High Vacuum Technology

ALCATEL

Instruction Manual

Molecular Drag Pump
MDP 5010

POMPE MOLECULAIRE 5010

MOLECULAR DRAG PUMP MDP 5010

S O M M A I R E

C O N T E N T S

SPECIAL INSTRUCTIONS

Read these instructions completely before unpacking and setting up your molecular drag pump.

Check all packages for shipping damage. If equipment has been damaged, notify ALCATEL and the shipper, reserving the right to make the usual claims against the shipper.

Unpack pump at location where it is to be installed.

Failure to comply with the setup and maintenance instructions will constitute a violation of the warranty conditions.

The user's attention is directed to the following :

- Bearings must be lubricated at regular intervals. See section 5.1.

- The molecular drag pump must be run at atmospheric pressure for about 5 minutes when new (see section 3.4.).

SECTION 1 - DESCRIPTION

The pump consists of the following :

- The model 5010 molecular drag pump itself.
- The CFV 10 static frequency converter.
- Electrical connectors required for operation (line cord, cord to connect pump and converter).

1.1 - MODEL 5010 MOLECULAR DRAG PUMP :

The Alcatel 5010 molecular drag pump is a vacuum pump with a multiblade rotor ; its operating principle is illustrated in fig. 1. Its rotational speed is 27 000 rpm.

The rotor, a smooth drum with a row of blades at the top, is mounted at the end of a shaft turning in two high-precision ball bearings lubricated with grease, and located in the low-vacuum area. All pumping elements are aluminium.

The pump is rotated by a single-phase electronically controlled electric motor.
The rotor is mounted directly on the shaft, while the stator is attached to the pump body.

Cooling is by natural convection.

Inlet flange :

- Inlet diameter : 76 mm.
- Inlet flange : Pneurop DN 63.

Exhaust flange : Pneurop DN 16.

This description is illustrated by the diagram in fig. 2 and the parts list in fig. 3.

1.2. - FREQUENCY CONVERTER (see fig. 4)

The electronic frequency converter is in the form of a 1/4 rack 19" 3 Unit module. It powers the pump motor and controls starting up to the rated speed of 27 000 rpm. The type of motor used results in an unusual electrical performance which completely eliminates the need for external cooling of the pump and converter. A number of safety devices built into the converter ensures proper function of the system.

1.21 - FRONT PANEL (fig. 4) composed of :

a) Start/stop switch to control molecular drag pump. Push switch lever to right to start pump, to left to stop.

b) Rotation indicator consisting of three pilot lights arranged from left to right : one red, one orange, and one green.

- The orange light indicates that the pump is in the starting phase, i.e. running at a speed between 0 and 27 000 rpm.

- The green light indicates that the pump is running at 27 000 rpm.

- The red light indicates that the pump has been stopped by the safety system because the pump was overload for more than 8 minutes. For example : prolonged high pressure operation.

1.22 - REAR PANEL- containing :

- At top : line cord socket J1.

- At bottom : Trelec socket for pump-converter cord J2.

- At center :

. F4 fuse from 0.316 A for 220 V, or from 0.63 A for 115 V.
. Line cord socket J4 for venting to atmosphere.

The electrical schematic in fig. 12 shows how the frequency converter operates.

1.3. - The wiring diagram for connecting the pump and converter is shown in fig. 6.

SECTION 2 - SPECIFICATIONS

2.1 - PUMP

- Nitrogen pumping speed : 7.5 l/s (see fig. 7)
- Helium pumping speed : 4 l/s
- Hydrogen pumping speed : 3 l/s

- Compression ratio at zero nitrogen pumping speed : 10^8
- " " " " helium " : 2.10^4
- " " " " hydrogen " : 10^3

Ultimate pressure with 2-stage mechanical pump : 10^{-6} mbar (see fig.8).

Maximum operating pressure at inlet, in continuous operation, during 8 hours at an ambiant temperature below 25° C : (1.10^{-1} mbar) - (see fig. 9).

Speed : 27 000 rpm.

Starting time : 3 minutes.

Room temperature : 0 to 35 degrees C*

Weight of pump : 2.35 kg

* Note : for a prolonged operation at a temperature between 30° and 50° C, we recommend to use a fan near the pump body.

2.2. - ELECTRONIC CONVERTER

- Line voltage : 220 V $\pm$ 10 % - 50 or 60 Hz - P/N 63194.
  115 V $\pm$ 10 % - 50 or 60 Hz - P/N 63193.

- Power draw :

	PUMP	CONVERTER
"Start" phase	25 Watts	50 Watts
"Synchronized" phase, with inlet pressure $< 10^{-4}$ mbar	5 Watts	15 Watts

- Output voltage : 40 V
- Room temperature : 0 to 50° C.
- Cable length : 2.5 m
- Weight : 2.1 kg
- Dimensions : 110 x 133 x 235.

SECTION 3 - INSTALLATION

3.1. - UNPACKING

IMPORTANT ! To be sure pump remains as clean as when shipped from our factory, we recommend that it not be unpacked until it is at the final installation site. Unpacking and setup must be carried out in one continuous process.

The package contains :

- This installation and setup manual.
- The electronic converter.
- Electrical power cords and connectors.

The molecular drag pump itself is packed between two foam rubber cushions to absorb shocks and wrapped in watertight wrapping.

3.2. - SETUP AND HOOKUP OF MOLECULAR DRAG PUMP

3.21 - Remove inlet plug from MDP inlet. This flange must not be in place when pump is operating under vacuum.

3.22 - Connect pump to vacuum line using accessories provided, shown in fig. 10 and listed in Section 6.

3.23 - Install pump on equipment for which it is intended (chamber or valve), under the following conditions :

a) Make sure working chamber is clean and free of solid particles which could damage the pump.

b) The Alcatel 5010 pump should be installed in a vertical position, with inlet at top or bottom. It can also be installed horizontally or in any intermediate position.

c) The equipment, frame or chassis on which the pump is mounted must be sufficiently rigid to prevent any vibration.

3.3. - ELECTRICAL CONNECTIONS

MAKE SURE THAT THE CONVERTER IS WIRED ACCORDING TO THE LINE VOLTAGE

- Check the power selecting switch and the fuse at the rear of the converter :

  . 220/240 V - position : fuse 0.316 A.
  . 115 V position : fuse 0.630 A.

Note : the unused fuse receptacle can be used to store a spare fuse of the proper amperage.

- Prepare the pump for operation as follows :

  . Connect the special cable to the MDP and to the converter (at J2 on the rear panel).

  . Connect the line cord to converter (at J1 on the rear panel).

The remote control plug J2 can be used for different functions described on fig. 11.

3.4. - WHEN STARTING PUMP FOR FIRST TIME

When pump is new or has been in storage for 2 months or longer, it should be run at atmospheric pressure for about 5 minutes, using the converter. This slow rotation distributes the grease uniformly over the ball bearings.

SECTION 4 - OPERATING DIAGRAM

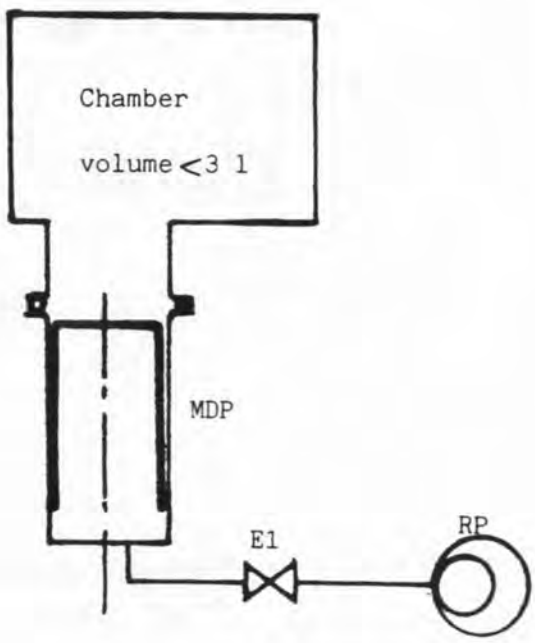
4.1. - MOUNTED ON SERIES 1 VALVE

1) Starting :

   - Molecular and backing pumps stopped.
   - Open E1.
   - Start both pumps MDP and RP.

2) Stopping :

   - Close E1.
   - Stop both pumps MDP and RP.



4.2. - MOUNTED ON SERIES 2 VALVES

1) Starting :

- Start molecular and backing pumps.
- Open E1 and E3.

2) Venting chamber to atmosphere :

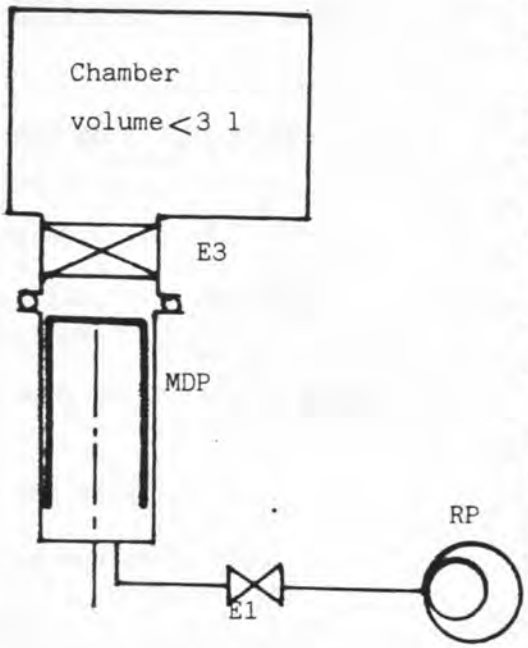
- Close E3.
- Admit neutral gas to chamber.

