

DRYTEL 1025

PUMPING UNIT

User's Manual

DRYTEL 1025 pumping unit

WELCOME

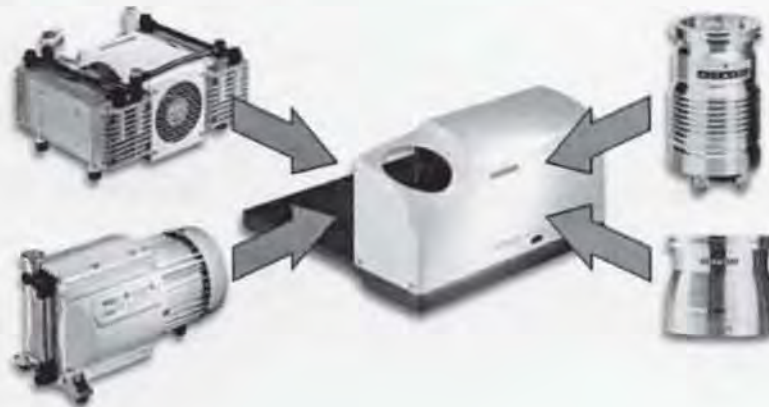
Dear customer,

You have just purchased a DRYTEL 1025 pumping unit.

We would like to thank you and are proud to count you among your customers.

This product has benefited from Alcatel's many years of experience in pumping unit design.

To guarantee high performances and full satisfaction from this equipment, we suggest that you study this manual before any intervention on your pumping unit, particularly the chapter on installation and start-up.



Applications

DRYTEL pumping units are recommended for all applications in which a clean and dry vacuum is required.

They may be used for different types of application:

- INDUSTRY: Cryogenics, Freeze-drying, etc.
- INSTRUMENTATION: Mass spectrometry, Airlock analysis, etc.
- RESEARCH AND DEVELOPMENT: Pumping small volumes, Gauge calibration, etc.
- VARIOUS SEMICONDUCTOR PROCESSES: Airlock pumping, etc.

Advantages

- Clean pumping,
- Flexibility, Reliability and Strength,
- Compact size and low weight,
- Easy maintenance,
- Economical solution.

DRYTEL 1025 pumping unit

This product complies with requirements of European Directives, listed in the Declaration of Conformity contained in G 100 of this manual. These Directives are amended by Directive 93/68/E.E.C (E.C. Marking).

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Chapter A

User's Manual DRYTEL 1025

PRESENTATION

■	Presentation	■	A 10
■	Operating principle	■	A 20
■	Control electronics	■	A 30
■	Technical characteristics	■	A 40
■	Options	■	A 50
■	Accessories	■	A 60

Presentation

DRYTEL 1025 PUMPING UNITS



MAIN CHARACTERISTICS

- No contamination by internal lubricants.
- High performance.
- Economical solution.

DIFFERENT PRODUCTS AVAILABLE

	DRYTEL 1025
Primary pump	AMD1 or AMD4
Secondary pump	MDP 5011 or ATH 31+
Options	Automatic air ballast
	Remote control
	DN16 exhaust end fitting

Operating principle

DESCRIPTION

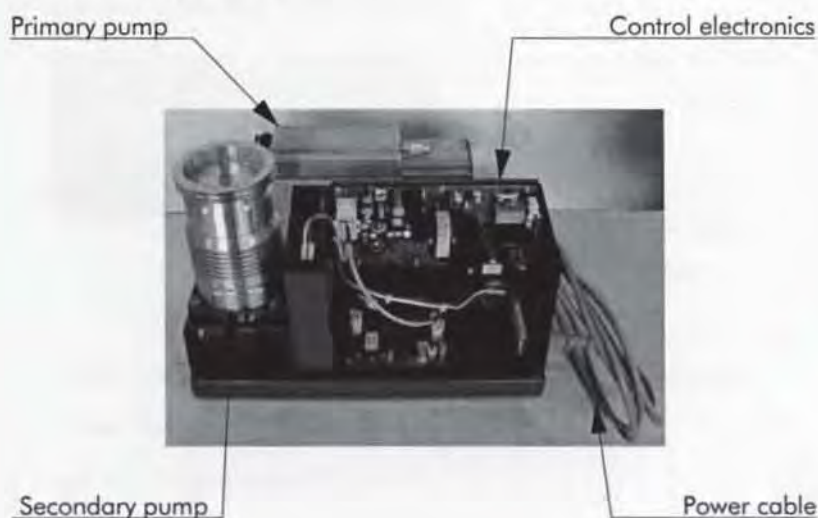
The DRYTEL 1025 pumping unit is a dry (oil-free) pumping system, capable of pumping from atmospheric pressure up to secondary vacuum pressures.

DRYTEL 1025		
Primary pump	AMD1 or AMD4	
Secondary pump	MDP 5011	ATH 31 +
Ultimate pressure *	1.10^{-6} mbar	1.10^{-8} mbar

* Ultimate vacuum measured according to PNEUROP specifications

It is composed of:

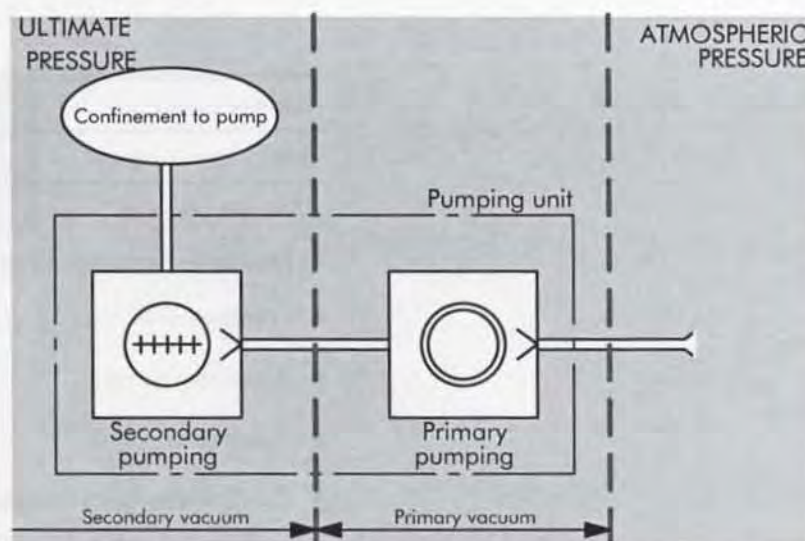
- A primary pump.
- A secondary pump.
- Control electronics integrated into the frame (see sheet A 30).
- A mains power cable.



Operating principle

PRINCIPLE DIAGRAM

At the secondary pump exhaust, the gases are evacuated to the atmosphere by a primary pump.



Control electronics

DESCRIPTION

The DRYTEL 1025 pumping unit is equipped with a control electronics system including:

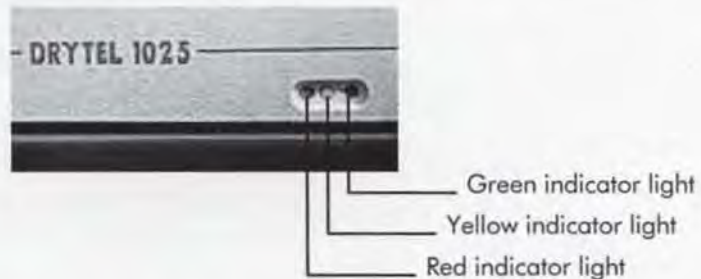
Internal part

- The power supply board.
- The secondary pump frequency converter board.
- The electric connections between the different pumping unit devices.
- The fan used to ventilate the control electronics and the secondary pump.
- The optional remote control (see sheets A 50, B50 and C 30).

Front panel

- The secondary pump status indicator.

The operating status of the pumping unit is represented by the three indicator lights: Red, Yellow and Green.



Green: the secondary pump has reached its synchronism speed.

Yellow: the secondary pump is speeding up.

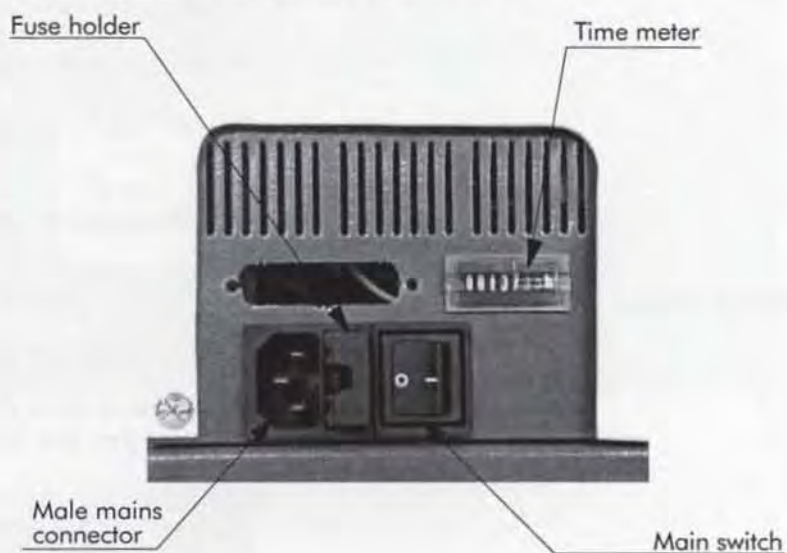
Red: fault on the pumping unit.

