



A3H Series

Multistage Roots dry pump

Operating instructions

Multistage Roots dry pump

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
Product's many years
of experience in
"semi-conductor" processes
and dry pumping.



This product is designed to generate vacuum by pumping on gases, but no liquids neither solids. It is dedicated for running in industrial environments.

⚠ DANGER

The pumps must not be operated in an area with risk of explosion.
Consult the nearest support service to study a solution.

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.

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).

SPECIAL FEATURES:

Multi-stage Roots technology – Water-cooled multi-voltage motors – adixen Network compatible.

Multistage Roots dry pump

This product complies with the requirements of European Directives, listed in the Declaration of Conformity available in section **G 100**.

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English original version

Operating instructions – A3H Series

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English original version

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Chapter E

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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).

CAUTION

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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).

Before switching on the product, study the operating manual and make sure you follow the safety instructions. You can recognise these by the 'Caution', 'Warning' and 'Danger' symbols.

Good practice tips and manufacturer's recommendations are in a blue box.

The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this manual.







It is the customer's task to:

- train operators to use the product if they do not speak the language the manual is written in,
- ensure operators know the safe practices to apply when using the product,
- keep this operating instruction manual and all other documents complete and accessible to personnel at all times,
- make protective equipment available for the operator,
- assign responsibilities, specific duties according to the qualification level: only skilled and trained operator can work on the product for installation, first start up and maintenance authorized by the manufacturer,
- ensure that the following points are observed and monitored:
 - compliance with the applicable standards and directives of the country in which the product is being operated,
 - safety regulations governing the handling of hazardous substances,
 - safety accidents-prevention regulations,
 - product is used only as intended.





Labelling

Operating instructions – A3H Series


Symbols


Symbols / Marking	Description
	Caution: possible risk, read the operator instructions
	Warning: electrical shock hazard
	Compulsory: wear gloves
	Compulsory: used a breathing mask
	Compulsory: wear protective glasses
	Earth connection
Power	White indicator light: pump is powered
Running	Green indicator light: pump is running
Warning	Yellow indicator light: in case of alert
Alarm	Red indicator light: in case of fault
HHR	Hand held remote connection
WATER IN	Cooling circuit connection
PRESSURE MAX 101 PSI (7 bars)	Cooling circuit maximum pressure
WATER OUT	Output water connection
NITROGEN	Inert gas purge connection
EXHAUST	Pump exhaust connection


Manufacturer label (example)



adixen Vacuum Products		F - 74009 Anancy		CE	
N°	APXXXXXX	Type	A803H	Ed.	12
THREE PHASES					
Volt	Full-Load current Ampere		Ampere rating of largest motor		Short circuit interrupting capacity kA
	50Hz	60Hz	50Hz	60Hz	
200 	27	27	15.6	15.6	10
230/240 	25	25	15.8	15.6	10
400/415 	20	20	9.1	8.1	10
460/480 	20	20	9.1	8.1	10
Electrical schematic diagram reference:					S9113-5


Pump labels

	WARNING HOT SURFACE Contact with pump bodies may cause burn. Switch off and wait until pumps cooled 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 MOVING PARTS PRESENT Moving parts can crush and cut. Keep hands or feet away from moving parts.	Located on the upper cover, this label informs the user, that moving parts present inside the pump could cause personal injury, like crushing or cutting. The user must keep all body parts away from moving parts.
---	--	---

	WARNING HEAVY OBJET Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when removing or replacing.	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.
--	---	---


	WARNING HAZARDOUS VOLTAGE Switch off the pump and disconnect the main power cable before opening the power box cover.	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.
	WARNING Leakage current may be greater than 3.5 mA Earth connection is essential before connecting supply.	

	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.
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Labelling

Operating instructions – A3H Series


Pump labels location



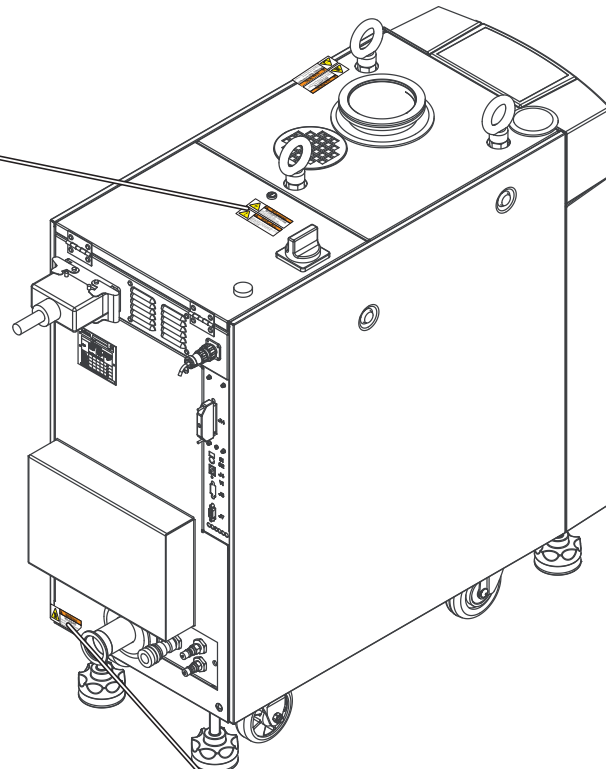
WARNING
HAZARDOUS VOLTAGE
Switch off the pump and disconnect the main power cable before opening the power box cover.



WARNING
Leakage current may be greater than 3.5 mA. Earth connection is essential before connecting supply.



WARNING
HEAVY OBJET
Can cause muscle strain or back injury. Use lifting aids and proper lifting techniques when removing or replacing.



WARNING
HOT SURFACE
Contact with pump bodies may cause burn. Switch off and wait until pumps cooled before servicing.



WARNING
MOVING PARTS PRESENT
Moving parts can crush and cut. Keep hands or feet away from moving parts.



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.



Introduction

Operating instructions – A3H Series

A 010 *Dry pump operational principle*

A 020 *A3H Series dry pump range*

A 030 *M4 monitoring system*

A 040 *Technical characteristics*

A 050 *Accessories*

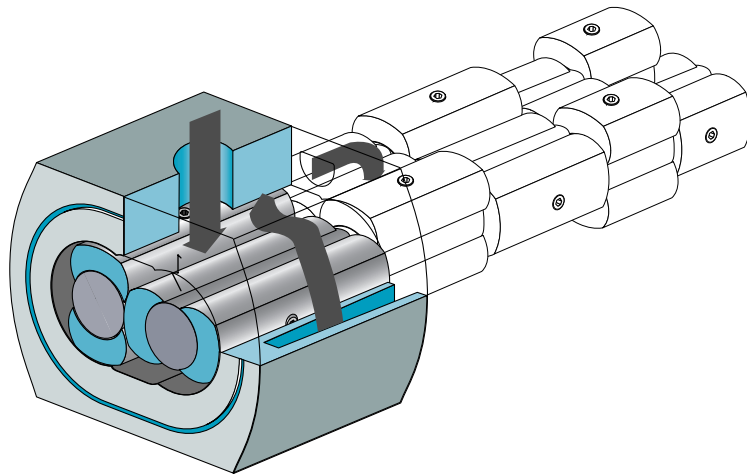
Dry pump operational principle

Designed to minimize potential residues

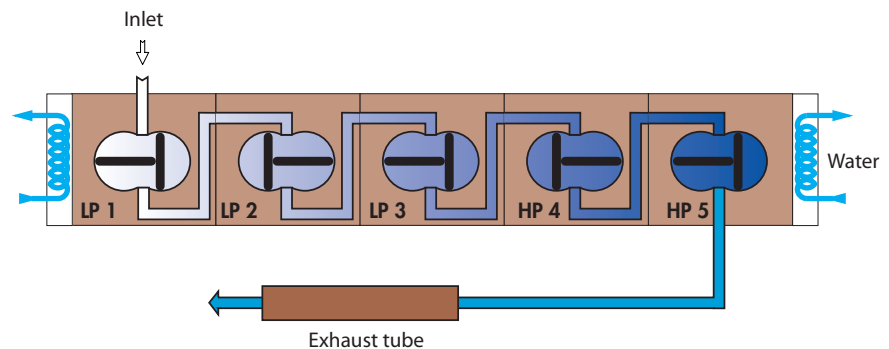
- The equipment is designed to minimize potential residue deposits:
- by limiting the internal volumes that contain gas,
 - by injecting N₂ purge on each pump stage to dilute the process gas,
 - by regulating the pump temperature and adjusting it to each process in order to limit gas condensation.

Multi-stage Roots principle

The Dry 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)

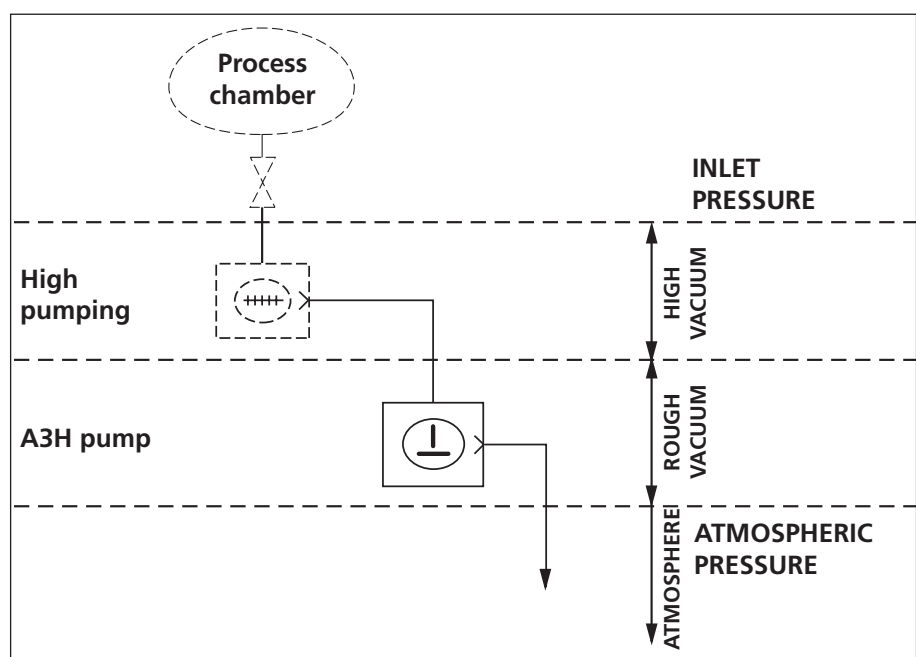
The vacuum tightness is ensured by the motor design.

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

Tightness at shutdown

The pump is fitted with an antisuckback valve in the exhaust tube, that prevents the exhaust gases being sucked back (specific versions are delivered without antisuckback valve, refer to ordering guide).

The pump in a pumping installation



A3H Series dry pump range

Model's description



A803H

A3H series is a range of dry pumps dedicated to the harshest applications of the semi-conductor industry.

The range includes 4 compact pumping systems, integrated into covered frame including FB203 roughing pump, roots blower (except for A203H model) and monitoring :

- **A203H**
- **A803H**
- **A1503H**
- **A1803H.**

Main key features of A3H range are robustness, high inlet flows capability, and optimized thermal management.

- Thermal management models : three versions are available.

STD version: **STAnDard** version for most of the applications (all models).

EHT version: **Extended High Temperature** (A1503H and A1803H). This configuration is recommended for all applications requiring the pump and gas temperature to be as high as possible to avoid any by-product condensation inside the pump.

Please contact the manufacturer for process recommendations.

ELT version: **Extended Low Temperature** (A803H, A1503H and A1803H)

This configuration is recommended for all applications requiring the pump and gas temperature to be as low as possible to avoid any by-product deposition inside the pump.

Please contact the manufacturer for process recommendations.

Pumps	STD	EHT	ELT
A203H	yes	no	no
A803H	yes	no	yes
A1503H	yes	yes	yes
A1803H	yes	yes	yes

A3H Series dry pump range

- Large volume version : two models are available*.
 - A203H large volume model
 - A1803H large volume model.

These versions are used for specific applications requiring the pumping of a chamber volume of 1m³ to 50m³.

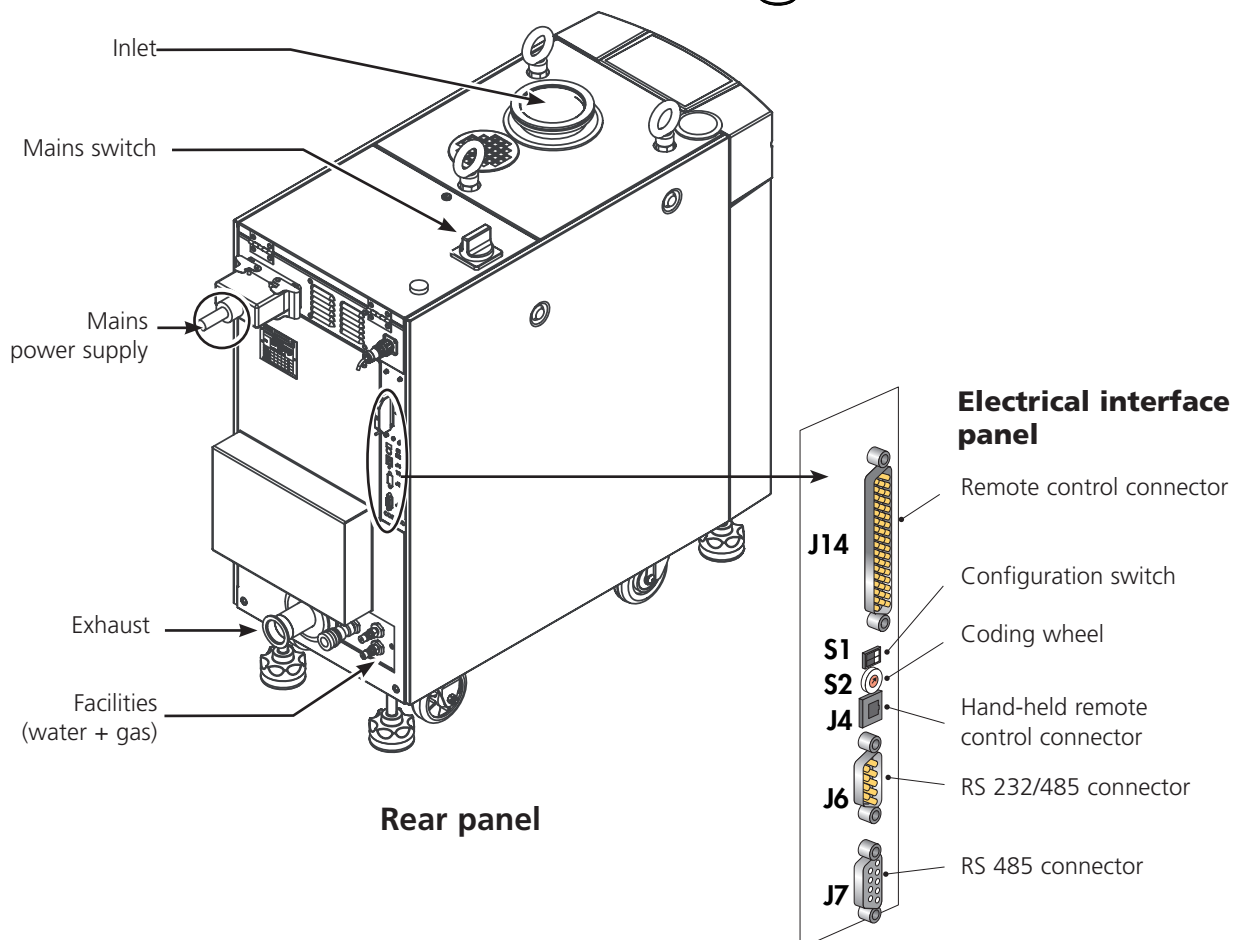
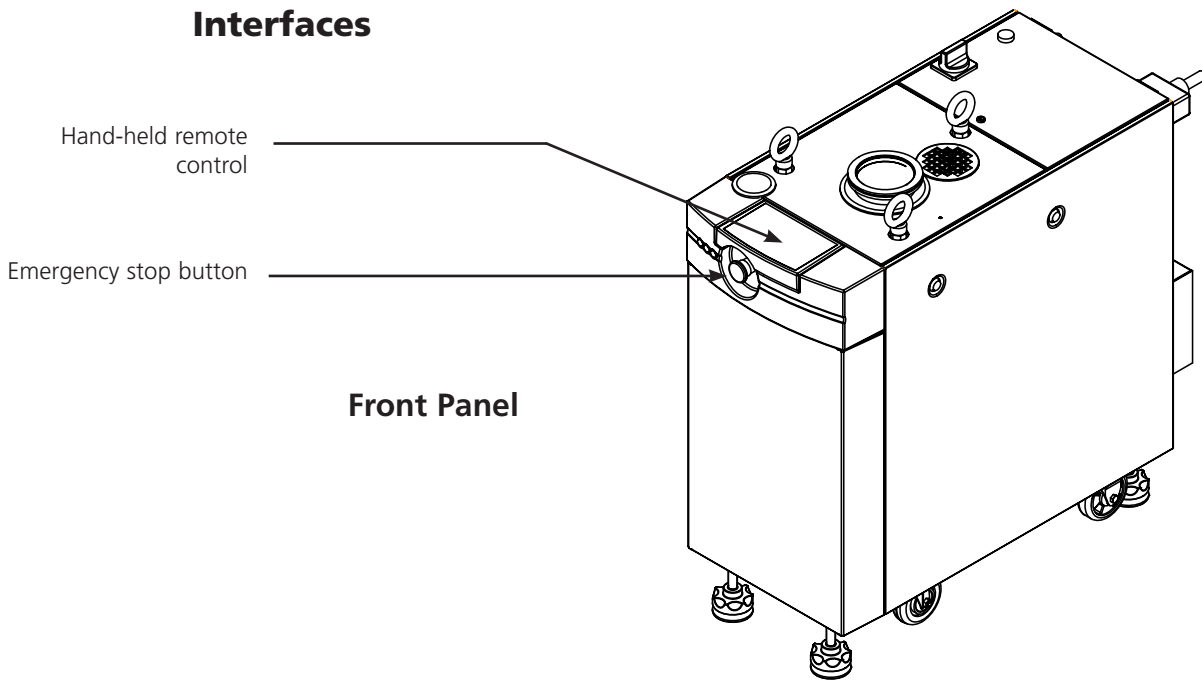
Available on A203H and A1803H models, this version features additional frequency converter on the dry pump.

*other versions are available: please contact the manufacturer for more information.

Each pump model is also equipped with the latest innovative solutions to withstand the harshest environment.

