



ADP / ADS Series Two

Multistage Roots dry pump

Operating instructions



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ADP/ADS Series Two

Dear Customer,
you have just purchased
an adixen dry pump.
We thank you and are
proud to include you in
our customers.

This product has benefited
from adixen Vacuum
Products' many years
of experience in
"semi-conductor" processes
and dry pumping.



**For optimum performance
and to obtain full satisfaction
from this equipment, we
recommend that you study
this manual before any
intervention on your pump,
in particular, the chapter on
installation and start up.**

APPLICATIONS:

- H version : for harsh processes.
- P version : for medium processes.
- LMversion : for clean processes.

AVANTAGES:

Reduced volume and foot-print – Low operating cost –
High performance (pumping speed and ultimate pressure) –
Excellent behavior in harsh environments – Easy integration –
Advanced monitoring functions (Stand-by position to reduce N₂
consumption, power failure protection) – SEMIS2-93 standard
compatible (on option).

SPECIAL FEATURES:

Multi-stage Roots technology – Water-cooled multi-voltage motors –
Exhaust and utilities connections possible on top or at the rear of
the pump – adixen Network compatible.

ADP/ADS Series Two

This product complies with the requirements of European Directives, listed in the Declaration of Conformity contained in sheet *G100* of this manual.

These Directives are amended by Directive 93/68/E.E.C (E.C. Marking).

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Operating instructions ADP/ADS Series Two

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CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury.

DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury (extreme situations).



Introduction

User's Manual ADP/ADS Series Two Detailed contents

A 010	<i>Dry pump operational principle</i>
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Dry pump operational principle

Design to minimize potential residues

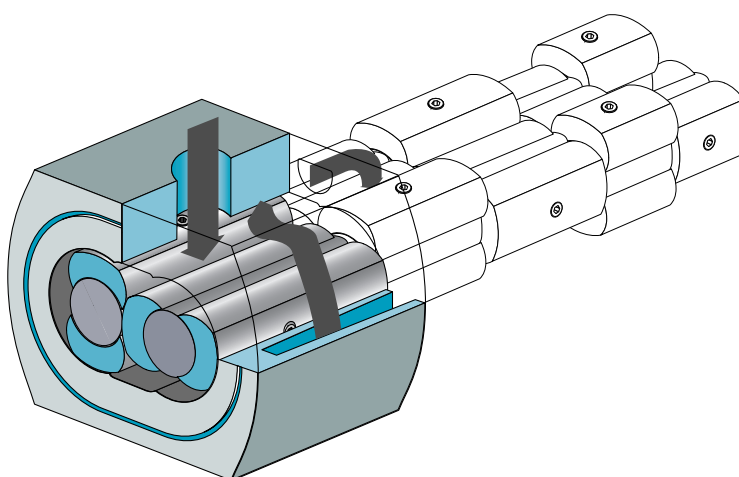
The equipment was designed to minimize potential residue deposits:

- by limiting the internal volumes that contain gas,
- by injecting N₂ purge on each pump stage to dilute the process gas (P and H versions),
- by regulating the pump temperature and adjusting it to each process in order to limit gas condensation (P and H versions).

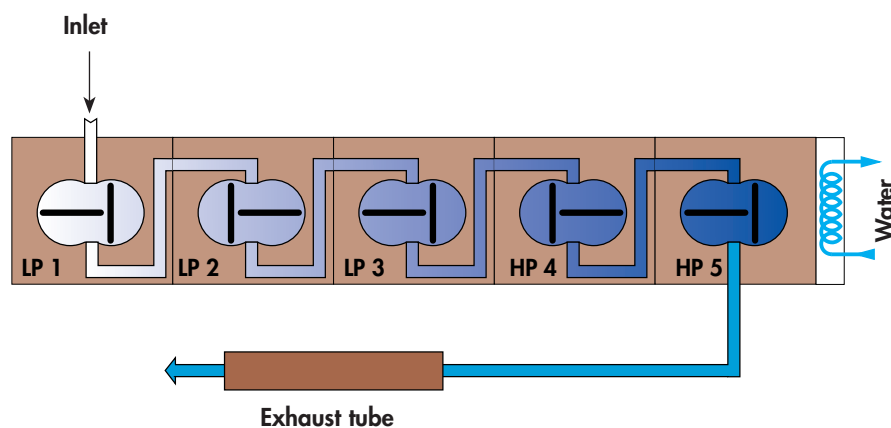
Multi-stage Roots principle

The ADP pump consists of 5 Roots type stages.

The two rotors rotate without touching each other.



The three stages on the low pressure side are called "LP stages" and the two stages on the high pressure side are called "HP stages".



Dry pump operational principle

Tightness with environment

Tightness at low pressure side

The pump is fitted with ball bearings lubricated with fluorinated grease.

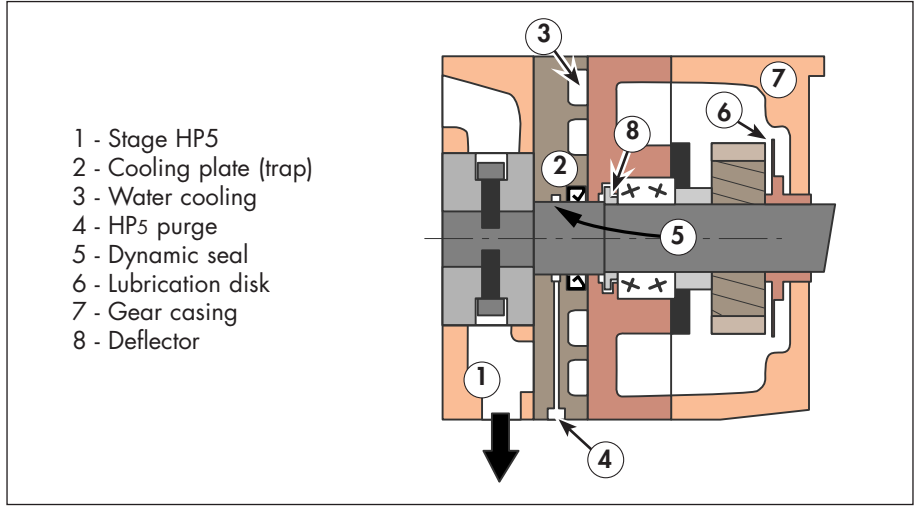
An overpressure zone is created around the bearing by injecting a neutral gas. The pressurization and the seals prevent pumped gases from migrating towards the bearings.

Neutral gas purging for the bearings is imperative for corrosive processes.

Tightness at high pressure side

The bearings are lubricated by oil splashing.

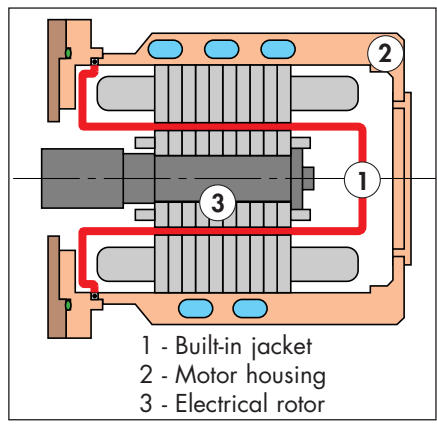
The oil sump is sealed from stage HP5 by a trap and a deflector.



Tightness at motor side (shaft passage)

The vacuum tightness is ensured by the motor design with built-in jacket (hermetically sealed).

This system provides total safety regarding leaks outside the pump and requires no maintenance.

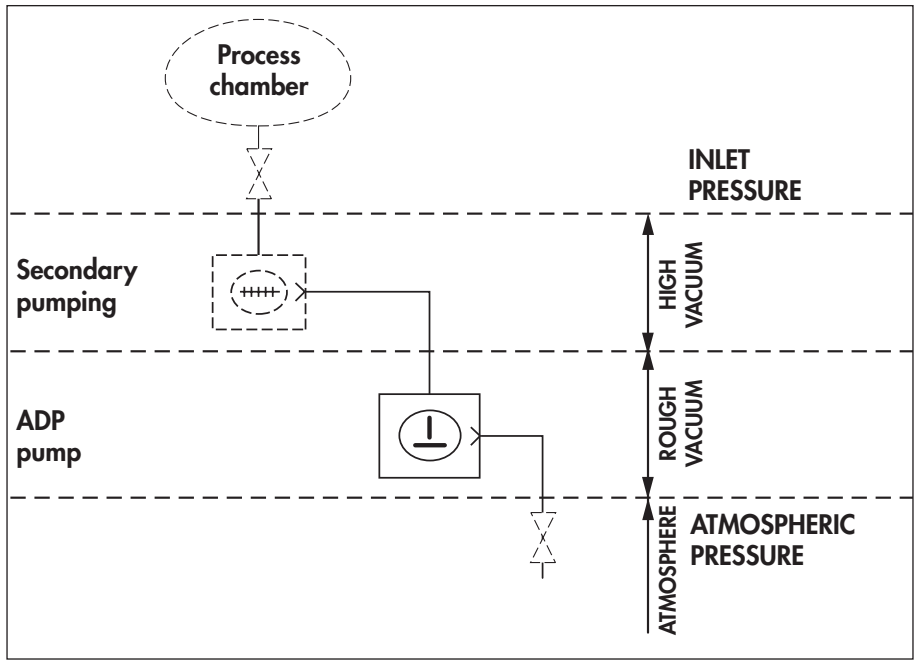


G 01.038 - Edition 05 - September 03

Dry pump operational principle

Tightness at shutdown The pump is fitted with an antisuckback valve in the exhaust tube, that prevents the exhaust being sucked back.

The pump in a pumping installation



ADP/ADS Series Two dry pump range

Model's description



The pump manufacturer has developed a range of dry pumps adapted to the different processes used in the semi-conductor industry.

The range includes:

- ADP122, which is available in two versions:

ADP 122 P: integrated in a covered frame including: the pump, the monitoring, the hand-held remote control, facilities, the flowmeter panel, the OEM interface, the serial link.

ADP 122 LM: simplified model with monitoring designed for clean processes (load-lock and transfer chamber pumping).

- Five pumping groups composed of an ADP122 combined with a Roots to make a fully integrated system:

ADS 602 H, ADS 602 P, ADS 602 LM, ADS 1202 H and ADS 1202 P for semi-conductors processes.

- Two high volume pumping groups ADS 1802.

They are composed of a A300 primary dry pump with a RSV 1802W Roots blower fitted to the inlet of the dry pump. The A300 dry pump is a five stage Roots type pump similar to ADP 122 pump, the RSV 1802W booster is a Roots blower type pump similar to RSV 1002P blower used in ADS 1202 P system. They are available in two versions:

ADS 1802 P for medium processes in the semi-conductor.

ADS 1802 H for harsh processes (anti-corrosive materials, possibility to increase purge flowrate). It includes a built-in dual cooling system.

H models are optimized for harsh processes (anti-corrosive materials, possibility to increase purge flowrate). Beside they are equipped with exhaust pipe heater device which reduces deposits when pumping condensable gases.

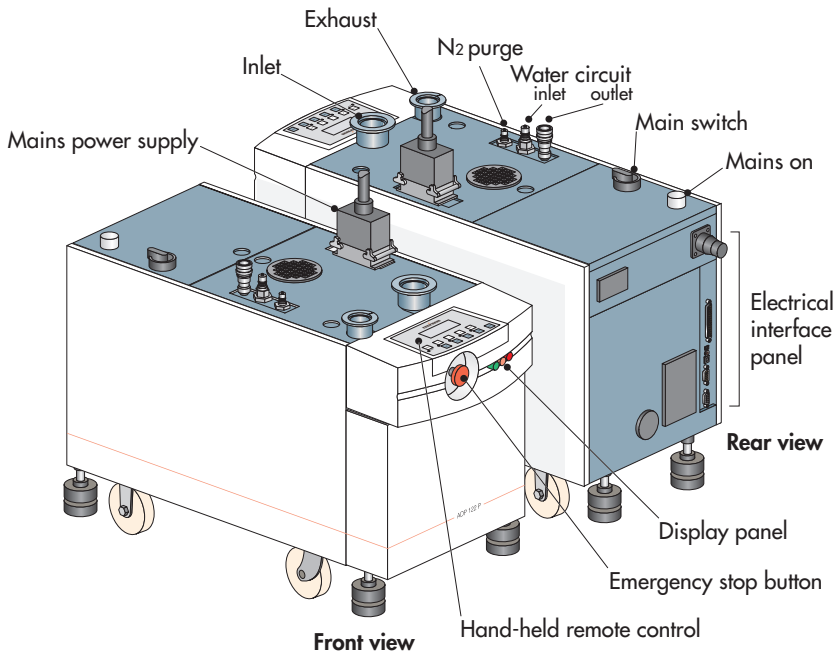
	Monitoring	Purge	Thermo-controlled	Applications
ADP 122 LM - ADS 602 LM	M4	No	No	Clean processes
ADP 122 P - ADS 602 P ADS 1202 P - ADS 1802 P	M4	Yes	Yes	Medium processes
ADS 602 H ADS 1202 H - ADS 1802 H	M4	Yes	Yes	Harsh processes

ADP/ADS Series Two dry pump range

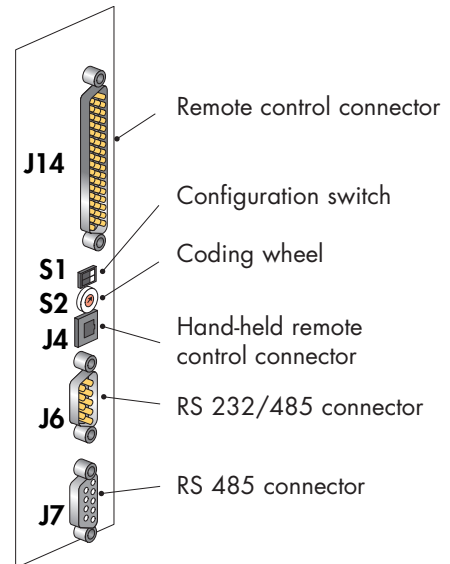
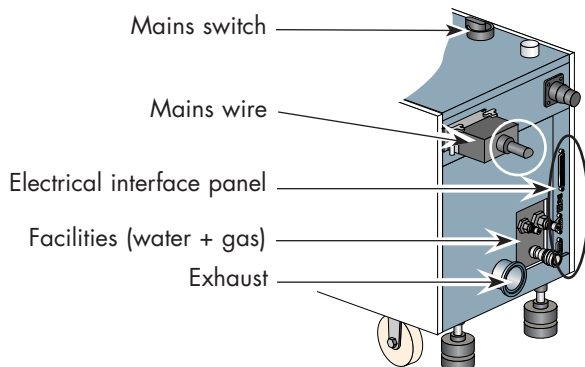
Interfaces

(example ADP 122 P)

Facilities on the top



Facilities at the rear



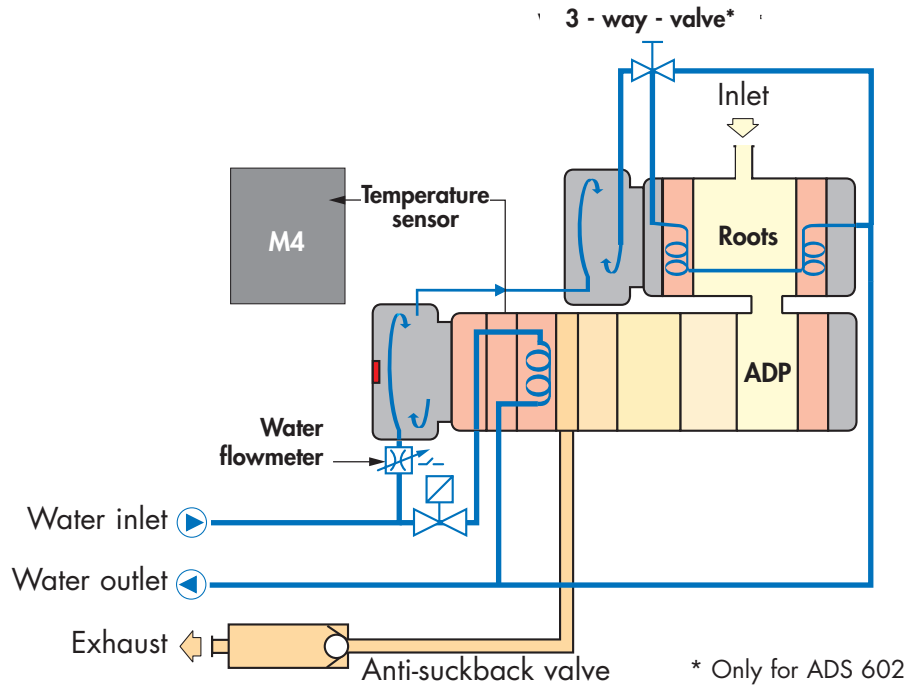
ADP/ADS Series Two dry pump range

Internal equipment of the pumps

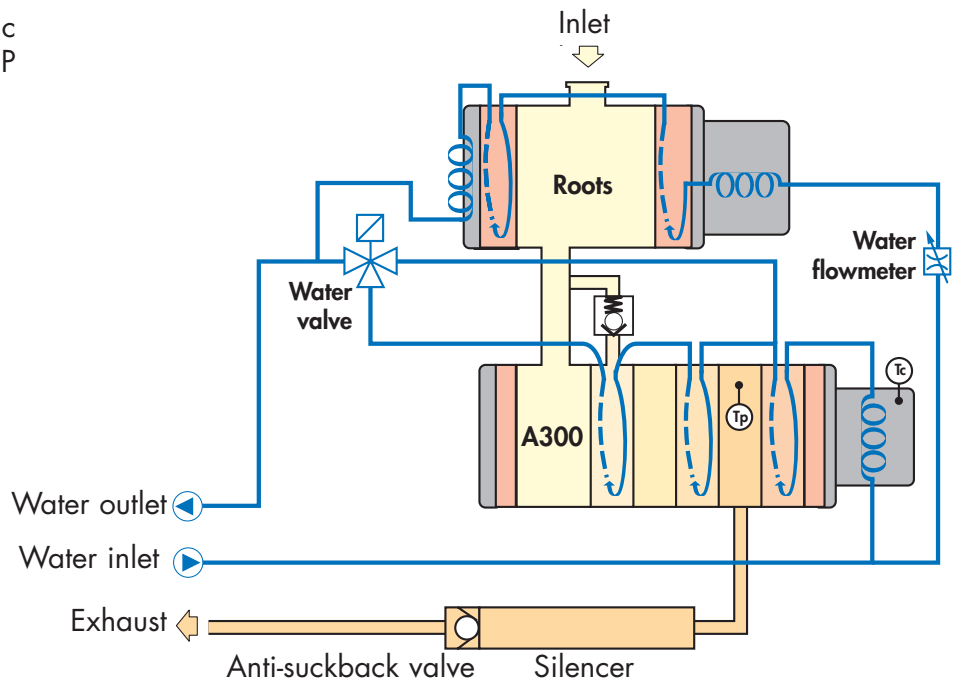
The dry pumps include a cooling circuit and an inert gas purge circuit (purge for P and H versions).

Cooling circuit

Principle schematic
ADS 602 P and H,
ADS 1202 P and H



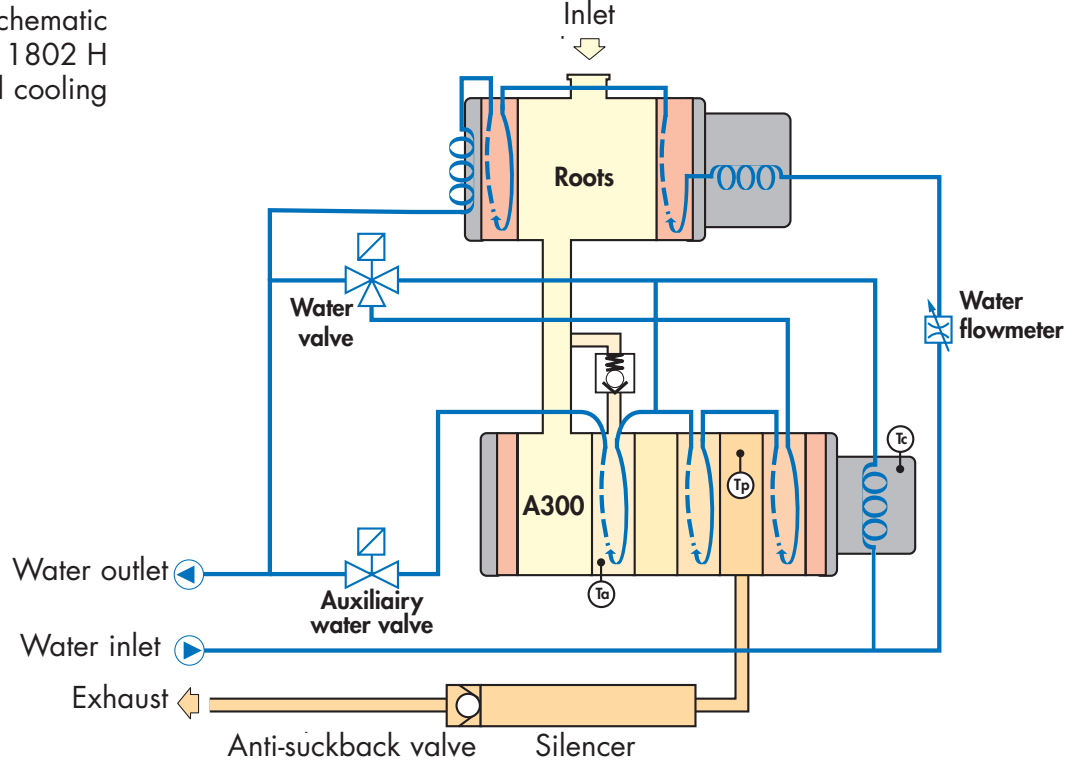
Principle schematic
ADS 1802 P



Tp : Temperature sensor of pump (alert and alarm)
Tc : Temperature sensor of motor (alert and alarm)

ADP/ADS Series Two dry pump range

Principle schematic
ADS 1802 H
dual cooling

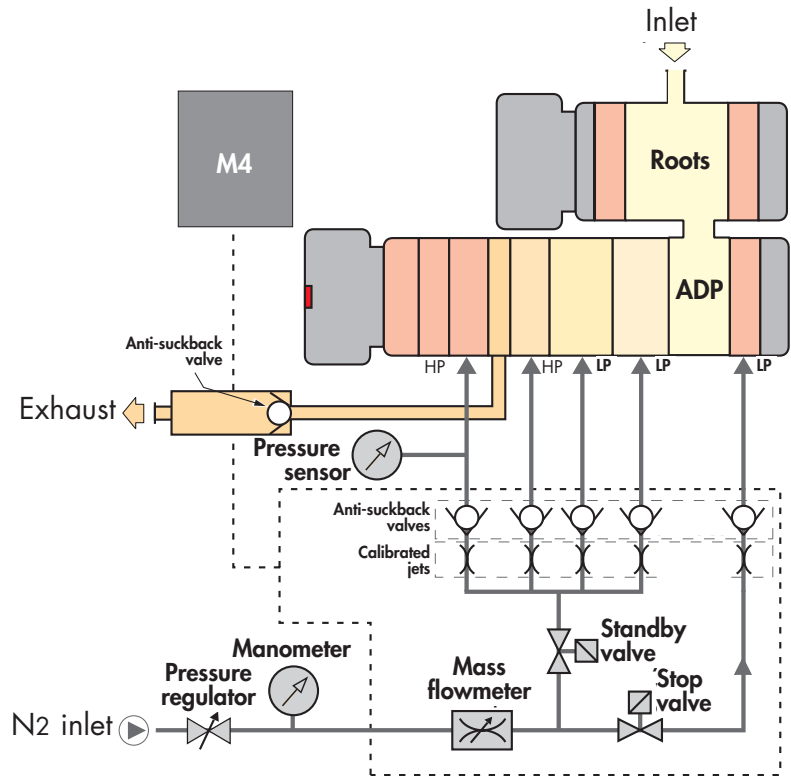


Tp : Temperature sensor of pump (alert and alarm)
Tc : Temperature sensor of motor (alert and alarm)
Ta : Auxiliary temperature sensor (alert and alarm)

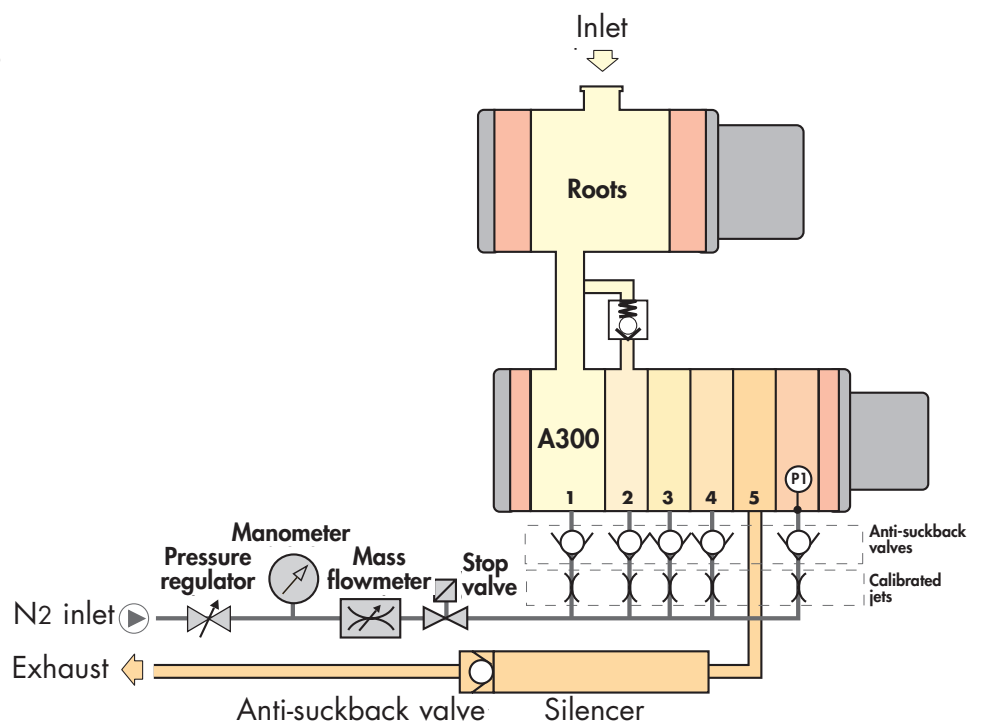
ADP/ADS Series Two dry pump range

N2 purge circuit

Principle schematic
ADS 602 P and H,
ADS 1202 P and H



Principle schematic
ADS 1802 P



P1: Analog sensor (alert, alarm)

M4 monitoring

Principle Each Series Two pump includes an intelligent monitoring system.

Description

Electrical cabinet

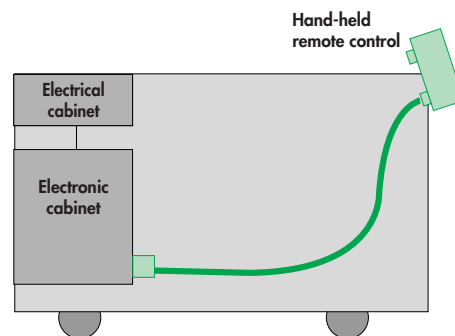
It is located at the rear of the machine.

It is linked with main power supply, ADP/Roots motors and electronic cabinet.

Hand-held remote control

It ensures Man-Machine interface.

It can be used either from the front or the rear of the pump and allows the access at all operation parameters.



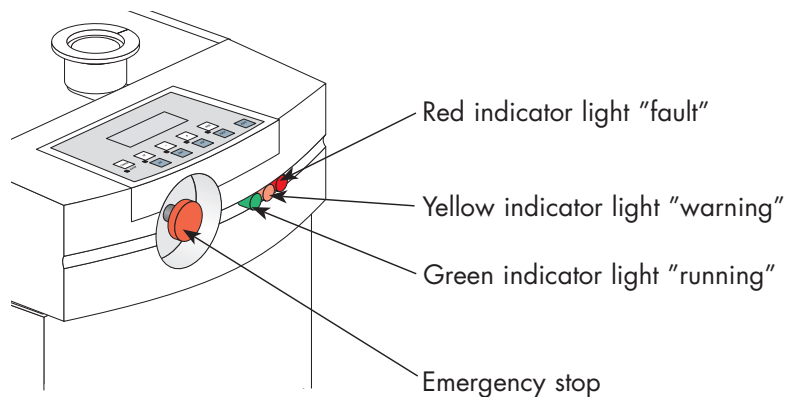
Electronic cabinet

It ensures the pump automatic operation and controls all sensors and valves.

It is linked to the display panel and emergency stop button.

It allows to exchange data with the hand-held remote control and ensures the interface with the supervision network.

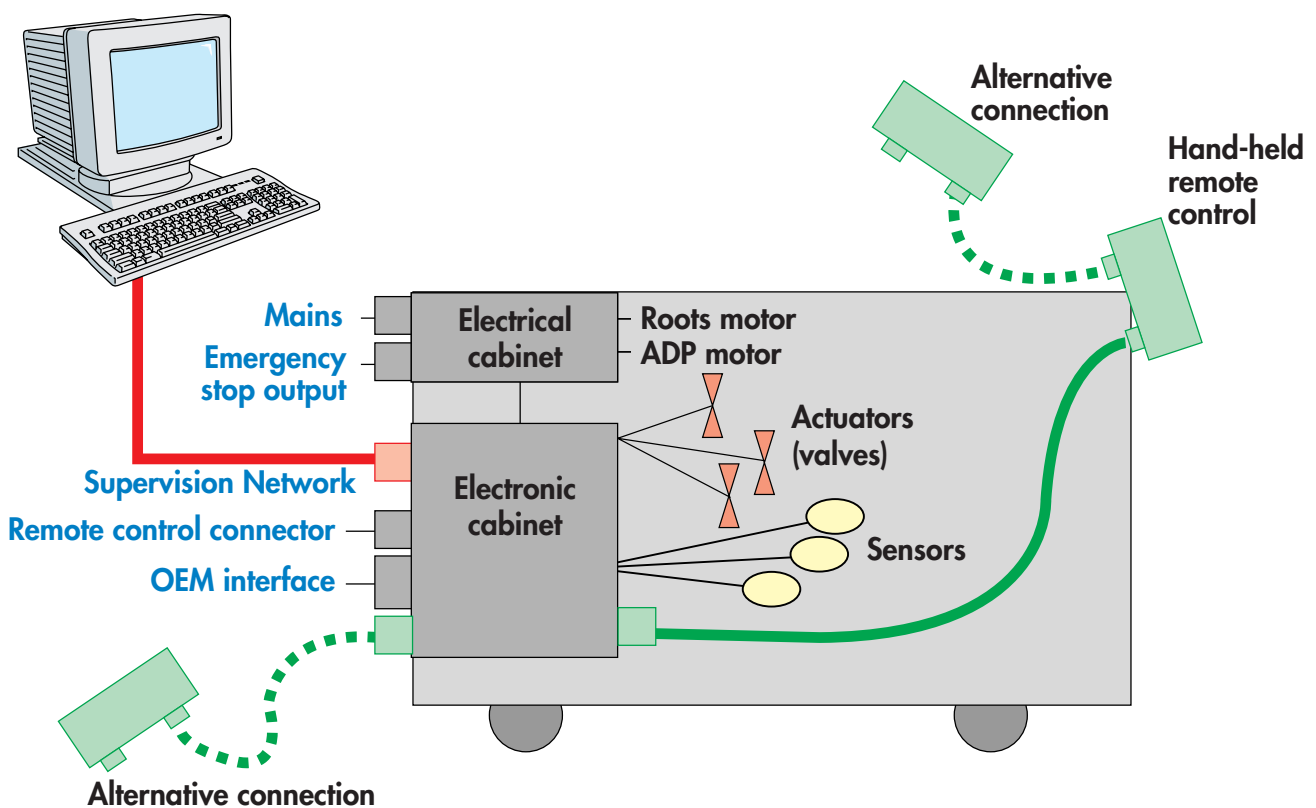
M4 monitoring can be interfaced with the main production equipment.



M4 monitoring

M4 monitoring characteristics

- Microprocessor controlled.
- Parameters and messages are displayed on the hand-held remote control.
- Memorization of the last ten warnings and hazards.
- RS 232 - RS 485 - Network links.



