

- Fasten spanner body (1) on the bowl hood.
- Slightly screw threaded rod (2).
- Lift the piece by hand or by hoist and place it down into the bowl body; take care that the "0" marks of the two pieces are aligned and that the guide pin of the bowl body enter in the corresponding groove of bowl hood.
- At the edge of the threaded rod is fixed a disk, that will rest on the distributor.
- If necessary, unscrew the threaded rod until the bowl hood is in contact with the disks.

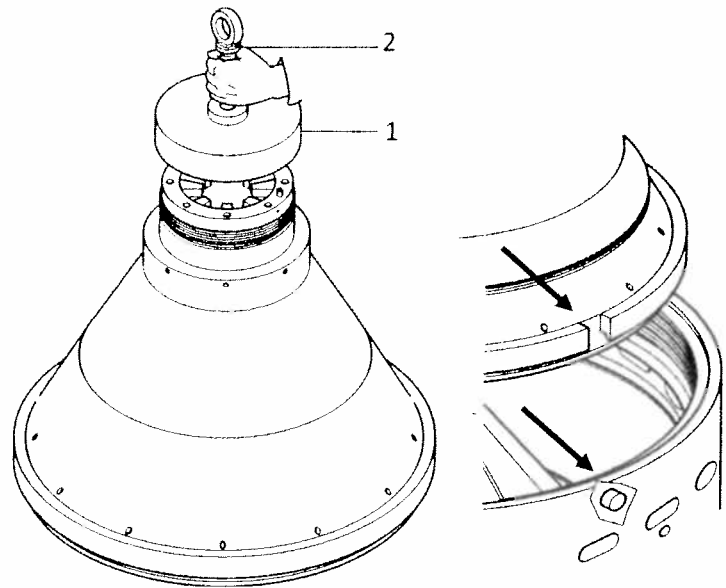


Figure 6.11

- 12) By the spanners (09.060.0 ÷ 09.090.0), compress the **disk stack** (Fig. 6.12). To make this, perform the above mentioned operations.

- Lay the flange (1) on bowl hood.
- Screw tight threaded rod (4) on the distributor. Do not forget bronze washer (2) under nut with handles (3).
- By using extension pipe (09.020.0) screw nut (3) as much as possible and anyhow until the bowl hood completely lay on the corresponding seat of the bowl body.

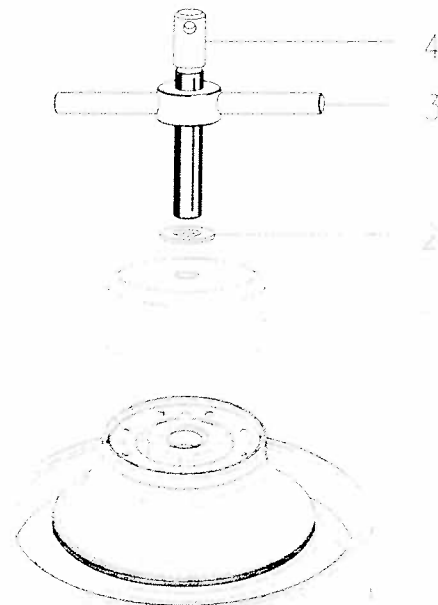


Figure 6.12

- 13) Smear antiscuff grease on threads of bowl body and big lock ring (Fig. 6.13 - part 1) and on contact surfaces between bowl hood and big lock ring (Fig. 6.13 - part 2).

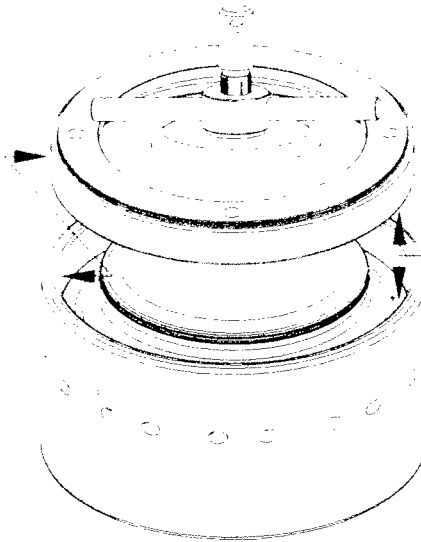
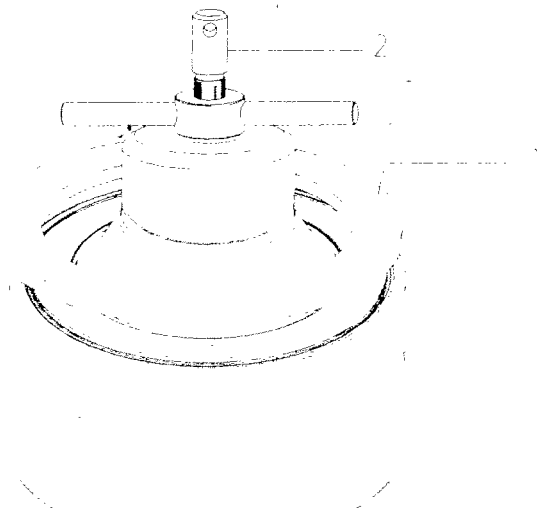


Figure 6.13

- 14) By the spanner (09.180.0) screw the **big lock ring** (Fig. 6.14) that has left-handed thread. It must be possible screw by hands the ring until the "0" mark is at least 1 cm. before the "0" mark of the bowl body (if this does not happen, it means that the assembly is not correct or the number of disks is wrong). Then fasten it down as much as possible by striking with mallet (09.030.0) the spanner handle. Now the "0" marks must be aligned. In case the bowl is not new and the parts start being worn, the "0" mark of the ring will go beyond the "0" mark of the bowl body. The distance between the two references must not exceed 3 cm.



- 1- Spanner for big lock ring (09.180.0)  
2- Spanner for compression disk pack

## 15) Remove the spanner for disk set compression.

The spanner for compression disk stack also allows to check if disks compression is correct. In fact one manual turn of nut (3 - fig. 6.12), by means of extension pipe, must cause a "sensation of toil". If after one turn it is still hard to loosen the spanner it means that one or two more disks are still necessary.

16) Apply the **gasket** on the bowl hood (Fig. 6.15 - part 2) checking that the pin on the bowl hood correctly enter in the suitable hole on the gasket.17) After carefully cleaning the grooves, insert the **OR gaskets** on feeding pipe and on **centripetal pump** (see Fig. 6.16).18) Insert the **feeding pipe** of product with the **centripetal pump** (Fig. 6.15 - parts 1 and 3).19) Apply the **finned cover** (Fig. 6.15 - part 4) and take care that the "0" marks of the cover and the bowl hood are aligned.20) By the spanner (09.210.0), screw (left-handed thread) the **small lock ring** (Fig. 6.15 - part 5).

## 21) Verify that the bowl is free to rotate, before assembling the cover.

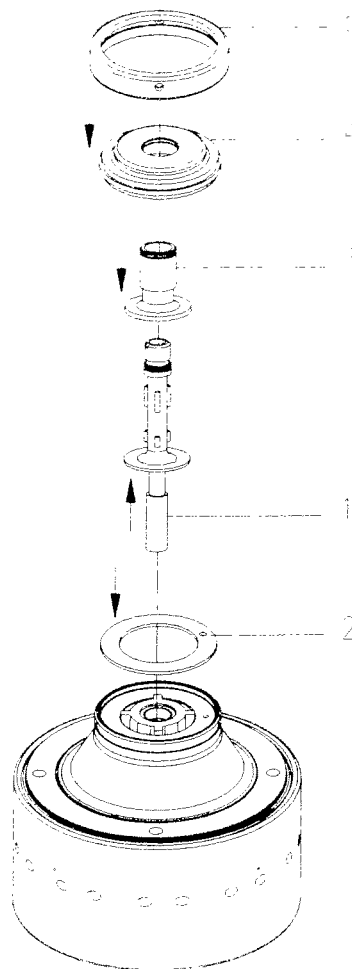


Figure 6.15

## 6.2. Inlet-outlet flow unit assembly

Before assembling, check all gaskets and grooves: they must be in good conditions and accurately cleaned. The spanners necessary for assembly are reported in Tab. 09. Do not use other tools or use them with caution.

The feeding pipe and the centripetal pump must be assembled in sequence with the last parts of the bowl (see § 6.1), then fix the cover on cyclone and finally the remaining parts of inlet-outlet flow unit.

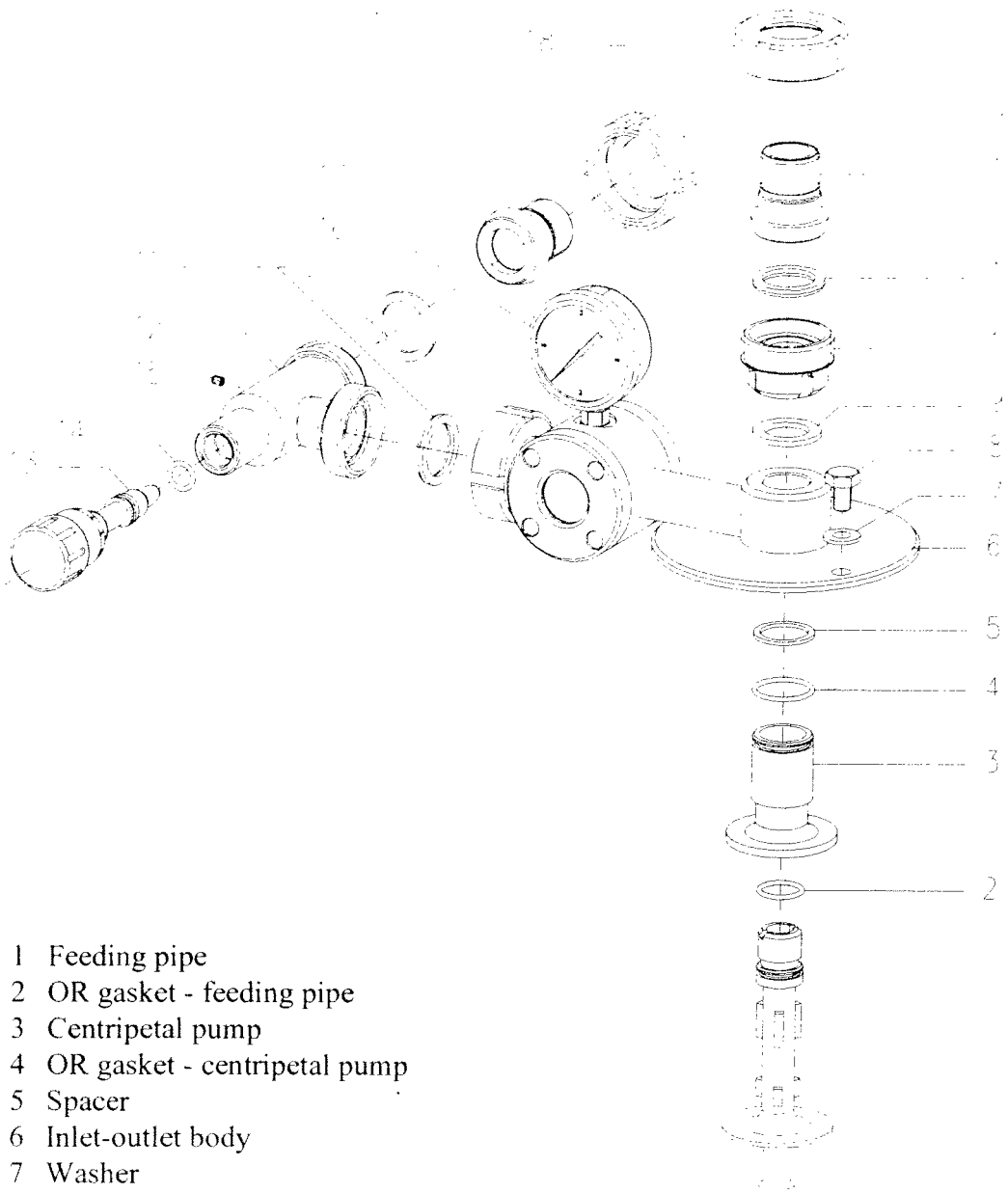
Proceed according to the following procedure (see Fig. 6.15):

1) Lift up the bowl on a clean surface and put it on a clean working surface with a vertical diameter of the throat of the feeding pipe.

- 2) Screw the 6 screws (08.040.0 - Tab. 08/A) on cyclone.
- 3) Assemble the spacer (5) on inlet-outlet body (6).
- 4) Insert body (6) on the feeding pipe (1), adapting it on the centripetal pump (3) and on the correspondent seat on the cover.
- 5) Screw hardly the two screws (8) of the flange of the inlet-outlet body into the holes of the cover.
- 6) Insert the nylon washer (9) and screw nut (10) - left-handed thread - using the spanners (09.190.0). Insert spanner (09.010.0) into the split of the feeding pipe to avoid pipe rotation when fastening the nut.
- 7) Apply on the shutter (13) the OR gasket (14).
- 8) Mount on the micrometric valve body (12) the shutter (13) and block it by the dowel (15).
- 9) Apply in the fittings the gaskets DN25 (11).
- 10) Apply the complete micrometric valve and the inlet / outlet fittings (17 and 18) on the inlet-outlet body (6).

Check that:

- spacers thickness and number is the prescribed one (see § 3.3 and 6.3).
- locking nut of feeding pipe (left hand thread), fixing screws of cover to frame (Tab 0.8) and of inlet-outlet flow unit to cover are hardly screwed.



- 1 Feeding pipe
- 2 OR gasket - feeding pipe
- 3 Centripetal pump
- 4 OR gasket - centripetal pump
- 5 Spacer
- 6 Inlet-outlet body
- 7 Washer
- 8 Screw
- 9 Nylon washer
- 10 Feeding pipe nut
- 11 Gasket DN25
- 12 Micrometric valve body
- 13 Shutter
- 14 OR gasket - shutter
- 15 Screw - blocking shutter
- 16 Manometer
- 17 Inlet-outlet - outlet - body
- 18 Flange DN 25

Figure 6.16

### 6.3. Adjustment of pumps position

The correct position of pump is in the middle of the corresponding chamber of the bowl. This position is obtained by inserting a few spacers (5 - Fig. 6.16) between the pump (3) and the inlet-outlet flow unit body (6). The number and thickness of spacers may vary only after the replacement of some parts of the vertical shaft unit (Tab.06) and/or of the bowl (Tab.03) and/or of the inlet-outlet flow unit (Tab.04). In this case it is advisable to vary corresponding number and thickness of spacers indicated on technical card § 3.3. The total thickness of spacers is determined by the following relation:

$$\text{Total thickness of spacers} = A - 0,5$$

To find "A" push down the centripetal pump to the bottom of the corresponding bowl chamber. The distance (measured in mm) between the cover upper edge and the pump gives the value of "A" (Fig. 6.17).

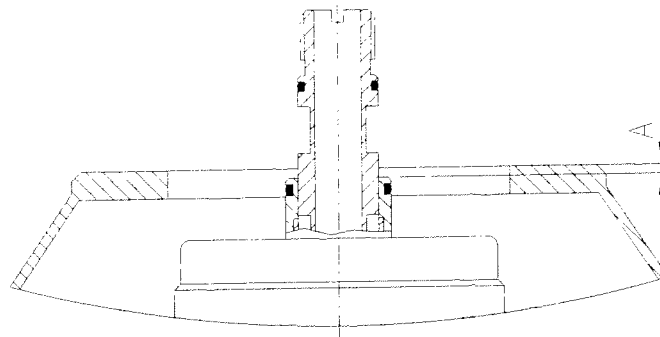


Figure 6.17

### 6.4. Inlet-outlet flow unit disassembly

**ATTENTION**  
**Generic danger**

Only with bowl completely standstill is possible to start disassembly.

**ATTENTION**  
**Generic danger**

Before disassembly, always perform machine chemical cleaning, that finish with cold water rinsing for about 5 minutes.  
In case it is not possible to perform the cleaning, cool the bowl passing through it cold water or other cooling fluid, before starting disassembly.

**ATTENTION**

When disassembling is suggested to put in a suitable area the dismantled components to make easier finding them out and to verify the completeness of the assembly at the end of it.

Proceed in the same order than assembly (see Fig. 6.16).

1) Disconnect feeding pipe and outlet pipes

- 2) Insert spanner (09.010.0 - Tab. 09) into the split of the feeding pipe and unscrew nut (10) - left-handed thread - using spanner (09.190.0).
- 3) Extract the nylon washer (9).
- 4) Unscrew the two screws (8) that fix the inlet-outlet flow unit to the cover.
- 5) Lift up the inlet-outlet body (6).
- 6) Unscrew the six screws (08.040.0 - Tab. 08).
- 7) Lift up cover by hands, paying attention to not damage the thread of feeding pipe.

### 6.5. Bowl disassembly

- 1) By the spanner (09.210.0), unscrew (left-handed thread) the **small lock ring**.
- 2) Remove the **finned cover**.
- 3) Extract the **feeding pipe** and the **centripetal pump**.
- 4) Remove the **gasket**.
- 5) By the spanners (09.060.0 ÷ 09.090.0), compress the **disk stack** (Fig. 6.12). To make this, perform the above mentioned operations.
  - Lay bell (1) on bowl hood.
  - Screw tight threaded rod (4) on the distributor. Do not forget bronze washer under nut with handles.
  - By using extension pipe (09.020.0) screw nut (3) as much as possible and anyhow until the bowl hood completely lay on the corresponding seat of the bowl body.
  - When the nut (3) lay on the flange (1), one turn is enough to slightly lift the distributor from bowl body.

The spanner for compression disk stack also allows to check if disks compression is correct. Infact one manual turn of nut (3 - Fig. 6.12), by means of extension pipe, must cause a "sensation of toil". If after one turn it is still hard to loosen the spanner it means that one or two more disks are still necessary.

- 6) Strike with the mallet (09.030.0) the spanner handle (09.180.0), to unscrew the **big lock ring** (Fig. 6.14), until loosen it (left-handed thread). Then take it out.
- 7) Remove the spanner for disk set compression.

