

Technologie du vide
High vacuum technology
Hochvakuumtechnik

Notice technique
Instruction manual
Technische Beschreibung

**POMPES TURBOMOLÉCULAIRES
TURBOPAK**

**TURBOMOLECULAR PUMPS
TURBOPAK**

**TYPE 5081 - 5101 + CFV 100
TYPE 5081 CP IS**

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▼
ALCATEL

TURBOMOLECULAR PUMPS AND TURBOPAK Type 5081 - 5101 + CFV 100

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NOTES

Read this manual completely before unpacking and installing the unit.

Check crates for damage in shipping notify ALCATEL and shipping company of any damage.

DO NOT UNPACK UNIT UNTIL READY TO INSTALL.

The guarantee is available only if the advice of the instruction manual are respected.

RETURN FOR REPAIR OR MAINTENANCE WORK

When returning equipment to our factories for repair or maintenance by our After-Sales Service, we would request you to :

- . let us know in writing, if your pump has been used for applications involving toxic or dangerous products, such chlorine, fluorine and their derivatives, etc... Please specify the nature of the product used, if this is the case.
- . If high risk or contaminating products, such as arsenic and its compounds, cyanure, etc... have been used, we are only able to carry out work on your equipement after decontamination performed and certified by your company, or by a specialist.

We advise the user that :

- Switch "on" the TMP at atmospheric pressure for 5 minutes.
- It's necessary to lubricate periodically the ball bearings (see parag.5) |

A - TURBOMOLECULAR PUMP 5101 - 5081 WITH CFV 100

CHAPTER 1 : GENERALITIES

1.1 - DESCRIPTION

The following equipement is standard :

- The turbomolecular 5101 or 5081 pump itself.
- The frequency converter CFV 100 from 0 to 450 Hz.
- Necessary electrical connectors.

1.2 - 5101 AND 5081 PUMPS

See figures 1a et 1b at the end of the manual.

The ALCATEL 5101 and 5081 turbomolecular pumps (TMP), are a one hundred percent turbomultistages design. The rotational speed is 27000 rpm.

The heart of the pump is assembled at the end a shaft that turns in two grease lubricated high-precision ball bearings, located in the forevacuum. The pumping elements are made of aluminum alloy.

The inlet housing including the connecting is made of stainless steel.

The pump is powered by a 450 Hz electric motor, mounted between the two ball bearings. The rotor fits directly on the shaft, and the stator, mounted in the body of the pump, is cooled by a fan located outside the pump, or by a water cooling ring, or by natural convection.

INLET FLANGES

Model 5101 : Pneurop NW 100 flange.

Model 5081 : Pneurop NW 63 flange.

Model 5101 UHV : UHV 63 CF ultra-high vacuum flange (a "knife edge ultra-high vacuum Type" for copper seal).

Model 5101 UHV : UHV 100 CF ultra-high vacuum flange (a "knife edge ultra-high vacuum" type for copper seal).

OUTLET FLANGES : Pneurop NW 25 flange.

1.3 - CFV 100 FREQUENCY CONVERTER

The electronic frequency converter is in the form of 1/4 19" 3 U module for installation in a 19" Rack frame.

It supplies the pump motor and controls the power required to achieve 27000.rpm .
A general electrical schematic is provided at the end of this manual (Figure 11/1, 11/2)

Safety devices are incorporated in the pump and converter, to monitor proper operating characteristics.

1.31 - FRONT PANEL (figure 2)

It includes :

a) A POWER SWITCH "0 - 1" : Pressing this switch on right energizes the converter. A yellow pilot light lights on when CFV is powered.

b) "START" SWITCH

Pressing this switch on left energizes the 450 Hz motor and the pump begins to run.

c) "STOP" SWITCH

Pressing this switch on left, stops current to the 450 Hz Turbomotor and the pump will stop.

d) 1 GREEN PILOT LIGHT "= 27000"

When it is "ON", it indicates that the converter is producing 450 Hz A.C. to drive the TMP motor.

e) 1 YELLOW PILOT LIGHT "< 27000"

When it is "ON", it indicates that the TMP is :

- In starting period
- In overloading : for exemple, in a continuous use at a pressure up to $\geq 10^{-1}$ mbar.

f) 1 RED PILOT LIGHT "  "

This light stays "OFF" as long as everything is operating normally. If a malfunction occurs it lights "ON" and indicates :

- . that there is an overheating due to converter.
- . either an overheating due to pump or its motor.

The motor is not energized and the pump is not running.



g) An elapsed time counter

It records pump operating time, from 0 to 100 000 hours.

DETECTION OF ROTATION

The detection of rotation, is materialised by three pilot lights "yellow, green, and red", which indicate the TMP motor speed.

The different possibilities are listed bellow.

	ACTION ON BUTTON		TMP MOTOR	PILOT LIGHTS			TMP SPEED rpm
	START	STOP		YELLOW	GREEN	RED	
1) Before starting	0	0	0	0	0	0	0
2) Starting	1	0	1	1	0	0	< 27 000
3) Pump at synchronism speed	0	0	1	0	1	0	= 27 000
4) Incident* Overheating due to pump or converter	0	0	0	1	0	1	 0
5) Overloading	0	0	1	1	0	0	< 27 000
6) Pumping stop	0	1	0	0	0	0	 0

* During the pump or converter cooling, the cycles 2, 3 (or 5) will be happened again periodically until the user remedies the overheating.

1.32 - REAR PANEL (figure 3)

It includes :

- Power source connector J1
- Pump and remote control connector J2
- Air cooling connector J5
- Vent valve connector J4
- A place for the interface output J6. (See paragraph.2.2)
- One power line fuse (0,5 A for 220 V and 200 V, 240 V, or 1A for 115 V and 100 V)

See CFV 100 general electrical diagram in the end of this manual. (figure 11/1 and 11/2).

CHAPTER 2 : SPECIFICATIONS

2.1 - PUMPS

See curve figure 4.

- Pumping speeds* at the inlet :

	5101 TMP	5081 TMP
- Nitrogen N ₂	100 l/s	80 l/s
- Helium He	60 l/s	50 l/s
- Hydrogen H ₂	40 l/s	40 l/s

- Compression ratios :

- N₂ : $8 \cdot 10^7$

- He : 2500

- H₂ : 300

- Ultimate pressure* measured with 2 stages RP and metal seal at inlet : $\leq 5 \cdot 10^{-9}$ mbar.

Maximum pressure in continuous operation **	TMP cooled by natural convection	TMP air cooled	TMP water cooled
at inlet	$1 \cdot 10^{-3}$ mbar	$1 \cdot 10^{-1}$ mbar	$1 \cdot 10^{-1}$ mbar
at exhaust	$1 \cdot 10^{-2}$ mbar	$1 \cdot 10^{-1}$ mbar	$1 \cdot 10^{-1}$ mbar

- Roughing pump recommended : 4 m³/h (3.2 cfm) -Alcatel model 2004 A.

- Rotational speed : 27 000 rpm.

- Startup : ≤ 1 mn 45 s

- Ambient temperature : 0 to 35° C (TMP cooled by natural convection) (32 to 95° F)

0 to 35° C (TMP air cooled or by natural convection) (32 to 95° F)

0 to 50° C (TMP water cooled) (32 to 132° F).

- Water flow : 0,2 to 1 l./mn with water temperature between 10 and 20 C.

- Pump weight : 3 kg. (6.6 lbs) for TMP 5081 NW 63 cooled by natural convection or 5.3 kg (11.7 lbs) for TMP 5101 UHV 100 CF air cooled

- Dimension : see figures 5/1 to 5/4.

* : measured by a measuring dome following Pneurop method.

** : these two pressures can't be cumulated.

2.2 - ELECTRONIC CONVERTER CFV 100

100 V - 115 V - 200 V - 220 V - 240 V - 50/60 Hz

The different line voltages correspond with a converter P/N specific (see chapter 7).

- Maximum power draw : 75 VA
- Output frequency : 0 - 450 Hz
- Ambient temperature : 0 - 50° C
- TMP Cable length : 2.5 m (11.4 ft)
- Weight : 2 kg (4.4 lbs)
- Dimensions : 110 x 134 x 225 mn (4.3 x 5.2 x 8.8 inches).

OPTIONS :

RF kit : if the converter must be used with radiofrequency, it is necessary to protect the converter.

Alcatel can supply upon request an "RF kit" - Part number 062198.

Interface kit :

An interface output can be connected to J6 at CFV 100 rear panel.

From this plug, the status of the three lamps can be output by contact closures.

It also includes an analog output that measures the speed of the pump (output 0.- 10 V for 0 - 27000 rpm)

- see schematic diagram fig. 9 - Eventually, it is possible to measure the pump input current. For this, contact Alcatel.

Locking device kit : Alcatel can supply a locking device kit for the converter rear plugs. (P/N 062397)

CHAPTER 3 : INSTALLATION

3.1 - UNPACKING

IMPORTANT !

Do not unpack turbomolecular pump from the shipping container until arriving at the installation site. Unpacking and installation must be performed in a single step.

The container includes the startup and maintenance manual and the completely assembled pumping system, cushioned with foam rubber. It is suggested to retain the containers and packaging material for any future transportation requirements of the TMP.

3.2 INSTALLATION OF THE TMP

3.21 - Remove protective cover from TMP inlet. This flange must not be used for proper operation of the TMP.

3.22 - Use flanges and seals corresponding to the inlet flange of the TMP.

- TMP WITH NW 100 AND NW 63 PNEUROP FLANGE

- . Install centering ring with viton seal, or inlet screen (splinter shield), on chamber or mount conductance lines.
- . Mount TMP separately and connect inlet flange.

- TMP WITH UHV 100 CF AND 63 CF FLANGE

- . Install copper seal.
- . Mount and connect TMP with washers and screws provided. Tightening torque must be between 2 and 2.5 m. daN.

3.23 - Connect TMP to the system.

- Insure that no foreign objects enter the inlet to avoid jarring the TMP.
- a) Insure that the system is clean and free of solide particules which could damage the pump.
- b) The ALCATEL 5101 and 5081 are mounted in any position, but prefebably in the vertical position with the inlet uppermost or undermost.
- c) Ambient temperature :
 - 32° F < T° < 95° F for TMP by air or by natural convection cooled
 - 32° F < T° < 132° F for TMP water cooled.
- d) The equipment, frame or chassis to which the TMP are connected must be sufficiently rigid to prevent vibration.

e) At inlet screen (splinter shield) is available, however this accessory reduces the pumping speed of the TMP.

3.24 - The bearings have been lubricated at the factory.

3.3 - RECOMMENDED FOREPUMP

3.31 - ALCATEL 5101 and 5081 TMP require a forepump. The ALCATEL 2004 A is recommended.

The selection of the forepump pumping speed will depend on the volume of the chamber to be pumped down and on the pump-down time to achieve $1 \cdot 10^{-2}$ mbar (this time must be 3 mn).

3.32 - PRECAUTIONS

To prevent oil backstreaming from the roughing pump (RP), avoid sudden changes in outlet circuit pressure.

Optionally, in order to prevent oil vapor contamination of the TMP and chamber, the following can be connected between the TMP outlet and the RP :

- a manual or automatic valve
- a molecular sieve trap (**the trap must not be exposed to the system**)
- the installation of a vent valve (NO) between the outlet flange of the TMP and the RP. (See chapter 6).

3.33 - The forevacuum line must be constructed of flexible hose.

- Remove protective cover from the TMP outlet.
- Install a NW 25 (10 inches ID) flexible hose to the TMP outlet, with the other end connected to the roughing pump.

3.34 - COOLING

a) Air cooling device :

The fan is assembled on the TMP by a bracket. This last is assembled on the pump rear tape with 3 screws CHc M4 x 10 (see figures 5/1 and 5/2).

- Connect the fan to converter at J5 with the special cable.
- The fan will start when the TMP is started.

The fan provides sufficient cooling for ambient temperature up to 95° F. If the ambient temperature is above 95° F, the user should install a water cooling collar.

b) Water cooling device :

It consists of a water circulator ring which can be equipped on the TMP housing. It is assembled on the pump rear tape by 3 screws CHc M4 x 20 (see figures 5/3 and 5/4). It is recommended for use at ambient temperature between 95 and 132° F, or in continuous use at high pressure.

- Use a flexible hose 6 x 8 mm to connect one of the water fittings to the water line. The user must provide some method of controlling water flow.
- Use a flexible 6 x 8 mm hose to connect the other fitting to the drain. The drain must operate with a zero backpressure system.
- Control the water flow at 0,6 l./mn with a water temperature at - 59° F and an ambient temperature at 77° F.

3.35 - POWER SUPPLY

MAKE SURE THAT ALL THE DISPLAYS ARE WIRED ACCORDING TO THE MAINS VOLTAGE

- Check the fuse at the converter rear panel :
 - . Fuse 1 A : 100 V - 115 V lines voltages
 - . Fuse 0.5 A : 200 V - 220 V - 240 V : lines voltages.
- Check voltage of the vent valve (NO), the fan with line voltage (A label 115 V is fixed on accessories used on 115 V).

Connect successively and in order (according to figure 6/1) :

- 1) TMP with the special cable to converter on J2 (at the rear panel). [Longer cable can be supplied upon request (standard length 3,5 m.)]. Wires section will be proportional to the length.
- 2) Fan with its cable (if TMP is air cooled) to converter on J5 (at the rear panel).
- 3) Converter to power line, with power line cable.

Remote control connecting line is made through plug P2 which equips pump-converter cable.

The remote control plug P2 can be used for the following functions :

- Connection of outer safety switch opens when a malfunction appears.
- Remote control from starting or stopping of the TMP motor (start and stop in front panel).
- We advise to screen the remote control cable.

See figures 6/2 and 6/3 - P2 plug connection.

Interface output J6 : see figure 6/4 at the end of the manual.

Note : If an electromagnetic valve is utilized on the same vacuum system as the turbomolecular pump then the valve must have a shielded cable. The shielded cable must properly grounded. This precaution must be followed to prevent interference with the TMP frequency converter.

3.4 - STARTING

For a **new TMP**, or **after two months**, we advise the user that switch "on" the TMP at atmospheric pressure for about 5 minutes with converter (it is necessary for a repartition of grease in ball bearings).

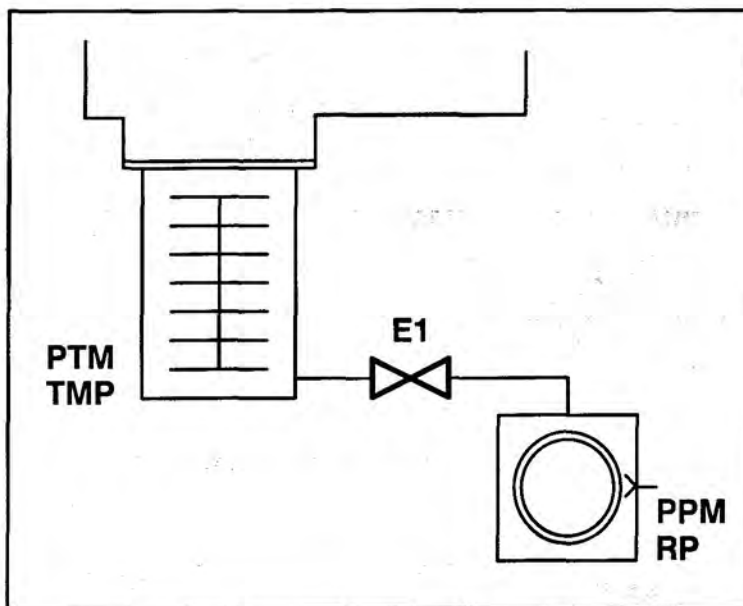
CHAPTER 4 : OPERATION

4.1 - STARTING AND STOPPING

Turbomolecular pump TMP.

Roughing pump RP.

4.11 - IN LINE ARRANGEMENT



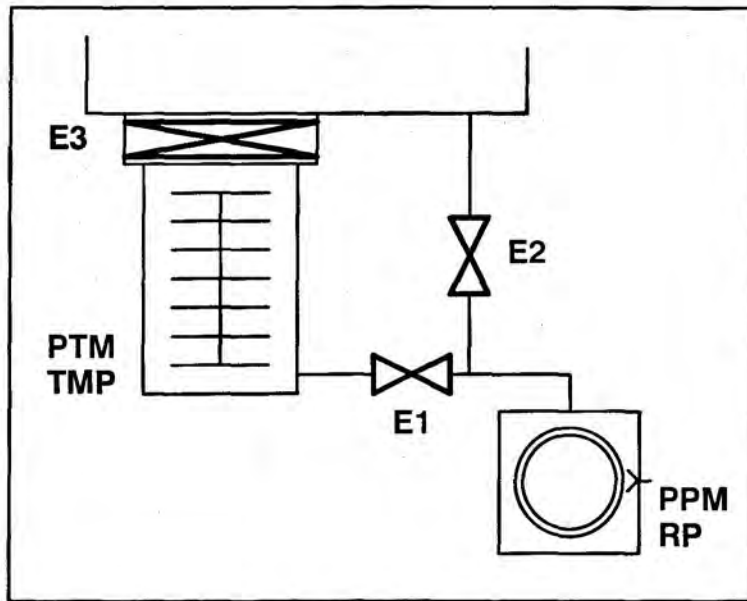
START

- RP and TMP off
- Open air cooling
- Open E1
- Start RP
- Start TMP

STOP

- Close E1
- Stop RP
- Stop TMP
- Inert gas enters inlet if necessary (1.5 mn or more)
- Shut off air cooling.

