DOSAPRO MILTON ROY
Groupe Sundstrand

INSTRUCTION MANUAL

FOR INSTALLATION,
OPERATING,
AND MAINTENANCE.

CE

Pump
SERIES G™ MODEL B

This manual should be made available to the person responsible for installation, operating and maintenance.

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CONTENTS

HOW TO USE THIS MANUAL ?

I - DESCRIPTION

I - 1. Unpacking and storage
I - 2. Description
I - 3. Operating principle of the pump
I - 4. Safety and health instructions

II - INSTALLATION

II - 1. Hydraulic installation
II - 2. Drip collection
II - 3. Handling
II - 4. Setting up
II - 5. Electrical installation

III - START UP

III - 1. Procedures before start up
III - 2. Start up
III - 3. Failures on start up
III - 4. Operation - Schedule of checks and maintenance operations

IV - ROUTINE MAINTENANCE

IV - 1. Occurrence of a leak from detection port
IV - 2. Oil change
IV - 3. Checking the pump capacity
IV - 4. Tracing causes of failure
IV - 5. Ordering spare parts

V - PREVENTIVE MAINTENANCE - ANNUAL OVERHAUL

V - 1. Spare parts required for annual overhaul
V - 2. Sequential actions

VI - SERVICING THE LIQUID END AND THE LIQUID END MOUNTING ASSEMBLY

VI - 1. General
VI - 2. Removing the liquid end and the liquid end mounting assembly
VI - 3. Reinstalling the liquid end and the liquid end mounting assembly

TECHNICAL CHARACTERISTICS

« EC » DECLARATION OF CONFORMITY

GUARANTEE

LIST OF « TECHNICAL ASSISTANCE » AND « SPARE PARTS » DEPARTMENTS

HOW TO USE THIS MANUAL ?

IMPORTANT: You should read the following paragraphs carefully in order to understand how to use this manual efficiently.

This manual corresponds to the type of pumps mentioned on the cover page.

There may be several different construction versions for each type of pump, however, and this manual takes those differences into account.

The paragraphs or lines specific to a given construction are:

- indented compared to the main text body,
- marked by a vertical line indicating the specific text,
- marked by a rectangle specifying the corresponding code.

Note: When first reading this document, you are advised to highlight the « boxes » corresponding to the construction of your equipment so the manual will be easier to read in future.

MARKING USED IN THE MANUAL

You will find, below, the list of the various possibilities and the corresponding markings.

In addition, to identify the type of construction of your pump, the table includes the pump code shown on the identification plate attached to the pump (Fig. 4.5a). Caution : only characters mentioned are to be taken into account when reading this manual.

Examples of pump code	:	G	5	3	9	-	5	4	1	Q
		G	6	8	9	-	5	6	7	N
Your pump code	:	G				-	5			

(to be filled in)

Use the following table to identify the markings of our pump.

Mark	Description	Pump code								
1	Liquid end, PP or mixed Liquid end, PVC	G				-			1 8	***
2	Liquid end, PVDF	G				-			2	
7	Liquid end, stainless steel (54..)	G				-		4	7	
7B	Liquid end, stainless steel (56..)	G				-		6	7	
H	High-viscosity version	G				-			1	H
Tri	3-phase power supply	G			9 or J	-				
Mono	Single-phase power supply	G			0 or C	-				

*** Character has to be different from « H ».

PART I - DESCRIPTION

I - 1. UNPACKING AND STORAGE

UNPACKING

The packaging must be carefully examined on receipt in order to ensure that the contents have not sustained any obvious damage. Precautions must be taken when opening the packaging in order to avoid damaging accessories which may be secured inside the packaging. Examine the contents and check them off against the delivery note.

STORAGE PRECAUTIONS

Storage for less than six months

Equipment shall preferably be stored in its original packaging and protected from adverse weather conditions.

Storage for more than six months

- Store the pump in its original packaging. In addition, packaging in heat-sealing plastic cover and dessicant bags must be provided for. The quantity of dessicant bags should be adapted to the storage period and to the packaging volume.
- Store protected from adverse weather conditions.

I - 2. DESCRIPTION

The « SERIES G » Model B pump is a compact electromechanical metering pump that is oil lubricated with a sealed housing, with capacity adjustment in operation or when stopped.

It is made up of the following components (Fig. 1.2a):

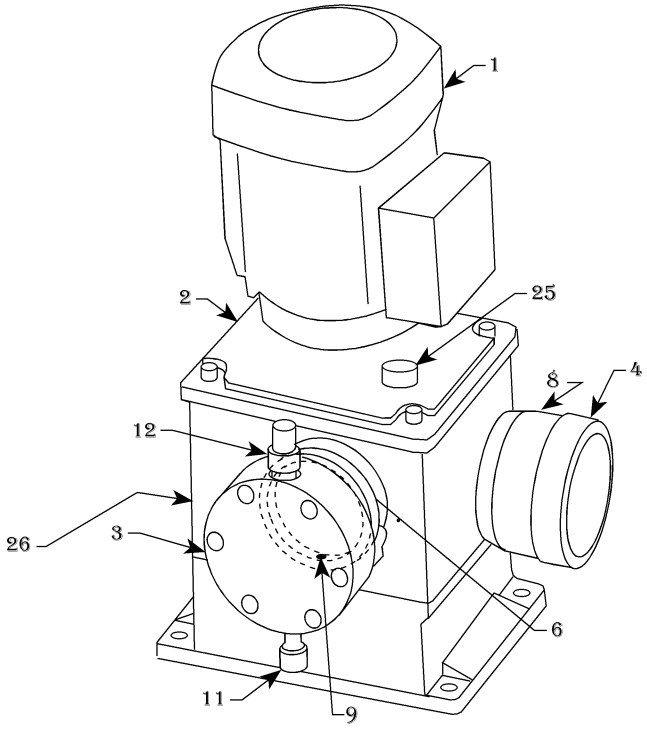
- a drive device comprising a motor [1],
- a mechanical assembly [2],
- a liquid end [3].

Leak-tightness between the mechanical assembly and the liquid end is ensured by means of a bellows.

Capacity adjustment is controlled either manually (by a stroke adjustment knob [4]) or automatically (such as by a servomotor).

Various components of the pump are shown in Figure 1.2a.

Note: For further information on the automatic control system, see the relevant specific manual.