- 8) By the spanner (09.110.0), extract the **bowl hood** (Fig. 6.11). Proceed as explained below.
  - Fasten spanner body (1) on the bowl hood.
  - Slightly screw threaded rod (2).
  - The piece starts lifting until a complete release.
  - Lift the piece by hand or by hoist. Use great caution when extracting it because sometimes the upper disk remain attached to it and so it could fall down.
- 9) Extract the **disks** and take care to not change the sequence of them.
- 10) By the spanner (09.060.0 ÷ 09.070.0), screwed in the threaded hole present on the upper edge of the **distributor**, lift the piece.
- 11) By the spanner (09.120.0), insert the **moving ram** (Fig. 6.6). Proceed as explained below.
  - Fasten spanner body (1) on the moving ram.
  - Slightly screw threaded rod (2).
  - If the ram raises with difficulty and the threaded rod is hard to screw, loosen it a little bit.
  - Give some blows with plastic hammer (not rubber) on the conical part of the moving ram and at the same time start again screwing the rod until a complete release of the piece.
  - Lift the moving ram by hand or by hoist
- 12) With the suitable spanner (09.185.0) and using the mallet (09.030.0), unscrew the **bowl body nut** (left handed thread).
- 13) By the spanner (09.060.0 ÷ 09.070.0), extract the **bowl body** (Fig. 6.2).
  - Slightly screw the threaded rod (1) on the bowl body.
  - If the piece raises with difficulty and the threaded rod is hard to screw, give some blows with plastic hammer on the eyebolt of the rod.
  - Start again screwing the rod until a complete release of the piece.
  - Acting on nut handles, lift the bowl body by hand or by hoist.

## 6.6. Bowl valves

On the bowl there are two valves (Fig. 6.18), placed at 180° one from the other.

The assembly-disassembly of bowl valves can be carried out without dismantling cover and bowl. To reach valves (with our special spanners), there is an opening, usually bunged, on the front of cyclone.



- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| 1 - Valve body                        | 2 - Valve ram                         |
| 3 - OR gasket - internal - valve body | 4 - OR gasket - external - valve body |
| 5 - OR gasket of valve ram            | 6 - Nylon gasket                      |

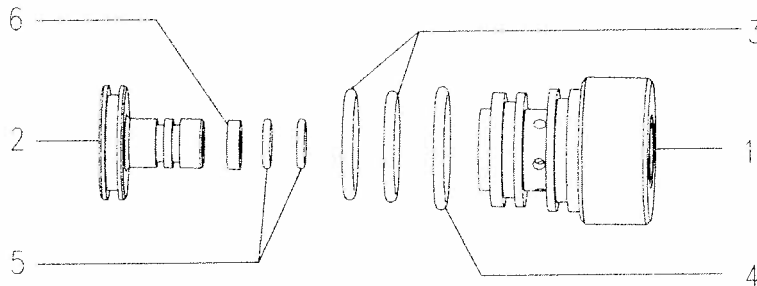


Figure 6.18

### Disassembly

- Remove the port plug for bowl valve (08.060.0 - Tab. 08)
- By using a screwdriver, make turning the bowl until the valve doesn't appear at your sight.
- Insert spanner body (09.050.0) so that the two fore pins fit the corresponding holes of valve body.
- Tighten screw in valve body and then tighten nut to fasten spanner to valve body.
- By wheeling spanner body, the valve is unscrewed (right-handed thread) from bowl body.
- The small ram will probably get out with the valve body; if this not, extract it (Fig. 6.20) by pulling spanner (09.040.0) after screwing its threaded end on small ram.

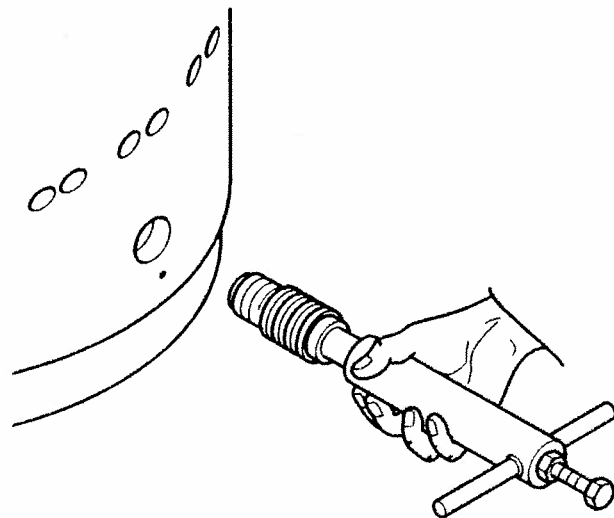


Figure 6.19

## Assembly

Before assembly verify the gaskets are in good conditions.

- Insert the small ram into the valve body.
- Apply the valve body on the spanner body, so that the two fore pins fit the corresponding holes on the valve.
- Tighten screw in valve body and then tighten nut to fasten spanner to valve.
- Add by finger a little bit of grease on the external valve gaskets, to avoid tearings when inserting.
- Insert with caution the spanner with valve into the hole on the bowl. Then, slowly screw the valve (to avoid damaging the OR gaskets with the thread), screwing for half a round and unscrewing a little bit until the valve is completely inserted.

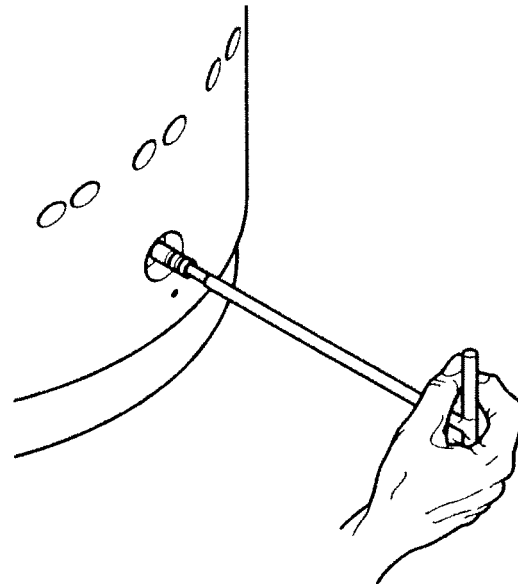


Figure 6.20

### 6.7. Hydraulic system for opening-closing the bowl

The bowl (Fig. 6.21) is provided with a ram (1) which periodically opens discharge holes (3) on the periphery of bowl, draining off the solids (2) accumulated during the separation. This ram is driven downward by the pressure of processed product and upward by operating liquid. When chamber (4) is filled with oil, the ram is in closed position (up); when chamber is partly empty, the ram goes to position of opening (down). The filling and emptying of chamber (4) is obtained through two oil pipes intercepted by solenoid valves:

- pipe (5) (solenoid valve YV0) for closing liquid, through which water fills up moving ram chamber (4);
- pipe (6) (solenoid valve YV1) for opening liquid, through which the partial emptying of chamber (4) takes place. Opening liquid acts on bowl valve (7) causing the opening of drain hole of chamber (4).

The solenoid valves are controlled by the programmer and by the timers that permit to realize the desired working cycle.

Both closing and opening liquid pipes are provided with manual emergency control consisting in a ball valve in parallel with the corresponding solenoid valve.

The manual discharge is acting manually on ball valve proceed as follows:

- 1) open YV0 (pre closing) and wait 5 seconds (approx.);

- 2) open/close BV1 (discharge); a partial discharge requires ab. 0,1 - 0,2 seconds of valve opening time;
- 3) wait ab. 10 - 15 seconds (after-rinsing) and then close BV0.

For the assembly/dismantling of "solenoid valve set" refer to Tab.05.

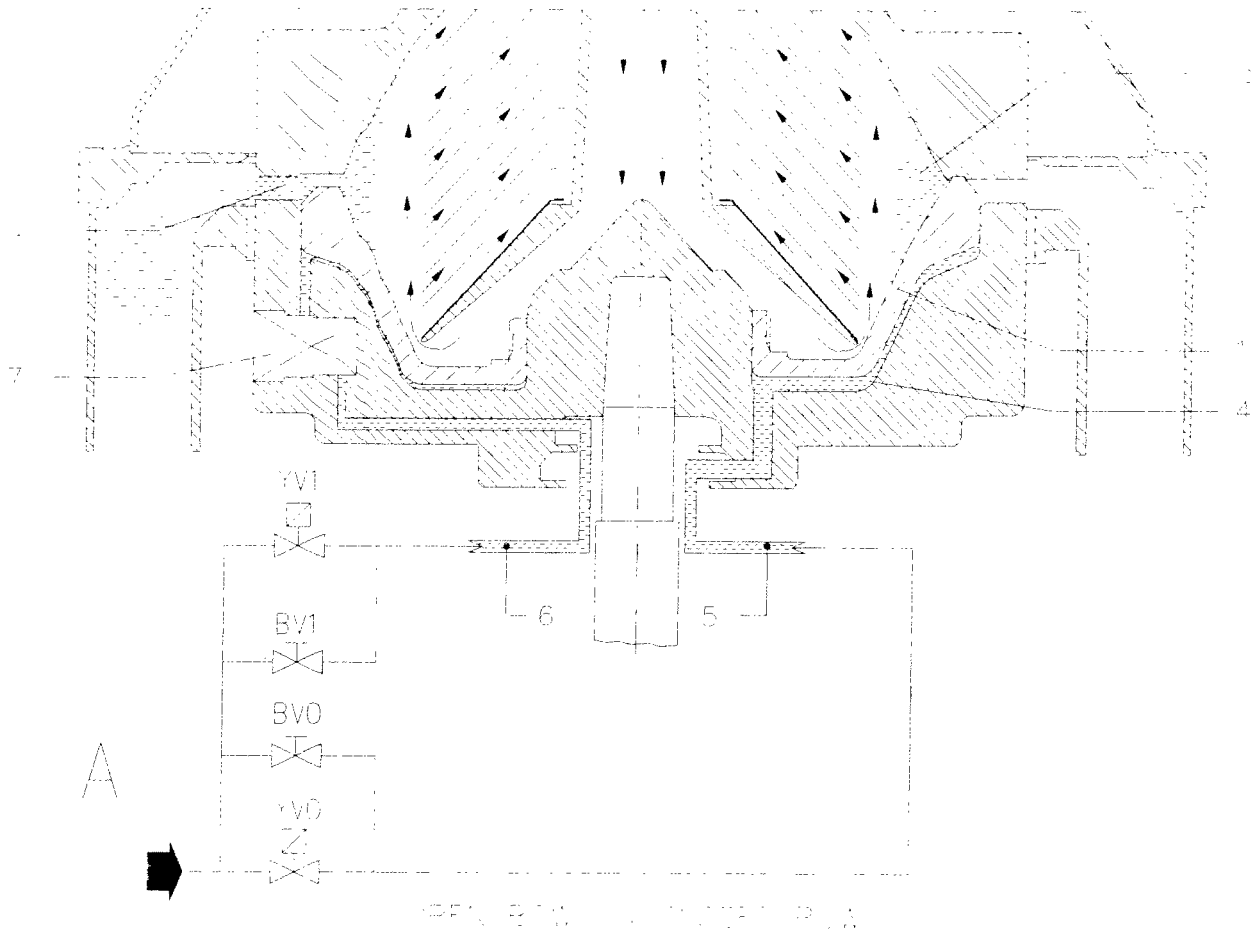


Figure 6.21

- |                          |   |
|--------------------------|---|
| 1 - Moving ram           | YV0 - Closing liquid solenoid valve         |
| 2 - Bowl discharge holes | YV1 - Opening liquid solenoid valve         |
| 3 - Separated solids     | BV0 - Closing liquid ball valve (emergency) |
| 4 - Moving ram chamber   | BV1 - Opening liquid ball valve (emergency) |
| 5 - Closing liquid       | A - Liquid from surge tank                  |
| 6 - Opening liquid       |   |
| 7 - Bowl discharge       |   |

## 6.8. Bowl blocking system

### ATTENTION

To avoid damaging of the vertical shaft and/or ball bearings, the machine transport on the road must be performed with the bowl blocked by the suitable spanner (09.320.0).

### ATTENTION

Don't start the machine before remove the bowl blocking spanner.

To move the machine without disassembling the bowl and to block the bowl during transportation, it is necessary to use the bowl blocking spanner (09.320.0). Proceed as explained below with reference to figure 6.22:

- remove the inlet-outlet body (fig.6.16 part 6) as explained in § 6.4 (point from 1 to 5)
- after removing the inlet-outlet body (fig.6.16 part 6) position the spacer (3) and the spanner body (4) on the cover (2)
- fix the spanner (4) to the finned cover (1) by the screws with washers (5 and 6)
- screw the (7) with washers (8) that make possible the lift of the bowl
- screw the (9) with washers (10) to block the bowl
- insert nylon washer (11) and screw the feeding pipe nut (12) as explained in § 6.2 (point 6).

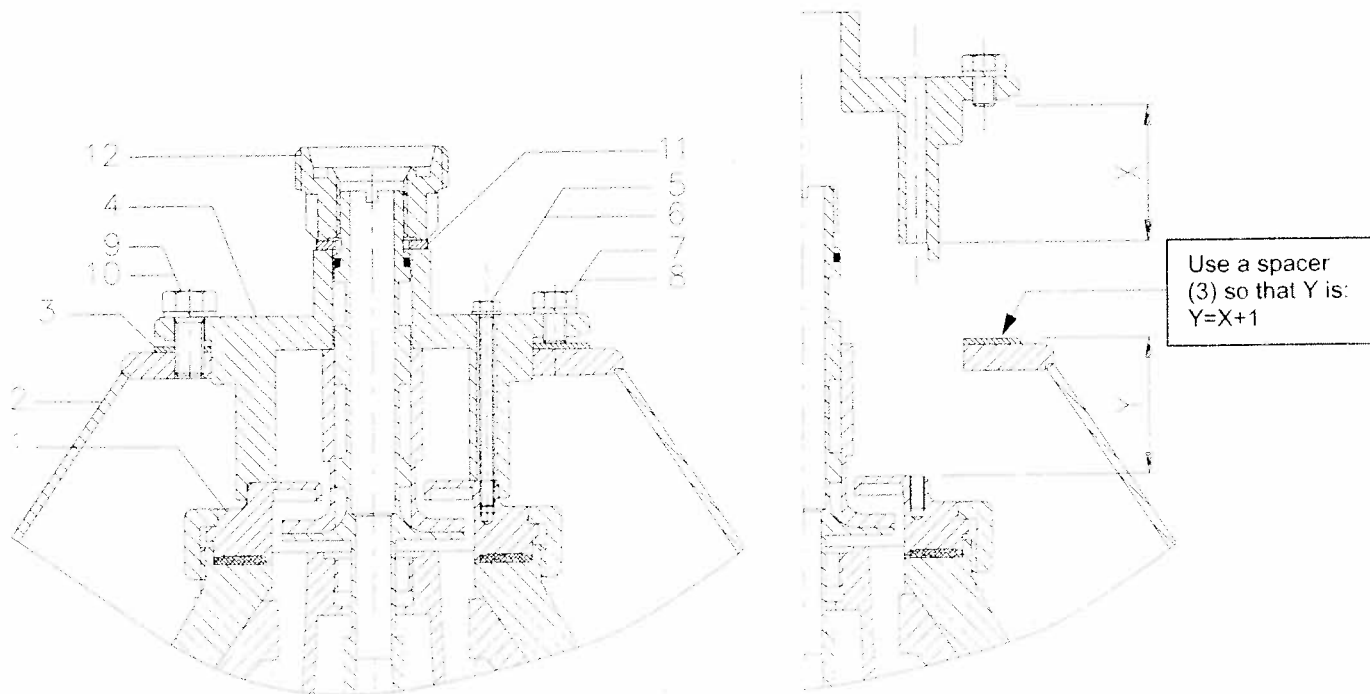


Figure 6.22

- 1 - Finned cover
- 2 - Cover
- 3 - Spacer
- 4 - Spanner body
- 5 - Screw M 5x65
- 6 - Washer Ø5

- 7 - Screw M 8x12
- 8 - Washer Ø8
- 9 - Screw M 10x25
- 10 - Washer Ø10
- 11 - Nylon washer
- 12 - Feeding pipe nut

## 7. MACHINE START

### 7.1. Warnings

Before machine starting, be sure to have understood the contents of this Handbook. For explanations and deepenings contact the manufacturer.

The normal operation and maintenance personnel have to own the specific expertise required by this Handbook, as well as the psychophysics requisites necessary and sufficient to make an intervention on the machine.

**ATTENTION**  
**Generic danger**

Only qualified and authorized personnel may perform regulations and interventions that are not assigned to the simple operator.

### 7.2. Safety systems description

**ATTENTION**  
**Generic danger**

Never tamper safety devices. Before setting at work the machine check their correct positioning and always verify their efficiency.  
In case of bad working inform the maintenance responsible.

#### 7.2.1. Project devices

To reduce the risks, it has been realized an opening on the frame closed by a sight glass, which permits to check if bowl is rotating or not.

#### 7.2.2. Shields

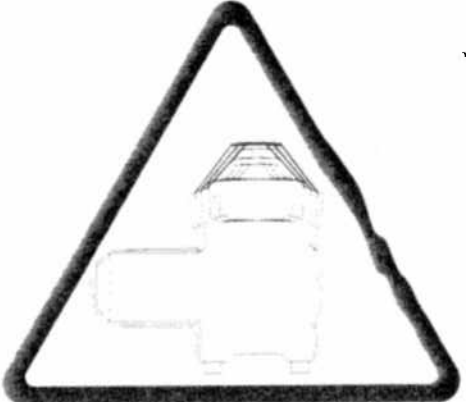

The following shields are presents:

- A series of steel shields are fixed with screws that totally prevent the access to the moving internal parts of the machine:
  - n°.1 bowl protection cover;
  - n°.1 plug to mount/remove the bowl valves;
- A motor protection cover.