Main functions

- Motor protection.
- N2 purge monitoring.
- Pump(s) temperature monitoring and control.
- Thermostatic control of the pump (temperature and water flow) (P and H versions).
- Exhaust pressure monitoring.
- Maintenance time control.

Technical characteristics

Characteristics	Units	ADP 122 P ADP 122 LM	ADS 602 H ADS 602 P ADS 602 LM	ADS 1202 H ADS 1202 P	ADS 1802 H ADS 1802 P
Peak pumping speed (50/60 Hz)	m ³ /h	95/112	480/560	1050/1150	1700/1700
	cfm	55.8/65.8	282/329	617/676	1000/1000
	l/mn	1583/1867	8000/9333	17500/19167	28333
Typical Ultimate Pressure (without N ₂ purge) (50/60 Hz)	mbar	1.10 ⁻² /9.10 ⁻³	8.10 ⁻⁴ /5.10 ⁻⁴	8.10 ⁻⁴ /5.10 ⁻⁴	5.10 ⁻⁴
	mtorr	7.5 / 6.7	0.6 / 0.375	0.6 / 0.375	0.375
	Pa	1 / 0.6	0.08 / 0.05	0.08 / 0.05	0.05
Maximum Ultimate Pressure (without N ₂ purge) (50/60 Hz)	mbar	3.10 ⁻² /1.5x10 ⁻²	2.10 ⁻³ /9.10 ⁻⁴	2.10 ⁻³ /9.10 ⁻⁴	9.10 ⁻⁴
	torr	22.5 / 11.25	1.5 / 0.675	1.5 / 0.675	0.675
	Pa	3 / 1.5	0.2 / 0.09	0.2 / 0.09	0.09
Maximum pumped volume	m ³	1			
Motor rating	kW	1.5	3	5.2	7.5
Supply voltage	V	200 V / 480 V - 3 phases - 50/60 Hz ⁽¹⁾			
Power consumption at ultimate pressure (50/60 Hz)	kW	1.3 / 1.5	1.8 / 2.0	3.0 / 3.2	3.5
Maximum continuous inlet pressure	mbar	50	10	5	3
	torr	37	7.5	3.7	2.25
Maximum exhaust overpressure	mbar	1200			
	torr	900			
N ₂ flowrate range ⁽²⁾	slm	0 to 60 (P version) / 0 to 120 (H version)			20 to 70 «P» 0 to 120 «H»
Water flow	l/mn	min. 1	min. 1	min. 1.3	min. 5
Rotation speed (functionnal block)	rpm	3000 to 3600			6000
Gear boxes fluid capacity	Dry pump ⁽³⁾	0.35	0.35	0.35	0.15
	Roots	-	0.7	1.90	1.55
Inlet flange		DN 50 – ISO KF	DN 100 – ISO KF		
Exhaust flange		DN 40 – ISO KF			
Dimension (l x w x h)	mm	830 x 390 x 580	830 x 390 x 875	995 x 390 x 985	995 x 390 x 985
	inch	32.7 x 15.4 x 22.8	32.7 x 15.4 x 34.4	39.2 x 15.4 x 38.8	39.2 x 15.35 x 38.8
Weight	kg	243	378	531	498
	lbs	540	840	1170	1097
Maximum sound level ⁽⁴⁾	dB(A)	< 65	< 68	< 69	< 69

(1) According to CE regulations. ADP Series Two can withstand a supply voltage variation of $\pm 10\%$.

(2) P and H versions only.

(3) A300 oil charge is filled at factory.

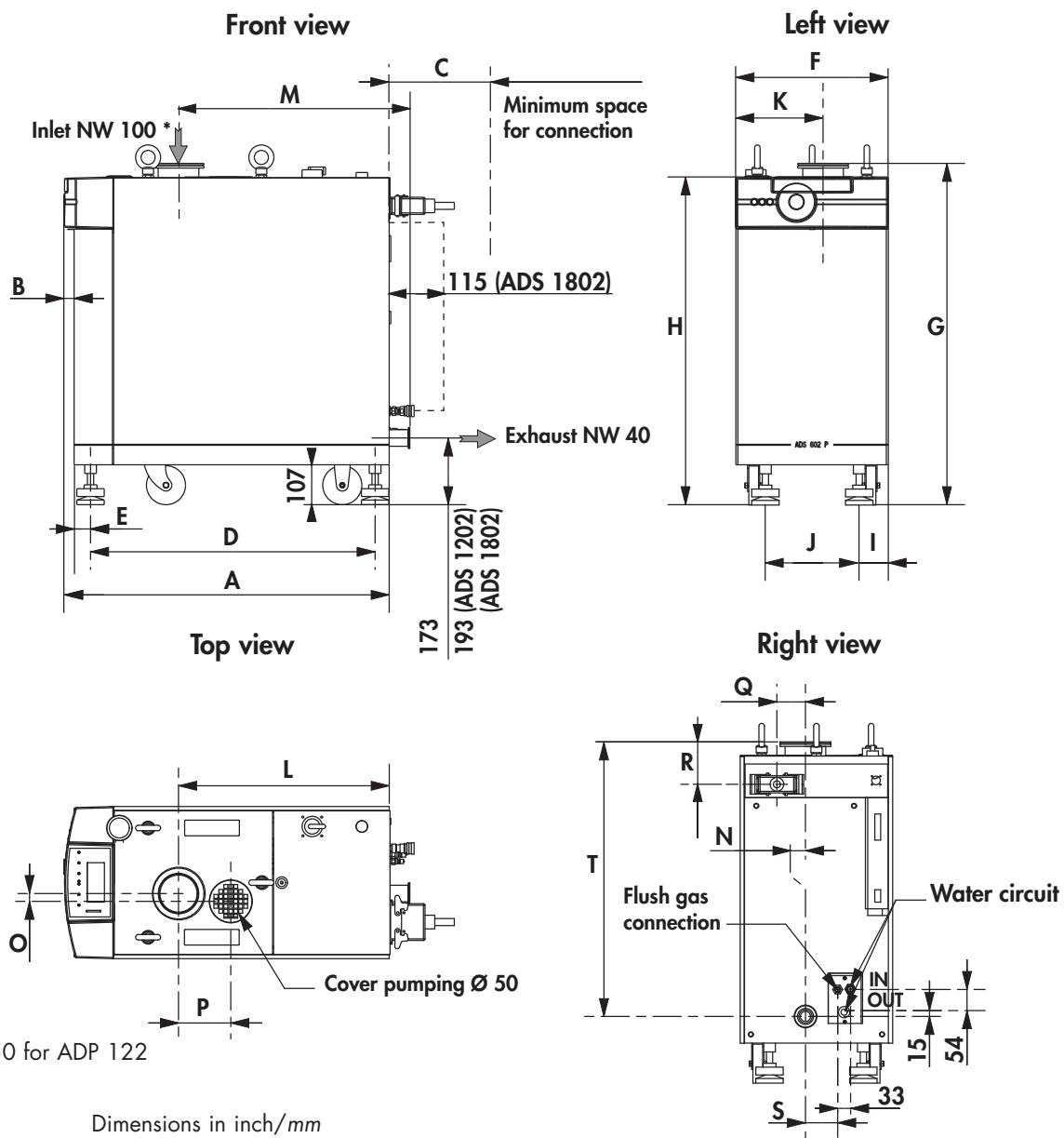
(4) Measured at 1 m length. and 1.6 m height. according to ISO 9614-2 standard.

Technical characteristics

Characteristics	Units	ADP 122 P ADP 122 LM	ADS 602 H ADS 602 P ADS 602 LM	ADS 1202 H ADS 1202 P	ADS 1802 H ADS 1802 P
<p>Environmental conditions:</p> <ul style="list-style-type: none"> • Use of the product • Altitude • Ambient operating temperature • Maximum relative humidity <ul style="list-style-type: none"> • Transient overvoltage • Pollution degree 		<p style="text-align: center;">indoor use up to 2000m 5 to 40°C (41 to 104°F) 80% for temp. up to 31°C (87°F) decreasing linearly to 50% at 40°C (104°F)</p> <p style="text-align: center;">category II rate 2</p>			

Technical characteristics

Dimensions (Facilities at rear)



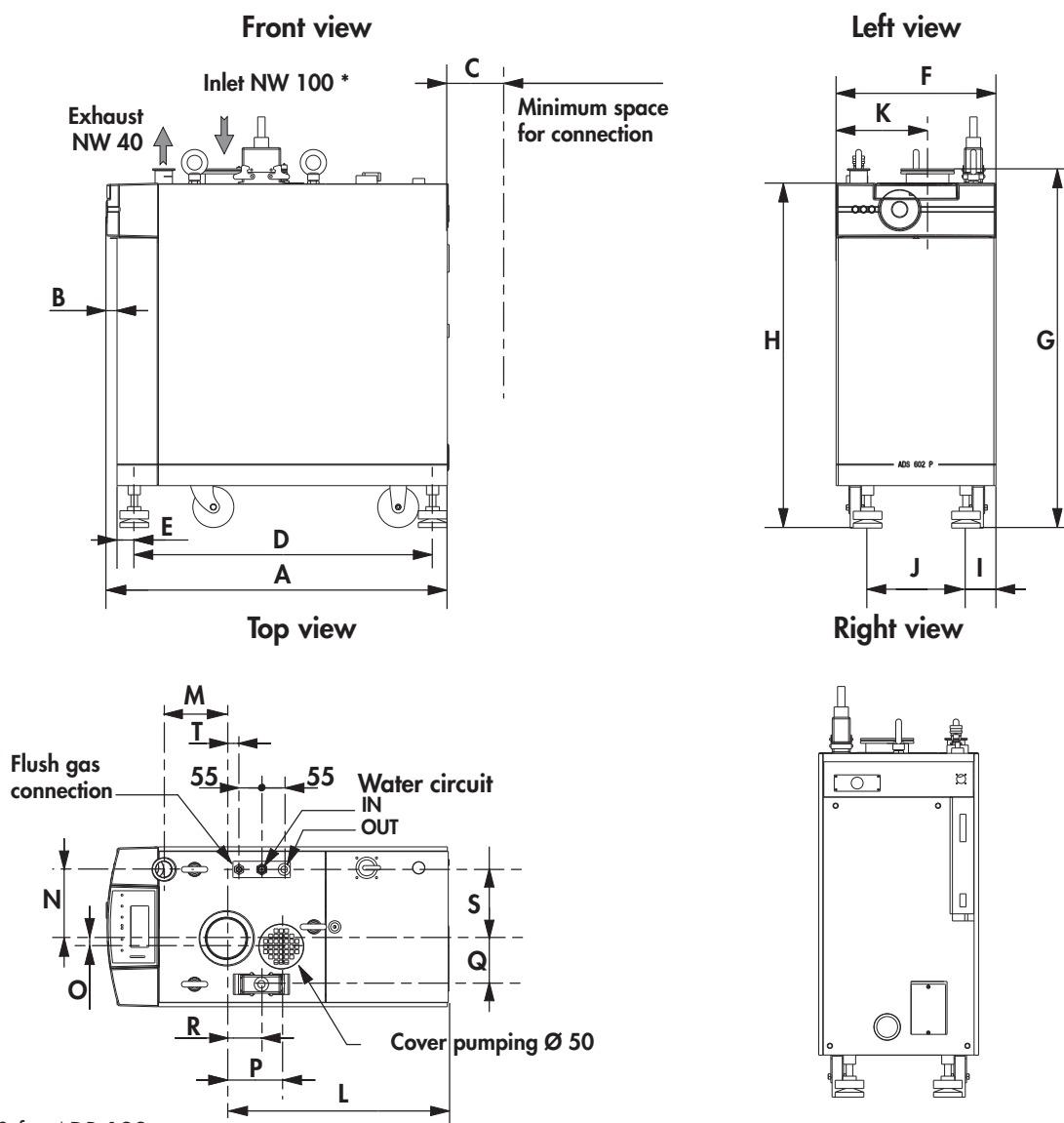
* DN50 for ADP 122

Dimensions in inch/mm

	A	B	C	D	E	F	G	H	I	J
ADP 122	32.8/832	1.03/26	10.3/260	28.7/728	1.54/39	15.4/390	22.8/580	22.0/560	3.62/92	5.83/148
ADS 602	32.8/832	1.03/26	10.3/260	28.7/728	1.54/39	15.4/390	34.4/875	33.1/840	3.62/92	5.83/148
ADS 1202	39.3/997	1.14/29	10.3/260	35.1/891	1.62/41	15.4/390	38.8/986	37.7/958	2.95/75	9.45/240
ADS 1802	39.2/995	1.06/27	10.4/263	35.1/891	1.62/41	15.4/390	38.8/986	37.8/959	2.95/75	9.45/240
	K	L	M	N	O	P	Q	R	S	T
ADP 122	8.8/223	26.5/674	28.6/727	0	1.12/28	10.6/269	2.87/73	3.70/94	3.23/82	16.5/419
ADS 602	8.8/223	21.2/539	23.3/592	0	0.79/20	5.28/134	2.87/73	4.25/108	3.23/82	27.7/704
ADS 1202	7.7/195	20.9/532	23.1/585	1.12/28	0	6.93/176	3.98/101	3.98/101	2.83/72	31.2/793
ADS 1802	7.7/195	20.9/531	23.1/585	1.12/28	0	6.93/176	3.98/101	3.98/101	2.83/72	31.2/793

Technical characteristics

Dimensions (Facilities on top)



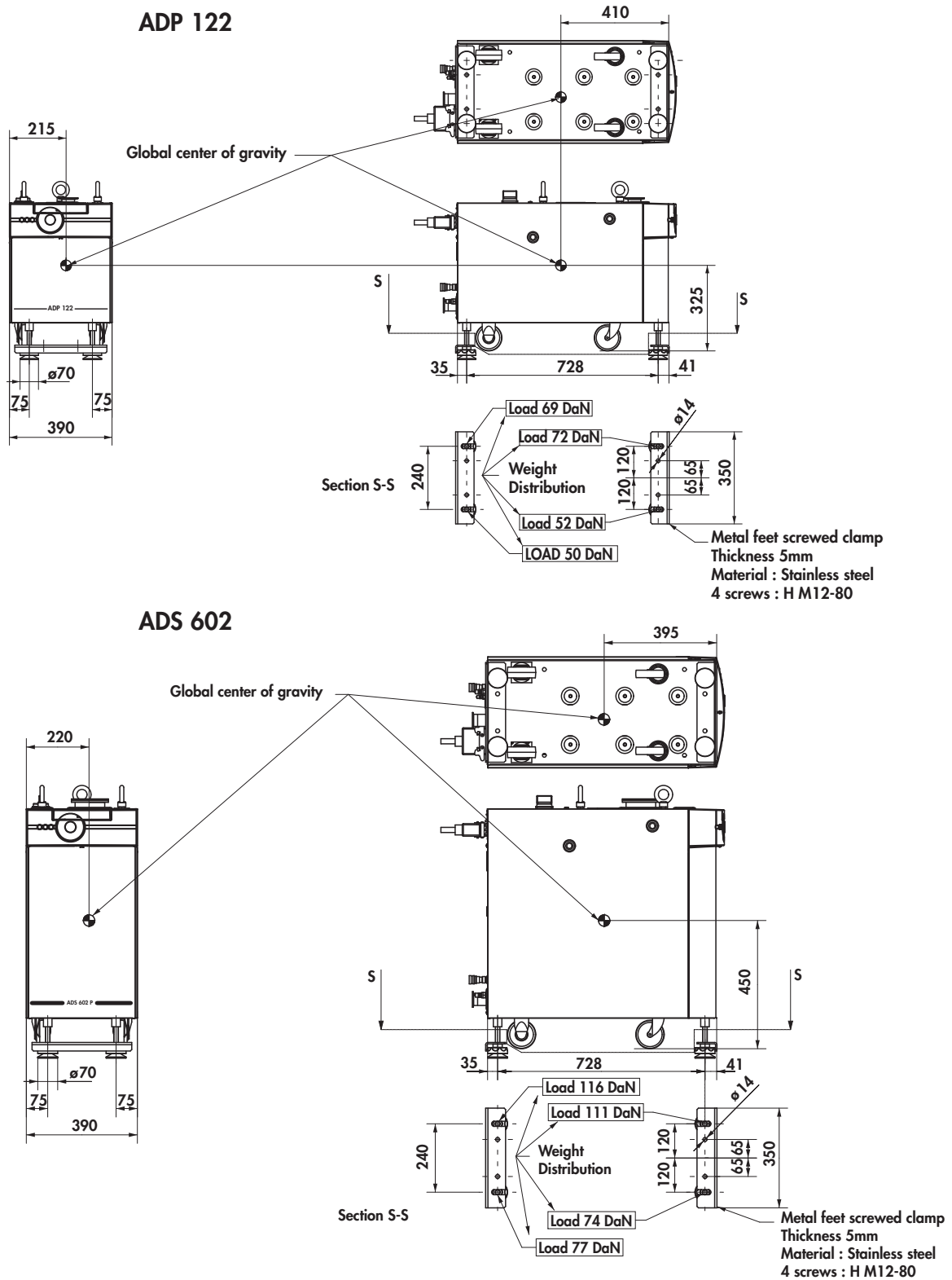
* DN50 for ADP 122

Dimensions in inch/mm

	A	B	C	D	E	F	G	H	I	J
ADP 122	32.8/832	1.03/26	3.27/83	28.7/728	1.54/39	15.4/390	22.8/580	22.0/560	3.62/92	5.83/148
ADS 602	32.8/832	1.03/26	3.27/83	28.7/728	1.54/39	15.4/390	34.4/875	33.1/840	3.62/92	5.83/148
	K	L	M	N	O	P	Q	R	S	T
ADP 122	8.8/223	26.5/674	0.71/18	6.61/168	1.12/28	10.6/269	4.41/112	8.66/220	6.61/168	6.54/166
ADS 602	8.8/223	21.2/539	6.02/153	6.61/168	1.12/28	5.28/134	4.41/112	3.45/85	6.61/168	1.22/31

Technical characteristics

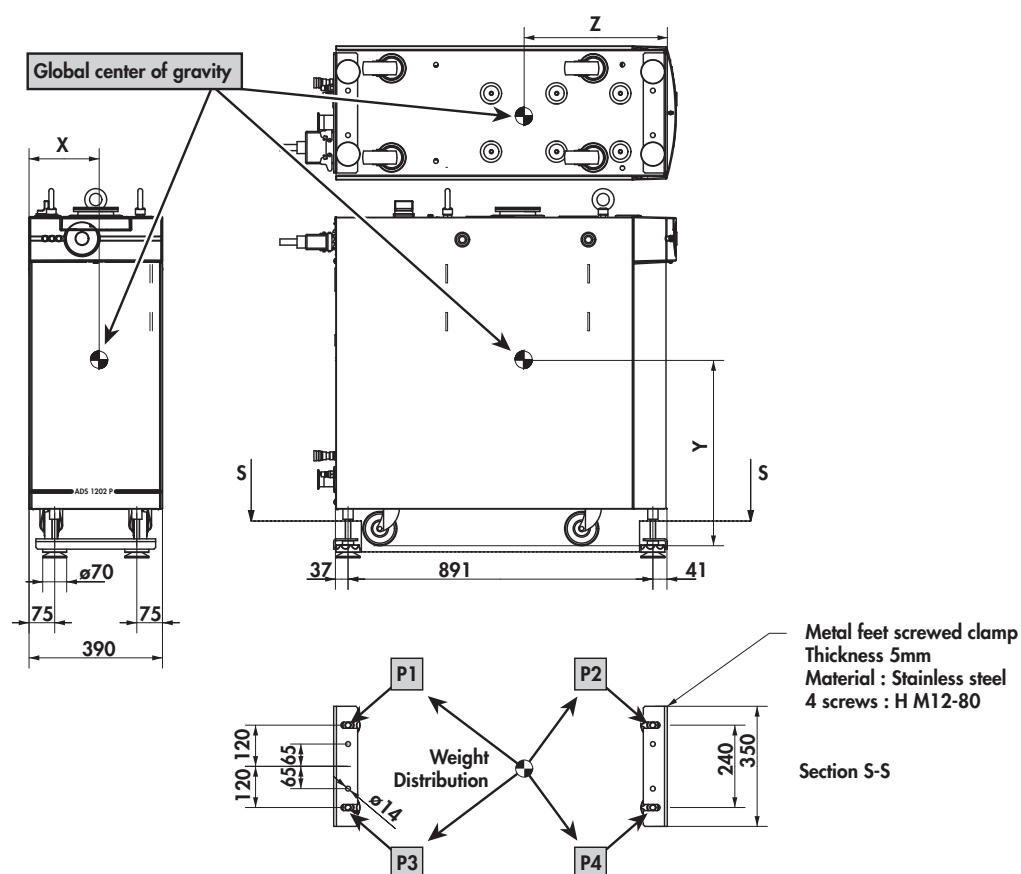
Isometric views and location of the antiseismic protection devices



Technical characteristics

Isometric views and location of the antiseismic protection devices (continued)

ADS 1202/1802



Center of gravity (inch/mm)		
	ADS 1202	ADS 1802
X	8.07 / 205	8.19 / 208
Y	21.3 / 540	21.7 / 552
Z	16.5 / 420	19.5 / 495

Load by foot (DaN)		
	ADS 1202	ADS 1802
P1	116	137
P2	157	132
P3	99	118
P4	134	113

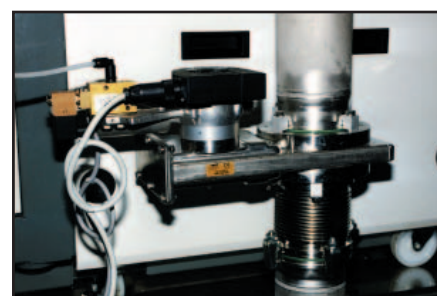
Accessories

Isolation valve at pump inlet

This valve avoids a reverse flow of gas to the chamber and increases tightness when the pump is switched off.

It also isolates the running pump from the process.

Manual valve	P/N
Aluminium:	
DN 50 ISO-KF	30384M
Stainless steel:	
DN 50 ISO-KF	30501M
DN 63 ISO-F	30502M
DN 100 ISO-F	30503M



Auto valve 24 VAC	P/N	Cable for electropneumatic valve (3.5m) P/N
Stainless steel:		
DN 50 ISO-KF	30501E	106532
DN 63 ISO-F	30502E	
DN 100 ISO-F	30503E	

Hand-held remote control

A second hand-held remote control can be connected on the pump, a longer cable can also be used.

	P/N
Control box alone	110942
Control box + cable 1.5m	111395
Cable 15m	107079



Accessories

Exhaust heater device (for P version)

The exhaust heater is installed on the exhaust pipe which reduces deposits when pumping condensable gases.

For installation of this accessory, see **B 130**.

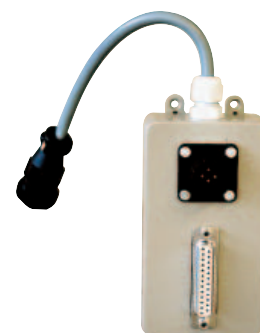


Heater on new exhaust pipe

Pump	Power supply	Facilities on top	Facilities at the rear
ADP 122	200/240 V	A459806	A459802
	380/480 V	A459807	A459803
ADS 602	200/240 V	A459808	A459802
	380/480 V	A459809	A459803
ADS 1202	200/240 V	-	A459804
	380/480 V	-	A459805
ADS 1802	200/240 V	-	110866
	380/480 V	-	110867

Interface boards OEM/Remote control

This device ensures direct interface between M4 monitoring and the main production equipment (contact the manufacturer's service center).



Fitting accessories

Several fitting accessories are available in the manufacturer's catalog (fitting rings, valves, bellows...).

Seismic bracket

This accessory allows to attach the pump specifically in earthquake area.

	P/N
Set of two seismic brackets	A328947

Accessories

DN 40 O-ring corrosion resistant (with PTFE protection)



This accessory resists against corrosive and aggressive gases (chloride and fluoride gases). A PTFE barrier and an internal centering ring protect the FPM O-ring.

	P/N
DN 40 O-ring corrosion resistant	108785

"Anti-noise" device (LM version)



This accessory reduces the vibrations transmitted to the exhaust line during cycle pumping at atmospheric pressure.

	P/N
Anti-noise device	109418

Lonworks and DeviceNet Interfaces

Series Two pumps offer a wide range of type of communication (RS 232, RS 485, Dry contacts, HHR). We increased this offer with two new types of interfaces.

The two most represented fieldbus in the Semiconductor industry are Lonworks and DeviceNet. These interfaces are available for all Series Two pumps except ADP 122 L.

Lonworks P/N 110900

Lonworks interface is used to interface the dry pump with every Lam 2300 tool. It means that this interface should be ordered for every installation on Lam 2300 tools. It completely replaces the electrical interface you were used to connect to our pumps.

DeviceNet P/N 108809

DeviceNet is used by Applied Materials or Matrix for its tools. This interface can be proposed to OEM if necessary.

RS 232 P/N 109434

RS 232 interface is used to add a RS 232 serial link and for RS232 protocol needs.

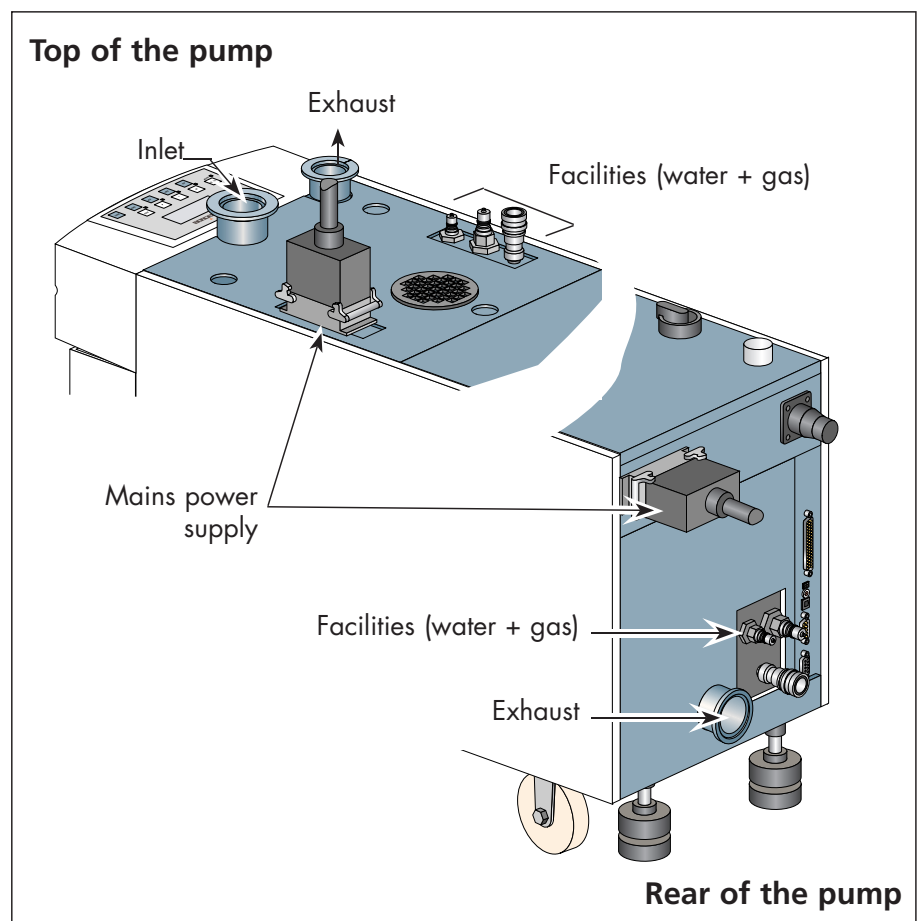
Options

In order to adapt the equipment to the specific conditions of the pumping installation, the pump manufacturer offers a choice of options, factory configured when the pump is ordered.

Depending on the country, some options are integrated as standard. Please consult with your local representative.

Facilities
(P and LM versions,
without ADS 1202
and ADS 1802)

The different facilities connections (water, N2, power supply) and the exhaust can be fitted on the top or at the rear of the pump. For H version, ADS 1202 and ADS 1802, facilities are always at the rear of the pump.



The main cable can be connected:

- directly on the terminal of electrotechnic cabinet (SEMI S2 93 compatibility),
- using a plug.

The exhaust can be fitted with the accessory of heating (see **A 50**).

Options

Power failure protection

This option protects the M4 monitoring system against power failures for a delay less or equal to 1 second (in accordance with SEMI F47 93 Standard).

Exhaustable enclosure

(Required for SEMI compatibility)

(P and H versions)

Compatible with SEMI F15 93 standard.

Exhaustable connection of 50 mm diameter (length 28 mm) optionally available.

Minimum volumetric flowrate of the equipment:

- ADP 122 : 36 m³/h (21 cfm).
- ADS 602 /1202/1802 : 82 m³/h (43 cfm).

SEMI S2 93 compatibility

ADP/ADS Series Two are in compliance with SEMI S2 93, only if options:

- main cable connected directly on the electrotechnic terminal (hard wire connection, see **B 50**),
- exhaustable enclosure,

are choosed in the ordering guide (certificate of compliance on pages 3 and 4).



Start-up

User's Manual ADP/ADS Series Two Detailed contents

B 000	<i>Safety instructions</i>
B 010	<i>Unpacking / Storage</i>
B 020	<i>Positioning the pump in the pumping installation</i>
B 025	<i>Filling the machine oil housings</i>
B 030	<i>Connection to the cooling circuit</i>
B 040	<i>Inert gas purge connection (N2 plug)</i>
B 050	<i>Electrical connection</i>
B 051	<i>Checking the direction of rotation at initial pump start-up</i>
B 060	<i>Connection to the pumping circuit</i>
B 070	<i>J14 Remote control plug connection</i>
B 100	<i>Emergency stop plug connection</i>
B 110	<i>RS 232 or RS 485 link wiring</i>
B 130	<i>Installation of exhaust heater accessory</i>

Safety instructions

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in property damage.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be used to alert against unsafe practices.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or severe injury.

DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or severe injury (extreme situations).



CAUTION

Our products are designed to comply with current EEC regulations. Any modification of the product made by the user is liable to lead non-compliance with the regulations, or even to put into doubt the EMC (ElectroMagnetic Compatibility) performance and the safety of the product. The manufacturer declines any responsibility for such operations.

CAUTION

The EMC performance of the product is obtained on the condition that the installation complies with the EMC rules.

In particular, in disturbed environments, it is essential to:

-  use shielded cables and connections for interfaces,
-  stabilize the power supply line with meshing from the power supply source to a distance of 3m from the product inlet.

Safety instructions

⚠ WARNING

When the main switch is set to "0", the part supply between the power plug and the main switch remains energized.
Risk of electrical shock in case of contact.
Disconnect the main electrical cable before servicing.

⚠ WARNING

Hazardous voltage enclosed.
Voltage or current hazard sufficient to cause shock.
Disconnect and lockout power before servicing.
Any intervention must be done by trained personnel only.

⚠ CAUTION

Lock out/tag out (LO/TO) device.
In order to properly secure the pump for installation and/or maintenance, it is required to lock out/tag out the pump properly in accordance with OSHA requirement 29 CFR.1910.147.

⚠ DANGER

For P and H pumps only.
If loss of purge flow creates a significant risk, then the purge flow must be monitored externally and a response to loss of purge flow must be provided by the process equipment and interlocked if necessary.
If pyrophoric materials above the LEL are sent to the pump then nitrogen should be supplied at a rate to ensure that concentration is diluted to be below the LEL, in addition an interlock should be provided to ensure that gas flow to the pump is stopped when nitrogen is lost.

⚠ WARNING

If loss of cooling water creates a significant risk, then the water flow must be monitored externally by the process equipment.

⚠ DANGER

If any corrosive, reactive, flammable, pyrophoric, oxidizing processes can be sent to the pump, then an exhaust monitor should be used in the secondary exhaust to ensure that gas flow to the pump is stopped when secondary exhaust is lost.
In addition an interlock should be provided to ensure that gas flow to the pump is stopped when nitrogen is lost.
If flammable materials are sent to the pump, the customer will need to provide a hardware based LEL detection in the secondary exhaust (capable of detecting at 25% of the LEL) that will stop chemical supply to the pump when gas is detected at 25% of LEL for that flammable material.