See sheet ➤ **C 20 Using the pumping unit in local mode**

Control electronics

Side panel

- Male mains connector.
- Fuse-holder.
- Main switch: 2 settings: 0 - 1
- The time meter giving the total operating time.



- Optional remote control connector (see sheets A 50, B 50 and C 30).

Technical characteristics

TECHNICAL DATA

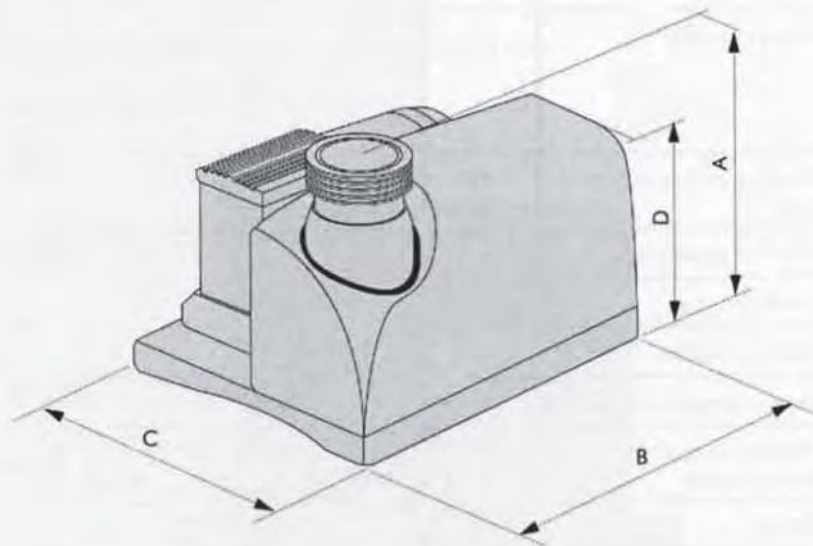
SECONDARY PUMP		MDP 5011				ATH 31 +			
PRIMARY PUMP		AMD1		AMD4		AMD1		AMD4	
Ultimate pressure *	mbar	1.10 ⁻⁶				1.10 ⁻⁸			
Pumping rate *N ₂	l/s	7.5				30			
.....He		4				20			
.....H ₂		3				14			
Primary pump pumping rate	m ³ /h	1.0 / 1.2				3.3 / 4.0			
Exhaust pressure	mbar	Atmosphere							
Start-up time	min	< 2							
Cooling system	/	Air							
Maximum inlet pressure	mbar	5				0.5			
Maximum operating temperature	°C	35							
Weight	Kg	15				26			
Storage temperature	°C	-10 to 60							
Inlet flange	/	DN 63 ISO-K							
Exhaust flange	/	Noise filter							
		DN 16 exhaust end fitting							
Frequencies	HZ	50 / 60							
Mains voltage	V	100 / 115 200 / 230 / 240							
Power consumption at start-up	W	210 (60Hz)	180 (50Hz)	370 (60Hz)	320 (50Hz)	220 (60Hz)	205 (50Hz)	380 (60Hz)	335 (50Hz)
Power consumption at synchronism	W	160 (60Hz)	130 (50Hz)	310 (60Hz)	250 (50Hz)	160 (60Hz)	135 (50Hz)	310 (60Hz)	270 (50Hz)
Noise level	dBA	< 52		< 56		< 52		< 56	

* Ultimate vacuum measured according to PNEUROP specification

Technical characteristics

DIMENSIONAL CHARACTERISTICS

Dimensions in mm



	MDP 5011		ATH 31+	
	AMD1	AMD4	AMD1	AMD4
A	265	265	240	240
B	385	385	385	385
C	305	410	305	410
D	225	225	225	225

Options

OPTIONS AVAILABLE

Exhaust end fitting

DN 16 exhaust end fitting

AMD1



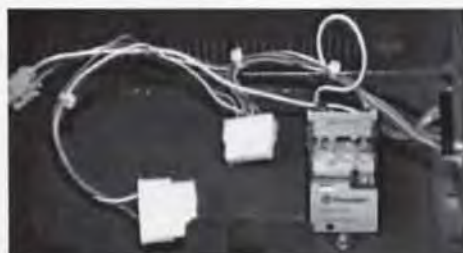
It is used to collect pumped gases to prevent them from being discharged into the atmosphere. The exhaust end fitting is used to replace the noise filter, when pumping pollutant or valuable gases.

DN 16 exhaust end fitting

AMD4



Remote control



Used to control the pumping unit remotely.

See sheet ➤ **B 50 Connecting the remote control connector (optional)**

See sheet ➤ **C 30 Using the pumping unit in remote control mode (optional)**

Automatic air ballast



Used to improve pumping of light gases and reduces condensation risks in the primary pump.

Options

OPERATING PRINCIPLE

When condensable gases are pumped, depending on the nature of the pumped gases, pressure and temperature conditions, they may condense in the dead volumes of the primary pump.

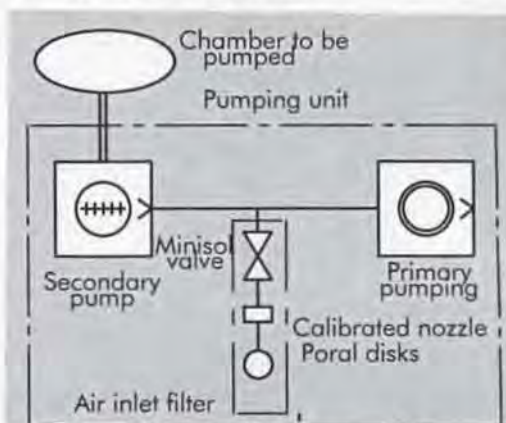
When the pumping unit is at low pressure, the primary pump is at the limit vacuum. The gases no longer pass through, its check valves no longer open and the condensates remain inside.

These condensates mix with dust and create a destructive abrasive for the pump diaphragm.

The introduction of gas at the last stage of the pump has various effects:

- the dilution of the pumped gas and the reduction of the partial vapor pressure of the residual gas in the pump.
- it increases the compression of the pump and heats it, reducing the risk of condensation by increasing the temperature of the internal pump.
- reduce in the last stage the partial pressure if the pumped gas and stop its condensation when the gas reaches the atmospheric pressure.
- in case of pumping at low pressure, when there is no flow, it gives the possibility to open the valves and evacuate the residual gases.

PRINCIPLE DIAGRAM



Powering up the solenoid valve opens it and introduces a calibrated quantity of air via a nozzle parallel to the pumped gas.

The sintered metal PORAL disks protect the nozzle from dust or foreign bodies carried by the gas or from the atmosphere.

The air inlet filter protects against dust or foreign bodies from the atmosphere.

In case of accident or if the pump stops, a valve closes this inlet and keeps the pump anti-suck back.

For more efficiency, it is possible to use a dry neutral gas as a purge gas. In this case, unscrew the air inlet filter and connect a cylinder or source of neutral gas.

See sheet .. ➤ **B 60 Connecting the automatic air ballast (optional)**

See sheet .. ➤ **C 40 Using the automatic air ballast (optional)**

Accessories

ACCESSORIES AVAILABLE

Different connection accessories are available in the Alcatel catalogue.

These accessories are to be ordered separately.

Inlet filter

Prevents the introduction of foreign bodies into the secondary pump inlet.

	P/N	
	DN 63 ISO-K	
	MDP 5011	ATH 31+
Screen filter (2.5 mm mesh)	063117	102565
20 µ inlet filter	062912	102668

Vacuum connection

Used to connect the pumping unit to the customer application.