A3H Series dry pump range

Interfaces



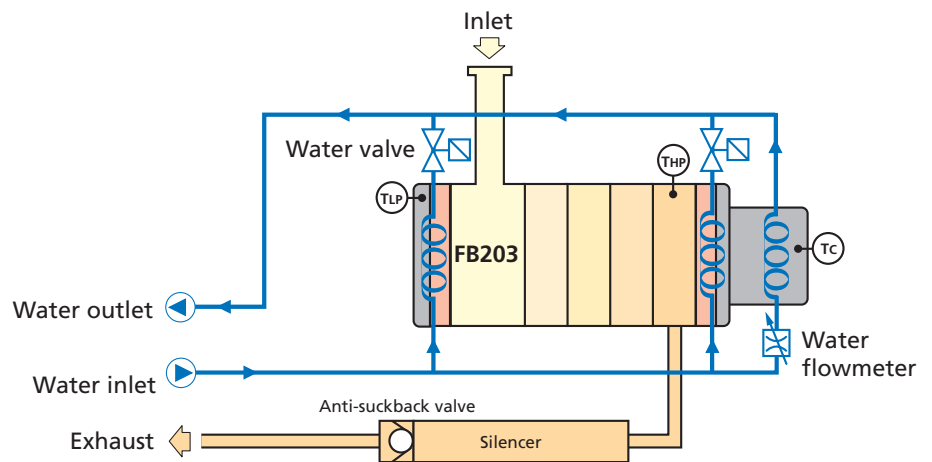
A3H Series dry pump range

Internal equipment of the pumps

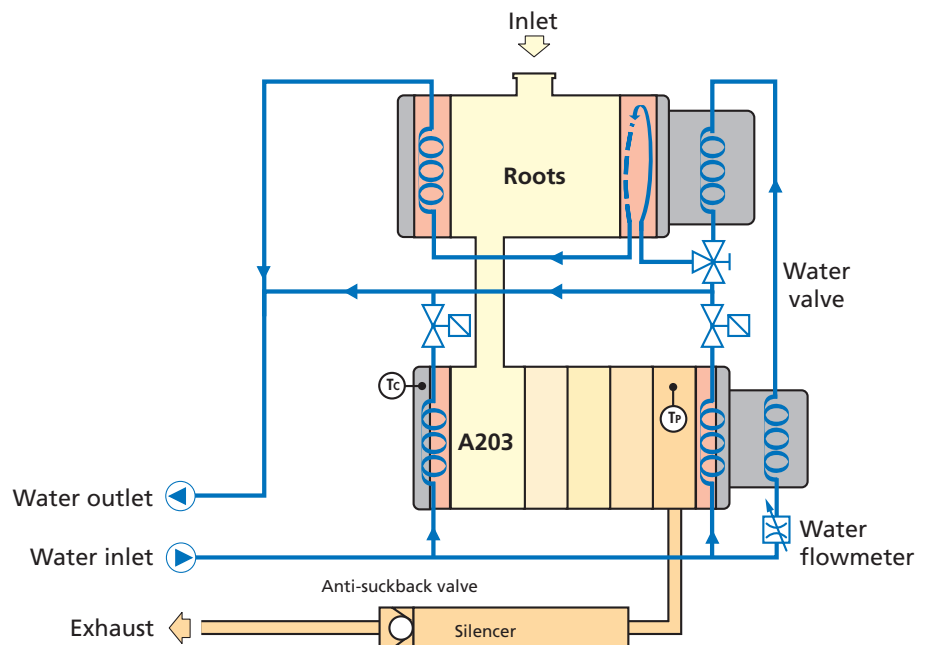
The dry pumps include a cooling circuit and an inert gas purge circuit.

Cooling circuits

A203H Principle schematic



A803H Principle schematic

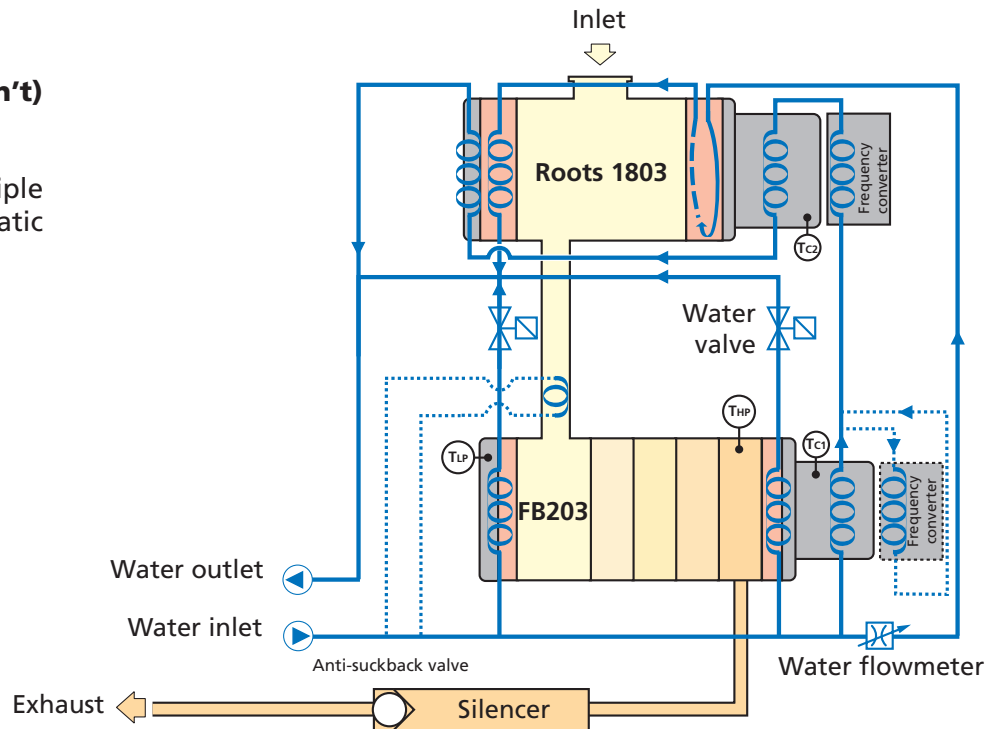


TLP, THP : Temperature sensor of pump (alert, alarm and setpoint)
 Tc : Temperature sensor of motor (alarm)
 ----- : for **ELT** version only.

A3H Series dry pump range

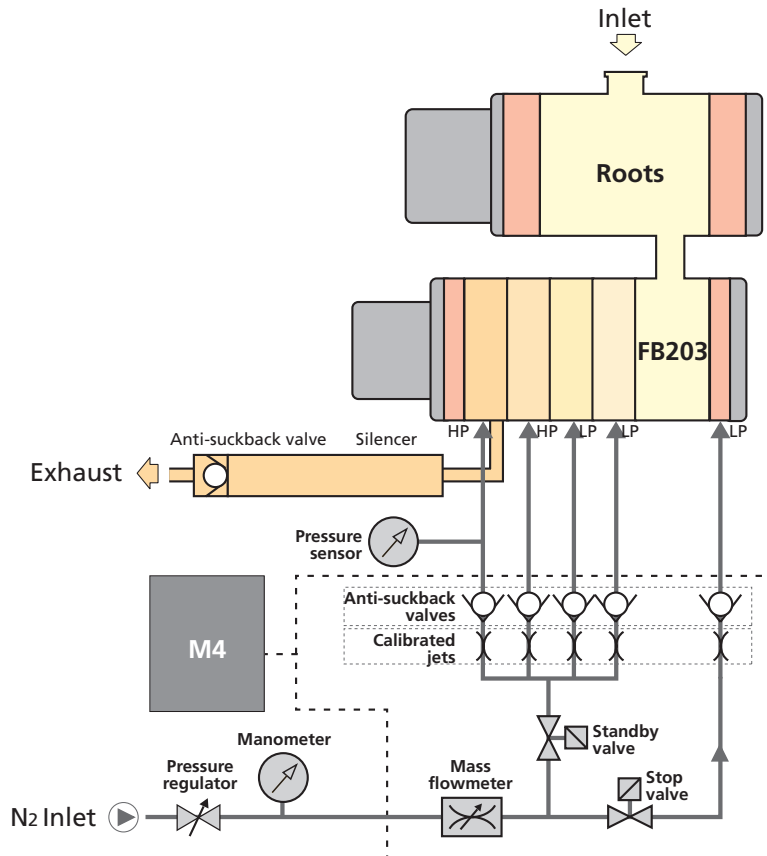
Cooling circuits (con't)

A1503H - A1803H Principle schematic



TLP, THP : Temperature sensor of pump (alert, alarm and setpoint)
 Tc : Temperature sensor of motor (alarm)
 ----- : for **ELT** version only.

N2 purge circuit Principle schematic



M4 monitoring system

Principle Each A3H Series pump includes an intelligent monitoring system.

Description

Electrical cabinet

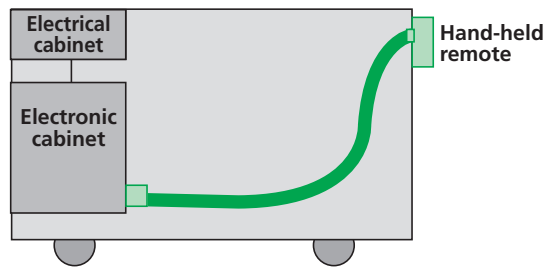
It is located at the rear of the machine.

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

Hand-held remote

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.



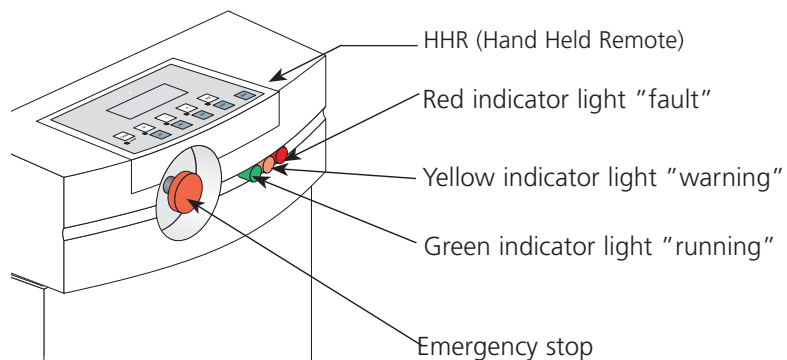
Electronic cabinet

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 and ensures the interface with the supervision network.

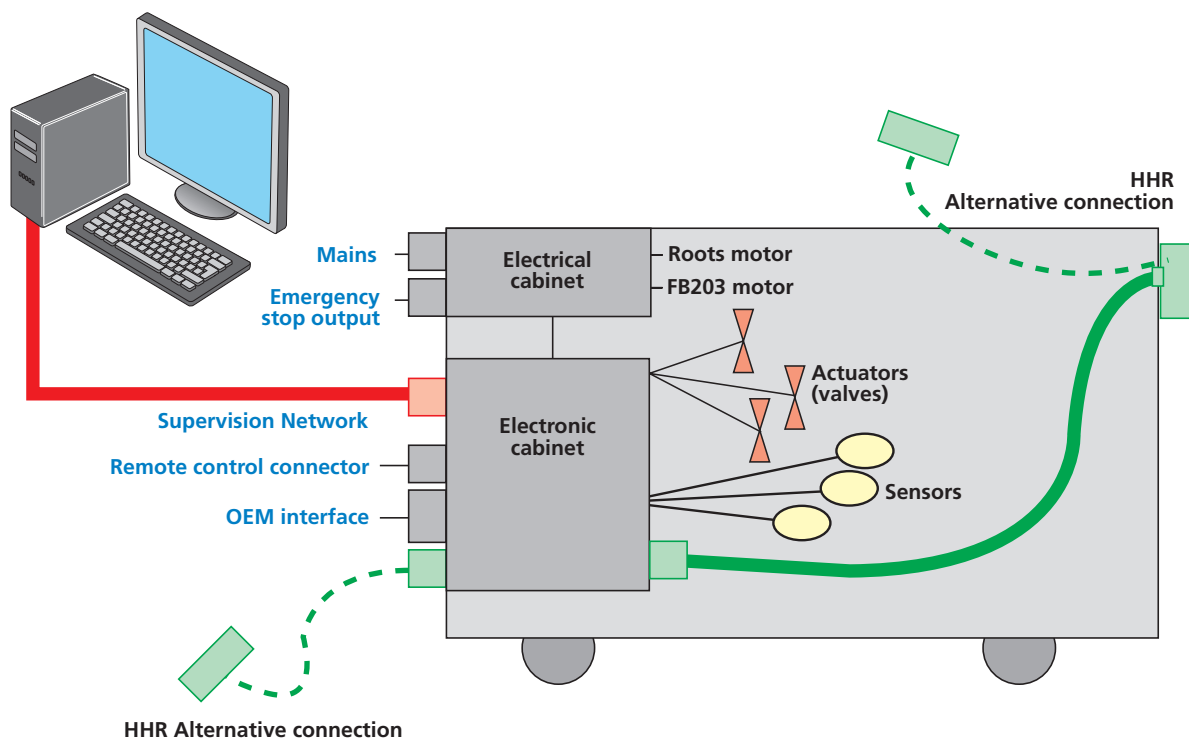
M4 monitoring can be interfaced with the main production equipment.



M4 monitoring system

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.
- Power failure protection.
- N2 purge monitoring.
- Pump(s) temperature monitoring and control.
- Thermostatic control of the pump (temperature and water flow)
- Exhaust pressure monitoring.
- Maintenance time control.

Technical characteristics

Characteristics	Units	A203H	A203H Large Volume	A803H	A1503H	A1803H	A1803H Large
Peak pumping speed (50/60 Hz)	m ³ /h	130 / 160	- / 160	600 / 700	1100 / 1200	1650 / 1700	- / 1200
	cfm	75 / 95	- / 95	350 / 412	647 / 706	970 / 1000	- / 706
	l/mn	2167 / 2667	- / 2667	10000 / 1667	18333 / 20000	27500/28333	- / 20000
Typical ultimate pressure (no N2 purge) (50/60 Hz)	hPa	6 · 10 ⁻² / 2 · 10 ⁻²	- / 2 · 10 ⁻²	1 · 10 ⁻³ / 5 · 10 ⁻⁴	1 · 10 ⁻³ / 5 · 10 ⁻⁴		- / 5 · 10 ⁻⁴
	torr	4.5 · 10 ⁻² / 1.5 · 10 ⁻²	- / 1.5 · 10 ⁻²	7.5 · 10 ⁻⁴ / 3.7 · 10 ⁻⁴	7.5 · 10 ⁻⁴ / 3.7 · 10 ⁻⁴		- / 3.7 · 10 ⁻⁴
Typical ultimate pressure (50 slm N2 purge) (50/60 Hz)	hPa	5 · 10 ⁻¹ / 1 · 10 ⁻¹	- / 1x · 10 ⁻¹	1 · 10 ⁻² / 5 · 10 ⁻³			- / 5 · 10 ⁻³
	torr	3.7 · 10 ⁻¹ / 7.5 · 10 ⁻²	- / 7.5 · 10 ⁻²	7.5 · 10 ⁻³ / 3.7 · 10 ⁻³			- / 3.7 · 10 ⁻³
Maximum ultimate pressure (no purge) 50/60 Hz	hPa	9 · 10 ⁻² / 5 · 10 ⁻²	- / 5 · 10 ⁻²	3 · 10 ⁻³ / 9 · 10 ⁻⁴			- / 9 · 10 ⁻⁴
	torr	6 · 10 ⁻² / 3.7 · 10 ⁻²	- / 3.7 · 10 ⁻²	2.2 · 10 ⁻³ / 6.7 · 10 ⁻⁴			- / 6.7 · 10 ⁻⁴
Maximum ultimate pressure (50 slm purge) 50/60 Hz	hPa	7 · 10 ⁻¹ / 2 · 10 ⁻¹	- / 2 · 10 ⁻¹	2 · 10 ⁻² / 9 · 10 ⁻³			- / 9 · 10 ⁻³
	torr	5.2 · 10 ⁻¹ / 1.5 · 10 ⁻¹	- / 1.5 · 10 ⁻¹	1.5 · 10 ⁻² / 6.7 · 10 ⁻³			- / 6.7 · 10 ⁻⁴
Maximum continuous inlet flow	slm	150	150	100	100	70	100*
Power supply ⁽¹⁾	V	200/230 V - 380/460 V - 3 phases - 50/60 Hz					
Power consumption at ultimate pressure (50/60 Hz)	kW	1.8 / 2	- / 2	2.2 / 2.4	3.2 / 3.4	2.6 / 2.8	- / 2.6
Power consumption at max. inlet flow	kW	3.5	3.5	4.5	5.5	6.5	7
Full load current at 200 V / 230 V	A	See B01					
Full load current at 380 V / 460 V		See B01					
Maximum exhaust overpressure	hPa	1200					
	torr	900					
Typical cooling water flow	l/mn	2 to 4			2.5 to 5		
	gal/mn	0.52 to 1.05			0.66 to 1.32		
N2 purge flow	SLM	20 to 120					
Gear box fluid capacity : Dry pump	l	0.35					
Gear box fluid capacity : Roots		-	-	0.7	1.55	1.55	1.55
Inlet flange	ISO-K	DN50	DN50	DN100	DN100	DN100/DN160	
Exhaust flange	ISO-KF	DN 40					
Dimension (l x w x h)	mm	See drawings on pages 2, 3, 4 and 5					
	inch	See drawings on pages 2, 3, 4 and 5					
Weight	kg	265	265	385	545		
	lbs	584	584	848	1200		
Maximum sound level ⁽²⁾	dB (A)	< 65	< 65	< 68	< 69		
Maximum volume	m ³	1	50	1	1	50	

(1) According to CE regulations, A3H Series can withstand a supply voltage variation of ± 10 %.