1	Motor	9	Leak detection port
2	Mechanical assembly	11	Valve assembly (suction)
3	Liquid end	12	Valve assembly (discharge)
4	Stroke adjustment knob	25	Filler plug
6	Liquid end mounting assembly	26	Drain plug
8	Stroke locking device		

Fig. 1.2a: Model B, series G pump

I - 3. OPERATING PRINCIPLE OF THE PUMP

See Figures 1.3b and 1.3c.

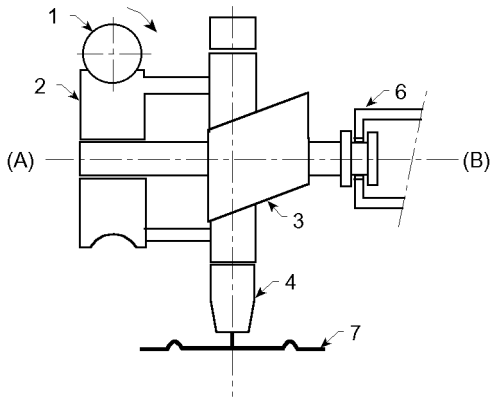
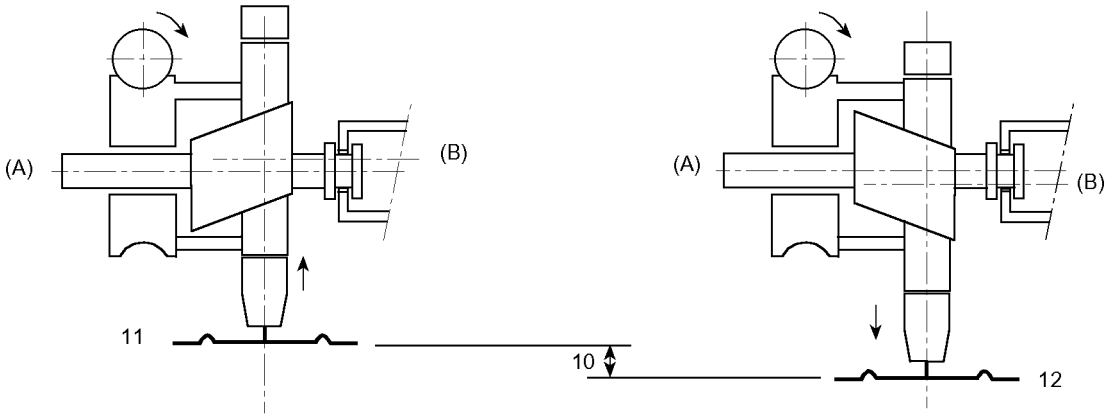


Fig. 1.3b : Setting to zero stroke



Suction phase **Discharge phase**

Fig. 1.3c : Setting to maximum stroke

1	Worm	7	Diaphragm
2	Tangential wheel	10	Stroke = two times the distance between (A) and (B)
3	Eccentric	11	Position at rear neutral point
4	Connecting rod	12	Position at forward neutral point
6	Crosshead		

MECHANICAL ASSEMBLY

The mechanical assembly works on the principle of a variable eccentric.

The rotational motion of the motor is transmitted by the worm [1] to the tangential gear [2] which is linked to an eccentric system [3].

The connecting rod [4], attached to this eccentric system, converts the rotary motion into a reciprocating linear motion with variable stroke. The stroke depends upon the eccentricity between the axis of rotation of the tangential wheel [A] and an axis of the connecting rod [B]. The stroke is adjusted by moving the crosshead [6] by means of a stroke adjustment screw. The movement of the crosshead causes movement of the male eccentric piece which modifies the position of the connecting rod axis.

When the connecting rod axis [B] is aligned with the axis of the tangential wheel [A], the connecting rod does not move and the stroke is zero.

Figure 1.3b shows the functional diagram at zero stroke.

Figure 1.3c shows the functional diagram at maximum stroke.

MECHANICALLY CONTROLLED DIAPHRAGM-TYPE LIQUID END

The diaphragm [7] is mechanically linked to the connecting rod [4] and has the same reciprocating motion.

During the suction phase, the movement of the diaphragm allows the suction of a given volume of fluid.

In the discharge phase, the process is reversed. The diaphragm then expels the fluid.

1 - 4. SAFETY AND HEALTH INSTRUCTIONS

The personnel responsible for installing, operating and maintaining this equipment must become acquainted with, assimilate and comply with the contents of this manual in order to:

- avoid any possible risk to themselves or to third parties,
- ensure the reliability of the equipment,
- avoid any error or pollution due to incorrect operation.

Any servicing on this equipment must be carried out when it is stopped. Any accidental start-up must be prevented (either by locking the switch or removing the fuse on the power supply line).

A notice must be attached to the location of the switch to warn that servicing is being carried out on the equipment.

During oil changing operations, the waste oil must be collected in a suitable receptacle. Any overflow of oil which may result must be removed using a degreasing agent suitable for the operating conditions.

Soiled cleaning cloths must be stored in suitable receptacles. The oil, degreasing agent and cleaning cloths must be stored in accordance with the rules on pollution.

Switch off the power supply as soon as any fault is detected during operation: abnormal heating or unusual noise.

Special care has to be taken for chemicals used in the process (acids, bases, oxiding/reducing solutions, ...).

PART II - INSTALLATION

II - 1. HYDRAULIC INSTALLATION

All the information concerning the hydraulic installation of a metering pump is detailed in a volume, « Generalities about metering pumps installation ». You should consult that manual to determine the installation required for your application.

Certain essential points are, however, also briefly covered in this document.

GENERAL

- Piping layout

There must be no swan-necks or stagnant volumes which are liable to trap air or gas.

Stresses due to incorrect alignment of piping with respect to the centreline of valves must be avoided as far as possible.

- Remove burrs and clean the piping before fitting.
- It is advisable to provide for a calibrating chamber in order to calibrate the pump in service conditions.