3) Conecting chamber to vacuum :

- Open E3.

4) Stop :

- Close E3 and E1.
- Stop both pumps.



4.3 - THREE VALVES INSTALLATION

1) Start :

- Start backing pump (RP).
- Open E2 and E3.
- At inlet pressure of 10 mbar, close E2 and open E1.
- Start molecular drag pump.

2) Venting chamber to atmospher :

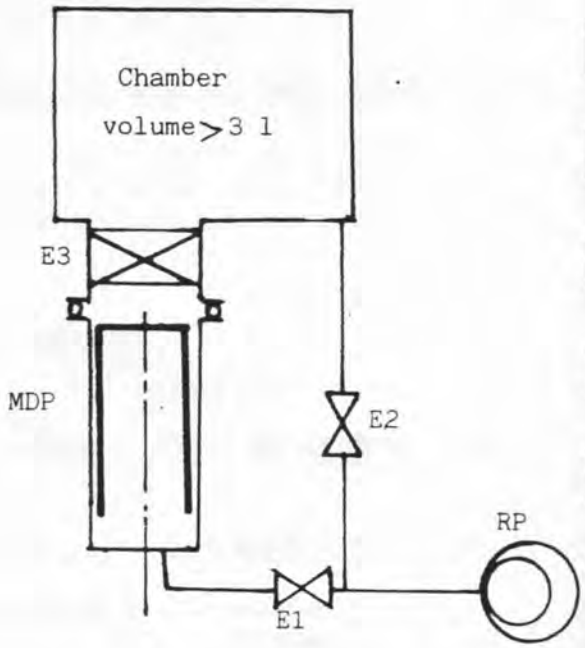
- Close E3.
- Admit neutral gas to chamber.

3) Connecting chamber to vacuum :

- Close E1, open E2.
- At inlet pressure of 10 mbar : close E2 and open E1 and E3.

4) Stop :

- Close E3 and E1.
- Stop both pumps.



SECTION 5 - MAINTENANCE AND REPAIR

5.1. - LUBRICATION

The quantity of grease required for molecular drag pump operation is added before the pump is first started at the factory. This grease remains in the pump during shipment, and must be replaced by the user after every 6000 hours operation at a room temperature of approximately 20° C, or every 2000 hours at a room temperature of 40° C (see fig. 5).

Use only grease recommended by Alcatel and order refills in syringe.

WHEN RELUBRICATING, PREVENT CONTAMINATION BY FOREIGN BODIES OR SUBSTANCES

Proceed as follows after stopping molecular drag pump, following diagram in fig. 2 :

a) Bearing opposite "pumping cell" :

- Remove tape (5) and remove three Allen-head retaining screws.
- Handle motor wires with care.
- Add 0.05 ml of grease to bearing (10) using grease syringe.

b) Bearings on "pumping cell" side :

- Insert syringe and nozzle into hole in screw (A) up to the end of shaft shaft (9), without pressing syringe plunger. Nozzle should be touching screw head.
- Add 0.12 ml grease slowly by depressing plunger while steadily pressing syringe body against bottom of hole.
- Retract syringe and nozzle.
- Replace tape (5) and gasket (12) : tighten screws.

5.2. - STARTUP AFTER "RELUBRICATION": * SEE REVISED PROCEDURE

Running in procedure is made automatically in two times :

. 1st time : 4 hours with MDP and RP on, with MDP at atmospheric pressure.

. 2nd time : 1 to 4 hours (depend on MDP) with MDP and RP on, with MDP at ultimate pressure.

MDP is operationnal when it has running during 30 minutes in continuous operation.

PIB 870217/023/AK

DATE Feb. 17, 1987

ALCATEL VACUUM PRODUCTS, INC.

Product information bulletin

REVISION TO MDP-5010 INSTRUCTION MANUAL

Section 5.2 - REVISED PROCEDURES FOR START-UP AFTER REGREASING

1. Run the MDP at atmospheric pressure without the RP for 4 hours. The MDP will cycle on (yellow LED) for approximately 8 minutes and off (red LED) for approximately 8 minutes. The cycling is a function of the amperage drawn by the MDP and a timing circuit in the converter.

2. Blank-off the inlet of the MDP and run the MDP and RP. The MDP will cycle on and off as in step (1) until it reaches full speed (green LED). Run the MDP at full speed for an additional 30 minutes and it is then ready for normal operation. Note: If the MDP is not blanked off from the chamber, oil backstreaming from the RP to the chamber may occur when the MDP is off.

Andrew Key
Product Support Manager
High Vacuum Components
February 1987

Note: This PIB is inserted into each MDP manual until this revision has been included and reprinted.

SCIENTIFIC SALES
GREASE - P/N 56993 #46
VAC

CHECK BACKING PRESSURE 20-25 TORR
SWITCH - TOGGLE TO CENTER.
UNPLUG WHITE PLUG. JEFF

SECTION 5 - MAINTENANCE AND REPAIR

5.1. - LUBRICATION

The quantity of grease required for molecular drag pump operation is added before the pump is first started at the factory. This grease remains in the pump during shipment, and must be replaced by the user after every 6000 hours operation at a room temperature of approximately 20° C, or every 2000 hours at a room temperature of 40° C (see fig. 5).

Use only grease recommended by Alcatel and order refills in syringe.

WHEN RELUBRICATING, PREVENT CONTAMINATION BY FOREIGN BODIES OR SUBSTANCES

Proceed as follows after stopping molecular drag pump, following diagram in fig. 2 :

a) Bearing opposite "pumping cell" :

- Remove tape (5) and remove three Allen-head retaining screws.
- Handle motor wires with care.
- Add 0.05 ml of grease to bearing (10) using grease syringe.

b) Bearings on "pumping cell" side :

- Insert syringe and nozzle into hole in screw (A) up to the end of shaft shaft (9), without pressing syringe plunger. Nozzle should be touching screw head.
- Add 0.12 ml grease slowly by depressing plunger while steadily pressing syringe body against bottom of hole.
- Retract syringe and nozzle.
- Replace tape (5) and gasket (12) : tighten screws.

5.2. - STARTUP AFTER "RELUBRICATION": * SEE REVISED PROCEDURE

Running in procedure is made automatically in two times :

. 1st time : 4 hours with MDP and RP on, with MDP at atmospheric pressure.

. 2nd time : 1 to 4 hours (depend on MDP) with MDP and RP on, with MDP at ultimate pressure.

MDP is operationnal when it has running during 30 minutes in continuous operation.

5.3. - REPLACEMENT OF BALL-BEARINGS

Choice ball-bearings according to two numbers inscribed after MP serial number on name plate and to table below, to obtain a properly clearance (from 1 to 2 µm).

SHAFT DIMENSIONS	5	4	3	2
Ball-bearing kit Part number * / Ball-bearings ø \ Shaft ø	7.995	7.996	7.997	7.998
63079 — 7.999	//////	//////	//////	1 µm
63080 — 7.998	//////	//////	1 µm	//////
63081 — 7.997	2 µm	1 µm	//////	//////

Exemple :

ALCATEL
TMP type : 5010
Serial number : 85501 - 23 → Shaft dimensions

- 1st number "2" : indicates shaft dimension near the pumping unit 7.998 mm.
  Ball-bearings choice : P/N 63079.

- 2nd number "3" : indicates shaft dimension opposite the pumping unit : 7.997 mm.
  Ball-bearings choice : P/N 63080.

* Ball-bearings kit includes the ball-bearings with its o-ring, and a spring washer. The latest doesn't affect MDP 5010.

SECTION 6 - ACCESSORIES

6.1 - STANDARD SHIPMENT INCLUDES

	Part Number
- The molecular drag pump.	95159
- The converter CFV 10 - 220 V	63194
115 V	63193
- Power cable (MDP - CFV 10)	63112
- Cable (Europe)	56727
- Cable (USA).	57662
- Centering ring for inlet (22 - 23 on figure 2)	63212
- Centering ring "DN 16" (13 - 19 on figure 2)	68599
- Set of 2 retainers and screws.	53221

6.2 - ACCESSORIES AVAILABLE ON ORDER

INLET :

- Guard filter on inlet	63117
- Rotatable flange with DN 63 ring	68420
- 4 claw clamps DN 63	68428
- Screws L 35 to 40 - ϕ 8	75388
- Blanking flange.	68285

EXHAUST :

- Elbow secrated DN 16	68528
- Reducing nipples DN 25 - 16 Macrovac	68510
- Elbows DN 16 - DN 16 Macrovac.	68575
- Centering ring DN 16 Inox - Viton	68228
- Quick connect clamps DN 16	83333