4. 12 - CLASSIC THREE-VALVES COMBINATION



a) Start (TMP off) :

- RP on
- Open air cooling
- Open E2
- Open E3 (E1 closed)
- At pressure $P \leq 1$ mbar
 - . E2 closed
 - . Open E1
- TMP on

b) Venting chamber to atmosphere :

- E3 closed
- Inert gas enters chamber (2 min)

c) Pumping down chamber :

- (RP and TMP on)
- E1 closed
 - E2 open
 - At pressure $P \leq 1$ mbar
 - . E2 closed
 - . E3 open
 - . E1 open

d) Stop :

- E3 closed
- E1 closed
- RP off
- TMP off
- Close air cooling

4.2 - BACKING

To reach ultimate vacuum rapidly, the dome or chamber connected directly to the pump inlet should be backed.

The maximum temperature at the top of the chamber must not exceed 200° C.

CAUTION ! during backing from dome, the temperature of the inlet flange must not exceed 120° C.

There is no need to bake the TMP but a bakout collar is available.

CHAPTER 5 : MAINTENANCE AND SERVICING

5.1 - RECHARGING WITH NEW GREASE AND CHANGING GREASE

The quantity of grease necessary for TMP operation was added to the bearings before the pump first started at the factory, and remains in the pump during shipment. The grease must be added to the bearings, periodically.(see fig. 7/2).

You must only use the ALCATEL grease contents in the syringe (see chapter 7)
When adding, proceed carefully with maximum cleanliness.

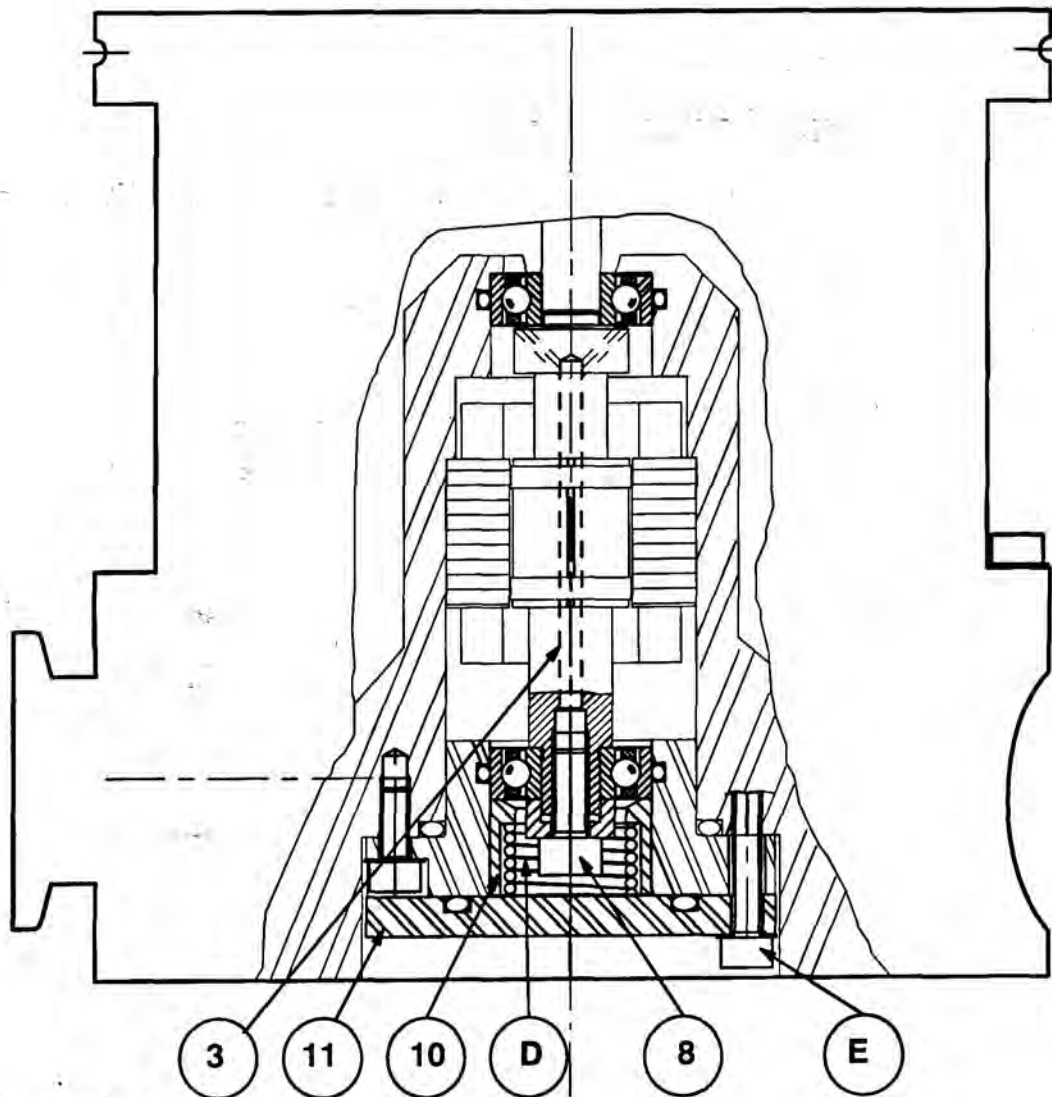
Warning :

- the TMP has two ball bearings : at every relubrication schedule, the user must relubricate the two ball bearings.
- The syringe is equipped with two removable spacers :
 - . one red spacer for the bearing opposite the pumping unit
 - . one black spacer for the bearing near the pumping unit.

Relubrication process

- 1) Stop the TMP and the RP.
- 2) Vent TMP to atmospheric pressure.
- 3) Ball bearing opposite the pumping unit (see figure 7/1)
 - Remove the part (11) unscrewing the 2 screws (E).(see photo 7.1).
 - Remove compression spring (D) and the spacer (10).
 - Insert the syringe to the ball bearing
 - Remove the red spacer and inject progressively the grease. (photo 7.2)
- 4) Ball bearing nearer to the pumping unit (see figure 7/1)
 - Insert the syringe through the screw (8) to the end of the axle (3).
The syringe must strike against the head of the screw (8) (see photo.7.3).
 - Remove the black spacer and inject progressively the grease. (photo 7.3)
 - Remove the syringe.
 - Reassemble the spacer (10) and the spring (D).
 - Close with the part (11) and its o-ring and screw with (E).

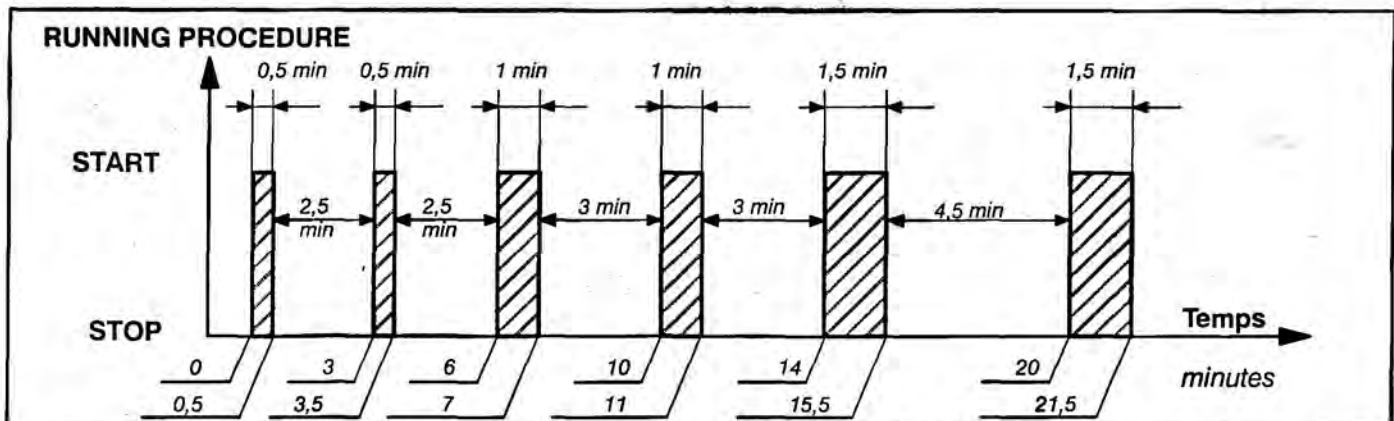
Schema



5.2 - Startup after "relubrication"

Start the TMP to atmosphere pressure for 6 min., as follows :

- Disconnect RP from TMP (vacuum connection).
 - . at time $t = 0$, press "start" button)
 - . at time $t = 3$ min, press "stop" button) 1st cycle
 - . at time $t = 6$ min, press "start" button)
 - . at time $t = 9$ min, press "stop" button) 2nd cycle
- continue like on the diagram below.



5.3 - REPLACEMENT OF BALL BEARINGS

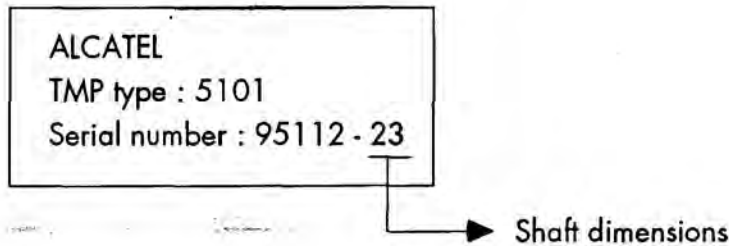
The ball bearings can be replaced at the user's facility

Replacement can be performed by a skilled service technician familiar with ALCATEL TMP. In this case Alcatel supplies instruction manual about ball-bearings replacement, special tools and ball-bearings.

Choice ball-bearings according to two numbers inscribed after TMP serial number on name plate and to table below.

Reference on name plate (shaft diam.)	Ball-bearings kit* P/N
1 (7,999)	066671
2 (7,998)	066672
3 (7,997)	066673
4 (7,996)	066674
5 (7,995)	066675

Example :



- 1st number "2" : indicates shaft dimension near the pumping unit 7.998 mm.

Ball-bearings choice : P/N 066672.

- 2nd number "3" : indicates shaft dimension opposite the pumping unit : 7.997 mm.

Ball-bearings choice : P/N 066673.

* Ball-bearings kit includes the ball-bearings, its o-ring, and a spring washer.

This last has been replaced by a compression spring on the new pumps.

The damping ring of the ball bearing is included into the seals kit.

5.4. - SEALS - MAINTENANCE - BALL-BEARINGS KITS

- Seals kit P/N 062698 : this kit contains a complete set of o-rings.

- Ball-bearings kit (P/N see parag. 5.3) : each kit contains ball-bearings and spring washer. (this last is not used in this pump type).

CHAPTER 6 - ACCESSORIES

6.1 - VENT ELECTROVALVE SYSTEM (NO) 240 V - (NO) 220 V - (NO) 200 V - (NO) 110 V - 100 V

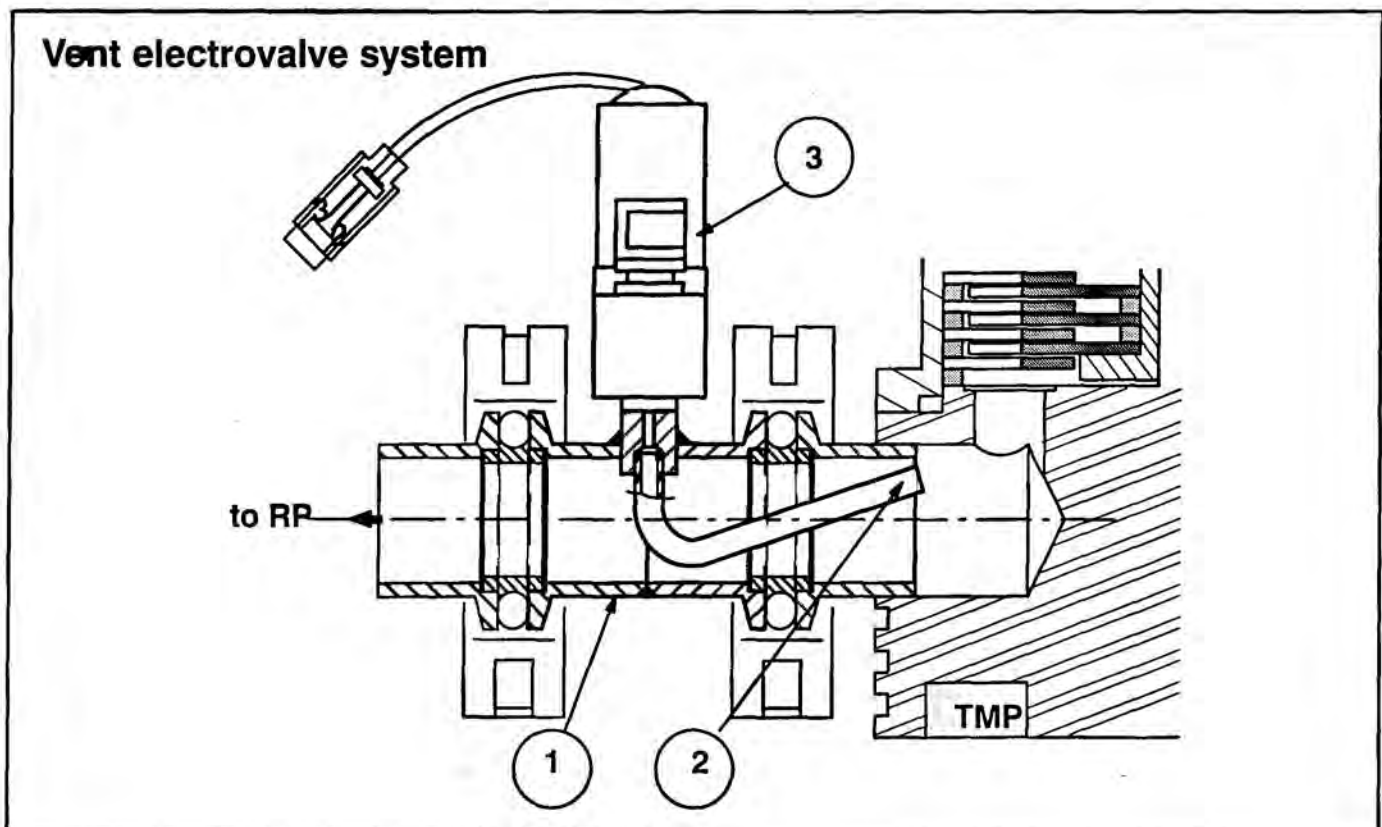
Check the solenoid valve voltage : it must be compatible with line voltage (see chapter 7 for P/N)

If there is a power failure, this device vents the TMP to atmosphere to prevent oil contamination from the roughing pump. It consists of :

- A solenoid valve (3) normally open (NO) mounted on a NW 25 flanged fitting. The fitting is installed between the outlet flange of the TMP and the foreline of the RP. It contains a tube (2) which introduces air into the pump from the solenoid valve.
- connect the solenoid valve cable to J4 of converter.

The user can vent the TMP as follows :

- Press the "Stop" switch on the converter.
- Push the power switch on left position.



6.2 - TURBO AIR INLET DEVICE

This device consists of a main supply, an air inlet solenoid valve NW 16 or NW 25, cables and sockets for connection to converter.

The air inlet device is able to :

- either allow air to enter the installation under vacuum following voluntary pumping shutdown or during a lengthy mains power cut.
- or start up the converter again following a short mains power cut.

Turbo air inlet device can be connected to converter CFV 100 in the case of this last is equipped with the optional interface.

Turbo air inlet device is delivered with its specific instruction manual.

CHAPTER 7 : EQUIPMENT CONFIGURATION - ACCESSORIES - PART NUMBER

DESCRIPTION	5081 TMP NW 63 Pneurop	5081 TMP UHV 63 CF	100 TMP NW 100 Pneurop	5101 TMP UHV 100 CF
Standard				
- TMP air cooled				
115 V/100 V	795414	795430	795439	795447
240 V/220 V/200 V	795519	795428	795437	795445
- TMP water cooled	795525	795520	795557	795562
- TMP cooled by natural convection	795412	795452	795436	795444
- CFV 100 converter			062757	
115 V 50-60 Hz			062758	
220 V 50-60 Hz			062755	
100 V - 200 V 50-60 Hz			062759	
240 V 50-60 Hz			056727	
- Line power cable *			057662	
220 - 240 V				
100 - 115 V - 200 V				
- Copper seal		062933		082080
- Power cable TMP / CFV 100		062748		
Accessories available				
- Pneurop rotatable flange	068420		068348	
- Centering ring + o-ring	068432		068439	
- Hardware for connection	068084	068291	068080	068294
- Bag of 10 copper seals		068299		068296
- Blank off flange	068285	068629	068350	068630
- Centering ring + o-ring NW 25			068189	
- Quick connect clamp NW 25			083264	
- Flexible stainless steel NW 25			068372	
length 1 m			068371	
length 0,5 m			056994	
- Vent E.V. system (NO)			063089	
220 V DN 25			063175	
115 V DN 25			063176	
100 V DN 25			063177	
200 V DN 25				
240 V DN 25				
- Inlet filter screen	063000	063115	056844	056845
- Back-out collar			056934	
220 V			063180	
115 V			062775	
- Automatic turbo air inlet device			062776	
DN 16 100 V - 115 V				
200 V - 220 V - 240 V				
Maintenance :				
- Seals kit			062698	
- Ball-bearings kit			066671	
- 1 -			066672	
- 2 -			066673	
- 3 -			066674	
- 4 -			066675	
- 5 -			056993	
- Syring of lubrication			037861	
- Time meter (5 V)			037866	
- Time meter (12 V)				
Options :				
- Power screened cable TMP/CFV 100			062616	
- RF kit			062198	
- Locking device kit for CFV 100 socket			062397	
- Interface kit			062969	

* included with converter supplying

CHAPTER 8 : CFV 100 CARD

Part number : 062319

The electrical frequency converter is in PC board. The customer can install in a form with six screws M3. The characteristics and functions are the same than the CFV 100 in a 1/4 rack (see parag. 2.2, PO 2, plug connection - Control figures 6/2 and 6/3).