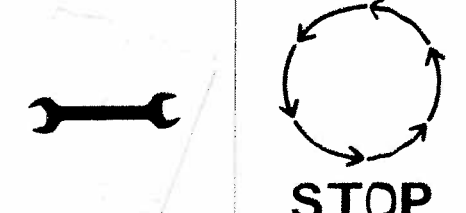
#### 7.2.3. Warning bill-stickings

In accordance with EEC 89.392 directives and his amendments, the following notice bill-stickings has been predisposed (Tab. ??):


• On the bowl protection cover:

	<p style="text-align: center;"><b>IF <u>UNUSUAL VIBRATION</u> OCCURS:</b></p> <ol style="list-style-type: none"> <li>1) INCREASE IMMEDIATELY TO A MAXIMUM THE LIQUID FEED (PRODUCT OR WATER) ACTING ON CAPACITY REGULATING SYSTEM;</li> <li>2) SWITCH OFF THE MOTOR</li> <li>3) APPLY THE BRAKE</li> </ol>
	

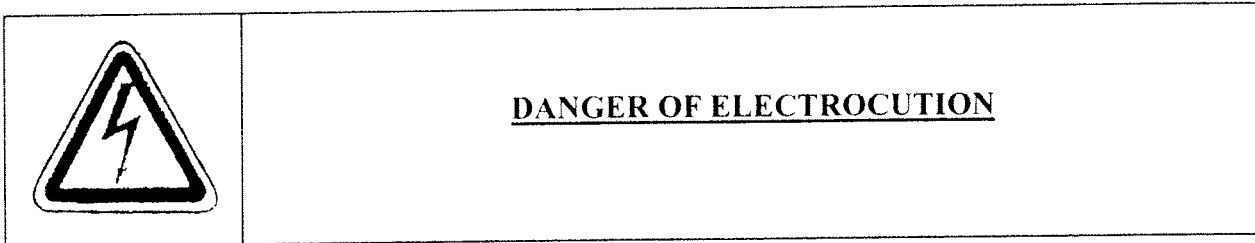
• On the bowl protection cover:

	<p style="text-align: center;"><b><u>SAFETY ALERT</u></b></p> <ul style="list-style-type: none"> <li>• CONSULT TECHNICAL MANUAL FOR PROPER SERVICE PROCEDURE</li> <li>• WAIT UNTIL ALL ROTATING PARTS HAVE COMPLETELY STOPPED BEFORE REMOVING SAFETY SHIELDS (check gears motion state as indicated in Fig 2.1).</li> </ul>
	

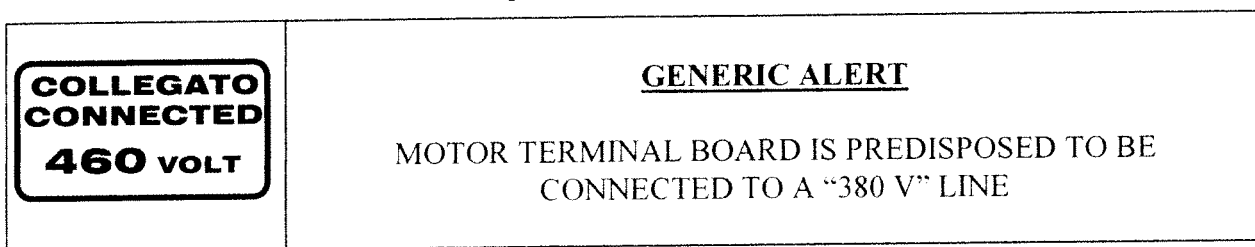
• Up the brake handwheel:

	<p style="text-align: center;"><b><u>TO BRAKE:</u></b> TURN THE HANDWHEEL ANTICLOCKWISE</p> <p style="text-align: center;"><b><u>TO DISACTIVATE THE BRAKE:</u></b> TURN THE HANDWHEEL CLOCKWISE</p>
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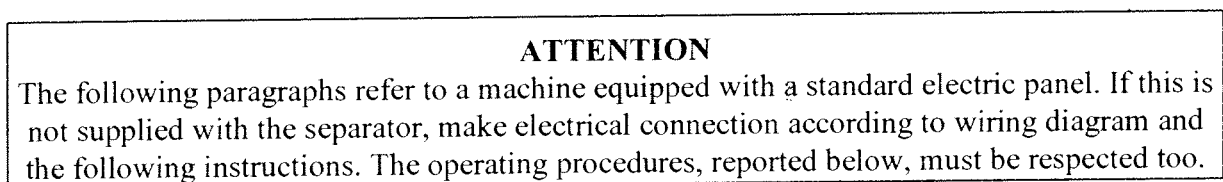
- **On the electric panel door:**



- **On the motor connection box (if electric panel is not present) or under the padlockly block-door command of electric panel:**



It's absolutely necessary to recognize the meaning of the warning bill-stickings and maintain the message readable. In case of deterioration, the stickings must be immediately substituted avoiding the use of the machine until it's unprovided with them. It's recommended to comply with the remarks referred on the stickings.



### **7.3. Control, regulation and signalling devices**

#### **7.3.1. Controls and signals**

On control panel, there are the following commands (Fig. 7.1):

- padlockly block-door command (QS1) 0-1 yellow-red coloured;
- white luminous indicator (HL0), meaning that tension is present in the line;
- start button (SB1) black coloured (with white guard HL1). This button start the separator motor;
- luminous button to stop the separator motor (SB2) red coloured (with guard HL2), that light up in case of magneto-thermic intervention of separator motor (M1);
- start button (SB3) black coloured (with white guard HL3). This button start the pump;
- luminous button to stop the pump motor (SB4) red coloured (with guard HL4), that light up in case of magneto-thermic intervention of pump motor (M2);
- black button for partial discharge (SB5);
- selector (SA2) 0-1 black coloured (discharge programs selection);
- a 2 timers to regulate the operating cycle;

- ammeter (FA) - current intensity indicator of separator motor.

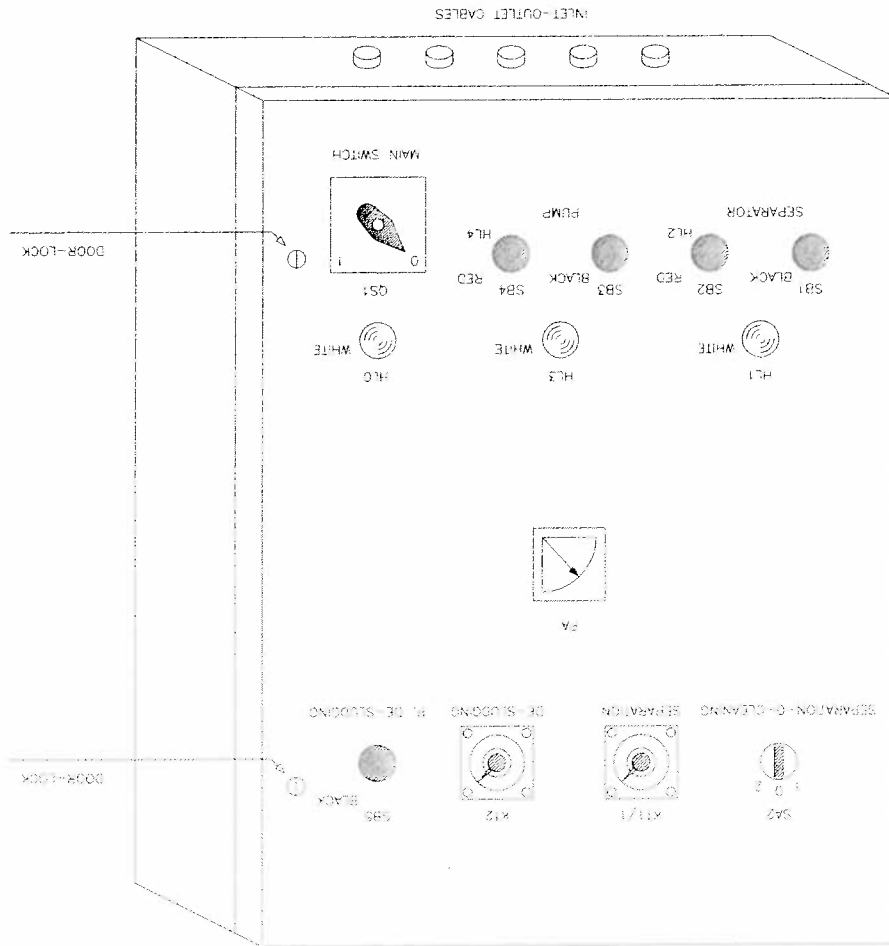


Figure 7.1

### 7.3.2. Regulation devices

#### On Product outlet:

- n°1 micrometric valve to adjust product counterpressure inside the clarifier;
- n°1 manometer;

#### Optional:

- no. 1 constant pressure valve, to maintain constant the counter-pressure at the outlet of the product. The regulation is performed by acting on pressure regulators (RPL, RPT - fig. 7.2) placed on the back side of electric panel;

#### On operating liquid line (OPTIONAL):

- n°2 emergency ball valves in replacement of the solenoid valves that control the opening/closing of the bowl;
- n°1 pressure reducer to settle the liquid pressure;
- n°1 pressure switch to check the liquid pressure value and activate surge tank pump when this is too low;



On electric panel (OPTIONAL):

- n° 2 timers to regulate the operating cycle (for more details of times see document MSE - T).

*Separator equipped with constant pressure valve*

The supply is complete of the following pneumatic components (fig. 7.2):

- working pressure regulator (RPL)
- overflow pressure regulator (RPT)
- working pressure manometer (MNL)
- overflow pressure manometer (MNT)

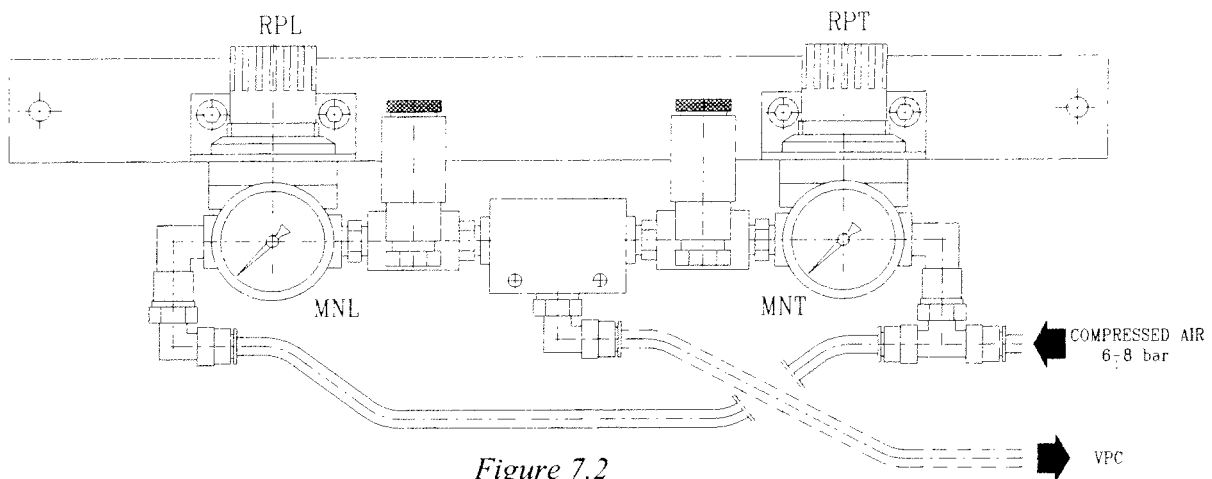


Figure 7.2

*Optional:*

#### 7.4. Functional stop of separator

Follow this procedure:

- Push the PUMP STOP button on the command panel (this button take electric energy off to product feeding pump).
- Push the SEPARATOR MOTOR STOP RED button on command panel (this button take electric energy off to motor but there is tension in the power circuit yet), and rotate the program selector S1 in "0" position.
- DISCONNECTION INTERRUPTER take tension off to electric panel (wait about 25 ÷ 30 min for the stop of bowl).
- To reduce the machine stop time use the brake rotating the hand-wheel in counterclock wise direction of rotation (stop time = 5 ÷ 7 min).

**ATTENTION**  
**Generic danger**

The BRAKE must be used ONLY after the MOTOR has been electrically CUT.

### 7.5. Emergency stop

The yellow-red disconnection interrupter, on electrical panel, operate like an emergency stop because cut out the feeding to machine power actuators. In this way the machine stop is assured in every operating condition.

### 7.6. Energy sources disconnection

#### *ELECTRIC ENERGY*

The general interrupter on the electric panel (door interlock) permits disconnection of the electric feeding. The interrupter can be lock to be sure of more security.

This interrupter can be used like an emergency stop.

#### *PNEUMATIC ENERGY*

Upstream the pneumatic system, the user must predispose an on-off valve that must allow the compressed air cutting.

### 7.7. Preliminary checks

- The bowl must be correctly assembled: the locking rings must be screwed right down (left-handed threaded) and the marks "O" of the corresponding parts must be aligned.
- All the fixed protection (cover, ports, etc.) must be in right position.
- Verify that inlet-outlet flow unit and cover are well fixed.
- Verify that the feeding pipe nut is well screw (left-handed threaded) , in order to obtain a good fixing of the centripetal pumps.
- Check oil level (oil must be slightly above the mark on the sight glass).
- Brake must be released.
- Open the operating liquid cock and regulate pressure at 2 bar. Check pressure simulationing a discharged (push the proper button on electrical panel). During discharged the pressure can not be lower than about 1,5 ÷ 1,7 bar .
- The outlet product and clean liquid valves must be close.
- If separator doesn't work for a long time (more than 3 months), is recommended:
  - check the good conditions of bowl valves;
  - oily separator again following the instruction at §5.5.1;
  - use machine without bowl for about 5 min.

**ATTENTION**  
**Generic danger**

Before start always verify the efficiency of the security devices and of the stop command.

## 7.8. Starting up instructions

**ATTENTION**

**Generic danger**

The machine OPERATOR MUST BE PRESENT at the starting-up phase.

**ATTENTION**

**Danger of clutch overheating**

**MUST NOT BE MAKE STARTING UP IN SUCCESSION**

After two starting up in succession before doing the third starting up wait so that the clutch shoes cool down.

Starting up of machine:

- Rotate the general interrupter (QS1) at "1" position, (light up of the bright white indicator means the presence of tension).
- Start motor of separator using the start button.
- Check the regular start of separator and wait for reaching nominal speed (next about 4 min. reads on tachometer the velocity value 1.740 r.p.m.).
- Rotate the programmer interrupter (SA2 in 1 or 2 position)
- Feed separator with hot water (about the process temperature) plugging the feeding pump start button and regulate the enclosure of bowl (there is the automatic enclosure before reaching nominal speed).
- If the separator has not worked for a long time or it has undergone extraordinary maintenance operations that required cover and inlet-outlet flow unit removal, the chemical cleaning cycle must be performed as described in § 8.5.
- Feed separator with product. If necessary regulate the flowrate using micrometric valves of the inlet-outlet unit. Completely leak the pre-filter.

**ATTENZIONE**

**Generic danger**

During starting-up the machine has not to rotate with empty bowl for a period up than 15 min.

## 8. MACHINE USE

### 8.1. Personnel tasks

Unmanned automatic machine, starting phase only.

#### Operator tasks:

- Normal operation control.
- Good operation testing (fluid level, capacity and temperature value, noisy, evident vibrations).
- Carry out cleaning cycle, with inlet of detergent fluid.
- Routine interventions on electric panel.
- Simple disassemblies.
- Lubricant oil change or topping up.

#### Mechanical technician tasks:

- Corrosion and wears testing.
- Repairs.
- Preventive maintenance with eventual cleaning and/or replacement of some parts.

#### Electrician tasks:

- Interventions on electric system.

### 8.2. Set-up and adjustments

Regulate the separator capacity within the nominal value shown on § 3.3. To achieve this, it is necessary to insert a regulatory valve or a neck washer on the separator feeding line.

To guarantee the machine good operation, control and adjustment operations must be performed before starting phase (see § 7.7).

To obtain a regular and efficient working of separator, feed the separator with constant flow of product.

It's important to avoid air mixing with liquid, so it's necessary to immerse the centripetal pump into the rotating liquid and to have a counterpressure in outlet pipes. This is obtained by the regulating valve in the outlet of the separator.

To set up the process perform the following operations:

- close the micrometric valve on outlet and wait until it is possible to see the flow of some product drop from the solids discharge pipe;
- open the micrometric valve on outlet and reduce the pressure of about 0,5±1 bar. The pressure will have a value of 3÷4 bar;
- In these conditions the correct working of the machine is guaranteed.

#### 8.2.1. Warnings

Always set slowly in and out after each setting and the operation stabilises before doing another change.

When the desired regulation has been achieved, mark the position of the shutter.

*Separator equipped with constant pressure valve*

- Rotate the pressure regulator of the bowl overflow RPT (fig. 7.2) until on MNT (fig. 7.2) could be read a pressure of about 6 bar.
- The regulation of counter-pressure at outlet could be performed acting both on shutter and on regulator RPL. For the best regulation:
  - act on regulator RPL in such a way that the pressure fall to zero;
  - rotate shutter until a pressure of  $2,5 \div 3$  bar could be read;
  - perform subsequent adjusting acting only on regulator RPL.

**8.3. Discharge cycle**

The ejection of the sludges accumulated in the bowl is performed by partial discharges. The partial discharge involves only a partial emptying of the bowl, it happens at bowl nominal speed and without the interruption of the product's feeding. The separation cycle by partial discharges is recommended for a product with a medium-low solids content (lower than 1 % approx).

The regulation of the discharge cycle can be made by 7 timers presents in electrical box, 2 of them can be adjusted on the external panel (KT1/1 e KT2), the others can be adjusted only opening the electrical box.

**ATTENTION**

The setting of the functional parameters depends upon the product's characteristics, the physical parameters of the process and the degree of separation required. Always CONTACT the MANUFACTURER for a suitable choice.

The times to set in electrical panel are scheduled in annexe document MSE-T. Here is explained their function:

**KT1/1) SEPARATION TIME [minutes]**

It's the time between two following discharges during separation. At the end of this time the discharge cycle starts. It has not to be lower than 180 seconds.

**KT1/2) WASHING TIME [minutes]**

It's the time between two following discharges during washing. At the end of this time the discharge cycle starts. It has not to be lower than 180 seconds.

**KT2) PARTIAL DISCHARGE TIME [seconds]**

During this time the solenoid valve for bowl opening (YV1) is opened. This time is in relation with the sludges volume effectively discharged. Increasing T1 a higher volume of ejected sludges is obtained and viceversa.

**KT3) BOWL CLOSING TIME [seconds]**

During this time the solenoid valve for bowl rinsing and closing (YV0) is opened. Oil starts filling the chamber between sliding piston and bowl body, lifting the piston and closing the bowl. This time have not to be lower than 8 sec.

**KT4) DELAY OF PARTIAL DISCHARGE [seconds]**

During this time the solenoid valve for bowl rinsing and closing (YV0) is opened and oil passing through the small pipe connecting solenoid valve with bowl body. This oil coat the internal surface of the bowl and the interval between bowl and cylinder to avoid the sedimentation of crystals and deposits.

**KT5/6) ON = BOWL CLOSING PAUSE TIME [minutes]**

It's the time between two subsequent injections of closing and rinsing liquid.

**KT5/6) OFF = BOWL CLOSING IMPULSE TIME [seconds]**

During this time the solenoid valve for bowl rinsing and closing (YV0) is opened. This action is necessary to maintain the closing of the bowl and the rinsing of the area between the bowl and the cover.