Safety instructions

⚠ WARNING

When the pump is switched off, internal parts (monitoring, frequency converter) contain capacitors charged with over 60 VDC and remain energized.

Electrical shock may result in severe injury.

Wait 1 minute after switching off before opening the pump.

⚠ WARNING

Other located hazardous energies

Water cooling circuit and nitrogen purge are pressurized hazardous energies. Release pressure before servicing:

- for the N₂ purge, disconnect the gas line quick connector and turn off the pressure regulator by turning the knob counter-clockwise;
- for the water cooling circuit, disconnect the input connector and leave the output connected. Wait 1 minute before disconnecting the output.

⚠ WARNING

Lock out/tag out (LO/TO) water and N₂ supplies.

The end user needs to provide a dedicated source of water and Nitrogen equipped with a manual valves that can be locked out within 10 feet of the tool.



Operating conditions may generate temperatures justifying particular attention on the part of the user (external surfaces > 70°C on exhaust connections).

Contact may cause burns.

Always use protective gloves and wait 30 mn before servicing.

⚠ WARNING

The user and /or OEM are ultimately responsible for operating the equipment in a safe manner. The manufacturer has no control over the types of gases exposed to this pump. This is the user and/or the OEM's responsibility to follow the necessary safety requirements.

Frequently process gases are toxic, flammable, corrosive, explosive and/or otherwise reactive.

Toxic gases can cause serious injury or death. Operators and users must take the appropriate safety recommendations to prevent injury. Consult the responsible department for instructions and safety information.

⚠ WARNING

Hazard gases through the pump can cause serious injury or death. It's mandatory by regulations to connect the pump's exhaust to a facility hazardous gas exhaust system which incorporates appropriate filters, scrubbers, etc. This system must meet all air and water regulations. Check that pump is correctly connected to the equipment (B 60).

Safety instructions

WARNING

Safety interlock

The pump motors are protected against overload through the RT1 circuit breaker (for the ADP pump) and RT2, RT3 circuit breaker (for the Roots pump), which include solid state components, refer to page *G 110* for electrical schematic.

These interlocks must never be overridden during installation, use or maintenance.

Once activated, power will be switched off and the pump will be put in a safe condition. When a fault occurs, the cause must be corrected before the fault can be cleared. To clear the fault, it is required to switch power off, main switch to "0" position, before opening the electrical box and unlock the circuit breakers.

CAUTION

Emergency button

The pump is equipped with an emergency stop (EMO) circuit. When activated, it places the equipment into a safe shutdown condition. For external use, two EMO dry contacts are provided on connector J1 pins 1 and 4 (refer to page *B 100 2/2*).

The pump EMO can also be externally monitored through connector J1 pins 2 and 3 (refer to page *B 100 2/2*).

The EMO circuit consists of electromechanical components, and resetting it will not re-energize the pump.

Decontamination – product dismantling

According to the regulations 2002/96/CE about Waste of electrical and electronical equipments, and 2002/95/CE about Restriction of Hazardous substances, the manufacturer provides a recycling paid service for the end-of-life of waste electrical and electronic equipment.


Any obligation of the manufacturer to take back such equipment shall apply only to complete not amended or modified equipment, using adixen Vacuum Products original spare parts, delivered by adixen Vacuum Products, containing i.e. all its components and sub-assemblies.


This obligation will not cover the shipping cost to an adixen take back facility.


Before returning the product, fill in the safety form, attach it to the product before shipping to the service-repair office closest to you.


Safety instructions

Pump labels

	<p>WARNING HOT SURFACE Contact may cause burn. Do not touch or wear protective gear before servicing.</p>	<p>Located on the covers of the pump, this label warns the user against possible risk of injury due to any hand contact with hot surfaces. It states that protective gloves should be used before performing any intervention.</p>
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	<p>WARNING HEAVY OBJET Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when removing or replacing.</p>	<p>Located on the upper cover, this label indicates that due to its heavy weight, the product should not be handled manually, but always through appropriate handling devices.</p>
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	<p>WARNING HAZARDOUS VOLTAGE ENCLOSED Voltage or current hazard sufficient to cause shock. Disconnect and lockout power before servicing.</p>	<p>Located on the upper covers, this label indicates that some of the internal parts are energized and could cause electrical shocks in case of contact. It advizes to disconnect the pump before any intervention or to properly lock-out and tag-out the equipment breaker before any intervention on the pump.</p>
--	---	---

	<p>WARNING FLAMMABLE, CORROSIVE AND TOXIC CHEMICALS LOCATED WITHIN THE ENCLOSURE Exposure may result in severe injury or death. Preventive maintenance must be done by trained personnel only.</p>	<p>Located on the upper cover, this label warns the user against pumped process gas that could be dangerous and toxic and could cause severe injuries or death. It specifies that any preventive maintenance operation can only be performed by trained personnel.</p>
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Contact in case of emergency

In case of emergency or equipment failure, please contact your service manager of your local service center (see addresses at the back of the manual).

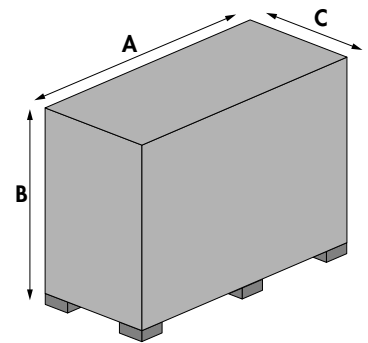
Unpacking / Storage

If the equipment has been damaged, take necessary steps with the carrier and inform the manufacturer, if necessary. In all cases, we recommend that the packaging be saved, in the event that the equipment must be transported or put into prolonged storage.

⚠ WARNING

Risk of tilting: Even when compliance with EEC safety rules is guaranteed (normal range $\pm 10^\circ$), it is recommended to take precautions as regards the risk of tilting during product handling, installation and operation. Refer to A 40 for location of the center of gravity.

Packaging dimensions and weight



Tolerance: ± 20 mm.

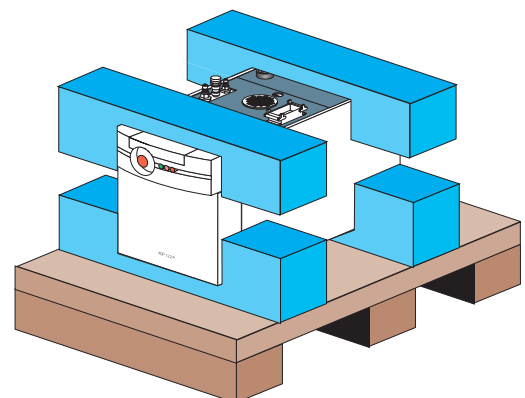
Pump	Dim. (inch/mm)			Weight (lbs/kg)
	A	B	C	
ADP 122	45.3/1150	31.1/790	24.8/630	606/275
ADS 602	61.0/1550	42.1/1070	24.8/630	903/410
ADS 1202	61.0/1550	46.9/1190	24.8/630	1244/565
ADS 1802	61.0/1550	46.9/1190	24.8/630	1267/530

Unpacking

Remove the top of the outer crate.

Remove the fixing screws of the side panels, and remove the crate.

Open the crate. Remove additional packages from the crate and set aside.



Unpacking / Storage

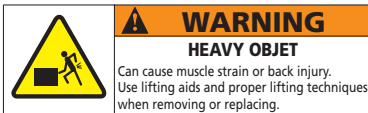
Unpacking (continued)

These packages contain:

Pump	Equipment
ADP 122	<ul style="list-style-type: none"> ■ 1 instruction manual ■ 1 x 0.4 liter oil filling ■ 3 hoisting rings ■ 2 water quick-connectors (1/4 NPT) ■ 1 N₂ quick connector (1/8 NPT) ■ 1 funnel ■ 1 EMO connecting plug (P/N 106587) ■ 1 remote control connecting plug (P/N 107222) ■ 1 electrical connector
ADS 602	<ul style="list-style-type: none"> ■ 1 instruction manual ■ 3 x 0.4 liter oil filling ■ 3 hoisting rings ■ 2 water quick-connectors (1/4 NPT) ■ 1 N₂ quick connector (1/8 NPT) ■ 1 funnel ■ 1 EMO connecting plug (P/N 106587) ■ 1 remote control connecting plug (P/N 107222) ■ 1 electrical connector
ADS 1202	<ul style="list-style-type: none"> ■ 1 instruction manual ■ 5 x 0.4 liter oil filling ■ 3 hoisting rings ■ 2 water quick-connectors (1/4 NPT) ■ 1 N₂ quick connector (1/8 NPT) ■ 1 funnel ■ 1 EMO connecting plug (P/N 106587) ■ 1 remote control connecting plug (P/N 107222) ■ 1 electrical connector
ADS 1802	<ul style="list-style-type: none"> ■ 1 instruction manual ■ 4 x 0.4 liter oil filling ■ 3 hoisting rings ■ 2 water quick-connectors (1/4 NPT) ■ 1 N₂ quick connector (1/8 NPT) ■ 1 funnel ■ 1 EMO connecting plug (P/N 106587) ■ 1 remote control connecting plug (P/N 107222) ■ 1 electrical connector

Unpacking / Storage

Handling

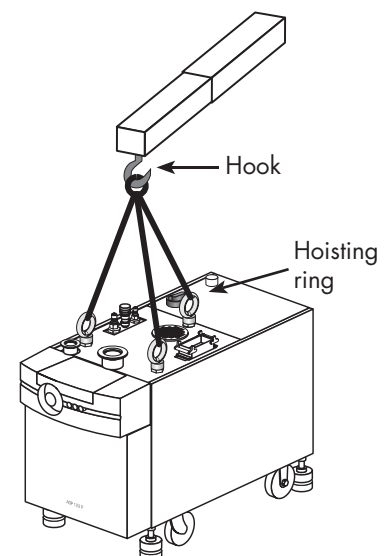


Regarding its weight, handling the pump can cause muscle strain or back injury.
For all equipment handling, use the appropriate handling devices.

Handling the pump to remove it from the crate

It is highly recommended that a hoist is used for lifting.

- Fit the hoisting rings (delivered in the crate in separate packaging) in the appropriate holes.
- With a hoist and a sling with three arms, lift the pump using hoisting rings.



Pump	Weight (lbs/kg)
ADP 122	535 / 243
ADS 602	833 / 378
ADS 1202	1170 / 531
ADS 1802	1097 / 498

CAUTION

The hoisting rings are delivered with the pump, screw them in the appropriate holes on the top of the pump. They only must be use to handle the pump.

Prepare the pump

Screw in the leveling pads of the frame and lower the pump on the wheels.

Remove any additional packages from the crate and set aside.

These packages will contain cables, accessories, and so forth.

To prevent humidity from entering the pump during transport, the unit has been pressurized with dry nitrogen before shipment. The inlet and exhaust are sealed with blank-off flanges which should not be removed until the pump is ready to be used.

Equipment storage

CAUTION

When the pump is new, if it is going to be put into storage, the inlet and exhaust seals should be left in place because the pump has been pressurized with dry nitrogen to prevent humidity from entering. Our equipment can be stored without particular storage precautions (pump pressurized in nitrogen and sealed) only at an ambient temperature between - 25°C and + 55°C.

Positioning the pump in the pumping installation

⚠ CAUTION

Pump performance will depend on the kind of accessories used and the quality of the mechanical connections such as the pump fittings.
As these pumps are typically used in a corrosive atmosphere, their reliability will depend on proper installation and maintenance. When assembling the vacuum circuit, we recommend the installation of maintenance accessories such as shut-off valves on the inlet and purge lines.
For safety reasons, use accessories on the inlet and exhaust lines whose materials and sealing properties are compatible with the gases being used.

Positioning the pump

Determine where the pump will be placed.

Refer to the technical specification section for dimensions, if needed (see **A 40**).

Use the handling devices to position the pump in the desired location (see **B 10**).

CAUTION

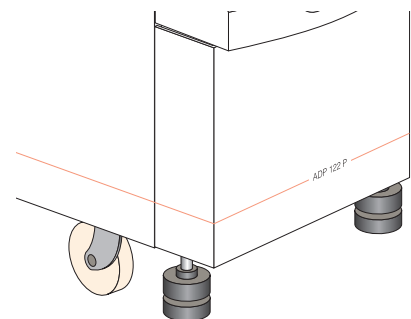
The pump must be operated in the horizontal position, with the pumping axis vertical and the inlet opening upwards.

⚠ WARNING

Risk of tilting: Even when compliance with EEC safety rules is guaranteed (normal range $\pm 10^\circ$), it is recommended to take precautions to reduce the risk of tilting during product handling, installation and operation. Refer to **A 40** for location of the center of gravity.

Each pump is equipped with four locking screw jacks.

Lock the pump by adjusting these jacks so that all four feet are resting solidly on the floor.



Positioning the pump in the pumping installation

Remove the flanging components (ADS 602 version)

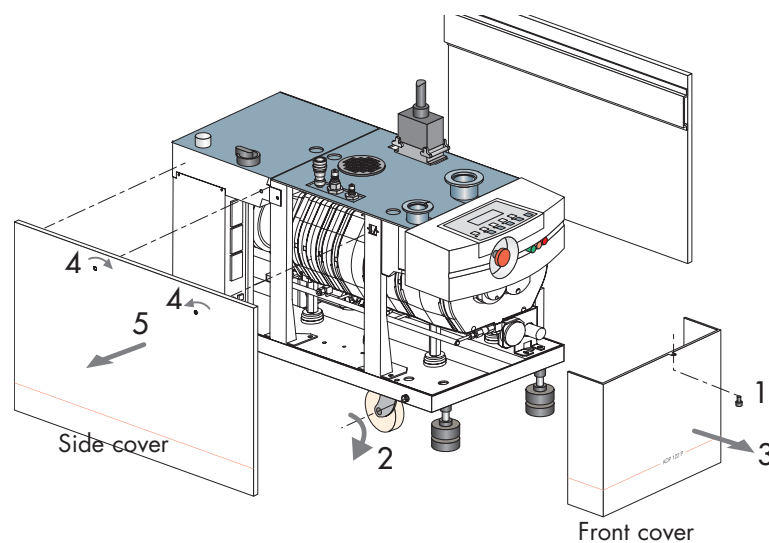


Remove the two assembling screws from the flanging plate, and the claw clamps (using a 17 mm flat wrench). Unscrew the screws maintaining the plate on the clamping bar. Remove the hoisting rings and disassemble the clamping bar. Re-install the hoisting rings to lift the pump.



Note: Keep the flanging components in order to dispatch the pump, if required.

Remove pump covers



Unscrew without removing it the front cover fixing screw (1) and rotate the cover around its axes (2). Remove the front cover by pulling it outwards (3).

CAUTION

Make sure the circuit is electrically isolated

Turn the quarter turn latches (4) using a screwdriver and pull the lateral cover.

Pull (5) top part of the cover to remove the side cover out; then lift. Repeat the operation for the other side cover.

Filling the machine oil housings

CAUTION

The pumps are delivered without an oil charge: the oil is delivered in separate containers. In the same way, it is recommended to drain the pump before returning the equipment.

CAUTION

For machines which use lubricants, it is recommended to request for the safety data sheets from the manufacturer.

The pump is tested using synthetic fluid A113.
We recommend the exclusive use of this fluid.

CAUTION

Mineral and synthetic oils cannot be used together. Contact the manufacturer or your service agent before making any changes.

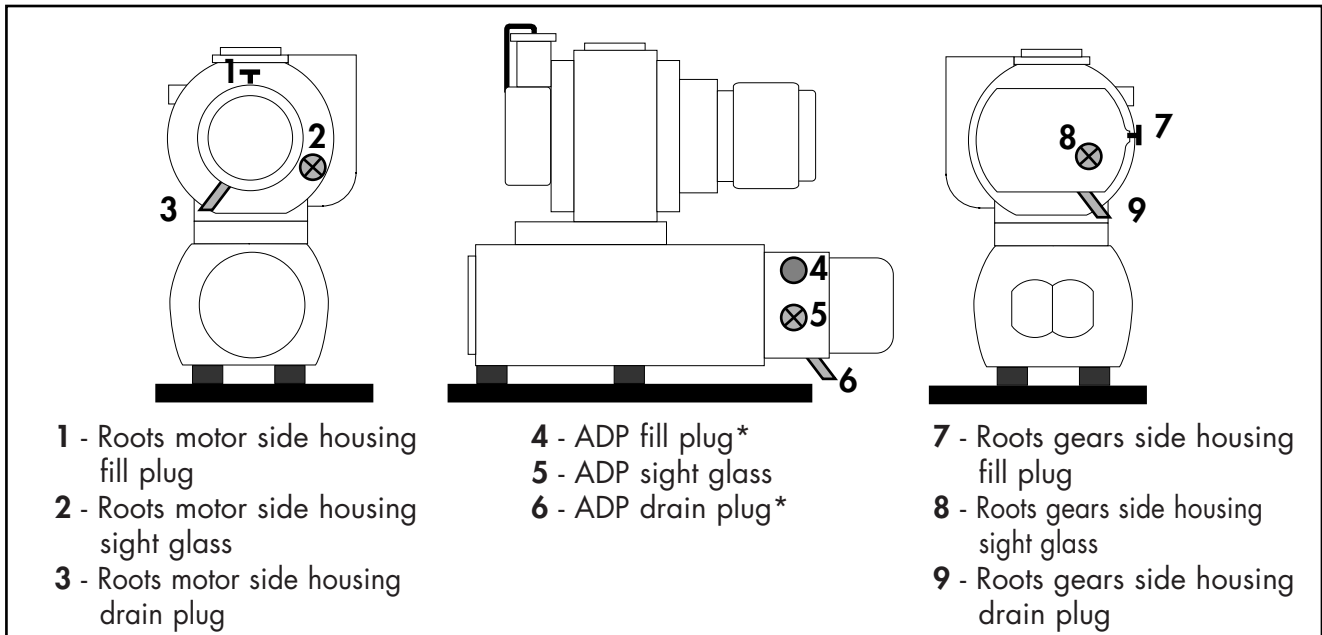
A113 medical safety data sheet is available upon request.

Oil quantities

Oil filling:					
Housing :	Dry pump	Roots housing gears side	Roots housing motor side	Oil capacity	Nber of can 0.4 l
ADP 122	0.35 L			0.35 L	x 1
ADS 602	0.35 L	0.45 L	0.25 L	1.05 L	x 3
ADS 1202	0.35 L	1.00 L	0.55 L	1.90 L	x 5
ADS 1802*	0.15 L	1.00 L	0.55 L	1.65 L	x 4

* A300 dry pump of ADS 1802 pump is delivered filling with oil.

Filling the machine oil housings



Filling procedure

Make sure the pump is off (main switch to "0" position), positioned horizontally and then remove the pump covers.

Use the funnel equipped with a flexible tube delivered with the pump.

Filling of the Roots motor side housing

Remove the grid located on the top cover to access to the fill plug easier. Remove the fill plug (1).

Position the funnel in the oil fill neck. Fill the pump with oil according to the recommended quantities.

Do not exceed the indicated quantities.

The oil level should be in the middle of the sight glass (2).

For this to be accurate, wait a few minutes for the oil to settle over all internal surfaces.

Replace the fill plug securely.

Filling of the Roots gears side housing

Remove the fill plug (7).

Position the funnel equipped with flexible tube in the oil filler neck.

Fill the pump with oil according to the recommended quantities.

Do not exceed the indicated quantities.

The oil level should be in the middle of the sight glass (8).

For this to be accurate, wait a few minutes for the oil to settle over all the internal surfaces.

Replace the fill plug securely.

Filling the machine oil housings

Filling of ADP

Remove the fill plug (4).

Position the flexible tube in the oil fill neck.

Fill the pump with oil according to the recommended quantities.

The oil level should be in the middle of the sight glass (5).

Do not exceed the indicated quantities.

Replace the fill plug securely.

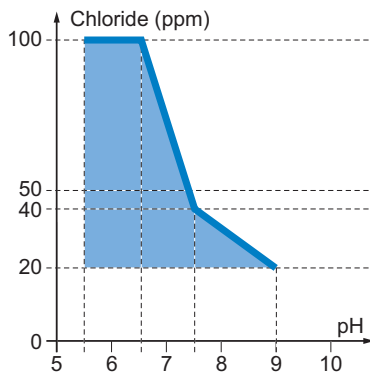
CAUTION

* On ADS 1802, the A300 dry pump is delivered with filled oil charge. Do not modify the oil level. This is done during pump overhaul by the manufacturer's trained personnel.

Connection to the cooling circuit

Water characteristics

In order to limit corrosion and motor cooling circuit clogging, it is recommended to use cooling water with the following characteristics:



- pH: 5.5 to 9
- Chlorine⁽¹⁾: 100 to 20 ppm depending on the pH
- Hardness: < 10 °fH (french degree)
< 2 milli-equivalent/L
< 100 mg/L of CaCO₃ (Calcium carbonate)
- Total dissolved solids: < 300 mg/L
- LSI: < 0 to +20°C
- Resistivity: 2000 Ω.cm < R < 1000000 Ω.cm
- Particles size: < 0.2 mm
- Input temperature⁽²⁾: +10°C to +35°C
- Relative input pressure: 2 · 10³ hPa to 6 · 10³ hPa
3 · 10³ hPa to 6 · 10³ hPa (ADS 1802)
- Differential pressure (inlet/outlet) : > 2 · 10³ hPa
3 · 10³ hPa (ADS 1802)
- Water flow: see **A 40**

⁽¹⁾ The oxidising action of the chlorine depends on the pH (aggressiveness of the water). The chlorine content must be within the coloured area on the graph opposite.

⁽²⁾ Subject to pump temperature setting.

CAUTION

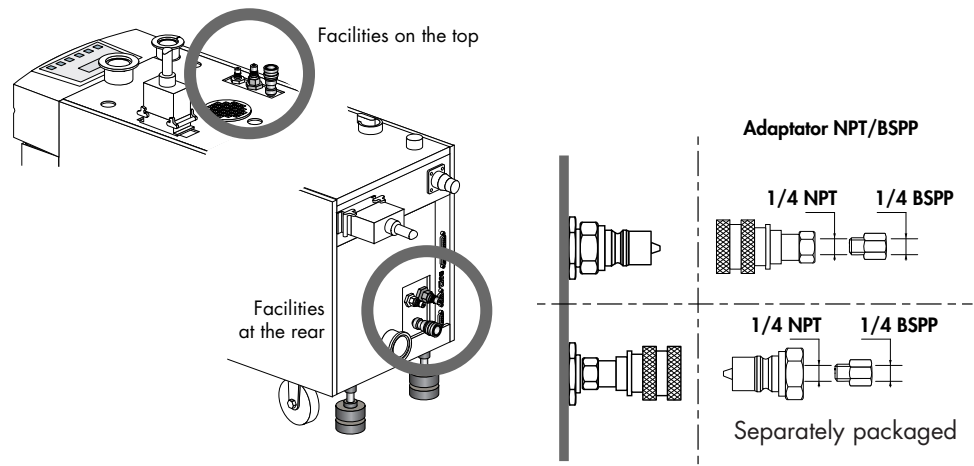
The use of uncontrolled city water can lead to water circuit clogging due to limestone deposition, which may necessitate in the worst case a complete cleaning and overhaul of the cooling circuit.

CAUTION

The presence of micro-organisms like aquatic weed and micro-biological substances like bacteria can lead to cooling problem in the pump. Appropriate water treatment system need to be use to prevent such growth of micro-organisms.

Connection to the cooling circuit

Water cooling quick connection

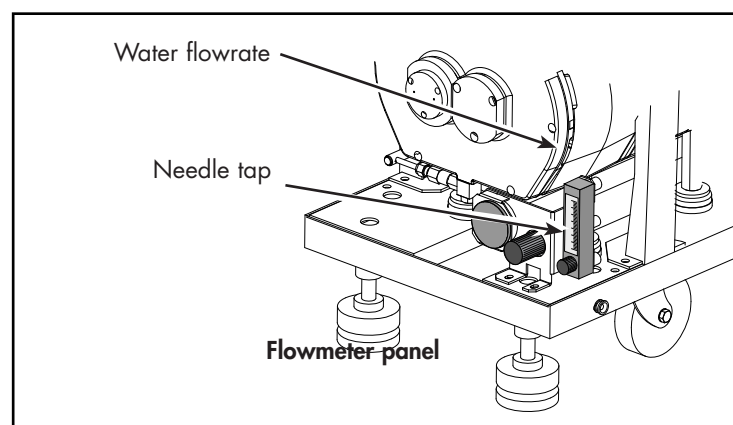


Install the two quick-connect connectors, packaged separately, on the self-sealing quick-connect connectors.

Connect the water pipes to the quick-connect connectors.

- Water inlet marked "IN" (1/4 inch NPT quick female connector)
- Water outlet marked "OUT" (1/4 inch NPT quick male connector)

Water flowrate adjustment



Remove the front cover.

The water flow will be adjusted according to the pump model (see **A40**) with the needle tap located on the flowmeter panel.

Inert gas purge connection (N2 connection)

Nitrogen characteristics

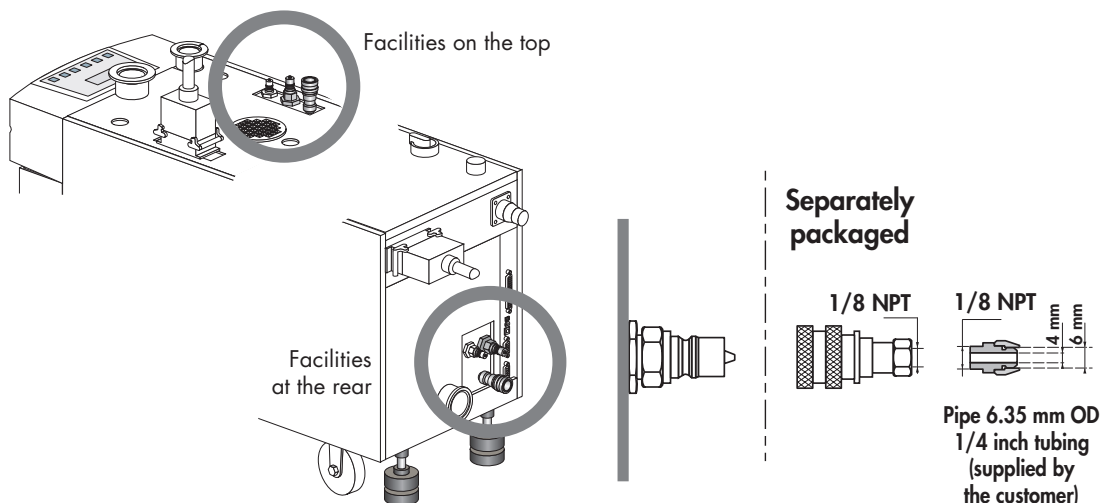
For maximum performances, a **filtered dry nitrogen supply** with the following characteristics is required:

- Condensation point < 22°C
- Dust < 1µ.m
- Oil < 0.1 ppm
- H₂O concentration < 10 ppb
- O₂ concentration < 5 ppb
- Pressure between 3 and 7 absolute bar (43 /100 psi)
- Flowrate per pump (see **A 40**)

CAUTION

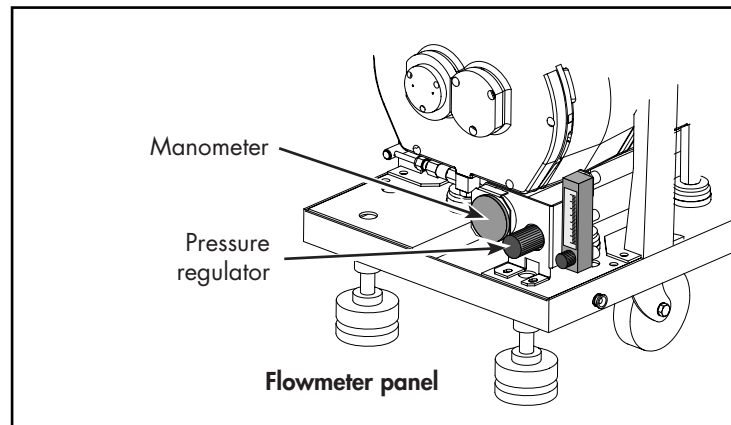
A sudden inrush of N2 into the pressurization circuit may result in damage to internal parts. Close the pressure regulator by turning the knob counter-clockwise before pressurizing the circuit.

Connection



Inert gas purge connection (N2 connection)

N2 flowrate adjustment



The N2 flowrate can be adjusted with the pressure regulator according to the process (see **A40**).

A mass flowmeter, located behind the front panel, allows flow reading on the hand-held remote module.

Electrical connection

**Make sure that main switch is off during electrical connection.
Study the preliminary precautions (see B 00).**

All the internal electrical connections required for use the pump are made prior to shipment.

However, the electrical connection of the main power supply is provided by the user.

Series Two pumps do not include any operator replaceable fuses.

Customer electrical installation protection

WARNING

The pump is equipped with a 10 000 AIC main breaker.
Electrical shock may result in severe injury.
Always disconnect main power before servicing the pump.

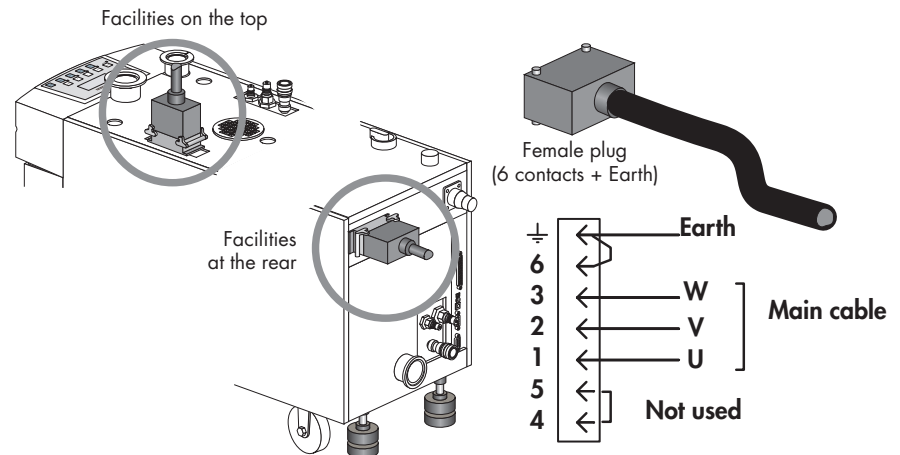
Main circuit breaker rating (recommended values):

Consumption / Breaker rating	200-230V – 50/60 Hz		380-480V – 50/60 Hz	
	Full-power consumption	Circuit breaker rating	Full-power consumption	Circuit breaker rating
ADP 122	9 A	15 A	5 A	10 A
ADS 602	19 A	25 A	11 A	15 A
ADS 1202	25 A	35 A	17 A	25 A
ADS 1802	32 A	40 A	17 A	25 A

For any change of power supply voltage in relation to the initial configuration, contact the manufacturer's Support Service.

Electrical connection

Electrical connection using a plug



The pump is supplied with a female plug separately packaged.

Connect the green lead to the ground on the connector.

Connect the mains cable to the power supply connector using wires with the following specifications:

- AWG-12 (or 2.5 mm²) for ADP 122
- AWG-10 (or 4 mm²) for ADS 602/ADS 1202/ADS 1802.

CAUTION

Check that the cable is correctly protected against ground defects and that earth wire is longer than the three conducting wires.

Then, connect the connector on the pump frame and **lock it**.