DESCRIPTION

The circuit includes :

- "Start" button, "Stop" button, power switch.
- 4 diodes : 1 green, 2 yellow and 1 red. They can be connected outside the card by a connecting plug.
- 2 terminal cables (12 V direct current - 2 mA (moy) for counter (included with standard card)
- 7 terminal cables 50/60 Hz - Protection for 115 V, 100 V - 1A, for 200, 220, and 240 V - 0,5.A. Secure the card with a fuse installed outside the pump.
- A connector with TMP (on this connector, there are start and stop button, security of TMP, power supply TMP and remote control (see CFV 100 card set up figure 8 in the end of this manual).

Accessories available on order :

- Power cable TMP - CFV 100 : P/N 062748
- Screened cable TMP - CFV 100 : P/N 062616

new 946868-025

Options :

- Timemeter kit P/N 062320
- Power cable TMP / CFV 100 (up to 50 m).
- Outside diode kit P/N 062939
- Interface kit P/N 062969.

B - TURBOPAK 5081 - 5101**CHAPTER 1 : DESCRIPTION -DIMENSIONS**

There are many standard models for utilization in minimum space requirement :

WITH CFV 100	220 V. - 50 Hz	115 V. - 60 Hz
Turbopak 5081 Pneurop		
Turbopak 5081 UHV 63 CF		
Turbopak 5101 Pneurop		
Turbopak 5101 UHV 100 CF		

Each group includes :

- The TMP 5081 or 5101 with air cooling.
- The frequency converter CFV 100.
- Necessary electrical connector 220 V. or 115 V.
- The roughing pump 2004 A.
- The rigid frame and the flexible stainless steel hoses.
- The control box.
- The space for electrical box 1/4 rack 3 V.
- It exists an accessory : it's a airing 220 V. (No) or 115 V. (No) - See parag. 6.1.

CHAPTER 2 : SPECIFICATIONS

- Line voltage : 220 V. \pm 10 % 50 Hz single phase (other line voltage in option).
- Maximum power draw : 1000 VA.
- Ambient temperature : < 95° F. If the turbomolecular pumping group is installed inside a frame, you must him ventilate.
- Weight : 65 Kg.

CHAPTER 3 : INSTALLATION

3.1 - UNPACKING

Caution ! do not unpack turbomolecular pump from shipping carton before bringing it to installation site. Unpacking and installation must be carried out in a single step. The packing includes the startup and maintenance manual, the completely assembled pumping frame, cushioned with foam rubber.

3.2 - For the assembly of the turbomolecular pump, see the chapter A, sections 3.2 and 3.4.

3.3 - CONNECTION TO ELECTRICAL WIRING

Connect the cable from the circuit breaker on the frame to the single phase 220 V. line. The other protections are made at the factory. RP is protected by thermal switch installed in the frame, below the TMP.

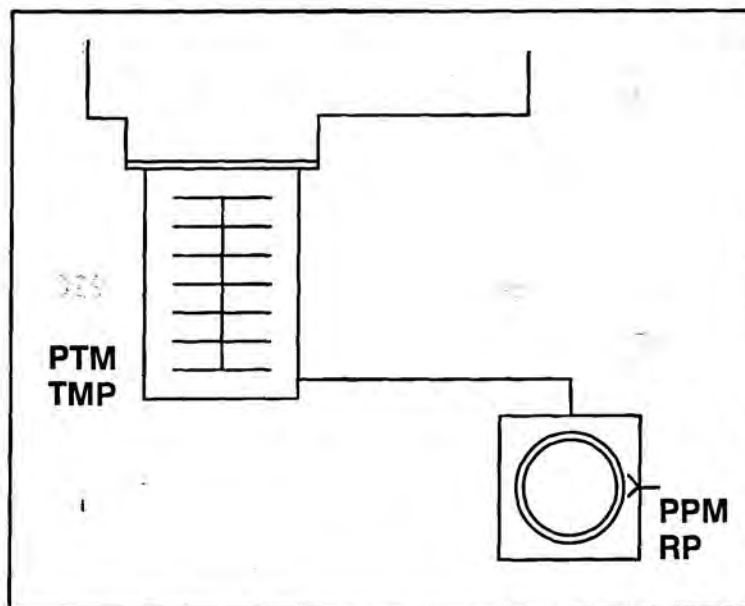
CHAPTER 4 : OPERATION

Turbomolecular pump TMP.

Roughing pump RP.

(See electrical diagram p. 9).

Standard model



Start :

- TMP and RP off.
- Open water line.
- Start. Proceed as follows :
 - . Throw line switch to the right position.
 - . Start the TMP by pushing the power switch on right.

Stop :

- Stop the TMP by pushing on the left the "stop" switch.
- Stop the RP by pushing the line switch on the left.
- RP and TMP off. Push "Stop" button.
- Inert gas enters inlet (1,5 mn or more).
- Shut off water.
- Push the line switch in the desired position to obtain the starting procedure (see parag. start).

CHAPTER 5 : MAINTENANCE

See chapter "Maintenance" of TMP (A.5 on present manual).

Maintenance of the RP : see manual joined with the pump.

C - TURBOMOLECULAR PUMP MODEL 5081 CP IS

CHAPTER 1 : DESCRIPTION

1.1. The 5081 CP IS TMP is specially designed for aggressive environments. Ball bearings and motor are isolated from process gases by a reversed dynamic seal and an inert gas purge system.

Inlet flange : UHV 63 CF.

Exhaust flange : NW 16.

Purge flange : NW 16.

Without continuous and proper utilization of the purge system, the TMP 5081 CP IS is not suitable for reactive gas or particulate laden applications.

Nevertheless, the dynamic seal allows ball bearings protection during a short time period (gases adjustment into the chamber for example), with TMP running at nominal speed. Let the purge supplied as soon as possible.

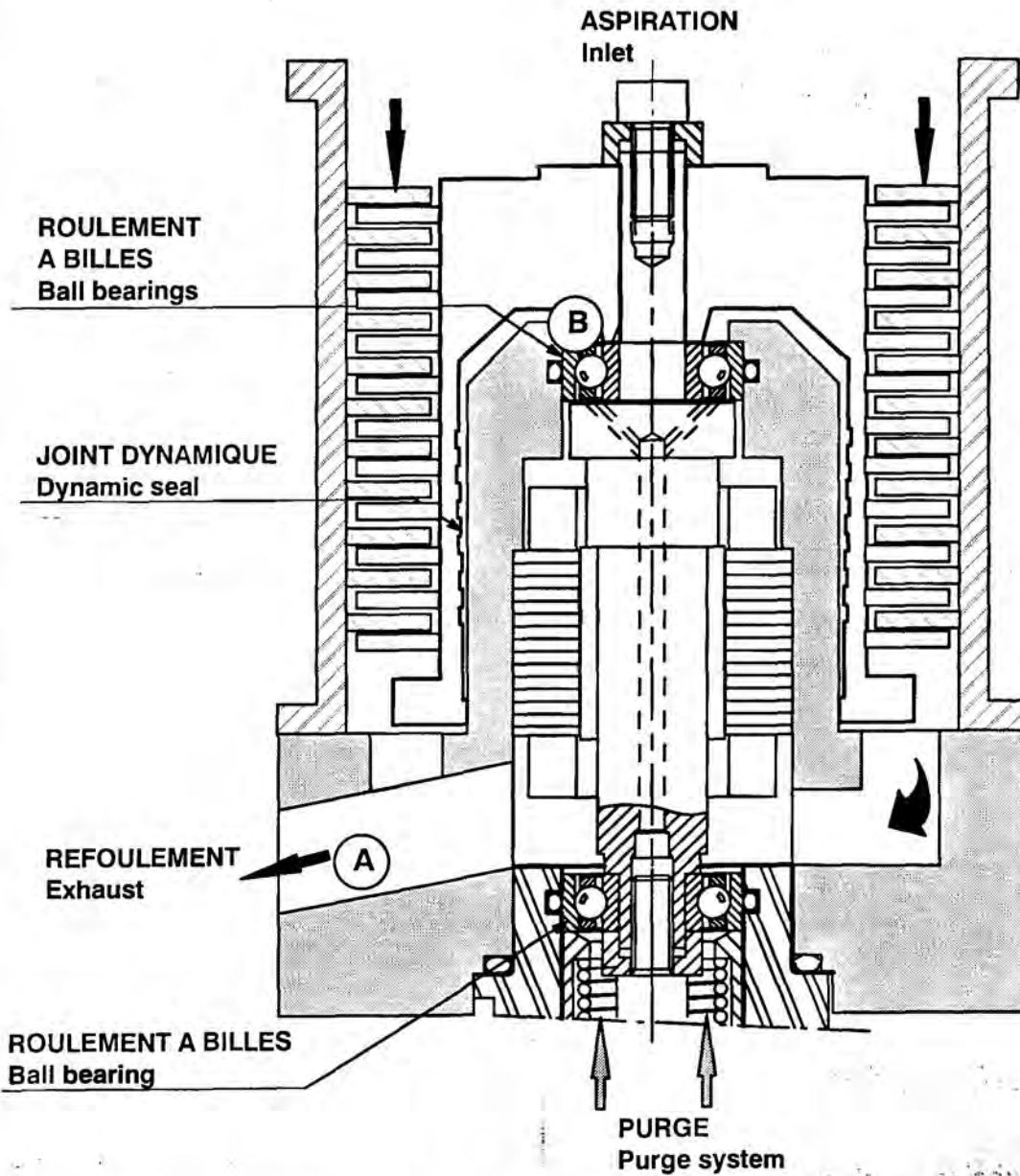
1.2. TMP 5081 CP IS operates with the same converter than the TMP 5081 standard.

1.3. REVERSED DYNAMIC SEAL

The reversed dynamic seal is an originally corrosion resistant device which re-inforces the neutral gas efficiency.

It can take the place of the purge for a short period of time when lightly corrosive gases are pumped.

The dynamic seal works as a molecular drag pump which prevents corrosive gases migration from the exhaust A to the bearing B.



Principle schematic of a CP pump with a reversed dynamic seal

CHAPTER 2 : SPECIFICATIONS

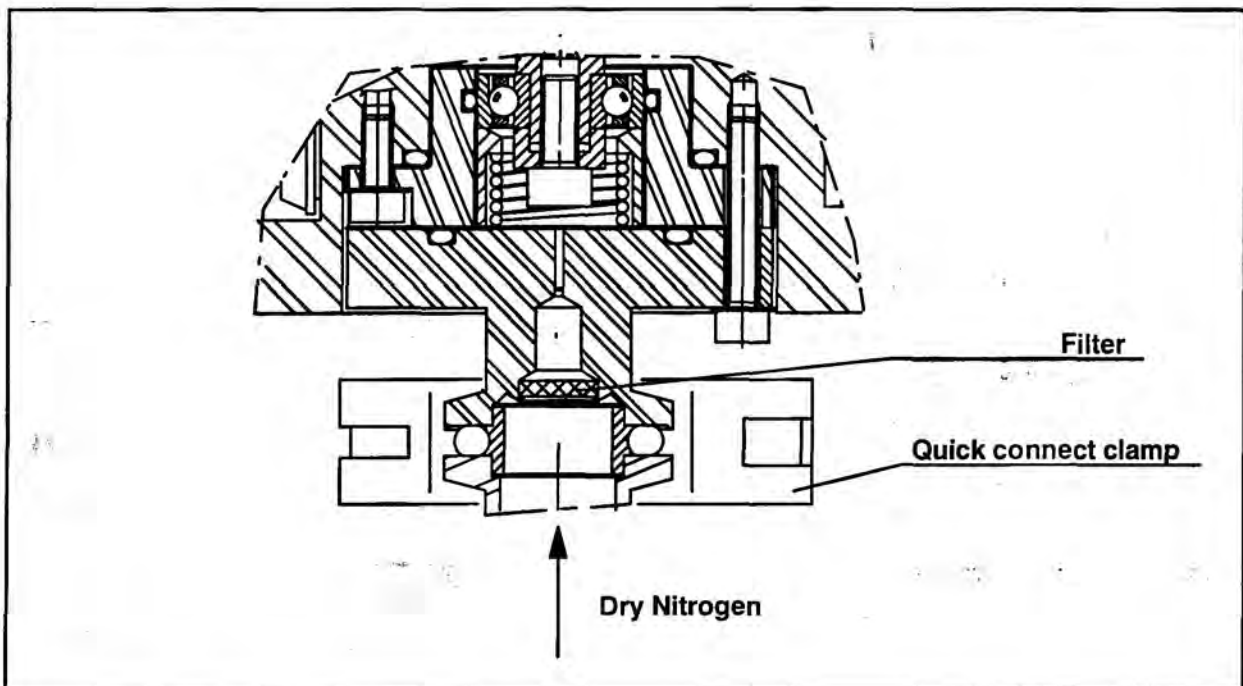
SPECIFICATIONS	UNIT	TMP 5081 CP IS
Pumping speed at $P < 10^{-4}$ mbar *:		
- nitrogen	l/s	80
- helium	l/s	50
- hydrogen	l/s	40
Compression ratio at zero :		
- nitrogen pumping speed		8.10^7
- helium pumping speed		2500
- hydrogen pumping speed		300
Ultimate pressure with draining	mbar	5.10^{-8}
without draining	mbar	5.10^{-9}
Maximum inlet pressure in continuous operation **		
- natural convection	mbar	1.10^{-3}
- air cooling	mbar	1.10^{-1}
Maximum exhaust pressure permissible**	mbar	1.10^{-1}
Roughing pump advised (2 stages pump)		2010 Alcatel
Dry nitrogen supply		
Flowrate (50 SCCM)	$\text{Pa.m}^3.\text{s}^{-1}$	83.10^{-3}
Pressure (absolute)	bar	1 à 1,3
Overpressure (absolute)	bar	2

* Measured by a measuring dome following Pneuop method.

** These two pressures can't be cumulated.

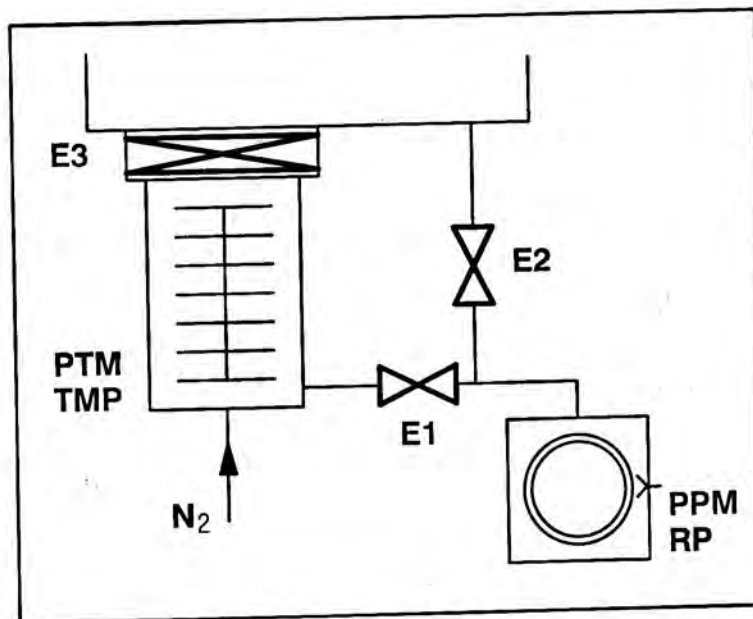
CHAPTER 3 : INERT GAS PURGE SYSTEM

- For proper protection from reactive gases and particulate the inert gas purge system must be used continuously. Alcatel recommends a nitrogen source that is dry (dew point of - 22 C at atmospheric pressure) and properly filtered (particulate < 1 μ and oil < 0,1 ppm).
- The purge gas line must have a NW 16 fitting to connect it directly to the TMP 5081 CP IS with a centering ring and quick connect clamp.



CHAPTER 4 : OPERATING DIAGRAM

4.1. We recommend to use the classic three valve combination :



1) Start TMP :

- RP on.
- Open water line.
- Open dry nitrogen line.
- Open E2.
- Open E3 (E1 closed).
- At pressure $P < 1$ mbar :
 - . E2 closed.
 - . Open E1.
- TMP on.

2) Venting chamber to atmosphere :

- E3 closed.
- Inert gas enters chamber (2 mn).
- Allow the pump running as much as possible to take the advantage of the dynamic seal protection when the purge is off.

3) Pumping down chamber (RP and TMP on) :

- E1 closed.
- E2 open.
- At pressure $P < 1$ mbar :
 - . E2 closed.
 - . E3 open.
 - . E1 open.

4) STOP

- E3 closed.
- Let TMP and RP run for 1 hour with purge remains on.
- Stop TMP but leave the RP and purge on for 30 minutes.
- E1 closed. Stop RP. The purge remains on for 15 minutes.
- Stop the purge.
- Allow the pump running as much as possible to take the advantage of the dynamic seal protection when the purge is off.