	P/N	
	DN 63 ISO-K	
	MDP 5011	ATH 31+
Aluminium centring ring (without O-ring)	063212	102568
O-ring	082028	
Rotary flange with ring	068420	
Seal	068285	

	P/N	
	MDP 5011	
	MDP 5011	ATH 31+
Screw kit	303416	
4 clamps	303056	

Chapter B

User's Manual DRYTEL 1025

START-UP

■ Safety instructions	■ B 10
■ Unpacking, storage	■ B 20
■ Mechanical connection	■ B 30
■ Electrical connection	■ B 40
■ Connecting the remote control connector (optional)	■ B 50
■ Automatic air ballast (optional)	■ B 60

Safety instructions

GENERAL

- Before powering up, the user must study the manual and follow the safety instructions.
- Our products are designed to comply with current EEC regulations. Any modification of the product is liable to result in non-compliance with regulations, or affect the EMC (Electromagnetic compatibility) performances and safety of the product.
Alcatel declines responsibility for consequences resulting from such an intervention.
- Products' EMC performances are subject to the installation being carried out in compliance with the applicable EMC regulations. Particularly in environments subject to interference, it is essential to:
 - use shielded links and connections for interfaces,
 - stabilise the power supply line with a mesh from the power supply source up to a distance to 3 m with respect to the product input.
- Before any maintenance operation on a product performed by a maintenance operator not qualified on safety regulations (EMC, electrical safety, chemical pollution, etc.), shut off the product from its different power sources (electricity, compressed air, etc.).
- Check that the pumping unit is connected correctly to the equipment.
- The performances and operating safety of this product can only be guaranteed if it is used in compliance with its normal use.
- Make sure that the chambers or confinements connected to the pumping unit inlet can withstand a negative pressure of 1 bar with reference to atmospheric pressure.
- The tightness of the products is guaranteed when leaving the factory for normal operating conditions.
If hazardous or corrosive gases are being pumped, the user is responsible for ensuring the quality of tightness.

Safety instructions

**WARNING**

When powering up an item of equipment containing capacitors loaded at over 60 VDC or 25 VAC, precautions must be taken at the connector pin access.

Electric shocks may cause severe injuries.

Before working on the pumping unit, it is recommended to wait 1 minute after setting the main switch to 0.

**WARNING**

When the main switch is set to 0, some electric connections may still be live.

Electric shocks may cause severe injuries.

Before working on the pumping unit, it is recommended to disconnect the mains power supply cable.

**WARNING**

It is dangerous to access the rotor of a turbomolecular pump on which the intake is not connected.

Even if the pump is not powered, it may be driven by another pump in operation.

Severe cuts may be caused on contact.

Before working on the pumping unit, it is recommended to:

- stop the pumping unit (main switch set to 0),
- wait for all the components to stop,
- disconnect the mains power supply cable.

**WARNING**

The pumping units are designed so as to prevent thermal risks for the user's safety.

However, particular operating conditions may induce temperatures justifying particular caution on the part of the user (outer surfaces > 70°C on exhaust connections).

Burns may be caused on contact.

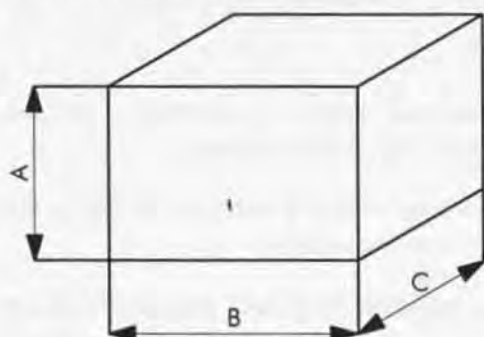
Wear protective gloves before repair work.

Unpacking, storage

PRECAUTIONS

- Unpack the equipment carefully and keep the packaging. Make sure that the equipment has not been damaged during transport. If it has been damaged, take the necessary measures with the transport operators and notify Alcatel if required.
In any case, we recommend that you keep the packaging (recyclable material) to transport the equipment if required or in the event of prolonged storage.
- To keep your product in the state of cleanliness in which it left our factory, we recommend to only unpack the pumping unit on its installation site.
The unpacking and assembly operations must be performed in a single sequence.
- Risk of toppling over: compliance with EEC safety regulations is guaranteed (normal range $\pm 10^\circ$).
However, it is recommended to take precautions to prevent the risk of the equipment toppling over during handling, installation and operation.

PACKAGING DIMENSIONS



Dimension (mm ± 50)	DRYTEL 1025
A	360
B	525
C	510

Unpacking, storage

UNPACKING

Packaging contents

The packaging contains the following packaging units:

- The pumping unit instruction manual.
- The DRYTEL pumping unit.
- The mains power supply cable.

Unpacking

Open the box.

Remove the different packaging units from the box.

Remove the top packing foam.

Remove the pumping unit from the box by releasing it from the bottom packing foam using the notch provided.

PUMPING UNIT STORAGE

The DRYTEL pumping unit can be stored without any particular precautions (ambient temperature between -10 and 60 °C).

The inlet flange must be sealed.

Note : If the exhaust connection option is installed, it is also recommended to seal the DN16 exhaust flange.

- Before starting up the pumping unit, it is essential to follow the turbomolecular pump running-in procedure :
 - **MDP 5011** (see sheet C 10).
 - **ATH 31+** (see sheet C 10).

Mechanical connection

PRELIMINARY RECOMMENDATIONS

- As a general rule, it is recommended to follow the safety instructions in sheet B 10.



Remove the protective seals on the inlet, and if applicable, exhaust orifices:

These components prevent foreign bodies from entering the pump during transport and storage.

It is dangerous to leave them on the pump in operation.

- Make sure that the working confinement is clean and free of "solid particles".
These particles could damage the secondary pump.
- The performances of the pumping unit depend on the type of accessories used and the quality of the mechanical connections.
- For different reasons, the cleanliness of the materials and seals used on the inlet and exhaust lines must be compatible with the gases pumped.
- Make sure that the rooms or confinements connected to the pumping unit inlet can withstand a negative pressure of 1 bar with reference to atmospheric pressure.
- The tightness of the products is guaranteed when leaving the factory for normal operating conditions.
If hazardous or corrosive gases are being pumped, the user is responsible for ensuring the quality of tightness.

POSITIONING THE PUMPING UNIT

- The work surface on which the pumping unit is installed must be sufficiently rigid to prevent any vibration.
- Due to the use of a primary and secondary pump, check that the group is placed in a ventilated place, and that the events are free.
The work at high pressure or in pumping cycles increase the temperature of the pump.
The reliability of the pumps can be reduced by a high ambient temperature.
- Install the pump on the equipment for which it is intended (see sheet B 20).

Mechanical connection

MECHANICAL CONNECTION

Intake

Position the centring ring equipped with its O-ring on the intake flange of the secondary pump.

Connect the intake flange of the secondary pump to the equipment.

Technical specifications	DRYTEL 1025
Inlet flange	DN 63 ISO-K

See sheet ➤ **A60 Accessories**

Exhaust

The pumping unit exhaust is provided:

- either via a noiseproof filter,
- or via a DN 16 exhaust end fitting (optional).

Spécifications techniques	DRYTEL 1025
Exhaust flange	Noiseproof filter
	DN 16 exhaust end fitting (optional)

See sheet ➤ **A 50 Options**

Various DN 16 connection accessories are available in the Alcatel catalogue.

These accessories are to be ordered separately.

Electrical connection

- As a general rule, it is recommended to follow the safety instructions in sheet B 10.



When powering up an item of equipment containing capacitors loaded at over 60 VDC or 25 VAC, precautions must be taken at the connector pin access. Electric shocks may cause severe injuries. Before working on the pumping unit, it is recommended to wait 1 minute after setting the main switch to 0.



When the main switch is set to 0, some electric connections may still be live. Electric shocks may cause severe injuries. Before working on the pumping unit, it is recommended to disconnect the mains power supply cable.



It is dangerous to access the rotor of a turbomolecular pump on which the intake is not connected. Even if the pump is not powered, it may be driven by another pump in operation. Severe cuts may be caused on contact. Before working on the pumping unit, it is recommended to:

- stop the pumping unit (main switch set to 0),
- wait for all the components to stop,
- disconnect the mains power supply cable.

MAINS VOLTAGE CHECK

- Check that the information on the label beside the mains connector complies with the network on which the pumping unit is installed.
Otherwise, make the necessary modifications (see sheet E 30).

Electrical connection

CONNECTION

Connect the female mains power supply cable connector to the male mains connector on the side of the pumping unit.

Connect the other end of the mains power supply cable to the mains connector.

Note : If the pumping unit is equipped with the remote control option, see sheet B 50.

Connecting the remote control connector (optional)

- As a general rule, it is recommended to follow the safety instructions in sheet B 10.
- The internal part of the pumping unit containing the control electronics is equipped with dry contact outputs. It is the customer's responsibility to use these outputs in compliance with safety standards.

REMOTE CONTROL FUNCTION

The remote control function is used for:

- Remote control of the On/Off functions:
 - of the primary pump,
 - of the secondary pump.
- Copying the status of indicator lights (see section on wiring to use the pumping unit in remote control mode).

LOCATION OF REMOTE CONTROL CONNECTOR

The remote control is connected via the male remote control connector on the side of the pumping unit.

Male remote
control connector



Note : In local mode, the pumping unit will only be able to operate if the plug connector (supplied by Alcatel and wired according to the diagram below) is connected to the remote control connector.