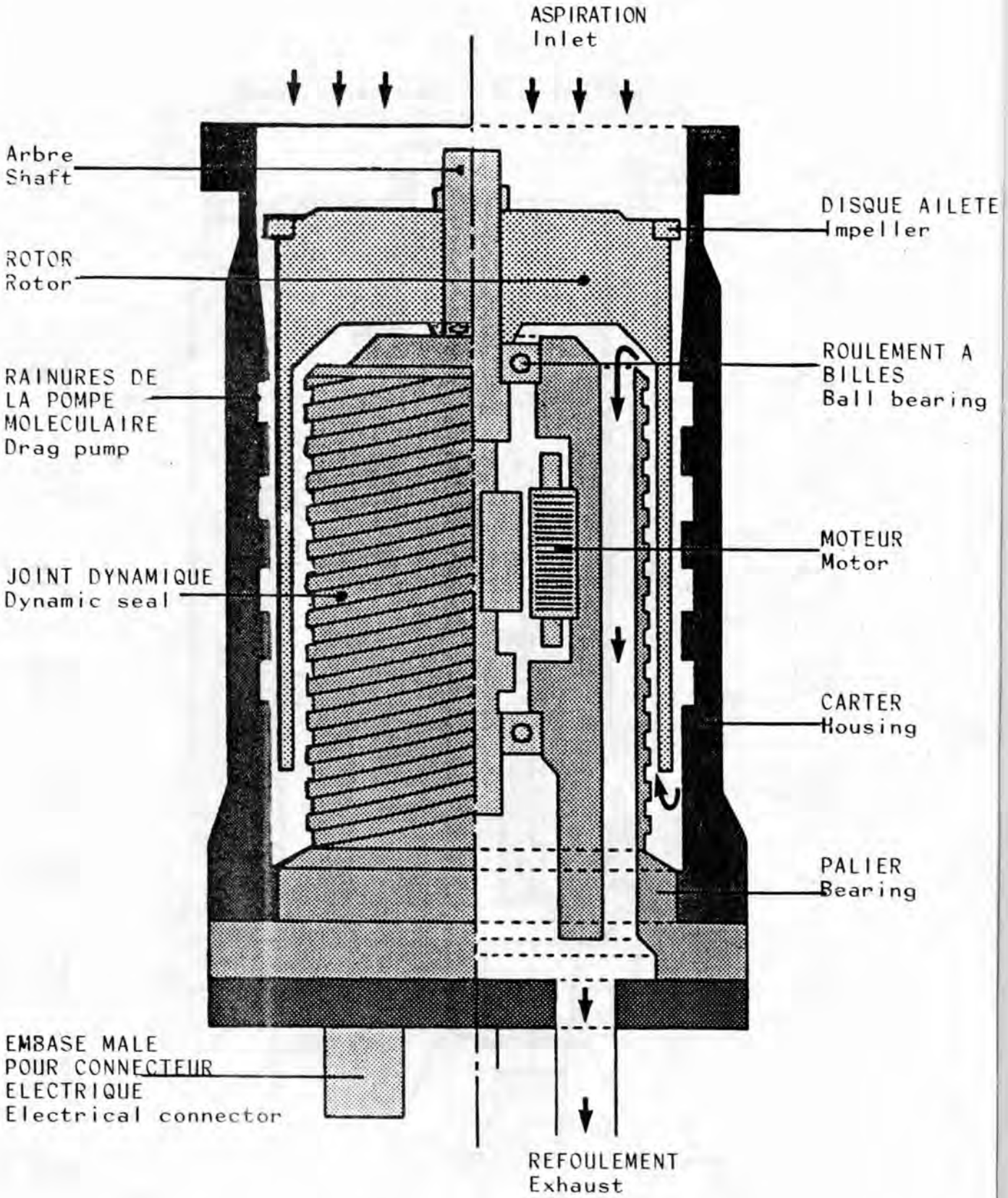
6.3 - ACCESSORIES FOR MAINTENANCE

ELECTRICAL :

- Lubricating syringe	56993
- Seal kit	63287
- Ball-bearing ϕ 7.999 mm	63079
ϕ 7.998 mm	63080
ϕ 7.997 mm	63081
- Electrical connector	38637
- Pre-load spring	63205

FIGURES ET PLANS

SCHEMAS AND DRAWINGS



PM 5010 POMPE MOLECULAIRE

MDP 5010 MOLECULAR DRAG PUMP

SECTION TRANSVERSALE/CROSS SECTION DRAWING

FIGURE 1

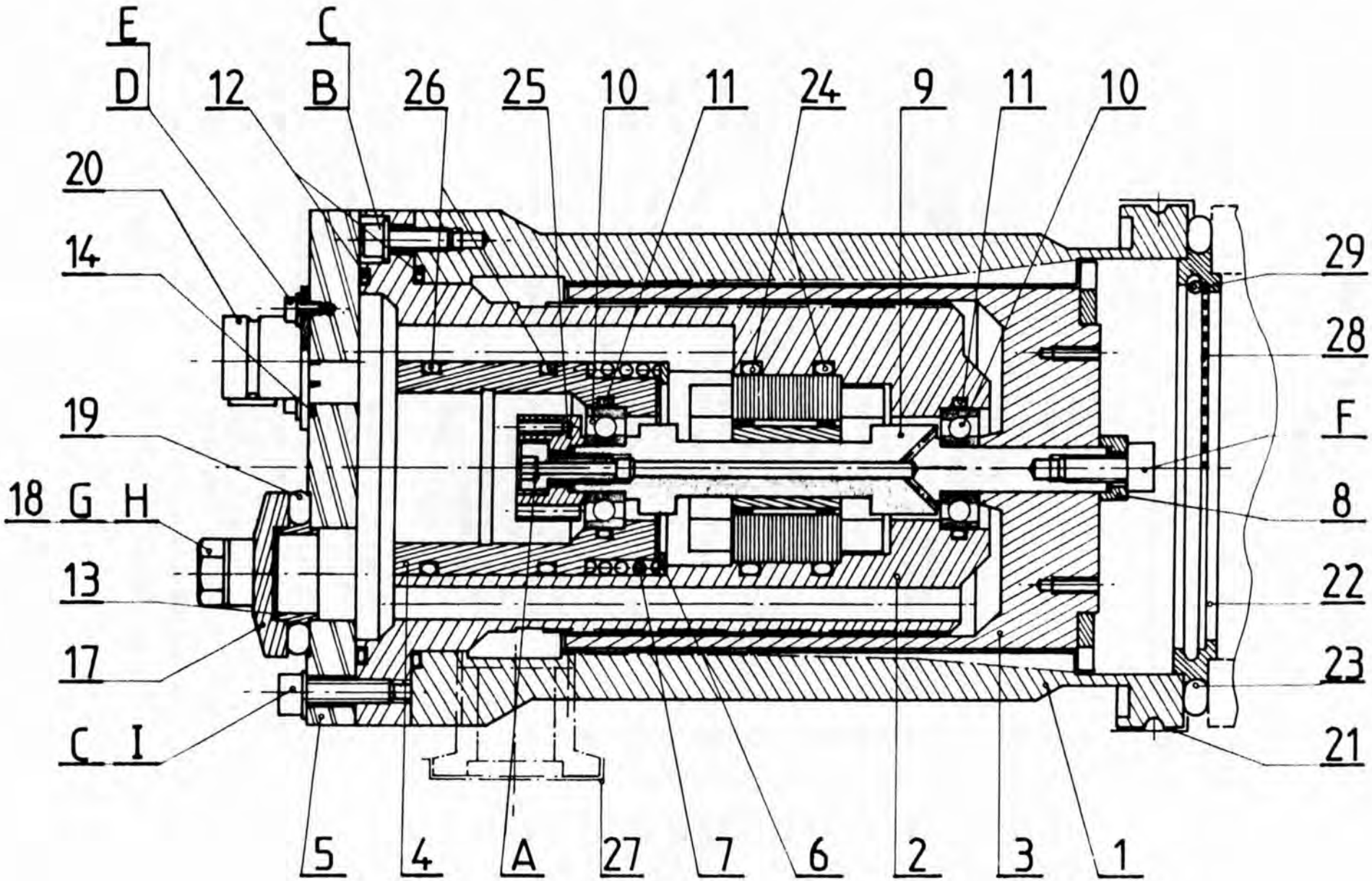

E
D
12
C
B
26
25
10
11
24
9
11
10
20
14
29
28
19
F
18 G H
8
13
22
17
23
C I
21
5
4
A
27
7
6
2
3
1

FIGURE 2

NOMENCLATURE - SPARE PARTS LIST

Figure 3

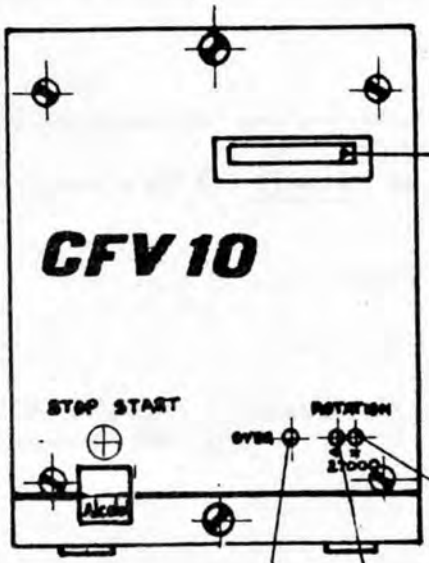
REP.	DESIGNATION	SPECIFICATION	NOMBRE / NUMBER	REFERENCE / P / N
1*	Stator	Stator	1	
1	Stator	Stator	1	063200
2	Palier	Bearing	1	063201
3	Moyeu	Hub	1	063211
3	Rotor	Rotor	1	063210
4	Fourreau arrière	End cap sleeve	1	063203
5	Plaque de fond	End cap	1	063204
6	Rondelle d'appui	Washer	1	063206
7	Ressort de pré-charge	Compression spring	1	063205
8	Bague de serrage avant	Clamping ring (front side)	1	056885
9	Moteur équipé	Motor	1	063207
10	ROulements	Ball-bearings	2	076413
11	Joint torique C2/D22	O-ring C2/D22	2	079068
12	Joint torique C2,5/D66	O-ring C2.5/D66	2	079000
13	Anneau porte-joint NW 16	Centering ring	1	068222
14	Joint torique C1,78/D17,20	O-ring C1.78/ D17.20	1	079212
17	Protecteur NW 16	Protector NW 16	1	068593
18	Taquet	Retainer	2	068504
19	Joint torique C5 / D18	O-ring C5 / D18	1	079237
20	Embase male	Plug socket	1	038637
21	Protecteur NW 63	Protector NW 63	1	056968
22	Porte-joints NW 63	Centering ring NW 63	1	063212
23	Joint torique C5,33/D75,57	O-ring C 5.33/D 75.57	1	082028
24	Joint torique C3 D34	O-ring C3 /D34	2	082047
25	Bague de serrage arrière	Clamping ring (rear side)	1	063218
26	Joint torique C2,5/D33,5	O-ring C 2.5/D 33.5	2	083768
27*	Protecteur NW 16	Protector NW 16		
28	Filtre pare-éclats (version 115 V)	Splinter shield (115 V version)	1	063002
29	Jonc d'arrêt	Ring	1	071671
A	Vis M5 x 12	Screw M 5 x 12	1	063208
B	Vis CHc M 4 x 12	Screw CHc M 4 x 12	3	082365
C	Rondelle diamètre 4	Washer diameter 4	6	073458
D	Vis C M 2,5 x 4	Screw C M 2.5 x 4	4	075702
E	Rondelle diamètre 2,5	Washer diameter 2.5	4	073492
F	Vis M 5 x 12	Screw M 5 x 12	1	063209
G	Vis H M 6 x 20	Screw H M 6 x 20	2	075412
H	Rondelle Ø 6	Washer diam. 6	2	073474
I	Vis CHc M 4 x 16	Screw CHc M 4 x 16	3	075571