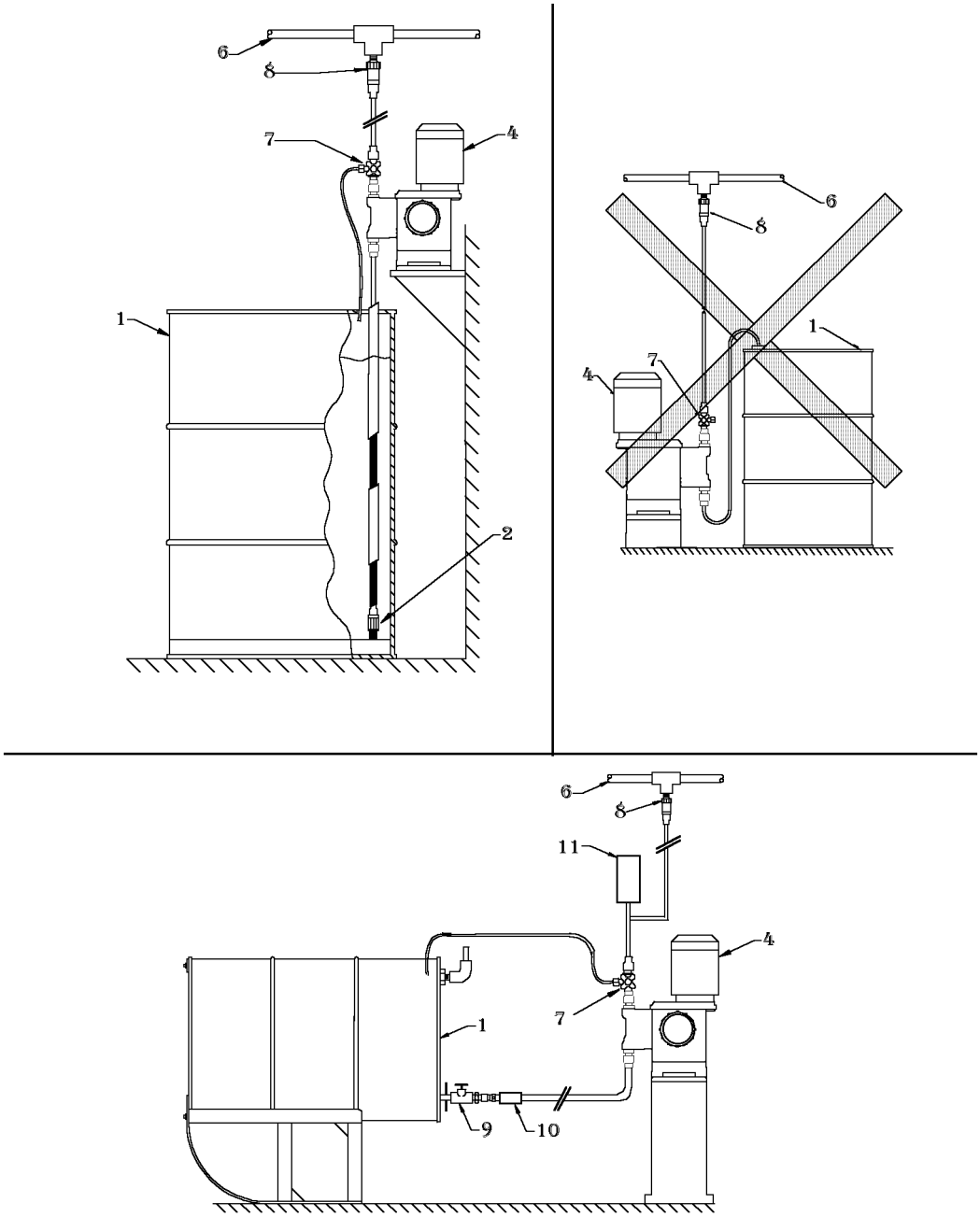
PIPING ON THE SUCTION CIRCUIT

- If your pump is flooded, a shutt-off valve will be required
- Check whether the diameter and length of pipe are compatible with the pump's maximum capacity.
- Install the pump as near as possible to the suction tank.
- If the length of the suction pipe exceeds 3 m, increase the piping cross-section.
- It is highly recommended to install a pulsation dampener.

PIPING ON THE DISCHARGE CIRCUIT

- Provide for a safety valve on the discharge pipe, designed to protect the installation.
- Check whether it is necessary to install a pulsation dampener, according to the width and diameter of the tubing.
- It is advisable to install a priming valve on the discharge circuit in order to make starting and maintenance of the pump easier.

Typical installations are shown schematically in Figure 2.1a.



1	Tank	8	Injection nozzle
2	Foot valve (equipped with a filter)	9	Shutt-off valve
4	Metering pump	10	Filter
6	Utilization	11	Pulsation dampener
7	Safety valve		

Fig. 2.1a : Diagrams of typical installations

II - 2. DRIP COLLECTION

Provide for outlets so that any leak or drips can be easily drained off without any danger. This is especially important in the case of harmful liquids.

See Figure 1.2a.

Position a tray under the plain hole (detection port [9]) located at the bottom of the liquid end mounting assembly to collect leaks in the event of rupture of the diaphragm or boot.

II - 3. HANDLING

Choose lifting equipment that is compatible with the weight of the pump. (See TECHNICAL CHARACTERISTICS at the end of the illustrations manual).

See Figure 2.3a.

Handling requires the following precautions :

Fit one sling under the motor and the liquid end.
Check that the assembly is correctly balanced before starting to move it.

Secure the pump as soon as it is positioned in its required location (see Chapter II - 4. Setting up).

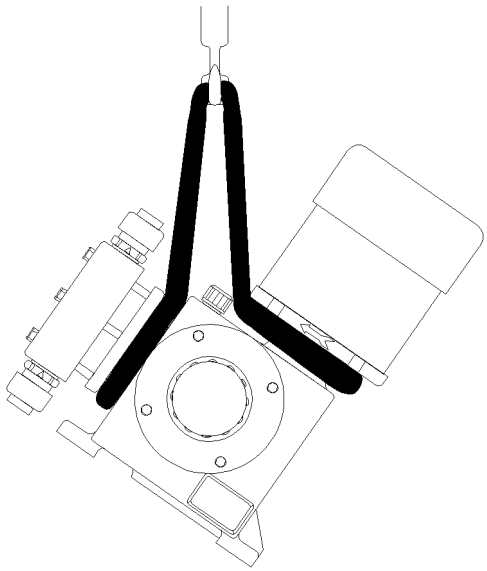


Fig. 2.3a : Handling

II - 4. SETTING UP

Secure the pump to a horizontal support (see attaching holes). Leave enough clear space around the pump to be able to carry out servicing operations and adjustments.

Pumps installed outdoors must be protected by a shelter (according to the climatic conditions).

II - 5. ELECTRICAL INSTALLATION

CONNECTING THE MOTOR

Check the specifications of the motor and compare them with the voltage available on your installation before making connections. Connect up the motor in accordance with the instructions in the terminal box (Fig. 2.5a).

Tri

A delta connection is required to connect up to a 230 V 3-phase power supply (Fig. 2.5b).

A star connection is required to connect up to a 400 V 3-phase power supply (Fig. 2.5c).