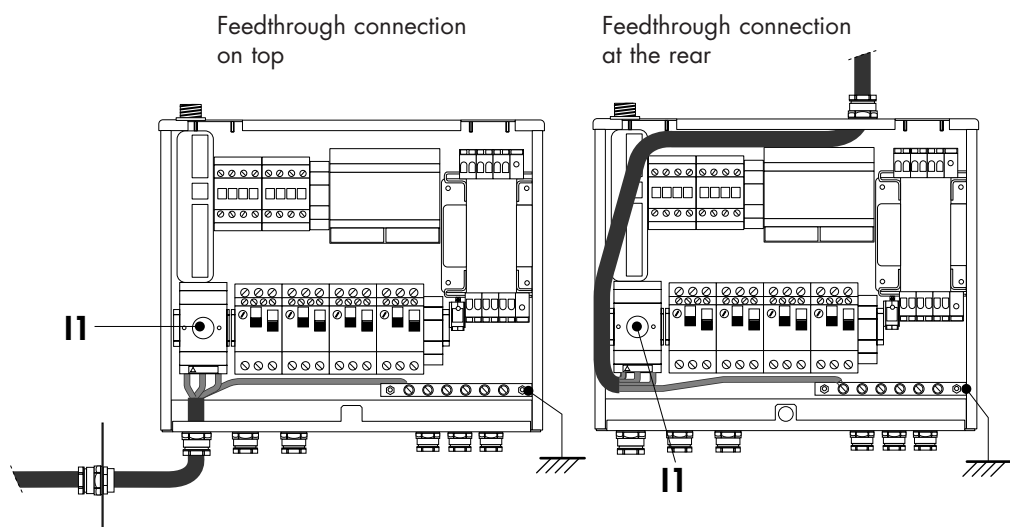
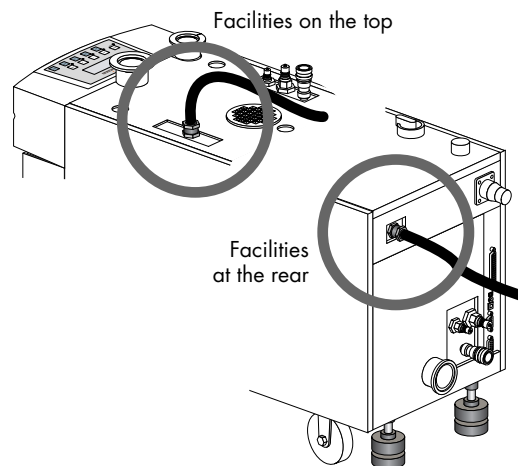
CAUTION

Motor rotation is defined by main power connection.
 Uncorrect wiring may cause backwards pump rotating.
 Check rotation sense at first start up (see B 51).

Electrical connection

Electrical hard wired connection

Open the electrical cabinet. Pass the cable through one of the feedthrough provided for this purpose.



CAUTION



An IEC 417#5017 symbol is located inside electrical cabinet near the ground wire connection terminal.

Electrical connection

Electrical hard wired connection (continued)

Connect the mains cable to the **I1** main disconnect switch using a cable with following specifications:

- AWG-12 (2.5 mm²) for ADP 122, or
- AWG-10 (4 mm²) for ADS 602/1202/ADS 1802.
(cable customer supply)

Connect the ground to the separate terminal bar.

⚠ CAUTION

Check that the cable is correctly protected against ground defects and that earth wire is longer than the three conducting wires.

CAUTION

Motor rotation is defined by main power connection.
Uncorrect wiring may cause backwards pump rotating.
Check rotation sense at first start up (see *B 51*).

Checking the direction of rotation at initial pump start-up

Before using the monitoring, check that the mechanical and electrical connections defined in the chapter B have been made.

CAUTION

Before each pump start-up, check that oil levels of ADP and Roots housings are visible in the middle of the sight glass: do this check with the pump stopped.

WARNING

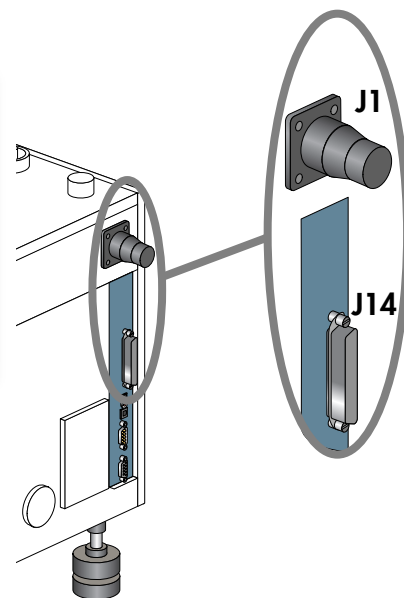
In order to prevent moisture from entering the pump before installation, it has been pressurized before hand with nitrogen and sealed with blank-off flanges.

Remove the guards blocking the intake and exhaust holes; these components prevent foreign bodies from entering the pump during transport and storage. It is dangerous to leave them on a pump in operation.

Connect the cover plugs

In local mode, the pump will run only if the cover plugs (delivered with the pump) are respectively connected on J1 and J14 connectors (remote control connector).

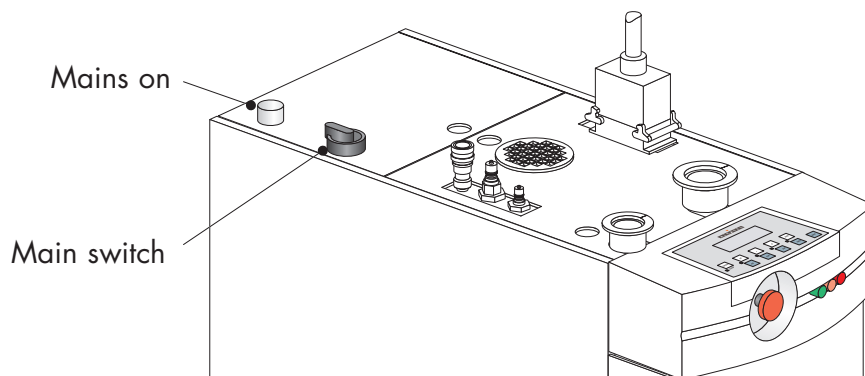
In remote mode, if the emergency stop is not interfaced, it is necessary to connect the cover plug J1.



Checking the direction of rotation at initial pump start-up

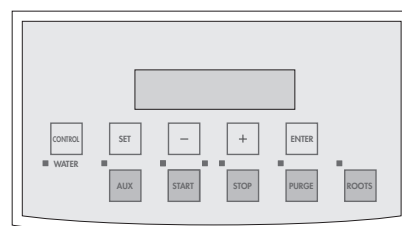
Switch on the pump

Set the main switch to position 1.
The "mains on" indicator light comes on.



Controlling the pump using the hand-held remote control

The hand-held remote control allows to control the pump and to configure the parameters.-



At the first hand-held remote control connection, the monitoring identifies the pump.

ALCATEL	AVT-F
MONITORING XXXXXX	
PRESS ENTER	
FOR COMMUNICATION	

Initialize the system by pressing on **ENTER**.

1H LOC	ROOTS
PUMPING STOPPED	
05/07/06	15:39

Because it is the first connection, it is necessary to take the pump control via the **CONTROL** key: **a star appears on the left side of the display.**

* 1H LOC	ROOTS
PUMPING STOPPED	
05/07/06	15:40

Checking the direction of rotation at initial pump start-up

Check the direction of rotation at initial pump start-up

DANGER

At the initial start-up, provide protection against the risk of crushing related to the rotating parts in the inlet.

A non-powered Roots can be driven by another pump in rotation (risk of crushing). Always connect the pump inlet port before starting the pump.

Remove the blank-off flange on the inlet and exhaust port.

Fit a pressure gauge at the pump inlet.

Set the main switch to position **I**.

To start or stop the Roots while the ADP is running, set the CMD.ROOTS menu on ENABLED (see **C 30**).

Press on the **ROOTS** key until the word ROOTS disappears from the display.

Start-up the pump by pressing **START** and stop it after few seconds:

- if the pressure indicated is less than $5 \cdot 10^{-1}$ mbar, the direction of rotation is correct.
- if the pressure increases, **invert two phases at the main power input female connector**, or from main switch terminal (or refer to **B 50** for hardwired connections).

WARNING

When the main electrical switch on the top of the pump is set to "0", the part supply between the power plug and the main switch remains energized.

Risk of electrical shock in case of contact.

Disconnect main electrical cable before servicing.

WARNING

Hazardous voltage enclosed.

Voltage or current hazard sufficient to cause shock.

Disconnect and lockout power before servicing.

Any intervention must be done by trained personnel only.

Checking the direction of rotation at initial pump start-up

Check the direction
of rotation at initial
pump start-up
(continued)

WARNING

When the pump is switched off, internal parts (monitoring, frequency converter) contain capacitors charged with over 60 VDC and remain energized.

Electrical shock may result in severe injury.

Wait 1 minute after switching off before opening the pump.

Note: rotation can also be checked at the exhaust by making sure gas is being forced out at the exhaust nipple.

CAUTION

In order to prevent foreign bodies from entering the pump, while waiting to be installed, replace blank-off flanges on inlet and exhaust ports again.

As soon as the installation and start-up procedure is complete, and the direction of rotation is checked (sheets **B 10 to B 51**):

- set the CMD.ROOTS on DISABLED (see **C 43**),
- connect the pump to the pumping line (see **B 60**), and
- if the pump has to be remote controlled, proceed to specific wiring instructions (**B 70**).

Connection to the pumping circuit

⚠ WARNING

Remove the blank-offs blocking intake and exhaust holes; these components prevent foreign bodies from entering the pump during transport and storage.

It is dangerous to leave the exhaust blank-off on a pump ready to be started.

⚠ WARNING

The vacuum pump is also a compressor: incorrect use may be dangerous. Study the user manual before starting the pump.

Make sure the direction of rotation has been checked (see **B 51**).

Preliminary precautions for inlet and exhaust connections

⚠ CAUTION

For safety reasons, any accessories connected to inlet and exhaust must be made of materials compatible with pumped gases and leak tested after the reassembly is completed.

Material in contact with process gases:

Components	Material
Pump, inlet, exhaust	Stainless steel, cast iron
O-ring, shaft seals	Fluorinated elastomers, PTFE, FPE, stainless steel, nickel

It is recommended to be able to isolate the pump from the vacuum and exhaust line, particularly if you pump on corrosive gases (inlet and exhaust isolation valves, purges,...).

Several fitting accessories are available in the manufacturer's catalog.

Incorporate flexible stainless steel flanged bellows in the vacuum and exhaust pump line to reduce the transmission of vibration.

When the pump is connected to the pumping line, it is essential to perform a leak test on the whole line to check the connection (pump, pipe,...)

Connection to the pumping circuit

At the pump exhaust

WARNING

Exhaust of corrosive, reactive, flammable, pyrophoric or oxidizing process gases may result in severe injury or death.

Always connect the pump exhaust of the P and H versions to an exhaust extraction system.

WARNING

Ensure that all components in the exhaust pipeline have a maximum pressure rating which is greater than the highest pressure that can be generated in your system.

Connection Exhaust connection: DN 40 ISO-KF

At the pump inlet

CAUTION

Make sure that any vacuum accessories connected to the inlet of the pump can withstand a negative pressure of 1 bar with reference to the atmospheric pressure.

Connection DN 50 ISO-KF for ADP 122.
DN 100 ISO-K for ADS 602, ADS 1202, ADS 1802.

Inlet isolation valve (accessory)

This accessory avoids a sudden reverse flow of gas to the chamber when the pump is stopped.

Connect the valve directly on the pump inlet flange using connecting accessories.

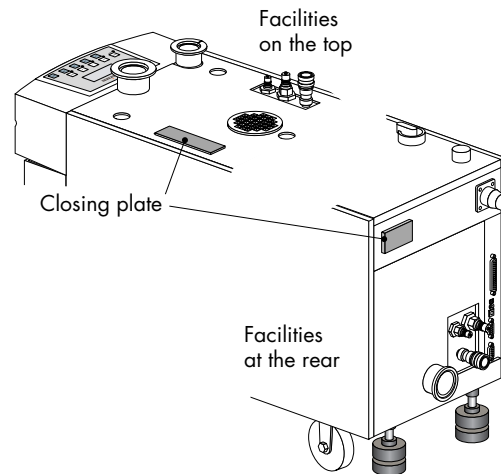
Connect the electrical cable to the electronic cabinet inside the frame (see **D 10**).

If the valve must be remote controlled, see **B 70**.

Connection to the pumping circuit

At the pump inlet (cont')

Remove the closing plate, connect the cable to the electronic cabinet and the plate equipped with a feedthrough, delivered with the cable.



Exhaustable enclosure (required for SEMI compatibility)

The enclosures have to be exhausted with a volumetric flowrate of minimum:

- 36 m³/h for l'ADP 122
- 82 m³/h for l'ADS 602 - 1202 - 1802

The exhaust duct must resist to a static pressure of 0.04" w.g. (as measured 2.0' from the duct connection to the cabinet).

The size of the exhaust duct is 50 mm.

J 14 remote control plug connection

Study the preliminary precautions (see B 00).

CAUTION

Make sure that the main switch is off to avoid any short circuit during remote control plug disconnection/connection.

CAUTION

Dry contact outputs are rated 50 V - 1 A max.
Overvoltage and overcurrent can cause internal electrical damages.
Monitor external contacts voltage below 50 V and current below 1 A.

WARNING

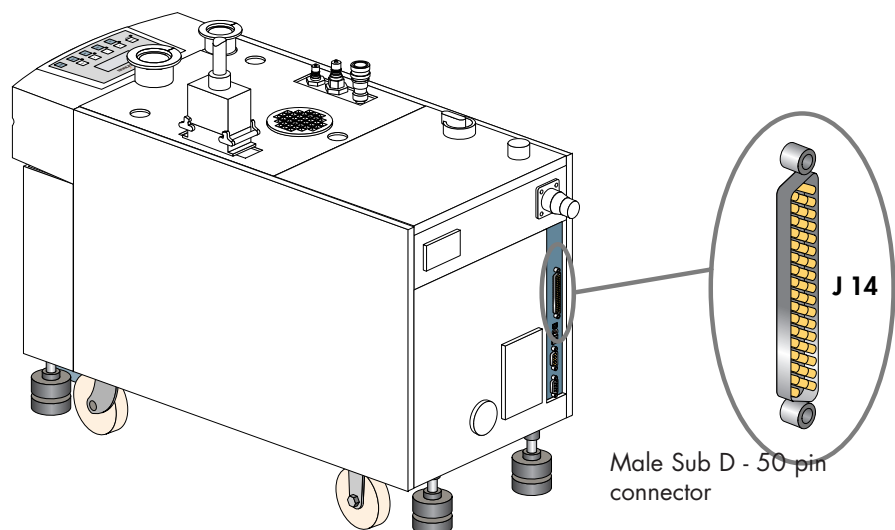
When units containing control circuits are equipped with dry contact outputs, it is the responsibility of the customer to use these outputs in compliance with extra low voltage installation and security standards: it concerns J1, J6 and J 14 connectors.

The remote control function allows:

- Remote control of pumping functions "START/STOP/PURGE", "Roots" and "Inlet valve".
- Remote monitoring of parameters through auxiliary dry contacts (50V - 1A). These contacts can be used to control automatic functions.

Location of J 14 remote control connector

The remote control connection is done via the "J 14" connector, located on the electrical rear panel of pump.

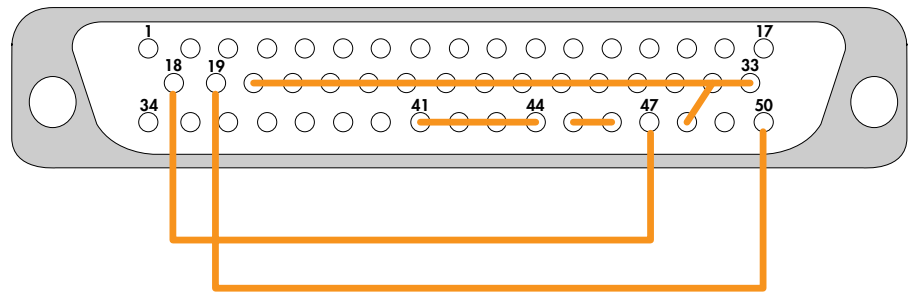


In local mode, the pump can run only if the cover plug (packaged with the pump) is fitted on "J 14" connector.

J 14 remote control plug connection

Cover plug wiring

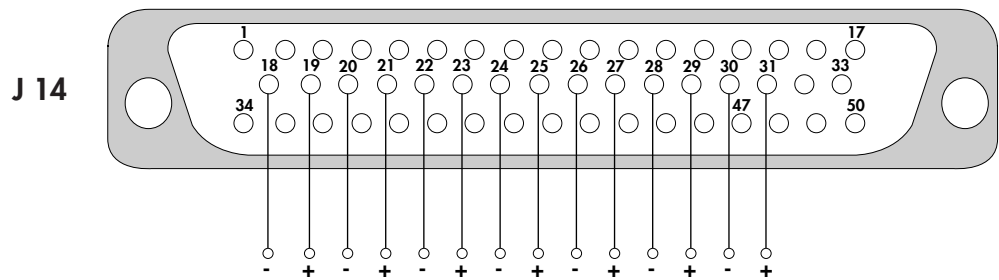
Cover plug type: Sub D - 50 pin connector.



Factory wired (soldered side view)

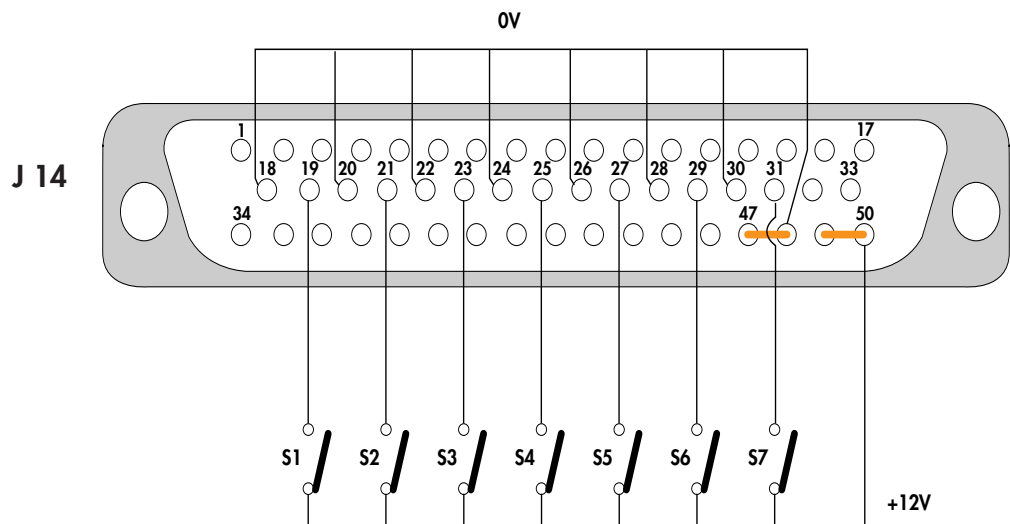
Control contacts (inputs)

These inputs are considered to be activated when a DC voltage between 5 and 30V is applied.



Wiring customer supplied 5 to 30 VDC.

Inputs can be used by pins 47, 48 (0V) and pins 49, 50 (12V), in order to be controlled by external contacts of the customer equipment.



Wiring customer supplied.

J 14 remote control plug connection

Control contacts (inputs)(cont')

All dry contacts are normally opened.

Contact	Function	
S1 (18-19)	Local mode or Remote control mode	Contact closed, local mode. Contact open, remote control mode.
S2 (20-21)	Pump Start/Stop	Contact closed, ADP starts. Contact open, ADP stops. This function is only valid when remote control mode is validated with contact S1 open.
S3 (22-23)	Roots Start/Stop	Contact closed, Roots starts. Contact open, Roots stops. This function is only valid when remote control mode is validated, with contact S1 open, and when " ROOT.CMD " selection is validated in DEFINITION menu of hand-held remote control.
S4 (24-25)	N2 purge Start/Stop	Contact closed, N2 purge Starts. Contact open, N2 purge Stops. This function is only valid when remote control mode is validated, with contact S1 open, and when " PURGE.CMD " selection is validated in DEFINITION menu of hand-held remote control.
S5 (26-27)	N2 stand purge valve Start/Stop	Contact closed, N2 stand purge starts after a time set (time programmed by RS232, see C 90). Contact open, N2 stand purge stops. This function is only valid when remote control mode is validated, with contact S1 open, and when " N2 STANDBY " selection is validated in DEFINITION menu of hand-held remote control.
S6 (28-29)	Opening/closing of inlet valve if S7 is activated	Contact closed, closing of inlet valve. Contact open, opening of inlet valve. This function is only valid when: <ul style="list-style-type: none"> • the remote control mode is validated • "INLET VALVE OPTION" selected and validated in the DEFINITION menu of hand-held remote control. • Inlet valve control authorization is not validated (S7 contact open).

J 14 remote control plug connection

Control contacts (inputs) (continued)

Contact	Function	
S7 (30-31)	Authorization to close or not the inlet valve with the key "AUX" of hand-held remote control	<p>Contact closed, authorization to close the inlet valve with the key "AUX" of hand-held remote control.</p> <p>Contact open, no authorization to close the inlet valve with the key "AUX" of hand-held remote control.</p> <p>This function is only valid when "INLET VALVE OPTION" is "VALID" in the DEFINITION menu of hand-held remote control. This function is not related to contact S6 and enables to function independently in local mode or remote control mode.</p>

Available outputs

Available dry contacts 50V - 1A.

These contacts open in the presence of a fault (normally closed):

Contact	Function
1-34	Pump fail (pump running, valve opened, no alert)
2-3	Alert presence
4-5	Alarm presence - Unit stoppage
6-7	Maintenance alert
8-9	Pump running, correct purge and inlet valve opened
14-15	Pump operation (ADP or ADS)
16-17	State of inlet valve
35-36	Motor temperature alert
37-38	Purge alert
39-40	Exhaust pressure alert

These contacts close in the presence of a fault (normally open):

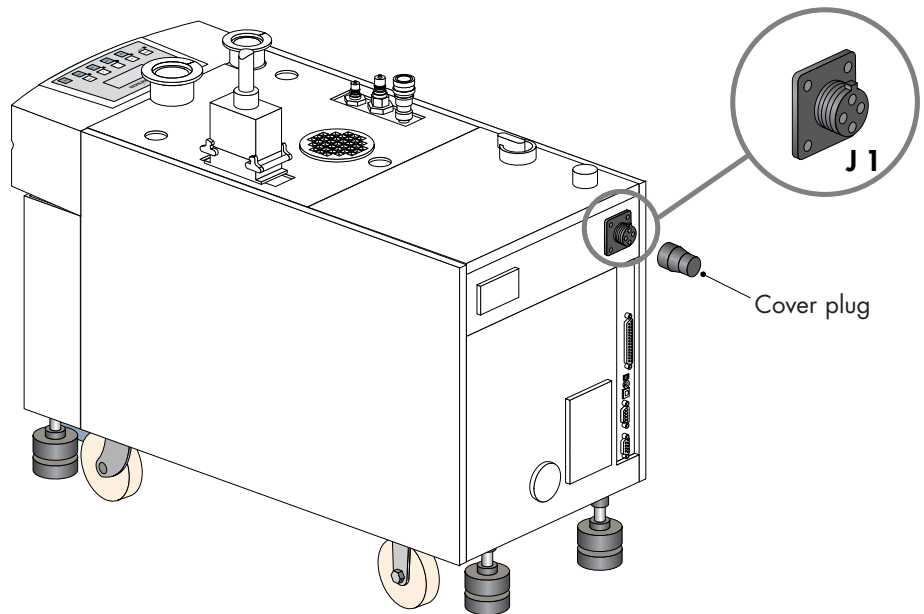
Contact	Function
10-11	Alarm presence - Unit stoppage
12-13	Alert presence (without maintenance)

Emergency stop plug connection

"J1" connector location

This connector allows the control or remoting of the emergency stop function from the front panel of the unit.

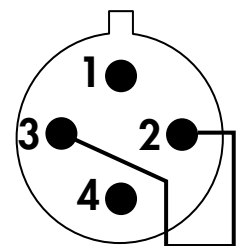
This connector is located at the rear of the pump.



Cover plug wiring

In local mode, the pump can run only if the cover plug (delivered with the pump) is fitted on "J1" connector.

When the emergency stop is interfaced, if the remote mode is not used, it is necessary to connect the cover plug: "J14".



AMP connector
Wiring viewed under soldered side

⚠ WARNING

When units containing control circuits are equipped with dry contact outputs, it is the responsibility of the customer to use these outputs in compliance with extra low voltage installation and security standards: it concerns J1, J6 and J 14 connectors.

Emergency stop plug connection

Control contacts (input)

All dry contacts are rated 50V - 1A.

The input is considered activated when the pins are linked.

Contact	Function
2-3	Contact opened, emergency stop command is activated.

Available output: "Emergency stop" state

Contact	Function
1-4	This contact opens when emergency stop is activated: Contact opened, emergency stop command is activated.

The output contact connected by the customer allows to control the equipment emergency stop from the pump emergency stop button.

RS 232 or RS 485 link wiring

At the first power-on, the user will find the factory set configuration (see **C 42**).

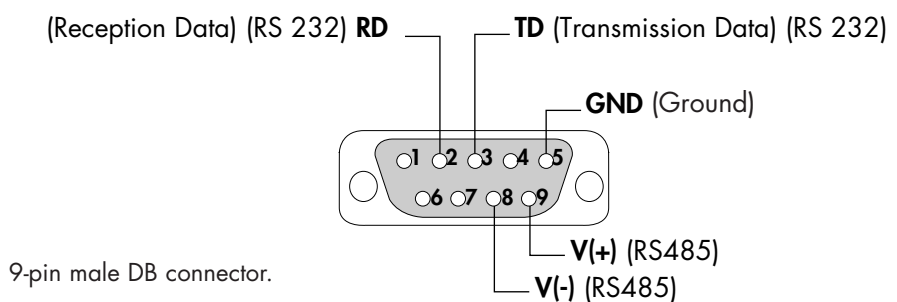
The settings can be modified through the M4 corresponding menu (see **C 42**).

The commands and messages reception syntax is available on chapter **C 90**.

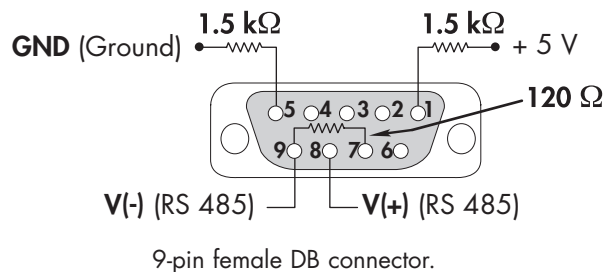
The initial configuration of the serial link is as follows:

- Type: **RS 232**
- Transmission speed: **9600 bauds**
- Data Length: **8 bits**
- Parity: **NO**
- Stop bit: **1**

Connector wiring RS 232/485 (J6)



Connector wiring RS 485 (J7)



Resistors are built-in in electronic cabinet.

Pin 7, 8 and 9 of J7 are internally and respectively connected to pin 7,8 and 9 of J6.

RS 232 or RS 485 link wiring

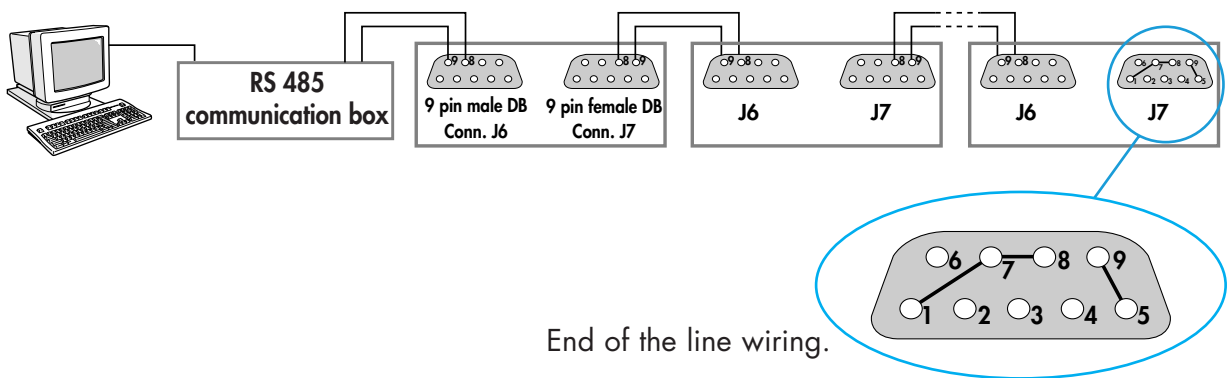
Examples of possible connection

RS232 link with single monitoring system M4

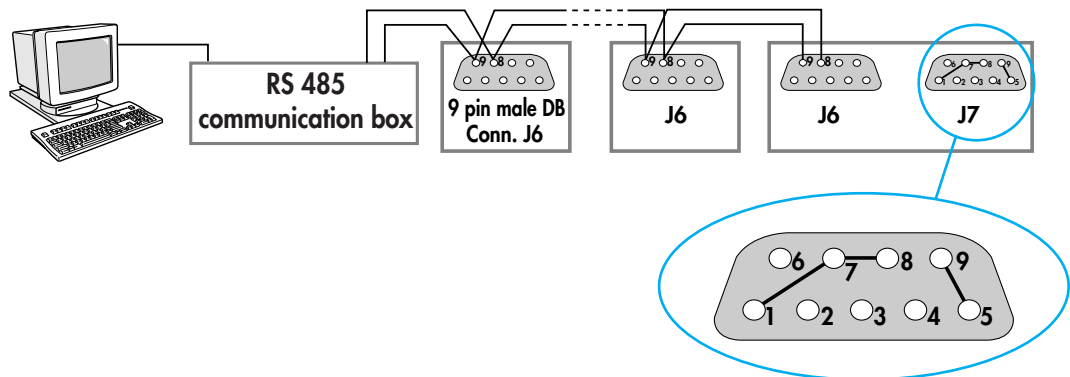


Serial link RS485

Series type connection: all communications will be lost if any one pump is disconnected.



Parallel type connection: communication will only be lost on the pump that is disconnected.



Installation of exhaust heater accessory

WARNING

When the main electrical switch on the top of the pump is set to "0", the part supply between the power plug and the main switch remains energized.

Risk of electrical shock in case of contact.

Disconnect main electrical cable before servicing.

WARNING

Hazardous voltage enclosed.

Voltage or current hazard sufficient to cause shock.

Disconnect and lockout power before servicing.

Any intervention must be done by trained personnel only.

WARNING

When the pump is switched off, internal parts (monitoring, frequency converter) contain capacitors charged with over 60 VDC and remain energized.

Electrical shock may result in severe injury.

Wait 1 minute after switching off before opening the pump.



WARNING
HOT SURFACE
Contact may cause burn.
Do not touch or wear protective gear before servicing.

Operating conditions may generate temperatures justifying particular attention on the part of the user (external surfaces > 70°C on exhaust connections).

Contact may cause burns.

Always use gloves before servicing.

CAUTION

Check the electrical compatibility between accessory and main power voltage.

Access to the exhaust pipe

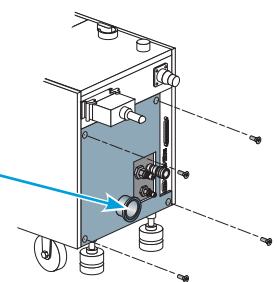
Facilities at the rear (exhaust in horizontal position)



Remove the seal.

Remove the rear cover unscrewing the 4 screws.

The exhaust pipe is located under the pump.



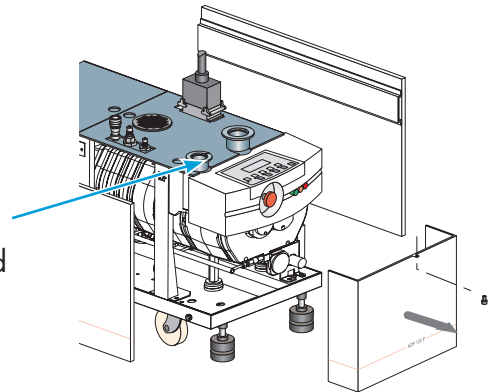
Installation of exhaust heater accessory

Access to the exhaust pipe (cont')

Facilities on top (exhaust straight up)



- Remove the seal.
- Remove the front cover and the two side covers.



Removing the pipe

If the pipe is equipped with a heater device and/or a pressure sensor, disconnect them from the electronic cabinet.