Connecting the remote control connector (optional)

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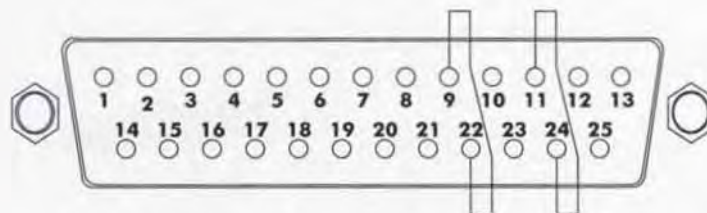
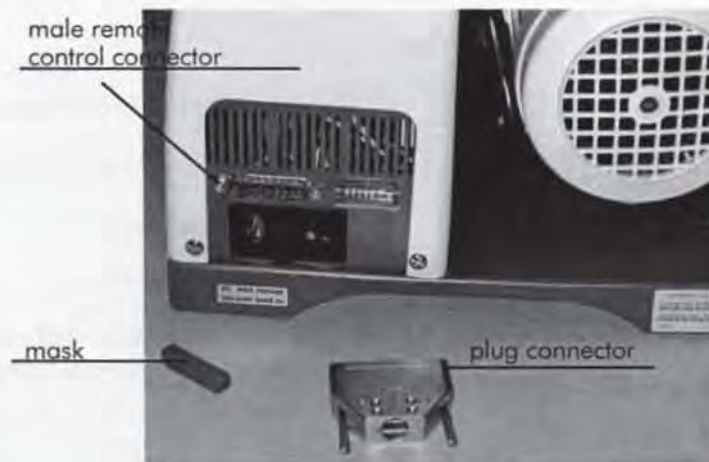


Note : In local mode, the pumping unit will only be able to operate if the plug connector (supplied by Alcatel and wired according to the diagram below) is connected to the remote control connector.

Connecting the remote control

Connection to use the pumping unit in local mode

If the pumping unit equipped with the remote control option is used in local mode, take off the mask and connect the plug connector (supplied by Alcatel and according to the diagram below) to the male remote control connector.



25-pin female sub-D connector type plug connector
Soldered side view

Contact	Function
9 - 22	Primary pump operation
11 - 24	Secondary pump operation

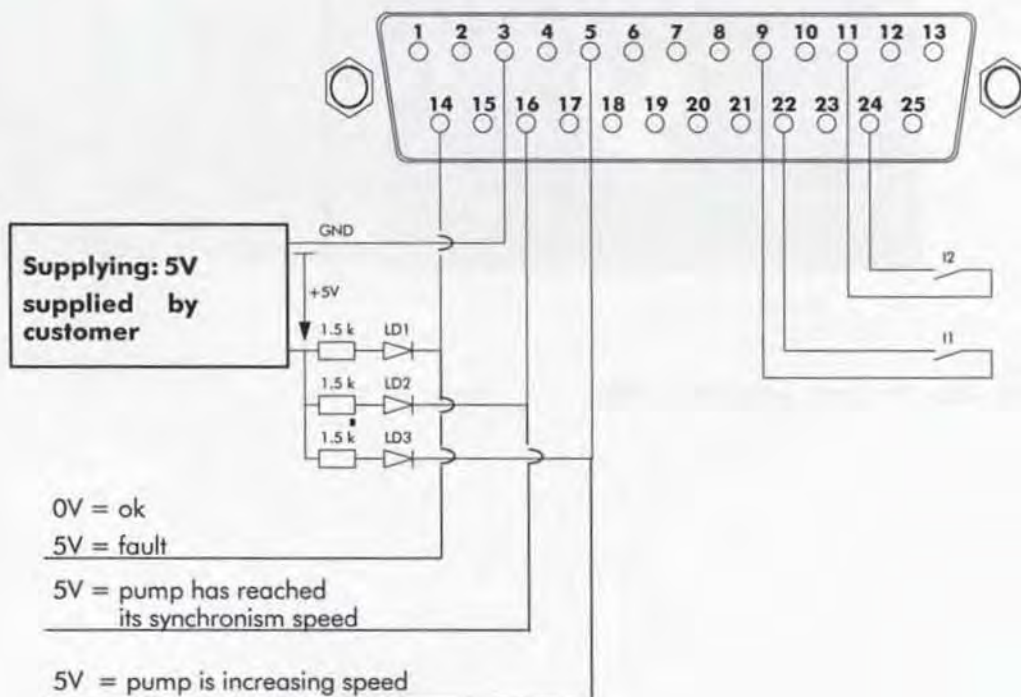
Connecting the remote control

Wire to use the pumping unit in remote control mode

If the pumping unit is used in remote control mode, wire the remote control connector (supplied by customer) according to the diagram below, take off the mask and connect it to the male remote control connector.



25-pin female sub-D connector type remote control connector soldered side view



Connecting the remote control connector (optional)

Wiring to use the pumping unit in remote control mode (continued)

The voltage is supplied by the customer.

These outputs are open collectors.

Contact	Function	Voltage	Current
I ₁	Primary pump On/Off control	5 V DC $\pm$ 5 %	500 μ A
I ₂	Secondary pump On/Off control	5 V DC $\pm$ 5 %	500 μ A
LD1	Red indicator light: the secondary pump is faulty.	30 V DC	40 mA
LD2	Green indicator light: the secondary pump has reached its synchronism speed.		
LD3	Yellow indicator light: the secondary pump is increasing speed.		

Connecting automatic air ballast (optional)

TECHNICAL CHARACTERISTICS

Neutral gas supply conditions: 1 bar (+0 ; +10 mbar)

Air or gas flow rate: 60 sccm

Connection thread: 1/8 G

Solenoid valve power supply voltage: 24 V DC

CONNECTING PROCEDURE

Wire the valve (24V) and ensure its control.

To connect the neutral gas line, unfasten the air inlet filter, and connect the line at this place (connection thread : 1/8G).



See sheet ➤ **C 40 Using the automatic air ballast**

Chapter C

User's Manual DRYTEL 1025

OPERATION

■ Safety instructions	■ C 10
■ Using the pumping unit in local mode	■ C 20
■ Using the pumping unit in remote control mode (optional)	■ C 30
■ Using automatic air ballast (optional)	■ C 40

Safety instructions

GENERAL

- As a general rule, it is recommended to follow the safety instructions in sheet B 10.
- Do not move or induce a shock on a pump in operation.
This could result in a risk of jamming.



The pumping units are designed so as to prevent thermal risks for the user's safety.

However, particular operating conditions may induce temperatures justifying particular caution on the part of the user (outer surfaces > 70°C on exhaust connections). Burns may be caused on contact.

Wear protective gloves before repair work.



It is dangerous to access the rotor of a turbomolecular pump on which the intake is not connected.

Even if the pump is not powered, it may be driven by another pump in operation.

Severe cuts may be caused on contact.

Stop the pumping unit, wait for all these components to stop completely and disconnect the power supply cable before any intervention on the equipment.

FIRST PUMPING UNIT ROTATION(RUNNING-IN)

- When the secondary pump is new, or after a storage for a shutdown period of 2 months or more, we recommend to start the secondary pump for approximately 10 min at atmospheric pressure by setting the main switch to 1.
Then let the pump running for 20 minutes at ultimate pressure.
The purpose of this slow rotation is to distribute the grease regularly in the ball bearings.

Using the pumping unit in local mode

PRELIMINARY RECOMMENDATION

- As a general rule, it is recommended to follow the safety instructions in sheets B 10 and C 10.
- Check that the secondary pump running-in instructions have been followed (see sheet C 10).

PROCEDURE

This procedure is intended for a pumping unit on which the remote control option has not been installed.

Otherwise, follow the instructions in sheet C 30.

USING THE PUMPING UNIT

Starting up the pumping unit

- Check that the primary pump switch is set to 1.
- Set the main switch to 1.

The following operations take place: the primary pump, fan and then the secondary pump (2 seconds after the primary pump) start up.

- If the pumping unit is equipped with an air ballast (see sheet C40)

Stopping the pumping unit

- If the pumping unit is equipped with the air ballast (see sheet C40)
- Set the main switch to 0.

The following operations take place: the primary pump, fan and secondary pump stop simultaneously.

Using the pumping unit in local mode

SYMBOLISATION OF PUMPING UNIT OPERATING STATUSES

The status of the indicator lights (on or off) reflect the operating status of the pumping unit and more specifically the speed of the secondary pump.

Start-up phase

Time T

Main switch set to 1.

Pumping unit starts up

The various parts of the pumping unit start up.



Start-up phase (continued)

Time T + 2s

The turbomolecular pump speeds up to reach its synchronism speed.

Pumping unit speeds up



Time T + 2 min

The pumping unit is ready for operation.

The secondary pump has reached its synchronism speed



Using the pumping unit in local mode

Phases liable to take place during pumping

Following air entry

When a high volume is pumped, or if the pumping unit is at high pressure, the secondary pump will slow down and lose its synchronism.

Once the pressure conditions are restored, the pump returns to its synchronism.