**KT  $\Delta$  /  $\Delta$  STARTING PHASE M1 [seconds]**

During this time separator motor is electrically fed with the phases connected in "star" way; after this time the separator motor is electrically fed with the phases connected in "delta" way.

**ATTENTION**

The following instructions have an orientative meaning because the adjust of the working cycle is extremely conditioned by the characteristics of the products and the physical parameters of the process (capacity, temperature, viscosity, density, etc.).

The separation time KT1/1 can be calculated approximately using the procedure reported in the following example:

**Example**

<u>Process data</u>	Capacity	2.500 l/h
	Content of solids in the inlet	0,5 %
	Content of solids desired in the output	0 %

The reduction of the solids content required to the machine is 0,5 %.

The quantity of separated solids in one hour is:

$$\text{Separated solids} = \text{Capacity} \times \text{Percentage of solids reduction} = 2.500 \times 0,5/100 = 12,5 \text{ l/h}$$

The useful volume of the solids chamber (which collects the separated solids) is calculated by introducing a safety factor being equal to 0,8. If the total volume of the solids chamber is  $V = 10 \text{ l}$ , then:

$$\text{Useful volume} = \text{Total volume} \times \text{Coeff. of safety} = 10 \times 0,8 = 8 \text{ l}$$

Now it must be calculated how many times the solids chamber is filled up in one hour:

$$n = \text{Separated solids} \div \text{admittable capacity} = 12,5 \div 8 = 1,5625 \approx 2 \text{ times} *$$

\* *always rounded up by excess.*

The separation time (time between a discharge and the other) must be then:

$$\text{Time of separ.} = \frac{\text{Seconds in one hour}}{N^{\circ} \text{ fill ups in one hour}} = \frac{3600}{2} = 1800 \text{ sec}$$

the time must be set by using the timers K12 on the electric panel.

The quantity of solids evacuated at each discharge is:

$$\text{Volume of evacuated solids} = \text{Separated solids} / \text{N}^\circ \text{ of discharges} = 12,5 / 2 = 6,25 \text{ l}$$

The volume of the evacuated liquid must be  $2 \div 3$  l more than the volume of the evacuated solids.

$$\text{Volume of evacuated liquid} = \text{Volume of evacuated solids} + 2 \div 3 = 6,25 + 2 \div 3 \approx 8 \div 9 \text{ l}$$

Now a discharge time must be set. At the beginning try with:

$$\text{Discharge time} = 0,07 \text{ sec} = 7 \text{ c.sec.}$$

Perform a partial discharge, collect in a container all the liquid actually discharged and verify that the volume corresponds to the calculated one.

If the actual volume is lower than the calculated one, the discharge time T1 must be increased ( $8 \div 9$  c.sec); while if the discharged volume is higher than the calculated one the discharge time T1 must be reduced ( $5 \div 6$  c.sec.).

#### 8.4. Ordinary maintenance

To guarantee the machine functionality and long-life, the operator must perform cleaning and ordinary maintenance.

##### **Ordinary maintenance**

##### *Before every shift*

Check that shields are undamaged

Check hydraulic, electric and pneumatic connections

Oil level check

Brake disconnection check

Operating water pressure control

Pneumatic system pressure control

##### *Operating machine*

General operation check

Control of capacity value and temperature

##### *At the end of every shift*

Machine chemical cleaning to remove working residuals.

#### 8.5. Separator chemical cleaning

The separator must be chemically cleaned to maintain a high efficiency level and to assure the hygiene of parts in contact with the product.

The correct product affect the cleaning efficiency, but how long is it in contact with the end of every working cycle.

The best result is obtained with the solution of caustic soda and water extracted.

**ATTENTION**  
**Generic danger**  
Cleaning solutions must NOT contain CHLORINE

The frequency of *cleaning cycle with caustic soda* depends on the characteristics of treated product. The following operations are recommended:

- Rinse the bowl with cold water for about 5 ÷ 10 min.
- Fill with 2% solution of caustic soda heated up to 75 ÷ 90 °C for about 30 minutes (for an efficient cleaning the solution temperature must never fall below 75°C).
- Rinse the bowl with cold water for about 5 ÷ 10 min.

If there are a lot of limestone deposits, it's necessary to make a *nitric acid cleaning cycle*. In this case proceed as follows:

- Rinse the bowl with cold water for about 5 ÷ 10 min.
- Fill with 0,5% solution of nitric acid heated up to 75 ÷ 90 °C for about 20 minutes (for an efficient cleaning the solution temperature must never fall below 75°C).
- Rinse the bowl with cold water for about 5 ÷ 10 min.

It is suitable to make two bowl discharges (at least) during each phase of cleaning cycle. During every cleaning phase the bowl should overflow for about 5 ÷ 10 seconds, (close the micrometric valve shutters, at the separator outlets) to wash the external surfaces of the bowl and the internal surfaces of cover and cyclone.

If you use the cleaning liquid line, before every discharge it is necessary to close the inlet valve to interrupt the separator feeding. The valve must be opened when separator has reached the nominal speed again.

Every cleaning cycle phase must finish by a total discharge (push button on electric panel).

**ATTENTION**  
**Burning danger**  
When cleaning takes place, a solution heated up to 75 °C flows in pipes, so DO NOT TOUCH the connection pipes, the inlet-outlet flow unit and the bowl cover.



## 9. GEAR

During the dismantling-assembly handle every component carefully, avoiding shocks and damages; use a suitable equipment.

### 9.1. Disassembly of the vertical shaft (Tab. 06)

#### ATTENTION

When disassembling is suggested to put in a suitable area the dismantled components to make easier finding them out and to verify the completeness of the assembly at the end of it.

To dismantle vertical shaft, first of all, disassembly solenoid valve unit (Tab. 05) and remove pipes (05.020.0 and 05.015.0), next displace helical wheel (parts from 07.190.0 to 07.230.0) to the right side making it run along the horizontal shaft (Tab. 07). Then proceed as follows:

- 1) Remove screw (06.300.0), operating liquid injector (06.280.0) and cover (06.270.0) with its gasket (06.290.0).
- 2) Lift labyrinth (06.250.0) with its gasket (06.260.0).
- 3) Remove elastic support assembly (06.240.0 ÷ 06.190.0).
- 4) Remove rings (06.180.0), (06.175.0) and (06.170.0).
- 5) Extract vertical shaft (06.140.0) together with its ball bearings.
- 6) Extract spheric support with all its parts (06.042.0 ÷ 06.065.0) by screwing a M10 screw into its threaded hole.
- 7) Remove the three screws (06.030.0) and then screw two of them on threaded holes of bush (06.020.0).

### 9.2. Assembly of the vertical shaft (Tab. 06)

Before assembly vertical shaft accurately clear and control all parts, making particular attention to gasket and ball bearings.

- 1) Insert spheric support with all its parts (06.042.0 ÷ 06.065.0) into bush (06.020.0).
- 2) Fix bush with its OR (06.010.0) to frame.
- 3) Assemble all parts from (06.070.0) to (06.160.0) on vertical shaft (06.140.0). The two thrust ball bearing (06.080.0) must be set as shown in figure 9.1.

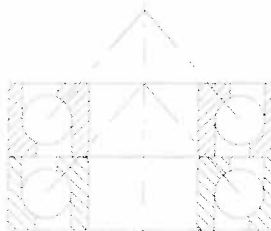


Figure 9.1

- 4) Insert vertical shaft into frame guiding self-aligning ball bearing (06.100.0) into bush (06.020.0).
- 5) Set rings (06.170.0), (06.175.0) and (06.180.0).
- 6) Set elastic support (06.190.0 ÷ 06.240.0).
- 7) Set labyrinth (06.250.0, 06.260.0), cover (06.270.0, 06.290.0) and operating liquid injector (06.280.0, 06.258.0) and fix all by the screw (06.300.0).

### 9.3. Disassembly of the horizontal shaft (Tab. 07)

#### ATTENTION

When disassembling is suggested to put in a suitable area the dismantled components to make easier finding them out and to verify the completeness of the assembly at the end of it.

To completely dismantle horizontal shaft, first of all, stake down clamping flange of gear housing, brake unit and motor cover by operating on suitable screws (Tab. 08). Then proceed as follows:

- 1) Remove motor with shoe holder and clutch shoes (07.030.0 ÷ 07.060.0) after unscrewing screws (07.010.0). **Do not remove the brake rings** on the shoe-holder because the dynamic balancing can be forged.
- 2) Remove motor ring support (07.080.0) unscrewing screws (07.070.0).
- 3) Unscrew tachometer support cover (07.330.0), tachometer (07.320.0), screws (07.300.0).
- 4) Extract tachometer side support (07.270.0) with ball bearing (07.250.0) and OR gasket (07.260.0). Extraction of unit can be make screwing two screws (07.300.0) into two threaded holes of the support.
- 5) Unloose screws (07.230.0) of helical gear wheel (07.200.0) and move wheel to the right side.
- 6) Remove screws (07.120.0) (through the holes of the clutch pulley) extract horizontal shaft 07.090.0 by the frame together clutch side support (parts from 07.140.0 to 07.180.0) extracting at the same time helical wheel (07.200.0) to vertical shaft. The operation is effected by screwing two screws (07.120.0) into the two threaded holes of the flange (07.140.0). Pay **ATTENTION to avoid shocks on gears**. Extract helical wheel by the frame.

### 9.4. Assembly horizontal shaft (Tab 07)

Before assembly clean and check all parts carefully, with particular attention to gasket and ball bearings.

On assembly be sure that axial groove on support 07.140.0, and oblique hole on support 07.270.0 are in the bottom side of ball bearing housing.

- 1) Assemble clutch side support (parts from 07.140.0 to 07.180.0) on horizontal shaft (07.090.0).

- 2) Insert on frame the unit at n° 1 and fix it at flange (07.140.0) with screws (07.120.0).
- 3) Insert helical wheel on horizontal shaft (07.090.0) with flanges and screws (parts from 07.200.0 to 07.230.0) e fix it in position and fasten with screws (07.230.0).
- 4) Insert tachometer side support on frame (parts from 07.240.0 to 07.270.0) and fix all with screws (07.300.0).  
Screw tachometer and cover (07.310.0+07.330.0).
- 5) Fix motor ring on frame (07.080.0) using screws (07.070.0).
- 6) Preassemble shoe holder and clutch shoe (parts from 07.040.0 to 07.060.0) on motor axis 07.030.0 so assemble all parts and fasten with screw (07.010.0). **Clutch shoe must be set as indicate in fig. 9.2 and in tab 07(with reference to motor direction of rotation) and insert on shoe holder in symmetrical position.** Before assembly carefully clean shoe holder and clutch shoe with emery cloth.
- 7) Reassemble brake unit, gear chamber and, in case motor cover (Tab. 08).
- 8) Fill gear chamber with recommended oil (see § 5.5.1).

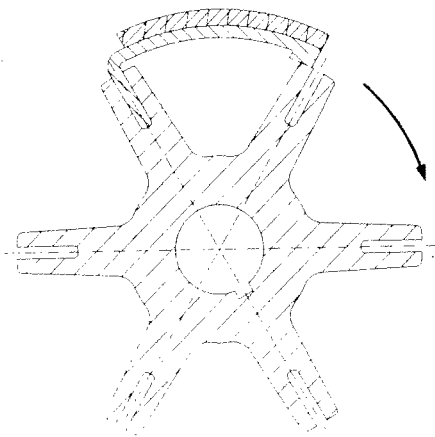


Figure 9.2

## 10. MAINTENANCE

### 10.1. Remarks

**ATTENTION**  
**Generic danger**

All the preventive and extraordinary maintenance operations must be performed with machine not operating and with electric, hydraulic and pneumatic feeding disconnected.

**ATTENTION**  
**Danger of electrocution**

Before performing interventions be sure the tension is disconnected.  
It is not sufficient open the general interrupter to completely disconnect the tension on the control panel because current is still present in the terminals of the block-door interrupter.  
Every electric intervention must be performed by electrician (qualified and competent person).

### Extraordinary maintenance

---

Oil change and accurately cleaning of gear chamber.

---

Bowl disassembly and accurately cleaning of each part, holes and valves.

---

Lubrication of bowl big lock ring and guides and sliding surfaces.

---

Lubrication of motor ball bearings according to manufacturer instructions.

---

Check of bowl gaskets.

---

Check of springs and buffers (eventual replacement).

---

Check of brake lining height.

---

Check the presence of operating liquid in lubrication oil.

---

Control of clutch shoes wear.

---

Remove the gear sight glass and check helical tothing of crown gear.

---

Check erosion and corrosion of threads of lock rings.

---

Replace ball bearings.

---

Repairs after accidental broken.

---

### 10.2. Corrective and preventive maintenance

Periodical maintenance and correct use are indispensable elements to warrant functionality, safe operation and long life of machine. Extraordinary maintenance interventions, at prescribed intervals, must be performed by mechanical technician who must operate in accordance with safety prescriptions reported in this Handbook. Check the effective working time of the machine, reading the value reported in the hour counter placed inside the electric panel.

## Preventive maintenance Plan

Operating hours						Maintenance	Frequency				
300	750	1500	3000	6000	12000		Every day	1/4 year	1/2 year	1 year	2 years
●						First oil change after initial start-up and thorough cleaning of gear chamber.					
						Check oil level.	●				
	●					Oil change and thorough cleaning of gear chamber.					
whenever disassembling						Grease bowl big lock ring and guide and sliding surfaces.	whenever disassembling				
					●	Grease motor ball bearings according to manufacturer's instructions.					
	when necessary					Clean filter in operating-liquid line.		when necessary			
						Clean discharge holes in operating-liquid feeding system.			●		
			●			Remove bowl and clean interior of frame and cyclone.			●		
	depends on product					Dismantle the bowl and clean thoroughly bores and chambers of the hydraulic system.		depends on product			
		●				Check bowl gaskets.					
		●				Check disks stack compression.		1 <sup>st</sup> check			
		●				Check starting time and rated speed.					
		●				Check buffer springs and buffers of vertical shaft support. Check brake shoes.					
			●			Check the wear of clutch shoes.					
						Check the presence of operating liquid in lubrication oil.		●			
			●			After removing the gear sight glass, check gearing of helical wheel gear.					
depends on product						Check spaces between solids ejection holes.	depends on product				
						Bowl inspection. Check erosion and corrosion on threads of lock rings.				●	
				●		Replace ball bearings on vertical shaft.					
					●	Replace ball bearings on horizontal shaft.					
					●	Replace ball bearings on motor shaft.					
				●		Replace buffer springs of vertical shaft support.					

### 10.3. Troubleshooting

The following table shows the main problems that may happen during operation. The probable causes and the remedies to adopt are still mentioned.

n°	TROUBLE	CAUSE	REMEDY
1	Revolving speed of bowl inferior to the rated one or starting time being too long (more than 4-5 min).	Wrong electrical connection.	Check voltage of mains and make electric connection again.
		Brake applied.	Release brakes by screwing hand-wheel.
		Motor operating in star-mode.	Check the electrical equipment.
		Clutch shoes oily.	Clean shoes and clutch pulley with emery cloth.
		Clutch shoes worn.	Replace the shoes.
	Some dirty slow down the bowl.	Disassembly cover and bowl and accurately clean them.	
2	Tachometer reads "O" while bowl is running.	Tachometer is not connected to the horizontal shaft.	Restore the connection correctly (drive pin, tachometer spring).
		Faulty tachometer.	Replace tachometer.
3	Standstill bowl while tachometer reads rated speed.	Helical gear wheel unclamped on horizontal shaft.	Tighten locking screws of helical gear wheel.
4	Bowl speed slows down during working.	Clutch shoes oily.	Clean shoes and clutch pulley with emery cloth.
		Clutch shoes worn.	Replace the shoes.
		Voltage drop.	Check voltage.
		Dripping from bowl.	See at trouble n° 7). check solenoid valves.
	Motor slows down during working.	Check motor.	
5	Starting time too short (starting current too high)	Rust connect shoes and clutch pulley.	Clean shoes and clutch pulley with emery cloth.
		Wrong number of shoes.	Check number of shoes. They can't be more than three.

n°	TROUBLE	CAUSE	REMEDY
6	Anomalous vibration and excess of noise during working.	Bowl out of balance due to:	
		- incorrect assembly or with parts from other bowls.	Assemble bowl correctly.
		- disks column has not adequate compression.	Add some disks (§ 6.1).
		- bad bowl desludging (vibration is higher with empty bowl).	Carefully clean the bowl and increase discharge time (T2) or reduce time between two following discharges (T1).
		- bowl parts damaged during disassembly or assembly.	Bowl must be inspected by one of our technicians.
		- clutch shoes not disposed correctly.	Check shoes are simmetrically disposed.
		- big lock ring badly tightened.	Disassemble and tighten lock ring.
		Inefficient support of vertical shaft owing to:	
		- broken or fatigued springs	Replace whole set of springs.
		- buffers seized.	Replace all buffers.
		Worn-out ball bearings	Replace all ball bearings and use the prescribed ones.
		Gears are in bad conditions owing to normal wear or:	Replace worn out part as well as helical wheel and pinion; carefully clean gear housing and change oil using the prescribed one. Eventually change oil more frequently. Clean or replace valve and check electric connection and component, if necessary.
		- lack of oil or oil is too fluid (gears become bluish)	
		- liquid in oil, (frame drain obstructed cleaning of inner upper surface of frame - solenoid valve YVI locked in open position).	
		- sludge in gear housing.	
- delayed oil change.			
- non contemporary replacement of helical wheel and pinion.			