CHAPTER 5 : EQUIPMENT CONFIGURATION - PART NUMBER

DESCRIPTION	PART NUMBER
TMP 5081 CP IS option air cooled : 115 V / 100 V	798043
TMP 5081 CP IS : option natural convection	798042

For accessories, see "A : TURBOMOLECULAR PUMPS MODEL 5081 - 5101" - Chapter 7.

FIGURES ET PLANS

Figure 1 a - 1b	- PTM 5081 - 5101 Vue d'ensemble
" 2	- CFV 100 - Face avant
" 3	- CFV 100 - Face arrière
" 4	- Courbes : débit en azote
" 5/1 à 5/5	- Plans d'encombrements PTM
" 6/1	- Raccordements électriques
" 6/2 - 6/3	- Branchement prise PO2 (télécommande)
" 6/4	- Branchement sortie interface J6
" 7/1	- Manipulation de graissage
" 7/2	- Abaque : période de rechargement en graisse
" 8	- Implantation carte CFV 100
" 9	- Schéma de principe circuit interface
" 10	- Schéma de principe Turbopack 5081/5101
" 11/1 - 11/2	- Schéma de principe du CFV 100

FIGURES AND DRAWINGS

Figure 1 a - 1b	- TMP 5081 - 5101 - Outside view
" 2	- CFV 100 - Front panel
" 3	- CFV 100 - Rear panel
" 4	- Curves : pumping speed
" 5/1 to 5/5	- TMP dimensions
" 6/1	- Electrical connections
" 6/2 to 6/3	- PO2 plug connection - Remote control
" 6/4	- J6 interface output connections.
" 7/1	- Lubrication
" 7/2	- Chart to relubricate the TMP
" 8	- CFV 100 card set up
" 9	- Interface schematic diagram
" 10	- Electrical schematic for turbopak 5081/5101
" 11/1 - 11/2	- CFV 100 general electrical schematic.

POMPE TURBOMOLECULAIRE 5101 A REFROIDISSEMENT A EAU
5101 TURBOMOLECULAR PUMP WITH WATER COOLING

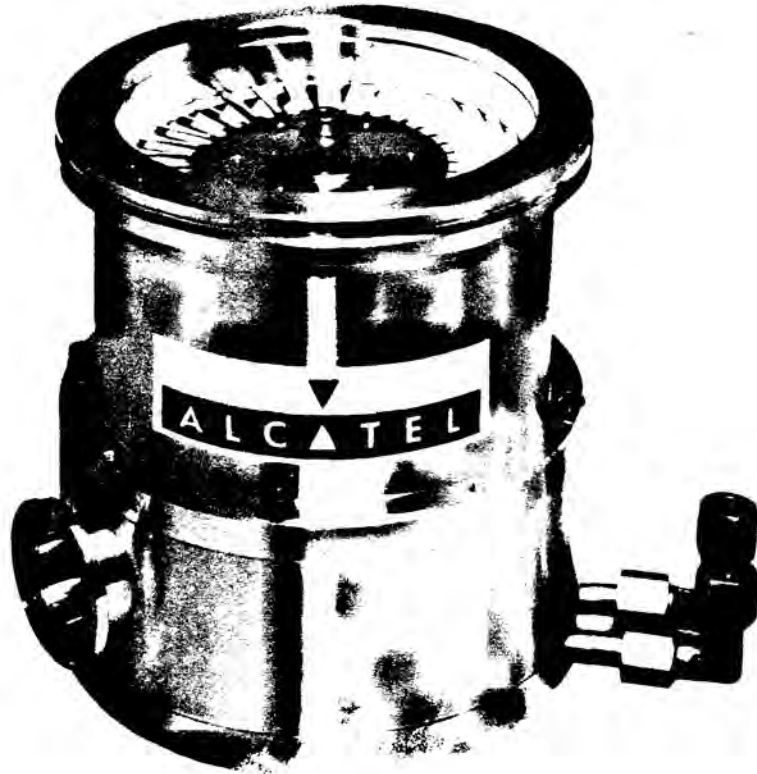


Figure 1a

POMPE TURBOMOLECULAIRE 5101 A REFROIDISSEMENT A AIR
5101 TURBOMOLECULAR PUMP WITH AIR COOLING

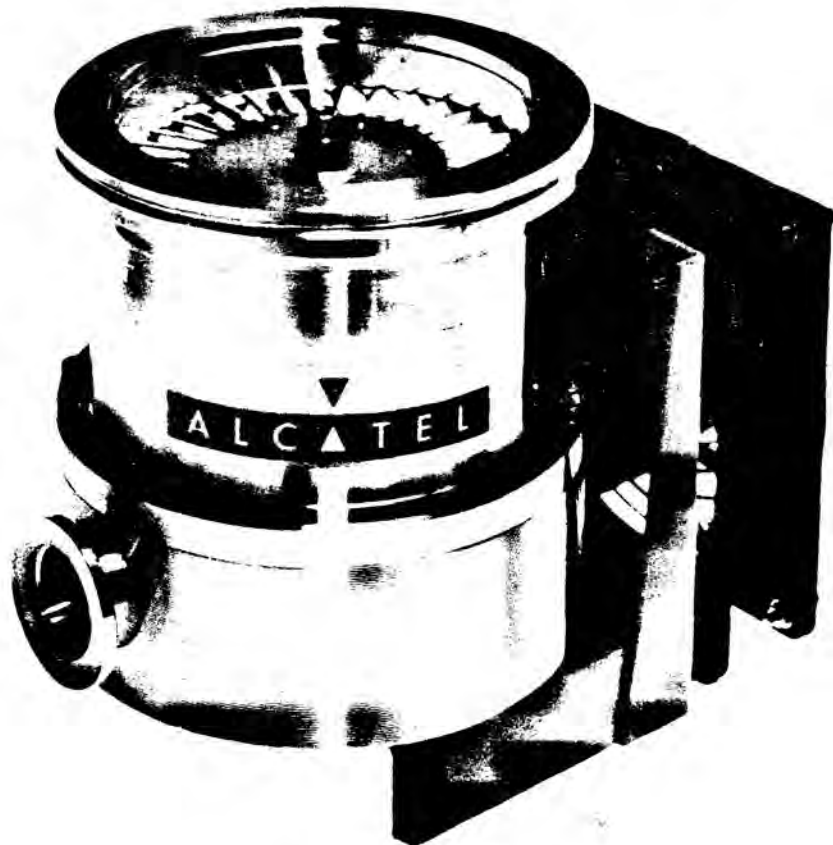


Figure 1b

CONVERTISSEUR DE FRÉQUENCE CFV 100 : Face avant
CFV 100 FREQUENCY CONVERTER : Front panel

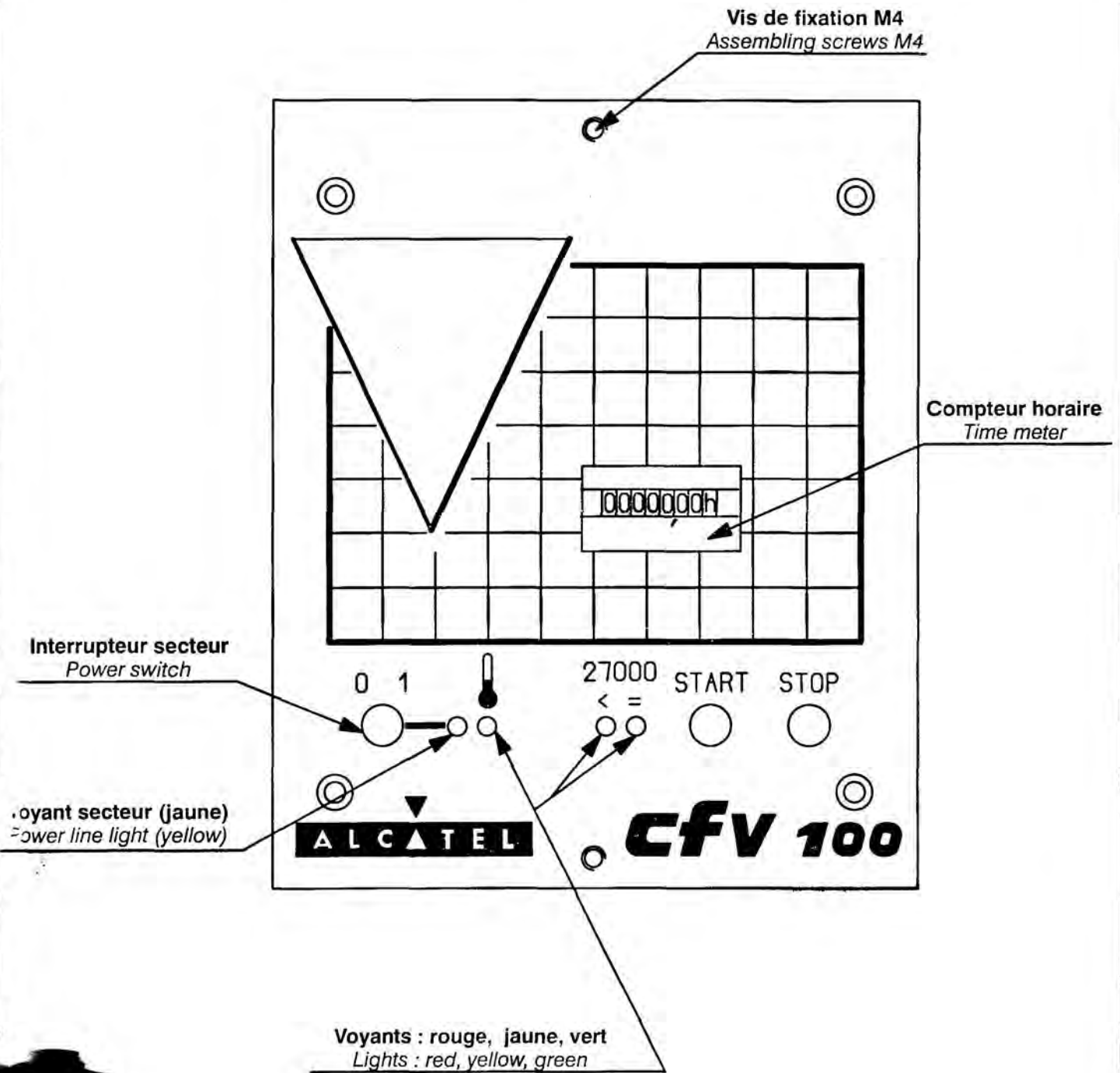


FIGURE 2

CONVERTISSEUR DE FRÉQUENCE CFV 100 : Face arrière
CFV 100 FREQUENCY CONVERTER : Rear panel