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

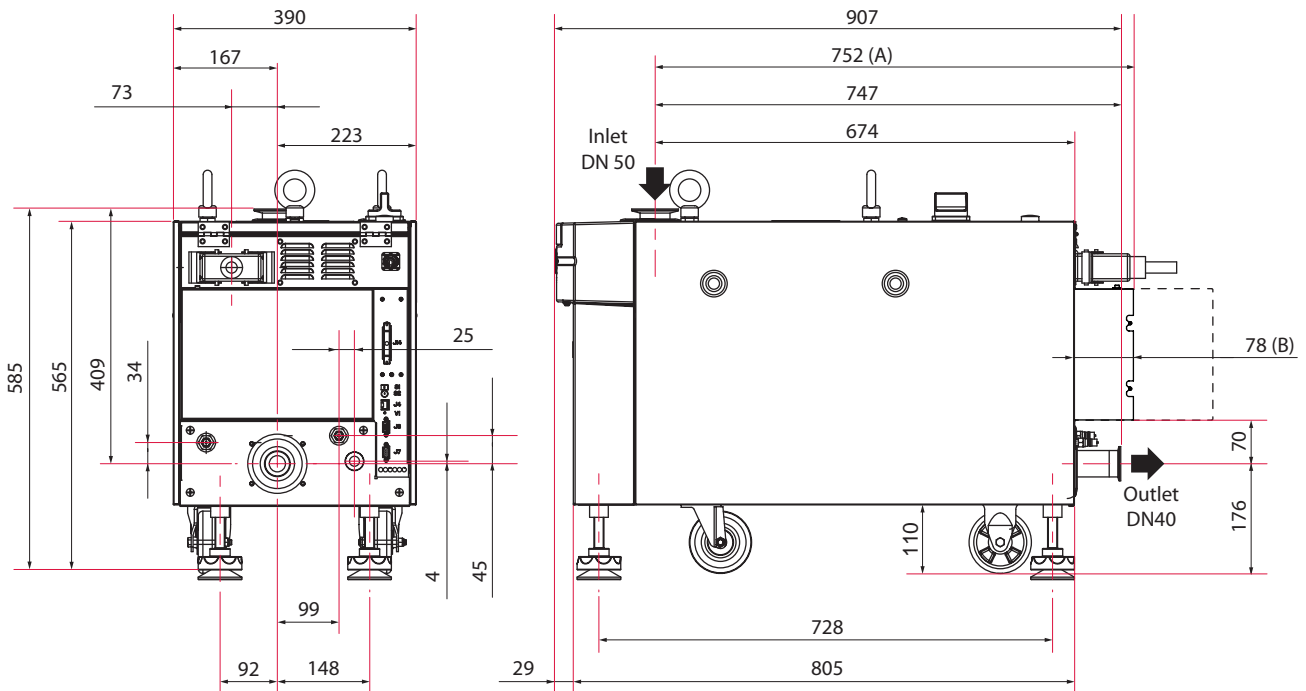
* Requires reduced Roots rotational speed

Technical characteristics

Characteristics	Units	A203H	A803H	A1503H	A1803H
Environmental conditions: <ul style="list-style-type: none"> ■ Use of the product ■ Altitude ■ Ambient operating temperature ■ Maximum relative humidity ■ Transient overvoltage ■ Pollution degree 		indoor use up to 2000 m 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) category II rate 2			

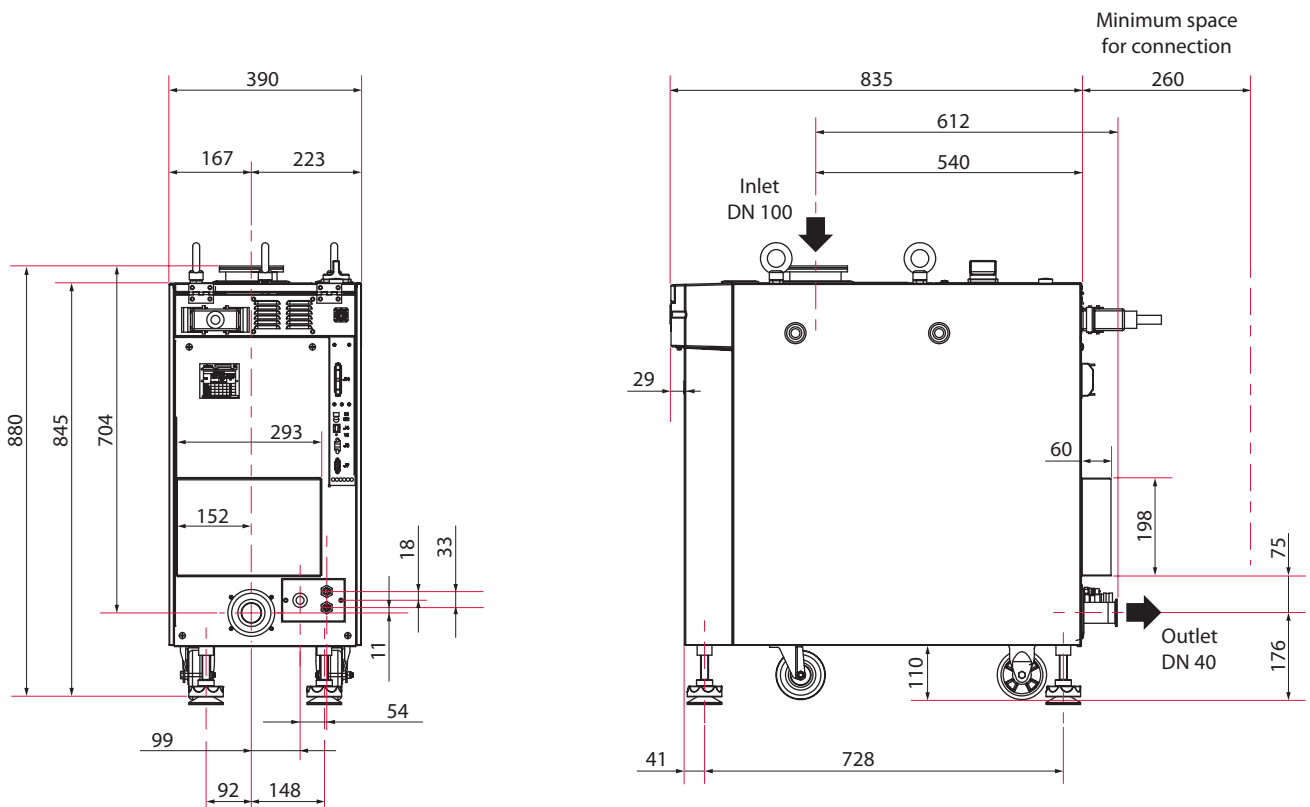
Technical characteristics

A203H dimensions (mm)



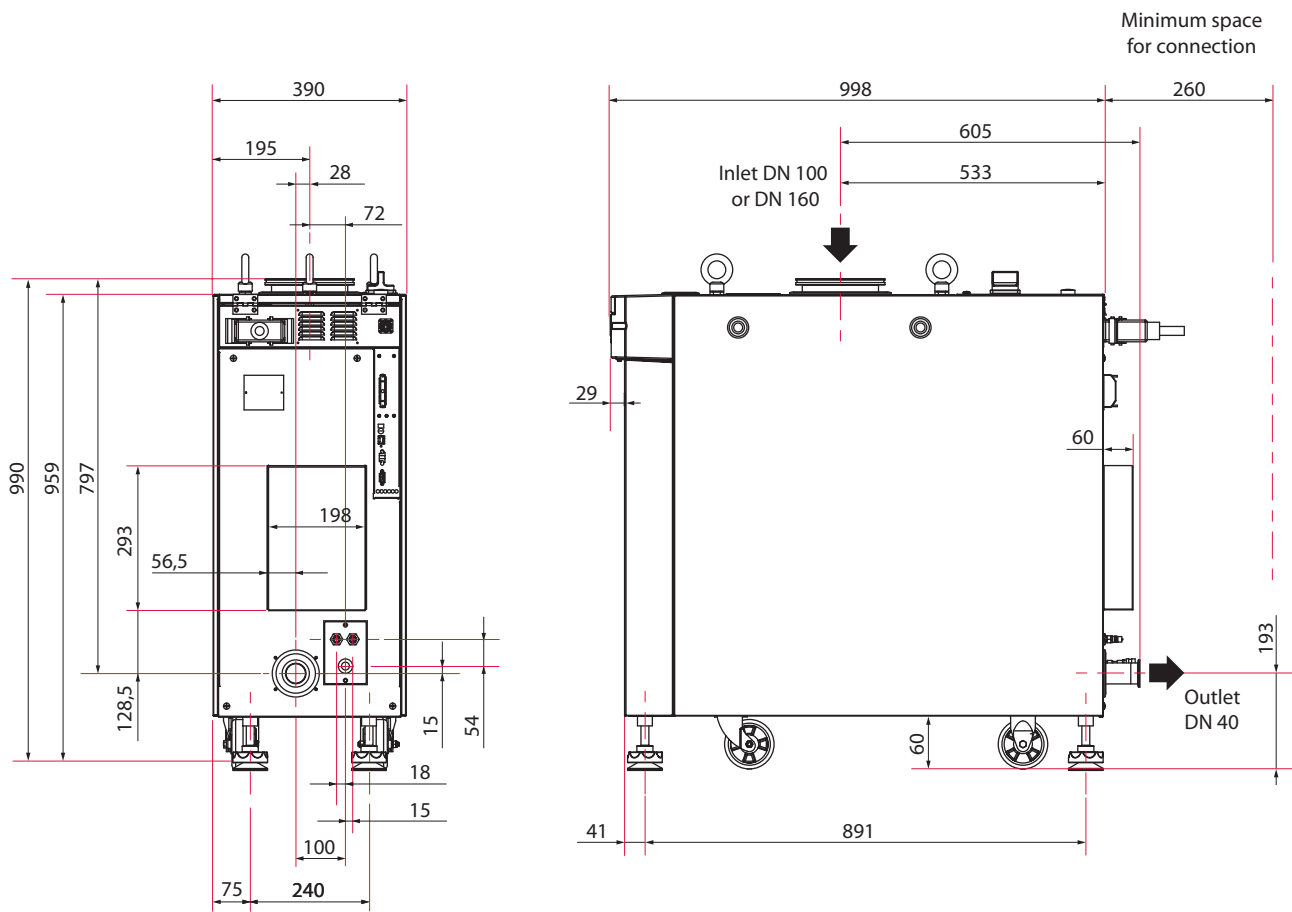
Technical characteristics

A803H dimensions (mm)



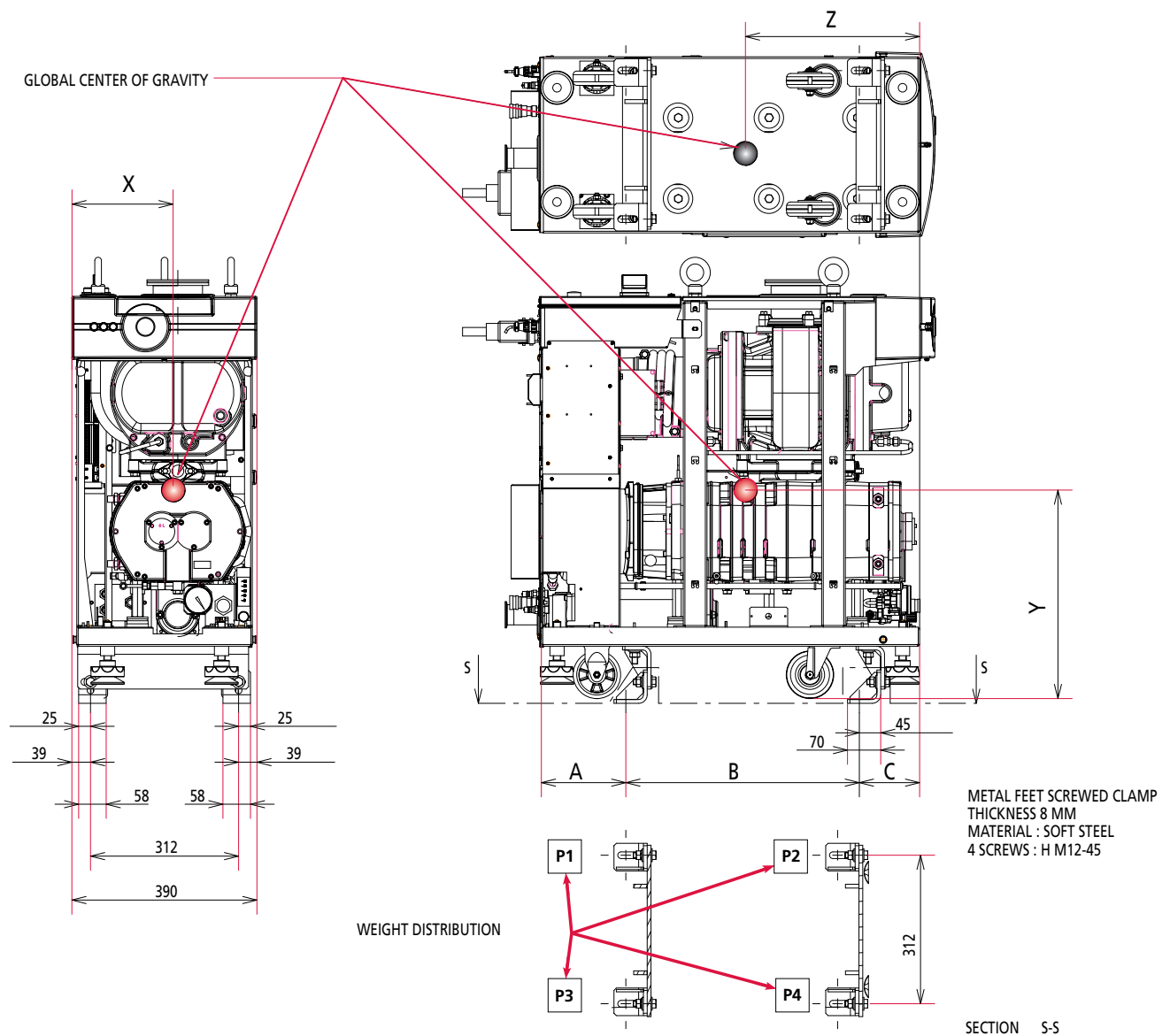
Technical characteristics

A1503H / A1803H dimensions (mm)



Technical characteristics

Isometric views and location of the antiseismic protection devices A203H / A803H / A1503H / A1803H models



Center of gravity (mm)			
	A203H	A803H	A1503H A1803H
X	210	213	205
Y	322	438	537
Z	394	367	446

Antiseismic protection device position (mm)			
	A203H	A803H	A1503H A1803H
A	178	178	271
B	492	492	545
C	127	127	144

Load by foot (DaN)			
	A203H	A803H	A1503H A1803H
P1	81.8	105	161
P2	68.9	110	129
P3	67.4	83	141
P4	56.9	87	114

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
Stainless steel	
DN 100 ISO-F	30503M
DN 160 ISO-F	30606M

Auto valve 24 VAC	P/N
Stainless steel	
DN 100 ISO-F	30503E
DN 160 ISO-F	30606E

Cable for electropneumatic valve	P/N
Cable 3.5 m	106532

Hand-held remote (HHR)

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



	P/N
Control box + cable 1.5m	119988S
Cable 15m	107079

Interface boards OEM/Remote control

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



Fitting accessories

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

Accessories

Seismic bracket

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

	P/N
Set of two seismic brackets	A328947

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

External anti-suckback valve

This accessory can be installed at the pump exhaust of the pump model without built-in anti-suckback device. It reinforces the tightness at shutdown. Contact us.

Lonworks interface

A3H Series offer a wide range of type of communication (RS 232, RS 485, Dry contacts, HHR). In addition, two other interfaces are available.

Lonworks

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 use to connect to our pumps.

	P/N
Lonworks	111199

RS 232

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

For other types of field buses, please contact the manufacturer.

B

Start-up

Operating instructions – A3H Series

B 000	<i><u>Safety instructions</u></i>
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B 070	<i><u>J14 Remote control plug connection</u></i>
B 100	<i><u>Emergency stop plug connection</u></i>
B 110	<i><u>RS 232 or RS 485 link wiring</u></i>

Safety instructions

Overview

Study the labelling described at the beginning of this manual.

We took care to provide you with a clean product. To keep it in this condition, unpack it only in its final place of use.

Make sure the equipment shows no sign of transport damage. If it has been damaged, take the necessary steps to record this with the carrier and inform the manufacturer. In all cases, we recommend keeping the packaging (reusable materials) for further transport of the equipment or for prolonged storage.

Our products are designed to comply with current EEC regulations. Users making their own modifications to the product are liable to break its compliance with these regulations, degrade its EMC (electromagnetic compatibility) rating, and make it unsafe to use. The manufacturer declines all liability for the consequences of such operations.

Contact in case of emergency

For emergencies and breakdowns, contact the manager of your local service center (see addresses at back of manual and on our website).

CAUTION

The product's EMC rating is obtained on the understanding that it is installed in compliance with EMC rules.

Of special note: in environments that are prone to emit interference, use shielded cables and connections on interfaces

WARNING

Heavy product

This product needs special handling precautions due to its weight. It should be removed from its crate only by staff trained in heavy materials handling: use the lifting rings and devices provided with the product. The maker can not be held liable for the consequences of using other rings.

WARNING

Risk of tilting

Although the product meets EEC safety regulations (topple angle $\pm 10^\circ$), it is advisable to guard against the risk of tilting during handling, installation, and use.

Refer to chapter A of the user's manual for location of the center of gravity.

Safety instructions

CAUTION

Ensure that the product is connected to an electrical installation:

- in compliance with the local and national safety requirements,
- equipped with electrical protection (fuses, circuit breaker, ...) which has a suitable earth (ground) point, properly connected.--

WARNING

Electric shock hazard on touching.
When the main isolator is switched to the «0» position, items located between the mains connection and the isolator are still under mains voltage.
Disconnect the mains cable from all power sources before commencing any maintenance work on the product.

WARNING

Electric shock hazard.
Some components have capacitors charged to over 60VDC. When power is switched off, they keep their charge for a time. Residual voltages from the filter capacitors can cause electric shocks all the way back to the mains plug. Wait 5 minutes after power-off before commencing any work on the product.

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

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.

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

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

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.

WARNING

When the EMO is activated, some internal electrical parts are energized and water cooling line and N₂ purge line are always supplied.
Risk of electrical shock in case of contact.
Before any intervention, disconnect main electrical cable, water inlet and outlet quick connectors and N₂ purge connector.

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

The products are designed to avoid subjecting users to heat hazards. However, specific operating conditions may exist that require extra caution from users due to the high temperatures (outer surfaces > 70 °C on the exhaust pipe),
Wear protective gloves and leave the pump to cool before working on the product.

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.
Hazardous 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 circuit breakers which may 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 (see **B 100**).

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

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

WARNING

Do not expose any part of the human body to vacuum.

The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system.

As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.

WARNING

The products are factory tested to ensure they will not leak in normal operating conditions. It is the user's responsibility to ensure this level of leak tightness is maintained.

WARNING

Any intervention must be done by safety trained personnel only (EMC, electrical safety, chemical risk,...). Before performing any maintenance operations on the product, isolate the product from the various energy sources (electricity, compressed air, ... etc).

Whenever you return the product to an adixen repair service center, please make sure you follow the «procedure for returning products» and fill in the declaration of contamination found at the end of the operating instructions or on our website.

A3H Series – Hook-up requirements

Packaging dimensions (B 10)	A203H	A803H	A1503H	A1803H	A1803H Large Volume
L x W x H	1200x900x1070 mm		1200x900x1190 mm		

Weight (B 10)	A203H	A803H	A1503H	A1803H	A1803H Large Volume
Packaging weight	360 kg 793 lbs	465 kg 1025 lbs	635 kg 1400 lbs		
System weight	265 kg 584 lbs	385 kg 848 lbs	545 kg 1201 lbs		

Water cooling circuit (B 30)	A203H	A803H	A1503H	A1803H	A1803H Large Volume
Water flow (minimum)	2 l/mn	2.5 l/mn	2.5 l/mn	2.5 l/mn	2.5 l/mn
Water temperature	10 to 25 °C				
Pressure	2 - 6 · 10 ³ hPa (29 to 87 psi) (relative pressure)				
Connection :	1/4 inch NPT or 3/8 inch NPT quick female connector 1/4 inch NPT quick male connector Stainless Steel / Brass Quick connect (supplied)				
Inlet type					
Outlet type					
Material					
Remarks					

Inert gas purge circuit (B 40)	A203H	A803H	A1503H	A1803H	A1803H Large Volume
Nitrogen flow	20 to 120 slm				
Pressure	2 - 6 · 10 ³ hPa (29 to 87 psi) (relative pressure)				
Connection :	1/8 NPT quick male connector Brass				
Inlet type					
Material					

A3H Series – Hook-up requirements

Electricity (<i>B50</i>)	A203H	A803H	A1503H	A1803H	A1803H Large Volume
Power consumption at maximum inlet flow	3.5 kW	4.5 kW	5.5 kW	6.5 kW	7 kW
Short Circuit Current Rating of main electrical cabinet	5 kAIC				
Power supply voltage	200-230 V 50/60 Hz				
Low voltage	200-230 V 50/60 Hz				
Full load current at 200V	20 A	27 A	32 A	33 A	30 A
Full load current at 230V	20 A	25 A	29 A	29.5 A	29.5 A
Breaker size	25 A	35 A	35 A	35 A	35 A
Cable section	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4mm ²)
Power supply voltage	380-460 V 50/60 Hz				
High voltage	380-460 V 50/60 Hz				
Full load current at 380V	10 A	20 A	21 A	21 A	15 A
Full load current at 460V	10 A	20 A	20 A	20 A	20 A
Breaker size	10 A	25 A	25 A	25 A	25 A
Cable section	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)	AWG-10 (4 mm ²)

Pumping circuit (<i>B60</i>)	A203H	A803H	A1503H	A1803H	A1803H
Gas inlet - flange	DN 50 - ISO-K	DN 100 - ISO-K	DN 100 - ISO-K		DN 160-ISO-K
material	Stainless Steel				
remarks	a bellow is necessary				
Gas exhaust - flange	DN 40 - ISO-KF				
material	Stainless Steel				
remarks	a bellow is necessary				

Unpacking / Handling / Storage

Make sure the equipment shows no sign of transport damage. If it has been damaged, take the necessary steps to record this with the carrier and inform the manufacturer. In all cases, we recommend keeping the packaging (reusable materials) for further transport of the equipment or for prolonged storage.