n°	TROUBLE	CAUSE	REMEDY
7	The bowl does not close	<p>Shortage of operating liquid due to:</p> <ul style="list-style-type: none"> <li>- feeding line cock turned off.</li> <li>- filter cartridge obstructed.</li> <li>- pressure reducer out of calibration.</li> <li>- holes of distributing cover obstructed.</li> </ul> <p>Non opening or inadequate opening of solenoid valve YV0 (Tab.21) due to:</p> <ul style="list-style-type: none"> <li>- solenoid valve broken or obstructed.</li> <li>- wrong electrical connection to the solenoid valve</li> <li>- not correct calibration of timers.</li> </ul> <p>Worn-out gaskets of bowl valves (Tab. 03).</p> <p>Worn-out gasket (5) fig. 6.1 of moving ram.</p>	<p>Turn it on</p> <p>Replace cartridge</p> <p>Regulate pressure at <math>1,8 \div 2</math> bar.</p> <p>Clear holes.</p> <p>Clean or replace solenoid valve.</p> <p>Check the connection.</p> <p>Regulate timers (see doc. MSE-T).</p> <p>Replace gaskets.</p> <p>Replace gasket.</p>
8	The bowl does not close correctly.	<p>Gasket of nylon (11) fig. 6.1 damaged.</p> <p>Worn-out gasket (5) fig. 6.1 of moving ram .</p> <p>Sludges prevent moving ram from fully adhere on nylon gasket of bowl hood.</p> <p>Worn-out gaskets of bowl valve (Tab. 03).</p>	<p>Replace gasket.</p> <p>Replace gasket.</p> <p>Clean bowl.</p> <p>Replace gaskets.</p>
9	The bowl does not open, even operating by hand on emergency ball valve BVI (Tab.21), which substitute solenoid valve YV0.	<p>Shortage of operating liquid: see at trouble 7) - shortage line.</p> <p>Worn-out gaskets of bowl valves.</p>	<p>See at trouble 7). Enlarge line inserting a large diameter pipe and/or installing a surge tank.</p> <p>Clean bowl valves and replace gaskets.</p>



n°	TROUBLE	CAUSE	REMEDY
10	The bowl does not open, opening takes place only operating by hand on emergency valve BVI (Tab.21), which substitute solenoid valve YVI.	Non opening of solenoid valve YVI due to:	
		- disconnected programmer (switch S1 in pos. "0").	Connect programmer (switch S1 in pos. "I" o "II").
		- worn-out programmer.	Verify cause and replace the worn-out component.
		- not correct calibration of timers T2, T3, T4.	Regulate timers (see at doc. MSE-T).
		- solenoid valve broken or obstructed.	Clean or replace solenoid valve.
	Worn-out gaskets of bowl valves (Tab. 03).	Replace gaskets.	
11	The bowl does not open correctly.	Not correct calibration of timer T2.	Regulate timer (see at doc. MSE-T).
		Insufficient pressure and/or capacity of operating liquid line.	Check and provide: pressure must be higher than 2 bar. Enlarge line inserting a large diameter pipe and/or installing a surge tank.
		Pressure reducer out of calibration.	Regulate pressure at $1,8 \div 2$ bar.
		Filter cartridge obstructed.	Replace cartridge.
		Worn-out gaskets of bowl valves (Tab. 03).	Replace gaskets.
12	Leakage of product from solids discharge pipe.	Excessive pressure.	Unscrewing the shutter on product outlet or regulator RPL (fig. 7.2), if present.
		It is worn the upper gasket of bowl hood (15) - fig. 6.1.	Replace gasket.
13	Insufficient product cleaning	Capacity too high.	Reduce the capacity.
		Solids chamber filled	Reduce time between two consecutive discharges.
		Disks column obstructed	Disassemble and clean: attention to the cleaning cycle

Product with excessive content of solids  
 Let product decant and/or insert  
 the product in the separator two  
 times.

n°	TROUBLE	CAUSE	REMEDY
14	Air in product outlet.	Insufficient pressure.	Screw the shutter of micrometric valve on product outlet.
Air infiltration in the product on the separator feeding line.		Check that every pipe union has its gasket, is closed and correctly expanded. Check that pump suck under water head. Pump must not suck air from its mechanical seal.	

## **11. DESACTIVATION/RESALE**

### **11.1. Disassembly/Scrapping**

The user, in accordance with EEC directives or in accordance with laws in force on own nation, is responsible about dismantling and elimination of every part of the machine.

Before unbilding the machine, the user must communicate to the manufacturer all the data reported on the identification plate.

### **11.2. Components and materials elimination**

In case of scrapping, the user, in accordance with local laws in force, must pay particular attention about elimination of materials which cause problems to the environment, as:

- Plastic of pneumatic pipelines,
- Insulated cables,
- Rubber gaskets.

Toxics or corrosives substances are not present.

### **11.3. Resale**

In case of resale as "used machine" the client/user must communicate all installation indications to the buyer, transferring him the responsibility concerning the information above mentioned.

## 12. SPARE PARTS

### How to order spare parts

Machine is marked with a manufacturing number and a model that are evident on the identification plate.

#### **IMPORTANT**

To have a fast delivery of spare parts it is necessary that the following data are ever indicated:

- Model of the machine
- Manufacturing number
- Component reference, code and description
- Quantity of parts required

The information about the spare parts are presents in the Tables of chapter 13.

In a different way, spare parts could be requested using the forms found at the end of chapter 13, where spare parts, which substitution is more probable and frequent, are reported (gaskets, clutch shoes, etc.). In this forms it's sufficient to indicate:

- The model of the centrifugal separator where the parts must be installed;
- The manufacturing n° of the separator;
- The selected spare parts (filling with a X the suitable box);
- The requested quantity.

### **13. DRAWINGS AND DIAGRAMS**

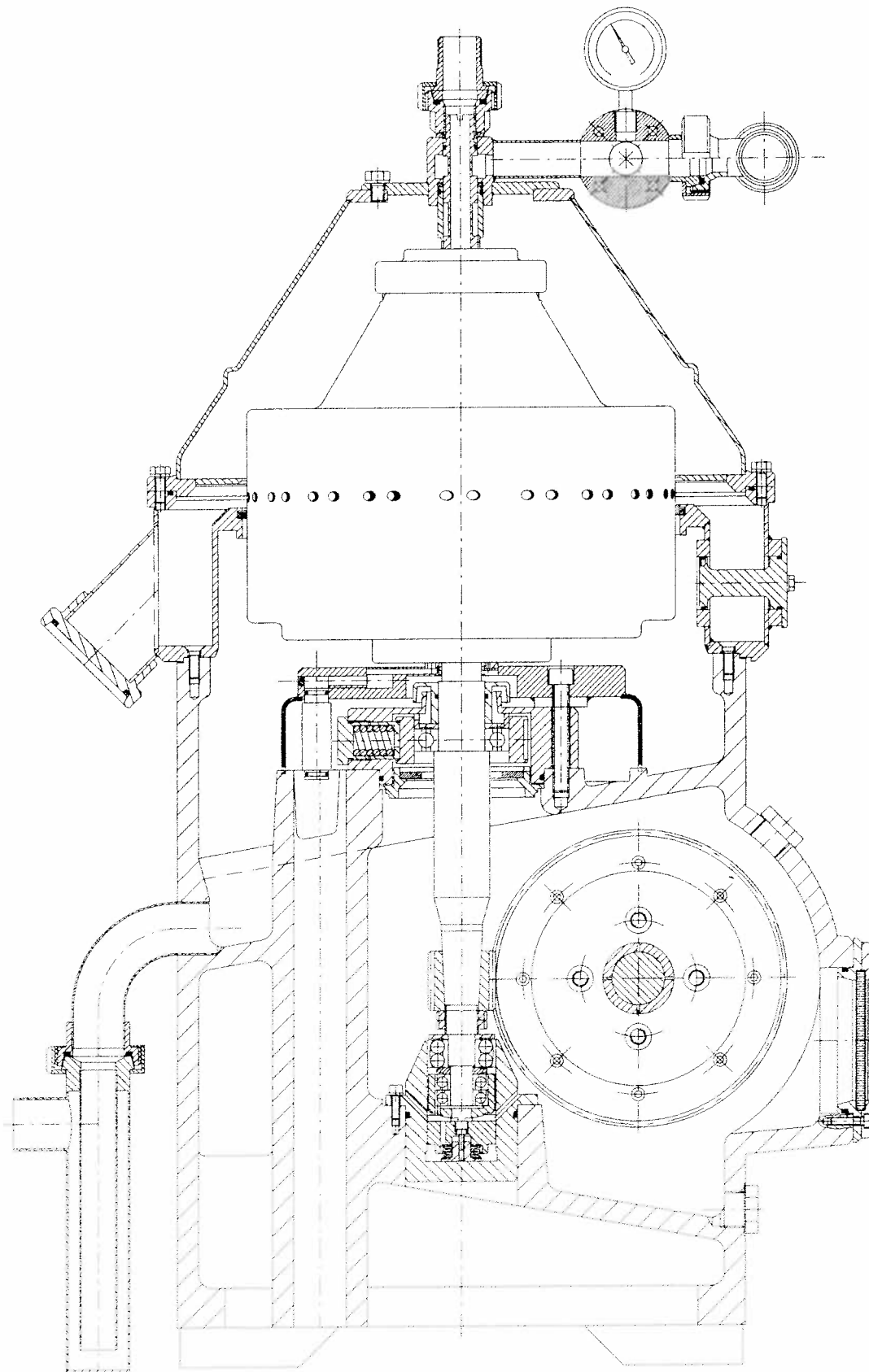
#### **Sections and spare parts tables**

Tab. 01	Vertical section
Tab. 02	Horizontal section
Tab. 03	Bowl
Tab. 04	Inlet-Outlet flow unit
Tab. 05	Operating liquid unit
Tab. 06	Vertical shaft unit
Tab. 07	Horizontal shaft unit
Tab. 08	Frame
Tab. 09	Special spanners

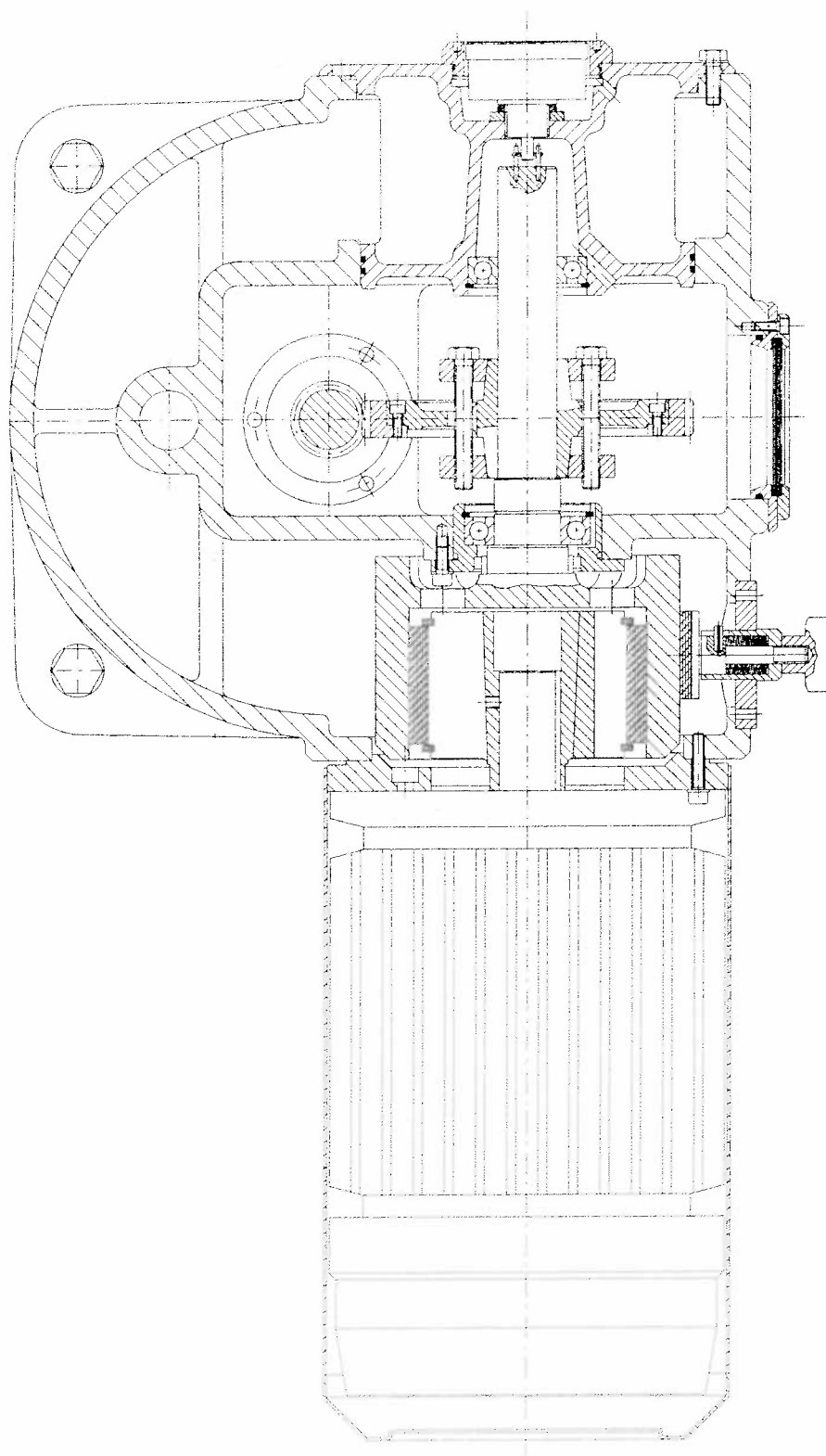
#### **Diagrams**

Tab. 20	Overall dimensions and installation plan
Tab. 21	Hydraulic system diagram
Tab. 22	Identification plates and alert stickers

**VERTICAL SECTION - TAB. 01**



**HORIZONTAL SECTION - TAB. 02**

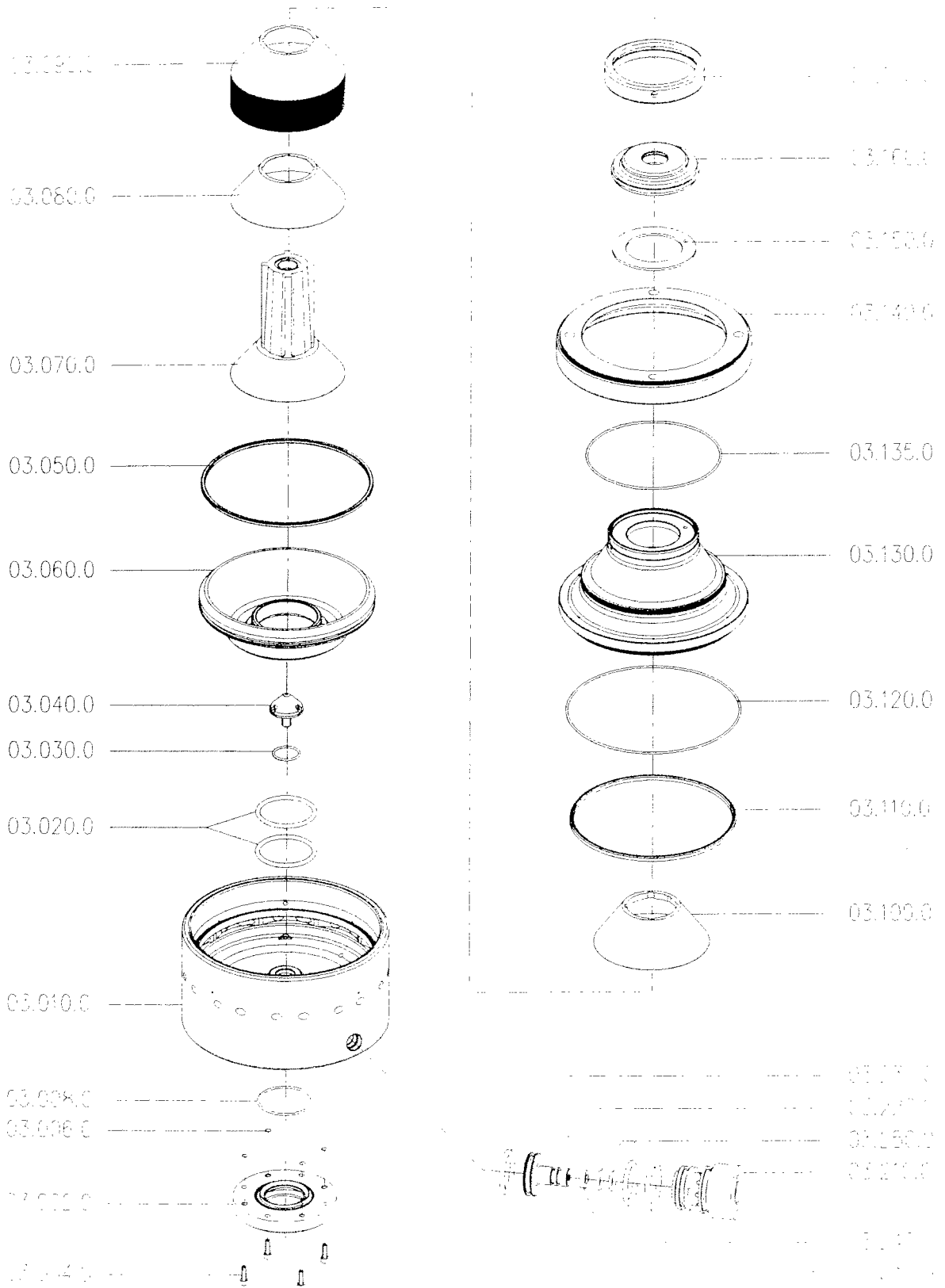


**BOWL - TAB. 03**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
03.002.0	300418100	1	Distributor ring
03.004.0	529011150	4	Screw M6x20
03.006.0	528020134	4	Gasket - holes distributor ring
03.008.0	528020259	1	Gasket - distributor ring
03.010.0	100733000	1	Bowl body
03.020.0 *	528020621	2	OR gasket - bowl body
03.030.0 *	528020170	1	OR gasket - bowl body nut
03.040.0	400591400	1	Nut - bowl body
03.050.0 *	400153901	1	Gasket - moving ram
03.060.0	300291600	1	Moving ram
03.070.0	100613200	1	Distributor
03.080.0	300613300	1	Bottom disk
03.090.0	300613400	~ 36	Intermediate disk
03.100.0	300591500	1	Upper disk
03.110.0 *	400345000	1	Nylon gasket - bowl hood
03.120.0 *	528020543	1	OR gasket - bowl hood
03.130.0	200292700	1	Bowl hood
03.135.0 *	528020272	1	OR gasket - bowl hood
03.140.0	300486900	1	Big lock ring
03.150.0 *	400361800	1	Gasket
03.160.0	400616100	1	Finned cover
03.170.0	400290200	1	Small lock ring
03.210.0	400258300	2	Valve body
03.220.0	400257900	2	Valve ram
03.230.0 **	528020149	4	OR gasket - valve body and ram
03.240.0 **	528020152	2	OR gasket - valve body
03.250.0 **	528020029	4	OR gasket - valve ram
03.260.0 **	400211900	2	Nylon gasket
03.510.0	832000349	1	Set of bowl gaskets (8 pieces,*)
03.520.0	832000046	1	Set of bowl valves gaskets (12 pieces, **)