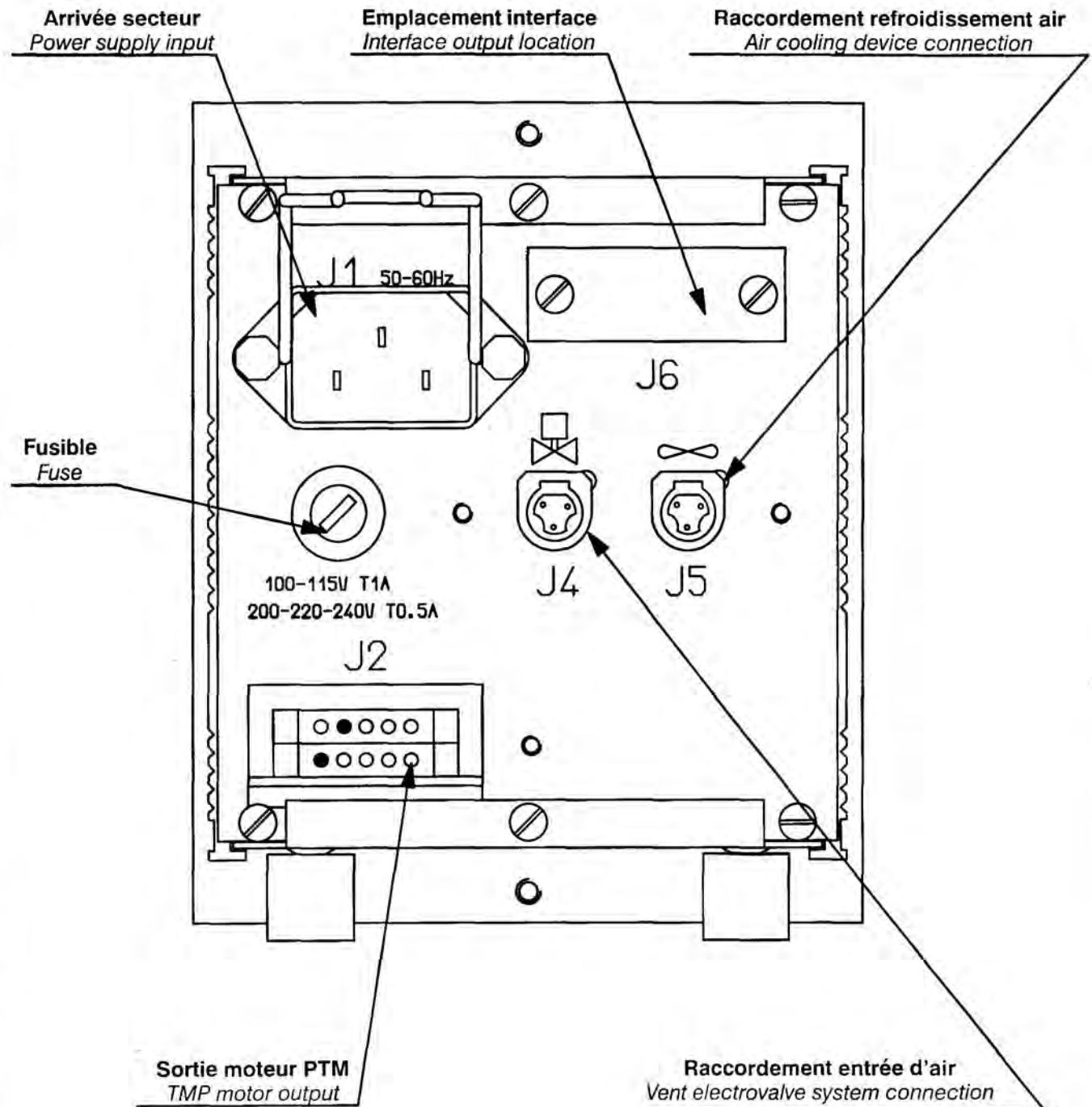


FIGURE 3

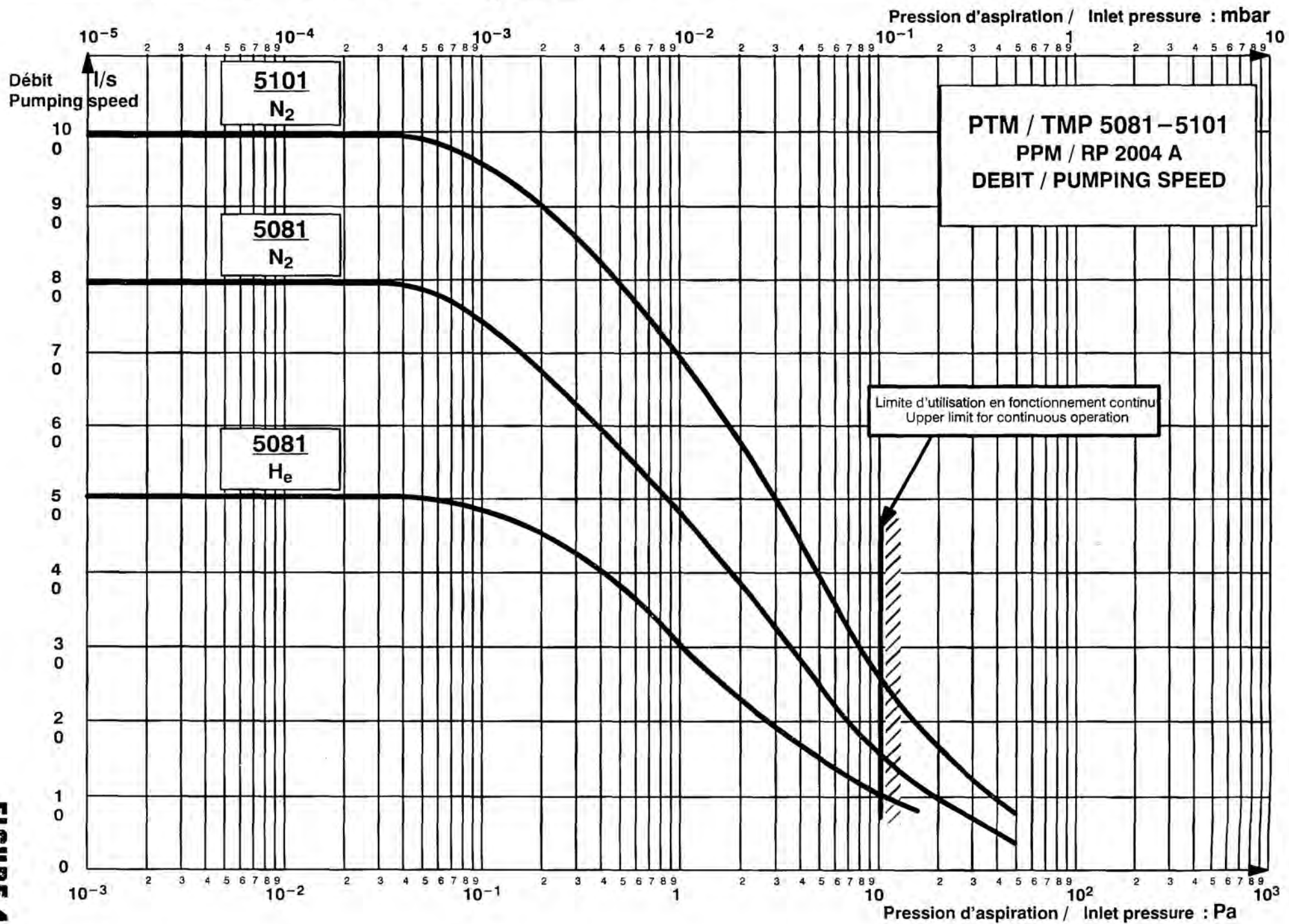
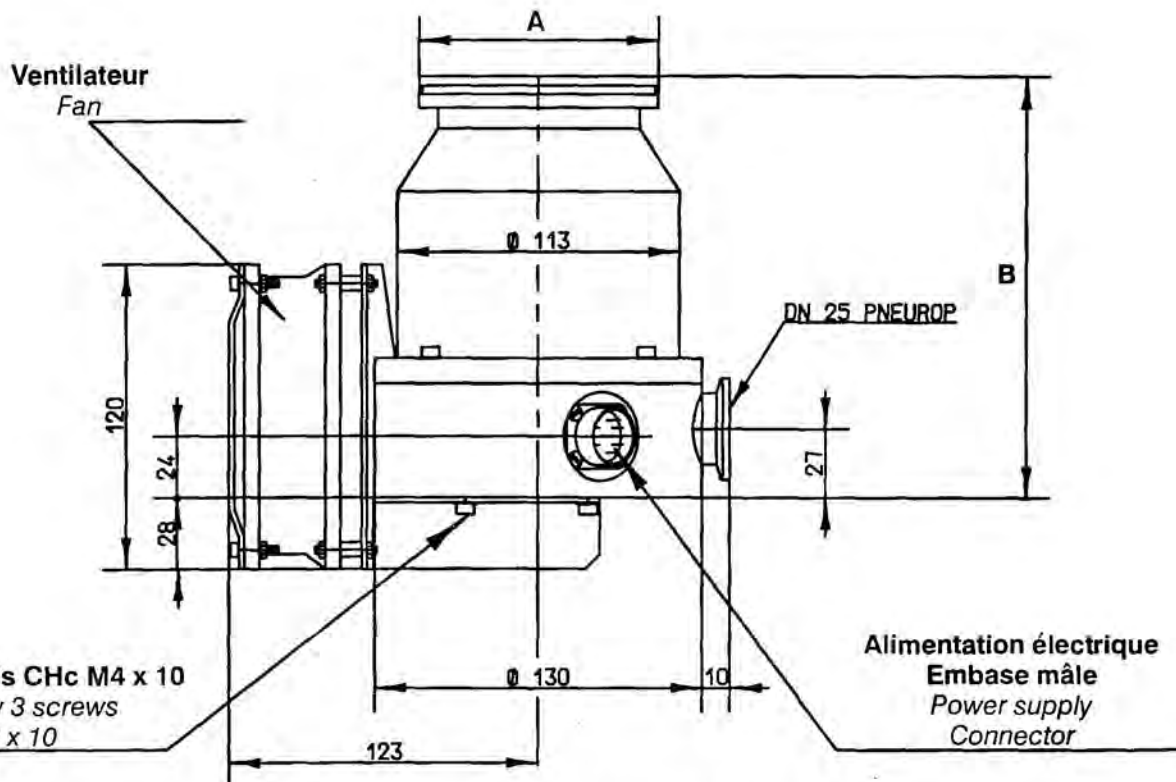
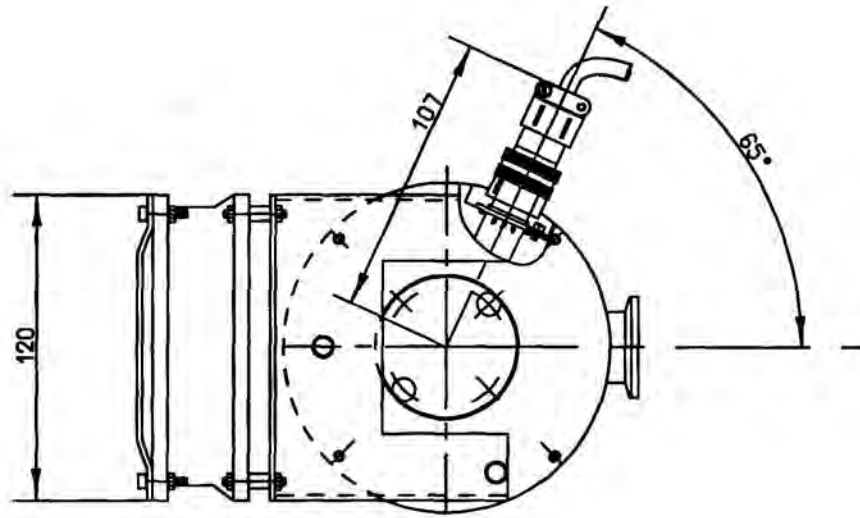


FIGURE 4

ENCOMBREMENTS / DIMENSIONS

PTM 5081 DN 63 – PTM 5101 DN 100 Peurop refroidies à l'air
TMP 5081 NW 63 – TMP 5101 NW 100 Pneuop air cooled

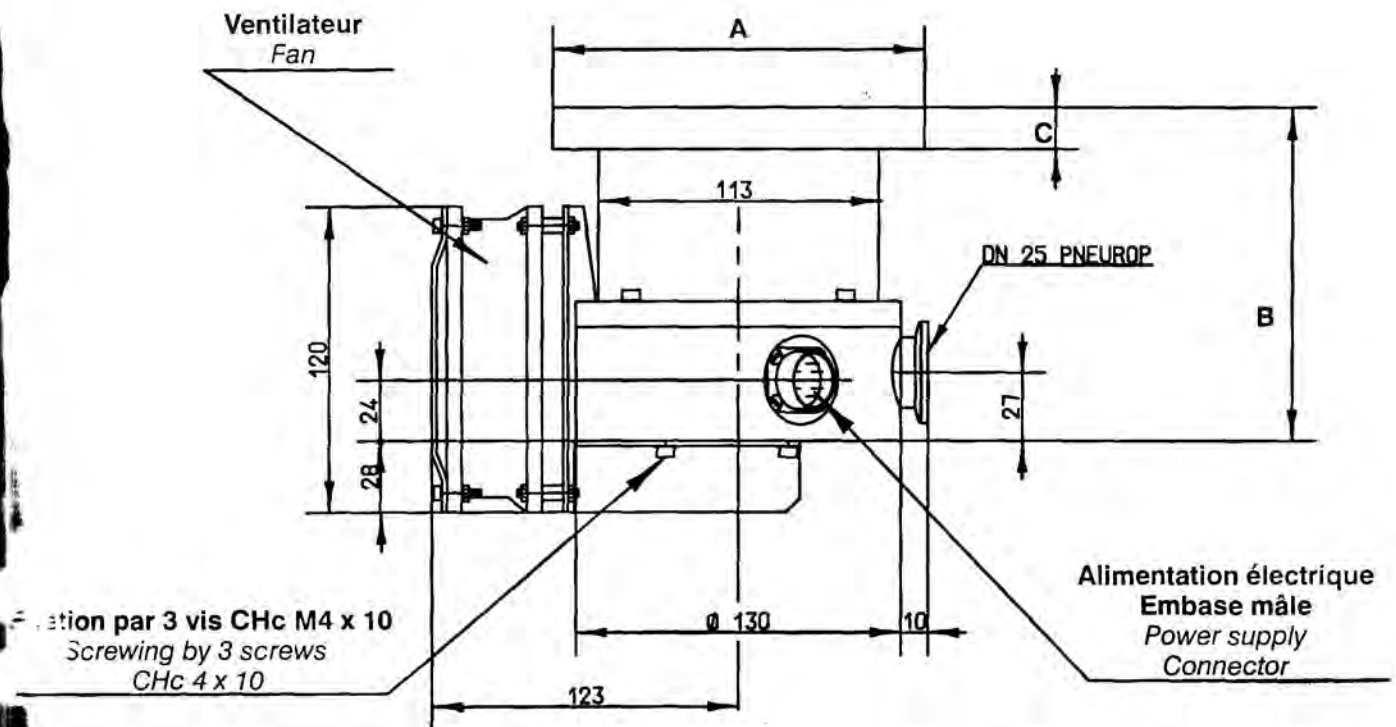
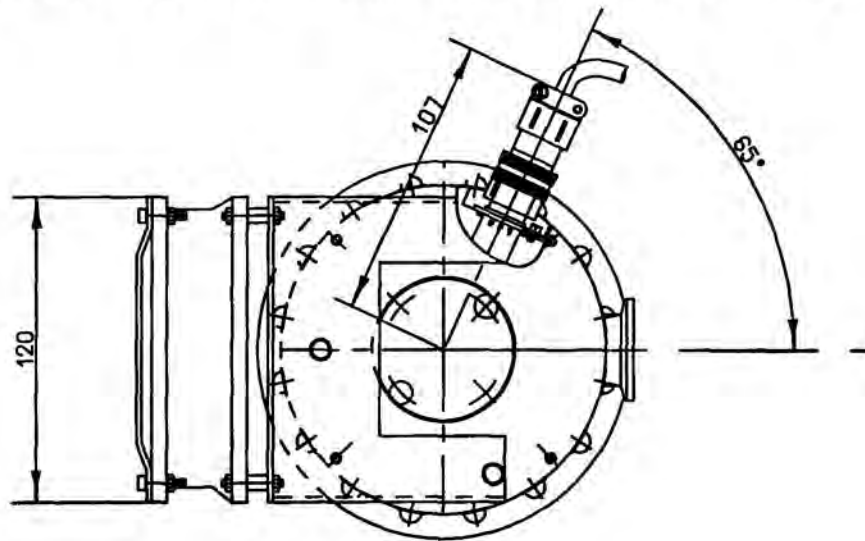


POMPE MODELE <i>Pump model</i>	COTE A <i>Dim. A</i>	COTE B <i>Dim. B</i>
5081 Pneuop DN 63	$\varnothing 95$ h11	165 mm
5101 Pneuop DN 100	$\varnothing 130$ h11	130 mm

FIGURE 5/1

ENCOMBREMENTS / DIMENSIONS

PTM 5081 UHV 63 CF – PTM 5101 UHV 100 CF refroidies à l'air
TMP 5081 UHV 63 CF – TMP 5101 UHV 100 CF air cooled



Fixation par 3 vis CHc M4 x 10
 Screwing by 3 screws
 CHc 4 x 10

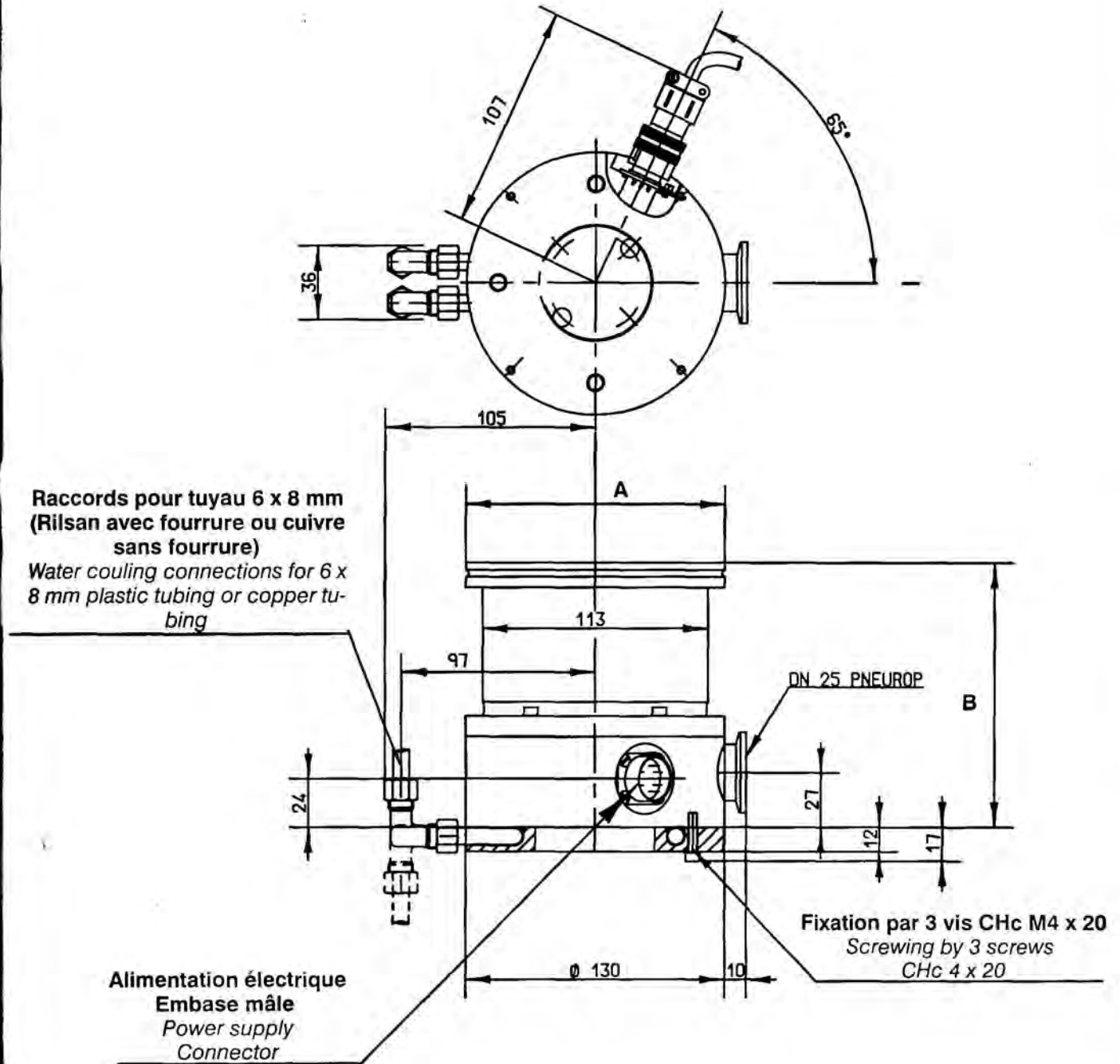
Alimentation électrique
 Embase mâle
 Power supply
 Connector

POMPE MODELE <i>Pump model</i>	COTE A <i>Dim. A</i>	COTE B <i>Dim. B</i>	COTE C <i>Dim. C</i>	Raccordement Bride <i>Connecting flange</i>
5081 UHV 63 CF	Ø 113,5 mm	180 mm	17,5 mm	8 trous Ø 8.6 équidistants sur Ø 92,1 (hors axes) 8 equidistant diam.8.6 holes on diam. 92,1 (off axis)
5101 UHV 100 CF	Ø 148,5 mm	130 mm	16 mm	16 trous Ø 8.6 équidistants sur Ø 130,2 (hors axes) 16 equidistant diam.8.6 holes on diam. 130.2 (off axis)

FIGURE 5/2

ENCOMBREMENTS / DIMENSIONS

PTM 5081 DN 63 – PTM 5101 DN 100 Pneuop refroidies à l'eau
TMP 5081 NW 63 – TMP 5101 NW 100 Pneuop water cooled

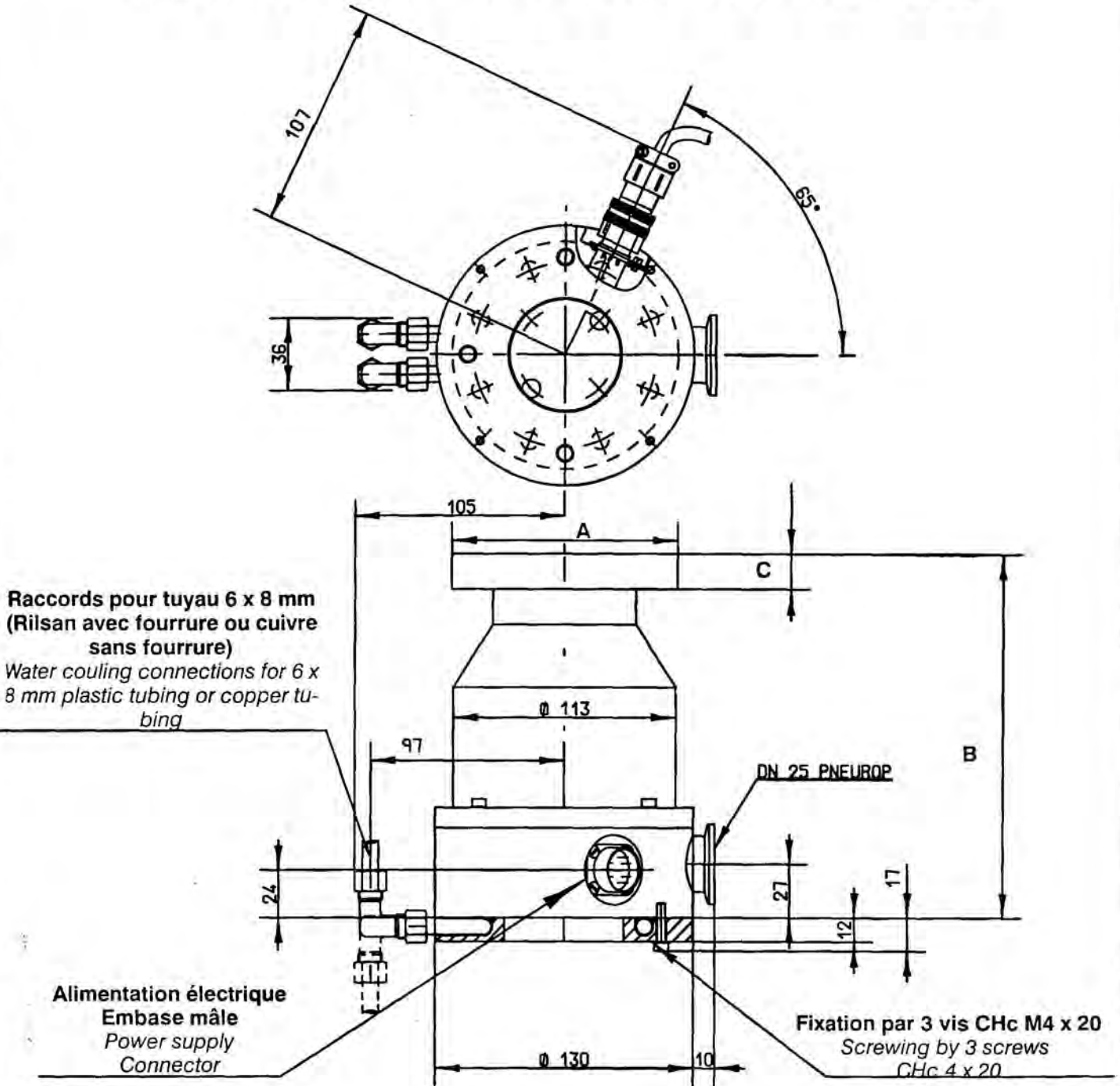


POMPE MODELE <i>Pump model</i>	COTE A <i>Dim. A</i>	COTE B <i>Dim. B</i>
5081 Pneuop DN 63	Ø95 h11	165 mm
5101 Pneuop DN 100	Ø 130 h11	130 mm