* : option : piquage latéral

* : option : side exhaust

CONVERTISSEUR DE FREQUENCE CFV 10

CFV 10 frequency converter



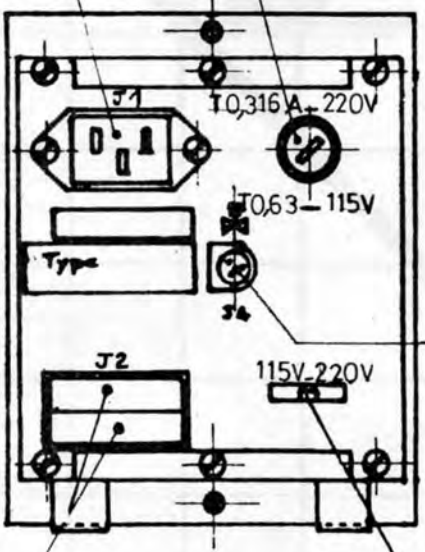
COMPTEUR HORAIRE
Time counter

VOYANTS Lights	ROUGE red	JAUNE yellow	VERT green

FACE AVANT - front panel

ARRIVEE SECTEUR
Power supply

FUSIBLE
Fuse



PRISE DE RACCORDEMENT
ENTREE D'AIR
Airing device connector

SORTIE MOTEUR PTM
TMP motor output

SELECTEUR DE TENSION
Power selecting switch

FACE ARRIERE - Rear panel

FIGURE 4

PM ALCATEL à graisse

Période de rechargement à graisse neuve sur pompe à refroidissement par air

Grease ALCATEL **MDP**

Time to recharge with new grease for pump air cooled.

Exemple : pour une utilisation moyenne à 25° C d'ambiance :

. à 5 000 h : 1ère recharge

. à 10 000 h : 2e recharge

. à 15 000 h : démontage de la **PM**
nettoyage ou changements des roulements
graissage
rodage

Exemple : for an use at 25° C ambient temperature :

. at 5 000 h : 1st lubrication

. at 10 000 h : 2nd lubrication

. at 15 000 h : disassemble **MDP**
clean or replace ball bearings
recharge with new grease
grind ball bearings