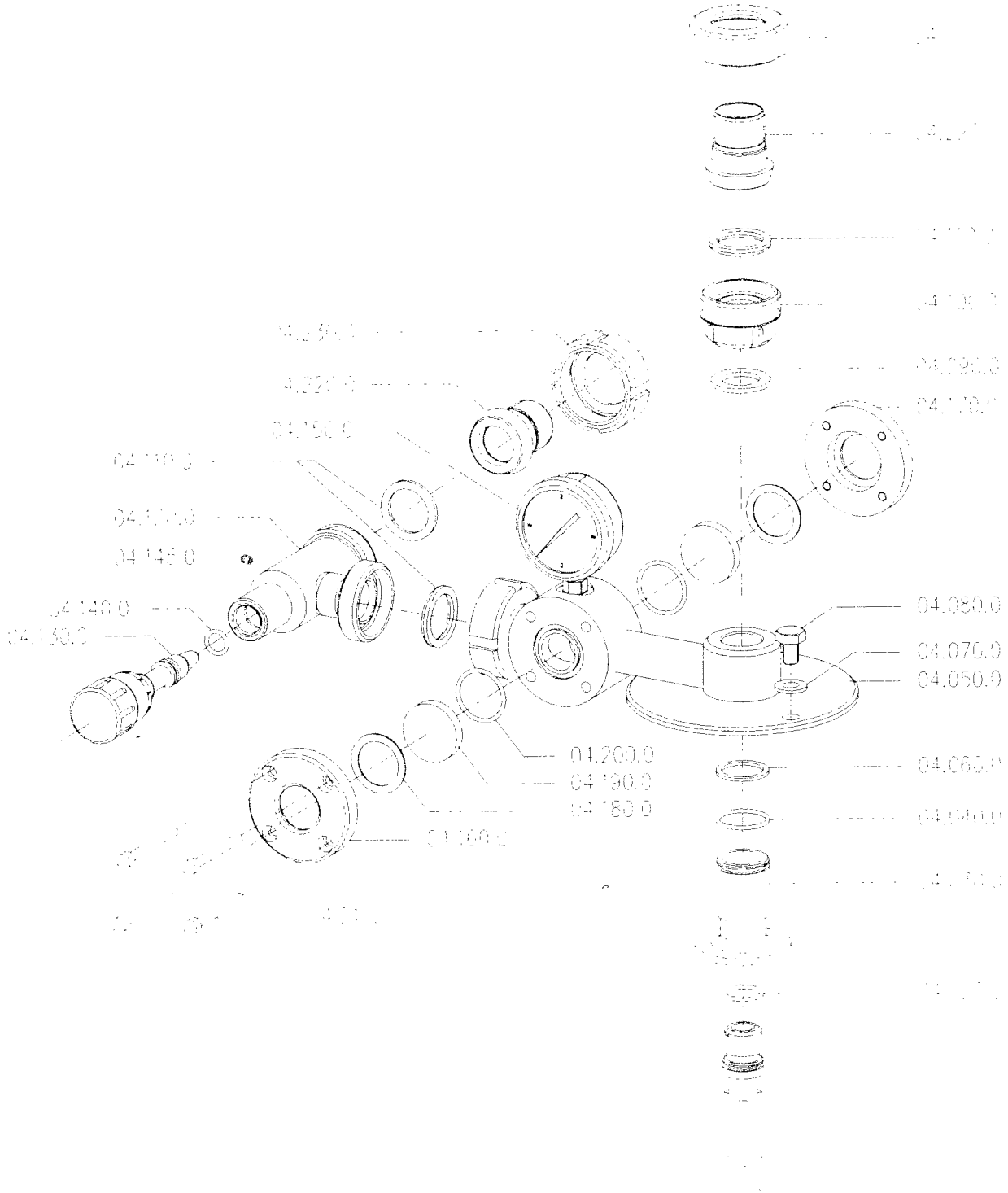
**TAB. 03**



**INLET-OUTLET FLOW UNIT - TAB. 04**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
04.010.0	300362200	1	Feeding pipe
04.020.0 *	528020155	1	OR gasket - feeding pipe
04.030.0	400363500	1	Centripetal pump
04.040.0 *	528020176	1	OR gasket - centripetal pump
04.050.0	300614300	1	Inlet-outlet body
04.060.0 **	40002170/X	0÷4	Spacer
04.070.0	529056010	2	Washer Ø10
04.080.0	529006144	2	Screw TE M10x16
04.090.0 *	400212000	1	Nylon washer
04.100.0	400200300	1	Nut - feeding pipe
04.110.0 *	528151019	3	Gasket DN25
04.120.0	400342400	1	Micrometric valve body
04.130.0	400616600	1	Shutter
04.140.0	528020125	1	OR gasket - shutter
04.145.0	529021076	1	Screw- locking shutter
04.150.0	520060100	1	Manometer
04.160.0	400128400	1	Drilled flange
04.170.0	400128300	1	Flange with threaded holes
04.180.0 #	400153200	2	Gasket - sight glass
04.190.0 #	523880927	2	Glass
04.200.0 #	528020182	2	OR gasket - sight glass
04.210.0	529011168	4	Screw M6x60
04.220.0	400591100	2	Fitting - inlet outlet
04.230.0	523906071	2	Ring
04.510.0	832000255	1	Set of inlet-outlet flow unit gaskets (6 pieces,*)
04.520.0	832004001	1	Set of spacer (3 pieces,** Thickness = 1, 2, 3 mm.)
04.530.0	832010005	1	Set of gasket for micrometric valve (1 piece, 04.140.0)
04.540.0	832020002	1	Set of sight glass with gaskets (6 pieces, #)

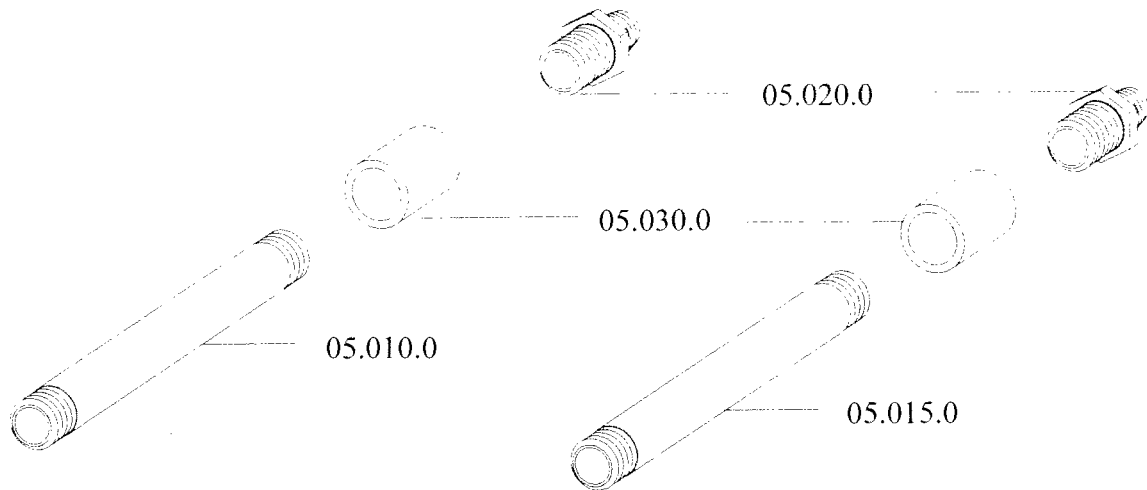
**TAB. 04**



**OPERATING LIQUID UNIT - TAB. 05**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
05.010.0	400249102	1	Rinsing external pipe (threaded)
05.015.0	400249101	1	Discharge external pipe (threaded)
05.020.0	400595700	2	Nipple 3/8" GAS - 3/8" NPT
05.030.0	523901068	2	Pipe coupling - female

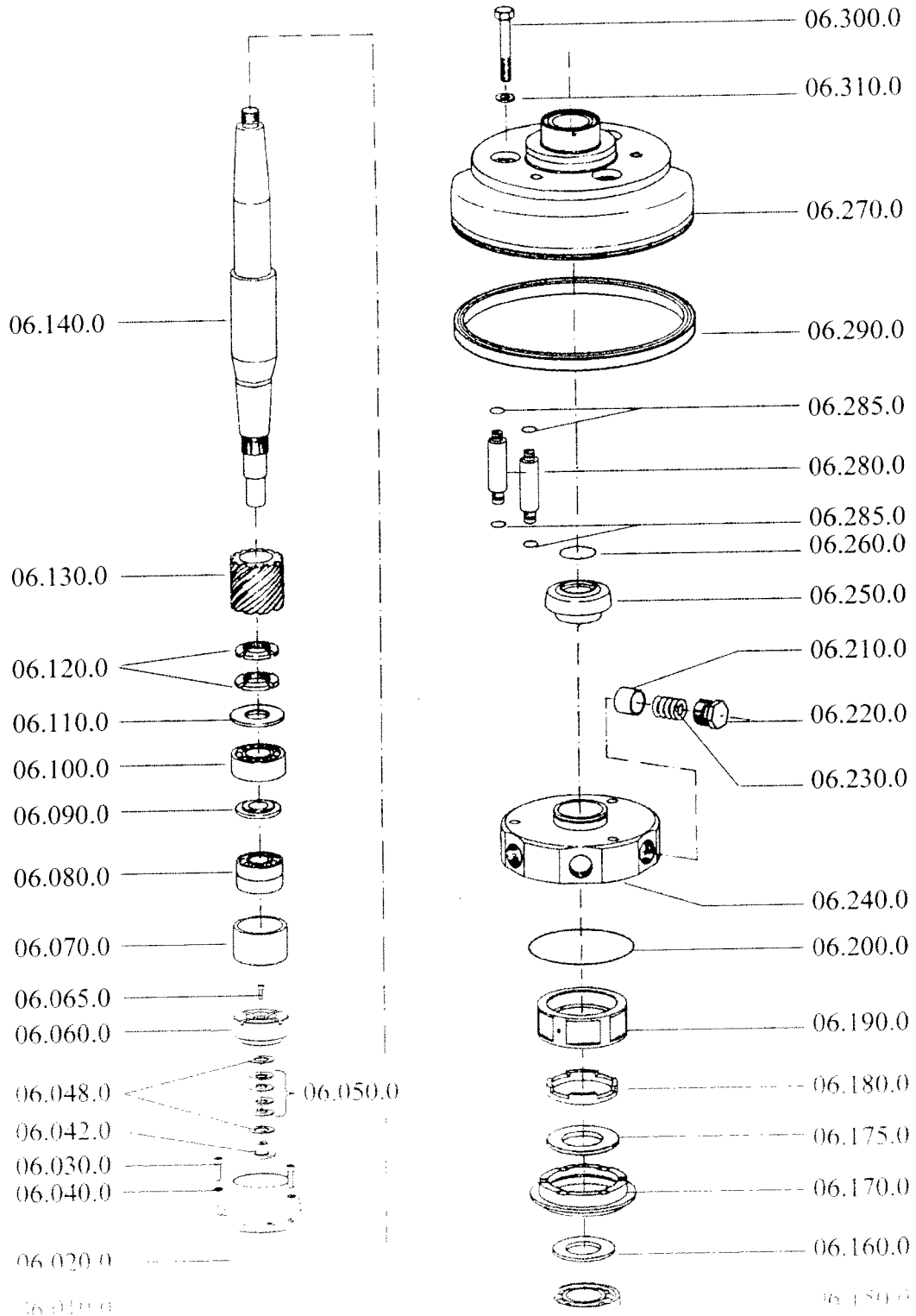
**TAB. 05**



**VERTICAL SHAFT UNIT - TAB. 06**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
06.010.0 **	528020420	1	OR gasket - bush
06.020.0	300040100	1	Bush
06.030.0	529010150	3	Screw TCCEI M6x20
06.040.0	529056506	3	Washer grower Ø6
06.042.0	400889400	1	Guide pin for spring
06.048.0	521100230	2	Bearing washer
06.050.0	529099192	4	Lower springs
06.060.0	400889700	1	Spheric support
06.065.0	529011040	1	Screw M4x12
06.070.0	400040800	1	Spheric bush
06.080.0 *	521075241	1	Couple of thrust ball bearings (2 pieces)
06.090.0 *	400208600	1	Washer - thrust ball bearings
06.100.0 *	521050445	1	Self-aligning ball bearing
06.110.0 *	400207600	1	Washer - self-aligning ball bearing
06.120.0	529066005	2	Ring nut
06.130.0 ***	300643800	1	Helical pinion ( <i>9.600 rpm - 60 Hz.</i> )
06.140.0	300000500	1	Vertical shaft
06.150.0 *	521040260	1	Upper ball bearing
06.160.0 *	400207300	1	Washer - upper ball bearing
06.170.0	300020400	1	Frame ring
06.175.0	400439005	1	Spacer ring
06.180.0	400020900	1	Spacer collar ball bearing
06.190.0	300019400	1	Collar
06.200.0 **	528020459	1	OR gasket - collar cage
06.210.0	400031700	6	Buffer
06.220.0	400294600	6	Buffer spring
06.230.0	400092300	6	Buffer screw
06.240.0	200146500	1	Collar cage
06.250.0	400171300	1	Labyrinth
06.260.0 **	528020188	1	OR gasket - labyrinth
06.270.0	200371200	1	Cage cover
06.280.0	400033200	2	Operating liquid pipe
06.285.0 **	528020125	4	OR gasket - operating liquid pipe
06.290.0 **	401027200	1	Gasket - cage cover
06.300.0	529011350	3	Cage cover screw TCCEI M12x80
06.310.0	529056012	3	Washer Ø12
06.510.0	832005009	1	Set of vertical shaft ball bearings and washers (6 pieces.*)
06.520.0	832001010	1	Set of vertical shaft gaskets (5 pieces, **)
06.530.0	832007070	1	Set of gears (1 piece), screw and washers (2 pieces, **)
06.530.0 **	071901010	1	071901010
06.540.0	832012000	1	Set of buffers (6 pieces, 06.210.0)
06.550.0	832012000	1	Set of buffer springs (6 pieces, 06.220.0)
06.560.0	832012002	1	Set of buffer screws (6 pieces, 06.230.0)

**TAB. 06**

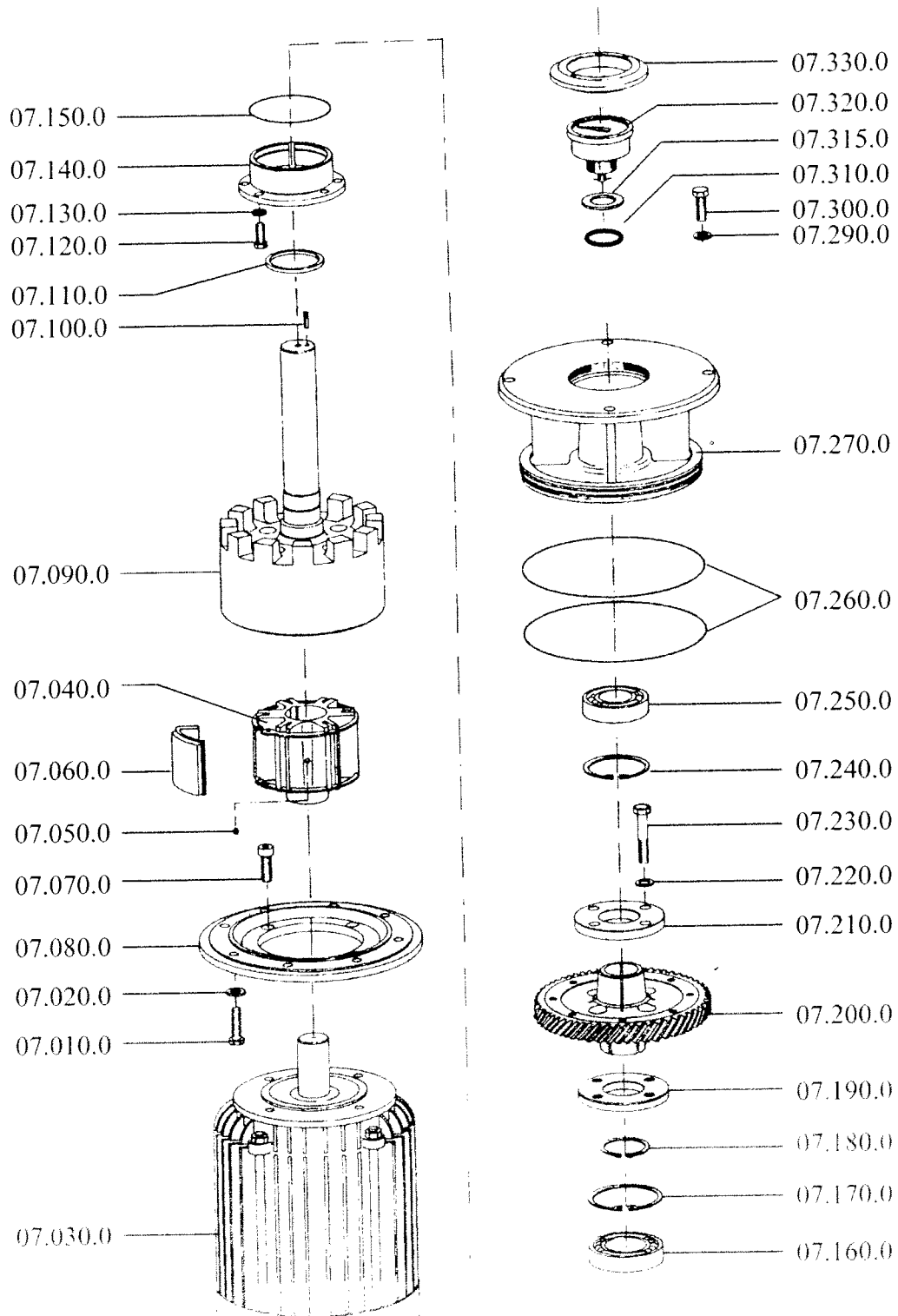


**HORIZONTAL SHAFT UNIT - TAB. 07**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
07.010.0	529005118	8	Motor screw
07.020.0	529055508	8	Washer
07.030.0	526186421	1	Motor
07.040.0	400197500	1	Shoe holder
07.050.0	529023202	1	Screw - shoe holder
07.060.0	400838200	3	Clutch shoe
07.070.0	529010272	1	Screw - motor ring
07.080.0	400134400	1	Motor ring
07.090.0	200233700	1	Horizontal shaft
07.100.0	529071148	2	Drive pin - tachometer
07.110.0 **	528003561	1	Seal ring - clutch side
07.120.0	529005114	4	Screw - clutch side
07.130.0	529055508	4	Washer
07.140.0	300967000	1	Support - clutch side
07.150.0 **	528020435	1	OR gasket - support
07.160.0 *	521000270	1	Ball bearing - clutch side
07.170.0 *	529090585	1	Expanding ring - outer
07.180.0 *	529090045	1	Expanding ring - inner
07.190.0 ***	400125200	1	Locking flange - gear wheel (threaded holes)
07.200.0 ***	300653800	1	Helicoidal gear wheel ( <b>9.600 rpm - 60 Hz.</b> )
07.210.0 ***	400125500	1	Locking flange - gear wheel
07.220.0 ***	529055012	4	Washer
07.230.0 ***	529000158	4	Locking screw - gear wheel
07.240.0 *	529090580	1	Expanding ring
07.250.0 *	521000265	1	Ball bearing - tachometer side
07.260.0 **	528020522	2	OR gasket - support side
07.270.0	300854101	1	Tachometer support
07.290.0	529056010	4	Washer
07.300.0	529006156	4	Screw - support
07.310.0 **	528151020	1	Nylon washer - tachometer side
07.315.0 **	400212700	1	Washer - tachometer side
07.320.0	400231500	1	Tachometer
07.330.0	400149100	1	Tachometer nut
07.910.0	832005005	1	Set of horizontal shaft ball bearings and circlips (5 pieces. *)
07.920.0	832001009	1	Set of horizontal shaft gaskets (6 pieces. **)
06.930.0	832011014	1	Set of clutch shoes (3 pieces. 07.060.0)
06.530.0	832007030	1	Set of gears, flanges, screws, and washers (06.130.0 *** -