Facilities on top (pipe monoblock)

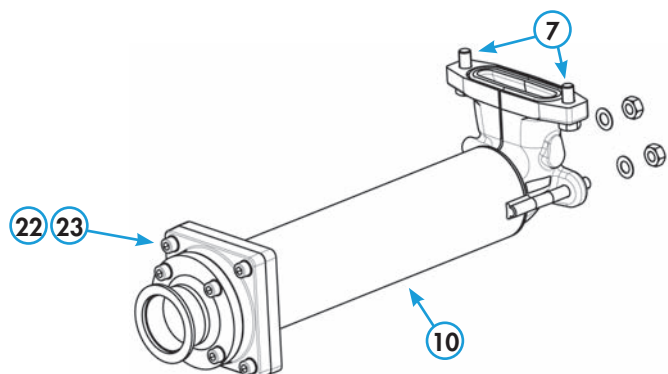
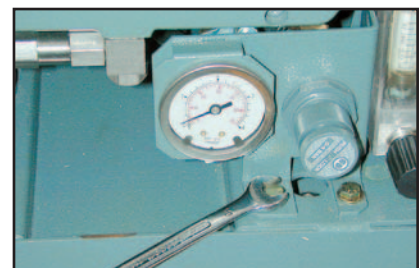
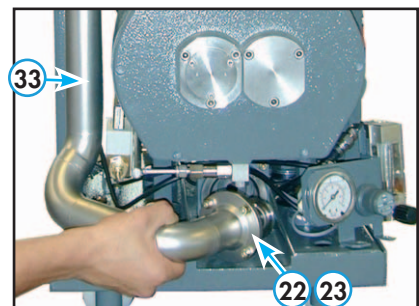


- Unscrew the 4 screws (23) Chc M6 x 20, remove the ond. washer (22). Remove the valve, the spring and the o-rings.



- Unscrew the banjo screw and the two assembling screws from the pressure regulator panel.

Remove the silencer by unscrewing and removing the 2 screws (7) and washers.

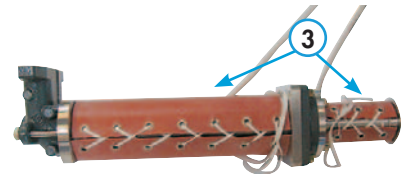


Installation of exhaust heater accessory

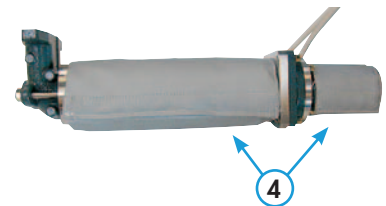
Exhaust heater installation

Facilities at the rear (exhaust in horizontal position)

Install the heating belts (3) on the pipes, using the tightening cords.



Install the heat insulating jackets (4).



Facilities on top (exhaust straight up)




The accessory is made up several heating belts to be installed on each one of the exhaust pipe elements (straight up and bent).

For ADS 1802P only

Install the heater devices on the exhaust pipes.



Reassembly of the equipped exhaust pipe

   Fit the pipe (10) on the pump exhaust and secure the 2 screws or the 2 nuts (7).

For facilities on top, fit the centering ring, the quick connect clamp, the flowmeter panel and the banjo screw.

If the exhaust pipe is equipped with a pressure sensor, refit it.

For ADS 1802P only

Install the exhaust pipe in a reverse order then disassembly.

WARNING

After the accessory assembly, perform an helium leak test on the pumping line.

Installation of exhaust heater accessory

Electrical connection for the exhaust heater

Connect the electrical cable(s) to the circuit breaker RT3 inside the electrical cabinet, by passing them through the feed-through or plugging them in the connector (according to the model).

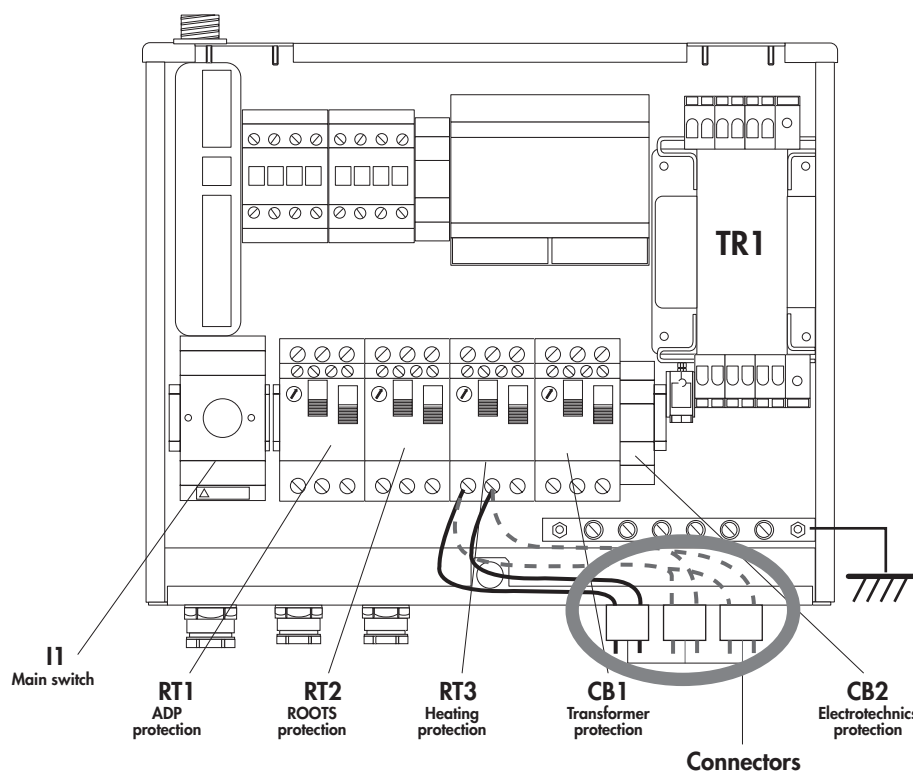
RT3 adjustment (see **D 10**).

To allow silencer removal without disconnecting the exhaust heater, check form and length of the electric cables.

Connect the heating belt electrical cable in parallel on RT3 (one cable per each feed-through).



Reassemble the pump covers on the pump frame.





User's Manual ADP/ADS Series Two Detailed contents

C 000	<i>Safety recommendations for harsh processes</i>
C 010	<i>Operating modes</i>
C 020	<i>M4 monitoring system parameters</i>
C 040	<i>Operating mode with hand held remote</i>
C 041	<i>Start-up of the M4 monitoring system</i>
C 042	<i>M4 monitoring system function table</i>
C 043	<i>Use of the M4 monitoring system for pumping operation</i>
C 044	<i>Saving and remote loading of pump configuration (M4 monitoring)</i>
C 045	<i>M4 monitoring setting for transport</i>
C 050	<i>Water flowrate on ADS 602, P and H versions</i>
C 060	<i>Use of the option "Power failure protection"</i>
C 070	<i>Use of the Inlet isolation valve (accessory)</i>
C 090	<i>Use of the serial link (M4 monitoring)</i>

Safety recommendations for harsh processes

Shutdown procedure for discontinuous operation.

All process pumps are designed for continuous operation in pumping process gas and should not be stopped.

adixen Vacuum Products will be released from any warranty and liability claims if a process pump is stopped for a prolonged time leading to condensation of by-products, powder build-up or corrosion inside the pump.

The only guaranteed solution by adixen Vacuum Products to restart a process pump after a prolonged stop is to perform a complete overhaul of the pump.

Despite this recommendation, if the pump is shutdown for a prolonged time, it is advisable to follow the precautions below-mentioned in order to reduce the risks of condensation, powder build-up and corrosion inside the pump.

- From the process chamber, flush the pump using a dry inert gas, such as Nitrogen, through the inlet port during 30 minutes.
- Stop inert gas supply and let the pump running at ultimate pressure for 5 minutes.
- Stop the pump and close inlet port with the appropriate blank-off flange.
- If the pump is equipped with a monitoring system, configure N2 prolonged option in the menu and set it on 30 minutes, then perform a cycle start/stop of the pump. Wait till end of purge prolonged cycle (30 minutes).
- Put appropriate blank-off flange at exhaust of the pump.
- Turn off the cooling water supply.

When the pump will need to be back in operation, the following points need to be observed :

- Remove the exhaust and inlet blank-off flanges and connect the pump to the equipment.
- Turn on the cooling water.
- Power on the pump and press start button.

In case of trouble to restart the pump, contact adixen Customer Service.

Safety recommendations for harsh processes

⚠ CAUTION

SAFETY INFORMATION related to SiH₄/H₂ PROCESSES

Processes using high H₂ or SiH₄ flows require extended safety to prevent any problem. In order to avoid any safety issue or risks relative to process and pumping conditions, it is necessary to set up the pump with correct settings, following adixen recommendations.

Concerned processes : PECVD Si : (a/ μ c-Si using both SiH₄ and H₂) ; PECVD SiN (using SiH₄)

On these applications, and depending on working conditions (flows ratio and working pressure), two risks can easily be identified.

- Explosion of Si dust,
- Ignition of SiH₄/H₂ trapped into powders.

Explosion of Si dust : (PECVD Si)

Some PECVD Si produces a lot of an orange/brown powder which is composed of very thin particles of Si. Depending on exact process conditions, size of these particles may vary from 0,1 to 100 μ m. In this range, a mix of Si dust and air in a cloud is considered as highly explosive as its ignition energy is very low. Friction between particles or air flow inrush is sufficient. Overpressure generated by this kind of mix is 10-11 times initial pressure.

Explosion due to ignition of SiH₄ trapped in by-products : (PECVD Si & SiN)

Another well known phenomena is explosion due to trapped silane. As PECVD Si and SiN produce a lot of powder which deposits into vacuum line, pump, exhaust line... The different layers of powder have the ability to retain/trap process gases. These gases can be released suddenly and ignite in case of violent air inrush.

Explosion consequences:

An explosion, either in vacuum line or pump or exhaust line, is a complex chemical reaction.. An explosion can also generate a leak which will generate a second explosion...

Another important point is that vacuum pumps are also compressors. Depending on pressure in volume to evacuate, pressure in different pump's stages can be much greater than Atmosphere. Consequently, explosion can generate very high local overpressure.

GENERAL RECOMMENDATION

It is necessary to pay particular attention to:

Leak tightness of the whole system:

- Be sure there is no air leak on pumping system itself and on vacuum line. Leak rate has to be lower than 10⁻⁶ mbar.l/sec of Helium. A leak from outside to inside may lead to uncontrolled reaction between SiH₄ and O₂. If the leak is big enough, H₂/O₂ mix could be ignited by decomposition of SiH₄. In the worst case, explosion can occur.
- End user must guarantee vacuum line and exhaust line leak-tightness
- Be sure there is no leak at pump exhaust. An overpressure Helium leak test has to be performed. Maximum leak rate is 5.10⁻⁵ mbar.l/sec.

N₂ purge:

- Be sure pump is purged with N₂. Air is prohibited.
- This purge could be stopped when process gases are off, but it has to be in a safe and robust procedure.
- Be sure N₂ purge warning and alarm are enabled
- Be sure N₂ purge is prolonged at least 10 min after pump stop to evacuate residual process gases after pump stop

Communication with tool:

- global warning and alarm and specific N₂ warning and alarm has to be sent to the tool which must shut off active gases.
- Immediate corrective actions must be scheduled in case of N₂ signals (warning or alarm).

Safety recommendations for harsh processes

CAUTION

SPECIFIC ADIXEN RECOMMENDATIONS for processes using SiH₄ and H₂

For these applications, using SiH₄ or H₂, adixen recommends:

- 1) To avoid O₂ in process vacuum line after process chamber maintenance : O₂ may likely react with trapped gases and deposited dusts & polymers.

Preferred solution:

adixen Vacuum Products strongly advise to use separated 'load lock & transfer' (clean) pump in order to evacuate process chamber from atmospheric pressure down to 60 mbar (or less), using a soft pumping step to limit particle transportation.

Alternative solution:

End User may flush process chamber and piping installation with nitrogen in order to decrease oxygen concentration below MOC/LOC level with safety margin (ie [O₂] < 2% for hydrogen or 0.84% for Silane).

- 2) To avoid air inrush in vacuum line: a sudden air inrush could shake the fore line strong enough to make powders fall and release pyrophoric gases. It could also lead to cloud creation which can be ignited easily with very low energy.
 - Avoid ports on the fore line between process chamber and process pump, or secure them (i.e. a valve must be equipped with a blank-off flange and a clamp which cannot be opened without a tool)
 - Use a main isolation valve which cannot be opened if the differential pressure is too high, meaning that only a soft pumping valve can be used to evacuate the chamber from atmosphere
 - To use an efficient flow restriction (i.e. soft pumping) for chamber evacuating from Atmosphere down to 60mbar : In order to avoid cloud formation within flammable range of common species
- 3) To stop Roots blowers interlocked when chamber pressure is higher than safety level of 60mbar, to avoid:
 - Si particles removal from pipe inner surfaces (generating Si dust cloud)
 - Generating Si dusts cloud due to high turbulences created at rotating parts contact.
 - Possible Roots exhaust overpressure which could increase effects of a possible explosion by increasing the initial pressure.
- 4) To interface pumps with the tool: N₂ warning has to be considered as a safety issue (see interface recommendations) with immediate interlock action on process gases inlet.
- 5) To flush the pump with N₂ (pump running) during at least 20mn before to exchange it
- 6) To install additional protections to avoid projections if any component of the entire system cannot withstand the pressure of an eventual explosion.
- 7) To minimize or secure quantity of inlets ports in the exhaust line which can become undesired leak sources or sudden, air inrush.
- 8) To respect a safety area around the pump of 4m minimum. This will prevent any damage on operators ears due to overpressure shock wave propagation, as well as little fragments ejection - if any.

Operating mode

Different control modes

According to the monitoring configuration and wiring, the pump can be:

- locally controlled by the hand-held remote control,
- remote controlled by serial link,
- remote controlled using dry contacts via J 14 connector.

Local mode

In local mode, the cover plugs delivered with the machine must be plugged on J1 and J14 connectors.

In this case of operation, the pump is running as a stand-alone part of the equipment on which it has been installed. The pump is controlled by a hand-held remote control, connected in front or at the rear of the frame, or by both simultaneously connected, one in front, the other at the rear of the frame.

A second hand-held remote control can also be connected in series with the first one.

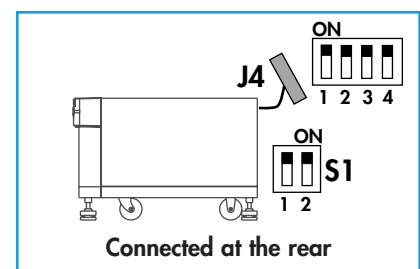
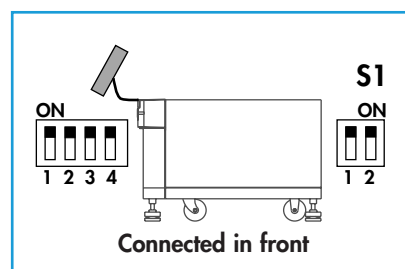
CAUTION

For safety reasons, the pump can be controlled only by one hand-held remote control at the same time.

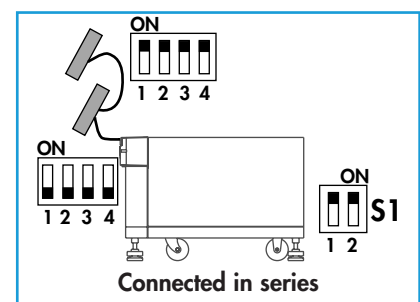
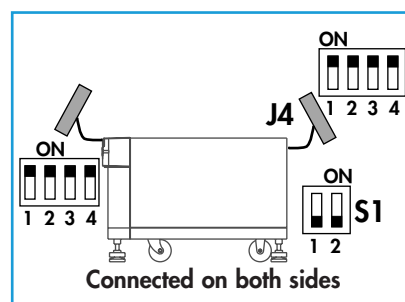
Switch configuration according to the hand-held remote control layout

Two switches have to be configured: the first at the back of hand-held remote control and the second, S1, located on electrical interface (see **A 20**).

Use of single hand-held remote control:



Use of two hand-held remote control:



Operating mode

Remote controlled operating modes

Remote control via J 14 (Dry contacts) Pump alone

The pump is monitored by the equipment in which it is installed (such as an automated pumping system or an industrial equipment).

The pump is remote controlled by dry contacts wired on J 14 connector or direct voltage (see **B 70**).

The hand-held remote control keyboard is inhibited as long as the contact S1 of the J 14 connector (see **B 70**) is kept open.

In Remote mode, **"REM"** is displayed on the display.

Datas and operating parameters can be read locally on the hand-held remote control.

Emergency pump can be externally monitored by using J1 connector pins 2 and 3 (see **B 100**).

Remote control via RS 232/485 serial link Pump alone or in a group of pumps

The pump is monitored by the equipment in which it is installed, either alone or in a group of pumps.

It is remote controlled by the commands transmitted on the serial link (see **B 110**).

Commands and reception syntax are given in chapter **C 90**.

The remote mode dry contacts have the priority over the serial link mode.

Control Remote selection (J14-S1 contact, see B 100)	Priority over
Remote control mode (REM)	Remote control connector > RS232
Local mode (LOC)	RS232 > Hand Held Display Module

M4 monitoring system parameters

Purpose of the sensors

Waterflow sensor	Signals insufficient water with a threshold mechanically adjusted in factory.
Mass-flowmeter	Allows the display of the nitrogen flowrate.
	Signals insufficient gas purge during a warning time, and stops the pumping at the end of alarm time.
Temperature sensor	Allows the regulation of the ADP temperature.
	Manage the pump temperature (alert if $T >$ alert threshold and alarm if $T >$ alarm threshold). The sensor is fitted with a low temperature threshold (Set temperature -15°C) signaling a pump is too cold.
Motor power sensor	Monitors the power consumed by the machine by generating an alert followed by an alarm as soon as the power is greater than each of its thresholds; the pump is immediately stopped when alarm threshold is exceeded.
Pressure sensor	Signals exhaust overpressure when the pressure reaches 1450 mbar (exhaust pipe clogging) and stops the pump at 1990 mbar.
E. Analogic sensor	Allows the monitoring of voltage (0-10V) or an input contact with two adjustable thresholds.
LI1, LI2 and LI3 Logic sensors	Allow the monitoring of a logic sensor and to program an alert time.
Auxiliary temperature sensor	Allows the monitoring: <ul style="list-style-type: none"> ■ of the auxiliary temperature (option), or ■ of the Roots body temperature on ADS 602 P and H versions (option), or ■ of dual cooling on ADS 1802 H functional block version.

(*) : ADS 602 P and H versions: a temperature sensor (PT 100) installed to monitor the Roots body temperature.

M4 monitoring system parameters

Summary table of monitoring parameters Max. and min. thresholds

	Unit	Thresholds		Initial configuration	
		Mini.	Maxi.	Alert	Alarm
Mass-flowmeter	slm	0	60 / 120	15	–
	mn	0	60	0	disabled
ADP temperature sensor	°C	70	130 140 (ADS 1802)	85	120
Motor power sensor	W	500	5000	2500	4000
E. analogic sensor	mV	0	9950	4000	8000
LI1 logic sensor	mn	0	60	disabled	disabled
LI2 logic sensor	mn	0	60	disabled	disabled
LI3 logic sensor	mn	0	60	disabled	disabled
Auxiliary temperature	°C	0	170	< 20 > 140	disabled
Auxiliary temperature (Roots temperature on ADS 602 P and ADS 602 H)	°C	0	170	< 20 > 140	–
Auxiliary temperature (Temperature control on ADS 1802 H)	°C	70	100	85	120

At the pump start-up, the monitoring operation will depend on the programming done at the factory. However, the monitoring system can be customized at any time according to the running process, by programming the parameters of the various menus listed in **C 42** with the pump stopped.

Sensor location See sheet **D 10**.

Operating mode with hand held remote

Start-up of the M4 monitoring system.....	C 41
M4 monitoring system function table.....	C 42
Use of the M4 monitoring system for pumping operation ..	C 43
Saving and loading of pump configuration (with M4)	C 44
M4 monitoring setting for transport.....	C 45

Start up of the monitoring system.

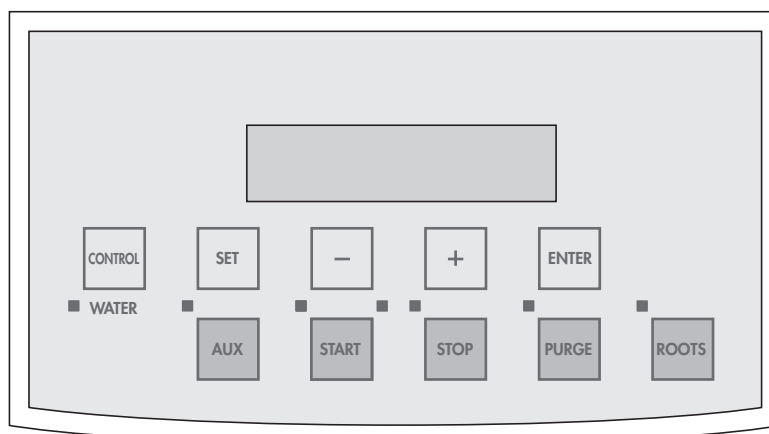
The hand-held remote module

The keyboard is used to configure the parameters.

Parameter selection and configuration keys

Indicators

Manual control key



The functions of the parameter selection and configuration keys

Symbol	Description	Functions
	Hand held remote control validation key	<ul style="list-style-type: none"> Means that the hand held remote is controlling the pump when a star appears on the display.
	Parameter setting mode access key	<ul style="list-style-type: none"> Press to access the parameter setting mode Press to exit the various menus without validating the functions
 	Selection keys	<ul style="list-style-type: none"> Press to move to: <ul style="list-style-type: none"> the next or the previous menu the next or the previous parameter in the displayed menu Press to select or adjust the value of the previously selected parameter
	Configuration validation key	<ul style="list-style-type: none"> Press to validate the selection of a menu, a parameter or a value Press to validate an answer to a requested information

A membrane protects the keys. Make selection by hand only and do not use hard objects such as pens, screwdrivers, etc., which could damage the keys.

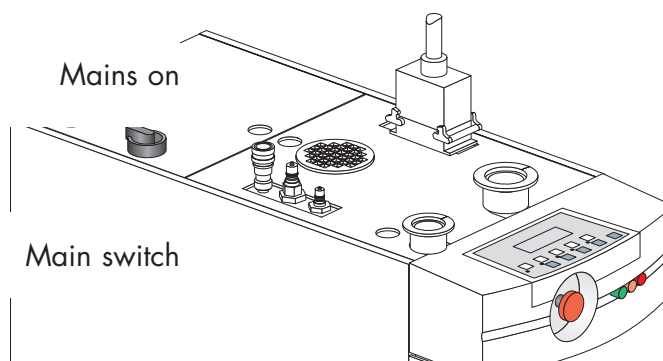
Fast scroll can be obtained for the **+** and **-** keys by continuously holding down the button.

For all the other keys, press several times.

Start up of the monitoring system

Pump start-up

Position the main switch to position **1**.
The "mains on" light indicator comes on.



The monitoring displays the state of the pump.

The star appears on the left side of the display and indicates that the control has been taken by hand-held remote control (control taken to check the direction of rotation).

* 1H LOC	ROOTS
PUMPING STOPPED	15:39
13/10/06	

The M4 monitoring system has been configured in the factory according to the options and accessories defined during the order.

This configuration allows the pump to run (see **C 30**).

If parameters have to be customized by the user, it is necessary to gain access to the program.

Access to the parameter settings

The programming made at the factory is protected by an access code which disables parameter modification.

Press the **SET** key.

Valid the code with **ENTER**.
("0" factory configuration).

Access code and parameters can be customized (see **C 42**).

ENTER PASSWORD :
CODE : 0

Start up of the monitoring system.

To ensure correct fault monitoring and customized parameters, it is necessary to initialize time and date of the machine.

Reset the clock (at the initial start-up)

Press the **SET** key to enter the menu. Press the **+** key, repeatedly to have access to the **SETTING** menu. Validate with **ENTER** key.

```
DEFINITION
>>> SETTING <<<
MAINTENANCE
MANAGEMENT
```

With the **+** key, move through to **DATE/TIME** menu. Validate with **ENTER** key.

```
SERIAL LINK
>>> DATE/TIME<<<
TEMPERATURE UNIT
PRESSURE UNIT
```

Access to the selected parameters with key **+** or **-**. Validate with **ENTER** key.

```
DAY
MONTH
YEAR
HOUR
```

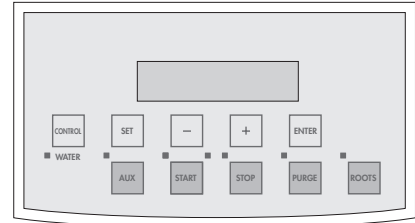
Update the needed parameters and validate. Return to the main menu by pressing **SET** successively.

```
DEFINITION
>>> SETTING <<<
MAINTENANCE
MANAGEMENT
```


M4 monitoring system function table

Pump configuration

Gain access to parameter programming using the hand-held remote control.



The programming made at the factory is protected by an access code which disables the entry of new parameters.

Press the key **SET**.

Valid the code with **ENTER**.

Access code can be customized (factory configuration "0").
(see page 6).

ENTER PASSWORD :

CODE : 0

Parameters can be transferred from one pump to another.

This can be done in case of a pump replacement, or for new pump installation (see C 44).

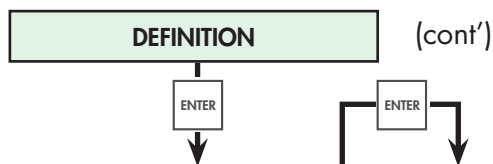
M4 monitoring system function table

Selection	Choice	Description	Initial configuration
LANGUAGE	ENGLISH FRENCH	All the menus are in the selected language.	ENGLISH
SYSTEM SELECT.	ADP122 ADS602 ADS602V ⁽¹⁾ ADS1202 ADS1802	Select the pump monitored by the monitoring system. (V indicates that the Roots is fitted with convertor option)	According to the pump
AUTO START.	ENABLED DISABLED	Allows the pump to restart automatically after a power cut, irrespective of the duration.	DISABLED
ANALOG INPUT	ENABLED DISABLED	Allows retrieving analogic data. This input is not available on ADS 602V ⁽¹⁾ , ADS 1202, ADS 1802 systems.	DISABLED
LOG.1 INPUT*	ENABLED DISABLED	Allows retrieving logic data on LOG.1 input using a customer supplied sensor (closed when switched off). This input stays DISABLED if parameter LL PUMP OPTION is enabled. ⁽¹⁾	DISABLED
LOG.2 INPUT*	ENABLED DISABLED	Allows retrieving logic data on LOG.2 input using a customer supplied sensor (closed when switched off). This input stays DISABLED if ADS 1202/ ADS 1802 system is selected.	DISABLED
LOG.3 INPUT*	ENABLED DISABLED	Allows retrieving logic data on LOG.3 input using a customer supplied sensor (closed when switched off). This input stays DISABLED if parameter LL PUMP OPTION is enabled. ⁽¹⁾	DISABLED
ROOTS CMD	ENABLED DISABLED	Allows separate control of the Roots START/STOP control from the ADP START/STOP, instead of simultaneous start-up, the Roots is started using ROOTS key or remote controlled.	DISABLED

(1): For no-standard configuration.

* : LOG.1, LOG.2, LOG.3 correspond to LI1, LI2, LI3 sensors (see **D 10**)

M4 monitoring system function table



Selection	Choice	Description	Initial configuration
PURGE CMD	ENABLED DISABLED	Allows independant purge control at pump start-up. The purge flow is controlled by the PURGE key or remote controlled.	DISABLED
N2 STANDBY OPT. ⁽²⁾	ENABLED DISABLED	"Standby purge" option validation during equipment standby phase.	DISABLED
INLET VALVE OPTION	ENABLED DISABLED	Inlet valve presence validation.	DISABLED
REG T° ADP OPTION	ENABLED DISABLED	Temperature regulation validation.	DISABLED
REG. AUX. T° OPT. ⁽³⁾	ENABLED DISABLED	Auxiliary dual temperature regulation sensor on fonctionnal block, presence validation.	DISABLED
AUX. T° OPTION ⁽³⁾	ENABLED DISABLED	Auxiliary temperature sensor presence validation.	DISABLED
LL PUMP OPT. ⁽¹⁾	ENABLED DISABLED	Allows ADP 122L pump monitoring by displaying operating status.	DISABLED
BACKUP POWER OPTION	ENABLED DISABLED	"Power failure protection" option presence validation.	DISABLED
BUZZER	ENABLED DISABLED	Buzzer validation in case of defect. Buzzer stops by pressing on ENTER .	ENABLED

(1) : For no-standard configuration.

(2) : "P" and "H" versions.

(3) : ADS 602 P and H versions: Initial configuration "ENABLED" to monitor Roots temperature.

M4 monitoring system function table

Selection	Selection	Settings limits	Initial configuration
SERIAL LINK 1	TYPE	RS232 / RS485 / NETWORK M3 / NETWORK M4	RS 232
	ECHO	ENABLED / DISABLED	ENABLED
	SPEED	1200/2400/4800/9600 Bauds	9600
	PARITY	NO / EVEN / ODD	NO
	2 STOP BITS	ENABLED / DISABLED	DISABLED
	ADDRESS	0 to 999	0
N2 FLOW SENSOR	WARNING time	0 to 60 mn / DISABLED	0 mn
	ALARM time	0 to 60 mn / DISABLED	DISABLED
PURGE WARNING ⁽⁴⁾ <i>(only with MFS)</i>		0 to 60 slm ("P" version) 0 to 120 slm ("H" version)	15
ADP TEMPERATURE ⁽⁴⁾	INPUT VALUE	70 to 130°C (or 140°C: ADS 1802)	100
	ALARM threshold ⁽⁵⁾	(Input value + 10°C) to 140°C	120
AUX. TEMP SENSOR ⁽⁴⁾	WARNING threshold 1	0 to 140°C	DISABLED ⁽³⁾
	WARNING threshold 2	20°C to 170°C	DISABLED ⁽³⁾
REGUL T° AUX	INPUT VALUE	70 to 100°C	100
	ALARM threshold ⁽⁵⁾	(Input value + 10°C) to 150°C	120
ADP POWER SENSOR	WARNING threshold	500 to 4000W	2500
	ALARM threshold	(Warning threshold) to 5000W	4000
ANALOG INPUT ⁽⁴⁾	WARNING threshold	0 V to (Alarm threshold)	4000
	ALARM threshold	(Warning threshold) to 9950 mV	8000
LOG1 SENSOR ⁽⁴⁾	WARNING time	0 to 60 mn / DISABLED	DISABLED
	ALARM time	0 to 60 mn / DISABLED	DISABLED
LOG2 SENSOR ⁽⁴⁾	WARNING time	0 to 60 mn / DISABLED	DISABLED
	ALARM time	0 to 60 mn / DISABLED	DISABLED
LOG3 SENSOR ⁽⁴⁾	WARNING time	0 to 60 mn / DISABLED	DISABLED
	ALARM time	0 to 60 mn / DISABLED	DISABLED
PURGE FLOW PROLONGED	PURGE FLOW PROLONGED	0 to 120 mn	10 mn
TIME - DATE	Month/Day/Year		
	Hours/Minutes		
TEMPERATURE UNIT*		CELSIUS / FARHENHEIT	CELSIUS
PRESSURE UNIT*		mbar / PSI / Torr / hPa	mbar
CONTRAST*		Contrast display setting	

(3) : ADS 602 P and H versions: see **C 20** for threshold adjustment.

(4) : Accessible menu only if option is validated in DEFINITION menu.

(5) : Alarm threshold setting must be done before the input value setting.

(*) : specific parameters to each hand-held remote control.

M4 monitoring system function table

Selection	Settings limits	Initial configuration
RUN TIME	0 to 65500 h	0
TOTAL MAINT.	0 to 65500 h	0
PARTIAL MAINT.	0 to 65500 h	0
ROOTS MAINT.	0 to 65500 h	0
LOAD LOCK MAINT. ⁽¹⁾	0 to 65500 h	0
INSPECT EXHAUST	0 to 65500 h	0
TOTALE MAINT. WARNING	1000 to 34000 h	17000
PARTIAL MAINT. WARNING	1000 to 34000 h	8500
ROOTS MAINT. WARNING	1000 to 34000 h	17000
LL MAINT. WARNING ⁽¹⁾	1000 to 34000 h	17000
EXHAUST WARNING	1000 to 34000 h	8500

(1) : For no-standard configuration.