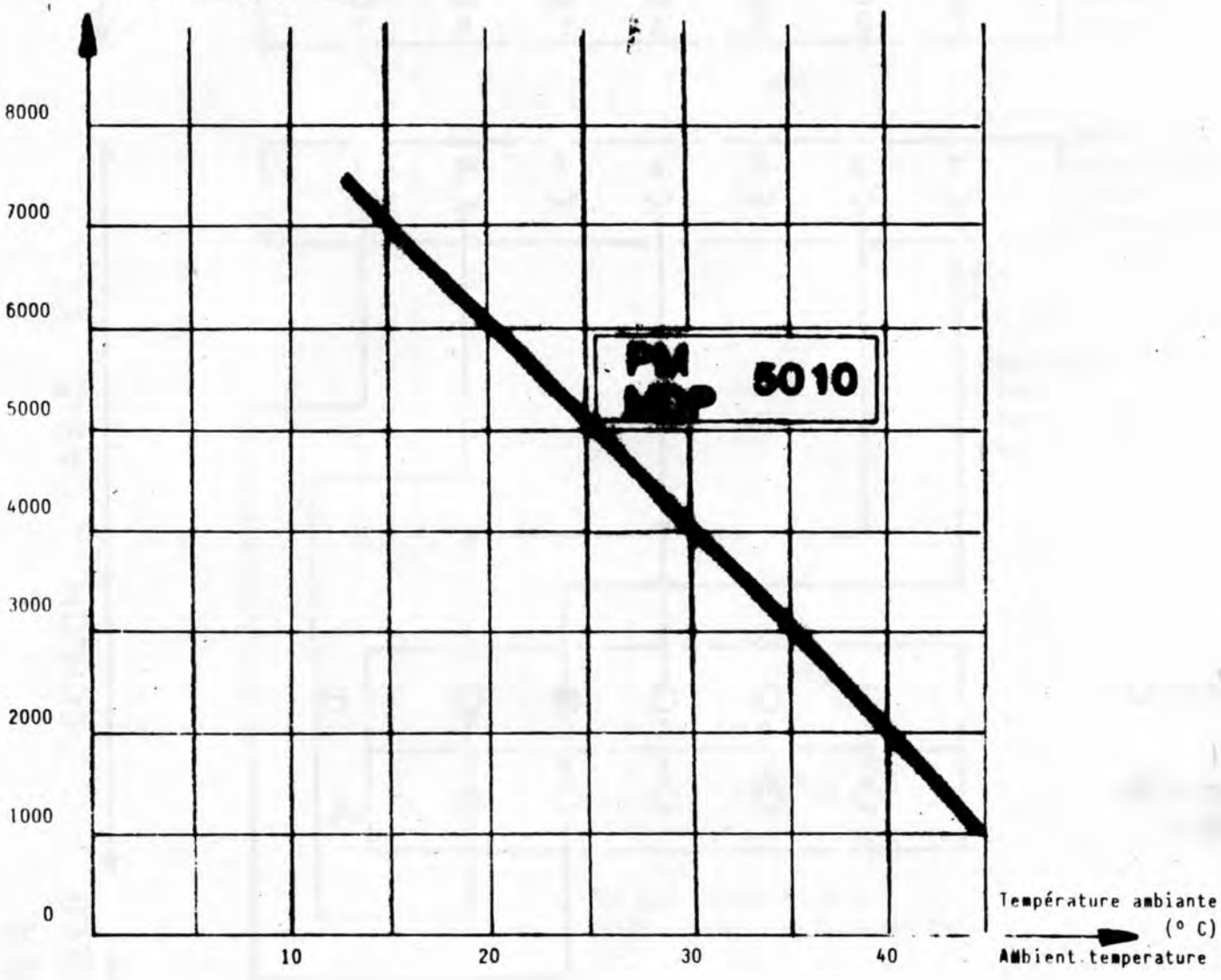


FIGURE 5

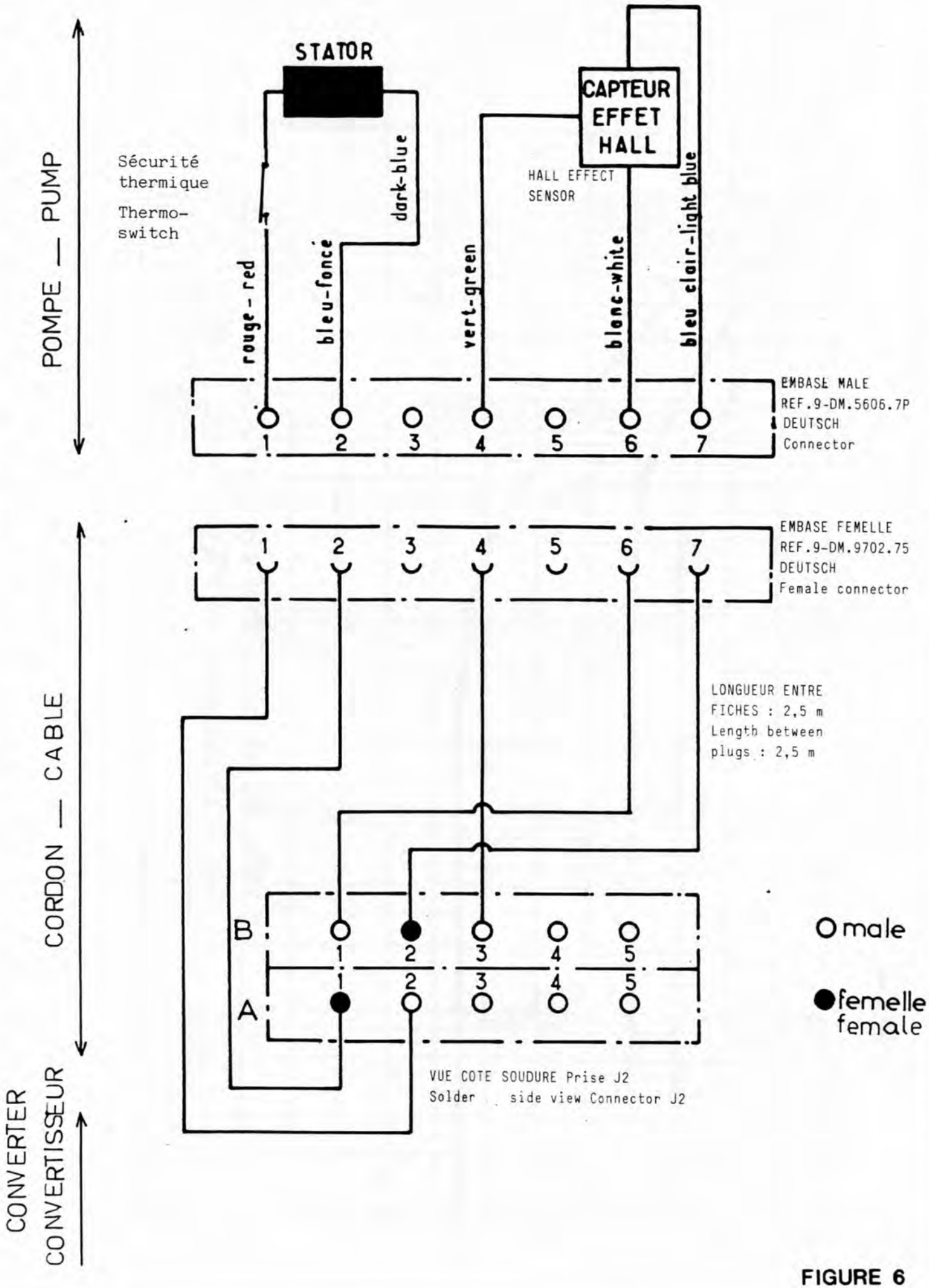

POMPE — PUMP
CORDON — CABLE
CONVERTISSEUR
CONVERTER
STATOR
CAPTEUR EFFET HALL
HALL EFFECT SENSOR
Sécurité thermique
Thermo-switch
rouge - red
bleu-foncé
dark-blue
vert-green
blanc-white
bleu clair-light blue
1 2 3 4 5 6 7
EMBASE MALE
REF.9-DM.5606.7P
DEUTSCH
Connector
EMBASE FEMELLE
REF.9-DM.9702.75
DEUTSCH
Female connector
LONGUEUR ENTRE FICHES : 2,5 m
Length between plugs : 2,5 m
B
A
1 2 3 4 5
VUE COTE SOUDURE Prise J2
Solder side view Connector J2
O male
● femelle
female

FIGURE 6

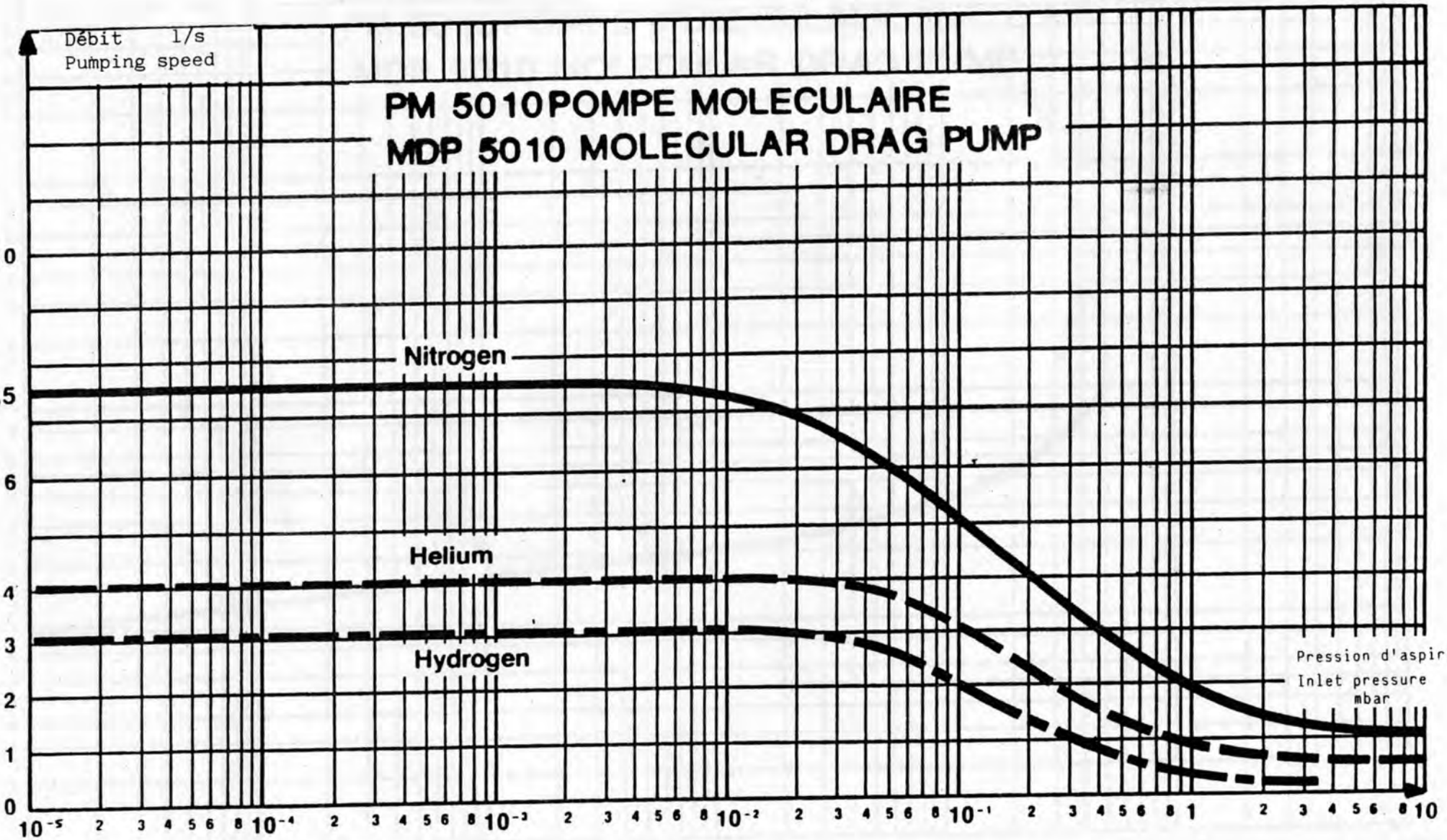

Débit l/s
Pumping speed
PM 5010 POMPE MOLECULAIRE
MDP 5010 MOLECULAR DRAG PUMP
10
7,5
6
4
3
2
1
0
Nitrogen
Helium
Hydrogen
Pression d'aspiration
Inlet pressure
mbar
10⁻⁵ 2 3 4 5 6 8 10⁻⁴ 2 3 4 5 6 8 10⁻³ 2 3 4 5 6 8 10⁻² 2 3 4 5 6 8 10⁻¹ 2 3 4 5 6 8 1 2 3 4 5 6 8 10