FIGURE 5/3

ENCOMBREMENTS / DIMENSIONS

PTM 5081 UHV 63 CF – PTM 5101 UHV 100 CF refroidies à l'eau
TMP 5081 UHV 63 CF – TMP 5101 UHV 100 CF water cooled



POMPE MODELE <i>Pump model</i>	COTE A <i>Dim. A</i>	COTE B <i>Dim. B</i>	COTE C <i>Dim. C</i>	Raccordement Bride <i>Connecting flange</i>
5081 UHV 63 CF	Ø 113,5 mm	180 mm	17,5 mm	8 trous Ø 8.6 équidistants sur Ø 92,1 (hors axes) <i>8 equidistant diam. 8.6 holes on diam. 92,1 (off axis)</i>
5101 UHV 100 CF	Ø 148,5 mm	130 mm	16 mm	16 trous Ø 8.6 équidistants sur Ø 130,2 (hors axes) <i>16 equidistant diam. 8.6 holes on diam. 130.2 (off axis)</i>

FIGURE 5/4

ENCOMBREMENTS / DIMENSIONS
PTM 5081 CP IS UHV 63 CF refroidie à l'air
TMP 5081 CP IS UHV 63 CF air cooled

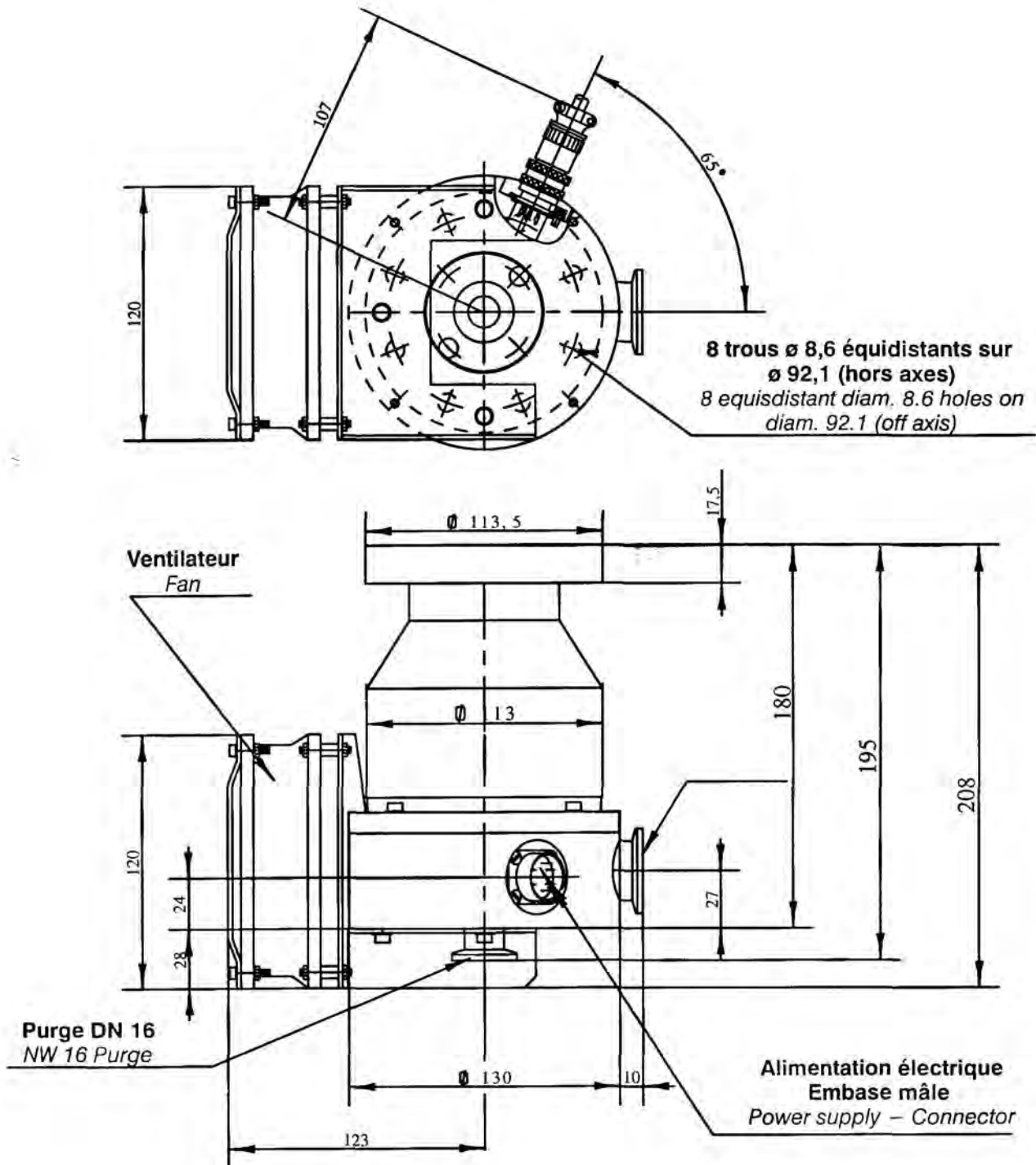


FIGURE 5/5

RACCORDEMENTS ELECTRIQUES ELECTRICAL CONNECTIONS

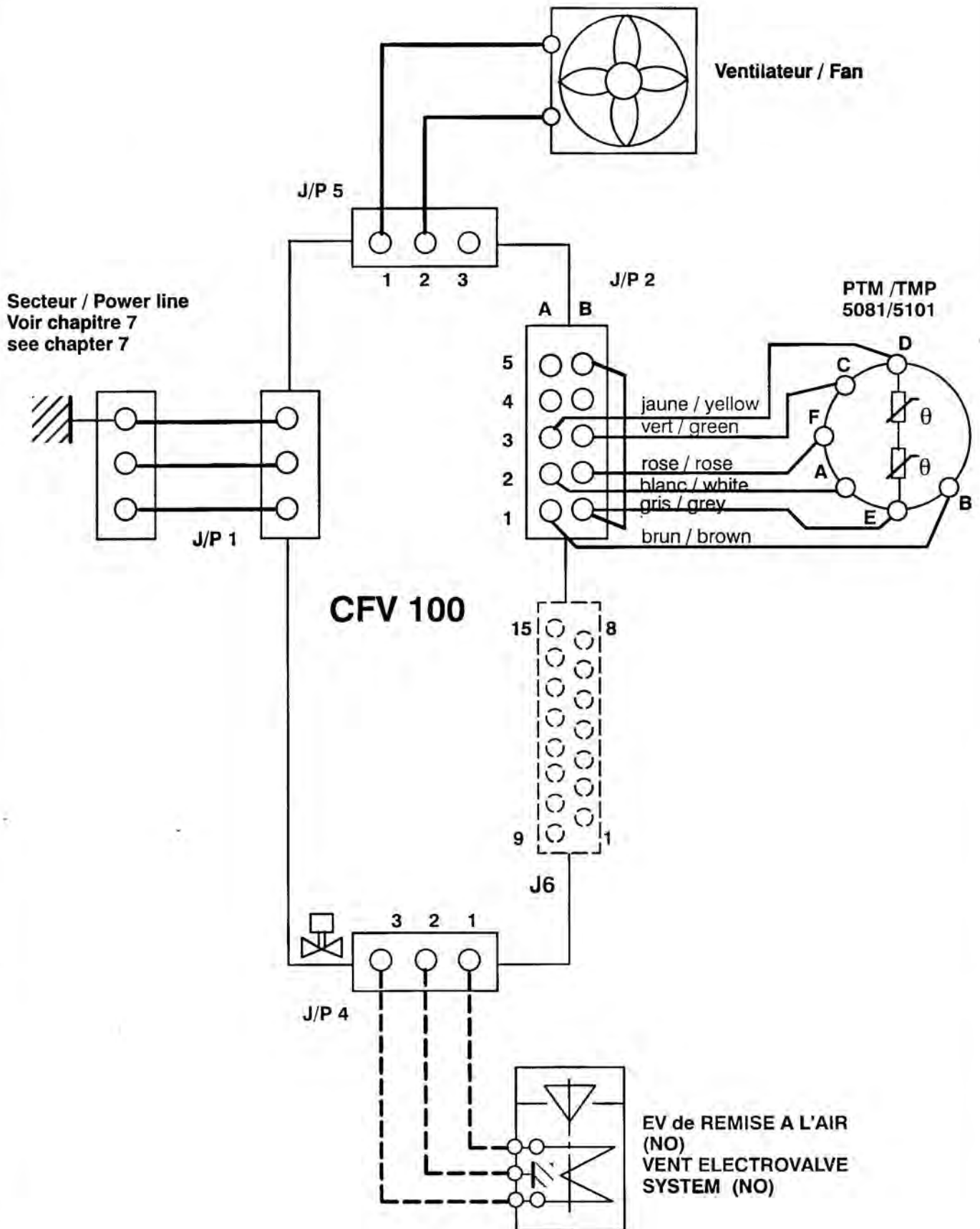
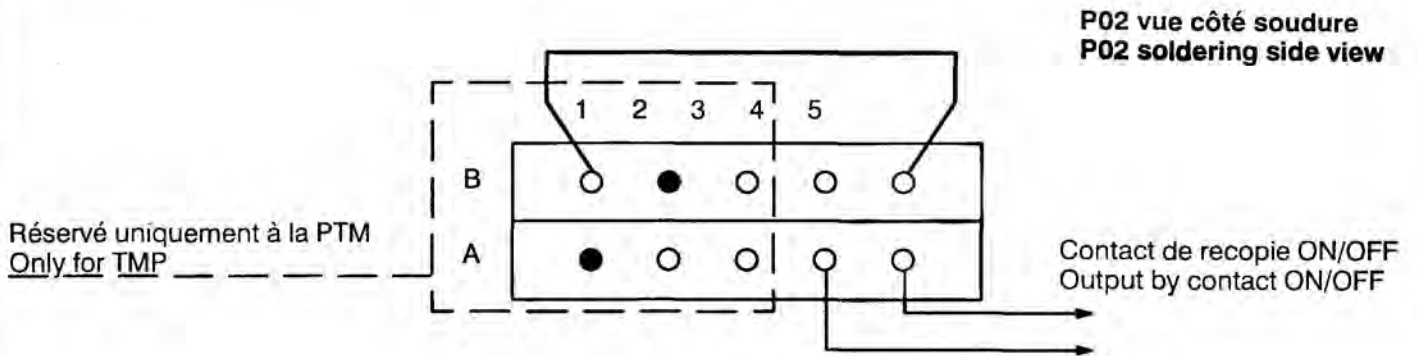


FIGURE 6/1

PRISE DE TELECOMMANDE P2 P2 REMOTE CONTROL PLUG CONNECTION

Légende / Legend
 ● Femelle – Female
 ○ Mâle – Male

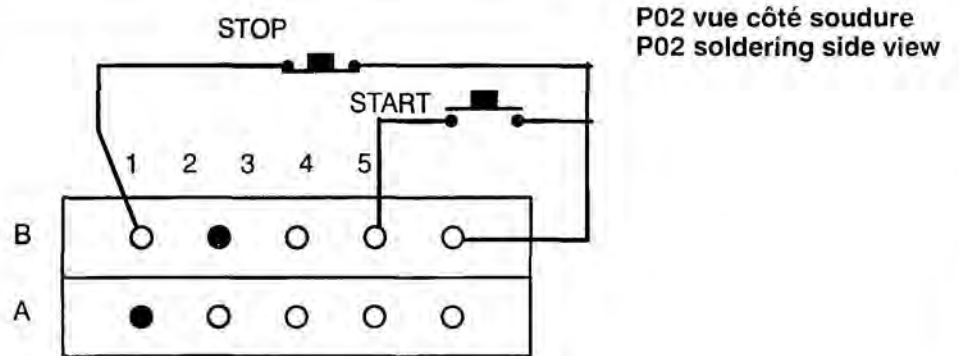


Câblage de base de la prise P2

en livraison standard (sans télécommande, sans sécurités extérieures).

Standard wiring of P2

delivered without remote control outer safeties.

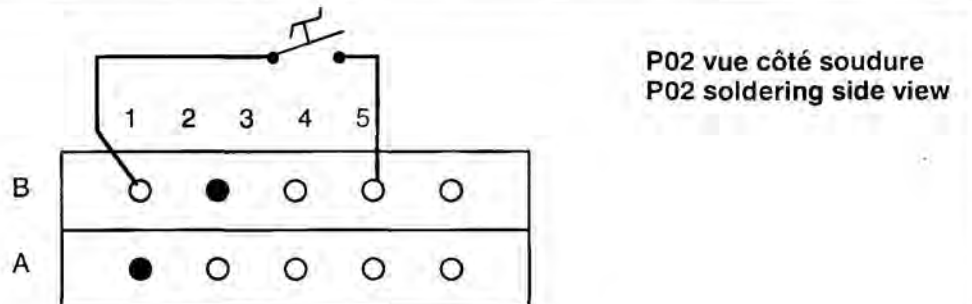


Câblage en version télécommande seule – Marche / Arrêt PTM par boutons poussoirs.

Les poussoirs "start et stop" de la face avant, conservent leur fonction.

Remote control wiring – Start /Stop TMP by buttons

"Start and stop" buttons of the front panel are operational.



Câblage en version télécommande secteur seule

avec interrupteur
 contact fermé : start PTM
 contact ouvert : stop PTM

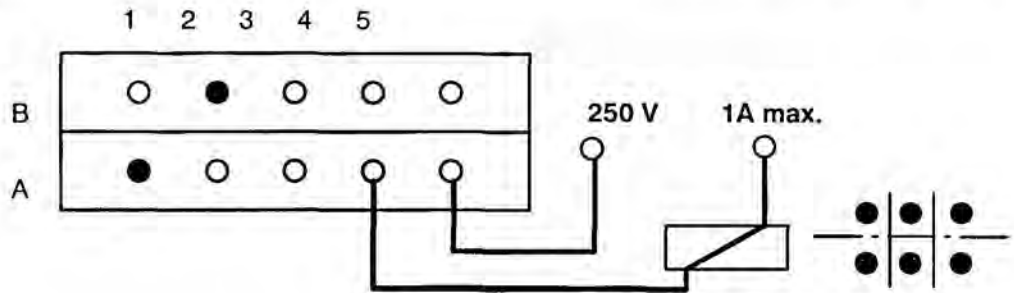
Remote control wiring

with interrupter
 closed contact : TMP starts
 opened contact : TMP stops.