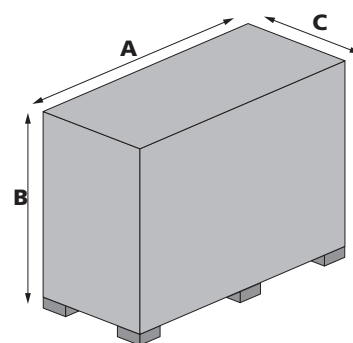
WARNING

Risk of tilting

Although the appliance meets EEC safety regulations (topple angle $\pm 10^\circ$), it is advisable to guard against the risk of tilting during handling, installation, and use.

Refer to **A 40** of the user's manual for location of the center of gravity.

Packaging dimensions and weight



Tolerance: ± 20 mm.

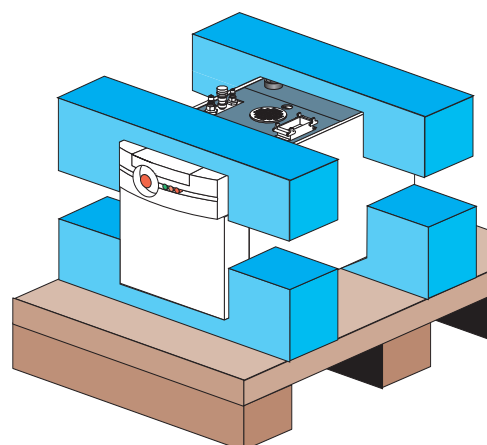
Pump	Dim. (inch/mm)			Weight (lbs/kg)
	A	B	C	
A203H	47.2/1200	42.1/1070	35.4/900	793/360
A803H	47.2/1200	42.1/1070	35.4/900	1025/465
A1503H	47.2/1200	46.8/1190	35.4/900	1400/635
A1803H	47.2/1200	46.8/1190	35.4/900	1400/635

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 / Handling / Storage

Unpacking (continued)

These packages contain*:

Equipment	Quantity provided with the pump		
	A203H	A803H	A1503H A1803H
Operating instructions	1	1	1
Oil filling of the pump (0,4 liter)	1	3	5
Hoisting ring	3	3	3
Funnel	1	1	1
EMO plug	1	1	1
Remote control plug	1	1	1
Water quick coupling	2	2	2
Nitrogen quick coupling	1	1	1

(*) Refer to (F10) for part numbers.

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.

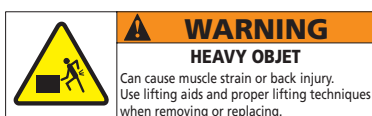
If the inlet and exhaust blanking plates have been removed, there is a risk of internal part corrosion. We advise:

- to pressurize the pump with Nitrogen or dry air (200 hPa relativ pressure),
- to seal the inlet and exhaust ports,
- and to store it at an ambient temperature between - 25 °C and + 55 °C, for a period of 1 year maximum.

Never store a pump which has been used. Return it to an adixen repair service center (refer to E10).

Unpacking / Handling / Storage

Handling



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

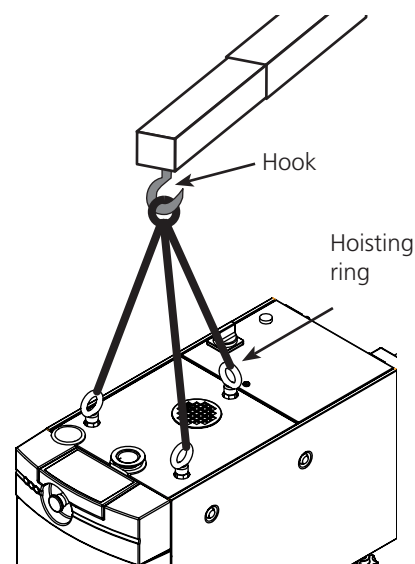
Heavy product
This product needs special handling precautions due to its weight. It should be removed from its crate only by staff trained in heavy materials handling : use the lifting rings and devices provided with the product. The maker can not be held liable for the consequences of using other rings.

Handling the pump to remove it from the crate

It is highly recommended that a hoist is used for lifting with the following specifications:

- Length for each arm must be > **500 mm** (21.65 inch).
- Rated capacity for each arm must be > **350 kg** (772 lbs).

Pump	Weight (lbs/kg)
A 203H	584 / 265
A803H	848 / 385
A1503H	1201 / 545
A1803H	1201 / 545



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.

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.**

CAUTION

In order to prevent moisture from entering the pump before installation, it has been pressurized before shipment with nitrogen and sealed with blanking plates. Do not remove these blanking plates until you are ready to install the product on your vacuum system.

Positioning the pump in the pumping installation

⚠ WARNING

Risk of tilting

Although the appliance meets EEC safety regulations (topple angle $\pm 10^\circ$), it is advisable to guard against the risk of tilting during handling, installation, and use.

Refer to A40 of the user's manual for location of the center of gravity.

Don't place the product on a tilted surfaces, it can drag the operator along due to its heavy weight:

- use castors to move it on short distances,
- locate it on flat, hard ground,
- do not push it sideways
- adjust the levelling feet for operation to make sure that the pump is not supported by the castors.

The product is not designed to carry people or loads and is not for use as a seat or step.

⚠ 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

CAUTION

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

Determine where the pump will be placed.

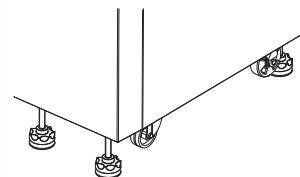
Refer to the technical specification section for dimensions, if needed (see **A 40**).

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

CAUTION

Lock the pump by adjusting the for leveling feet for resting solidly on the floor.

Use a water level to check if the frame is in horizontal position in both axis.



⚠ CAUTION


Risk of trips.

Route and secure cables, hoses and pipework during installation to avoid any possible risk of trips.

Positioning the pump in the pumping installation

Remove the flanging components (A803H model)

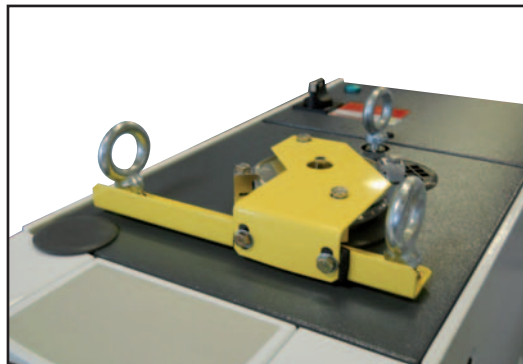
 Remove the two assembling screws from the flanging plate, and the claw clamps

 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.



Filling the machine oil housings

CAUTION



Risk of oil ingestion.

The pumps are delivered without an oil charge: the oil is delivered in separate containers.

Wear gloves, protective glasses and mask to fill in the oil in the pumps.

The pumps are tested using synthetic fluid A113. We recommend the exclusive use of this fluid.

The safety data sheet for oil is available on our website www.adiden.com.

CAUTION

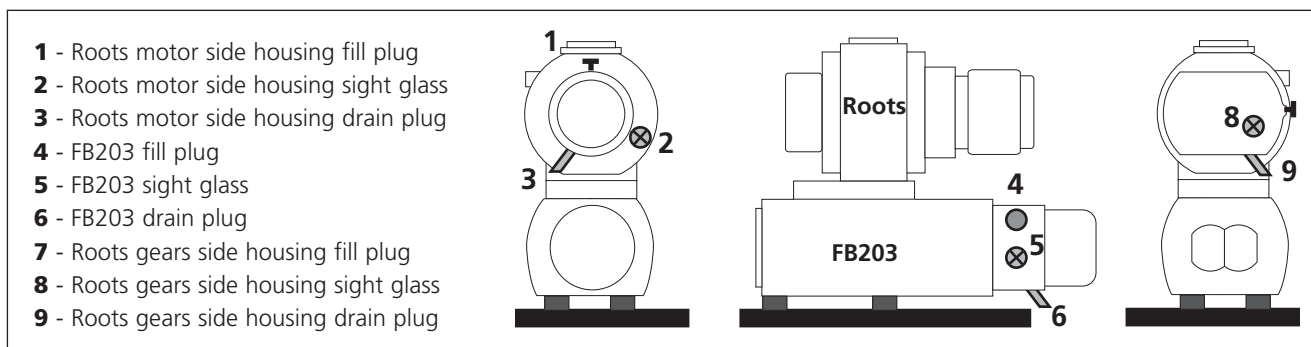
Mineral and synthetic oils cannot be used together. Contact the manufacturer or your service agent before making any changes.

Oil quantities

Pump model	Quantities (liter)				Nber of can 0.4 L
	FB203	Roots housing		Oil capacity	
		gear side	motor side		
A203H	0.35	-	-	0.35	x 1
A803H	0.35	0.45	0.25	1.05	x 3
A1503H	0.35	1.00	0.55	1.90	x 5
A1803H	0.35	1.00	0.55	1.90	x 5

Note : on A803H, the Roots oil casings are filled at factory.

Filling the machine oil housings



Filling procedure **Make sure the pump is off** (main switch to "0" position) **and positioned horizontally**, 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 (except Roots on A803H)

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.

Ensure that the oil level of the pump is correct.

Oil level check on Roots

Correct oil level



Check that the oil level is in the middle of the sight glass.

Filling the machine oil housings

Filling of FB203 dry pump

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.

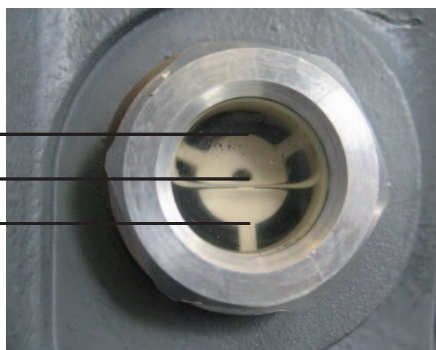
Ensure that the oil level of the pump is correct.

Oil level check on FB203

Maximum oil level

Optimum oil level

Minimum oil level



Check that the oil level is between the minimum and the maximum level by looking through the oil level sight glass.

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:

- Treated soft water or non-corrosive industrial water
- pH between 7.5 and 11
- Hardness < 7 milli-equivalent/l
 - = 350 mg/l of CaCO₃ (calcium carbonate)
 - = 35 °f (French degree)
- Resistivity: 1,500 Ω.cm < R < 20,000 Ω.cm
- Particles maximum size: 0.2 mm
- Solid pollution < 100 mg/dm³
- Temperature from 10 ° to 25 °C
- Pressure range between 2 - 6 · 10³ hPa (29 to 87 psi) (relative pressure)
- Water flow: see **A 40**

If the "solid particle size" and "solid pollution" water characteristics values can not be reached, install a filter on the cooling connection.

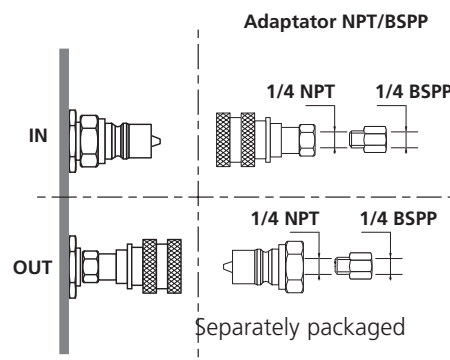
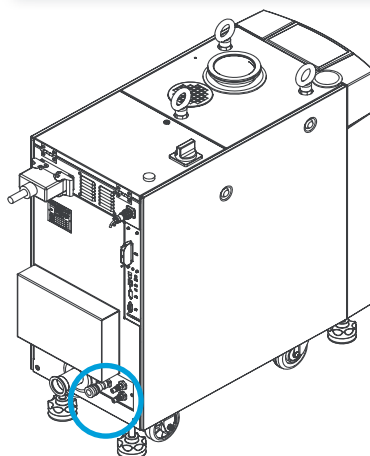
CAUTION

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.

Water cooling quick connection



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

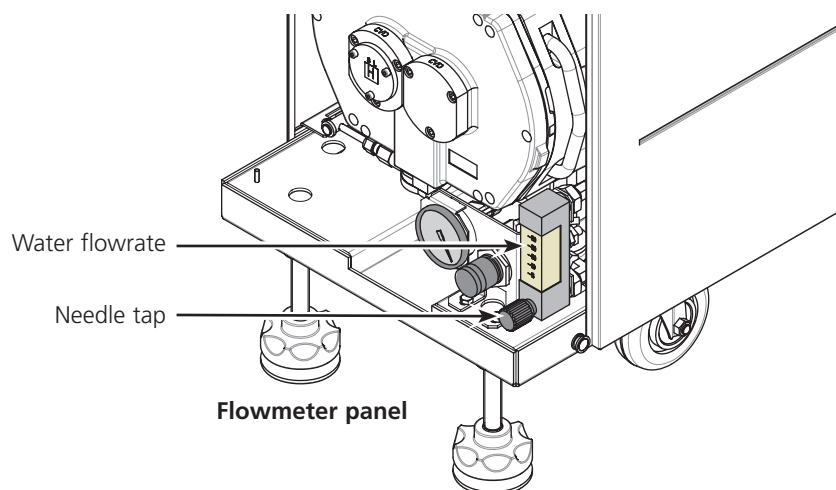
Connect the water pipes to the quick coupling connectors.

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

*or 3/8 inch depending on the pump configuration. (See **F 10**)

Connection to the cooling circuit

Water flowrate adjustment



Remove the front cover.

The water flow will be adjusted according to the pump model (see **A 40**) with the needle tap located on the flowmeter panel.

Note for A1503H and A1803H: the flowmeter adjusts the water flow in the roots flanges blower only.

Inert gas purge connection (N2 connection)

Nitrogen characteristics

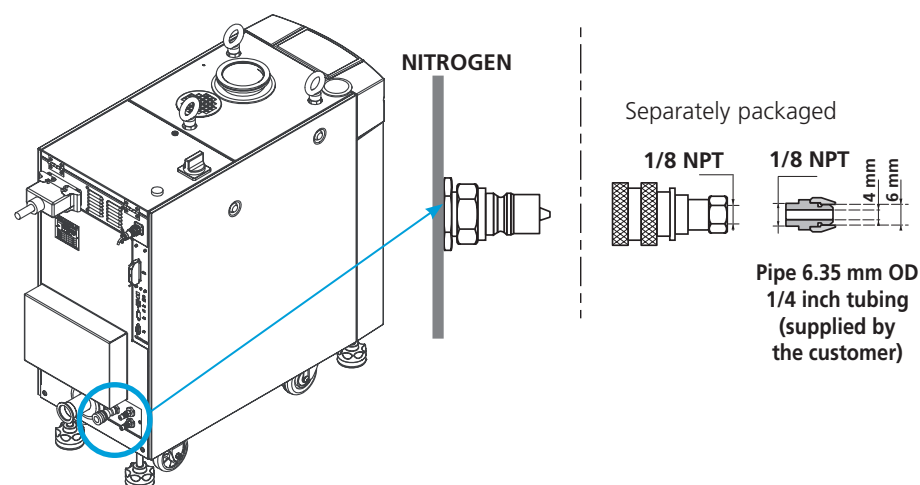
For maximum performances, a **filtered dry nitrogen supply** with the following characteristics is required:

- H₂O concentration < 10 ppb
- O₂ concentration < 5 ppb
- Dust < 1 μm
- Oil < 0.1 ppm
- Pressure between 2 - 6 · 10³ hPa (29 to 87 psi) (relative pressure)
- Maximum flowrate: 120 slm

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.

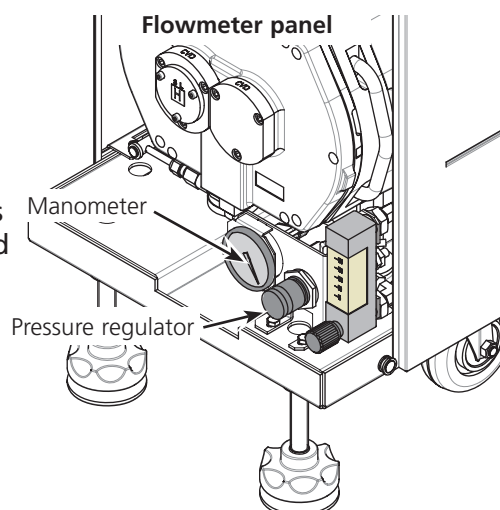
Connection



N₂ flowrate adjustment

The N₂ flowrate can be adjusted with the pressure regulator according to the process (see **A 40**).

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**).

WARNING

Electric shock hazard.
The voltages and currents in use can induce electric shock.
Isolate and lock out power line by switching off the main isolator before maintaining the product /or removing the cover.
This main isolator has an interrupting current fo 10KAIC.
Take care! items located between the mains connection and the isolator are still under mains voltage: disconnect the mains cable from all power sources before commencing any maintenance work on the product.
Only skilled, authorized people may carry out maintenance work.

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.

A3H Series pumps do not include any operator replaceable fuses.

WARNING

The user must provide an electrical disconnecting device of the pump separate from the pump main supply. This device must be located close to the pump and must be easily accessible by the operator.

Customer electrical installation protection

Installation protection with circuit breaker

The user must supply the pump from facilities equipped with main circuit breaker, curve D (IEC 60947-2), in accordance with local regulations and with a minimum amp. interrupting current of 10kAIC.

This protection device should be in close proximity to the pump (no further than 7m (25 ft)) within line of sight of the pump.

Main circuit breaker rating (recommended values).

Pump model	Circuit breaker rating	
	200-230V — 50/60 Hz	380-460V — 50/60 Hz
A203H	25 A	10 A
A803H	30 A	20 A
A1503H	35 A	25 A
A1803H	35 A	25 A

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

Electrical connection

Customer electrical installation protection (con't)

Differential circuit breaker

In case of insulation defect, for personnel protection you must install on the main power supply a type B differential circuit breaker GFI (or RCD) of 300 mA. This equipment protection device is compatible with type T.T electrical network.

For other network type T.N or I.T, apply the right protection device. Contact Adixen product manufacturer for advice.

In all cases, comply with current local regulations.