M4 monitoring system function table

Selection	Selection	Settings limits	Initial configuration
PASSWORD		0 to 65535	0
PUMP Nr AND VERSION	Frame serial Nr		-
	M4 serial Nr		-
	M4 OTP Version		-
	M4 Flash Version		-
	ADP serial Nr		-
	ROOTS serial Nr		-
	Display OTP version	(OTP - One Time Programmable)	-
	Display Flash version		-
STORAGE		ENABLED / DISABLED	DISABLED
CONFIG. SAVE	Save a pump configuration in the hand-held remote control memory.		
CONFIG. LOAD	Allows to record the configuration from hand-held remote control to monitoring system memory.		
OPERATING TIME	Displays the operating times of the various components.		
LAST WARNINGS	Displays the 10 last warnings recorded.		
LAST ALARMS	Displays the 10 last alarms recorded.		

Use of the M4 monitoring system for pumping operation

Study the preliminary precautions (see B 00).

CAUTION

Check the direction of rotation at the initial start-up (see B 51).

CAUTION

The performance and the operational safety of this product is guaranteed provided that it is used in normal operating parameters defined in this manual.

Operation setting

According to the selected operating mode, check the position of the S1 switches on the electrical interface, and at the rear of the hand-held remote module (see C 10).

Neutral gas purge control

For safety reasons, the pump is set with **CMD PURGE** on DISABLED. This selection does not allow the user to stop the gas purge while pump is running.

When the purge gas is selected, the message N2 is displayed on the hand held remote module.

Note: in some process, it can be necessary to stop the gas purge during pumping, set the CMD PURGE on ENABLED and the S2 coding wheel to "1" position. This setting concerns also the LM versions.

Pump start-up

To start the Roots and ADP simultaneously, set the **CMD.ROOTS** menu on DISABLED.

To start or stop the Roots while the ADP is running, set the **CMD.ROOTS** menu on ENABLED.

The Roots will start or stop by pressing the **ROOTS** key.

When the Roots is running, a message "Roots" is displayed on the hand held remote module.

Use of the M4 monitoring system for pumping operation

⚠ WARNING

The user and /or OEM are ultimately responsible for operating the equipment in a safe manner. The manufacturer has no control over the types of gases exposed to this pump. This is the user and/or the OEM's responsibility to follow the necessary safety requirements.

Frequently process gases are toxic, flammable, corrosive, explosive and/or otherwise reactive.

Toxic gases can cause serious injury or death. Operators and users must take the appropriate safety recommendations to prevent injury. Consult the responsible department for instructions and safety information.

Pump start-up

Start up the pump by pressing **START**.

The following operations will perform automatically:

- inlet valve opens (if preselected),
- ADP pump starts up,
- data capture and sensor processing,
- purge gas valve opens (P version and H version) if option **CMD.PURGE** disabled
- Roots pump starts up (if selected).

At the same time the operating parameters are displayed.

Gain access to other operating parameters* using **+** or **-** keys.

52H LOC N2	ROOTS
ADP.POWER	1410 W
PRESSURE	940 MBAR
ADP TEMP.	58°C

(*) Only installed and configured options parameters are displayed.

Note: for thermal regulated pumps, "**THERM ADP**" water valve opens when the temperature reaches the ADP temperature set value. It closes when the temperature decreases -2°C below the ADP temperature set value.

⚠ WARNING

The pumps are equipped with an exhaust pressure monitoring sensor. It is the responsibility of the user to prevent the risks related to excess overpressure.

Operation monitoring

During operation, the user is warned of an operating incident by:

- one or several faults are displayed on the screen, alternating with monitoring parameters. When these faults are activated, the monitoring system triggers the warning phase followed by the hazard phase. The period of time for these phases can be set.
- indicator lights on the front panel and buzzer sounded, if option selected.
- indicator lights on display panel.
- the fault contacts on the remote connector J14 at the rear of the monitoring unit are closed.
- pumping is stopped when an hazard threshold or a time is reached.

A list of incidents is given in the **chapter D**.

Use of the M4 monitoring system for pumping operation

Pumping shut-down

Press on **STOP** key and valid with **ENTER**.

The following operations will perform automatically:

- inlet valve closes (if any and if selected),
- pump(s) stop(s),
- injection of purge gas continues during the shutdown phase (P and H versions only) if timing has been programmed (0 to 120 min).

⚠ WARNING

When the "STOP IN PROGRESS" message appears on the display, don't intervene on the pump: risk of injury by contact with hot surfaces. Wait for the "PUMPING STOPPED" message before intervening on the pump.

For an extended shutdown of the pump, refer to the safety recommendations «shutdown procedure for discontinuous operation» (see chapter C00).

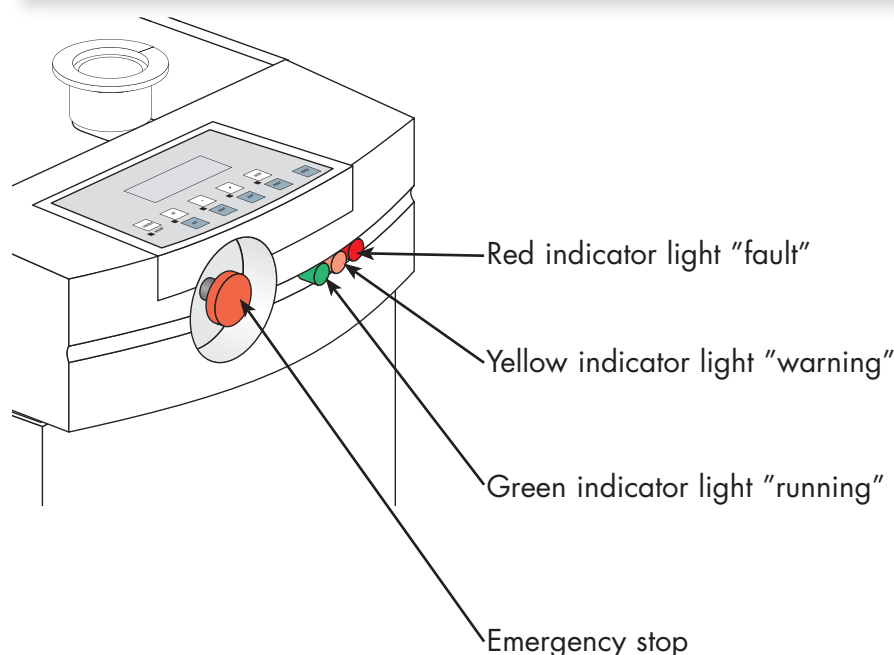
Auto-restart configuration

In standart configuration (factory configuration), when there is a loss of voltage, system is stopped. When the voltage comes back, to restart the system, it is necessary to press **START**.

The automatic restarting is possible if **AUTO RESTART** is set on **ENABLED**.

⚠ DANGER

When the pump has been configured for automatic restart after a power failure, it is the responsibility of the user to take all the measures required to prevent risks resulting from this type of operation.



Use of the M4 monitoring system for pumping operation

Use with two hand-held remote controls

To take the control with a hand-held remote control, press only on the **CONTROL** key of the chosen hand-held remote control: then a star appears on the left corner of the display.

The control of the pump is now not possible from the other hand-held remote controls, as long as the first one has not given the control back.

To give the control again, press on the **CONTROL** key of the hand-held remote control, until the star has disappeared.

Reading of data and parameters can be done on both hand-held remote controls, **even if they do not control the pump**.

If the message "NOT ALLOWED" appears after an action of any key, check the presence of the star on the display, showing that the control has been taken.

Saving and remote loading of pump configuration (M4 monitoring)

At pump installation or replacement, it may be interesting to copy the configuration (set of all the parameters and operation setting programmed by the user) from a pump to another.

CAUTION

Loading and saving the parameters with the pump in operation may result in a software conflict.
Perform these operations when the pump is switched on but with pumping stopped.

Configuration saving

The pump configuration is memorized in the internal electronics of M4 monitoring.

Enter in the menu by **SET**.

Go on using **+** to access the **MANAGEMENT** menu and valid by **ENTER**.

```
DEFINITION
SETTING
MAINTENANCE
>>> MANAGEMENT <<<
```

Go on using **+** to access the **CONFIG.SAVE** menu and valid by **ENTER**.

```
STORAGE
>>>> CONFIG SAVE <<<<
CONFIG. LOAD
OPERATING TIME
```

The pump configuration is then duplicate into the hand-held remote control memory.

Return to main menu and exit the setting mode by **SET**.

Disconnect the hand-held remote control.

Saving and remote loading of pump configuration (M4 monitoring)

Remote loading

Connect the hand-held remote control onto the pump to configure.

Take the control of the pump from the hand-held remote control (*at cover left of the display).

Load the configuration previously saved into the pump by selecting the **CONFIG. LOAD** menu from **MANAGEMENT** menu.

The former configuration is automatically reset.

All pump parameters are loaded remotely, except the options which have to be locally configured according to the pump:

- language
- buzzer
- serial link
- date and time
- temperature unit
- pressure unit.

CAUTION

Loading parameters may result in creating software conflicts.
After loading, configure manually the following parameters (temperature unit, pressure unit, serial link, time and date).

M4 monitoring setting for transport

Setting of "storage" mode for transports and prolonged storage

Gain access to MANAGEMENT menu by successive press on +.

Enter the sub menu STORAGE by pressing **ENTER** then select ENABLED using the key +.

Valid with **ENTER**.

The pump start up is now not possible, second counter is blocked.

Note: At switching on, STORAGE mode is automatically deleted. Date and Time reset is only necessary (operating mode blocked during storage) (see **C 41**).

DEFINITION SETTING MAINTENANCE >>>> MANAGEMENT <<<<
--

STOCK	150H
PUMPING STOPPED	
01/09/06	13H56

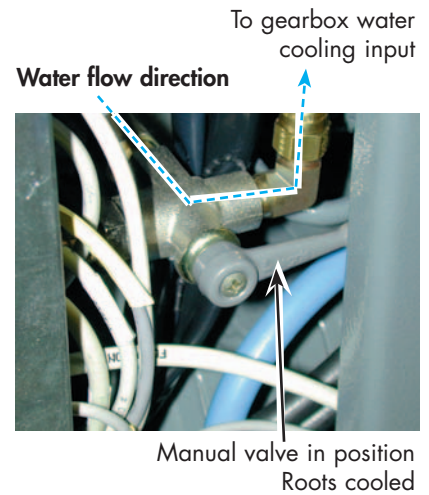
Water flowrate on ADS 602, "P" and "H" versions

Roots cooling circuit

The cooling circuit is equipped with a 3 - way - valve which allows Roots cooling depending on the process.

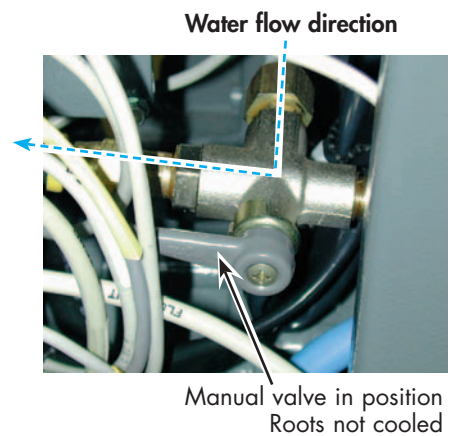
When the Roots is cooled:

It corresponds to the initial configuration.
Adjust the temperature threshold according to the table next page.

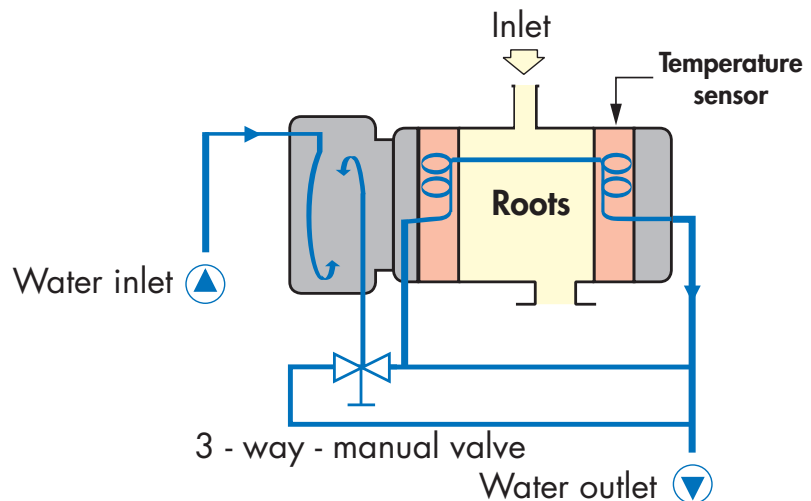


When the Roots is not cooled:

Depending on the process, it is not necessary to cool the Roots.
In this case, invert the valve opening position from a half turn and adjust the threshold according to the table next page.



Schematic principle



Water flowrate on ADS 602, "P" and "H" versions

Warning threshold adjustment

Pump version	ADS 602 P	ADS 602 H
Roots cooling	Yes	No
Warning low	< 20°C	< 60°C
Warning high	> 70°C	> 100°C
Typical value measured on Roots body	40/50°C	80/90°C
Maximum pressure in continuous operation	10 mbar	3 mbar*

(*) If the operating pressure is higher, the Roots must be cooled.

Use of the option "Power failure protection"

This option includes a board installed in the electronic cabinet which supplies power to the electronics for a second in the event of main power failure.

The option can be configured by the user in the hand held remote control DEFINITION menu.

Select the battery "ENABLED" option in the hand held remote control DEFINITION menu. If a mains power cut occurs, a message "**W09 power supply**" is displayed on the hand held remote control, **but the state of output contacts don't change on the remote control connector.**

Two cases can arise:

The mains voltage is restored within a delay of 1 seconds

If the pump is running when the failure occurs, it will restart automatically and goes back to initial operation.

The mains voltage is not restored within the second following the mains power failure

After this time a message "**D09 power supply**" is created (as the pump is no longer powered, this message will be displayed once the mains supply will be restored, in the latest alarms section of the ADMINISTRATION menu).

The battery supply is then cut.

This alarm will thus be taken into account by customer's equipment.

When the main voltage is restored:

- if "**AUTO RESTART**" is DISABLED, the pump stands stopped,
- if "**AUTO RESTART**" is "ENABLED", the pump restart automatically and goes back to initial operation.

Use of the inlet isolation valve (accessory)

The operation describes the various factors involved in operating the inlet valve.

Valve option disabled

(can be configured in the hand held remote control DEFINITION menu). The valve is always open.

Valve option enabled

(can be configured in the hand held remote control DEFINITION menu). The valve can be operated in four different ways:

1. Controlled by the pump (local mode).
2. Controlled by the customer's equipment (remote control mode).
3. Controlled by the hand held remote control.
4. Controlled via the serial link.

1. Controlled by the pump (local mode)

For the valve operating mode as described below, contact S1 must be closed (see **B 70**) and contact S7, open (see **B 70**).

- If the "STOP" button on the hand held remote control is pressed or if the pump is stopped due to an alarm, the valve is closed and the pump stops as soon as the valve end stop sensor is triggered or after 3 seconds.
- If the "START" button on the hand held remote control is pressed, the valve opens 3 seconds after the pump start up.

2. Controlled by the customer's equipment (remote control mode)

For the valve operating mode as described below, contact S1 must be open (see **B 70**) and contact S7, open (see **B 70**).

- The valve closes if contact S6 (see **B 70**) controlled by the customer's equipment is closed.
- The valve opens if contact S6 (see **B 70**) controlled by the customer's equipment is opened.

Note: stopping or starting the pump has no effect on the valve.

Use of the inlet isolation valve (accessory)

3. Controlled by the hand held remote control

For the valve to operate as described below, contact S7 must be closed (see **B 70**).

Pressing the "**AUX**" button on the hand held remote control opens or closes the valve, whether the pump is stopped or running (press the "**ENTER**" button on the hand held remote control to confirm the operation).

Note: In either local or remote control mode:

- When the pump stops normally or due to an alarm, the valve is closed and the pump stops as soon as the valve end stop sensor is triggered or after 3 seconds.
- When the pump is started, the valve opens 3 seconds after the pump starts.

4. Controlled via the serial link

The valve open control message on the serial link is only taken into account if contact S7 is closed.

Use of the serial link (M4 monitoring)

M4 Monitoring system parameter configuring

The initial configuration of the serial link is as follows:

- Type: **RS 232**
- ECHO: **ENABLED**
- Transmission SPEED: **9600 bauds**
- Parity: **NO**
- 2 Stop bits : **DISABLED**
- Address: **0**

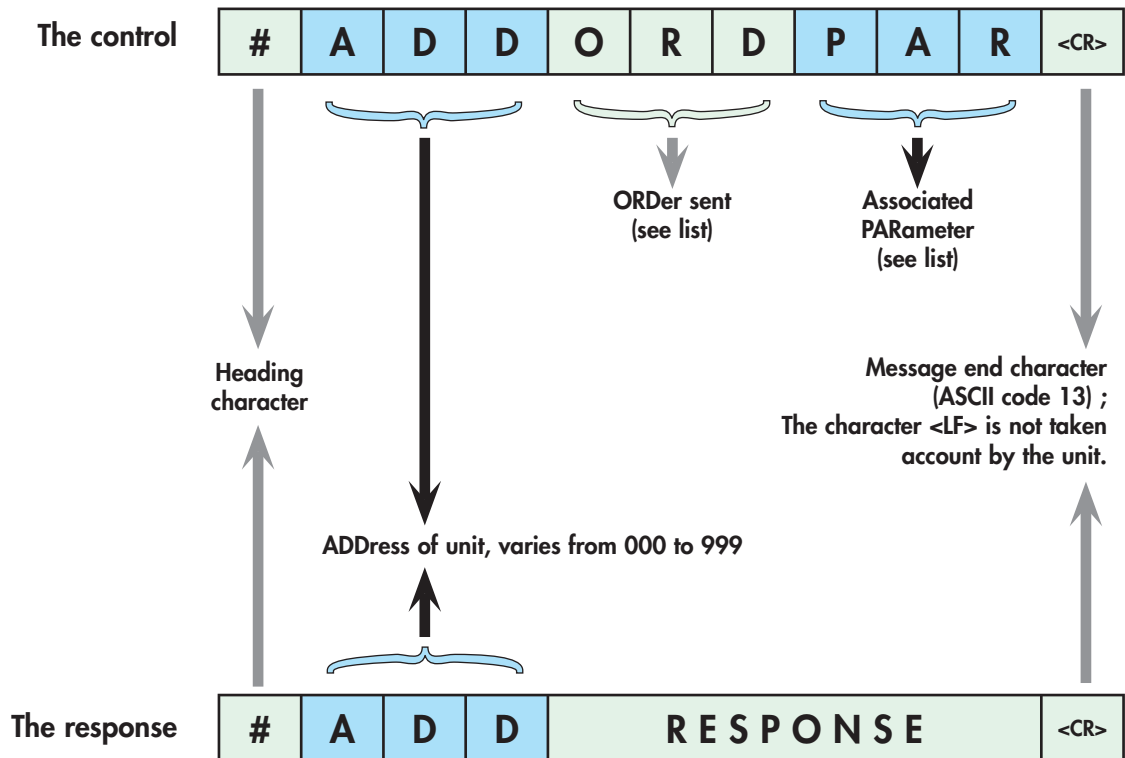
Setting / Observations	Action / Observations	Display / Observations
Access in the SETTING menu	Press the key + repeatedly to have access to the SETTING menu. Valid with the key ENTER .	<pre> DEFINITION MENU >>> SETTING <<< MAINTENANCE MANAGEMENT </pre>
Access to the parameter programming by the "Serial link 1" menu	Valid SERIAL LINK 1 menu with the key ENTER .	<pre> >>> SERIAL LINK 1 <<< CAPTEUR PURGE ALERTE PURGE REGUL. T° ADP </pre>
Access to the parameter to modify	Access to the parameter with + and valid with the key ENTER . Modify the chosen parameter with the keys + and - , and valid the setting with key ENTER . Return to main menu with key SET .	<pre> >>> TYPE RS 232 <<< ECHO ENABLED SPEED 9600 PARITY NO </pre>

Controlling the unit pumping using the serial link

The controls are used to manage information relative to the working pump. The pumping remote controls are however managed as a priority.

Use of the serial link (M4 monitoring)

Instruction syntax



Example of dialog :

E : #000 SYS ON

R : #000 OK

E : #000 ROO ON

R : #000 ERR2

Use of the serial link (M4 monitoring)

List of controls

Order	Parameter	Response	Action
DLI	XXX	OK ou ERR2	Program the automatic transmission interval in min:1 to 255 sec.
DLR	None		Start up the Data Logger.
ECH	ON or OFF	OK or ERR2	Return all characters received on the serial link in the case of ECHON
HDR	<val> see folio 6/6	OK or ERR3	Change the response heading character. Input its ASCII value.
IDN	None	V X.X	Send back the software version number.
SET	XXYZZZZ	OK or ERR2	Parameter setting: (example: # 0 0 0 S E T X X Y Z Z Z Z) XX = 00 : ADP power 01 : Aux. temperature 02 : Analog input 03 : Nitrogen 04 : E1 logic input 05 : E2 logic input 06* : Purge flow prolonged 07 : ADP Maintenance 08 : ADP LP bearings 09 : Load Lock maintenance 10 : Exhaust Maintenance 11 : ROOTS Maintenance 12 : Reserved 13 : Reserved/MFS alert 14 : Date setting : Day 15 : Date setting : Month 16 : Date setting : Year 17 : Time setting : Hour 18 : Time setting : Minute 19 : Free 20 : Set. (0)/ADP T° alarm (1) 21 : Reserved 22 : E3 logic input Y = 0 : Alert (concerns parameters 1 : Alarm XX=00/01/02/03/04/05/22) ZZZZ = Threshold value (see page 5/6)
SEP	<val> see folio 5/6	OK or ERR3	Used to change the separator character between 2 consecutive data items in a response. Input its ASCII value.
SYS	ON or OFF	OK or ERR2	Start up the pumping unit with SYSON and stop with SYSOFF.
TPS	XX		Maintenance time XX = 00 : Running time 01 : ADP Maintenance 02 : ADP LP bearing 03 : Load Lock maintenance 04 : Exhaust Maintenance 05 : ROOTS Maintenance 06 : Free
ROO	ON or OFF	OK or ERR2	Start up the ROOTS with the command ROOON and stop with ROOOFF.
PUR	ON or OFF	OK or ERR2	Start up the purge with PURON and stop with PUROFF.

* When XX=06 then Y=0 : purge flow prolonged for 10 minutes, setting values from 0 to 120 min.
 Y=1 : standby purge for 10 seconds, setting values from 0 to 9999s.

Use of the serial link (M4 monitoring)

List of controls (continued)

Order	Parameter	Response	Action		
DEF	XXY	FAULT	Display the 10 latest Alerts or Alarms (Example : # 0 0 0 D E F X X Y) XX = 0 to 09 (00 the newest, 09 the oldest) Y = 0 alarm, Y = 1 alert		
OPT	XXY		Choice of the pressure and the purge flowrate XX = 20, Y = 0 : standard pressure, Y = 1 : specific pressure XX = 21, Y = 0 : MFS = 60 slm, Y = 1 : MFS = 120 slm Dual cooling on ADS 1802 H XX = 26, Y = 0 : DISABLED, Y = 1 : ENABLED		
STA	NONE		<p>Transmission of a Data Logger frame</p> <p>Example :</p> <pre>#000 00100010000 0990 0 080 017 200 000 000 00 000000000000000000000000 0000</pre> <p style="font-size: small; margin-left: 20px;"> 0/3 5/15 17/20 22/25 27/29 31/33 35/37 39/42 44/45 47/67 69/72 </p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> 0 : header character 1-2-3 : address 4 : separator character 5 : ADP status 6 : Roots status 7 : purge status 8 : stand-by 9 : water valve 10 : inlet valve 11 : authorization valve closed 12 : ADP water valve 13 : Roots water valve 14 : pump LL on/off 15 : monitoring mode control* Bit 7 : always to 1 Bits 6,5,4,3,2,1 : reserved Bit 0 = 0 : local mode Bit 0 = 1 : remote mode 16 : separator character 17-20 : pressure (mbar) 21 : separator character 22-25 : power (W) 26 : separator character 27-29 : ADP temperature (°C) 30 : separator character 31-33 : reserved (°C) 34 : separator character 35-37 : auxiliary temperature (°C) 38 : separator character </td> <td style="width: 50%; vertical-align: top;"> <ul style="list-style-type: none"> 39-42 : analog input (mV) 43 : separator character 44-45 : MFS (max. 99 slm) 46 : separator character 47 : pressure fault 48 : aux. temperature fault 49 : consumption fault 50 : E analog fault 51 : E1 logic fault 52 : E2 logic fault 53 : variator fault 54 : water flow fault 55 : main power supply fault 56 : motor temperature fault 57 : valve fault 58 : breaker fault 59 : N2 purge fault 60 : maintenance fault 61 : ADP high temperature fault 62 : ADP low temperature fault 63 : Roots temperature fault 64 : LL pump fault 65 : E3 logic fault 66 : free fault 67 : free fault 68 : separator character 69-72 : N2 purging in second 73 : CR </td> </tr> </table>	<ul style="list-style-type: none"> 0 : header character 1-2-3 : address 4 : separator character 5 : ADP status 6 : Roots status 7 : purge status 8 : stand-by 9 : water valve 10 : inlet valve 11 : authorization valve closed 12 : ADP water valve 13 : Roots water valve 14 : pump LL on/off 15 : monitoring mode control* Bit 7 : always to 1 Bits 6,5,4,3,2,1 : reserved Bit 0 = 0 : local mode Bit 0 = 1 : remote mode 16 : separator character 17-20 : pressure (mbar) 21 : separator character 22-25 : power (W) 26 : separator character 27-29 : ADP temperature (°C) 30 : separator character 31-33 : reserved (°C) 34 : separator character 35-37 : auxiliary temperature (°C) 38 : separator character 	<ul style="list-style-type: none"> 39-42 : analog input (mV) 43 : separator character 44-45 : MFS (max. 99 slm) 46 : separator character 47 : pressure fault 48 : aux. temperature fault 49 : consumption fault 50 : E analog fault 51 : E1 logic fault 52 : E2 logic fault 53 : variator fault 54 : water flow fault 55 : main power supply fault 56 : motor temperature fault 57 : valve fault 58 : breaker fault 59 : N2 purge fault 60 : maintenance fault 61 : ADP high temperature fault 62 : ADP low temperature fault 63 : Roots temperature fault 64 : LL pump fault 65 : E3 logic fault 66 : free fault 67 : free fault 68 : separator character 69-72 : N2 purging in second 73 : CR
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* Monitoring mode control (15) :



Item 5 to 14 :
= 0 : OFF
= 1 : ON

Item 47 to 65 :
= 0 : OK, no fault
= 1 : alert
= 2 : alarm

Use of the serial link (M4 monitoring)

Table for mini/maxi parameter thresholds

Parameter	Unit	Thresholds		
		Mini	Maxi	Limit
Mass-flowmeter	slm	0	60 (P version) 120 (H version)	
ADP pump temperature sensor	°C	70	130 or 140 (ADS 1802)	
Moter power sensor	W	500	5000	
E. analogic sensor	mV	0	9950	
LI1. logic sensor	mn	0	60	61 DISABLED
LI2. logic sensor	mn	0	60	61 DISABLED
LI3. logic sensor	mn	0	60	61 DISABLED
Auxiliary temperature (dual cooling on ADS 1802 H)	°C	70	100	
Auxiliary temperature ADS 602 P - ADS 602 H	°C	0	170	
Auxiliary temperature	°C	70	170	

Modifying the separator character

Order	Parameter	Response	Action
SEP	<val> val = decimal value of the ASCII code of the separator character between 1 and 255	OK or ERR3	Change the separator character between two consecutive data items in the response. Note: - The factory configuration is the decimal code «032» of the «space» character. - Customer selection is memorized by the monitoring.

Example: An order of the type: **#000SEP044<CR>«044»** is the decimal ASCII code of the character «,» (comma).

Command **#000STA<CR>**

Response **#000,00000,2,0080,2530,0127,1230,0000000000 <CR>**

Only commands requiring the separator character are affected by the SEP order.

Use of the serial link (M4 monitoring)

Modifying the header character

Order	Parameter	Response	Action
HDR	<val> val = decimal value of the ASCII code of the header character between 001 and 127	OK or ERR3	Change the header character in front of a response address. Note : - The factory configuration is the decimal code «035» of the character «#». - The code «020» corresponds to «no header character» - Customer selection is memorized by the monitoring.

Example: The value «047», the decimal ASCII code of the character «/».

Command **#002HDR047<CR>**

Response **/002OK**

Command **002IDN<CR>**

Response **/002M3 MONITORING SYSTEM VERSION 2.02**

Interpreting responses supplied by the serial link

OK or a specific response to the order if everything is correct.

ERRO : setting fault

ERR1 : order fault

ERR2 : parameter fault

ERR3 : context fault

ERR4 : checksum fault

Note: "The Remote control mode" has priority on RS 232 or RS 485 commands for SYS, ROO and PUR commands.



Maintenance

User's Manual ADP/ADS Series Two Detailed contents

D 000	<i>Safety instruction related to maintenance</i>
D 010	<i>First level of maintenance</i>
D 030	<i>Diagnosis and troubleshooting</i>
D 400	<i>Pump or Roots does not start</i>
D 500	<i>The pump is running and then is showing a warning or fault message</i>
D 600	<i>The pump is running but the performances are not correct</i>

Safety instruction related to maintenance

⚠ WARNING

When the main electrical switch on the top of the pump is set to "0", the part supply between the power plug and the main switch remains energized.

Risk of electrical shock in case of contact.

Disconnect main electrical cable before servicing.

⚠ WARNING

Hazardous voltage enclosed.

Voltage or current hazard sufficient to cause shock.

Disconnect and lockout power before servicing.

Any intervention must be done by trained personnel only.

⚠ WARNING

When the pump is switched off, internal parts (monitoring, frequency converter) contain capacitors charged with over 60 VDC and remain energized.

Electrical shock may result in severe injury.

Wait 1 minute after switching off before opening the pump.



⚠ WARNING
HAZARDOUS VOLTAGE ENCLOSED
 Voltage or current hazard sufficient to cause shock. Disconnect and lockout power before servicing.

Located on the upper covers, this label indicates that some of the internal parts are energized and could cause electrical shocks in case of contact. It advises to disconnect the pump before any intervention or to properly lock-out and tag-out the equipment breaker before any intervention on the pump.



⚠ WARNING
HOT SURFACE
 Contact may cause burn. Do not touch or wear protective gear before servicing.

Located on the covers of the pump, this label warns the user against possible risk of injury due to any hand contact with hot surfaces. It states that protective gloves should be used before performing any intervention.



⚠ WARNING
FLAMMABLE, CORROSIVE AND TOXIC CHEMICALS LOCATED WITHIN THE ENCLOSURE
 Exposure may result in severe injury or death. Preventive maintenance must be done by trained personnel only.

Located on the upper cover, this label warns the user against pumped process gas that could be dangerous and toxic and could cause severe injuries or death. It specifies that any preventive maintenance operation can only be performed by trained personnel.

⚠ DANGER

Remaining process gases in the pump may cause severe injury or death. Before removing the pump, continue N2 flow from the process tool for 30 min. Nitrogen pressure and flow rate should be identical to the programmed values during process.

Safety instruction related to maintenance

DANGER

During pump removal, operator could be in contact with process residues on the exhaust which could cause severe injury or death.
Ask your safety department for instructions according to the local statements.

Recommandations (P and H versions)

Purge the installation with dry nitrogen.
The flush is performed automatically when the pump is stopped (normal stop, or due to a fault) if a maintained level of purge gas has been programmed.

Otherwise, proceed as follows:

- If the pump is remote controlled, remove the connections on J14 and J1 connectors, at the rear of the pump, and connect the cover plug connectors (supplied with the machine) instead.
- Adjust the parameter "PURGE FLOW PROLONGED" for a period of 10 minutes and program the PURGE COMMAND on ENABLED.
- Press START and then STOP on the front panel: the gas purge takes place during the "STOP IN PROGRESS".