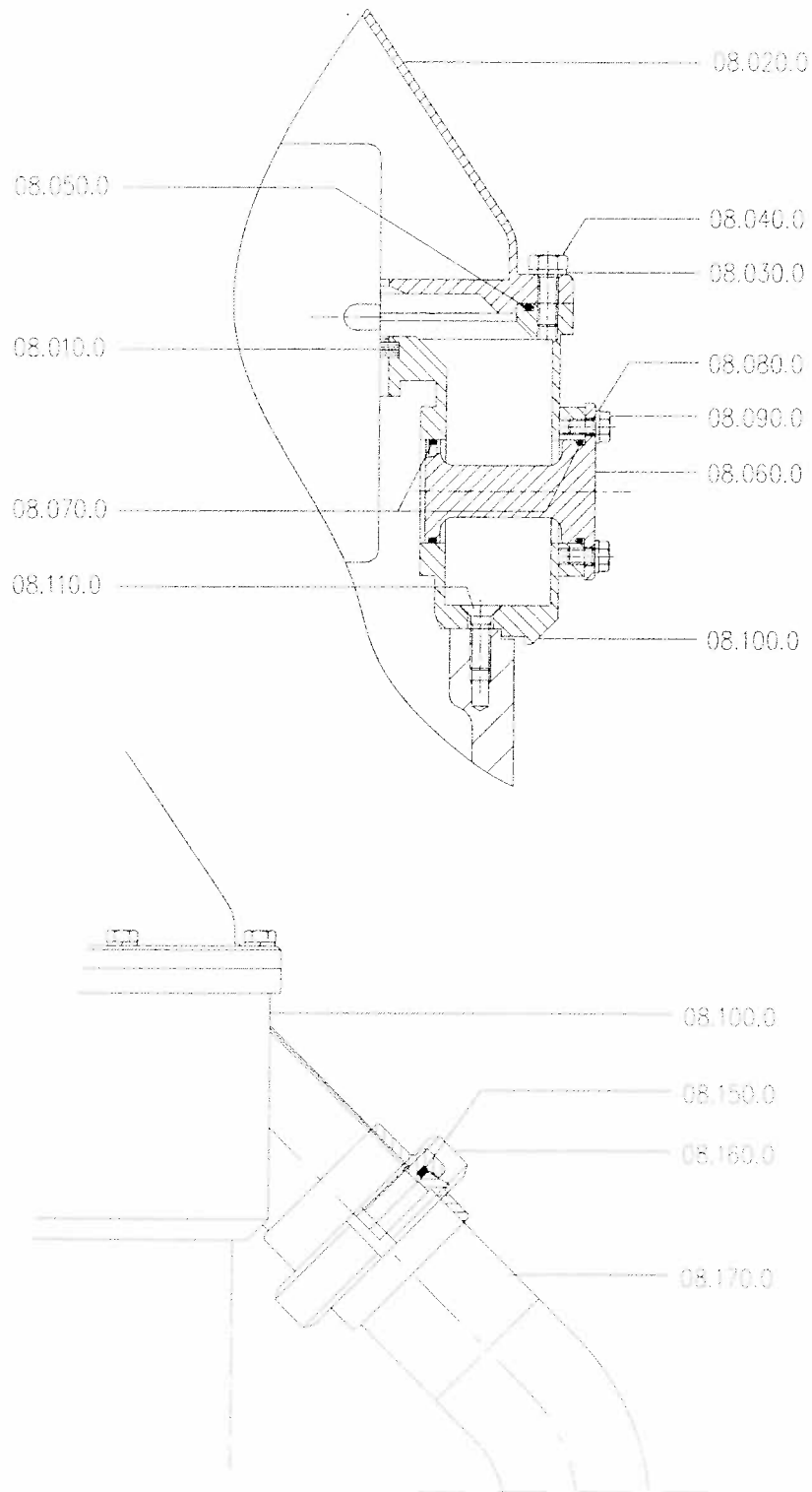
**TAB. 07**



**FRAME - TAB. 08/A**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
08.010.0	400324000	1	Cyclone teflon gasket
08.020.0	200614410	1	Cover
08.030.0	529056508	6	Washer
08.040.0	529006114	6	Cover clamping screw
08.050.0	400303301	1	OR gasket - cover
08.060.0	400678000	1	Port plug for bowl valve
08.070.0	528020188	2	Gasket - plug
08.080.0	529056006	2	Washer
08.090.0	529006110	2	Screw - plug
08.100.0	200060210	1	Cyclone
08.110.0	529013134	8	Screw - cyclone
08.150.0	528151040	1	Gasket DN65
08.160.0	523906081	1	Nut
08.170.0	400636110	1	Separated solids discharge

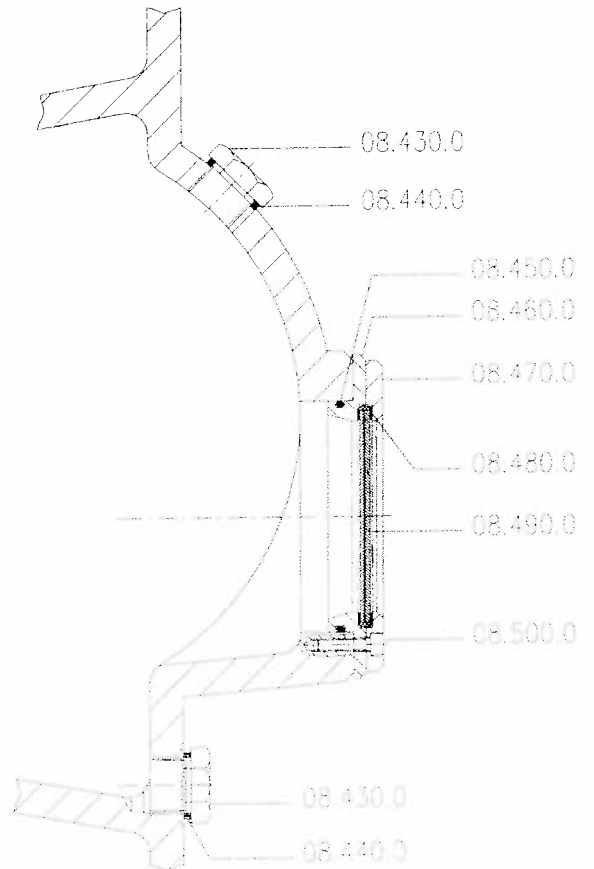
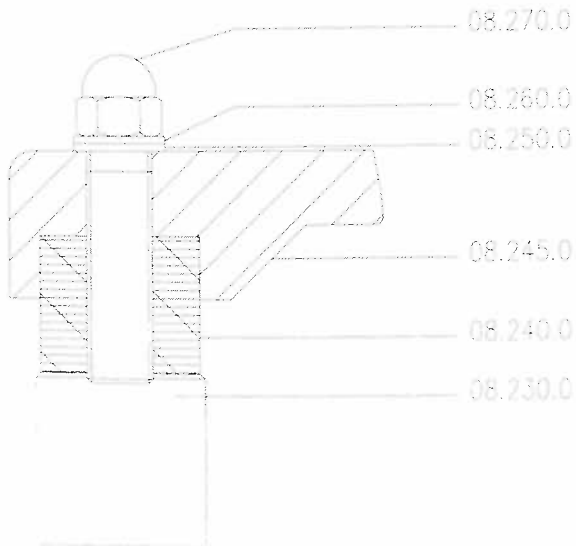
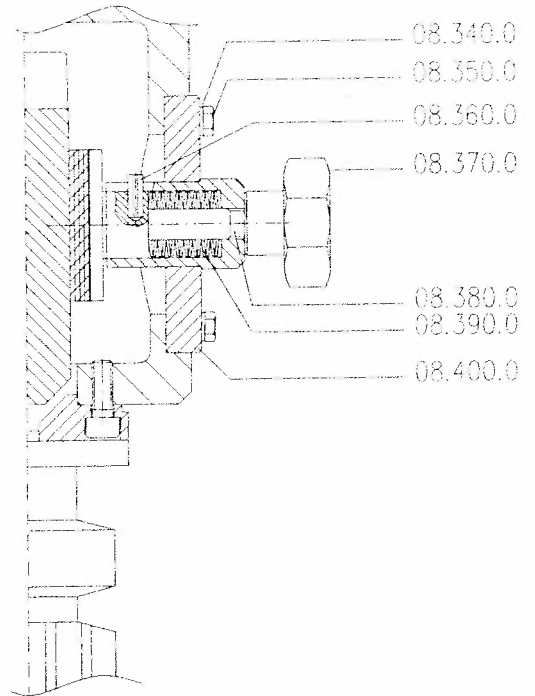
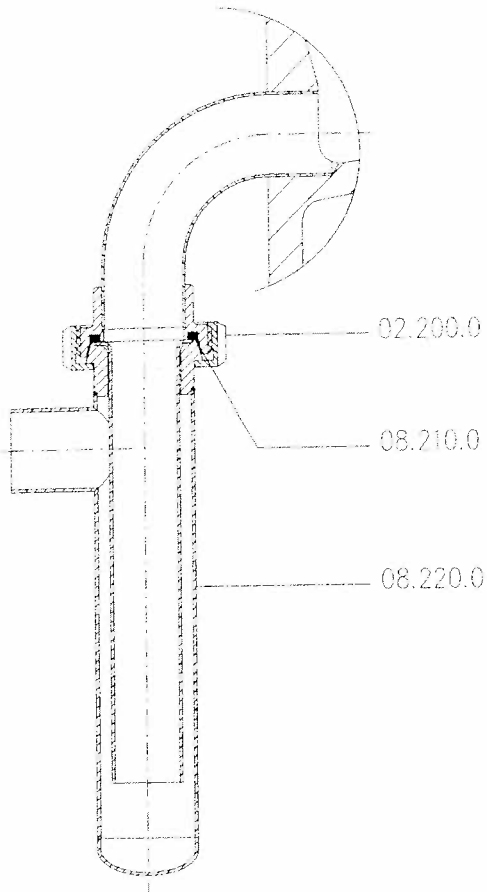
**TAB. 08/A**



**FRAME - TAB. 08/B**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
08.200.0	528151030	1	Gasket DN40
08.210.0	523906075	1	Nut
08.220.0	400734500	1	Drain trap
08.230.0	400314800	4	Feet to weld
08.240.0	400121100	4	Shock absorber
08.245.0	300312101	1	Frame
08.250.0	400213800	4	Nylon washer
08.260.0	529056016	4	Washer Ø16
08.270.0	529061116	4	Cap nut M16
08.340.0	529056006	4	Washer Ø6
08.350.0	529006076	4	Screw TE M6x25 - brake flange
08.360.0 *	529070355	1	Elastic pin - brake
08.370.0	521580020	1	Brake hand wheel
08.380.0 *	400046800	1	Brake shoe with pin
08.390.0	529099169	28	Brake spring
08.400.0	400125100	1	Brake flange
08.430.0	400234300	2	Plug - oil supply/drain
08.440.0	400211200	2	Gasket - oil plug
08.450.0	528020444	1	OR gasket - flange
08.460.0	400135100	1	Inner flange - gear chamber
08.470.0	400856400	1	Outer flange - gear chamber
08.480.0 **	400831900	1	Gasket - sight glass
08.490.0 **	400833600	1	Sight glass
08.500.0	529011154	4	Screw TCCEI M6x25 - sight glass
08.710.0	400046800	1	Brake shoe with pin and elastic pin (2 pieces,*)
08.720.0	832020019	1	Sight glass with gaskets (2 pieces,**)
08.730.0	832016500	1	Set of shock absorbers (4 pieces, 08.240.0)

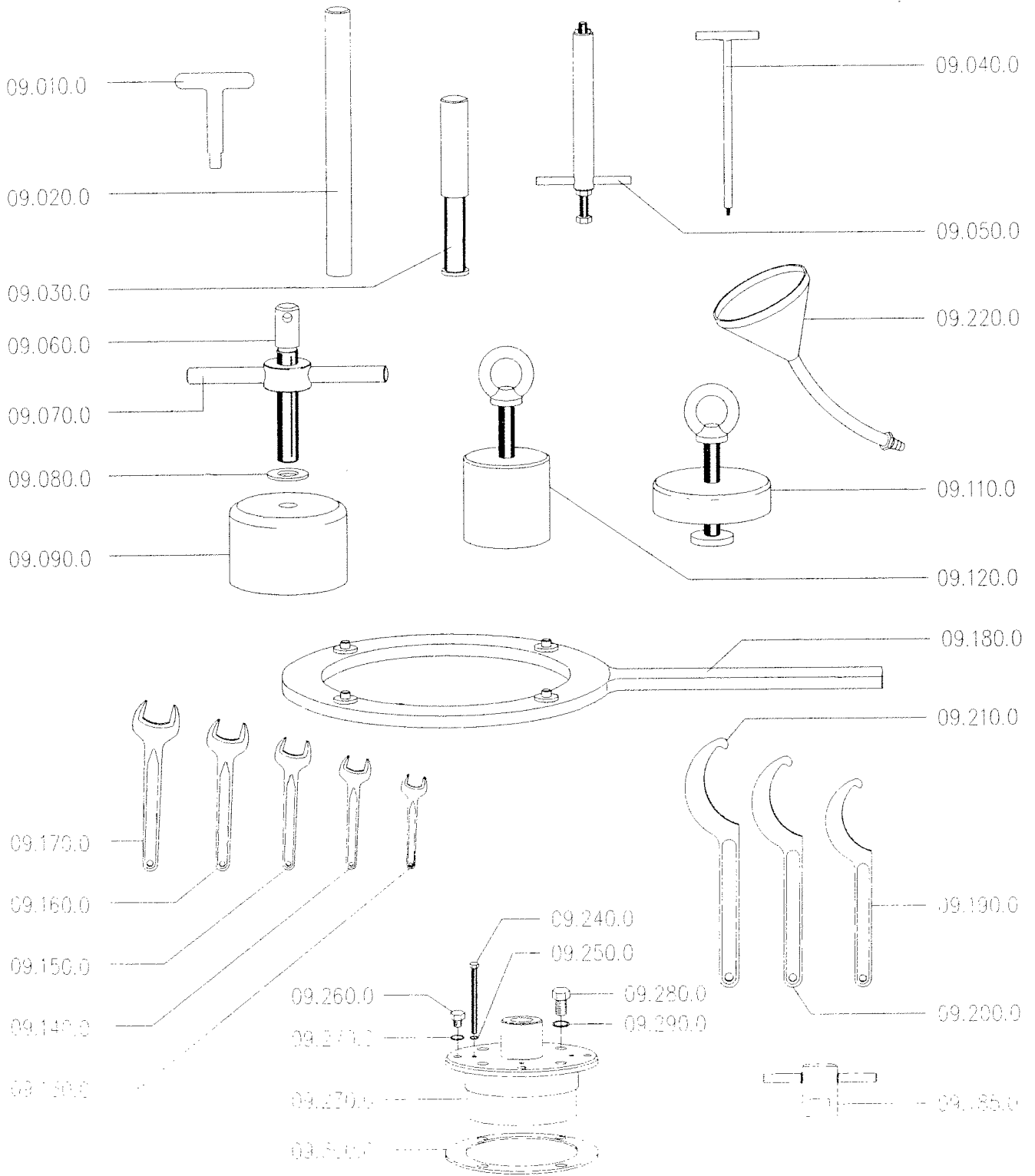
**TAB. 08/B**



**SPECIAL SPANNERS - TAB. 09**

<u>Reference</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
09.010.0	400217300	1	Spanner for feeding pipe locking
09.020.0	400309900	1	Extension pipe
09.030.0	400056000	1	Mallet
09.040.0	400055800	1	Spanner for valve ram extraction
09.050.0	400055900	1	Spanner for valve body extraction
09.060.0 *	400181400	1	Threaded pin for disk compression
09.070.0 *	400093700	1	Nut of disk compression spanner
09.080.0 *	400210700	1	Washer of disk compression spanner
09.090.0 *	400126300	1	Bell of disk compression spanner
09.110.0	400431900	1	Spanner for extracting bowl hood
09.120.0	400054300	1	Spanner for extracting sliding piston
09.130.0	560000010	1	Spanner AC 10 for cyclone plug clamping screws
09.140.0	560000013	1	Spanner AC 13 for cover-cyclone and flow unit-cover clamping screws
09.150.0	560000017	1	Spanner AC 17 for rinsing pipe union
09.160.0	560000019	1	Spanner AC 19 for rinsing pipe union
09.170.0	560000032	1	Spanner AC 32 for oil plugs
09.180.0	300602400	1	Spanner for big lock ring
09.185.0	400591700	1	Spanner for bowl body nut
09.190.0	560040545	1	Union pipe spanner 45/50
09.200.0	560040570	1	Union pipe spanner 68/75
09.210.0	560040120	1	Spanner for small ring 120/130
09.220.0	564900080	1	Oil supply funnel
09.230.0 **	400615800	1	Blocking bowl
09.240.0 **	529006065	4	Screw M5x65
09.250.0 **	529056505	4	Washer
09.260.0 **	529006102	4	Screw M8x12
09.270.0 **	529057508	4	Washer
09.280.0 **	529006152	4	Screw M10x25
09.290.0 **	529056510	4	Washer
09.300.0 **	400616201/2/3	1	Flange thickness 1, 2, 3 mm
09.310.0	400432100	1	Disk compression spanner (4 pieces. *)
09.320.0	832030000	1	Spanner for blocking bowl (**)