CAUTION

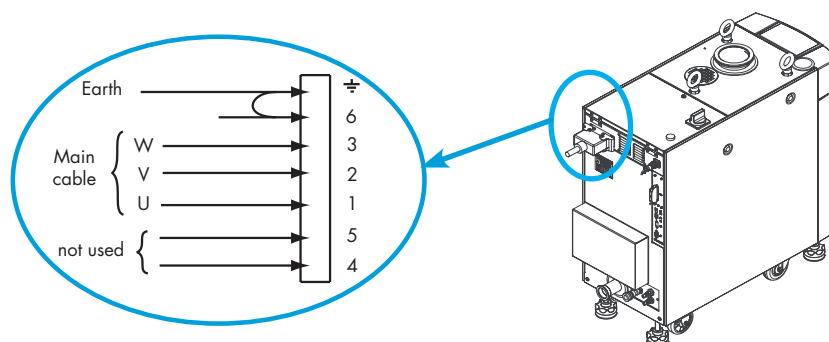


An IEC 417#5019 symbol is located on the rear panel for the main power supply earth terminal.

Ensure that the equipment and the electrical supply cable are suitably protected against earth defects and that the earth wire is longer than the three conducting wires.

The user must provide a second protective earth (ground) conductor with a cross-sectional area at least equal to the conducting wire size. Then, connect the protective earth stud to the suitable installation earth point.

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-10 (or 4 mm²).

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**).

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.

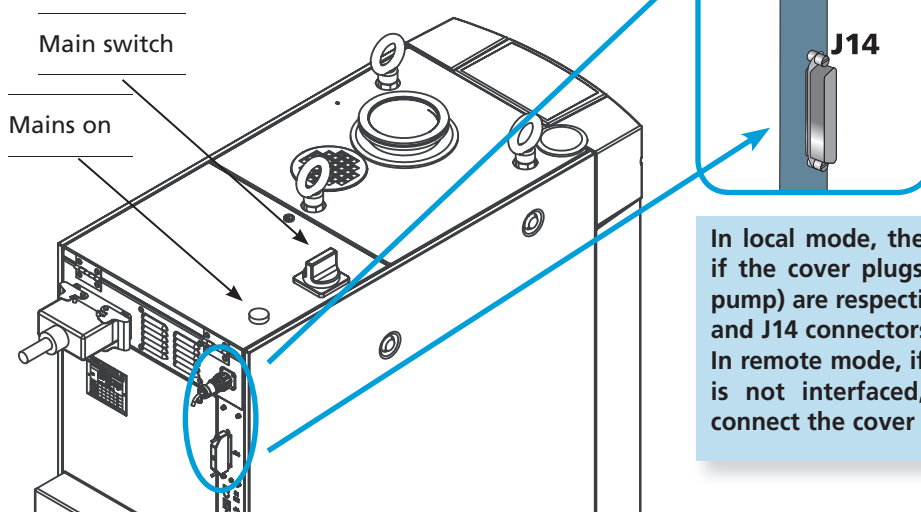
CAUTION

Before each pump start-up, check that oil levels of FB203 and Roots housings are visible in the middle of the sight glass: do this check with the pump stopped.

WARNING

Do not expose any part of the human body to vacuum. The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system. As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.

Connect the cover plugs



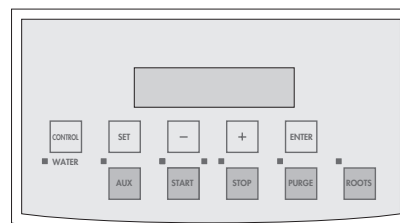
In local mode, the pump will run only if the cover plugs (delivered with the pump) are respectively connected on J1 and J14 connectors. In remote mode, if the emergency stop is not interfaced, it is necessary to connect the cover plug J1.

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

Checking the direction of rotation at initial pump start-up

Controlling the pump using the hand-held remote

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



At the first hand-held remote 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 and an X appear alternatively on the left side corner of the screen.

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

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 before starting the pump.

Remove the blanking plates on the inlet and exhaust port.

Fit a pressure gauge at the pump inlet.

Set the main switch to position **1**.

To start or stop the Roots while the FB203 is running, set the CMD.ROOTS menu on ENABLED (see **C 43**).

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 $5 \cdot 10^{-1}$ hPa, the direction of rotation is correct.
- if the pressure increases, **invert two phases at the main power input female connector** (refer to **B 50**).

Checking the direction of rotation at initial pump start-up

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

WARNING

Electric shock hazard on touching.

When the main isolator is switched to the «0» position, items located between the mains connection and the isolator are still under mains voltage.

Disconnect the mains cable from all power sources before commencing any maintenance work on the product.

WARNING

Electric shock hazard.

Some components have capacitors charged to over 60VDC. When power is switched off, they keep their charge for a time. Residual voltages from the filter capacitors can cause electric shocks all the way back to the mains plug. Wait 5 minutes after power-off before commencing any work on the appliance.

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 blanking plate 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 50**).

Connection to the pumping circuit

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

WARNING

Do not expose any part of the human body to vacuum.
The product is supplied with the inlet and exhaust sealed. Remove these blanking plates when you are ready to connect the product on your vacuum system.
As well as, don't operate the product unless the inlet and exhaust are connected to a vacuum and exhaust pumping line.

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

Preliminary precautions for inlet and exhaust connections

CAUTION

For safety reasons, any accessories connected to the inlet and exhaust must be made of materials compatible with pumped gases.

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 adixen Vacuum Products' catalog.

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

After connecting the appliance to the pumping line, check for leaks along the whole of the line to ensure proper connections have been made (pump, pipes, valves, etc.).

Connection to the pumping circuit

At the pump inlet

CAUTION

Make sure that any vacuum accessories connected to the inlet of the pump can withstand a negative pressure of $1 \cdot 10^3$ hPa, with reference to the atmospheric pressure.

To get the best pumping speed, ensure that the vacuum line is the minimum length possible and has an internal diameter not less than the inlet connection of the pump.

Inlet isolation valve (accessory)

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

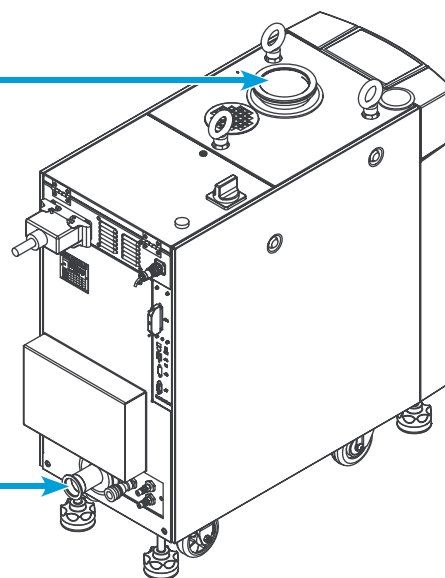
Connect the valve directly on the pump inlet flange using connecting accessories.

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

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

Inlet port	
A203H	DN 50 ISO-K
A803H	DN100 ISO-K
A1503H	DN100 ISO-K
A1803H	DN100 ISO-K or DN 160 ISO-K

Exhaust port	
DN40 ISO-KF	



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 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.

J14 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 30V - 1 A max.
Overvoltage and overcurrent can cause internal electrical damages.
Monitor external contacts voltage below 35V and current below 1 A.

⚠ WARNING

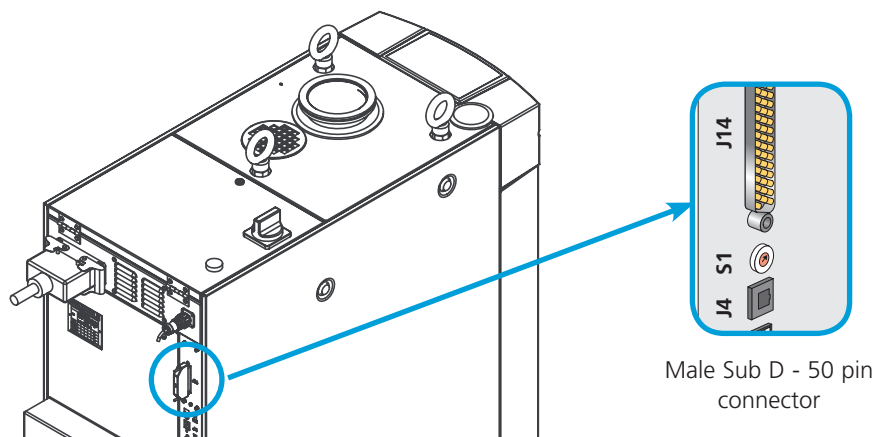
When units containing control circuits are equipped with dry contact outputs, it is the responsibility of the customer to use these outputs in compliance with safety extra low voltage installation and security standards : it concerns J1, J6, J7 and J14 connectors.

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 (30V - 1A). These contacts can be used to control automatic functions.

Location of J14 remote control connector

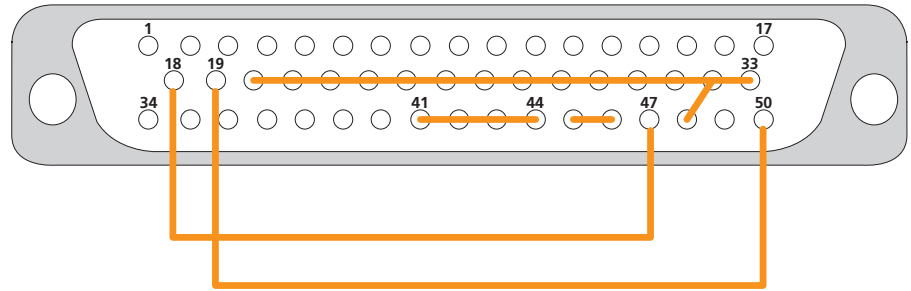
The remote control connection is done via the "**J14**" connector, located on the electrical rear panel of pump.



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

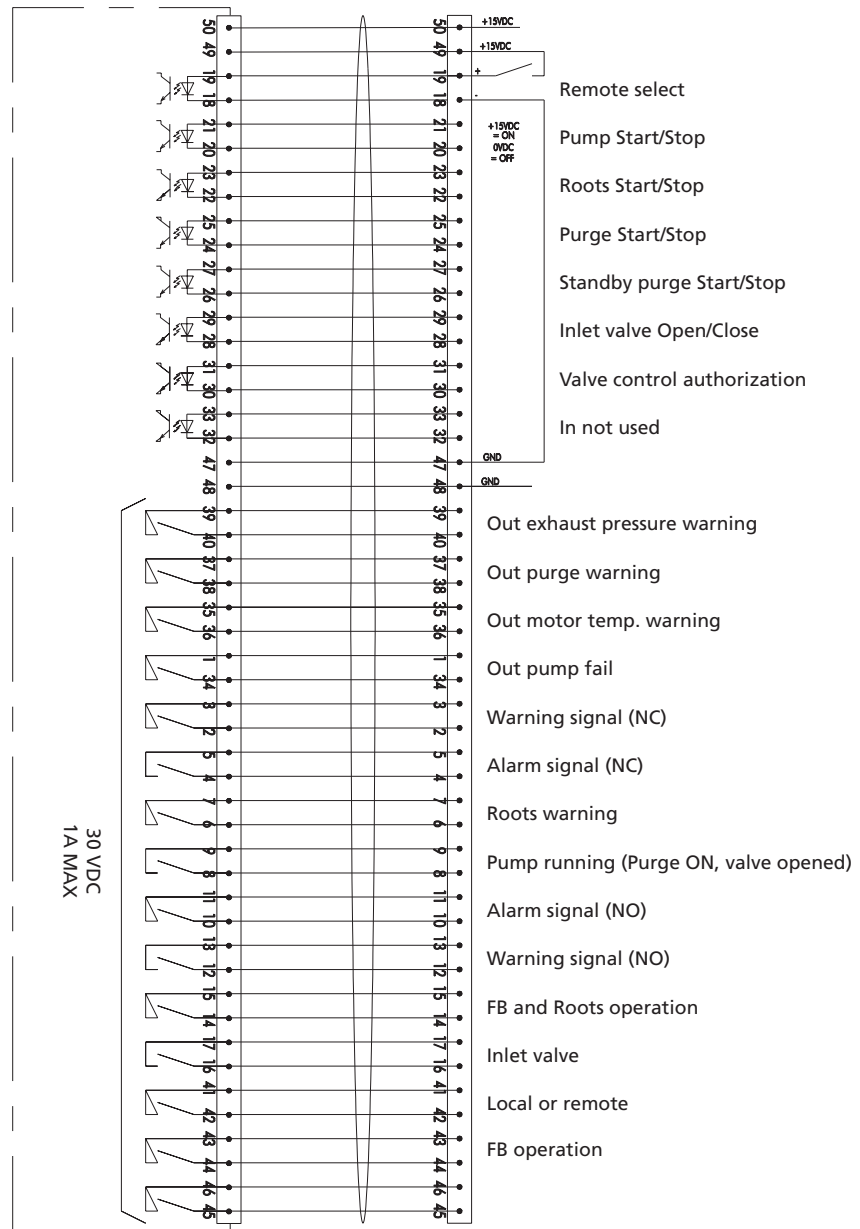
J14 remote control plug connection

Cover plug wiring Cover plug type: Sub D - 50 pin connector.



Factory wired (soldered side view)

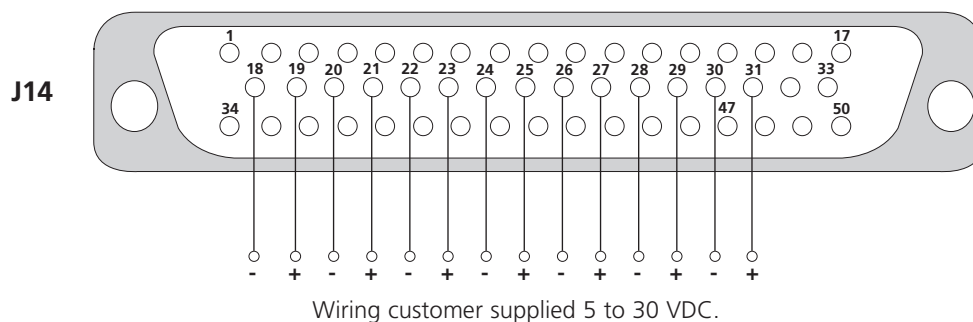
J14 wiring



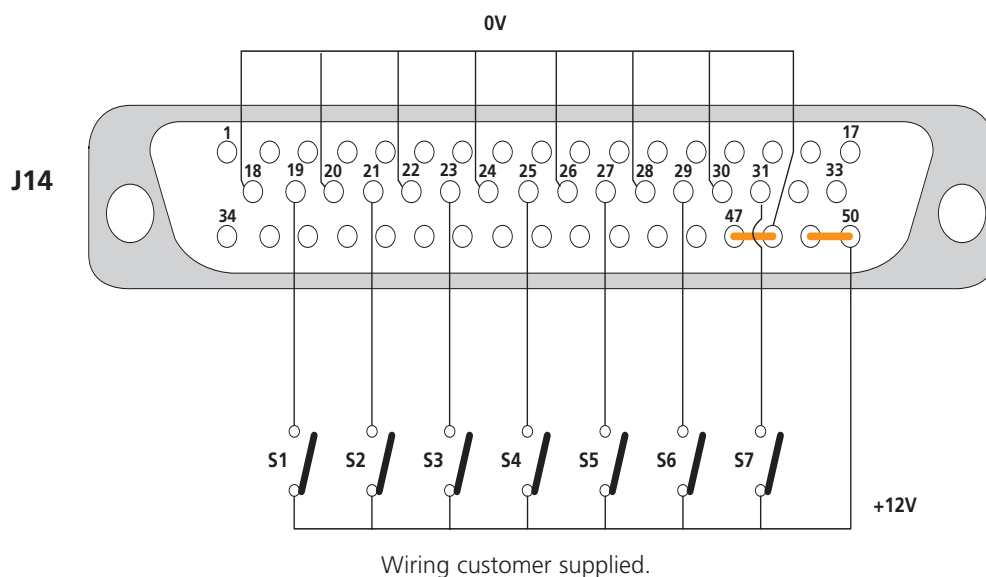
J14 remote control plug connection

Control contacts (inputs)

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



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.



J14 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, pump starts. Contact open, pump 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.
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.
S5 (26-27)	N2 standby purge valve Start/Stop	Contact closed, N2 standby purge starts after a time set (time programmed by RS232, see C 90). Contact open, N2 standby 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.
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" is validated in the DEFINITION menu of hand-held remote. • Inlet valve control authorization is not validated (S7 contact open).
S7 (30-31)	Authorization to close or not the inlet valve with the "AUX" button of hand-held remote	Contact closed, authorization to close the inlet valve with the "AUX" button of hand-held remote. Contact open, no authorization to close the inlet valve with the "AUX" button of hand-held remote. This function is only valid when "INLET VALVE OPTION" is enabled in the DEFINITION menu of hand-held remote. This function is not related to contact S6 and enables to function independently in local mode or remote control mode.

J14 remote control plug connection

Available outputs Available dry contacts 30V - 1A.

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

CONTACT	FUNCTION
1-34	Pump fail (pump running, valve opened, no warning)
2-3	Warning presence
4-5	Alarm presence - Unit stoppage
6-7	Maintenance warning
8-9	Pump running, correct purge and inlet valve opened
14-15	Pump running (FB + Roots running)
16-17	State of inlet valve
35-36	Motor temperature warning
37-38	Purge warning
39-40	Exhaust pressure warning

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

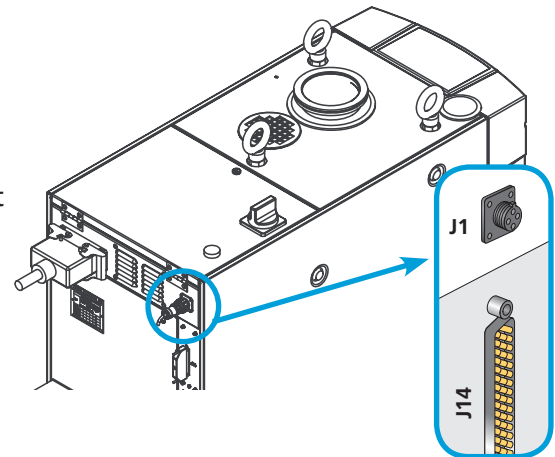
CONTACT	FUNCTION
10-11	Alarm presence - Unit stoppage
12-13	Warning presence (without maintenance)
43-44	FB203 running

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.

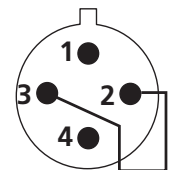
This connector is located at the rear of the pump.



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

Control contacts (input)

All dry contacts are rated 50V - 1A.

The input is considered activated when the pins are linked.

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

Available output: "Emergency stop" state

	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.

⚠ 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 safety extra low voltage installation and security standards : it concerns J6, J7 and J14 connectors.

RS 232 or RS 485 link wiring

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

The settings can be modified through the M5 corresponding menu (☰ C 42).

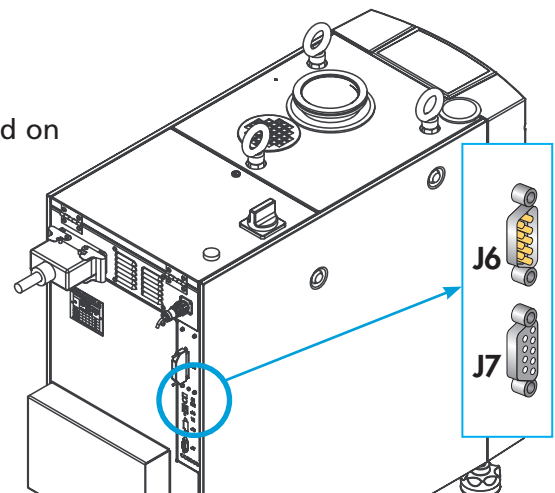
The commands and messages reception syntax is available on ☰ C 90.