Mono

For connection in SINGLE-PHASE mode, see Figure 2.5d.

CAUTION : Do not forget to connect the earth terminal on the motor [PE] (Fig. 2.5a) to the equipment earth conductor.

The electrical protection installed for the motor (fuse or thermal protection) must be suitable for the motor's rated current.

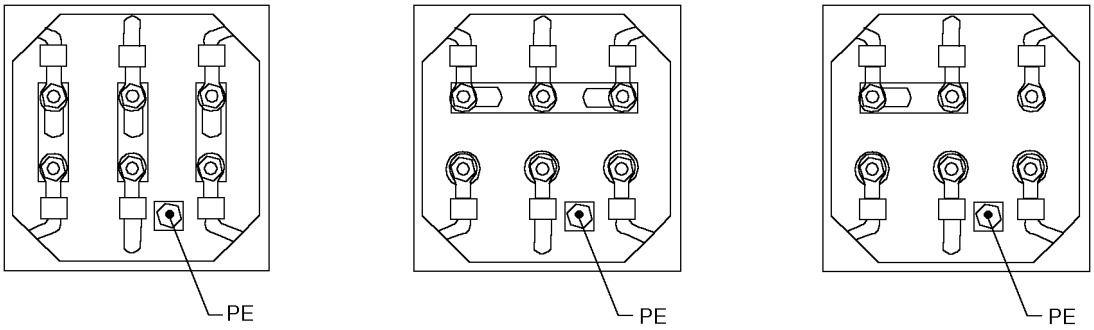


Fig. 2.5a : Motor terminal box

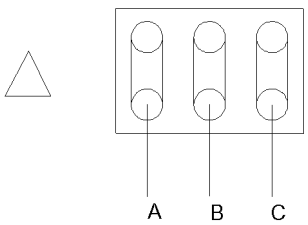


Fig. 2.5b :
230 V delta connection

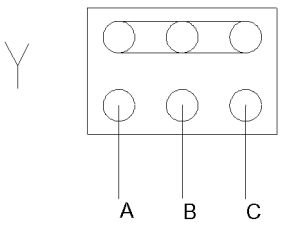


Fig. 2.5c :
400 V star connection

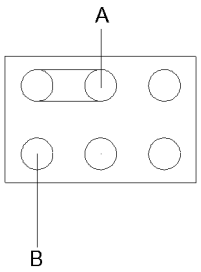


Fig. 2.5d :
Single-phase connection

PART III - START UP

III - 1. PROCEDURES BEFORE START UP

Special care has to be taken for chemicals used in the process (acids, bases, oxiding/reducing solutions, ...).

See Figure 1.2a.

- Check that the pump is secured to its support (Chapter II - 4. Setting up).
- Remove the plug [25] and fill the housing with the supplied oil (2,8 l approximetely). Check oil level by mean of the gauge of the plug [25].
- Check the opening of all the isolating valves installed on the suction and discharge circuits. If the discharge circuit is equipped with an injection nozzle or a back-pressure valve, open the priming valve for discharge (if there is no priming valve, disconnect the discharge pipe). This makes it possible to verify that there is liquid present if the pump is installed in flooded suction, or to prime the pump if it is installed in suction lift.
- Set the pump capacity adjustment to 0% (stroke adjustment knob [4]).

Checking the electrical connection of the motor

Start up the pump to check the motor's direction of rotation. It must comply with that indicated by the arrow marked on the pump housing.

Tri	To reverse the motor's direction of rotation, invert A and B or A and C (See Figure 2.5b or 2.5c). Stop the pump.
Mono	To reverse the motor's direction of rotation, see the instructions in the terminal box. Stop the pump.

III - 2. START UP

- Once all the checks and procedures described in the previous section have been carried out, start up the pump.
- Check visually and by listening. (In particular, check that there are no suspicious noises).
- Make sure that the stroke adjustment knob is unlocked. Adjust the pump capacity gradually from 0 % to 100 % and control the liquid output at priming valve or discharge check valve.
- As soon as the liquid to be pumped flows out of the priming valve or the discharge valve, priming has been achieved. Close the priming valve or reconnect the discharge pipe, as applicable.
- Set the pump to the desired capacity. Lock the stroke adjustment knob with the stroke locking screw [8] (Fig. 1.2a).

III - 3. FAILURES ON START UP

PROBLEMS WITH MOTOR

The motor runs with difficulty and heats up.

- The characteristics of the electrical power supply do not match the specifications of the motor.

Tri

- One phase is incorrectly connected.
- The electrical connection used is not suitable.

The motor overheats.

- Check that the pressure on the discharge side is compatible with the equipment's capabilities.

Tri

- The direction of rotation of the motor is incorrect. (Check using the arrow marked on the housing). Reverse the direction of rotation (see Chapter III - 1. Procedures before start up, Checking the electrical connection of motor).

PROBLEMS WITH FLOW RATE

The flow rate is lower than desired

- The pump capacity is incorrectly adjusted: adjust the capacity to the desired value and lock the stroke adjustment knob.
- The suction power is insufficient. (Piping cross-section too small or piping too long): replace the pipes with ones with a larger cross-section or install the pump in flooded suction.
- The leak-tightness of the suction pipes is unsatisfactory.
- The viscosity of the liquid is incompatible with the capabilities offered by your pump version.

The capacity is greater than desired

- The pump capacity is incorrectly adjusted: adjust the capacity to the desired value and lock the stroke adjustment knob.
- A syphoning phenomenon is observed: check that the suction pressure is not greater than the discharge pressure. Install a 4FV or a back-pressure valve on the discharge side.
- Too many flow pulsations : a pulsation dampener is required, or the pulsation dampener installed is of the wrong size, or the pressurization of the pulsation dampener is incorrect.

The capacity is variable

- This problem may be due to particles from the piping which interfere with the operation of the valve assemblies: clean the piping (if there is an abnormal presence of particles) and the valve assemblies (see chapter IV - 2.).

III - 4. OPERATION - SCHEDULE FOR CHECKS AND MAINTENANCE OPERATIONS

The programme of checks and maintenance operations depends on the conditions in which the equipment is used. For this reason, the following frequencies are given as an example only. Individual users should adapt these frequencies to their own specific operating conditions.