Wear gloves, protective glasses and, if necessary, a breathing mask.

Ventilate the premises well.

Do not dispose of residue, if necessary, have it destroyed by a qualified organization.

WARNING

Unsuffisant tightness after servicing could result in chemical hazards.
Always perform a leak test after maintenance.

How to contact us

The partial and full overhaul must be performed by manufacturer's trained personnel.

Contact nearest service center or the service support at the following e-mail address:

support.service@adixen.fr

First level of maintenance

Study the safety instructions related to maintenance (See D 00).

When a problem occurs, the user is informed by:

- the relevant fault indicator light which is located on the front panel: yellow lit in case of warning, red lit in case of fault (followed by a pump stop or not, depending on setting parameters, see C 42),
- the audible buzzer warning (if preselected),
- the fault contacts on the J14 remote connector at the rear of the monitoring system which close,-
- the stopping of the pumping although the STOP command has not been given,
- the display of fault message on the display of the hand-held remote control,
- a message via the RS 232 or RS 485 link on a micro-computer.

Maintenance time monitoring

Depending on the maintenance parameter programmed, when the operating time before maintenance has expired, the screen display alternates between operating parameters and the corresponding warning message.

The red indicator light is lit on front panel.

This information can be read at any time using the MAINTENANCE menu.

Perform maintenance on the relevant parts.

Maintenance frequency

Maintenance times can change according to processes and equipment used. Contact the pump manufacturer for more information.

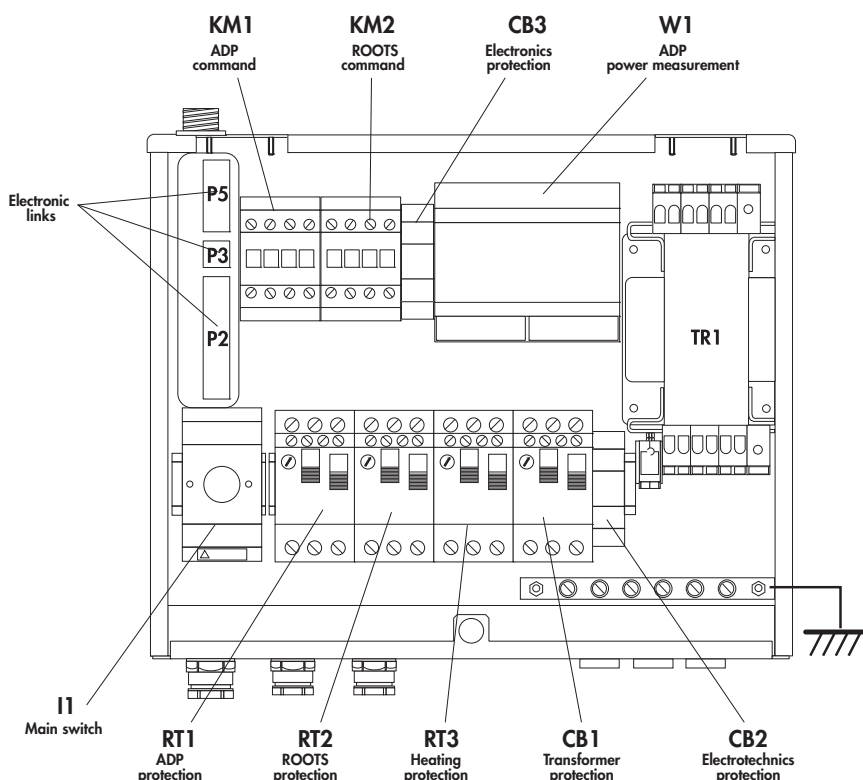
Oil change

There is no oil change required on site. This is done during the pump overhaul by the manufacturer's trained personnel.

First level of maintenance

Location of electrical components (electrical cabinet)

The diagnosis and troubleshooting guide (from **D 30**) may lead to check the electrical components of the monitoring cabinet described below:



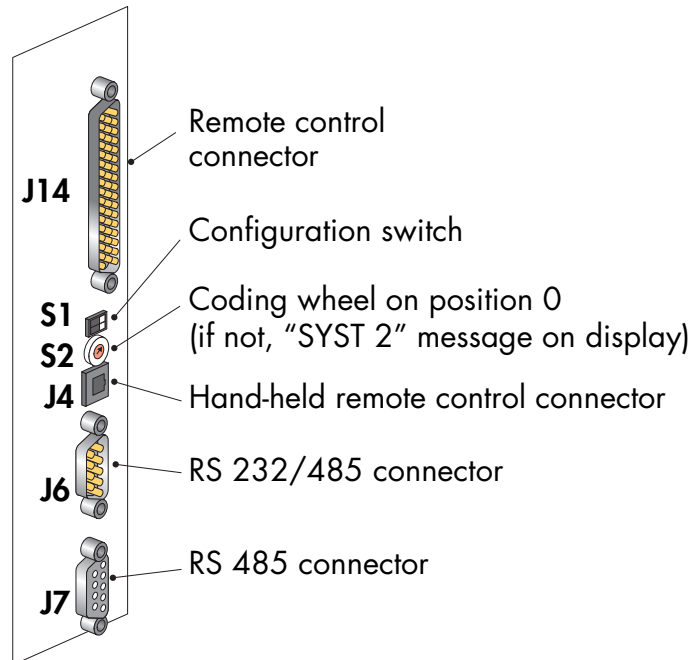
Breaker rating

Pump		Voltage	RT1	RT2(1)	RT3	CB1
ADP 122 / ADS 602	B.T.	200 à 230 V - 50/60 Hz	10 A	10 A	1 A	1 A
	H.T.	380 à 480 V - 50/60 Hz	6 A	6 A	0,7 A	0,7 A
ADS 1202	B.T.	200 à 230 V - 50/60 Hz	10 A	18 A	1 A	1 A
	H.T.	380 à 480 V - 50/60 Hz	6 A	13 A	0,7 A	0,7 A
ADS 1802	B.T.	200 à 230 V - 50/60 Hz	14 A	18 A	1 A	1 A
	H.T.	380 à 480 V - 50/60 Hz	9 A	13A	0,7 A	0,7 A

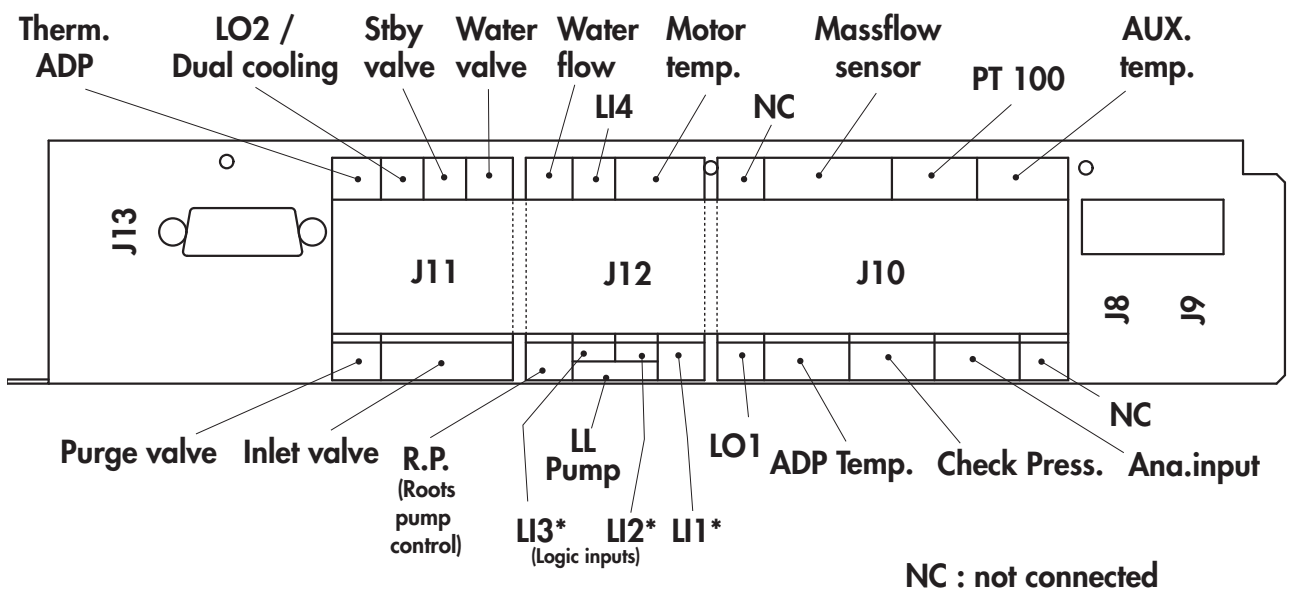
(1) On ADS 602 (with variator) breaker rate on 10A.

First level of maintenance

Electrical interfaces lay-out at the rear of the pump



Sensors connectors lay-out at the rear of the monitoring system M4



* Parameters and displays of logic inputs are worded "LOG1 - LOG2 - LOG3" on the hand held remote module (see C 42).

Diagnosis and trouble shooting

■ **Pump or Roots does not start.....** ■ **D 400**

- mains presence light indicator does not switch on
- hand-held remote control display is not lighting up
- display is showing a message or an alarm

■ **The pump is running and
a message numbered is showing** ■ **D 500**

■ **The pump is running but
the performances are not correct** ■ **D 600**

Pump or Roots does not start

- Mains presence light indicator does not switch on .. ■ **page 1**
- Hand-held remote control display is not lighting up . ■ **page 1**
- Display is showing a message or an alarm ■ **page 2**

Mains presence light indicator does not switch on

Incident	Cause	Troubleshooting
Mains presence light indicator does not switch on	<ul style="list-style-type: none"> ▶ No mains ▶ Main switch on position "0" ▶ External emergency stop engaged ▶ Unit emergency stop engaged ▶ CB1 breaker switched off ▶ CB2 breaker switched off ▶ Other problem 	<ul style="list-style-type: none"> ▪ Check power supply. ▪ Switch it on "1". ▪ Check the presence of cover plug J1, or check its locking. ▪ Rotate to unlock the emergency stop on the front panel display. ▪ Check the amperage setting (see D 10). ▪ Switch it on. ▪ Switch it on (see D 10). <p>☎ Call customer service center.</p>

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Hand-held remote control display is not lighting up

Incident	Cause	Troubleshooting
Hand-held remote control display is not lighting up, but the "mains presence" green light indicator is on	<ul style="list-style-type: none"> ▶ CB3 breaker switched off ▶ Twisted cable incorrectly connected ▶ Other problem 	<ul style="list-style-type: none"> ▪ Switch it on (see D 10). ▪ Check the connection. <p>☎ Call customer service center.</p>

Pump or Roots does not start

Display is showing a message or an alarm

Incident	Cause	Troubleshooting
<p>Hand-held remote control display is showing</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> MONITOR M4 D 9111 VX.XX </div>	<p>▶ Hand-held remote control is on soft loading configuration</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> ▪ Set the switch S1-1 to "OFF" (see C 10). ▪ Switch off for 10 s, then switch on again. <p>☎ Call customer service center.</p>
<p>Hand-held remote control display is showing</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> WAIT ??? </div>	<p>▶ Electronic is in "slave" mode: without hand-held remote control</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> ▪ Set the switch S2 to "0". ▪ Switch off for 10 s, then switch on again. (see D 10). <p>☎ Call customer service center.</p>
<p>Display is showing</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> XXH LOC.N2. PUMPING STOPPED MM/JJ/AA HH:MM </div> <p>... by pressing on any key ...</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> XXH LOC.N2. COMMAND NOT ALLOWED JJ/MM/AA HH:MM </div>	<p>▶ Pump is used with several hand-held remote controls</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> ▪ Only one hand-held remote control can monitor the pump. ▪ Press on CONTROL to disable the monitoring on other remote controls. ▪ Press on CONTROL on the requested remote control to monitor the group. ▪ Wait for the display: <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> * XXH LOC.N2. PUMPING STOPPED MM/JJ/AA HH:MM </div> <p>☎ Call customer service center.</p>
<p>Message on display</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> STOCK </div>	<p>▶ Pump in storage mode</p>	<ul style="list-style-type: none"> ▪ Set the main switch to "0" to switch off the pump. ▪ Switch it on again.
<p>Message on display</p> <div style="border: 1px solid black; padding: 5px; background-color: #e0f2f1;"> REM </div>	<p>▶ In Remote mode: No cover plug or bad connection</p> <p>▶ M4 problem</p>	<ul style="list-style-type: none"> ▪ Check the wiring of J14 connector (see B 70). <p>☎ Call customer service center.</p>

Pump or Roots does not start

Incident	Cause	Troubleshooting
<p>Only ADP starts No "Roots" message on the display</p>	<ul style="list-style-type: none"> ▶ Incorrect M4 configuration ▶ Roots command "VALID" 	<ul style="list-style-type: none"> ▪ Configure for "ADS". ▪ Reset the configuration if separate Roots command is not necessary. ▪ Configure Roots command "INVALID". ▪ Press "ROOTS" key
<p>Roots does not run but "ROOTS" message on the display</p> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">ROOTS</div>	<ul style="list-style-type: none"> ▶ Roots LED off ▶ Other problem 	<ul style="list-style-type: none"> ▪ Check the presence or connection of RP plug located on electronic inside cabinet J12 (see D 10). <p>☎ <i>Call customer service center.</i></p>
<p>Display is showing other messages</p> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">W01/D01 EXHAUST PRESSURE</div> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">W09/D09 POWER SUPPLY</div> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">D34 BREAKER</div> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">D35 EM. STOP; ADP CONT.</div> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">D37 ROOTS BREAKER</div> <div style="border: 1px solid black; background-color: #d9ead3; padding: 2px; margin-bottom: 5px;">D38 ADP BREAKER</div>	<p>▶ see D 500 for trouble-shooting</p>	

The pump is running and then is showing a warning or fault message

Warning message «WXX»

- the yellow light is lighting up.
- the buzzer is activated (if parameter configured see C 42).
- the pump is not stopped.

Fault message «DXX»

- the red light is lighting up.
- the buzzer is activated (if parameter configured see C 42).
- the pump stops.

Faults list

Warning «W»	Fault «D»	Number	Fault	page
x	x	01	EXHAUST PRESSURE	2
opt		02	AUX TEMPERATURE	2
x	x	03	MOTOR POWER	2
opt	opt	04	ANALOGIC INPUT	3
opt	opt	05	LOGIC INPUT 1	3
opt	opt	06	LOGIC INPUT 2	3
opt	opt	07	SPEED CONTROL	3
x		08	WATER FLOW	4
x	x	09	POWER SUPPLY	4
x	x	10	MOTOR TEMP.	4
opt		11	INLET VALVE	5
opt	opt	12	LOGIC INPUT 3	3
x	x	13	N2 FLOW	5
x	x	15	ADP TEMP. HIGH	6
x		16	ADP TEMP. LOW	6
opt		18	LOAD-LOCK PUMP	6
x		19	SYS : 1	D10
x		20	SYS : 2*	
opt		28	LOAD-LOCK MAINT.	6
opt		29	ROOTS MAINT.	7
x		30	EXHAUST MAINT.	7
x		31	ADP LP MAINT.	7
x		32	ADP MAINT.	7
	x	34	EM. STOP; ADP CONT.	7
	x	35	EMERGENCY STOP	7
	x	36	ADP CONTACTOR	7
	opt	37	ROOTS BREAKER	7
	x	38	ADP BREAKER	8
	opt	39	ROOTS CONTACTOR	8

(x) Standard management.

(opt) Optional management. The message is only displayed if the option is installed on the pump.

* if such defect type is displayed, contact the customer service.

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Warning</p> <p>W01 EXHAUST PRESSURE</p>	<ul style="list-style-type: none"> ▶ Exhaust pressure > 1450 mbar (P/LM) > 1650 mbar (H) ▶ Sensor problem (P = 500mbar) ▶ Other problem 	<ul style="list-style-type: none"> • Check N2 flowrate setting (see B 40). • Check exhaust line. • Check the sensor connection on CHECK PRESS connector. ☎ Call customer service center.
<p>Fault</p> <p>D01 EXHAUST PRESSURE</p>	<ul style="list-style-type: none"> ▶ Exhaust pressure > 1990 mbar ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Check N2 flowrate setting (see B 40). • Check exhaust line. • Check the sensor connection on CHECK PRESS connector. ☎ Call customer service center.
<p>Warning</p> <p>W02 AUX TEMPERATURE "AUX TEMP" input not used</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration 	<ul style="list-style-type: none"> • Check that "AUX.TEMP." option is not valid.
<p>Warning</p> <p>W02 AUX TEMPERATURE "AUX TEMP" input is used</p>	<ul style="list-style-type: none"> ▶ Incorrect kind of probe ▶ T < lower or T > higher warning threshold ▶ ADS 1802 : T < (Set temperature - 15°C) or T > fault threshold ▶ Incorrect connection (displayed temp. = 170°C) ▶ Other problem 	<ul style="list-style-type: none"> • Check that the sensor is a PT 100 type probe. • Check that the measured temperature corresponds to the display. • Check the thresholds. • Check that the measured temperature corresponds to the display. • Check the thresholds. • Check that the sensor is wired between pins 17 and 18 of "AUX.TEMP." connector. • Remake the connection (see D 10). ☎ Call customer service center.
<p>Warning then Fault</p> <p>W03/D03 MOTOR POWER</p>	<ul style="list-style-type: none"> ▶ Incorrect rotation direction ▶ Other problem 	<ul style="list-style-type: none"> • Check the direction of rotation of the pump (see B 51). ☎ Call customer service center.
<p>Warning then Fault</p> <p>W03/D03 MOTOR POWER Power > threshold</p>	<ul style="list-style-type: none"> ▶ Incorrect threshold setting ▶ Other problem 	<ul style="list-style-type: none"> • Check the settings of monitoring thresholds. ☎ Call customer service center.

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Warning or Fault</p> <p>W04/D04 ANALOGIC INPUT</p> <p>Analogic input is not used</p>	<p>▶ Incorrect monitoring configuration</p>	<ul style="list-style-type: none"> • Check that "ANALOG INPUT" menu is not valid.
<p>Warning or Fault</p> <p>W04/D04 ANALOGIC INPUT</p> <p>Analogic input is used</p>	<p>▶ Incorrect monitoring configuration</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the warning or fault thresholds. • Check that the voltage is in accordance with M4 display. <p>📞 <i>Call customer service center.</i></p>
<p>Warning or Fault</p> <p>W05/D05 LOGIC INPUT 1</p> <p>W06/D06 LOGIC INPUT 2</p> <p>W12/D12 LOGIC INPUT 3</p> <p>Logic input is not used</p>	<p>▶ Incorrect monitoring configuration</p>	<ul style="list-style-type: none"> • Check that "LI1 LOG INPUT" (LI2 or LI3) is not valid.
<p>Warning ou Fault</p> <p>W05/D05 LOGIC INPUT 1</p> <p>W06/D06 LOGIC INPUT 2</p> <p>W12/D12 LOGIC INPUT 3</p> <p>Logic input is used</p>	<p>▶ Incorrect monitoring configuration</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the warning or fault delays. • Check the sensors. <p>📞 <i>Call customer service center.</i></p>
<p>Warning</p> <p>W07 SPEED CONTROL</p> <p>Variator option is not used</p>	<p>▶ Incorrect monitoring configuration</p>	<ul style="list-style-type: none"> • Check that "SYSTEM SELECT." menu is properly configured.
<p>Warning</p> <p>W07 SPEED CONTROL</p> <p>Roots does not run at nominal speed</p>	<p>▶ Mechanical problem</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the exhaust line. <p>📞 <i>Call customer service center.</i></p>
<p>Warning</p> <p>W07 SPEED CONTROL</p> <p>Roots does not run</p>	<p>▶ Motor problem</p>	<p>📞 <i>Call customer service center.</i></p>
<p>Fault</p> <p>D07 SPEED CONTROL</p> <p>(ADS 1802 only)</p>	<p>▶ Incorrect monitoring configuration</p>	<ul style="list-style-type: none"> • Check that "SYSTEM SELECT." menu is properly configured.

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Fault</p> <p>D07 SPEED CONTROL</p> <p>A300 functional block does not run at ultimate speed</p>	<ul style="list-style-type: none"> ▶ Mechanical problem ▶ Other problem 	<ul style="list-style-type: none"> • Check the exhaust line. ☎ Call customer service center.
<p>Warning</p> <p>W08 WATER FLOW</p>	<ul style="list-style-type: none"> ▶ No water flow ▶ Insufficient water flow ▶ Sensor not wired ▶ Other problem 	<ul style="list-style-type: none"> • Check the water supply. • Check the main valve connection on "Water valve" connector (see D 10). • Check that the main valve, the flowmeter and the pipes are not clogged. • Check the setting value of the flowmeter (see B 30). • Check that there are no leaks. • Check the flowmeter connection on the "Waterflow" connector (see D 10). ☎ Call customer service center.
<p>Warning then Fault</p> <p>W09/D09 POWER SUPPLY</p>	<ul style="list-style-type: none"> ▶ Main power is not correct ▶ Other problem 	<ul style="list-style-type: none"> • Check the main power. ☎ Call customer service center.
<p>Warning</p> <p>W10 MOTOR TEMP.</p>	<ul style="list-style-type: none"> ▶ Motor temperature is > 100°C ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • See Warning Water flow (W08). • Check the sensor connection on Mot. temp. connector (see D 10). ☎ Call customer service center.
<p>Fault</p> <p>D10 MOTOR TEMP.</p> <p>Soft > 1.03</p>	<ul style="list-style-type: none"> ▶ No motor temperature cable connected ▶ Motor temperature is > 150°C ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • In case of ADS 602, check that a cover plug or a cable is connected on LI4 logic input (see D 10). • Check the sensor connection on Mot. temp. connector (see D 10). • See Warning Water flow (W08). • Check the sensor connection on Mot. temp. connector (see D 10) (and the Roots temperature sensor on LI4 on model ADS 602, ADS 1202.) ☎ Call customer service center.
<p>Fault</p> <p>D10 MOTOR TEMP.</p> <p>Soft < 1.03</p>	<ul style="list-style-type: none"> ▶ Sensor problem ▶ Motor temperature is > 150°C ▶ Other problem 	<ul style="list-style-type: none"> • Check the sensor cable connection on Mot. temp. connector (see D 10). • See Warning Water flow (W08). ☎ Call customer service center.

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Warning</p> <p>W11 INLET VALVE</p> <p>There is no isolating valve at inlet</p>	<p>▶ Incorrect monitoring configuration</p>	<ul style="list-style-type: none"> • Check that "INLET VALVE OPTION" is not validated
<p>Warning</p> <p>W11 INLET VALVE</p> <p>There is an isolating valve at inlet</p>	<p>▶ The valve does not close at pump stop or does not open at start-up</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check compressed air supply. • Check valve condition. <p>☎ Call customer service center.</p>
<p>Warning then Fault</p> <p>W13/D13 N2 FLOW</p>	<p>▶ No purge flow</p> <p>▶ Insufficient purge flow</p> <p>▶ Incorrect threshold setting</p> <p>▶ Sensor problem</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check nitrogen supply. • Check the main valve connection on Purge valve connector (see D 10). • Check the setting of nitrogen flow (see B 40). • Check that there is no leak. • Check the warning threshold. • Check the sensor connection on MassFlow Sensor connector (see D 10). <p>☎ Call customer service center.</p>
<p>Warning</p> <p>W15 ADP TEMP. HIGH</p> <p>Pump temperature is > of 10°C to the temperature control setting value</p>	<p>▶ Temperature control valve supply problem</p> <p>▶ Cooling problem</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the temperature control valve connection on Therm. ADP connector (see D 10). • See Warning Water flow (W08). <p>☎ Call customer service center.</p>
<p>Fault</p> <p>D15 ADP TEMP. HIGH</p> <p>Pump temperature is between: (Set temperature - 15°C) and (Set temperature + 10°C) but the display is 0 or 170 °C or Pump temperature is lower than fault threshold</p>	<p>▶ Defective temperature sensor</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the sensor connection on ADP.Temp connector (see D 10). <p>☎ Call customer service center.</p>
<p>Fault</p> <p>D15 ADP TEMP. HIGH</p> <p>Pump temperature is higher than fault threshold (> Set temperature+ 10°C)</p>	<p>▶ Temperature control valve not connected</p> <p>▶ Cooling problem</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check the temperature control valve connection on Therm. ADP connector (see D 10). • See Warning Water flow (W08). <p>☎ Call customer service center.</p>

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Warning</p> <p>W16 ADP TEMP. LOW</p> <p>Pump temperature is < of 15°C to the temperaturecontrol setting value</p>	<ul style="list-style-type: none"> ▶ Temperature control valve supply problem ▶ Other problem 	<ul style="list-style-type: none"> • Check the temperature control valve connection on Therm. ADP connector (see D 10). ☎ Call customer service center.
<p>Warning</p> <p>W18 LOAD-LOCK PUMP</p> <p>LI1 and LI3 logic inputs are not used to monitor a LL pump</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration 	<ul style="list-style-type: none"> • Check that “LL PUMP OPTION” is not valid. (see C 42).
<p>Warning</p> <p>W18 LOAD-LOCK PUMP</p> <p>LI1 and LI3 logic inputs are used to monitor a LL pump</p>	<ul style="list-style-type: none"> ▶ LL pump problem ▶ Wiring problem ▶ Other problem 	<ul style="list-style-type: none"> ☎ Call customer service center. • Check the connections on LI1 and LI3 connectors (see D 10). ☎ Call customer service center.
<p>Warning</p> <p>W28 LOAD-LOCK MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of a parameter is reached 	<ul style="list-style-type: none"> • Check maintenance thresholds. ☎ Call customer service center.
<p>Warning</p> <p>W29 ROOTS MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of a parameter is reached 	<ul style="list-style-type: none"> • Check maintenance thresholds. ☎ Call customer service center.
<p>Warning</p> <p>W30 EXHAUST MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of a parameter is reached 	<ul style="list-style-type: none"> • Check maintenance thresholds. ☎ Call customer service center.
<p>Warning</p> <p>W31 ADP LP MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of a parameter is reached 	<ul style="list-style-type: none"> • Check maintenance thresholds. ☎ Call customer service center.
<p>Warning</p> <p>W32 ADP MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of a parameter is reached 	<ul style="list-style-type: none"> • Check maintenance thresholds. ☎ Call customer service center.
<p>Fault on ADS 1202/1802</p> <p>D34 AR.URGT; CONT.ADP</p>	<ul style="list-style-type: none"> ▶ Incorrect M4 configuration ▶ Other problem 	<ul style="list-style-type: none"> • Configure for “ADP 122” or “ADS” (see C 42). ☎ Call customer service center.
<p>Fault</p> <p>D35 EMERGENCY STOP</p>	<ul style="list-style-type: none"> ▶ Pump emergency stop is engaged ▶ Other problem 	<ul style="list-style-type: none"> • Rotate to unlock the emergency stop on the front panel display. ☎ Call customer service center.

The pump is running and then is showing a warning or fault message

Incident	Cause	Troubleshooting
<p>Fault</p> <p>D36 ADP CONTACTOR</p>	<p>▶ KM1 contactor not closed</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check CB2 (see D 10). • Check that there is a strap between pins 2 and 3 of emergency stop terminal (see B 100). <p>📞 Call customer service center.</p>
<p>Fault</p> <p>D37 ROOTS BREAKER</p>	<p>▶ RT2 breaker switched off</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check that ADS option is selected. (see C 42). • Check RT2 setting (see D 10). • Switch RT2 on. <p>📞 Call customer service center.</p>
<p>Fault</p> <p>D38 ADP BREAKER</p>	<p>▶ RT1 breaker switched off</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check RT1 setting (see D 10). • Switch RT1 on. • Check the exhaust line. <p>📞 Call customer service center.</p>
<p>Fault</p> <p>D39 ROOTS CONTACTOR</p>	<p>▶ KM2 contactor not closed</p> <p>▶ Other problem</p>	<ul style="list-style-type: none"> • Check CB2 (see D 10). • Check that there is a strap between pins 2 and 3 of emergency stop terminal (see B 100). • Check the emergency stop switch (J1). <p>📞 Call customer service center.</p>

The pump is running but the performances are not correct

Incident	Cause	Troubleshooting
Bad vacuum or no vacuum	▶ Polluted or clogged pump	<ul style="list-style-type: none"> • Maintenance ADP ⌚ Call customer service.
	▶ Internal oil leak	<ul style="list-style-type: none"> • Maintenance ADP ⌚ Call customer service.
Mechanical noise	▶ Damaged ball bearing	<ul style="list-style-type: none"> • Maintenance ADP ⌚ Call customer service.
	▶ Rotors seizing	<ul style="list-style-type: none"> • Maintenance ADP ⌚ Call customer service.
	▶ Unsynchronized gears	<ul style="list-style-type: none"> • Maintenance ADP ⌚ Call customer service.
No N2 purge	▶ Incorrect configuration	<ul style="list-style-type: none"> • Reset M4 configuration (PURGE CMD enabled) or set the purge manually (PURGE key on hand held remote control).



Maintenance sheets

User's Manual ADP/ADS Series Two Detailed contents

E 010	<i>ADP/ADS Exchange standard repair</i>
E 011	<i>Preliminary precautions</i>
E 012	<i>Draining of the water cooling circuit</i>
E 013	<i>Saving of the pump configuration</i>
E 014	<i>Disconnecting the pump from the installation</i>
E 015	<i>Conditionning the pump for shipping</i>

ADP/ADS Exchange standard repair

Presentation of ADP/ADS exchange standard repair

ADP/ADS exchange standard repair has been detailed into several key steps.

These are detailed in specific sheets as listed below.

The key steps must be followed in chronological order:

- Preliminary precautions ■ E 011
- Draining of the water cooling circuit ■ E 012
- Saving of the pump configuration ■ E 013
- Disconnecting the pump from the installation ■ E 014
- Shipping procedure for contaminated pumps ■ E 015
- Safety questionnaire ■ G 200
- Installing a new pump ■ B 000 to B130
- Remote loading of pump configuration ■ C 44

Preliminary precautions

Protection against corrosive gases

Users are advised to observe the precautions presented below during any maintenance operation on the pump and, more especially, any operations requiring the disassembly of sub-assemblies.

⚠ DANGER

Remaining process gases in the pump may cause severe injury or death. Before removing the pump, continue N₂ flow from the process tool for 30 min.

Nitrogen pressure and flow rate should be identical to the programmed values during process.

⚠ DANGER

During pump removal, operator could be in contact with process residues on the exhaust which could cause severe injury or death.

Ask your safety department for instructions according to the local statements.

Users are advised:



To stop the pump according to «shutdown procedure for discontinuous operation» safety instructions (see COO).

To use gloves, protective goggles and, if required for the gases in question, a breathing mask.

To ensure that the premises are well ventilated.

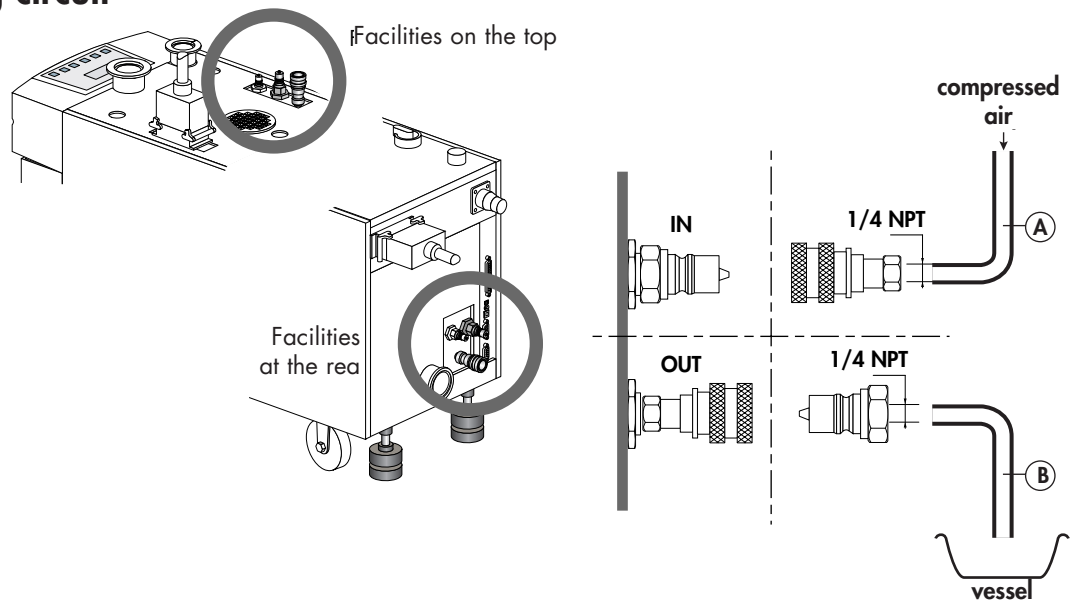
Not to dispose of residues in the usual waste disposal network and, if necessary, to call an organization which specializes in their recycling or destruction.