PRISE DE TELECOMMANDE P2 P2 REMOTE CONTROL PLUG CONNECTION

Légende / Legend
 ● Femelle – Female
 ○ Mâle – Male

**P02 vue côté soudure
P02 soldering side view**



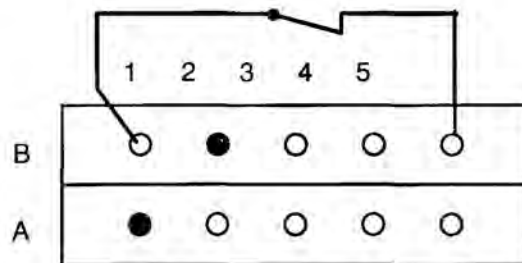
Câblage commande extérieure seule (PTM ou autre)

les bornes A4–A5 permettent de commuter 250 V–
1A max

Outer control (TMP or other)

Terminals A4–5 terminals allows to switch 250 V–
1A max

**P02 vue côté soudure
P02 soldering side view**



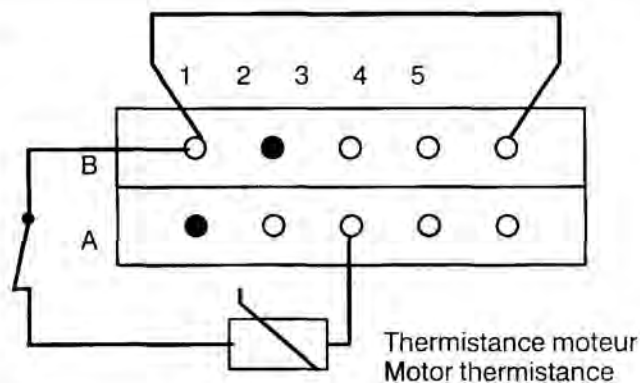
Câblage d'un contact sécurité extérieure
sans signalisation par la LED rouge

contact ouvert : arrêt PTM

Outer safety switch wiring
without indication by the red LED

opened contact : TMP stops

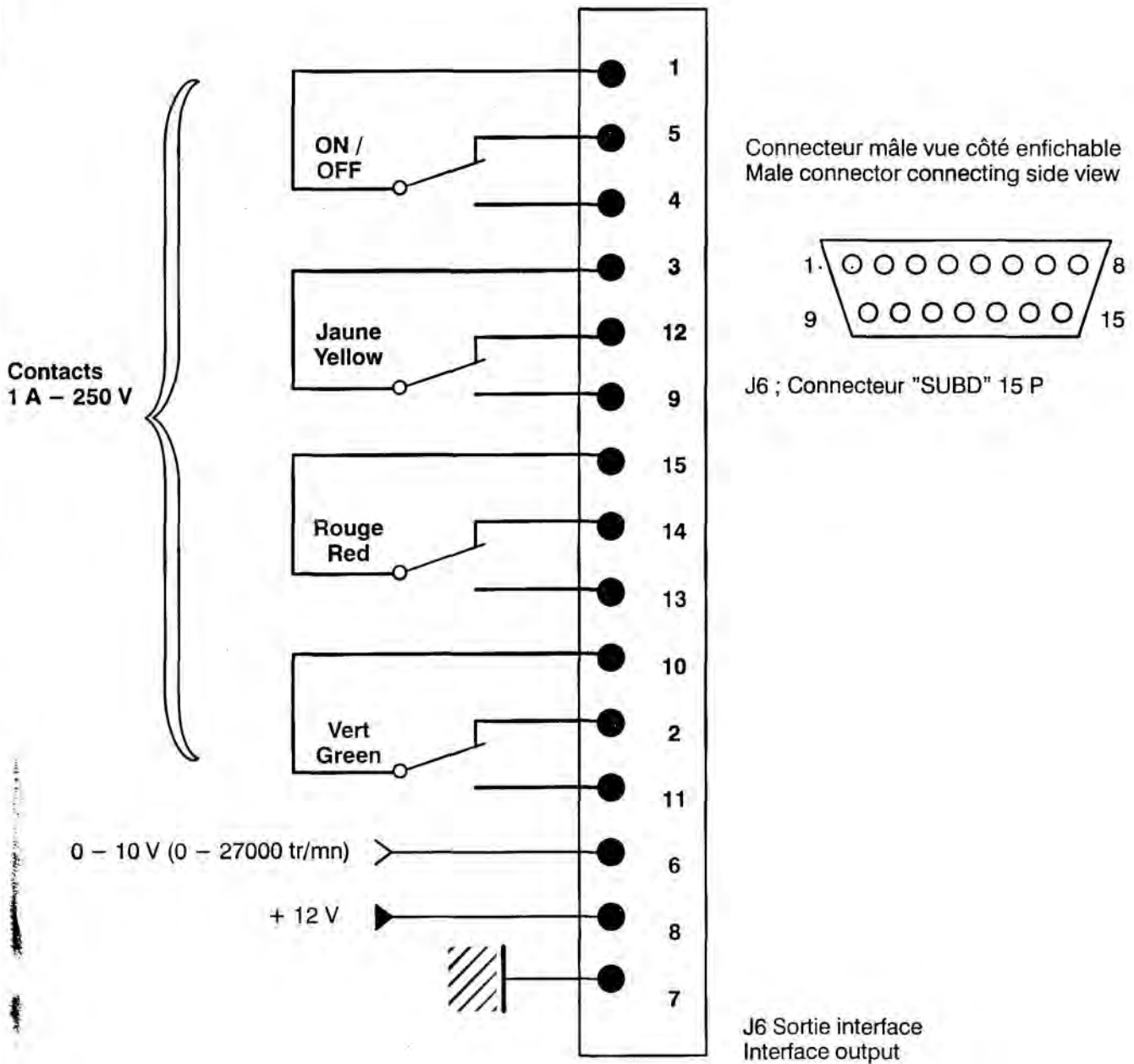
**P02 vue côté soudure
P02 soldering side view**



Câblage d'un contact sécurité extérieure
avec signalisation par la LED rouge
Contact ouvert : arrêt PTM et LED allumée

Outer safety switch wiring
with indication by the red LED
opened contact : TMP stops, and red LED lights on

BRANCHEMENT SORTIE INTERFACE J6 J6 INTERFACE OUTPUT CONNECTIONS



Vert : vitesse = 27000 tr/mn (fonctionnement normal)
Green : speed = 27000 tr/mn (normally operating)

Jaune : vitesse < 27000 tr/mn (démarrage ou surcharge)
Yellow : speed < 27000 tr/mn (starting or overloading)

Rouge : défauts (Temps de démarrage trop long, sécurités convertisseur ou sécurités extérieures)

Red : fault (Starting period too long, converter safeties or outside safeties.)

FIGURE 6/4

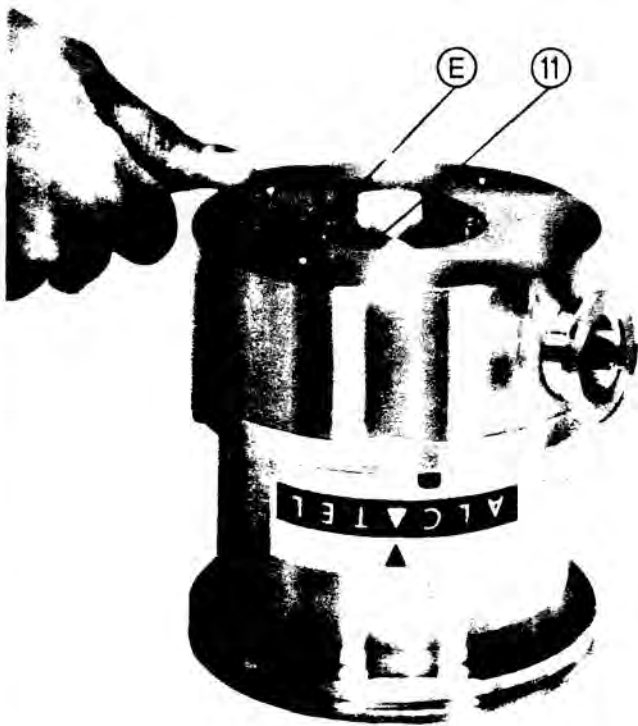


Photo n° 7-1

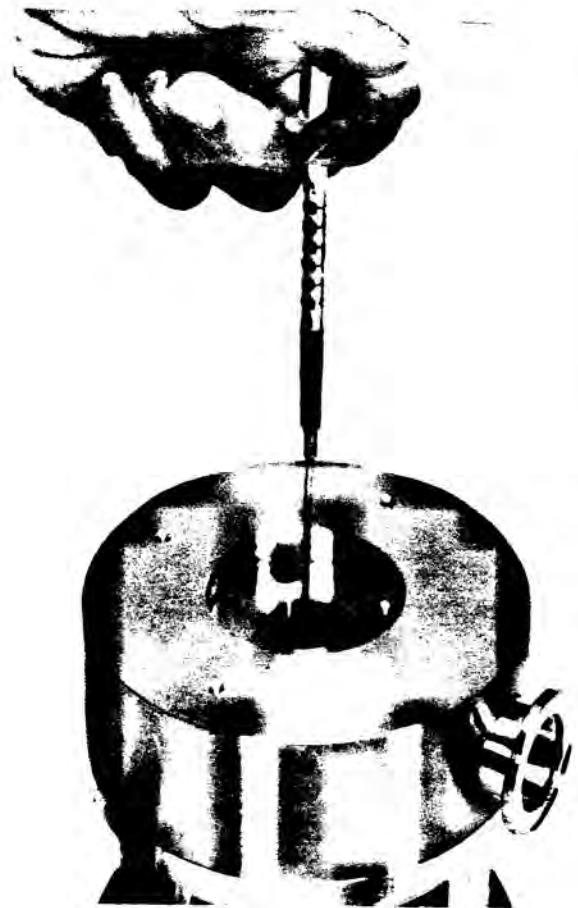


Photo n° 7-2

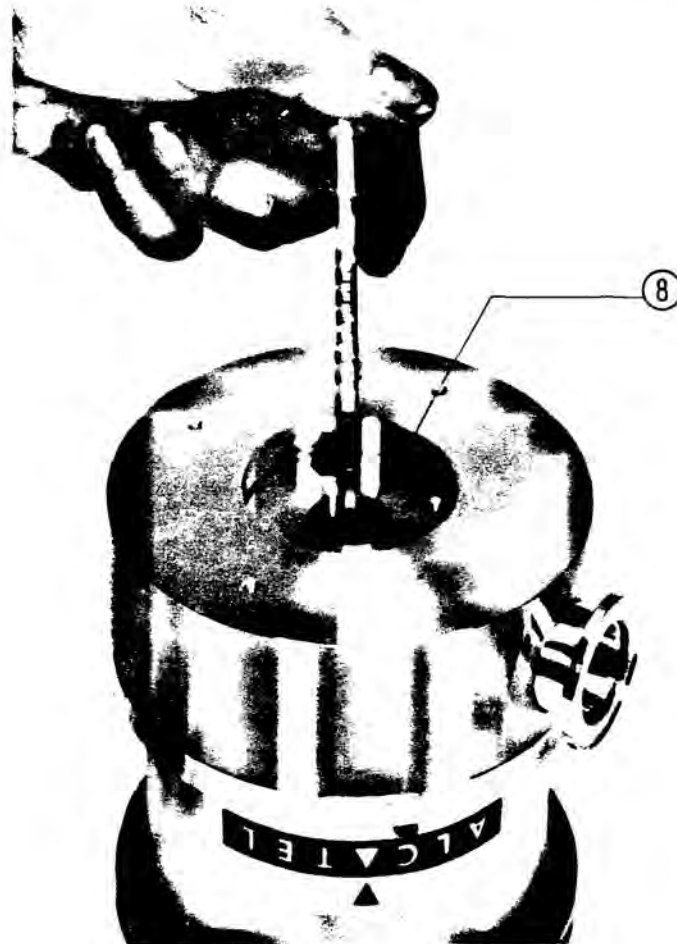


Photo n° 7-3

FIGURE 7/1

PTM 5081 / 5101 : Période de rechargement en graisse

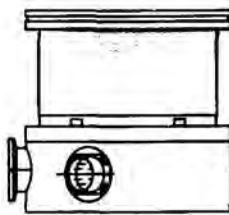
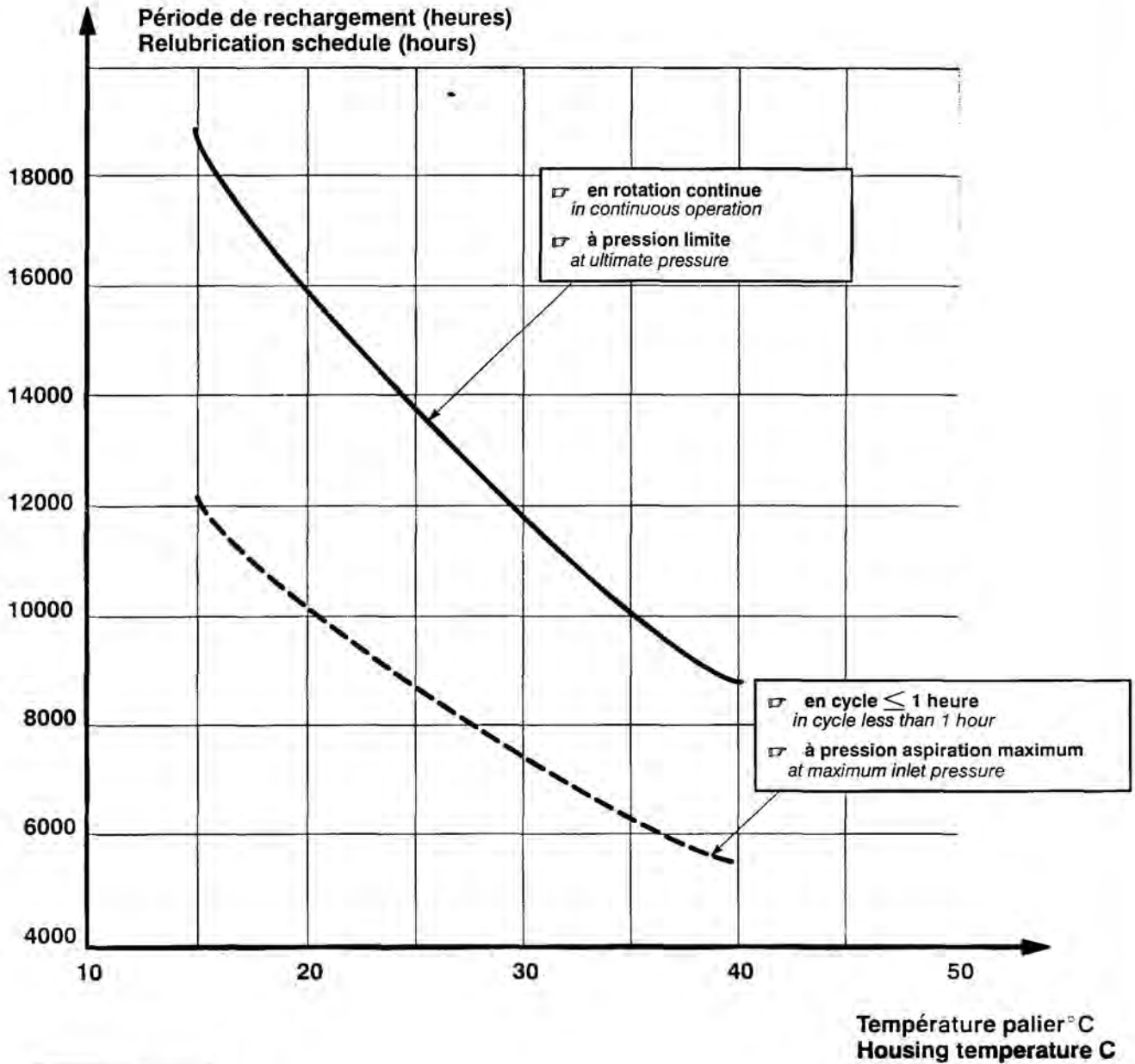
RELUBRICATION OF TMP 5081 / 5101 : Relubricate the bearings of the TMP according to the chart below

Exemple : Pour une utilisation moyenne à 20 °C de température palier, en rotation continue et à pression limite :

- à 16000 h : 1ère recharge
- à 32000 h : 2ème recharge
- à 48000 h : démontage de la TMP, nettoyage et changement des roulements, rodage.

Example : for use at 20 C housing temperature, in continuous operation, at ultimate pressure :

- 16000 h : 1st lubrication
- 32000 h : 2nd lubrication
- 48000 h : disassemble the TMP, replace and condition the ball bearings.