When	Check	Servicing	See
Every month	Check for the occurrence of a leak from the detection port - if leak occurs ->		Chapter IV -1
After 250 hours		Change lubricating oil	Chapter IV-2
Every 3 months	Check by listening (no knocking) - if unsatisfactory ->		Chapter IV-4
Every 6 months (or 2,500 hours)		Change lubricating oil	Chapter IV-2
Frequency to be defined according to process (approx. 1,000 hours)	Check on compliance of flow rate	Check on pump capacity	Chapter IV-3
Every year (or 3,000 hours)		Annual overhaul	Part V

A model maintenance sheet is shown in Figure 3.4a to help you ensure follow-up of your servicing actions (checking or maintenance).

MAINTENANCE SHEET

Pump code : D.M.R. internal no. :
Liquid pumped :

Service Operation	Date	Hours	Remarks

Fig. 3.4a : Model Maintenance Sheet

PART IV - ROUTINE MAINTENANCE

IV - 1. OCCURRENCE OF A LEAK FROM DETECTION PORT

Determine whether the product collected at the detection port [9] (Fig. 1.2a) is lubricating oil or the pumped fluid.

- If the product is pumped fluid, the diaphragm is faulty. Proceed with its replacement (see Part V).
- If the product is lubricating oil, the secondary diaphragm is faulty. Proceed with its replacement (see Part V).

IV - 2. OIL CHANGE

LUBRICATING OIL

- Perform the first housing oil change after 250 hours' operation. Subsequent oil changes will be carried out every 2,500 hours' operation or every six months.
- Disconnect the pump electrically, check that the equipment cannot be switched on accidentally. Position a notice at the location of the switch.

Note

To avoid any risk of burning by the hot oil, protective gloves should be worn.

See Figure 1.2a.

- Unscrew the plug [26] and drain the oil into a tray. Put PTFE ribbon on the threads and screw the plug.
- Remove the plug [25] and fill the housing with appropriate oil (2,8 l approximately). Check compatibility of oil with conditions of use. Check oil level by mean of the gauge of the plug [25].
- Quantity: see TECHNICAL CHARACTERISTICS at the end of the manual.
- Remove any overflow of oil immediately with a suitable degreasing agent for the operating conditions.

Recommendations

- Standard conditions: standard oil
- Ambient temperature: > - 5°
- Max. oil temperature: + 90°

Table of equivalencies:

FUCHS	RENEP 220
B.P.	GR XP 220
CASTROL	ALPHA SP 220
ELF	REDUCTELF SP 220
FINA	GIRAN 220
IGOL	DYNAM SP 220
MOBIL OIL	MOBILGEAR 630
SHELL	OMALA 220
TOTAL	CARTER EP 220
ESSO	SPARTAN EP 220

- Special conditions : for example, low-temperature oil. Consult us.

IV - 3. CHECKING THE PUMP CAPACITY

This is a question of determining the curve representing the pump's capacity according to its setting.

Four measurements are sufficient (adjustment to 100 %,75 %, 50 % and 25 %).

Place the foot valve in a calibrating chamber (graduated reservoir). Measure the volume of pumped liquid for a given period of time at the various settings.

Plot the curve and use it to determine the adjustment corresponding to the desired capacity.

IV - 4. TRACING CAUSES OF FAILURE

PROBLEMS WITH MOTOR

The motor does not run

The thermal relay has been tripped.

- The motor is defective.
- Wiring is defective.
- Check the parts of the mechanical assembly.

The motor heats up abnormally

- The quantity of lubricating oil is incorrect: trace the leak (see Chapter IV - 1.)
- The pump is used in conditions it was not designed for.

PROBLEMS WITH FLOW RATE

The pump produces no flow

- The pump capacity is adjusted to « 0 % » : Adjust the capacity to the desired value and lock the stroke adjustment knob.
- The liquid end is unprimed: release the pressure on the discharge pipe and prime the liquid end, or check the leak-tightness of the suction circuit.
- The balls of the valve assemblies are blocked by particles: clean or replace the valve assemblies. First, check whether the presence of these particles is normal and take corrective action if necessary.
- The diaphragm is faulty (rupture): see Chapter IV - 1. And replace the diaphragm (see Part V).

The pump does not provide the required flow rate

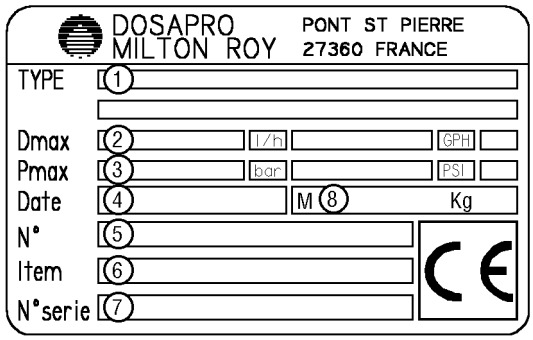
- The pump capacity is incorrectly adjusted: adjust the capacity to the desired value and lock the stroke adjustment knob.
- The ball seats and/or the balls are dirty or worn: clean or replace the ball seats and the balls or the valve assemblies.
- The leak-tightness of the suction circuit is unsatisfactory: repair or replace the piping.

IV - 5. ORDERING SPARE PARTS

To make it easier to register your order for spare parts and ensure quicker delivery, please provide us with the following details:

- information on the pump : type [1] and contract number [5]. These two items of information are shown on the identification plate mounted on the pump (see Fig. 4.4a).
- Information on the spare part : reference, description and quantity. These items of information are specified in the spare parts lists.

You will find the phone and fax number of the Spare Parts Department at the end of this documentation.



1	**Type : Pump code**
2	Dmax : maximum capacity
3	Pmax : maximun pressure
4	Date: date of manufacture
5	**N° : Contract No**
6	Item : your reference
7	N° série.: Dmr internal no

Fig. 4.5a : Identification plate

PART V - PREVENTIVE MAINTENANCE

ANNUAL OVERHAUL

V - 1. SPARE PARTS REQUIRED FOR ANNUAL OVERHAUL

Annual overhaul (after one year or 5,000 hours' operation) involves the replacement of the following wear parts:

- Valve assemblies,
- Diaphragm,
- Secondary diaphragm,

The servicing action required for the replacement of valve assemblies, diaphragm and secondary diaphragm are described in Part VI : Servicing the liquid end and the liquid end mounting assembly. The procedures must be carried out in the specified order.

Chapter V - 2. Sequential actions allow partial servicing operations to be carried out.

V - 2. SEQUENTIAL ACTIONS

Carry out the procedures in the specified order having read the general information (in Chapter VI - 1).