The initial configuration of the serial link is as follows:

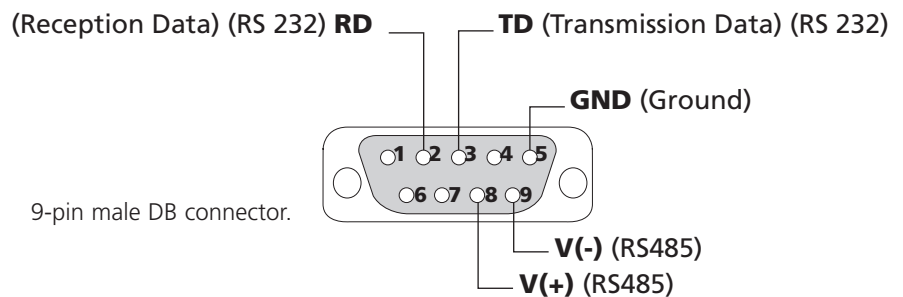
- Type: **RS 232**
- Transmission speed: **9600 bauds**
- Data Length: **8 bits**
- Parity: **NO**
- Stop bit: **1**

The connections are located on the electrical rear panel of pump.

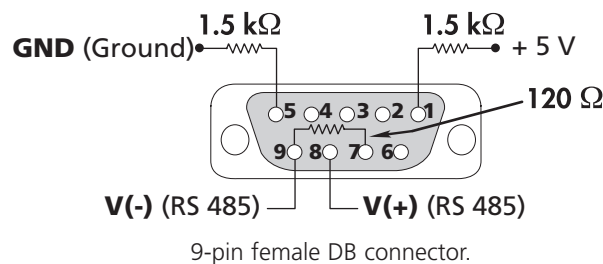
Connectors location



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

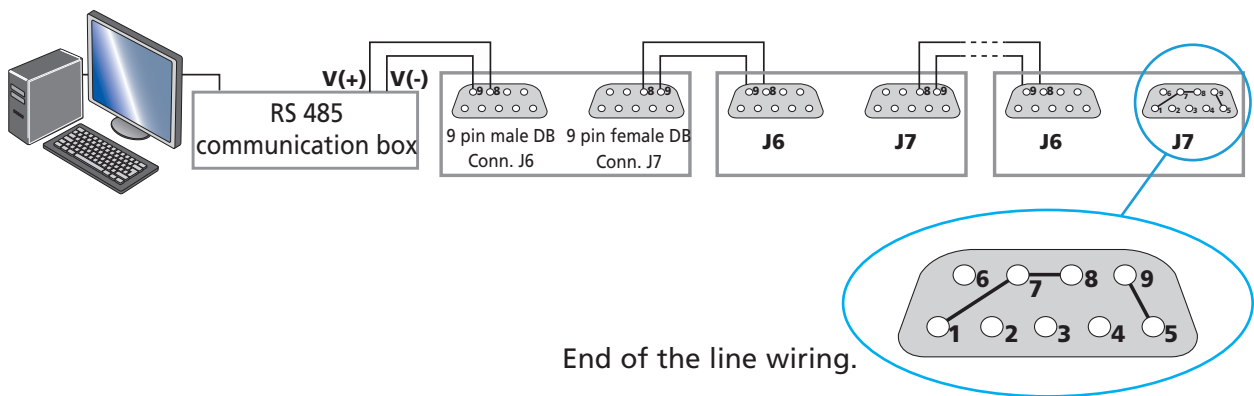
Examples of possible connection

RS232 link with single monitoring system M4

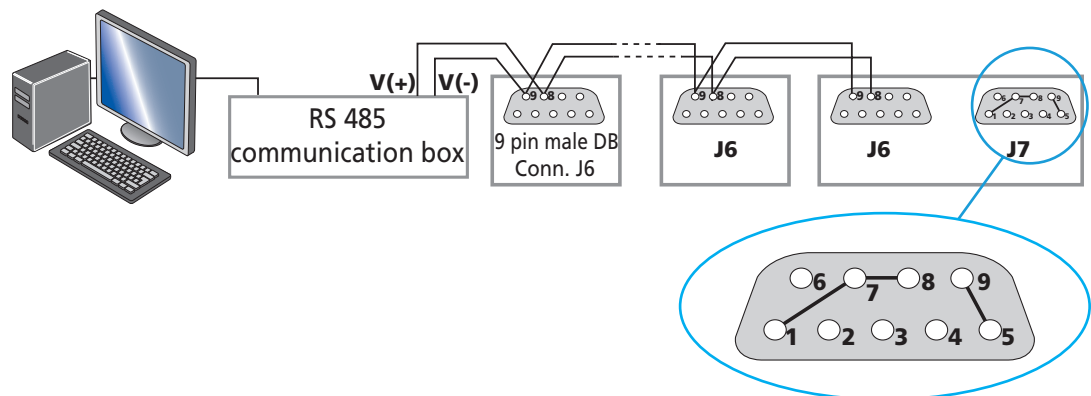


Serial link RS485

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.





Operating instructions – A3H Series

C 000	<i>Safety recommendations for harch processes</i>
C 010	<i>Operating modes</i>
C 020	<i>M4 monitoring system parameters</i>
C 040	<i>Operating mode with HHR</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 loading of pump configuration (with HHR)</i>
C 045	<i>M4 monitoring setting for transport</i>
C 050	<i>Water flowrate on A803H model</i>
C 060	<i>Use of the «power failure protection»</i>
C 070	<i>Use of the Inlet isolation valve (accessory)</i>
C 080	<i>Use of the bellows heater</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 shut down 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), these risks can easily be identified.

- Explosion of Si dust (only on PECVD Si)
- Ignition of SiN powders (on PECVD SiN, when NH₃/SiH₄ ratio < 1)
- Ignition of SiH₄/H₂ trapped into powders.

1 - 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.

Available ignition sources sufficient to ignite:

- Electronic charges loaded into particles naturally generated by plasma into process chamber
- Friction between particles or air flow inrush
- Local elevated temperature due to mechanical contact
- Auto-ignition when Si dust produced in anaerobic conditions is violently put in contact with O₂ is also possible

Overpressure generated by this kind of mix explosion/detonation is 10 to 11 times initial pressure.

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

Another well known phenomena is explosion due to trapped silane or poly-silane polymers. 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 or desorbs flammable process gases (like Hydrogen & Silane).

In case of violent air inrush, a cloud may be generated. Trapped flammables gases can be released suddenly and ignite.

3 - 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 which then could generate a second explosion due to the additional air ingress.

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 high local overpressure (ie 25 · 10³ hPa may be locally reached with an initial pressure of 2.5 · 10³ hPa obtained in the primary dry pump when the complete pumping system is exposed to 1 Atm at inlet).

Safety recommendations for harsh processes

CAUTION**Safety information related to SiH₄/H₂ processes
(cont'.)****GENERAL RECOMMENDATIONS**

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 $1 \cdot 10^{-6}$ hPa l/s of Helium. Air ingress to inner side 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 $5 \cdot 10^{-5}$ hPa l/s from pump exhaust to Abatement system inlet.

N₂ purge:

- Be sure pump is purged with N₂. **Air is prohibited.**
- This purge needs to be maintained at any time to avoid air back streaming likely to enter in contact with flammable deposits.
- This purge could be exceptionally stopped when process gases are off and full system has been flushed with nitrogen. This has to be secured in a safe and robust procedure.
- Be sure N₂ purge warning and alarm are enabled and properly interlocked with the process equipment.
- Be sure N₂ purge is prolonged at least 10 min after pump stop in order to evacuate residual process gases after pump stop.

Process line (from process chamber to abatement inlet) opening before the end of previously described purge must be strictly prohibited.

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 warning or alarm signals

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 hPa (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 60 hPa : 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 6 hPa, 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 4 m 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 (HHR),
- remote controlled by the equipment (remote control connector),
- remote controlled by serial link (RS232 connector)

If the EMO connector is not connected to the tool, it is necessary to connect the EMO cover to the EMO (J1) connector  **B 100**.

Local control mode

In local mode, the remote control cover plug must be connected to the remote control connector at the rear panel of the pump. The remote cover plug is necessary to disable the remote control mode and to enable the local control mode.


The pump is running as a stand-alone part of the equipment on which it has been installed.

The pump is controlled by the hand held remote (HHR), connected in front or rear panel of the pump.

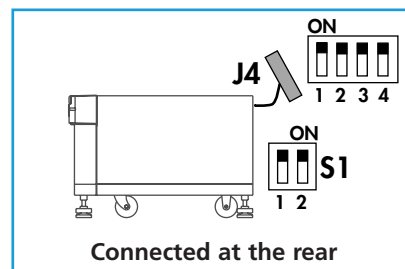
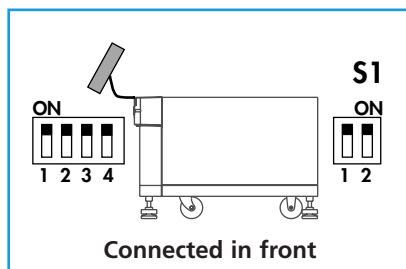
CAUTION

Even if 2 HHR can be connected together, one in front and one at the rear, for safety reasons, the pump can be controlled only by one HHR at the same time.

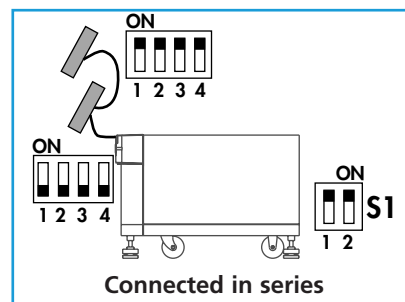
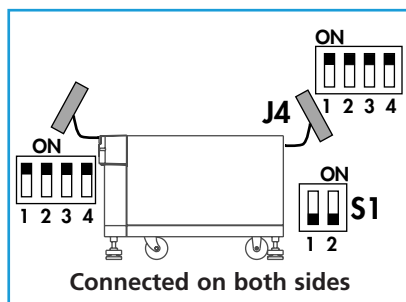
Switch configuration according to the HHR layout

Two switches have to be configured: the first at the back of HHR, near the cable connector, and the second, **S2**, located on M4 electrical interface ( **A 20**).

Use of the hand-held remote control :



Use of two hand-held remote control :



Operating mode

Remote control operating modes

Remote control via J14 remote control connector

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 the opening or closing of different dry contacts wired on remote control connector (■ **B 70**).

This mode is enabled when **J14-S1** contact is open that also inhibit the control of the pump by the HHR. However, the data and operating parameters can be read on the HHR.

Remote control via RS232/RS485 connector

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.

The pump is remote controlled by the commands transmitted on the serial link (refer to ■ **B 110** for wiring and ■ **C 90** for commands).

Pump control mode Priority

Pump control mode	How enable the mode ?	Display on HHR	How to disable ?
Local mode using HHR	<ul style="list-style-type: none"> Connect the HHR on the connector. Connect the remote control cover plug on J14. Press CONT key. 	LOC	<ul style="list-style-type: none"> Press CONTROL key on HHR.
Remote control mode via J14 remote connector	<ul style="list-style-type: none"> Connect the pump to the tool via J14 (■ B 70). Open S1 contact to remote control the pump. 	REM	<ul style="list-style-type: none"> Close S1 contact on J14.
Serial link mode via RS232/485 connector	<ul style="list-style-type: none"> Connect the pump to the tool via RS232/485 (■ B 110). Send CTRLON command (■ C 90). 	RS	<ul style="list-style-type: none"> Send CTRLOFF command.

1 - RS mode has priority on **LOC** and **REM** mode.


2 - REM mode has priority on **LOC** mode.

3 - LOC mode has NO priority on the other modes.


Operating mode

N₂ control operation Software monitoring

The absence or a too low flow of N₂ is software monitored.

This is defined by three parameters that can be adjusted through the HHR  **C 42**:

- Purge level warning;
- Purge sensor warning time (W13);
- Purge sensor alarm time (D13).

Example Let's consider that the setting of the **Purge** sensor parameters in the **SETTING** menu  **C 42** is the following:

The sequences in case of N₂ loss will be the following ones:

- As soon as pressure drops below the threshold (t=0 mn):

The yellow leds on the HHR and in front of the pump will turn "on".

Purge sensor	Warning	2 mn
	Alarm time	5 mn


The purge warning message (W13) is displayed on the HHR.

The pump warning signal (remote control plug pins 2 and 3), the purge feedback signal (remote control plug pins 37 and 38) and the final valve interlock signal (remote control plug pins 8 and 9) will open.

Pump will still be running.

- At the end of the warning time (t=2mn):
The red leds on the HHR and in front of the pump will turn "on".
The purge alarm message (D13) is displayed on the HHR.
The pump buzzer will turn on.
The pump alarm signal (remote control plug pins 4 and 5), the purge feedback signal (remote control plug pins 37 and 38) and the final valve interlock signal (remote control plug pins 8 and 9) will open.
Pump will still be running.
- At the end of the alarm time (t=5mn): Pump stops.

"Purge sensor" setting

The **Purge sensor** parameters in the **SETTING** menu  **C 42** is set at factory as follows:

This means that the pump monitoring will not take decision to stop the pump in case of N₂ loss or too low flow.

Purge sensor	Warning	0 mn
	Alarm time	Disabled


However all the information to handle safety operations linked to the process gas panel are provided through the "remote control connector" and the "safety connector".

Operating mode

WARNING

The use of the stand-by purge is not recommended in case of process generating powder, as the protection against powder is drastically reduced. The use of this function must be carefully studied in order to be sure that no process gases or by-products are present in the pump or in the exhaust line when this function is activated.


Stand-by purge operation

The **stand-by purge function** can be used to reduce the pump nitrogen consumption during process idle. The “remote control” plug  **B 70** must be used for this feature.

“Standby N2 option” setting

The selection of the **Standby N2 option** can be performed by the RS 232/485 or the HHR.

To change the parameter of the **Standby N2 option** from **Disabled** to **Enabled** with the HHR, perform the following operations:

- Connect the HHR plug to the HHR connector on the front or rear panel.
- Set the **Standby N2 option** parameter in the **DEFINITION** menu  **C 42** as follows:

Standby N2 option	Enabled
-------------------	---------


Autostart control operation

The **autostart function** allows the automatic restarting of the pump when the stop is caused by a power failure.

“Auto-start” setting

The selection of the **Auto-start** can be performed by the RS 232/485 or the HHR.

To change the parameter of the **Auto-start** from Disabled to Enabled with the HHR, perform the following operations:

- Connect the HHR plug to the HHR connector on the front or rear panel.
- Set the **Auto-start** parameter in the **DEFINITION** menu  **C 42** as follows:

Auto-start	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.

M4 monitoring system parameters

Purpose of the sensors

		Unit	Thresholds	
			Mini.	Maxi.
Waterflow sensor	Signals insufficient water with a threshold mechanically adjusted in factory.	-	-	-
Mass-flowmeter	Allows the display of the nitrogen flowrate.	slm	10	120
	Signals insufficient gas purge during a warning time, and stops the pumping at the end of alarm time.	mn	0	60
Functionnal block temperature sensor	Manage the pump temperature with M4 (warning if T > warning 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	°C	70	100 (LP) 100 (HP)
Motor temperature sensor	In case of temperature motor alarm the pump will be stopped by cutting the 24V of the emergency stop loop and will show an alarm.			
Motor power sensor	Monitors the power consumed by the machine by generating a warning 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.	W	500	5000
Pressure sensor	Signals exhaust overpressure when the pressure reaches 1650 hPa (exhaust pipe clogging) and stops the pump at 1990 hPa	-	Only factory adjustment	
E. Analogic sensor (only on A203H)	Allows the monitoring of voltage (0-10V) or an input contact with two adjustable thresholds.	mV	0	9950
LI1, LI3 Logic sensors	Allows the monitoring of a logic sensor and to program a warning time. The input logic is available only if Roots 2 menu is disabled.	mn	0	60

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  **D 10**.

Operating mode with HHR

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 M4 monitoring system

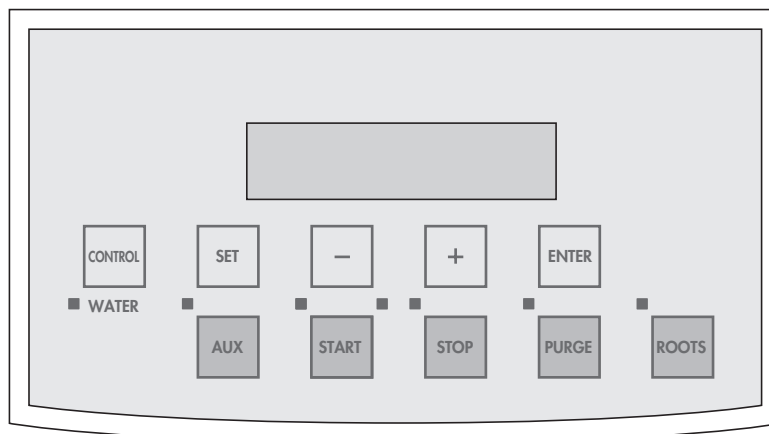
The hand-held remote module

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.

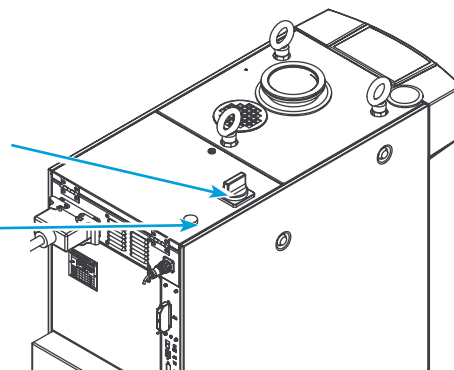
For all the other keys, press several times.

Start up of the M4 monitoring system

Pump start-up

Position the main switch to position **1**.

The "mains on" light indicator comes on : «**pump ready**».



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 taken to check the direction of rotation).

* 1H LOC N2	ROOTS
PUMPING STOPPED	
03/15/09	15:39

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 (☰ C 43).

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

Access to the parameter settings

The programing 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 (☰ C 42).

ENTER PASSWORD :

0

Start up of the M4 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).

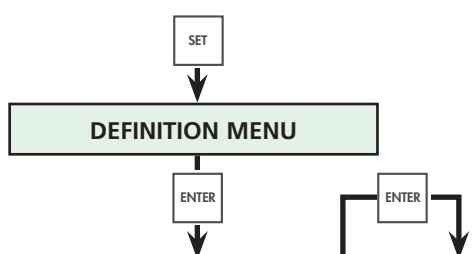
<p>ENTER PASSWORD :</p> <p>-----</p> <p>*0*</p>

Parameters can be transferred from one pump to another. This can be done in case of a pump replacement, or for new pump installation (📖 C 44).