Point de mesure de la température palier
Housing temperature measuring point

IMPLANTATION CARTE CFV 100
CFV 100 CARD SET UP

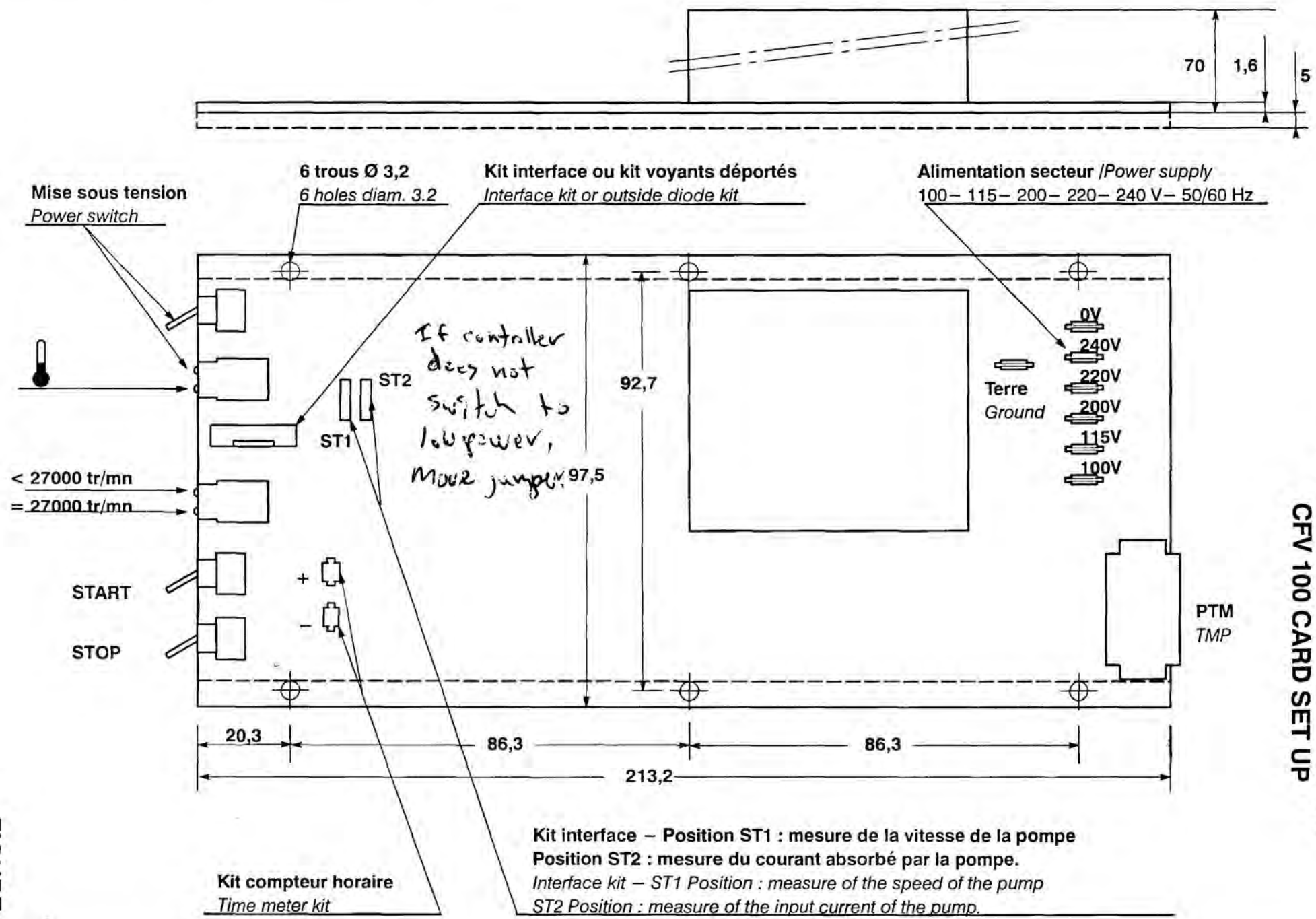


FIGURE 8

SCHEMA DE PRINCIPE – INTERFACE CFF 100 ou CFV 100
INTERFACE CFF 100 or CFV 100 – GENERAL ELECTRICAL SCHEMATIC

8456-351

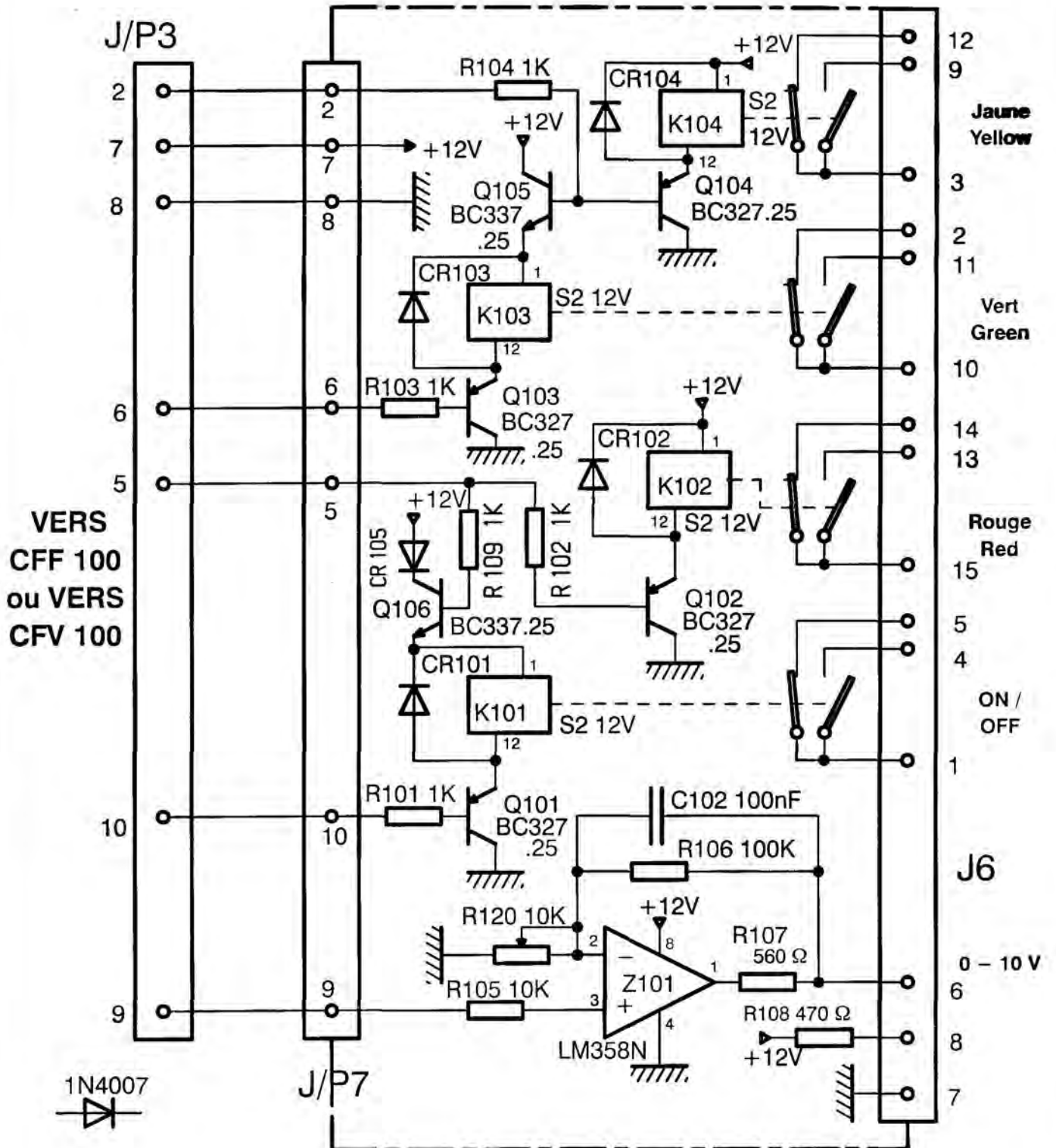


FIGURE 9

SCHEMA DE PRINCIPE / GENERAL ELECTRICAL SCHEMATIC
TURBOPAK 8334-5

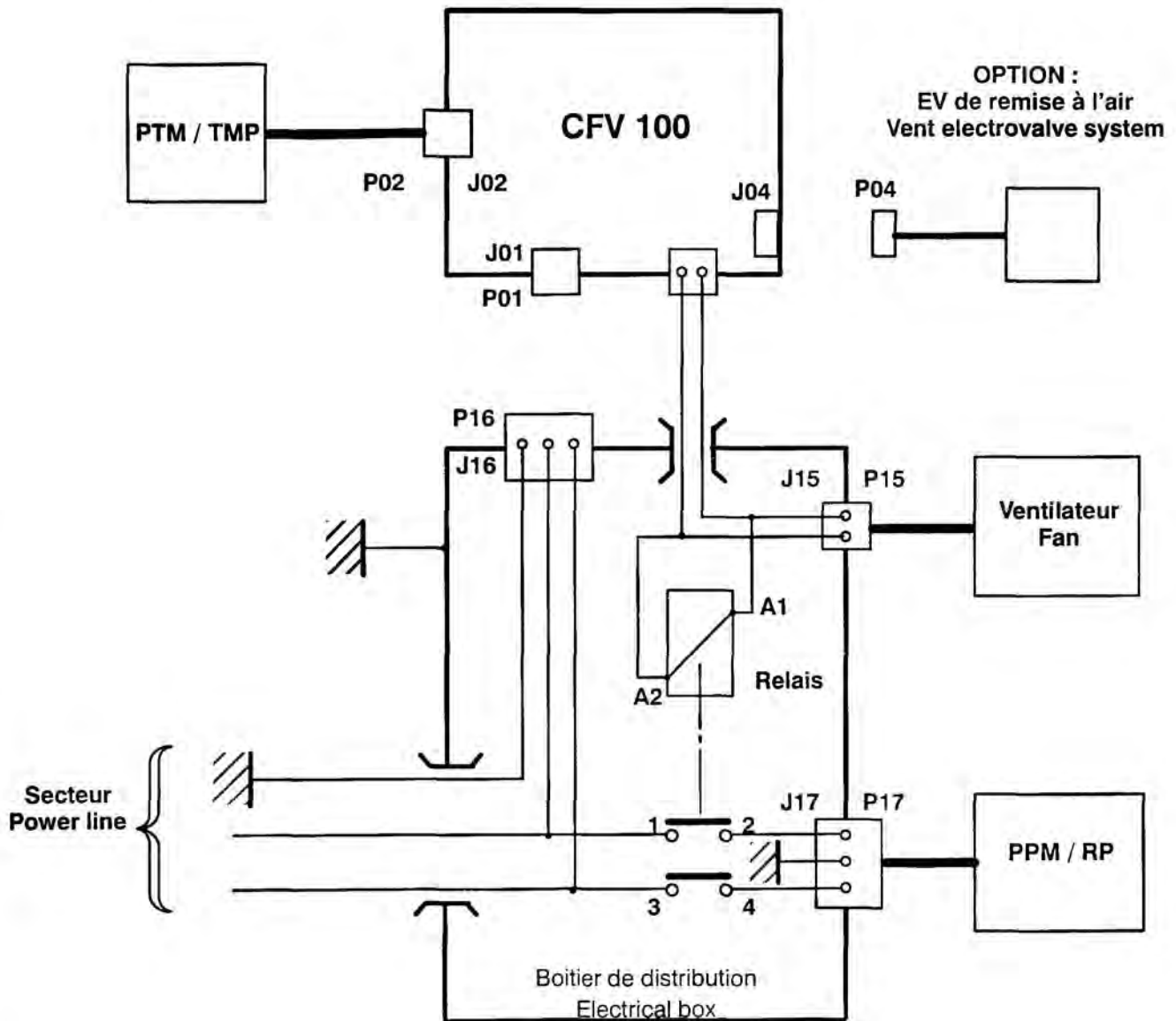


FIGURE 10

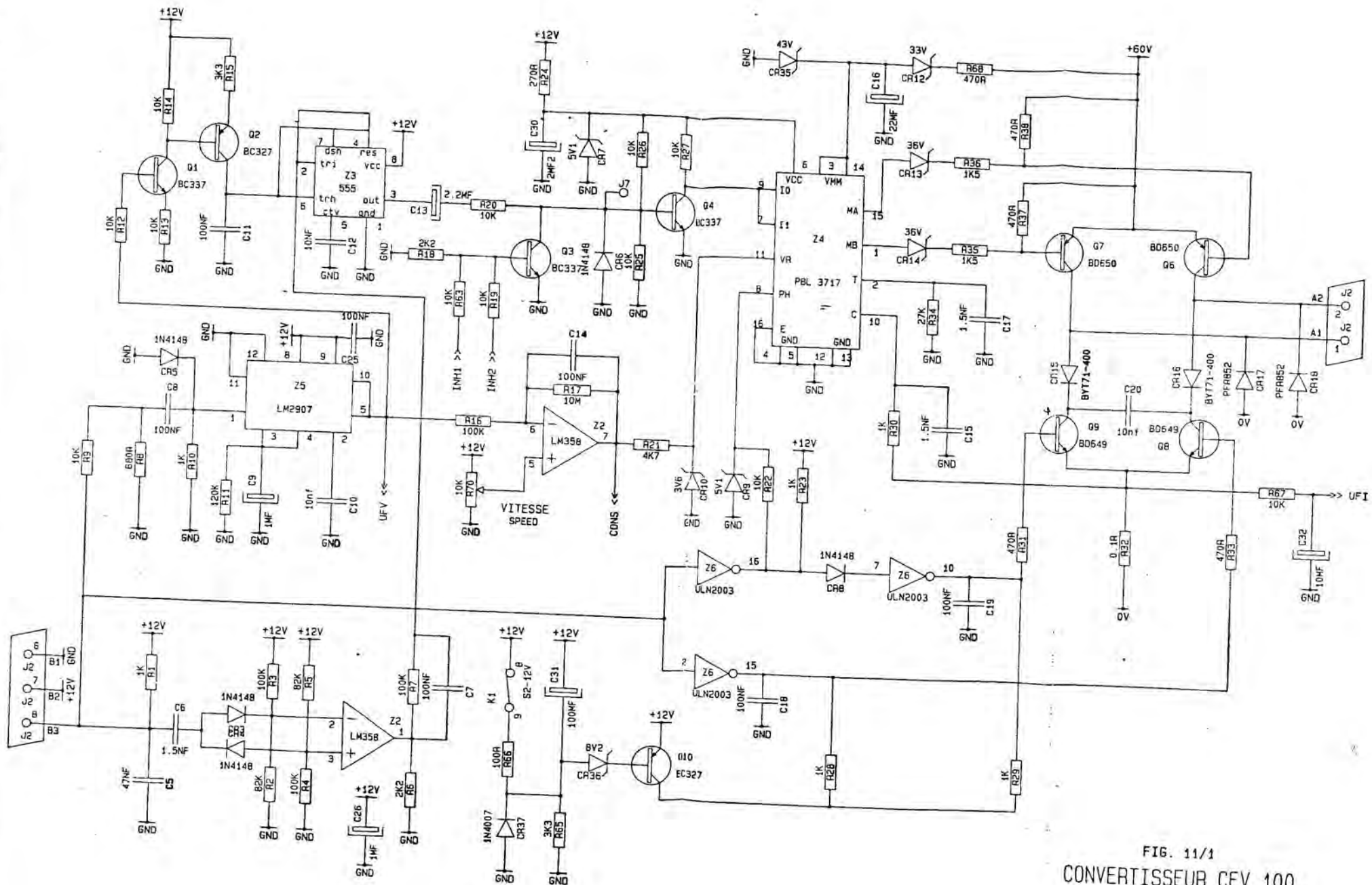


FIG. 11/1
 CONVERTISSEUR CFV 100
 SCHEMA DE PRINCIPE
 SCHEMATIC DIAGRAM

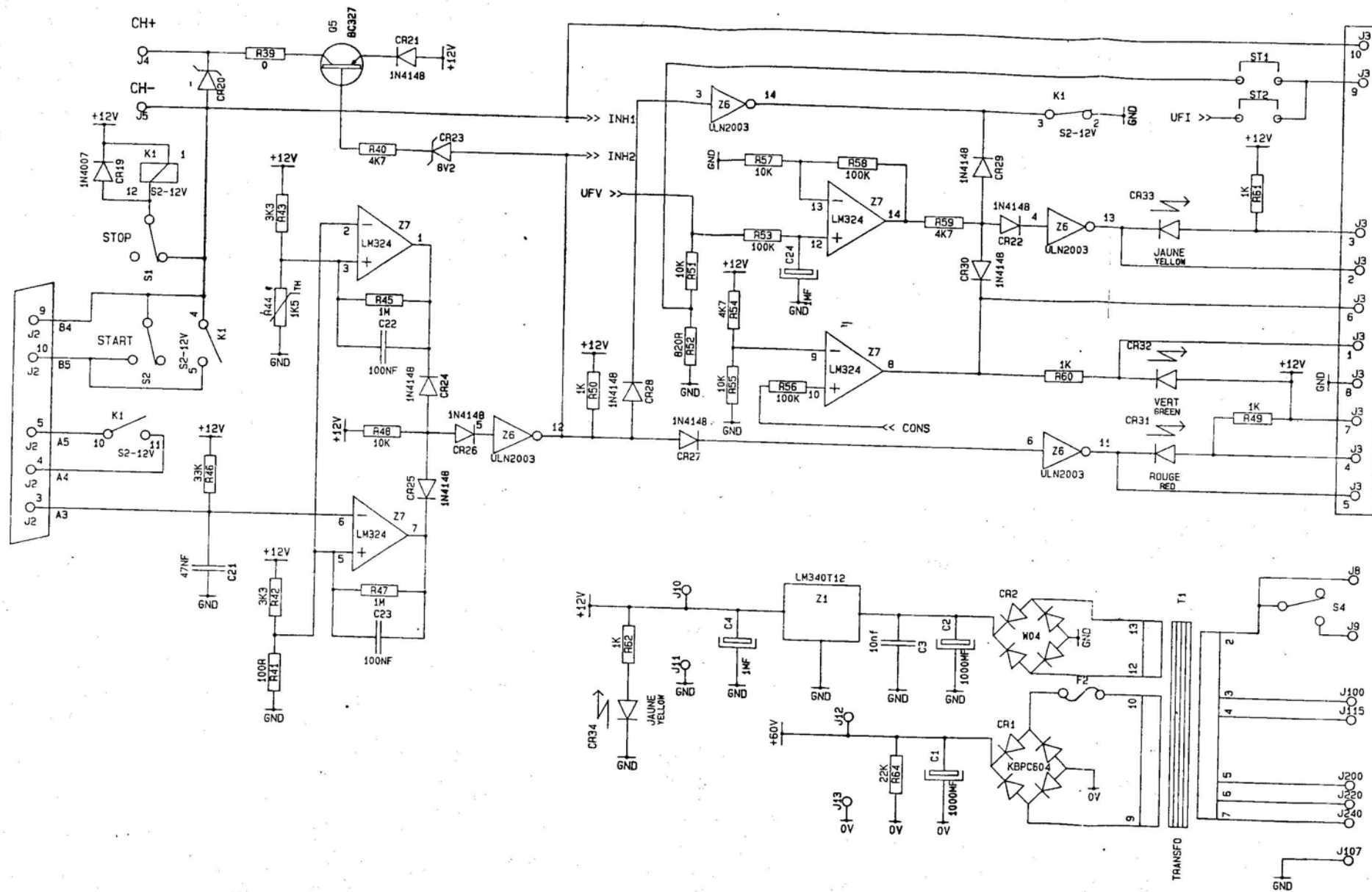


FIG. 11/2
 CONVERTISSEUR CFV 100
 SCHEMA DE PRINCIPE
 SCHEMATIC DIAGRAM