SERVICING THE VALVE ASSEMBLIES

- Preliminary operations: Part VI - Section A1, Paragraphs 1 to 3
- Removing the valve assemblies: Part VI - Section B1
- Reinstalling the valve assemblies: Part VI - Section B2
- Restarting: Part VI - Section A2, Paragraphs 2 to 6

REPLACING THE DIAPHRAGM

- Preliminary operations: Part VI - Section A1, Paragraphs 1 to 3
- Removing the diaphragm: Part VI - Section C1
- Reinstalling the diaphragm: Part VI - Section C2
- Restarting: Part VI - Section A2, Paragraphs 2 to 6

REPLACING THE SECONDARY DIAPHRAGM

- Preliminary operations: Part VI - Section A1
- Removing the diaphragm: Part VI - Section C1
- Removing the secondary diaphragm: Part VI - Section D1
- Reinstalling the secondary diaphragm: Part VI - Section D2
- Reinstalling the diaphragm: Part VI - Section C2
- Restarting: Part VI - Section A2

PART VI - SERVICING THE LIQUID END AND THE LIQUID END MOUNTING ASSEMBLY

Carry out the procedures described below:

- in the order of the text in the case of annual overhaul (or 5,000 hours' operation).
- in the order specified in the section dealing with the partial servicing envisaged (Chapter V - 2. Sequential actions).

VII - 1. GENERAL

Note

- For the sake of simplicity, the procedures described do not mention the washers fitted with fasteners (such as screws and nuts). Do not forget to reinstall washers after removing them.
- Verify that parts are undamaged before reinstalling.
- Clean the recess for O-rings when they are removed. Apply tallow in the recess before reinstalling the new O-ring.

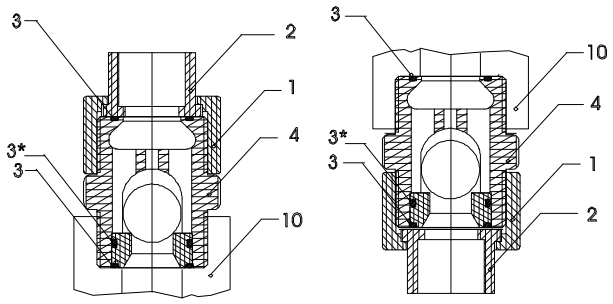
Special care has to be taken for chemicals used in the process (acids, bases, oxiding/reducing solutions, ...).

VI - 2. REMOVING THE LIQUID END AND THE LIQUID END MOUNTING ASSEMBLY

A1. Preliminary operations

Before carrying out any servicing action on the liquid end or tubes, take the necessary steps to ensure that any harmful liquid they may contain is not spilt and does not touch personnel. Provide for the rinsing of the liquid end, if necessary, and provide for appropriate protective equipment. Check that there is no pressure and the temperature of components before starting to dismantle.

1. Position the pump capacity adjustment on "0%".
2. Disconnect the pump electrically. Check that the equipment cannot be started up accidentally. Place a notice at the location of the switch.
3. Disconnect the pump hydraulically.
4. Drain the oil from the housing (see chapter IV - 2.).



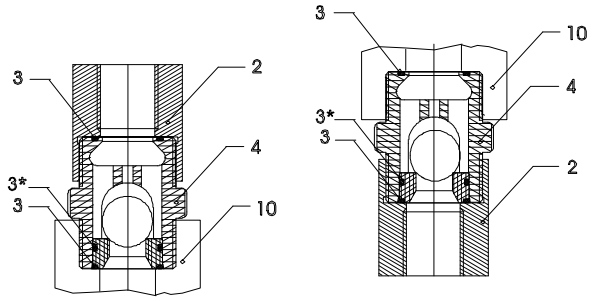
Discharge Suction

1	Nut	4	Liquid end body
2	Union	10	Liquid end body
3	Seal		Valve assembly body

* on 56.. liquid end only

Fig. 6.2a : Sectional drawing of valve assemblies

1



Discharge Suction

2	Union	4	Valve assembly body
3	Seal	10	Liquid end body

* on 56.. liquid end only

Fig. 6.2a : Sectional drawing of valve assemblies

2

B1. Removing the valve assemblies

See figure 6.2a.

1

For each valve assembly :

1. Unscrew the nut [1] and remove the union [2].
2. Unscrew the valve assembly body [4] and remove the valve assembly in order to replace it.
3. Clean the tapped holes in the liquid end body [10].

2

B1. Removing the valve assemblies

See figure 6.2a.

For each valve assembly :

1. Unscrew the union [2].
2. Unscrew the valve assembly body [4] and remove the valve assembly in order to replace it.
3. Clean the tapped holes in the liquid end body [10].

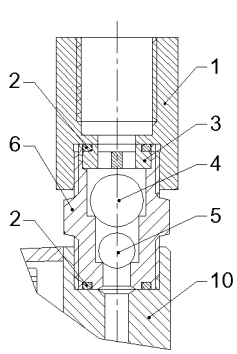
7

B1. Removing the valve assemblies

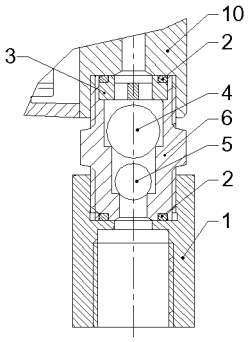
See Figure 6.2a.

For each valve assembly:

1. Unscrew the union [1].
2. Unscrew the valve assembly body [6].
3. Remove the O-rings [2], the ball stop [3] and the balls [4] and [5].
4. Clean the body, seat and ball assemblies. In case of wear, proceed with the replacement of the « seat - ball » assemblies or the valve assemblies.
5. Clean the tapped holes in the liquid end [10].



Discharge



Suction

7

1	Union	5	Ball
2	O-ring	6	Valve assembly body
3	Ball stop	10	Liquid end
4	Ball		

Fig. 6.2a : Sectional drawing of valve assemblies, S.S.

7B

B1. Removing the valve assemblies

See figure 6.2a.