Pumping unit speeds up



The secondary pump has reached its synchronism speed



A technical incident occurs

The pumping unit is faulty



See sheet ➤ **D 30 Troubleshooting and remedies**

Shutdown phase

Time T + n

Main switch set to 0.

The various parts of the pumping unit stop.

The pumping unit stops



Using the pumping unit in remote control mode (optional)

DIFFERENT CONTROL MODES

The pumping unit may be:

- controlled locally using the main switch,
- controlled remotely by dry contacts using the remote control connection.

LOCAL MODE

- To enable operation in local mode of a pumping unit equipped with the remote control option, connect the plug connect to the male remote control connector on the side of the pumping unit (see sheet B 50).

In this type of operation, the pumping unit is completely autonomous in relation to the equipment in which it is installed.

Preliminary recommendations

- As a general rule, it is recommended to follow the safety instructions in sheets B 10 and C 10.
- Check that the secondary pump running-in instructions have been followed (see sheet C 10).

Starting up the pumping unit

- Plug in the mains power supply cable.
- Check that the primary pump switch is set to 1.
- Set the main switch to 1.

The following operations take place: the primary pump, fan and then the secondary pump (2 seconds after the primary pump) start up.

- If the pumping unit is equipped with an air ballast (see sheet C40)

Stopping the pumping unit

- If the pumping unit is equipped with an air ballast (see sheet C40)
- Set the main switch to 0.

The following operations take place: the primary pump and secondary pump stop simultaneously.

- Unplug the mains power supply cable.

The following operation takes place: the fan stops.

Using the pumping unit in remote control mode (optional)

REMOTE CONTROL MODE

- To enable the operation in remote control mode of the pumping unit, connect the remote control connector to the male remote control connector on the side of the pumping unit (see sheet B 50).

The pumping unit is then controlled by the equipment in which it is installed.

Preliminary recommendations

- As a general rule, it is recommended to follow the safety instructions in sheets B 10 and C 10.
- Check that the secondary pump running-in instructions have been followed (see sheet C 10).

Starting up the pumping unit

- Plug in the mains power supply cable.
- Check that the primary pump switch is set to 1.
- Set the main switch to 1.

The fan starts up.

The start-up of the primary and secondary pumps is controlled remotely by opening and closing the various dry contacts wired on the remote control connector (see sheet B 50).

- If the pumping unit is equipped with an air ballast (see sheet C 40)

Stopping the pumping unit

The shutdown of the primary and secondary pumps is controlled remotely by opening and closing the various dry contacts wired on the remote control connector (see sheet B 50).

- If the pumping unit is equipped with an air ballast (see sheet C 40)
- Set the main switch to 0.
- Unplug the mains power supply cable.

The following operation takes place: the fan stops.

Using the pumping unit in remote control mode (optional)

SYMBOLISATION OF PUMPING UNIT OPERATING STATUSES

In local mode, the status of the indicator lights is directly visible on the pumping unit.

In remote control mode, the remote control connection makes it possible to copy the status of the indicator lights (see sheet B 50).

In both cases, the information is interpreted according to the description in sheet C 20.

Using automatic air ballast (optional)

PROCEDURE

Start-up phase

Start the pumping unit and let it work 1 hour at ultimate pressure to get its temperature working.

Open the automatic gas ballast to increase the pump temperature during 15 minutes.

Pump the condensable gases.

Shutdown phase

Let the pumping unit works with the gas ballast opened during 15 minutes to flush it.

Close the air ballast and let the pumping unit works in pressure during 15 minutes to dry it.

In case of important pollution, disconnect the primary pump and let it pumps for 1 hour on dry gas purge.

Reconnect the primary pump, then let the pumping unit works in ultimate pressure for dry it.



WARNING

In every case, in function of the pumped gas, connect the exhaust end fitting at an extraction or at a scrubber.

For safety reasons, if the gas is corrosive, check that the gas pipe before and after the pumping unit is made of compatible material with the gas.

If the gas is toxic, check that used materials are compatible with the requested leakness level.

If necessary, install a purge at the exhaust of the pumping unit to dilute the gas and protect the exhaust from the moisture.

Chapter D

User's Manual DRYTEL 1025

MAINTENANCE

■ Safety instructions	■ D 10
■ First level maintenance	■ D 20
■ Troubleshooting and remedies	■ D 30
■ Maintenance frequencies.....	■ D40

Safety instructions

- As a general rule, it is recommended to follow the safety instructions in sheets B 10 and C10.



When powering up an item of equipment containing capacitors loaded at over 60 VDC or 25 VAC, precautions must be taken at the connector pin access. Electric shocks may cause severe injuries. Before working on the pumping unit, it is recommended to wait 1 minute after setting the main switch to 0.



When the main switch is set to 0, some electric connections may still be live. Electric shocks may cause severe injuries. Before working on the pumping unit, it is recommended to disconnect the mains power supply cable.



Before performing maintenance operations, it is necessary to check the pumping conditions: toxicity, corrosion of the pumped gases.

CAUTION

The tightness of the products is guaranteed when leaving the factory for normal operating conditions. If hazardous or corrosive gases are being pumped, the user is responsible for ensuring the quality of tightness.



It is dangerous to access the rotor of a turbomolecular pump on which the intake is not connected. Even if the pump is not powered, it may be driven by another pump in operation. Severe cuts may be caused on contact. Before working on the pumping unit, it is recommended to:

- stop the pumping unit (main switch set to 0),
- wait for all the components to stop,
- disconnect the mains power supply cable.

First level maintenance

IDENTIFICATION OF ANOMALIES

When an anomaly occurs, the user is informed by:

- the status of the indicator lights on the front panel of the pumping unit (see sheet C 20),
- the information sent by the remote control connection if the pumping unit is equipped with the remote control option,
- abnormal pumping unit noise or behaviour.

Troubleshooting and remedies

INCIDENT	SYMPTOM	CAUSE	ACTION	SHEET
1	The pumping unit is not operating.	The mains power supply cable is not connected correctly.	Connect the mains power supply cable.	B 40
		The main switch is set to 0.	Set the main switch to 1.	C 20
		The fuse has blown.	Check the condition of the fuse and replace it if necessary.	E 30
2	The primary pump is not operating or not operating correctly.	The primary pump switch is set to 0.	Set the primary pump switch to 1.	C 20
		Incorrect primary pump power supply voltage selection.	Correct the primary pump power supply voltage.	E 30
		The pumping unit has heated up	Wait for the pumping unit to return to ambient temperature.	/
3	The secondary pump is not operating.	Incorrect power supply. <i>The indicator lights do not come on</i>	See action for incident 1.	/
		The pumping unit has heated up. <i>The red indicator light comes on</i>	Wait for the pumping unit to return to ambient temperature.	/
		The secondary pump is faulty.	Contact the Alcatel service centre.	/
4	The secondary pump is not operating correctly. (start-stop)	The variator board is faulty. <i>The red indicator light comes on</i>	Contact the Alcatel service centre.	/
		Power supply board fault. <i>Les voyants lumineux ne s'éclairent pas</i>	Contact the Alcatel service centre.	/
5	The pumping unit's limit vacuum is incorrect.	There is a leak on the installation. <i>The yellow indicator light may come on</i>	Check the installation and shut off the pumping unit to confirm that it is operating correctly.	/
		There is a leak on the pumping unit. <i>The yellow indicator light comes on</i>	Check the condition of the tubes and their attachment.	E 40

D 30

Troubleshooting and remedies

INCIDENT	SYMPTOM	CAUSE	ACTION	SHEET
5 (continued)	The pumping unit's limit vacuum is incorrect.	The primary pump diaphragms are faulty.	Shut off the primary pump. Check that the limit vacuum is greater than 5 mbar. If so, carry out maintenance.	E 50
		Other.	Contact the Alcatel service center.	/
6	The secondary pump is noisy.	The bearings are not greased correctly.	Operate a new running-in procedure	C 10
			Regrease or change the bearings.	MDP 5011 E 60 ATH 31+ Contact the Alcatel service center
7	The primary pump is noisy.	The primary pump is at high pressure.	See action for incident 5.	/
		The primary pump is not powered correctly.	See action for incident 4.	/

Maintenance frequencies

- Some maintenance operations require mechanical know-how and must be performed by qualified personnel.
In the event of doubt, these operations may be carried out by an Alcatel service centre.

PUMPING UNIT

Frequency	Operation to be carried out	Sheet
Once a year	Removal of dust from unit	E 40
Every 2 to 3 years	Replacement of primary pump / secondary pump pipe	E 40

PRIMARY PUMP

The frequency at which the primary pump diaphragms and check valves are replaced depends on the context in which the pumping unit is used.

Under difficult conditions (pumping of condensable products, operation in high ambient temperatures, etc.), the maintenance frequencies given below should be reduced.