FIGURE 7

PRESSION LIMITE – ULTIMATE INLET PRESSURE

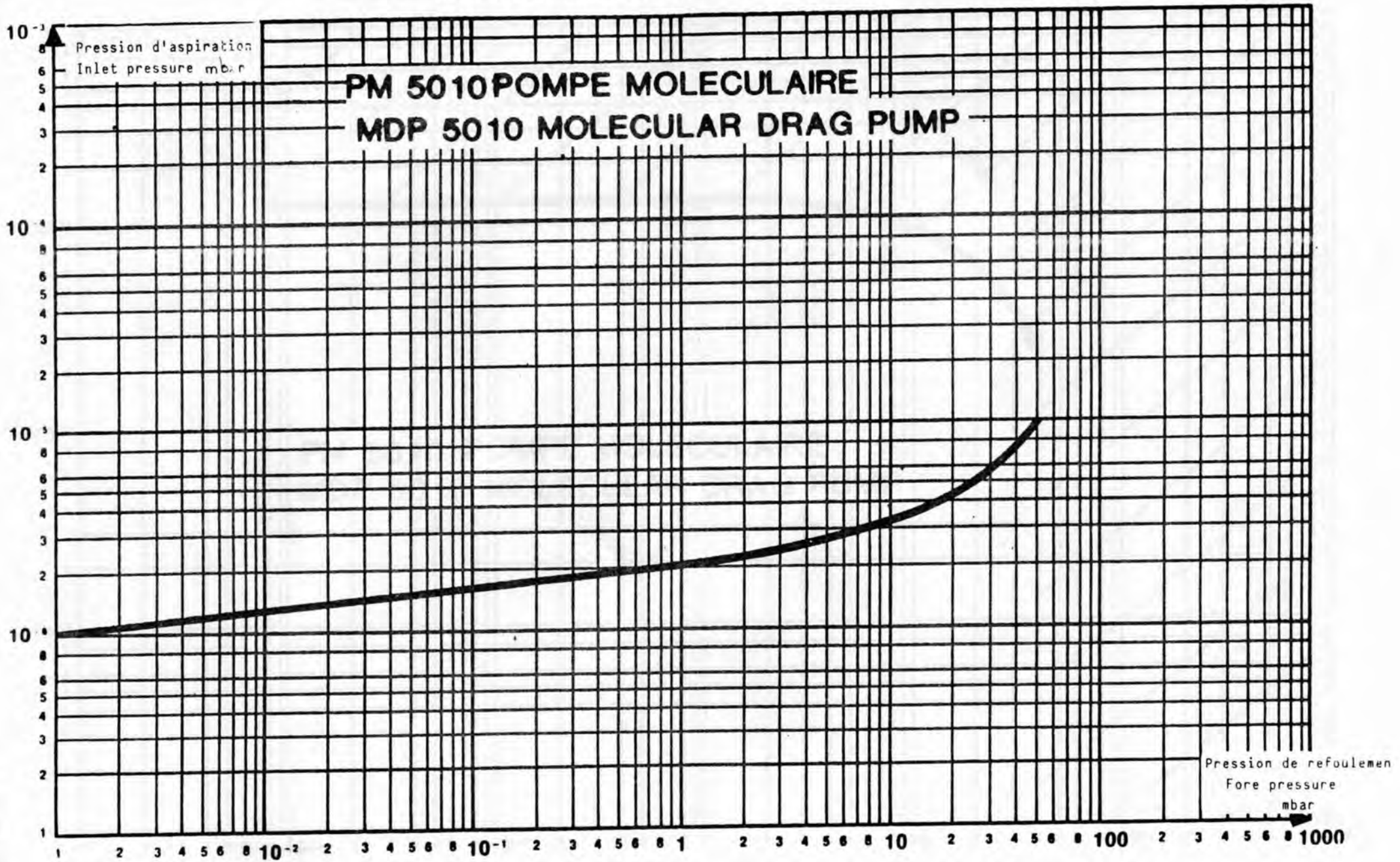


FIGURE 8

PRESSION MAXIMALE D'UTILISATION _ MAXIMUM INLET PRESSURE

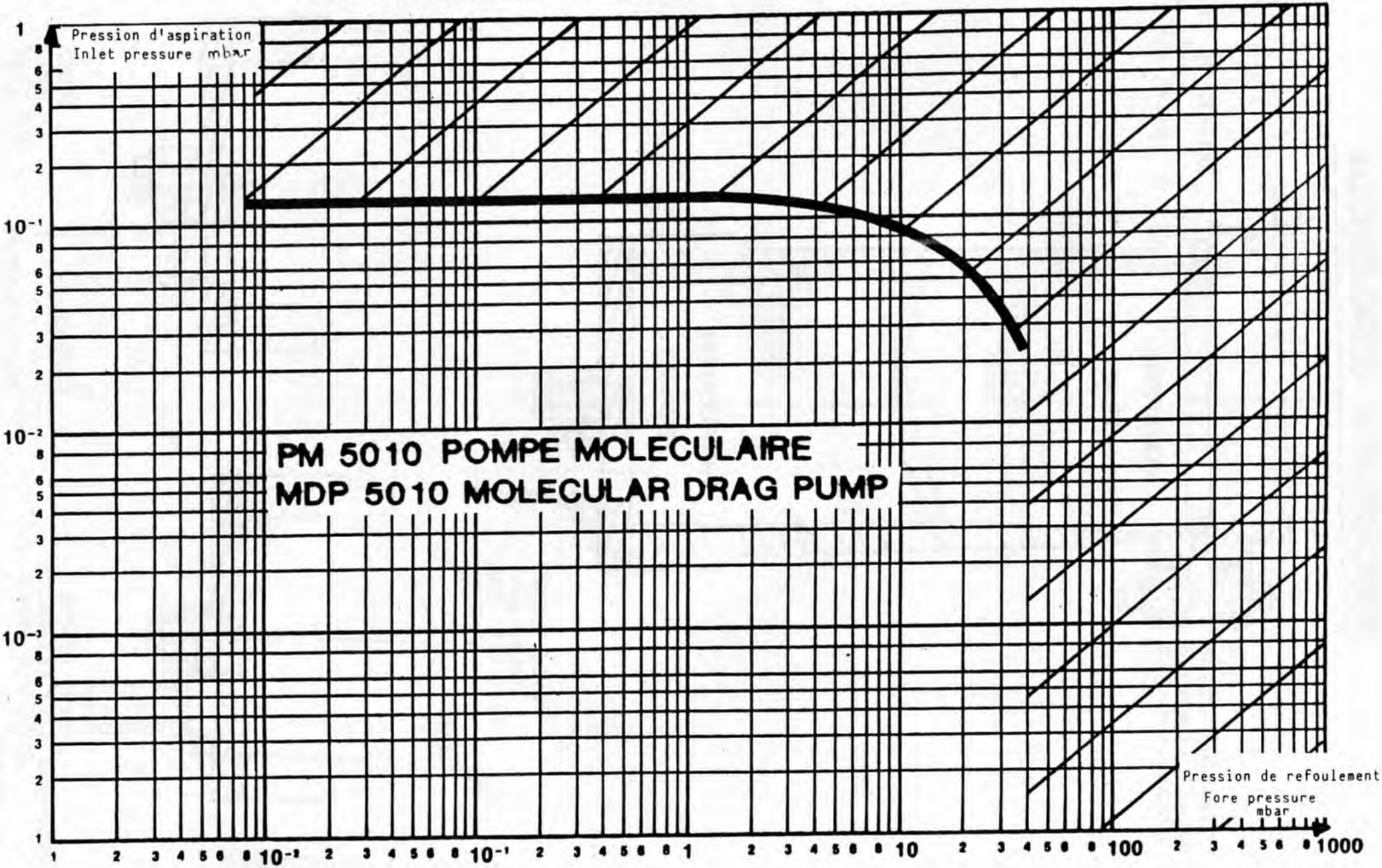
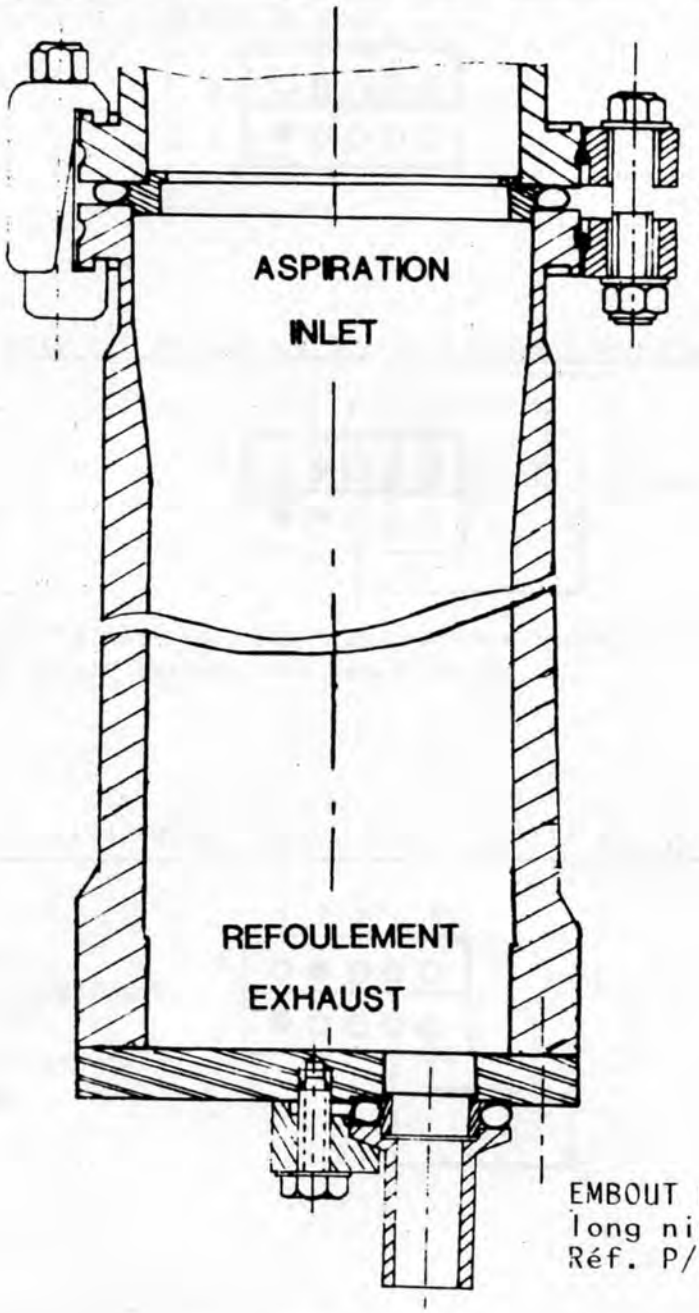


FIGURE 9

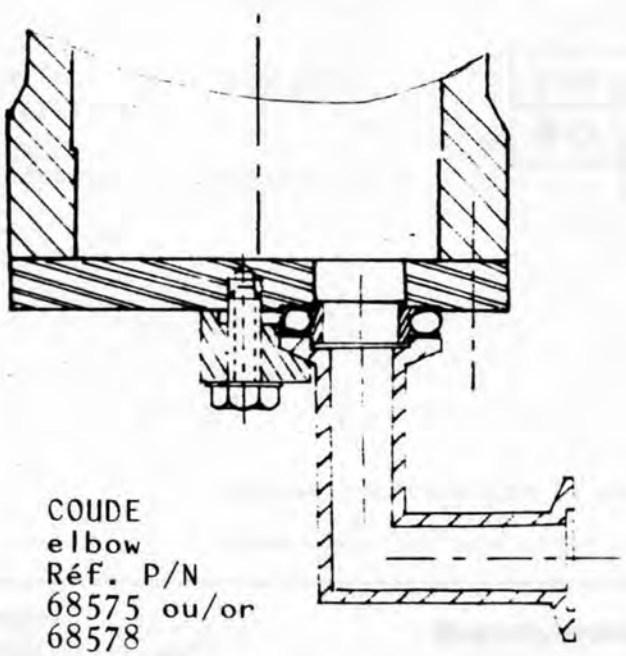
ACCESSOIRES /ACCESSORIES



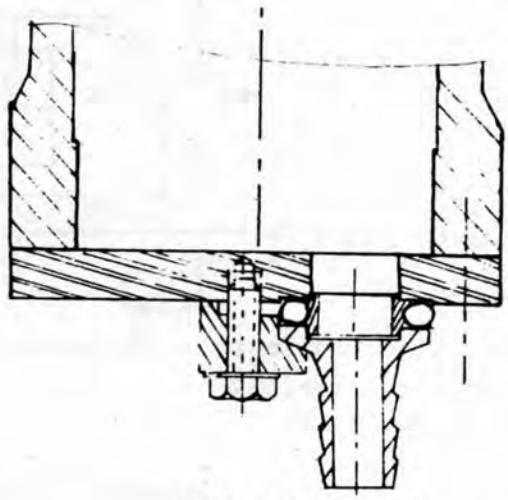
GRIFFE DE SERRAGE
Claw clamp
Réf. P/N 68428