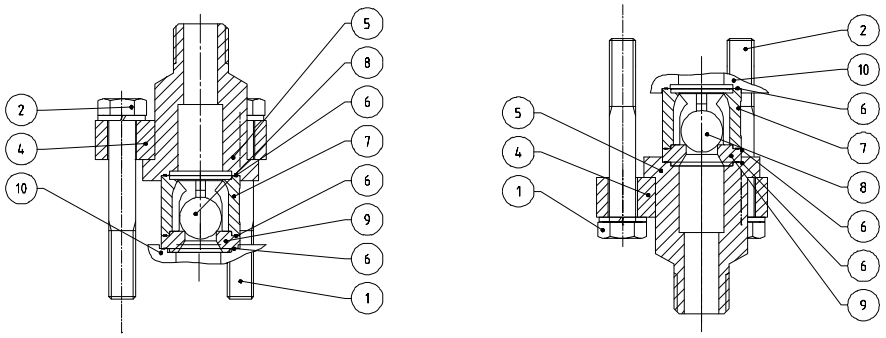
1. Unscrew the screws ([1] and [2]) and remove the flange [4].
2. Remove the union [5].
3. Remove the ball guide [7] (and its seal [6], ball [8] and seat [9] equipped with two seals [6].
4. Clean the tapped holes in the liquid end body [10].
5. Clean the body, seat and ball assemblies. In case of wear, proceed with the replacement of the "seat - ball" assemblies or the valve assemblies.

H

B1. Removing the valve assemblies

See figure 6.2a.

1. Unscrew the nut [1] and remove the union [2].
2. Unscrew the valve assembly body [4] (suction circuit), [13] (discharge circuit) et remove the valve assembly to replace it.
3. Clean the tapped holes in the liquid end body [10].

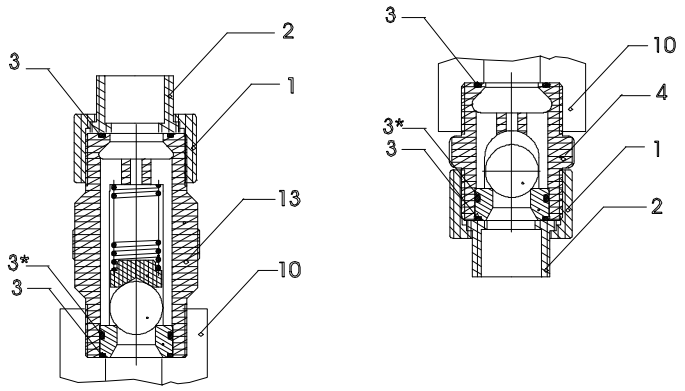


Discharge Suction

7B

1	Screw	7	Ball guide
2	Screw	8	Ball
4	Flange	9	Seat
5	Union	10	Liquid end body
6	Seal		

Fig. 6.2a : Sectional drawing of valve assemblies, s.s.



Refoulement Aspiration

1	Nut	4	Valve assembly body (suction)
2	Union	10	Liquid end body
3	Seal	13	Valve assembly body (discharge)

* on 56.. liquid end only

Fig. 6.2a : Sectional drawing of valve assemblies.

H

C1. Removing the diaphragm

See figure 7.2b.

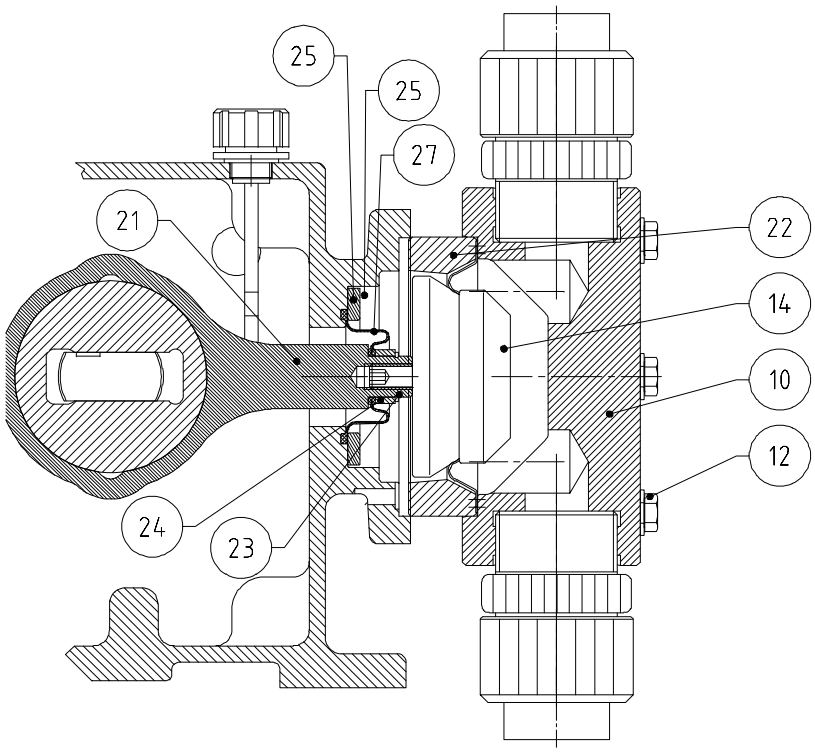
1. Undo the screws [12]. Remove the liquid end body [10].
2. Set the stroke adjustment knob to "100 %".
3. Remove the motor casing and rotate the motor by hand in order to place the diaphragm [14] in the "front" position.
4. Unscrew the diaphragm assembly [14] from the connecting rod [21].

D1. Removing the secondary diaphragm

See figure 6.2b.

1. Remove the diaphragm seat [22].
2. Remove the retaining ring [23].
3. Remove the oil seal clamp [24].
4. Unscrew the four screws [25] and remove the plate [26].
5. Remove the secondary diaphragm [27] and mark the direction of fitting.

Note : It is advisable to replace the secondary diaphragm in the course of servicing operation.



10	Liquid end body	23	Retaining ring
12	Screw	24	Oil seal clamp
14	Diaphragm assembly	25	Screw
21	Connecting rod	26	Plate
22	Diaphragm seat	27	Secondary diaphragm

Fig. 6.2b : Sectional drawing of liquid end and liquid end mounting assembly.

VI - 3. REINSTALLING THE LIQUID END MOUNTING ASSEMBLY AND THE LIQUID END

D2. Reinstalling the secondary diaphragm

See figure 6.2b.

1. Apply tallow on the mating faces and position the secondary diaphragm [27] in compliance with the direction of fitting.
2. Position the oil seal clamp [24] and the retaining ring [23] on the connecting rod [21].
3. Position the plate [26] on the secondary diaphragm and tighten the four screws [25] (applying a torque of 0,25 m.daN).
4. Position the diaphragm seat [22], placing the detection port [9] (fig. 1.2a) facing downwards.

C2. Reinstalling the diaphragm

See figure 6.2b.

1. Screw the diaphragm assembly [14] fully home into the connecting rod [21].
2. Rotate the motor by hand in order to place the diaphragm in the "back" position. La périphérie de la membrane doit reposer sur le siège de membrane [22].
3. Position the liquid end body [10] on the diaphragm and attach it by tightening the screws [12] evenly (applying a torque of 1 m.daN).