Maintenance frequencies

Frequency	Operation to be carried out	Sheet
Once a year	Replacement of diaphragms	AMD1 E 50
	Replacement of check valves	AMD4 E 51

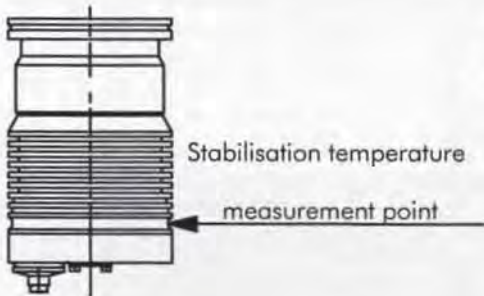
SECONDARY PUMP

The pump grease refilling and bearing replacement periods depend on their use.

Stabilisation temperature measurement point

Maintenance frequencies

Maintenance frequencies

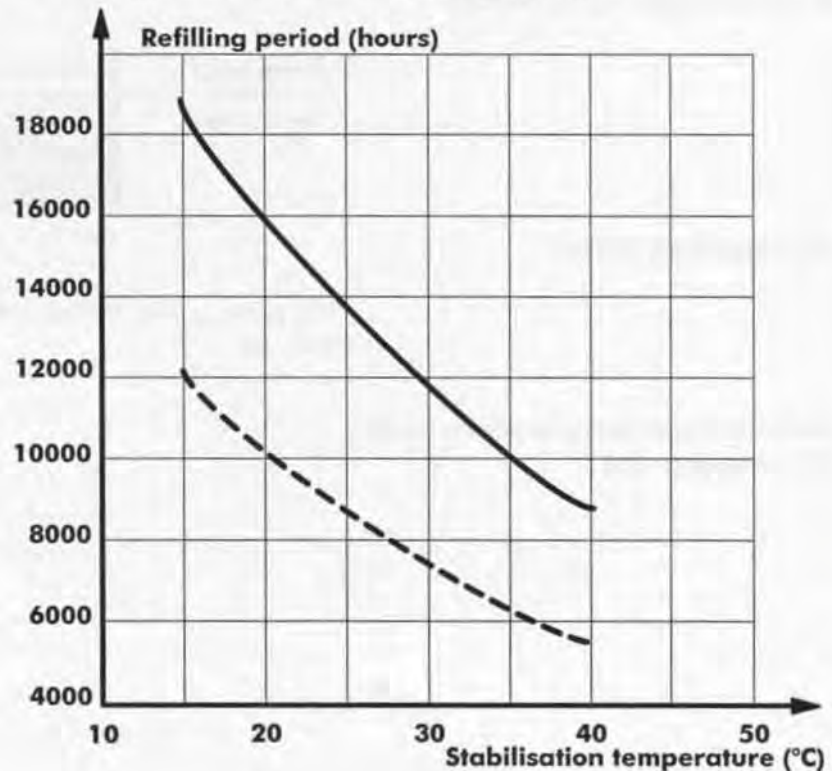


For example : for **average** use at a stabilisation temperature of **20°C**, in **continuous** rotation and at **limit** pressure:

Pump	Frequency	Operation to be carried out	Sheet
MDP 5011	16,000 hours	First grease refill	E 60
	32,000 hours	Second grease refill	E 60
	48,000 hours	Pump disassembly	E60
		Bearing cleaning and replacement	F 10
		Running-in	E 60
ATH 31 +	26,000 hours	Bearing cleaning	Contact the Alcatel service center

Grease refilling scale

- In continuous rotation, at limit pressure.
- - - In cycle ≤ 1 hour, at maximum intake pressure.



Chapter E

User's Manual DRYTEL 1025

INTERVENTION SHEETS

■ Pumping unit dispatch procedure	■ E 20
■ Electric configuration selection	■ E 30
■ Pumping unit maintenance	■ E 40
■ AMD1 pump maintenance	■ E 50
■ AMD4 pump maintenance	■ E 51
■ Refilling the MDP 5011 pump bearings with grease	■ E 60
■ Starting up the MDP 5011 pump after refilling the bearings with grease	■ E 70

Pumping unit dispatch procedure

- As a general rule, it is recommended to follow the safety instructions in sheets **B 10**, **C 10** and **D 10**.
- Remember to complete the "safety questionnaire" and return it to the repair service centre (see sheet **G 10**).

PUMPING UNIT PREPARATION

Seal the intake, and if applicable exhaust, orifices using the protections removed during the mechanical connection.

These components will prevent foreign bodies from being introduced into the pump during transport and storage.

Electric configuration selection

- As a general rule, it is recommended to follow the safety instructions in sheets B 10, C 10 and D 10.

SUMMARY OF SELECTIONS

	Unit	Low Voltage	High Voltage
Mains voltage	V	100 - 115	200 - 220 230 - 240
Fuse	A	4 - 6.3	2 - 3.15
Diaphragm pump switch setting		115	230
Power supply board switch setting		115	230

COWLING DISASSEMBLY



Unfasten and remove the four M 4 - 10 cowl attachment screws.

Remove the cowl.

PARAMETER SELECTION

Power supply board



Set the switch to the suitable voltage.

- LV = 115 V
- HV = 230 V

Electric configuration selection

PARAMETER SELECTION (CONTINUED)

Membrane pump



Set the switch to the suitable voltage.

- LV = 115 V
- HV = 230 V

Power supply unit



Remove the fuse holder from the power supply unit by pressing its tab.

Fit a suitable fuse.

	AMD1	AMD4
LV	4 A	6.3 A
HV	2 A	3.15 A

Put the fuse holder back in place (by snapping it on) in its housing in the power supply unit.

COWLING REASSEMBLY

Position the cowling.



Fasten the four M 4 - 10 cowling attachment screws.

Pumping unit maintenance

- As a general rule, it is recommended to follow the safety instructions in sheets B 10, C 10 and D 10.

REMOVING DUST FROM THE PUMPING UNIT

Clean the inner and outer parts of the pumping unit using a blow gun and compressed air.

REPLACING THE PIPE

Cowling disassembly



Unfasten and remove the four M 4 - 10 cowling attachment screws.

Remove the cowling.

Tube disassembly



Tube



Unfasten the clamping collar on the intake side tube of the primary pump.

Release the intake side tube from the primary pump.

Retrieve the clamping collar.



Unfasten and remove the four C HC M 6 - 10 screws attaching the secondary pump onto its support.

Remove the four M 6 washers.



Unfasten and remove the C HC M 6 ground cable attachment screw.

Remove the M 6 washer.

Release the ground cable.

Disconnect the secondary pump/converter board connection cable.



Unfasten the clamping collar on the exhaust side tube of the secondary pump.

Release and discard the tube.

Retrieve the clamping collar.

Pumping unit maintenance

Tube reassembly

Insert the retrieved clamping collars at each end of the new tube.

Fit one side of the new tube onto the connection fitting of the secondary pump so that it comes to a stop.



Tighten the retrieved clamping collar half-way up the connection fitting.

Connect the secondary pump/converter board connection cable.

Position the ground cable.



Keep it in position using the C HC M 6 screw equipped with its M 6 washer.

Position the secondary pump on its support (exhaust side tube of secondary pump facing front of pumping unit).



Fasten the four C HC M 6 - 10 screws equipped with their M 6 washer, taking care not to crush the shock mounts.

Fit the other side of the new tube onto the connection fitting of the primary pump so that it comes to a stop.



Tighten the retrieved clamping collar half-way up the connection fitting.

Cowling reassembly

Position the cowling.



Fasten the four M 4 - 10 cowling support screws.

AMD1 Primary pump maintenance

- As a general rule, it is recommended to follow the safety instructions in sheets B 10, C 10 and D 10.
- The tools and maintenance components required are outlined in a specific chapter F10.

See sheet **F 10 Maintenance kit**



WARNING

Never use vacuum grease or a not soft lint-free cloth.

DISASSEMBLING THE PUMP FROM ITS SUPPORT



Unfasten the clamping colled of the intake side tube of the primary pump.

Release the intake side tube from the primary pump.



Unfasten and remove the two C HC M 6 - 12 screws.

Remove the two M 6 washers.

Remove the primary pump from its support.

Disconnect the primary pump power supply cable.

REPLACING CHECK VALVES AND DIAPHRAGMS

It is recommended, when replacing diaphragm, to disassemble and reassemble each of the diaphragms in succession, so as not to invert the parts of one subassembly with another during reassembly, particularly possible locking washers.

Primary pump breakdown view



AMD1 Primary pump maintenance

Connector disassembly



While holding the banjo using the 16 mm flat wrench, unfasten and release the upper connector using the 14 mm flat wrench.

Perform the same procedure for the lower connector.

Check valve disassembly



Unfasten and remove the 6 C HC M 5 - 20 casing cover screws.



WARNING

Head covers and valves may come with the casing cover : proceed delicately and identify the valve position on the head cover.