BRIDE TOURNANTE
Rotatable flange
Réf. P/N 68420

EMBOUT LONG
long nipple
Réf. P/N 68510



COUDE
elbow
Réf. P/N
68575 ou/or
68578

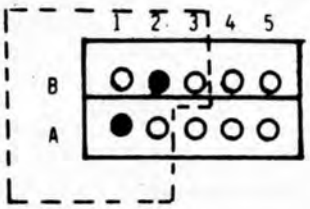


EMBOUT CRANTE
tapered hose adaptator
Réf. P/N 68528

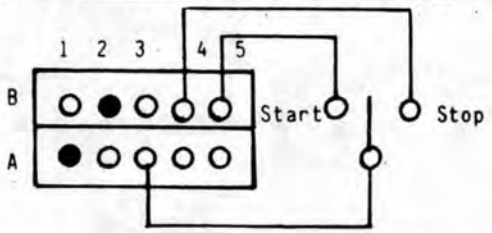
FIGURE 10

PRISE VUE COTE SOUDURE / PLUG SOLDERING SIDE VIEW

RESERVE UNIQUEMENT
A LA POMPE
Only for pump



MONTAGE DE BASE (CABLAGE DE BASE)./ Standard connection (Standard wiring)

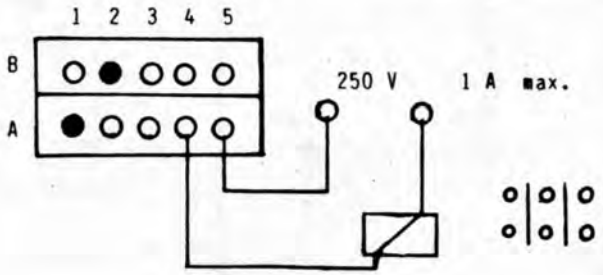


LES POUSSOIRS "START" ET "STOP" DE L'APPAREIL CONSERVENT LEUR FONCTION
"Start" and "Stop" buttons are operational.

CABLAGE EN VERSION TELECOMMANDE SEULE/ Remote control wiring

LE CONTACT SE FERME
LORSQUE "START" EST ENCLENCHE

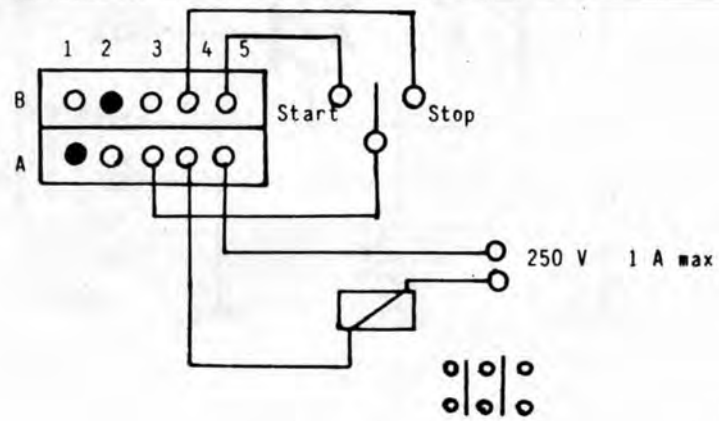
The contact is closing when
"Start" is locking.



COMMANDE EXTERIEURE SEULE (PM ou AUTRE) / Outer control (MDP or other)

REGROUPE LES DEUX CAS
PRECEDENTS

Proceed as indicated above



CABLAGE TELECOMMANDE ET COMMANDE EXTERIEURE

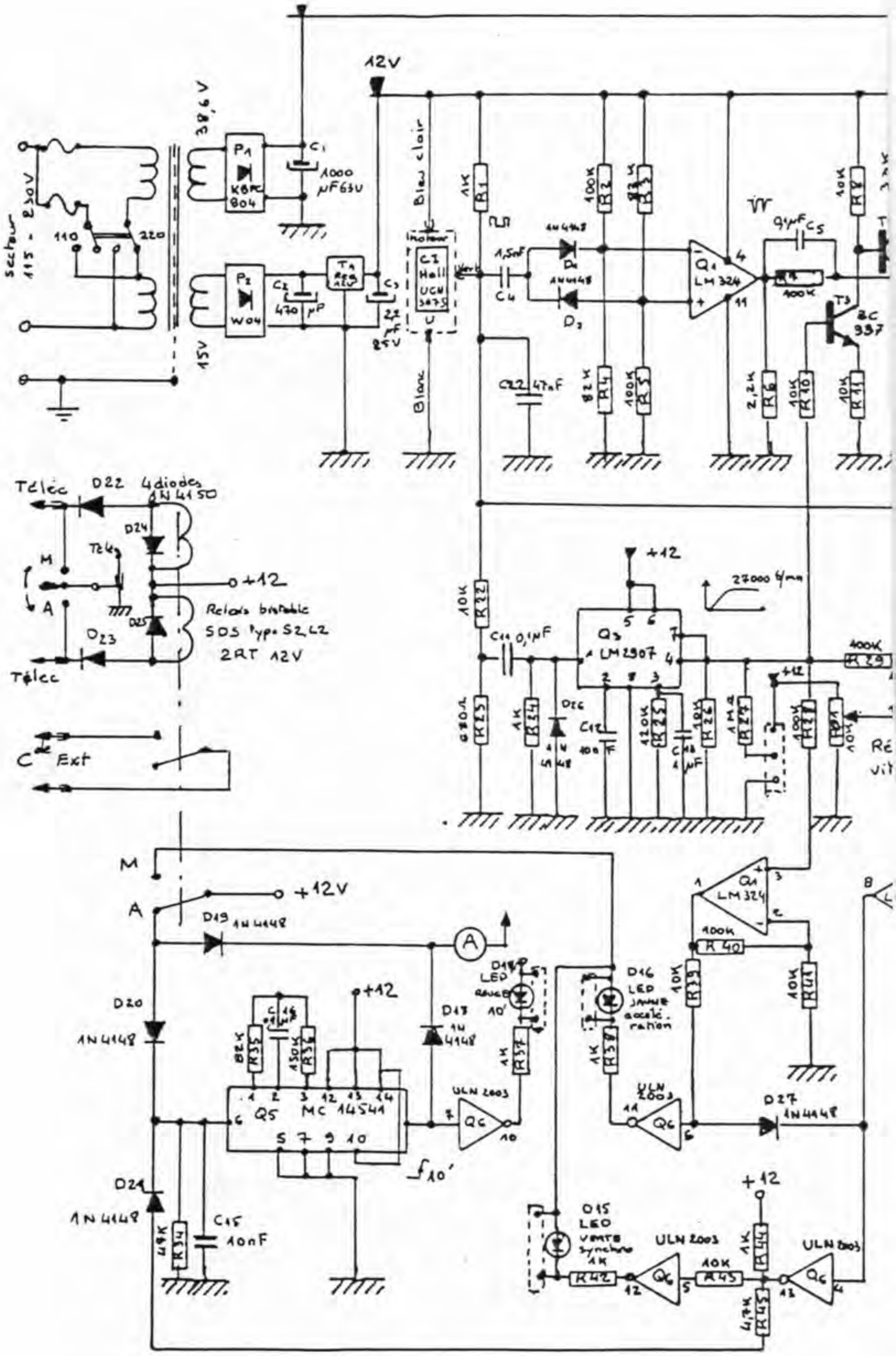
Remote control and outer control switch wiring