To have ready the “inlet and exhaust” flanges. They are fitted on the pump at delivery. If the flanges are missing, contact Customer Service.

Draining of the water cooling circuit

Connecting the cooling circuit

Disconnect the water inlet and outlet quick connectors.



As the water circuit is equipped with water valve (normally closed), emptying operation must be done when the pump is running (so valves are opened).

Prepare a flexible pipe (A) with a 1/4 inch quick male connector (to be connected to compressed air circuit) and another flexible pipe (B) with a 1/4 inch female connector.

Disconnect inlet and outlet water fittings on the pump.

Connect pipe (B) on the pump, at location "OUT" and place the other end of the pipe in a vessel (total water volume will be greater than one litre).

Connect pipe (A) at location of "IN" and connect the other end to a compressed air circuit (2 to 5 bars).

Draining of the water cooling circuit

Draining the water volume

CAUTION

This operation must be performed quickly, because without any water cooling the pump will overheat after a few minutes and will be in warning/hazard mode.

Turn on the pump (main switch to 1).

In the monitoring DEFINITION menu, set **THERM. ADP OPTION** to INVALID.

Press **START**. Inject compressed air into the **IN** inlet and let the pump run until all the water has been completely evacuated (or check whether there is any water in the flowmeter).

Press **STOP** and confirm by pressing **ENTER**.

Enter monitoring again to set **THERM. ADP OPTION** to VALID.

When the water is filled out, quickly stop the pump and disconnect pipes **(A)** and **(B)**.

Saving of the pump configuration

Back up the settings of the pump to be replaced in order to enter them into the new pump and ensure identical operations.
We advise not returning the hand-held remote control to the service center.

CAUTION

Loading and saving the parameters with the pump in operation may result in a software conflict.

Perform these operations when the pump is switched on but with pumping stopped.

Configuration saving

The pump configuration is memorized in the internal electronics of M4 monitoring.

Enter in the menu by **SET**.

Go on using **+** to access the MANAGEMENT menu and valid by **ENTER**.

```
DEFINITION
SETTING
MAINTENANCE
>>> MANAGEMENT <<<
```

Go on using **+** to access the CONFIG.SAVE menu and valid by **ENTER**.

```
STORAGE
>>>> CONFIG SAVE <<<<
CONFIG. LOAD
OPERATING TIME
```

The pump configuration is then duplicate into the hand-held remote control memory.

Return to main menu and exit the setting mode by **SET**.

Disconnect the hand-held remote control.

Disconnecting the pump from the installation

DANGER

Remaining process gases in the pump may cause severe injury or death. Before removing the pump, continue N₂ flow from the process tool for 30 min. Nitrogen pressure and flow rate should be identical to the programmed values during process.

DANGER

During pump removal, operator could be in contact with process residues on the exhaust which could cause severe injury or death. Ask your safety department for instructions according to the local statements.

WARNING

When the main electrical switch on the top of the pump is set to "0", the part supply between the power plug and the main switch remains energized. Risk of electrical shock in case of contact. Disconnect main electrical cable before servicing.

WARNING

Hazardous voltage enclosed. Voltage or current hazard sufficient to cause shock. Disconnect and lockout power before servicing. Any intervention must be done by trained personnel only.

WARNING

When the pump is switched off, internal parts (monitoring, frequency converter) contain capacitors charged with over 60 VDC and remain energized. Electrical shock may result in severe injury. Wait 1 minute after switching off before opening the pump.

Turning off the pump

Release the customer's main circuit breaker.

Disconnect the mains wire from the electrical connector.

If the connection passes through a feedthrough, disconnect the mains wire from the terminal inside the electrical cabinet (see **B 50**).

Disconnecting the pump from the installation

Disconnection Disconnect the nitrogen quick connector.

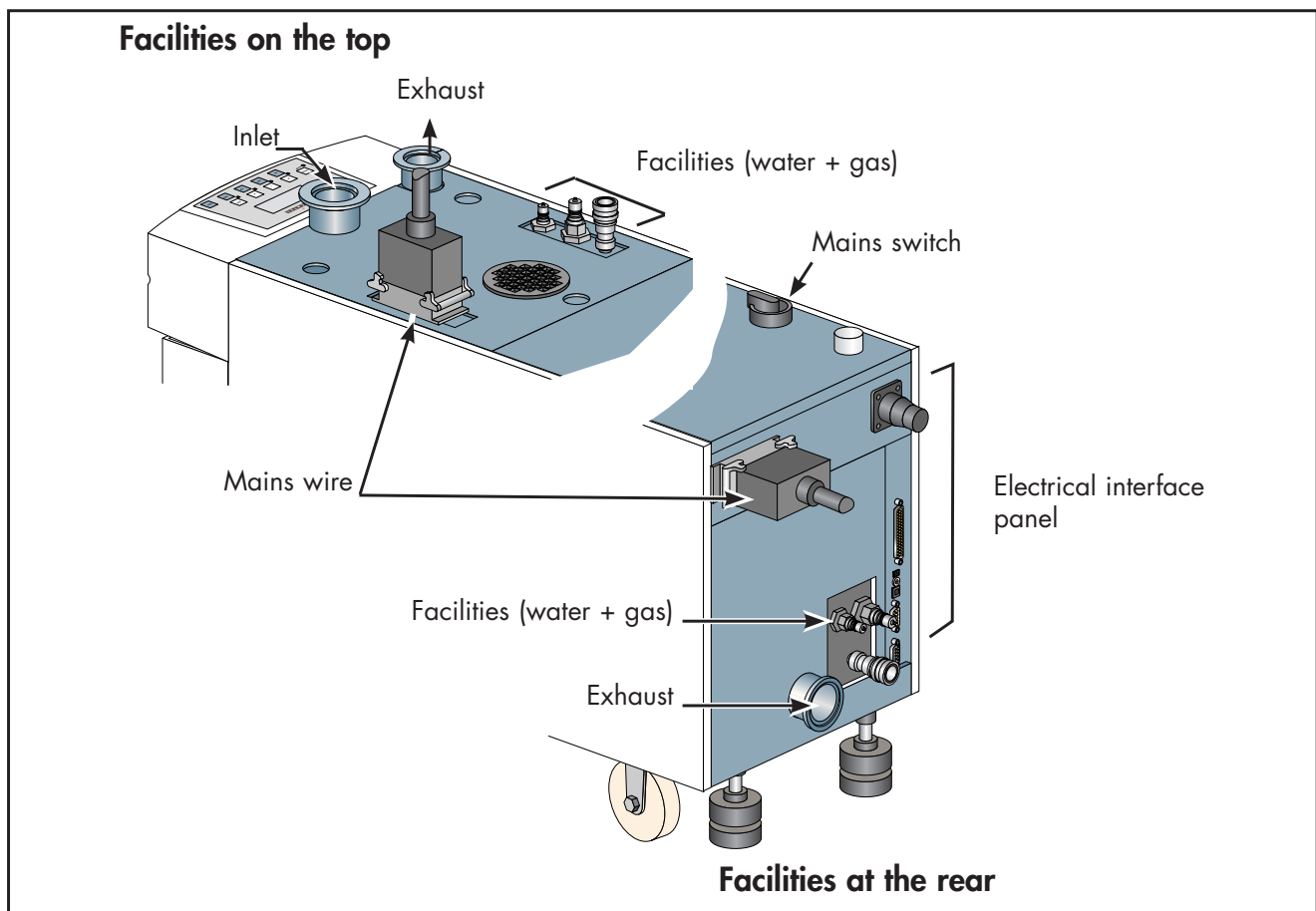
Disconnect all the connectors on the electrical interface panel. Do not forget to connect the "REMOTE CONTROL" and "EMERGENCY STOP" plugs (supplied with the original pump).

Disconnect the pump from the pumping piping and fit a protector on the inlet.

Disconnect the pump exhaust and fit a protector on the exhaust.

Raise the four legs and the anti-vibration pads (if fitted).

Remove the pump from the installation.



Conditioning the pump for shipping

Refer to the preliminary precautions before intervene on the product (see **E 14**).

Preparing the pump for expedition

Pumps that are to be shipped must first be pressurized with dry nitrogen (see **E 11**).

Inlet

Install the connections provided with the pump when it was first delivered. Contact the service center for components if necessary.

Accessory	DN 50 ISO-KF (ADP)	DN 100 ISO-K (ADS)
Inlet blank-off flange	106314	090467
Equipped centering ring	087168	068349
Quick-connect clamp	303003	–
Double-claw clamps (set of 4)	–	303056
1/8 gas connector	082981	082981

Exhaust

Accessory	DN 40 ISO-KF
Blank-off flange	068197
Equipped centering ring	068230
Releasable clamp	303002

You must have a supply of dry nitrogen to pressurize the pump. See **B 40** for the dry nitrogen's characteristics.

Pressurizing the pump

Block the inlet port with the flanges supplied.

Connect the nitrogen to the gas connector.

- Pressurize the pump with dry nitrogen to an ultimate pressure of 1.5 bar.
- When the nitrogen flows out of the exhaust, seal it shut with the accessories provided.
- Disconnect the nitrogen supply.

Fill the safety questionnaire sheet **G200**.

Conditioning the pump for shipping

Flange the pump ADS 602

Remove 2 hoisting rings to install the clamping bar.

Re-install the hoisting rings and screw them.

Install the flanging plate, position the assembling screws on the clamping bar without blocking them.

Position the flanging plate on the pump inlet and secure the claw clamps.

Then, secure all the assembling screws.





Appendix

User's Manual ADP/ADS Series Two Detailed contents

G 100	<i>Declaration of conformity</i>
G 101	<i>SEMI certificate</i>
G 110	<i>ADP/ADS electrical schematic (P/LM/H models) (with option power failure protection)</i>
G 120	<i>ADP/ADS electrical schematic (P/LM/H models) (without option power failure protection)</i>
G 150	<i>Frequency converter wiring for ADS 1202</i>
G 151	<i>Frequency converter wiring for ADS 1802</i>
G 200	<i>Service</i>

DECLARATION OF CE CONFORMITY

We, **adixen Vacuum Products**
98, avenue de Brogny · BP2069
74009 Annecy cedex – France

ISO 9001 CERTIFIED

declare under our sole responsibility that the following products:

ADP 122LM / ADP 122P and monitoring M4
ADS 602LM / ADS 602P / ADS 602H and monitoring M4
ADS 1202P / ADS 1202H / ADS 1802P / ADS 1802H and monitoring M4

to which this declaration relates are in conformity with the relevant provisions of the following European Directives:

2006/042/EC: Machinery directive

2006/095/EC: Low voltage directive

2004/108/EC: Electromagnetic Compatibility Directive

2002/095/EC: Restriction of Hazardous Substances

when used in accordance with the instruction manual of the product.

Those products comply with the relevant provisions of the above Directives and carry the CE marking.

Signatures:



Mr. Eric TABERLET
President

Annecy, August 24, 2012

Authorized person to compile the relevant technical documentation:



Mr. Gilles BARET
Products and Technology Director
98, avenue de Brogny · BP 2069 / 74009 Annecy - France

Semi certificate



SGS United Kingdom Limited
 Technical Services

South Industrial Estate
 Bowburn
 Co. Durham
 DH6 5AD

CERTIFICATE OF COMPLIANCE

Certificate No S2/DUR 21706/GM/FH/00

- Semi S1-90* Safety Guidelines for Visual Hazard Alerts
- Semi S2-93A* Safety Guidelines for Semiconductor Manufacturing Equipment
- Semi S8-95* Safety Guidelines for Ergonomics / Human Factors
- Engineering of Semiconductor Manufacturing Equipment
- Semi F15-95* Test Method for Enclosures using Sulphur Hexafluoride tracer gas and Gas Chromatography.

- 1. Name Of Manufacturer **Alcatel Vacuum Technology France**
 98, Avenue de Brigny
 4000 Annecy BP 2069
- 2. Description Of Equipment **ADP 122 & ADP 1202P High Vacuum Pumps**
- 3 Tests Performed **Inspection to the above detailed standards.**
- 4 Conditions Subject To Issue **This certificate refers to the machines inspected only. Any modifications made subsequent to the final inspection will make this certificate invalid, therefore full details of all modifications must be submitted to SGS for approval to retain the validity of this certificate**

For Approved Body:

Signature: *J Huggins*
 Position: Engineer
 Date: 6th February 2000

Approved By:

G Moffat
 Technical Manager
 6th February 2000

S2A/01	ISSUE: 01	DATE: March 2000
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Member of the SGS Group (Société Générale de Surveillance)

Semi certificat



SGS United Kingdom Limited
 Technical Services


South Industrial Estate
 Bowburn
 Co. Durham
 DH6 5AD

CERTIFICATE OF COMPLIANCE

Certificate No. S2/DUR21191/TS/RWR/99

- Semi S1-90* Safety Guidelines for Visual Hazard Alerts.
- Semi S2-93A* Safety Guidelines for Semiconductor Manufacturing Equipment
- Semi S8-95* Safety Guidelines for Ergonomics / Human Factors
 Engineering of Semiconductor Manufacturing Equipment
- Semi F15-95* Test Method for Enclosures using Sulphur Hexafluoride tracer gas and Gas Chromatography

- 1. Name Of Manufacturer **Alcatel Vacuum Technology France**
98, Avenue de Brogny
4000 Annecy BP 2069
- 2. Description Of Equipment **ADP / ADS Series Two Dry Pump**
Model ADS 602P
Serial Number 984265SP
- 3 Tests Performed **Inspection to the above detailed standards.**
- 4 Conditions Subject To Issue **This certificate refers to the machine inspected only and the agreed Improvement Plan being implemented in full.**
Any modifications made subsequent to the final inspection or changes to the Improvement Plan will make this certificate invalid, therefore full details of all subsequent modifications must be submitted to SGS for prior approval to retain the validity of this certificate

For Approved Body:
 Signature: 
 Position: Senior Engineer
 Date: 26th April 1999

Approved By:

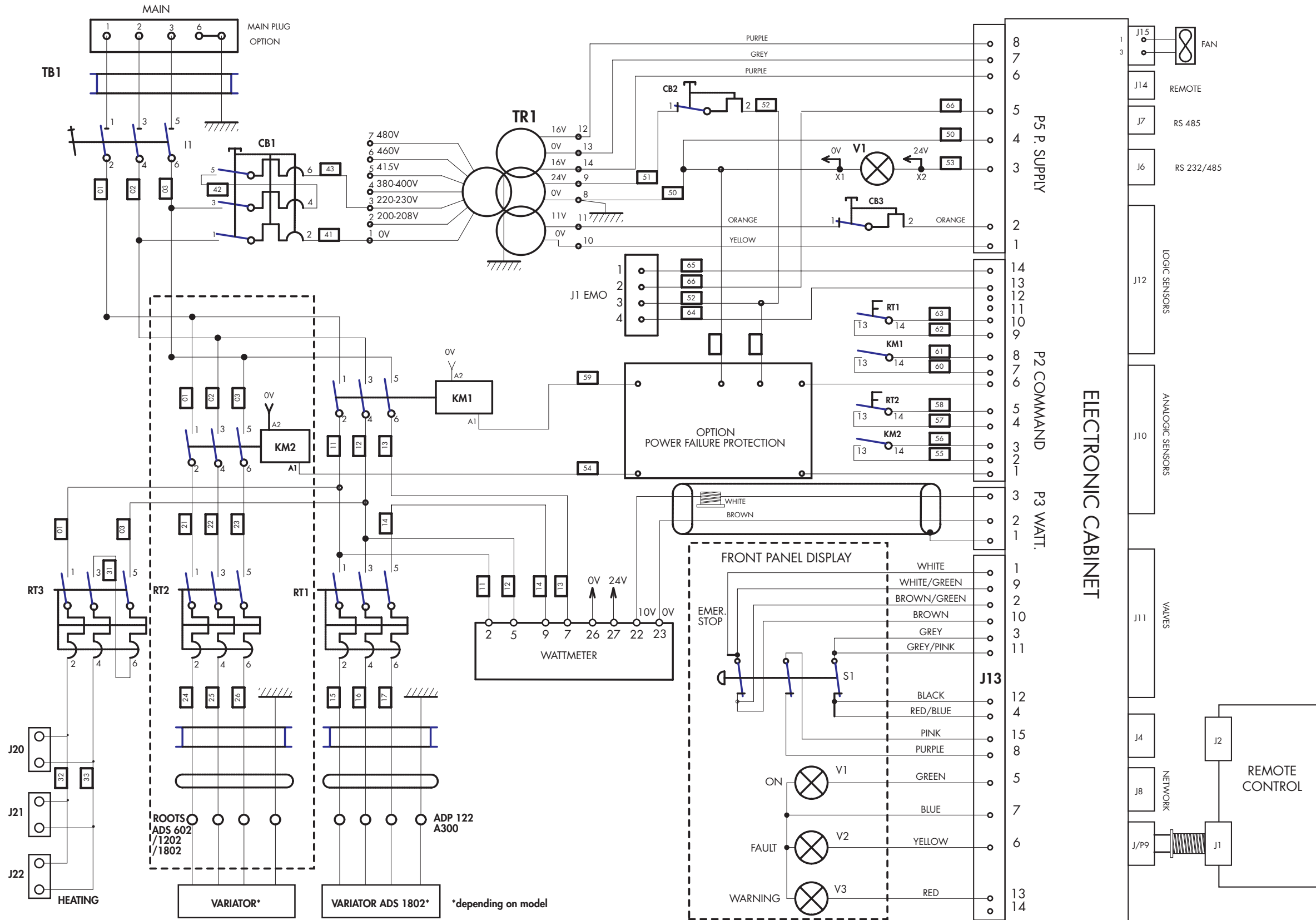
 Technical Manager
 26th April 1999

S2/04	ISSUE: 02	DATE: April 1999
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Member of the SGS Group (Société Générale de Surveillance)

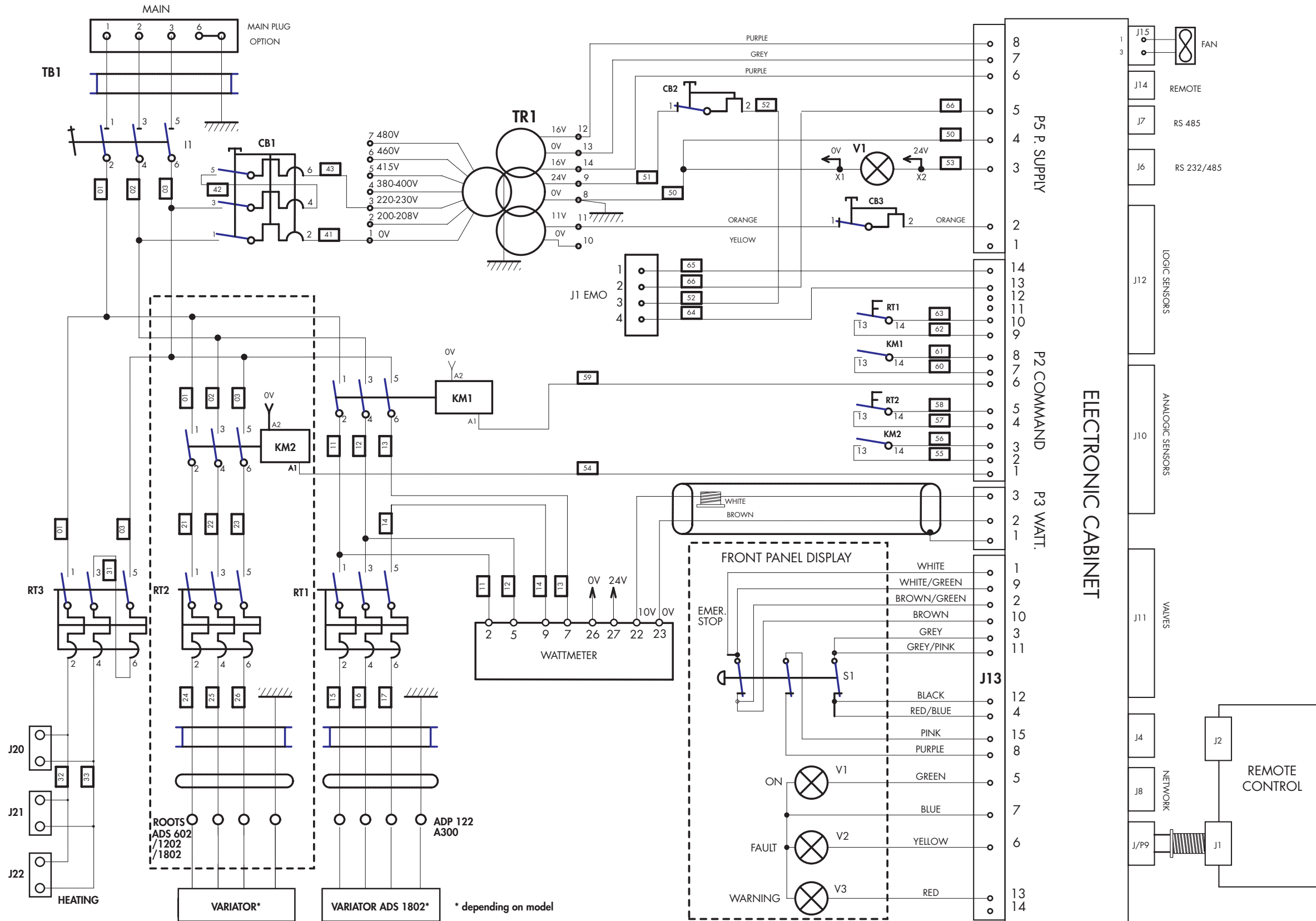
G 110

ADP/ADS electrical schematic (P/LM/H models) (with option power failure protection)

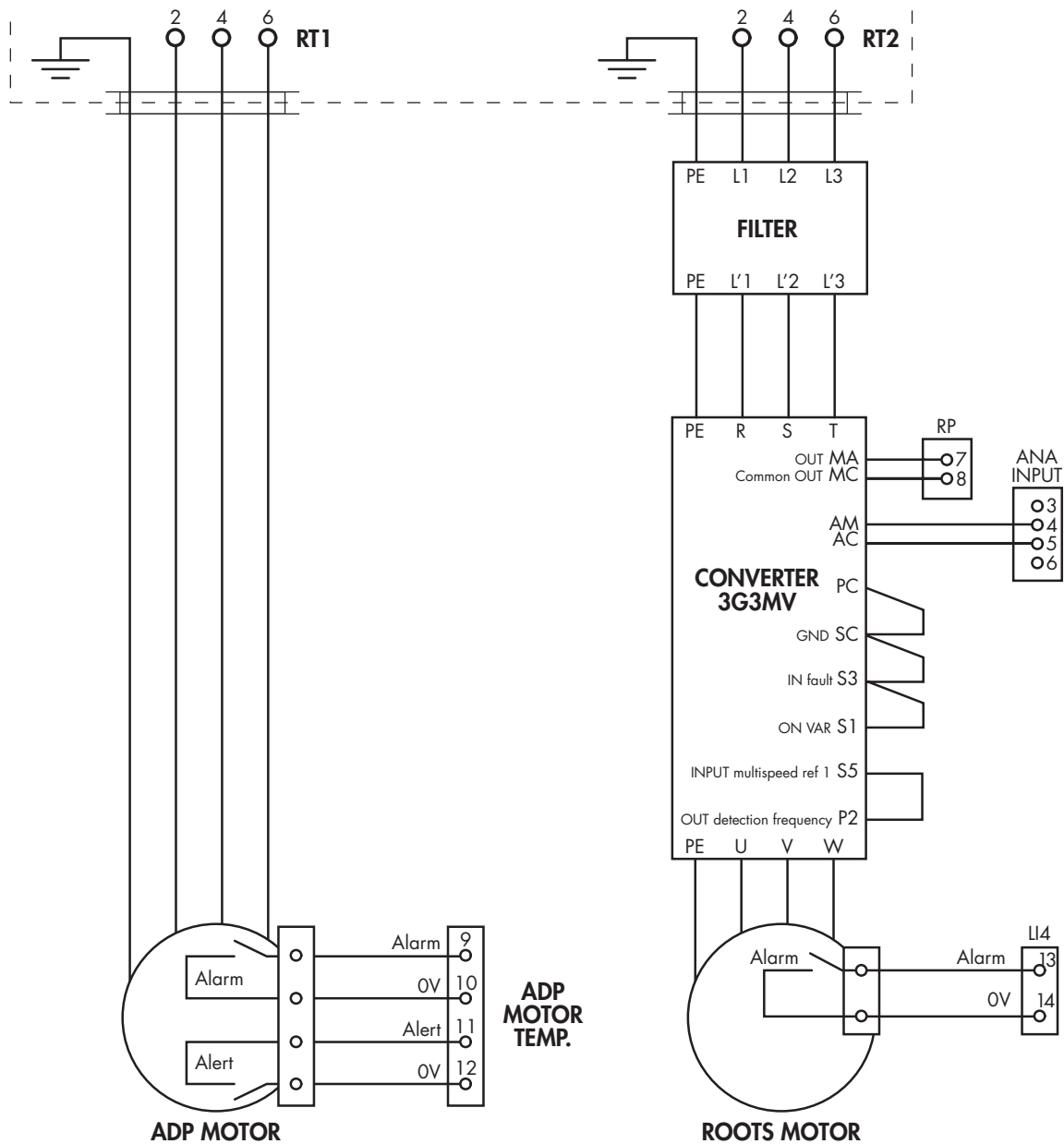


G 120

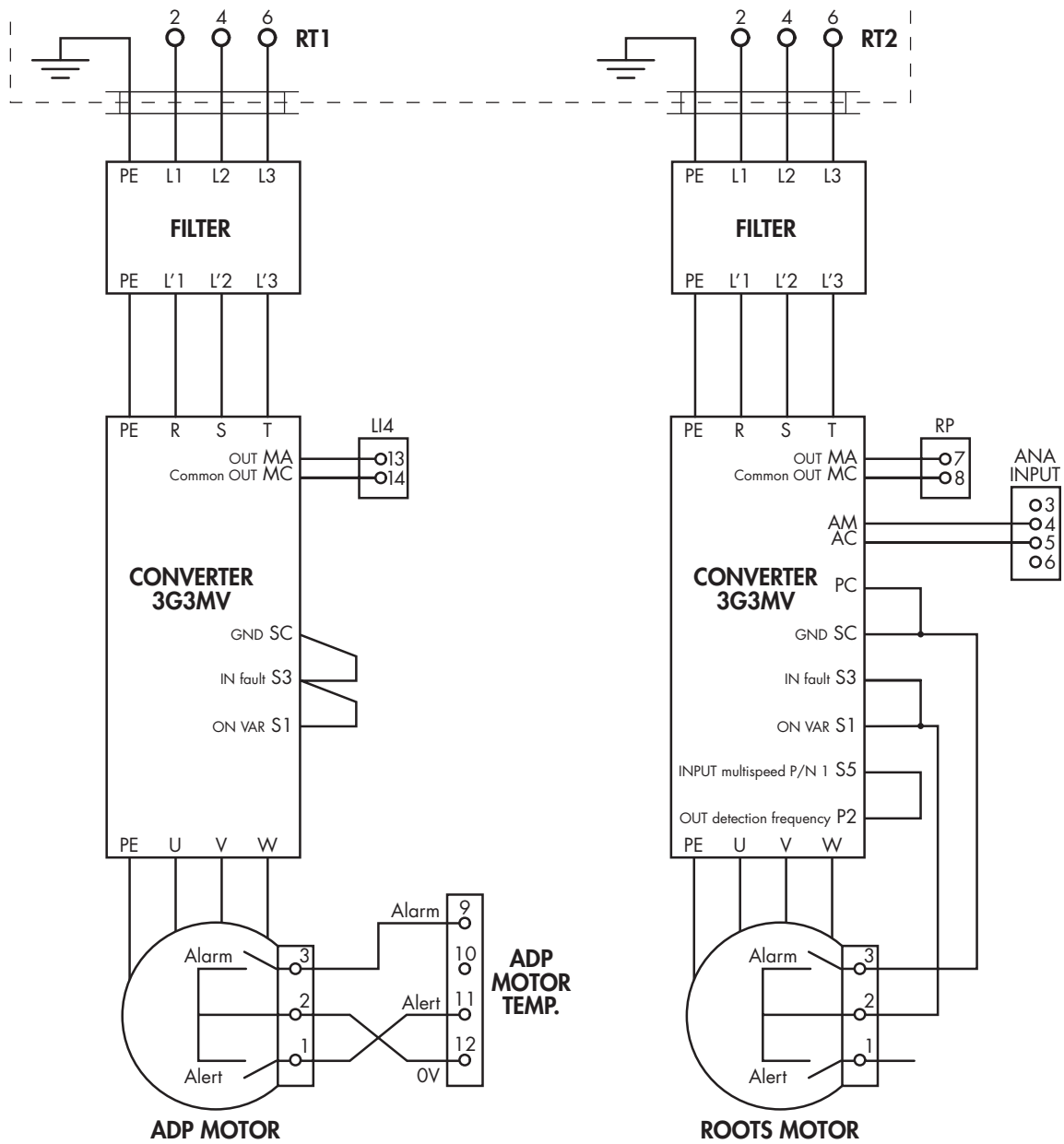
ADP/ADS electrical schematic (P/LM/H models) (without option power failure protection)



Frequency converter wiring for ADS 1202



Frequency converter wiring for ADS 1802



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Service

Pfeiffer Vacuum offers first-class customer service!

- On-Site maintenance for many products)
- Overhaul / repair in the nearby Service Location
- Fast replacement with refurbished exchange products in mint condition
- Advice on the most cost-efficient and quickest solution

Detailed information, addresses and forms at: www.pfeiffer-vacuum.com (Service).

Overhaul and repair in the Pfeiffer Vacuum Service Center

The following general recommendations will ensure a fast, smooth servicing process:

- ➔ Fill out the «Service Request/Product return» form and send it to your local Pfeiffer Vacuum Service contact.
- ➔ Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.
- ➔ Fill out the declaration of contamination and include it in the shipment (mandatory!). The Declaration of contamination is valid for any product/device including a part exposed to vacuum.
- ➔ Dismantle all accessories and keep them.
- ➔ Close all the ports flange openings by using the original protective covers or metallic airtight blank flanges for contaminated devices.
- ➔ If possible, send pump or unit in its original packaging.

Sending of contaminated pumps or devices

No devices will be accepted if they are contaminated with micro-biological, explosive or radioactive substances. "Hazardous substances" are substances and compounds in accordance with the hazardous goods regulations (current version).

- ➔ Neutralize the pump by flushing it with nitrogen or dry air.
- ➔ Close all openings airtight.
- ➔ Seal the pump or device in suitable protective film.
- ➔ Return the pump/device only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

Pump or device returned without declaration of contamination form fully completed and/or non-secured in a suitable packaging, will be decontaminated and/or returned at the shipper's expense.

Exchange or repaired devices

The factory operating parameters are always preset with exchange or repaired devices. If you use specific parameters for your application, you have to set these again.

Service orders

All service orders are carried out exclusively according to our general terms and conditions for the repair and maintenance, available in our website.

**Vacuum Solutions
from a single Source**

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, technological perfection, competent advice and reliable service.

**Complete range
of products**

From a single component to complex systems: We are the only supplier of vacuum technology that provides a complete product portfolio.

**Competence in
theory and practice**

Benefit from our know-how and our portfolio of training opportunities! We support you with your plant layout and provide first-class on-site service worldwide.

**Are you looking for a
perfect vacuum solution?
Please contact us:**

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