Remove the top part of the casing (casing cover, head covers and check valves).

Separate the head covers from the casing cover.

Remove and discard the check valves.

Diaphragm disassembly



Using a seal scoop, lift two opposite sides of the diaphragm so as to insert the diaphragm wrench.

Press the diaphragm wrench on the attachment disk and then unfasten and carefully remove the attachment disk/diaphragm/disk support subassembly.

Remove and identify any locking washer placed between the connecting rod and the disk support.

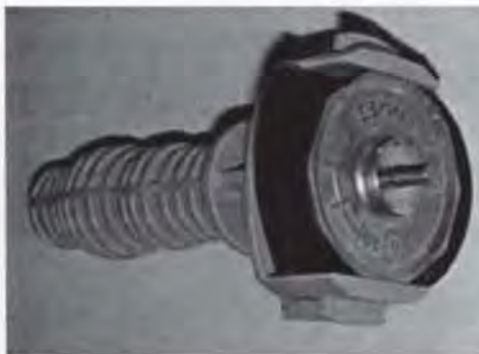
Separate the diaphragm from the attachment disks and the disk support and discard it.

Clean the diaphragm seats with alcohol (see sheet F 10).



AMD1 Primary pump maintenance

Diaphragm reassembly



Insert the new diaphragm between the attachment disk and the disk support.

Take care to position the tight part of the diaphragm on the attachment disk side.

Lift two opposite sides of the diaphragm so as to insert the attachment disk/diaphragm/support disk in the diaphragm wrench.

Take care not to scratch or mark the diaphragm on the sealing side during this operation.

If required, position the lock washer identified during the disassembly on the connection rod.

Fasten the attachment disk/diaphragm/disk support subassembly.

Take care that lock washers do not fall when the subassembly is approached.

Remove the diaphragm wrench.

Flatten the diaphragms.

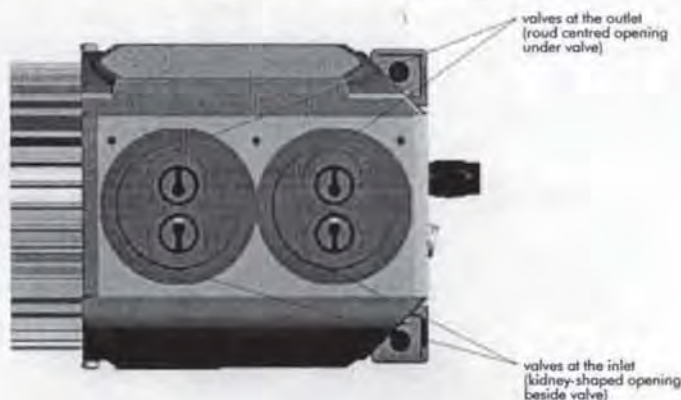
Check valve reassembly



Position the new check valves in the head covers

Position the equipped head covers in their casing housing.

Take care to observe their position (see diagram).



Position the casing cover, shaking it slightly to ensure that the head covers are positioned correctly.

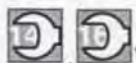


Fasten the six C HC M 5 - 20 screws in contact and diagonally and then tighten.

Note : At the end of tightening of the casing cover attachment screws, the cover must not be in contact with the casing.
The maximum torque to be applied is 6 Nm.

AMD1 Primary pump maintenance

Connector reassembly



While holding the banjo using the 16 mm flat wrench, fasten the upper connector using the 14 mm flat wrench.

Perform the same procedure for the lower connector.

CAUTION

During the disassembly and reassembly connectors, take care of not damage the aluminium's tapping (risk of sicking).

For reassembly, fasten the connector with the hand. Then ensure that the connector is in correct position, before fasten with the flat wrench.

REASSEMBLING THE PUMP ON ITS SUPPORT

Connect the primary pump power supply cable.

Position the primary pump on its support.



Fasten the two C HC M 6 - 12 screws equipped with their M 6 washer.

Check that the clamping collar is on the tube.

Fit the available end of the tube onto the primary pump connection fitting so that it comes to a stop.



Tighten the clamping collar half-way up the connection fitting.

AMD4 Primary pump maintenance

- It is recommended to follow the safety instructions in sheet B 10.
- the tools and maintenance components required are outlined in a specific chapter F 10.

See sheet **F 10** maintenance kit



WARNING

Never use vacuum grease or a not soft lint-free cloth

DISASSEMBLING THE PUMP FROM ITS SUPPORT

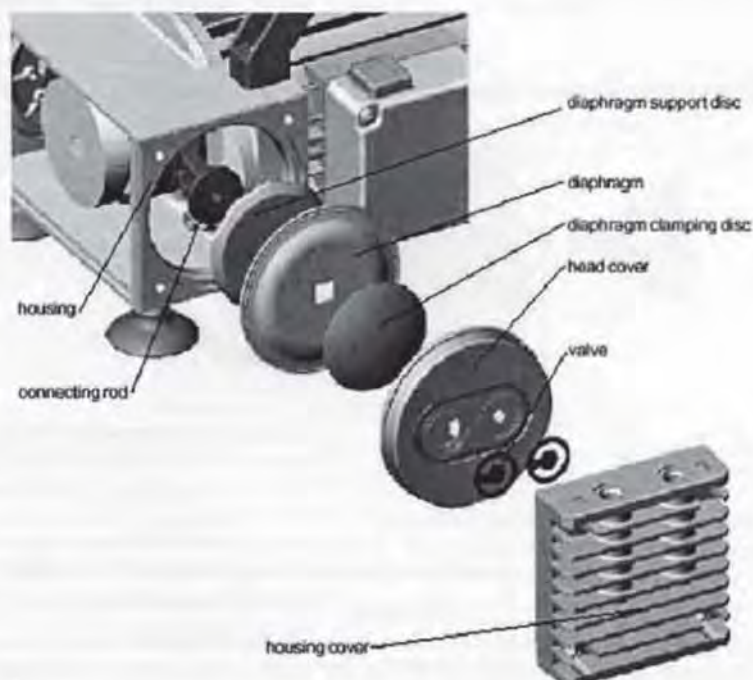
Disconnect inlet port of the diaphragm pump from the pumping line.
Disconnect the exhaust port of the diaphragm pump from the exhaust line (if connected).

REPLACING CHECK VALVES AND DIAPHRAGMS

CAUTION

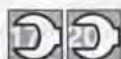
When replacing diaphragms, it is recommended, to disassemble and reassemble successively one after the other to avoid any pats (possible if locking washers are present).

AMD4 DRYTEL 1025 breakdown view



AMD4 Primary pump maintenance

Connector disassembly



While holding the banjo fitting using the 20 mm flat wrench, unfasten and release the upper connector using the 17 mm flat wrench. Perform the same procedure for the lower connector. Unscrew and disassemble the connectors and their washers.

Check valve disassembly



Unfasten and remove the 4 CHC M6 casing cover screws. Remove the top part of the casing (casing cover, head cover). Separate the head cover from the casing cover.

Note : Check the position of the valves on the head covers.

Remove and discard the used valves .
Check the o-ring and change it if necessary.
Clean the valve seats with alcohol (see sheet F 10).

Diaphragm disassembly



With a screwdriver for recessed head screws, unfast the 4 screws and remove the flange of the housing.

Unfast the diaphragm clamping disc with the face wrench.



Note : If the disassembly of the diaphragm is difficult, position the rod at the upper position and push the diaphragm from the inside of the housing.

CAUTION

Never use a sharp tool to separate the diaphragm and the clamping disk.

Separate the diaphragm from its support and discard it.

AMD4 Primary pump maintenance

Diaphragm reassembly



Position new diaphragm between diaphragm clamping disc with square head screw and diaphragm support disc. Check for washers under clamping disc (eventually). Put them on the screw of the diaphragm clamping disc.

Use the face wrench enclosed in the maintenance kit to assemble diaphragm clamping disc, diaphragm and diaphragm support disc (and eventually washers) to the connecting rod.

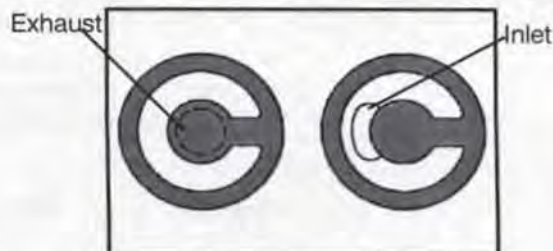
The optimum torque is reached if the pointer in the handle of the face wrench shows to the longer marker line.



Push the rod at the lower position and center the diaphragm in the housing.

On the head cover, put the o-ring on its groove and the 2 valves on their housing in the head cover.

Note : Ensure that the black valves and white valves are correctly positioned on the head cover.



Position the housing cover on the head cover and check the polarizing slot. Put the rod in the lower position.

Install this assembling on the housing and fasten the 4 CHC M6 screws.