LEGENDE legend

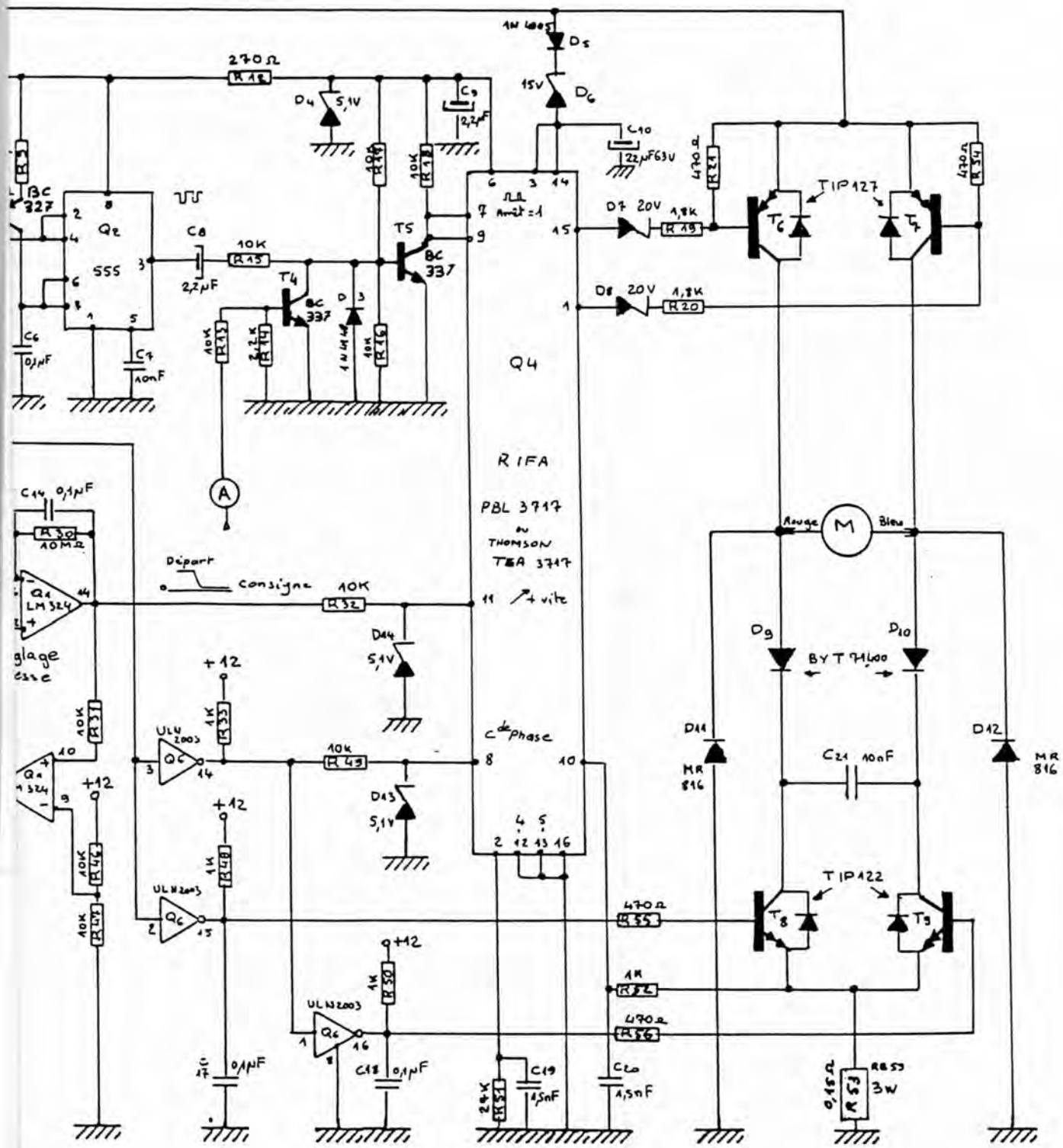
● FEMELLE - Female
○ MALE - Male

Branchement prise Télécommande
Plug connection Remote control

FIGURE 11



12V
38,6V
15V
secteur 115 - 230V
110
220
P1 KBPC 804
C1 1000 µF63V
P2 W04
C2 470 µF
T1 REG 12V
C3 22 µF 25V
Bleu clair
moteur
CI Hall UGN 3075
Blanc
R1 1K
C4 1,5nF
D1 1N4148
D2 1N4148
C22 47nF
R2 100K
R3
R4 82K
R5 100K
Q1 LM 324
C5
R8 100K
R9 10K
T3 BC 337
R6 2,2K
R10 10K
R11 10K
Télec
D22
4diodes 1N 4150
D24
T24
M
A
+12
Relais bistable SDS type S2,L2 2RT 12V
D25
D23
Télec
C Ext
+12
27000 t/mn
Q3 LM 2907
R22 10K
C11 0,1µF
R23 470Ω
R24 1K
D26 1N 4148
C12
R25 120K
C13 1µF
R26
R27 1MΩ
R28 100K
R29 100K
R31
M
A
+12V
D19 1N 4148
A
D18 LED rouge 10'
D16 LED jaune accélé-ration
D20 1N 4148
R35 82K
R36 150K
C14
+12
D17 1N 4148
R37 1K
R38 1K
Q5 MC 14541
ULN 2003
Q6
f10'
Q4 LM 324
R40 100K
R39 10K
R41 10K
D27 1N 4148
B
D21 1N 4148
R34 49K
C15 10nF
D15 LED verte synchro 1K
R42
ULN 2003
10K R43
+12
R44 1K
ULN 2003
R45 4,7K



SCHEMA ELECTRIQUE

GENERAL ELECTRICAL DIAGRAM

FIGURE 12

ALCATEL

FRANCE

ALCATEL
Département industries
Division vide et mécanique
Services Commerciaux
33, rue Emeriau
75725 PARIS CEDEX 15 - France
Tél. : 16.1.45.71.10.10
Télex ALCANUC 270 431
Service après vente PARIS
40, rue danton
92240 MALAKOFF
Tél. : 16.1.46.56.63.06
Service après vente ANNECY
98, avenue de Brogny B.P. 69
74009 ANNECY CEDEX
Tél. : 50.65.77.90
Télex 385 153 F

Vide primaire : Tél. : 50.65.77.93
Vide secondaire : Tél. : 50.65.77.85
Electronique : Tél. : 50.65.78.13
Détection : Tél. : 50.65.78.20

Service pièces détachées PARIS
Tél. : 16.1.45.71.10.10

Service gestion Commandes ANNECY
Tél. : 50.65.78.50
Tél. : 50.65.78.51
Tél. : 50.65.78.52
Tél. : 50.65.78.53

AGENCES RÉGIONALES

AGENCE EST
Rue des Châteaux
70140 PESMES
Tél. : 84.31.21.41

AGENCE RHÔNE-ALPES
167, Rue du Hérisson
38140 RIVE-SUR-FURE
Tél. : 76.91.14.85

AGENCE MÉDITÉRANÉE
26, Allée Camille Borghèse
Parc Rigaud N° 23
13100 AIX-EN-PROVENCE
Tél. : 42.23.51.42

AGENCE AQUITAINE
21, Avenue de la Croix - B.P. N° 6
LE TAILLAN-MÉDOC
33320 EYSINES
Tél. 56.95.17.71

ARGENTINA
JORGE A. MOENTACK
H. Yrigoyen 1180-8° Piso
1086 BUENOS AIRES -
Republica Argentina
Tél. : 37.90.21/5
Télex 10294 MONTA AR

AUSTRALIA
JOHN MORRIS SCIENTIFIC
PTY LTD
P.O. Box 447
WILLOUGHBY 2068
N.S.W.
Tel. : (02) 406 6466
Telex : 22001

AUSTRIA
ALCATEL GmbH
Postfach 347 - Am Bildacker 1
6980 WERTHEIM AM MAIN -
Bundesrepublik Deutschland
Tél. : (093 42) 1081 zu 1084
Télex : 689 102 ALVAC D

BELGIUM
VACUUM EQUIPMENT
27, Avenue de l'Aulne
1180 BRUXELLES
Tél. : (02) 378 38 86
Télex : 63 952 EQVAC B

CANADA
CANADIAN VACUUM EQUIPMENT
2755 De Miniac H4 S1 E5
St-Laurent - MONTRÉAL - Canada
Tél. : (514) 332 1025

DENMARK
ALCATEL GmbH
Postfach 347 - Am Bildacker 1
6980 WERTHEIM AM MAIN
Bundesrepublik Deutschland
Tél. : (093 42) 1081 zu 1084
Télex : 689 102 ALVAC D

EGYPT
TACSO
121, Ramsès Street
AP P4 - CAIRO Egypt
Tél. : (20 2) 75 15 42
Télex : 93 346

FINLAND
SV VACUUMSERVICE OY
P.O. Box 86
SF - 00251 Helsinki
Finland
Tél. : 358 0 736 244
Télex : 12 58 21 VACS SF

GERMANY
ALCATEL GmbH
Postfach 347 - Am Bildacker 1
6980 WERTHEIM AM MAIN
Bundesrepublik Deutschland
Tél. : (093 42) 1081 zu 1084
Télex : 689 102 ALVAC D

GREECE
NORM Ltd
Advanced Technology Equipment Co
18, Voulis Street
ATHENS - Greece
Tel. (30 1) 323 49 88
Telex : 219 323

ITALIE
Rial s.r.l.
Via Novara 6/A
43100 PARMA - Italia
Tel. : (0521) 771 275
Telex : 53 02 59 CCIAPR 1

JAPAN
ANELVA
8-1, 5 Chome yotsuya
Fuchu-shi - TOKYO 183 - Japan
Tel. : 0423 64 21 11
Telex : 02832558 NEVARN J

NETHERLANDS
V.G. INSTRUMENTS B.V
P.O. BOX 171
NL 1380 AD Weesp
Tel. : 02940 - 80 484
Telex : 120 97

PORTUGAL
COMMERCIAL LABORUM
Rua da Restauraçao 83.2
4000 PORTO - Portugal
Tel. : (351 29) 69 57 67
Telex : 23 156

REP. OF SOUTH AFRICA
FRANSA - P.O. Box 41211
CRAIGHALL - TVL
Republic of South Africa
Tel. : (27 11) 787 57 31
Telex : 42 4871 SA

SPAIN
SATEC
Apartado Postal n° 384
BILBAO - Espana
Tél. : (94) 443 77 94
Télex : SATEC 32 182 CCINB

SWEDEN
VACUUM SERVICE - P.O. Box 42137
Vretenborgsvägen 8
Västberga
12612 STOCKHOLM 42 - Sverige
Tel. : (08) 744 29 85
Telex : 116 95 VAC SERV

SWITZERLAND
ALCATEL GmbH
Postfach 8307
Effretikon
Schweiz
Tel. : (41) 52 32 60 52

UNITED KINGDOM
ALCATEL VACUUM PRODUCTS
Fairacres Industrial Estate
Windsor Berks SL 44 LF
United Kingdom
Tel. : (75.35) 69 222
Telex : 848 650

UNITED STATES OF AMERICA
ALCATEL VACUUM PRODUCTS
40 Pondpark Road
South Shore Park
HINGHAM - MASS 02043
United States of America
Tel. : (617) 749 87 10
Telex : 0940 222
1050 East duane avenue Suite E
Commerce Park
Sunnyvale CA 94086
Tél. : (408) 746 29 47
Télex : 172 652 Alcat SUVL