**TAB. 09**



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**OVERALL DIMENSIONS AND INSTALLATION PLAN**  
**TAB. 20**

- A Product inlet DN25 DIN11851- 1" NPT
- B Product outlet DN25 DIN11851- 1" NPT
- D Operating liquid inlet 3/8" NPT
- E Operating liquid outlet DN40
- F Solids outlet DN65

***Shields and removables parts for maintenance operations***

- 1 Cover
- 2 Bowl valves plug
- 3 Oil supply plug
- 4 Oil drain plug
- 5 Flange tachometer side
- 6 Carter motor (*optional*)

***Components and equipments***

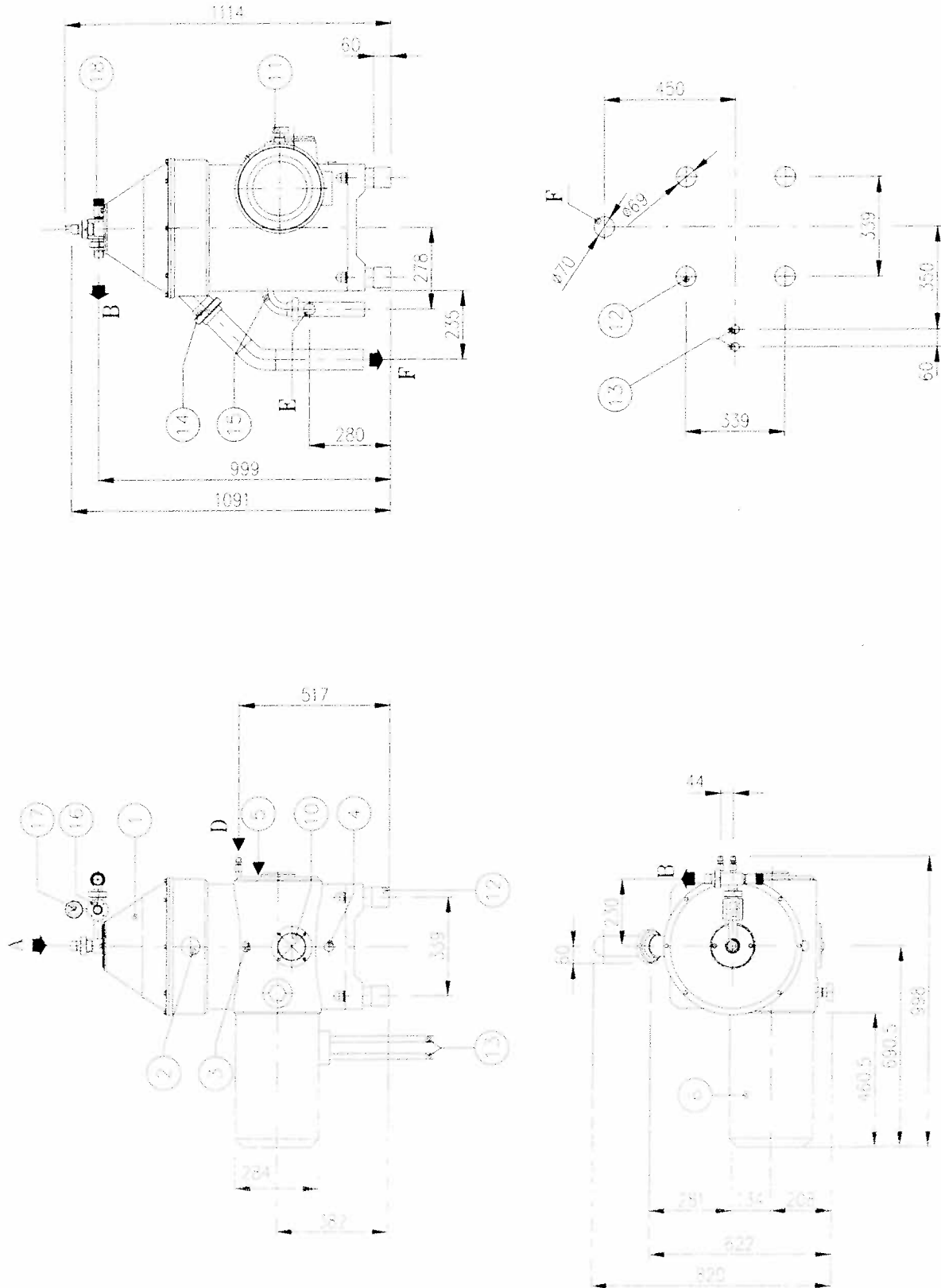
- 10 Sight glass - check standstill machine and oil level
- 11 Brake handwheels
- 12 Feet to weld
- 13 Pipes for motor cables (*optional*)
- 14 Solids discharge pipe
- 15 Drain trap

***Product outlet***

- 16 Sight glass
- 17 Manometer
- 18 Micrometric valve



**TAB. 20**



**HYDRAULIC SYSTEM DIAGRAM - TAB. 21**

- A Product inlet DN25 DIN11851- 1" NPT
- B Product outlet DN25 DIN11851- 1" NPT
- D Operating liquid inlet 3/8" NPT
- E Operating liquid outlet DN40
- F Solids outlet DN65

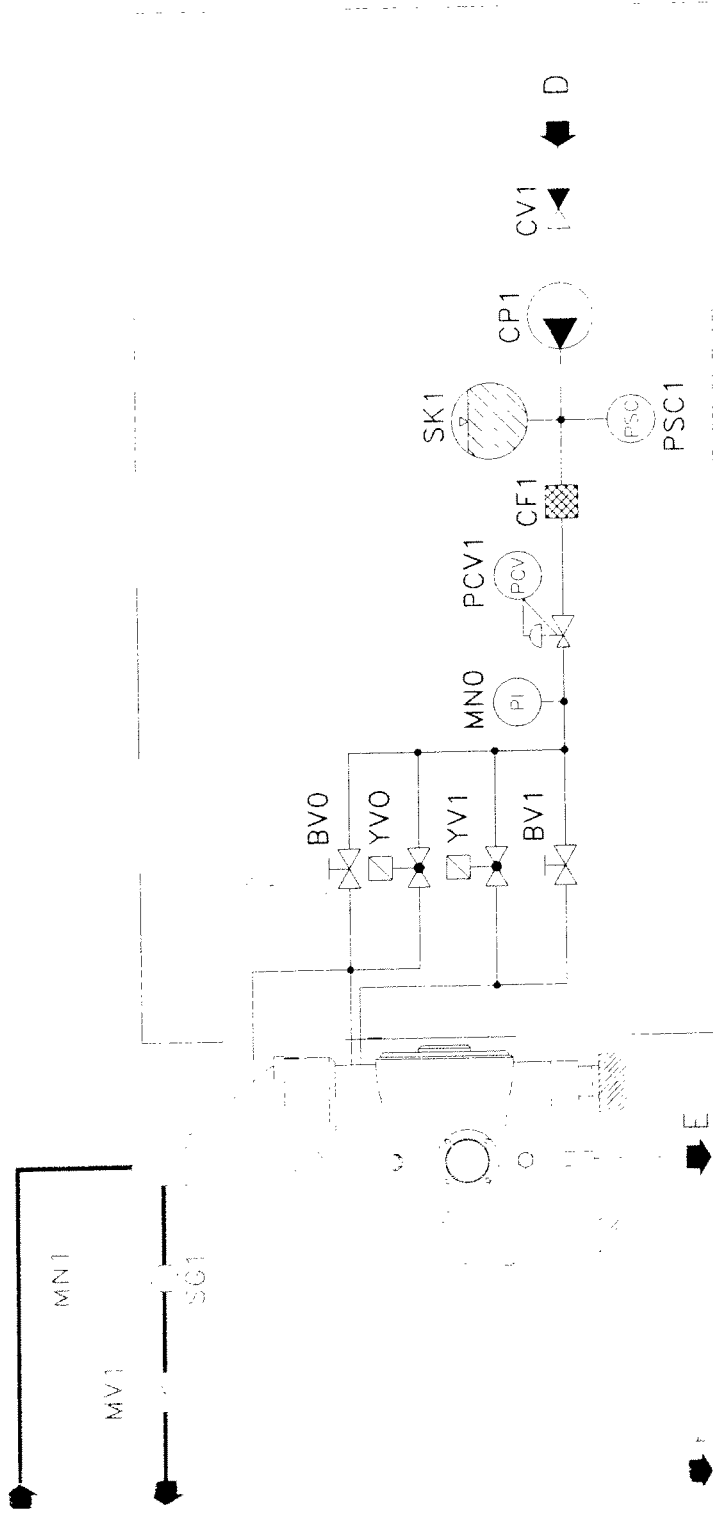
***Product outlet***

- MN1 Manometer
- MV1 Micrometric valve
- SG1 Sight glass

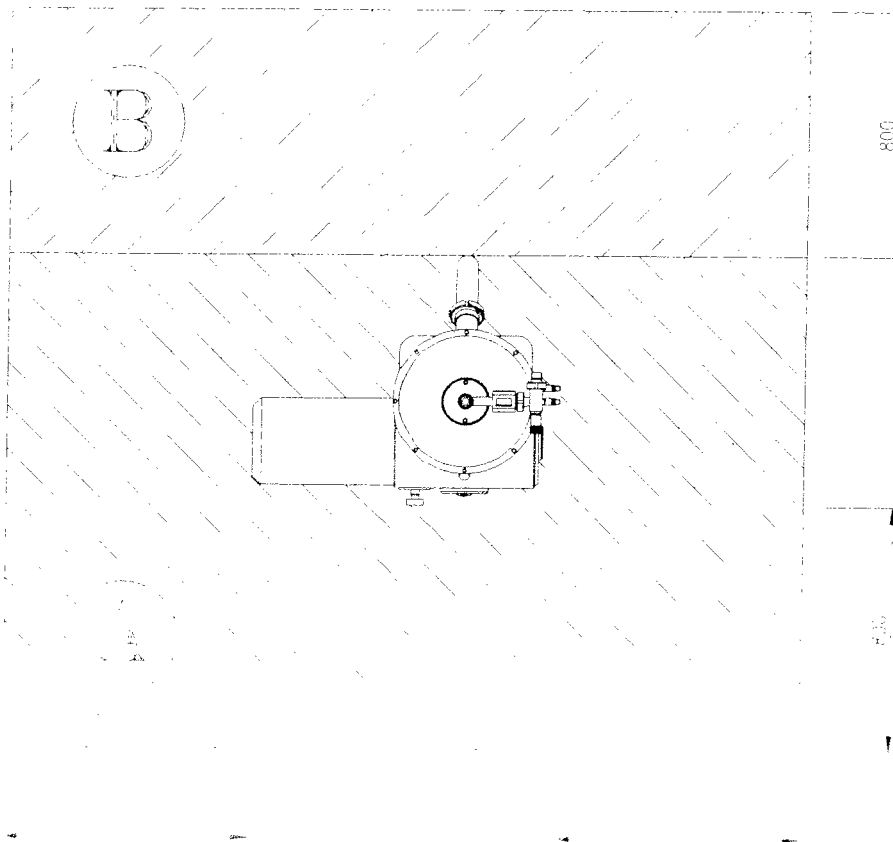
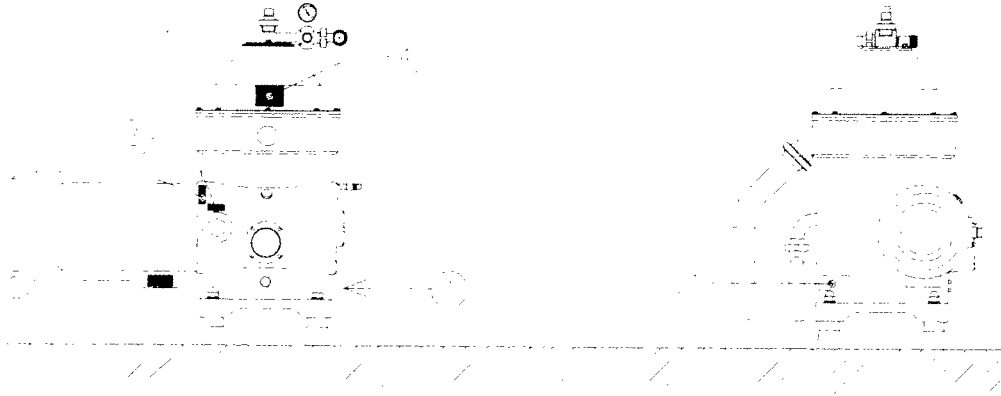
***Operating liquid unit (OPTIONAL)***

- CV1 Check valve
- CP1 Surge tank pump
- PSC1 Pressure switch
- SK1 Surge tank
- CF1 Operating liquid filter
- PCV1 Pressure reducer
- MN0 Manometer
- BV1 Ball valve (emergency)
- YV1 Operating water solenoid valve - opening liquid
- YV0 Operating water solenoid valve - closing liquid
- BV0 Ball valve (emergency)

**TAB. 21**



**IDENTIFICATION PLATES AND ALERT STICKERS**  
**FREE NECESSARY AREA - TAB. 22**



- 1 Plate with technical and identification data of separator
- 2 Plate with motor direction of rotation
- 3 Plate with brake direction of activation
- 4 sticker safety alert
- 5 sticker motor connection voltage

- 6 Free necessary area for normal operation
- 7 B Free necessary area for maintenance

## SPARE PARTS REQUEST FORM

**Centrifugal separator mod.: SE 113TOV..... Manufacturing N°: .....**

Mark with a X the requested spare parts and indicate the selected quantity.

<u>Ref.</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
<i>Bowl (Tab. 03)</i>			
<input type="checkbox"/>	03.510.0	832000394	..... Set of bowl gaskets (8 pieces)
<input type="checkbox"/>	03.520.0	832000046	..... Set of bowl valves gaskets (12 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Inlet-outlet flow unit (Tab. 04)</i>			
<input type="checkbox"/>	04.010.0	300362200	..... Feeding pipe
<input type="checkbox"/>	04.030.0	400363500	..... Centripetal pump
<input type="checkbox"/>	04.150.0	520060100	..... Manometer
<input type="checkbox"/>	04.510.0	832000255	..... Set of inlet outlet gaskets (6 pieces)
<input type="checkbox"/>	04.520.0	832004001	..... Set of spacers (3 pieces)
<input type="checkbox"/>	04.530.0	832010005	..... Set of gasket for micrometric valve (1 piece)
<input type="checkbox"/>	04.540.0	832020002	..... Set sight glass with gaskets (6 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Operating liquid unit (Tab. 05)</i>			
<input type="checkbox"/>	.....	.....	.....
<i>Vertical shaft (Tab. 06)</i>			
<input type="checkbox"/>	06.510.0	832005009	..... Set of vertical shaft bearings and washers (6 pieces)
<input type="checkbox"/>	06.520.0	832001010	..... Set of vertical shaft gaskets (8 pieces)
<input type="checkbox"/>	06.530.0	832007030	..... Set of gears, flanges, screw and washer (12 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Horizontal shaft (Tab. 07)</i>			
<input type="checkbox"/>	07.910.0	832005005	..... Set of horizontal shaft bearings and circlips (5 pieces)
<input type="checkbox"/>	07.920.0	832001009	..... Set of horizontal shaft gaskets (6 pieces)
<input type="checkbox"/>	07.930.0	832011014	..... Set of clutch-shoes (3 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Frame (Tab. 08)</i>			
<input type="checkbox"/>	08.710.0	400046800	..... Brake shoe with pin and elastic pin (2 pieces)
<input type="checkbox"/>	08.720.0	832020019	..... Sight glass with gasket (2 pieces)
<input type="checkbox"/>	.....	.....	.....

SEITAL S.r.l.

Chapter 13  
Rev. 2 of 07/11/11



## SPARE PARTS REQUEST FORM

**Centrifugal separator mod.:** SE 113TOV..... **Manufacturing N°:** .....

Mark with a X the requested spare parts and indicate the selected quantity.

<u>Ref.</u>	<u>Code</u>	<u>Quantity</u>	<u>Description</u>
<i>Bowl (Tab. 03)</i>			
<input type="checkbox"/>	03.510.0	832000394	..... Set of bowl gaskets (8 pieces)
<input type="checkbox"/>	03.520.0	832000046	..... Set of bowl valves gaskets (12 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Inlet-outlet flow unit (Tab. 04)</i>			
<input type="checkbox"/>	04.010.0	300362200	..... Feeding pipe
<input type="checkbox"/>	04.030.0	400363500	..... Centripetal pump
<input type="checkbox"/>	04.150.0	520060100	..... Manometer
<input type="checkbox"/>	04.510.0	832000255	..... Set of inlet outlet gaskets (6 pieces)
<input type="checkbox"/>	04.520.0	832004001	..... Set of spacers (3 pieces)
<input type="checkbox"/>	04.530.0	832010005	..... Set of gasket for micrometric valve (1 piece)
<input type="checkbox"/>	04.540.0	832020002	..... Set sight glass with gaskets (6 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Operating liquid unit (Tab. 05)</i>			
<input type="checkbox"/>	.....	.....	.....
<i>Vertical shaft (Tab. 06)</i>			
<input type="checkbox"/>	06.510.0	832005009	..... Set of vertical shaft bearings and washers (6 pieces)
<input type="checkbox"/>	06.520.0	832001010	..... Set of vertical shaft gaskets (8 pieces)
<input type="checkbox"/>	06.530.0	832007030	..... Set of gears, flanges, screw and washer (12 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Horizontal shaft (Tab. 07)</i>			
<input type="checkbox"/>	07.910.0	832005005	..... Set of horizontal shaft bearings and circlips (5 pieces)
<input type="checkbox"/>	07.920.0	832001009	..... Set of horizontal shaft gaskets (6 pieces)
<input type="checkbox"/>	07.930.0	832011014	..... Set of clutch-shoes (3 pieces)
<input type="checkbox"/>	.....	.....	.....
<i>Frame (Tab. 08)</i>			
<input type="checkbox"/>	08.710.0	400046800	..... Brake shoe with pin and elastic pin (2 pieces)
<input type="checkbox"/>	08.720.0	832020019	..... Sight glass with gasket (2 pieces)
<input type="checkbox"/>	.....	.....	.....