Note : Fasten the 4 CHC screws in contact diagonally and then tighten with a maximum torque of 10 Nm.

Note : Housing cover must not be in contact with the housing to avoid pump seizing.

AMD4 Primary pump maintenance

Connector reassembly

Settle the pipes between the stages by respecting their initial position.



CAUTION

When disassembling and reassembling the connectors, be careful of not damage the aluminium's threading. Ensure the good position of the first nut of the connector in fastening by the hand, before using the wrench.

On the connector install the seal washers, the inlet port and the spacers.



While holding the banjo fitting using the 20 mm flat wrench, fasten the upper connector using the 17 mm flat wrench.

Repeat this procedure for each connector.



Secure the housing plate with the 4 screws.

Check the ultimate pressure of the pump. It must be lower than 2 mbar.

REASSEMBLING THE PUMP ON ITS SUPPORT

Connect the inlet port to the pumping line.

Connect the exhaust port to the exhaust extraction system (if necessary).

See sheet **B 30** Mechanical connection

CAUTION

If the ultimate pressure is not reached :

- In case of diaphragms and valves replacement, a running in period of some hours is necessary before reaching the ultimate pressure.
- After the running in period, if the ultimate pressure is 5 mbar different from the technical data, check the leaks on pipes between the different stages and connectors.

Refilling the MDP 5011 pump bearings with grease

REFILLING FREQUENCY

The first greasing required for the correct operation of the secondary pump is performed in the factory.

Subsequent regreasings should be carried out according to the procedure below, according to a frequency defined according to the processes used (see sheet D 40).

GREASING PROCEDURE

Cowling disassembly



Unfasten and remove the four C M 4 - 10 cowling attachment screws.

Remove the cowling.

Disassembling the secondary pump from its support



Unfasten and remove the four C HC M 6 - 10 screws attaching the secondary pump to its support.

Remove the four M 6 washers.



Unfasten and remove the C HC M 6 ground cable attachment screw.

Remove the M 6 washer and release the ground cable.

Disconnect the secondary pump/converter board connection cable.



Unfasten, without removing them, the two H M 6 - 20 screws of the clamping flanges of the secondary pump exhaust side tube.

Pivot the clamping flanges.

Remove the exhaust flange and its seal holder ring.

Refilling with grease

- During lubrication, take care not to introduce foreign bodies into the pump.

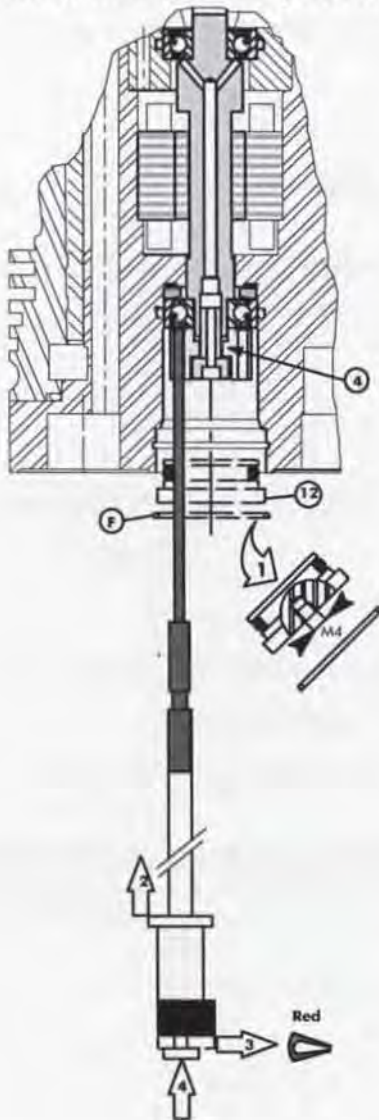
The secondary pump is equipped with two bearings. At each refill, the user must refill these two bearings.

The greasing syringe contains two jumpers:

- A black one for greasing the pumping cell side bearing.
- A red one for greasing the bearing opposite the pumping cell.

Refilling the MDP 5011 pump bearings with grease

Refilling with grease (continued)



Greasing the bearing opposite the pumping cell

Remove the axis brake (F) and the rear plug (12). To remove the plug, fasten an M4 extraction screw in the threading provided for this purpose.

Insert the syringe needle into one of the two diametrically opposed holes of the rear ring (4).

Remove the red jumper.

Progressively introduce half the quantity of grease.

Remove the syringe and its needle.

Insert the syringe needle into the second hole of the rear ring (4).

Progressively introduce the rest of the grease, until the plunger comes to a stop.

Remove the syringe and its needle.

Greasing the pumping cell side bearing

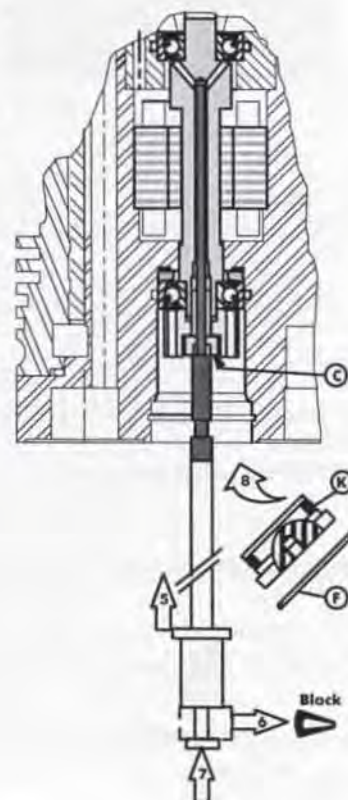
Insert the syringe needle into the orifice of the screw (C) until it comes to a stop against the screw head.

Progressively introduce the grease, until the plunger comes to a stop.

Remove the syringe and its needle.

Reassemble the plug (12) and its seal (K).

Put the axis brake (F) back in position.



Refilling the MDP 5011 pump bearings with grease

Reassembling the secondary pump on its support

Position the seal holder ring.

Position the exhaust flange equipped with its seal holder ring (see note).

Pivot the clamping flanges so as to hold the exhaust flange in position.



Fasten the H M 6 - 20 screws.

Connect the secondary pump/converter board connection cable.

Position the ground cable.



Hold it in position using the C HC M 6 screw using its M 6 washer.

Position the secondary pump on its support (exhaust side tube of the secondary pump facing the front of the pumping unit).



Fasten the four C HC M 6 - 10 screws equipped with their M 6 washer taking care not to crush the shock mounts.

Note : When positioning the exhaust flange, make sure that the clamping collar screw is inside the circle defined by the secondary pump.

Cowling reassembly

Position the cowling.



Fasten the four C M 4 - 10 cowling attachment screws.

RUNNING AFTER REFILLING WITH GREASE

- After refilling with grease, it is essential to follow the secondary pump start-up instructions after refilling the bearings with grease (see sheet E 70).

Starting up the MDP 5011 pump after refilling the bearings with grease

- After refilling the bearings with grease, it is essential observe the different phases of the start-up procedure.

RUNNING-IN CYCLE

First phase

Check that the secondary pump is connected to the pumping unit.

The secondary pump must run initially for 6 minutes at atmospheric pressure.

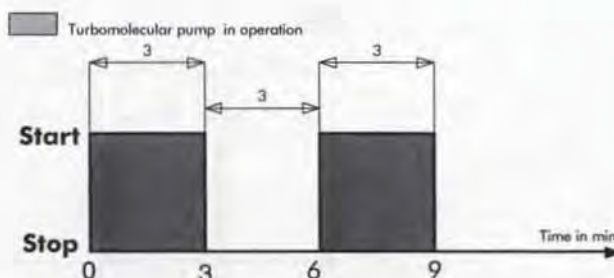


WARNING

During this operation, check that you have taken all the dispositions to forbid the contact of the fin of the rotor in rotation.

For this, it is necessary to observe the following schedule:

Time (min)	Main switch	Pumping unit status
First cycle		
0	1	Pumping unit start-up
3	0	Pumping unit shutdown
Second cycle		
6	1	Pumping unit start-up
9	0	Pumping unit shutdown



Starting up the MDP 5011 pump after refilling the bearings with grease

Second phase

After completing the first phase, seal the secondary pump intake and perform the following running-in cycles (the second phase is carried out in a vacuum):

Time (min)	Main switch	Pumping unit status
First cycle		
0	1	Pumping unit start-up
0.25	0	Pumping unit shutdown
Second cycle		
2.75	1	Pumping unit start-up
3	0	Pumping unit shutdown
Third cycle		
5.5	1	Pumping unit start-up
6	0	Pumping unit shutdown
Fourth cycle		
9	1	Pumping unit start-up
9.5	0	Pumping unit shutdown
Fifth cycle		
12.5	1	Pumping unit start-up
13.25	0	Pumping unit shutdown
Sixth cycle		
17.75	1	Pumping unit start-up
18.5	0	Pumping unit shutdown