1

B2. Reinstalling the valve assemblies

See figure 6.2a.

For each valve assembly :

1. Check that O-rings [3] have been placed correctly.
2. Screw the valve assembly body [4] in the liquid end body [10], taking care to comply with the direction of fitting (screwing by hand).
3. Position the union [2] on the valve assembly body and screw the nut [1] (screwing by hand).

2

B2. Reinstalling the valve assemblies

See figure 6.2a.

For each valve assembly :

1. Check that O-rings [3] have been placed correctly.
2. Screw the valve assembly body [4] in the liquid end body [10], taking care to comply with the direction of fitting (screwing by hand).
3. Screw the union [2] onto the valve assembly body [4] (screwing by hand).

7

B2. Reinstalling the valve assemblies

See Figure 6.2a.

For each valve assembly:

1. Insert the balls ([5] and {4]) and the ball stop [3] into the valve assembly body [6] (taking care to comply with the direction of fitting).
2. Fit a seal [2] on the ball stop and a seal [2] under the valve assembly body.
3. Screw the valve assembly body onto the liquid end body [10]. Tighten to a torque of 2 m.daN.
4. Tighten the union [1] (to a torque of 2 m.daN).

7B

B2. Reinstalling the valve assemblies

See Figure 6.2a.

For the suction circuit :

1. Fit the union [5] on the flange [4].
2. Fit a seal [6] on each face of the seat [9].
3. Position a seat [9] on the union [5], taking care to comply with the direction of fitting.
4. Position a ball [8] and a ball guide [7] (equipped with a seal [6]).
5. Fit this assembly on the liquid end by means of screws [1] and [2] (Caution: the flange must be perpendicular to the centreline of the valves). Tighten the screws evenly, proceeding by opposite pairs to a torque of 3 m.daN.

For the discharge circuit :

1. Fit a seal [6] on each face of the seat [9].
2. Position a seat [9] on the liquid end body [10], taking care to comply with the direction of fitting.
3. Position a ball [8] and a ball guide [7] (equipped with a seal [6]).
4. Fit a union [5] and a flange [4] on the ball guide.
5. Fit this assembly on the liquid end by means of screws [1] and [2] (caution: the flange must be perpendicular to the centreline of the valves). Tighten the screws evenly, proceeding by opposite pairs to a torque of 3 m.daN.

H

B2. Reinstalling the valve assemblies.

See figure 6.2a.

1. Check that O-rings [3] have been placed correctly.
2. Screw the valve assembly body [4] (suction circuit), [13] (discharge circuit) onto the liquid end body [10], taking care to comply with the direction of fitting (screwing by hand).
3. Position the union [2] on the valve assembly body and screw the nut [1] (screwing by hand).

A2. Remise en route

1. Fill the housing with oil (see chapter IV - 2.).
2. Connect up the pump hydraulically.
3. Check that the capacity is set to "0 %"
4. Check that there are no suspicious noises when starting up.
5. Set the pump capacity to "100 %" to obtain quicker priming.
6. After priming, set the pump to the desired capacity and lock the stroke adjustment knob.

TECHNICAL CHARACTERISTICS

(1) Code de la pompe	**G51.-54..***	**G52.-54..***	**G53.-54..***	**G58.-54..***	**G68.-56..***	**G73.-58..***
(2) Max. flow rate in l/h, at 1,5 barg	90	175	345	430	590	1135
(2) Max. flow rate in l/h (Q), at max. pressure	86	168	331	412	573	1119
Steady state accuracy (flow rate between 10 % and 100 %)	± 2 %	± 2 %	± 2 %	± 2 %	± 2 %	± 2 %
Max. discharge pressure, in barg	8	8	8	8	5	3,5
Max. suction pressure, in barg (Pasp)	2	2	2	2	2	2
Suction head, in meters water head (Ha)	2,5	2,5	2,5	2,5	2,5	2,5
Priming suction head, in meters water head	2	2	2	2	2	2
(2) Stroke speed, in stroke /mn	36	72	144	180 (3)	180 (3)	144
(2) Motor speed, in rpm	1500	1500	1500	1500	1500	1500
Motor power, in W	0,37	0,37	0,37	0,37	0,37	0,37
Volume of lubricating oil, in l	2,8	2,8	2,8	2,8	2,8	2,8
Quality of lubricating oil	Ch. IV-2	Ch. IV-2	Ch. IV-2	Ch. IV-2	Ch. IV-2	Ch. IV-2
Weight of pump, in kg (approx.)	40	40	40	40	40	40
Niveau de bruit, en dB A	< 75	< 75	< 75	< 75	< 75	< 75

* The "." (third digit) is identified by 9 or J according to the motor frequency.
This ‘’.. ’’ corresponds to different types of liquid ends or connections.
(1) See identification plate mounted on the pump (fig. 4.5a).
(2) With 50 Hz motor, multiplied by 1.2 in 60 Hz.
(3) Is not used in 60 Hz.

GUARANTEE

The vendor guarantees his products according to the D.M.R. general conditions of sale.

The vendor's guarantee only covers the replacement or the repair, at his cost and in his factory, of all parts acknowledged by his technical services as being defective due to an error in conception, of material or of execution.

It is the purchasers responsability to prove the said defects. The guarantee does not cover the replacement of wear parts mentioned in part V - Preventive Maintenance.

The vendor reserves the right to modify all or part of his products in order to satisfy the guarantee. The guarantee does not cover charges arising from dismantling, assembly, transport and movements.

The replacement of one or several parts, for whatever reason, does not prolong the period of guarantee.

The guarantee is not applicable notably in the following cases :

- installation not in accordance with standard current practice.
- deterioration or accident resulting from negligence.
- lack of surveillance or maintenance.
- modifications to conditions of use.
- chemical corrosive or erosive attack. The proposed materials of construction are recommendations subject in all cases to verification and acceptance by the client. The recommendations, based on the experience of the vendor and the best available information, do not guarantee against wear or chemical action.

The guarantee ceases :

- if the storage of the material, outside the vendors factory, does not conform to his recommendations or to current standard practices.
- in case of work or dismantling of the material by someone who does not respect written recommendations of the instruction manual (when replacing wear parts).
- if parts from another origin are substituted for the original parts supplied by the manufacturer.

The purchaser cannot call on guarantee claims to suspend, delay or adjust payments.

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