Menu description

Menu	Description
DEFINITION MENU	To configure the pump model, functional options, and external sensor management.
SETTING	To adjust the monitoring parameters.
MAINTENANCE	To read or adjust the pump maintenance time.
MANAGEMENT	To change the password, register the pump serial number and software version, save or load pump configuration.
OPERATING TIME	Displays the operating times of the various components.
LAST WARNING(S)	Displays the 10 last recorded warnings.
LAST ALARM(S)	Displays the 10 last recorded alarms.

M4 monitoring system function table



Selection	Choice	Description	Initial configuration
LANGUAGE	ENGLISH FRENCH	All the menus are in the selected language.	ENGLISH
SYSTEM SELECT	A203H A803H A1503H A1803H A803H_C	Select the pump monitored by the monitoring system. (“c” indicates that the Roots is fitted with frequency convertor option)	According to the pump
ROOTS 2 ⁽³⁾	ENABLED DISABLED	Allows to manage a second Roots in case of integration in a dry pumping system. This parameter must be set on disabled for A3H pumps only.	DISABLED
ANALOG INPUT ⁽¹⁾	ENABLED DISABLED	Allows to monitor an 0-10V analog input with two threshold.	DISABLED
Li1 LOG INPUT ⁽²⁾	ENABLED DISABLED	Allows retrieving logic data on Li1 LOG input using a customer supplied sensor (closed when switched off).	DISABLED
Li3 LOG INPUT ⁽²⁾	ENABLED DISABLED	Allows retrieving logic data on Li3 LOG input using a customer supplied sensor (opened when switched off).	DISABLED
AUTO START	ENABLED DISABLED	Allows the pump to restart automatically after a power cut, irrespective of the duration.	DISABLED
ROOTS CMD	ENABLED DISABLED	Allows separate control of the Roots START/ STOP control from the FB START/STOP, instead of simultaneous start-up, the Roots is started using ROOTS key or remote controlled.	DISABLED
PURGE CMD.	ENABLED DISABLED	Allows independant purge control at pump start-up. The purge flow is controlled by the PURGE key or remote controlled. This menu appears when the coding wheel is position to 1 (initial configuration, coding wheel to 0).	DISABLED
N2 STAND BY	ENABLED DISABLED	“Standby purge” option validation during equipment standby phase.	DISABLED
INLET VALVE OPTION	ENABLED DISABLED	Inlet valve presence validation.	DISABLED
BACKUP POW. 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) Only on A203H pump model.

(2) Li1 LOG, Li3 LOG correspond to the logic sensors connected at the rear of the M4 monitoring

(3) Only on A1503H / A1803H

M4 monitoring system function table

Selection	Selection	Setting limits	Initial configuration
PURGE SENSOR	WARNING time	0 to 60 mn / DISABLED	0 mn
	ALARM time	0 to 60 mn / DISABLED	DISABLED
PURGE WARNING	Set WARNING	10 to 120 slm	15 slm
T° FB HIGH PRESS.	INPUT VALUE	70 to 100 °C	100 °C
	Set ALARM	(Input value + 20 °C) to 150 °C	120 °C
T° FB LOW PRESS.	INPUT VALUE	70 to 100 °C	70 °C
	Set ALARM	(Input value + 20 °C) to 140 °C	90 °C
T° ROOTS 2 ⁽⁴⁾	INPUT VALUE	50 to 60 °C	
	Set ALARM	70 to 130 °C	
FB POWER	Set WARNING	500 W to Set ALARM	2500 W
	Set ALARM	Set warning to 5000 W	4000 W
ANALOG. INP. SENSOR ⁽⁴⁾	WARNING time	0 to 8000 mV	4000 mV
	ALARM time	4000 to 9950 mV	8000 mV
LOG1 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 PROLONGED		0 to 60 mn	10 mn
T° ROOTS 2 ⁽⁴⁾	INPUT VALUE	50 to 60 °C	100 °C
	Set ALARM	70 to 130 °C	100 °C
SERIAL LINK	TYPE	RS232 / RS485 / NETWORK	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 ⁽⁵⁾	0 to 999	0
DATE & TIME	Day /Month / Year		
	Hours/Minutes		
TEMPERATURE UNIT*		CELSIUS / FARHENHEIT	CELSIUS
PRESSURE UNIT*		mbar / PSI / Torr / hPa	mbar
CONTRAST*	+/-	Contrast display setting	

(4) : menus accessible only if the option is ENABLED

(5) : specific parameters to each hand held remote

M4 monitoring system function table

Selection	Setting limits	Initial configuration
RUN TIME	0 to 65500 h	-
OVERHAUL MAINT	0 to 65500 h	0
OVERHAUL WARNING	1000 to 34000 h	17000

Selection	Selection	Setting limits	Initial configuration
PASSWORD	Value	0 to 65535	0
PUMP SN AND VERS.	FRAME SERIAL N°		-
	ELEC SERIAL N°		
	ELEC OTP VERSION		-
	ELEC FLASH VERSION		-
	FB SERIAL N°		-
	ROOTS SERIAL N°		-
	OTP DISP. VERSION		-
FLASH DISP. VERSION		-	
STORAGE	ENABLED / DISABLED		DISABLED
CONFIG. SAVE	Save a pump configuration in the HHR memory.		
CONFIG. LOAD	Allows to record the configuration from HHR to monitoring system memory.		

Use of the M4 monitoring system for pumping operation

Study the preliminary precautions (📖 B 00). Before using the monitoring, check that the mechanical and electrical connections defined in the chapter B have been made.

The performance and operational safety of this product are guaranteed provided it is used normally in the operating conditions defined in this manual.

It is the customer's task to:

- train operators to use the product if they do not speak the language the manual is written in,
- ensure operators know the safe practices to apply when using the product.

CAUTION

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

CAUTION

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

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 HHR (📖 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 HHR.

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

Pump start-up possible choices

To start the Roots and FB203 simultaneously, set the **CMD.ROOTS** menu on DISABLED.

To start or stop the Roots while the FB203 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, the word "**ROOTS**" is displayed on the HHR.

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**.

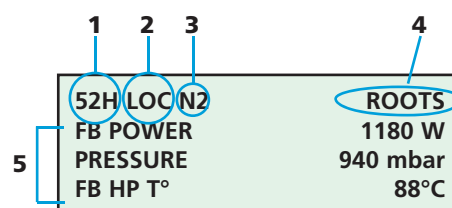
The following operations will perform automatically:

- inlet valve opens (if preselected),
- FB203 pump starts up,
- data capture and sensor processing,
- purge gas valve opens 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.

- 1 - Number of running hours
- 2 - LOC for local operating mode

- 3 - N2 for Purge ON
- 4 - Roots ON
- 5 - Display of pump information*



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

Note: for the thermal regulation of the pumps, the water valves open when the temperature reaches the FB temperature set value. They close when the temperature decreases - 2 °C below the FB203 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.

Use of the M4 monitoring system for pumping operation

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 alarm 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 alarm threshold or a time is reached.

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

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 if timing of **Purge prolonged** of the SETTING menu has been programmed (0 to 120 min)  **C 42**.

This additional N2 injection is activated after each pump stop, whatever may be the origin, either a stop command coming from the tool, from the HHR or a pump stop generated by an alarm.

The message STOP IN PROGRESS appears on the screen.

*52H LOC N2	ROOTS
# STOP IN PROGRESS	#
PRESSURE	528 mbar
FB HP T°	82°C

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.

- Pump temperature management continues during the stop phase.
- When timing of **Purge prolonged** expires (if selected) or if pressure > 1500 hPa, then the message PUMPING STOPPED appears on the screen.

52H	LOC	ROOTS
PUMPING STOPPED		
03/15/09		15H12

To stop the pumping system for a long period, refer to «Shut down procedure for discontinuous operation» safety instructions, see **C00**.

Start-up after an emergency stop

To restart the pump after an emergency stop, it is necessary to:

- remedy to the problem,
- rotate to unlock the emergency button.
- start up the pump by pressing START.

Use of the M4 monitoring system for pumping operation

Auto-restart configuration

In standard 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 with two HHR

To take the control with a HHR, press only on the **CONTROL** key of the chosen HHR : then a star and a "X" flash alternatively on the left corner of the display.

The control of the pump is now not possible from the other HHR, as long as the first one has not given the control back.

To give the control again, press on the **CONTROL** key of the HHR, until the star has disappeared.

Reading of data and parameters can be done on both HHR, **even if they do not control the pump**.

If the message "NOT ALLOWED" appears after an action of any key, it means that the HHR has not taken the control.

Press **CONTROL** key, check the presence of the star and the letter "X" alternatively on the left corner of the screen, showing that the control has been taken.

Start-up after an emergency stop

To restart the pump after an emergency stop, it is necessary to:

- remedy to the problem,
- rotate to unlock the emergency button,
- press the **"START"** button.

Saving and loading of pump configuration (with HHR)

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 monitoring.

Enter in the menu by **SET**.

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

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

The following screen appears:

Validate with **ENTER** button.

The pump configuration is then duplicate into the HHR memory.

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

Disconnect the hand-held remote.

```
MAINTENANCE
>>>MANAGEMENT<<<
OPERATING TIME
LAST ACTIONS
```

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

```
CONFIG SAVE
CONFIRM ?
```

Saving and loading of pump configuration (with HHR)

Remote loading

Connect the M4 to the pump to configure.

Take the control of the pump from the HHR (blinking of "*" and "X" at left corner 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) (☰ C 41).

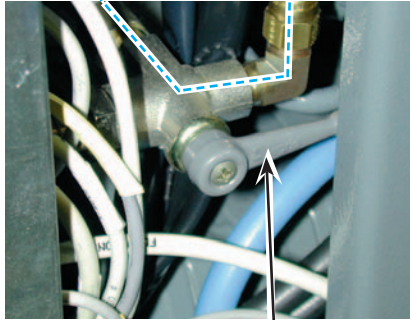
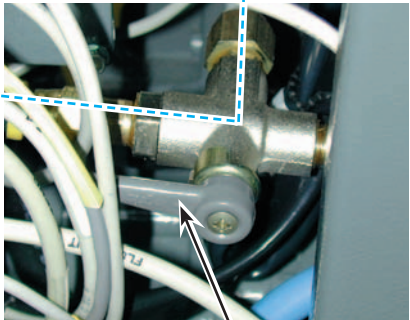
MAINTENANCE
>>>MANAGEMENT<<<
OPERATING TIME
LAST ACTIONS

XSTOCK	LOC N2	ROOTS
PUMPING STOPPED		
03/15/09		13H56

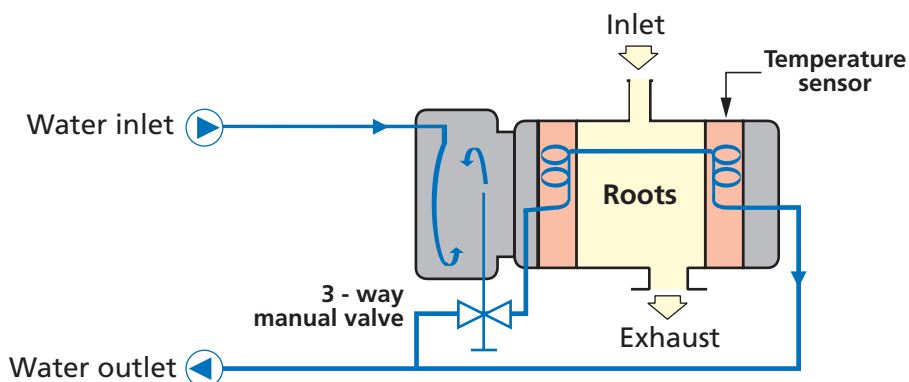
Water flowrate on A803H

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:	When the Roots is not cooled:
<p>It corresponds to the initial configuration. Adjust the temperature threshold according to the table below.</p> <p style="text-align: right;">To gearbox water cooling input</p> <p>Water flow direction</p>  <p style="text-align: center;">Manual valve in position Roots cooled</p>	<p>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 below.</p> <p style="text-align: center;">Water flow direction</p>  <p style="text-align: center;">Manual valve in position Roots not cooled</p>

Schematic principle



Use of the “Power failure protection”

This device 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 of the inlet valve.

Inlet valve option setting


The selection of the **Inlet valve option** can be performed by the RS 232 / 485 or the HHR.

To change the parameter of the **Inlet valve option** with the HHR, perform the following operations:

- Connect the HHR plug to the HHR connector on the front or rear panel.
- Set the **Inlet valve option** parameter in the DEFINITION menu  **C 42** as follows:

Inlet valve option setting	Valve controlled by
Disabled	The valve is always open.
Enabled	<ul style="list-style-type: none"> ■ the pump in local mode. ■ the HHR in local mode. ■ the customer's equipment in remote control mode (J14). ■ the RS232/485 serial link.

Controlled by the pump (local mode) without use of AUX button on HHR

For the valve operating mode as described below, contact **J14-S1** must be closed and **J14-S7** opened  **B 70**.

- If the HHR **STOP** button 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 HHR **START** button is pressed, the valve opens 3 seconds after the pump starts.

It is impossible to open or close the inlet valve by pressing **AUX** button.

Controlled by the HHR (local mode) using AUX button on HHR

For the valve operating mode as described below, contact **J14-S1** and **J14-S7** must be closed  **B 70**.


Pressing the **AUX** button on the HHR opens or closes the valve, whatever the pump is stopped or running (press the **ENTER** button on the HHR to confirm the operation).



Note : Even in 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.

Use of the inlet isolation valve (accessory)

Controlled by the customer's equipment via J14 (remote control mode)

For the valve operating mode as described below, contact **J14-S1** and **J14-S7** must be open  **B 70**.

- The valve closes if contact **J14-S6** controlled by the customer's equipment is closed  **B 70**.
- The valve opens if contact **J14-S6** controlled by the customer's equipment is opened  **B 70**.

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

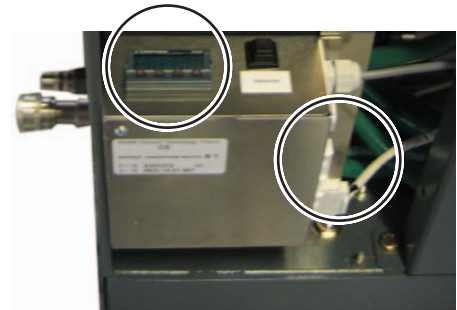
Controlled by the RS232 serial link (RS control mode)

The valve open control message on the serial link is only taken into account if contact **J14-S7** is closed.

Use the bellows heater

Controller location

In the A3H pump, behind the left cover.



Description



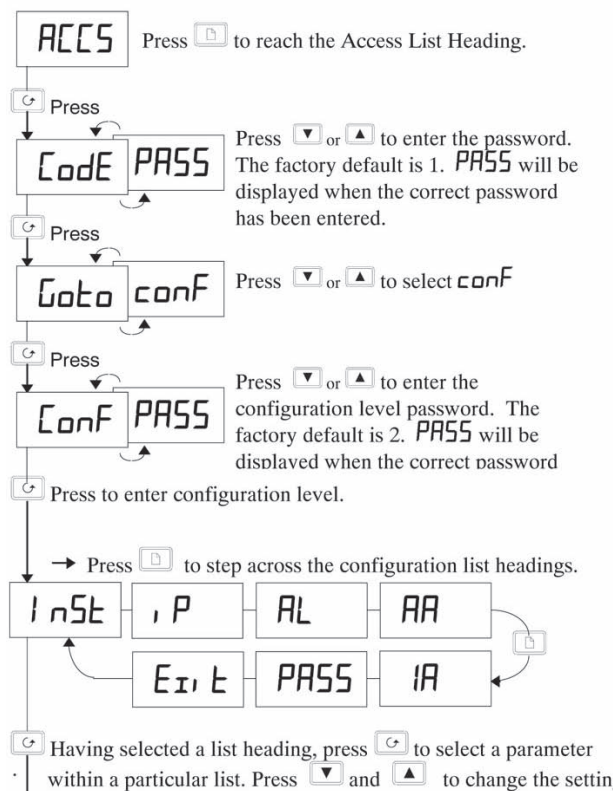
Press to step across the list headings.

Press to step down the parameters within a particular list. You will eventually return to the list heading.

Press to view the value of a selected parameter. Keep pressing to decrease/increase the value.

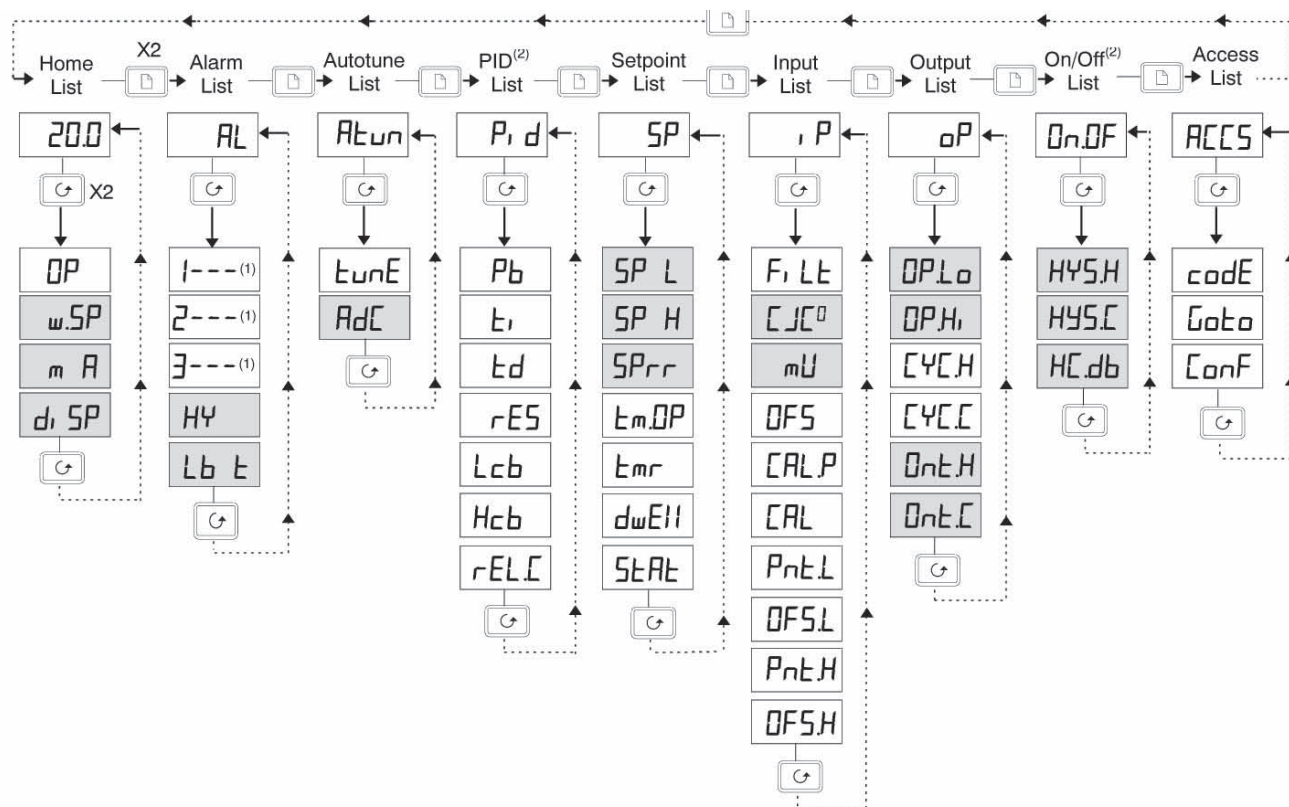
Configuring the controller

To select configuration level



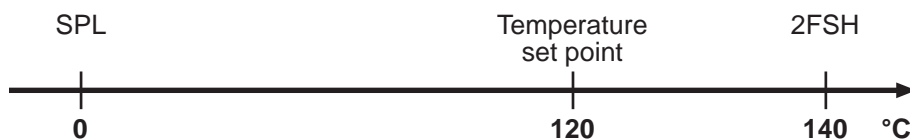
Use the bellows heater

Parameters navigation



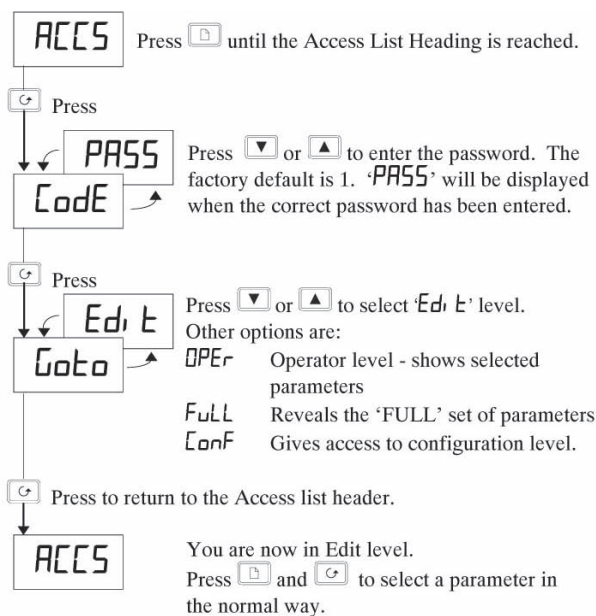
Example of setting

Depending on the customer configuration, the temperature set point can be configured from 0°C to 120°C. When temperature set point is defined, alarm must be adjusted around the set point as follows:

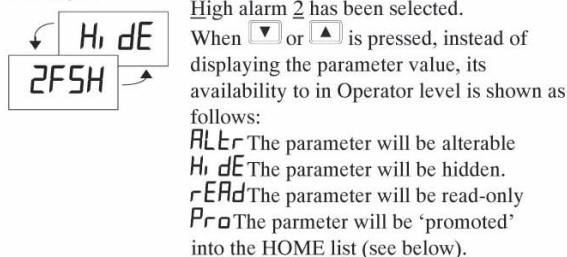


Use the bellows heater

To hide, reveal and promote parameters



Example:



Use the bellows heater

Parameters list

Menu	Parameter	Description	Parameter value
DiSP	Std	Display process value and set point accessed by pressing the and buttons	Regulated Value – set point value 120 °C
AL	2FSH	Alarm on High value (max. temperature allowable in continuous on RSV heaters device)	140 °C
	HY	Alarm hysteresis	1
Atun	tunE	Automatic tuning	OFF
PiD	Pb	Proportional band	20
	ti	Integral constant	360
	td	Derivative constant	60
	Hcb	Cutback high	Auto
	Lcb	Cutback low	Auto
SP	SP L	Set point limits low limit	0
	SP H	Set point limits high limit	140
	SPrr	Set point speed limit	OFF
	tmOP	Timer mode	OPT1
	tmr	Time remaining	0
	dwell	Palier time	OFF
	Stat	Timer state	OFF
iP	FiLt	Filter time in seconds	1,6
	OFS	Offset of process value	0
	CAL.P	Access code for calibration	0
oP	CYCH	Heat cycle time	1
ACCS			
InSt	Unit	Display units : centigrade	°C
	dEC.P	Decimal places in display	nnnn
	Ctrl	Control type	Pid
	Act	Control action : Reverse (normal action for temperature control)	rEu
	Pdtr	Manual reset tracking (PD control) In auto holds manual reset value	Hold
iP	inPt	Type of temperature sensor : PT 100	rtd
	CJC	Cold compensation soldering	Auto
	ImP	Impedance adapter value in case of sensor loss	Auto
AL	AL 1	Alarm 1 - disabled	OFF
	Ltch	Alarm 1 - memorised	no
	bLoc	Alarm 1 - blocked	no
	AL2	Alarm 2 - High alarm mode (not used)	FSH
	Ltch	Alarm 2 - memorised	no
	bLoc	Alarm 2 - blocked	no
	AL3	Alarm 3 - disabled	OFF
	AL3	Alarm 3 - memorised	no
	AL3	Alarm 3 - blocked	no
SPLi	Limitation of Alarm set point by set-up limits	Con	
AA	id	Output relay	rELY
	Func	Logic output	diG
IA	id	Switched DCLogic output	LoG
	Func	Heater output	HEAt
	diGF	Alarm mode if safety sensor broken	Sbr
	SEnS	Output relay type	nor

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 **SET** to enter in menus.
Press the key **+** repeatedly to have access to the SETTING menu.
Valid with the key **ENTER**.

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

Access to the parameter programming by the "Serial link" menu

Valid SERIAL LINK menu with the key **ENTER**.

```
PURGE PROLONGED
>>> SERIAL LINK <<<
DATE TIME
TEMPERATURE UNIT
```

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**.

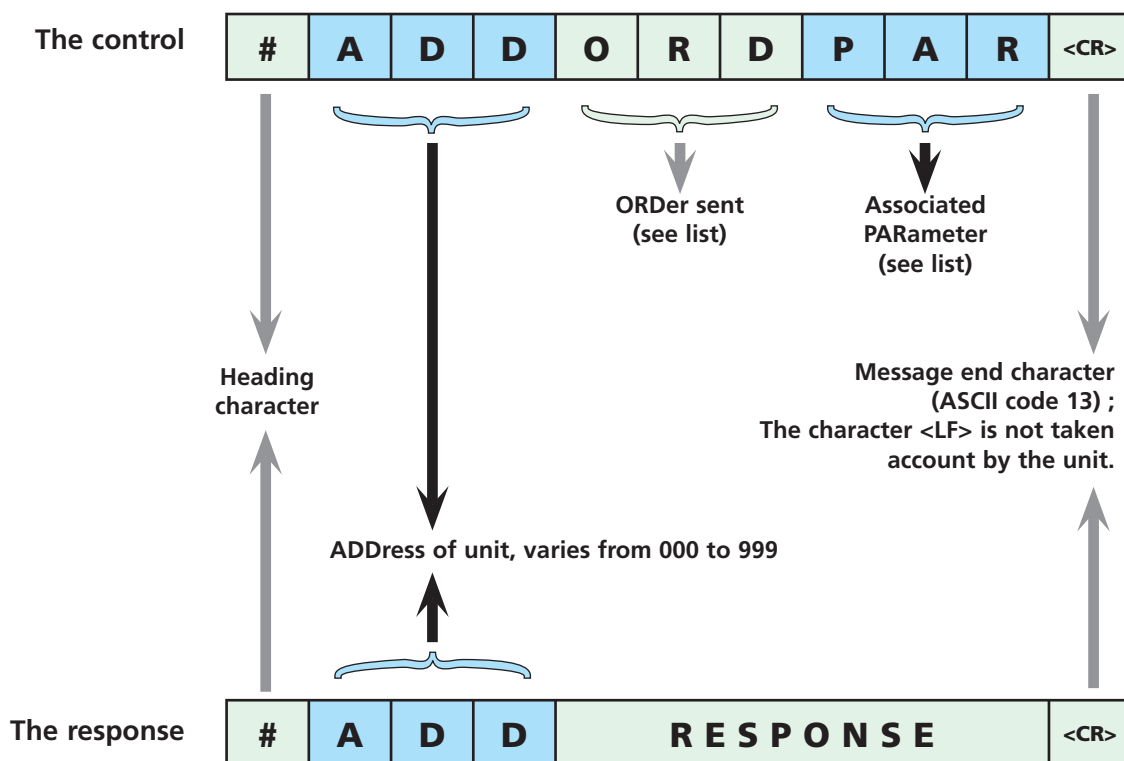
```
>>> TYPE                RS 232 <<<
ECHO                    ENABLED
SPEED                   9600
PARITY                  NO
```

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
ADR	XXX	OK or ERR2	To allocate a specific adress to a product making up a network. From 000 to 255 (can be modified only when the pump is stopped).
DLI	XXX	OK ou ERR2	Program the automatic transmission interval in min:1 to 255 sec.
DLR	None	OK	Start up the Data Logger for RS232 only.
ECH	ON or OFF	OK or ERR2	Return all characters received on the serial link in the case of ECHON for RS232 only.
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 : FB power 01 : LP temperature 02 : Analog input 03 : Nitrogen 04 : E1 Logic input 05 : E2 Logic input 06* : Purge flow prolonged 07 : FB maintenance 08 : Reserved 09 : Reserved 10 : Reserved 11 : Reserved 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 : Sel(0)/HP T° alarm (1) 21 : Reserved 22 : E3 Logic input Y = 0 : Alert (concerns parameters) 1 : Alarm XX=0/01/02/03/04/05/22) 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 : Full overhaul 02 : Reserved 03 : Reserved 04 : Reserved 05 : Reserved 06 : Reserved

* 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		
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.		
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 = 1 : specific pressure A3H XX = 21, Y = 1 : MFS = 120 slm Dual cooling on A3H XX = 26, Y = 1 : ENABLED		
STA	NONE		<p>Transmission of a Data Logger frame</p> <p>Example :</p> <pre>#000 00100010000 0990 0080 017 200 000 0000 00 00000000000000000000 0000 0/3 5/15 17/20 22/25 27/29 31/33 35/37 39/42 44/45 47/67 69/72</pre> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"> <ul style="list-style-type: none"> 0 : header character 1-2-3 : address 4 : separator character 5 : FB status 6 : Roots status 7 : purge status 8 : stand-by 9 : water valve 10 : inlet valve 11 : authorization valve closed 12 : FB water valve 13 : Roots water valve 14 : reserved 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 : FB temperature (°C) 30 : separator character 31-33 : reserved (°C) 34 : separator character 35-37 : LP temperature (°C) 38 : separator character </td> <td style="width: 50%; border: none;"> <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 : LP. 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 : FB high temperature fault 62 : FB low temperature fault 63 : Roots temperature fault 64 : reserved 65 : E3 logic fault 66 : free 67 : free 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 : FB status 6 : Roots status 7 : purge status 8 : stand-by 9 : water valve 10 : inlet valve 11 : authorization valve closed 12 : FB water valve 13 : Roots water valve 14 : reserved 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 : FB temperature (°C) 30 : separator character 31-33 : reserved (°C) 34 : separator character 35-37 : LP 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 : LP. 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 : FB high temperature fault 62 : FB low temperature fault 63 : Roots temperature fault 64 : reserved 65 : E3 logic fault 66 : free 67 : free 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)

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.

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 **/0020K**

Command **#002IDN<CR>**

Response **/002M5_A1503H HV V1.07**

Use of the serial link (M4 monitoring)

Interpreting responses supplied by the serial link

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

ERR0 : 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

Operating instructions – A3H Series

D 000 *Safety instruction related to maintenance*

D 010 *First level of maintenance*

D 030 *Diagnosis and troubleshooting*

D 400 *Pump or Roots does not start*

D 500 *The pump is running and then is showing a warning or fault message*

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

Safety instructions related to maintenance

This chapter D describes the main preventive maintenance operations and provides a guide for first diagnosis in the event of an incident.

⚠ WARNING

Maintenance must be performed by a skilled maintenance operator trained in the relevant health and safety aspects (EMC, electrical hazards, chemical pollution, etc.).
Isolate the product from all energy sources (mains electricity, compressed air, etc.) before starting work.

⚠ WARNING

Electric shock hazard on touching.
When the main isolator is switched to the «0» position, items located between the mains connection and the isolator are still under mains voltage.
Disconnect the mains cable from all power sources before commencing any maintenance work on the product.

⚠ WARNING

Electric shock hazard.
Some components have capacitors charged to over 60VDC. When power is switched off, they keep their charge for a time. Residual voltages from the filter capacitors can cause electric shocks all the way back to the mains plug. Wait 5 minutes after power-off before commencing any work on the appliance.



⚠ WARNING
HAZARDOUS VOLTAGE
Switch off the pump and disconnect the main power cable before opening the power box cover.

Located on the upper cover, 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 with pump bodies may cause burn. Switch off and wait until pumps cooled 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.

Safety instructions related to maintenance

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.

Recommandations

Purge the installation with dry nitrogen.

The flush is performed automatically when the pump is stopped (normal stop, or due to an alarm) if a maintained level of purge gas has been programmed.

Otherwise, proceed as follows:

- If the pump is operated by remote control, disconnect the J14 and J1 connectors, at the rear of the electronic cabinet and connect the cover plug to it (supplied with the machine).
- Adjust the parameter "PURGE FLOW PROLONGED" for a period of 10 minutes and program PURGE CMD on ENABLED.
- Press START and then STOP on the front panel. Gas purge takes place after the pump has stopped.

Users are advised:



- Wear gloves, protective glasses, any appropriated safety equipment,
- Ventilate the premises well,
- Do not eliminate maintenance waste via standard disposal channels. Have it destroyed by a qualified company if necessary,
- Install the inlet and exhaust blanking plates, thus delivered with the pump or available as accessories (refer to E15) .

WARNING

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

The outside of the appliance and control box can be cleaned with a lint free wiper. Avoid using cleaning products that deteriorate printed surfaces and self adhesive labels. All other cleaning operations must be done by our service centers.

Luminosity

Surrounding lighting in maintenance area must be sufficient to work or make maintenance on the pump: higher than 300 lux.



Safety instructions related to maintenance

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 Vacuum Products take back facility.

Before returning the product, fill in the declaration of contamination form available at the end of this operating manual or on our website. Attach it to the product before shipping to the service-repair office closest to you.

How to contact us?

The partial and full overhaul must be performed by manufacturer 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 (📖 **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, 📖 **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.

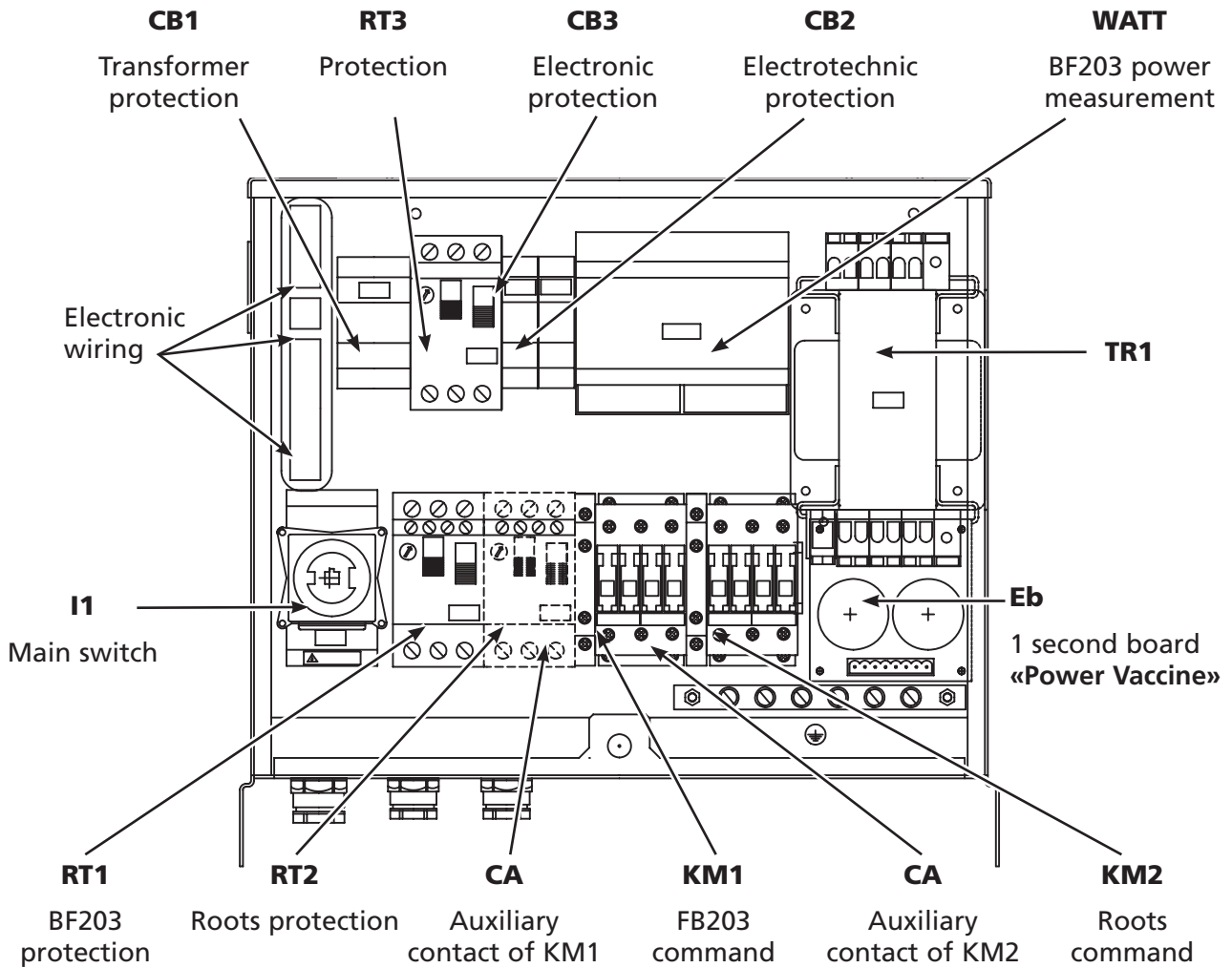
Oil change

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 **D30**) may lead to check the electrical components of the monitoring cabinet described below:

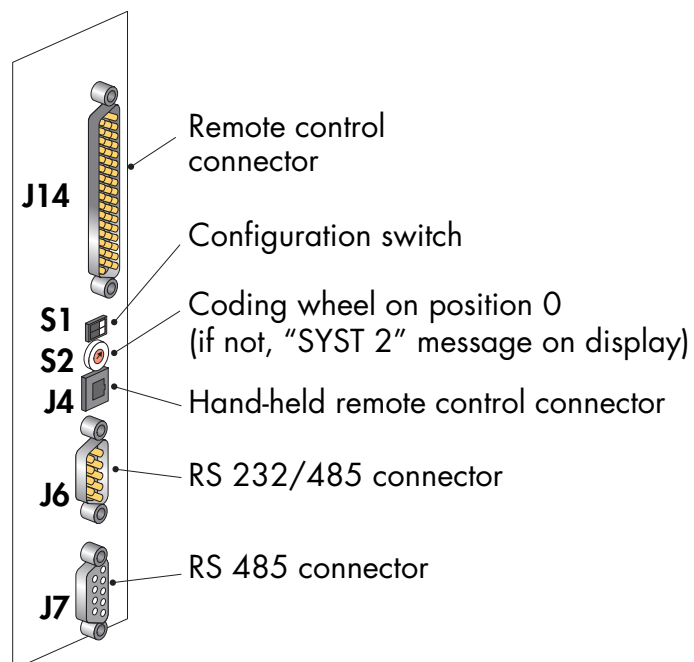


First level of maintenance

Breaker rating

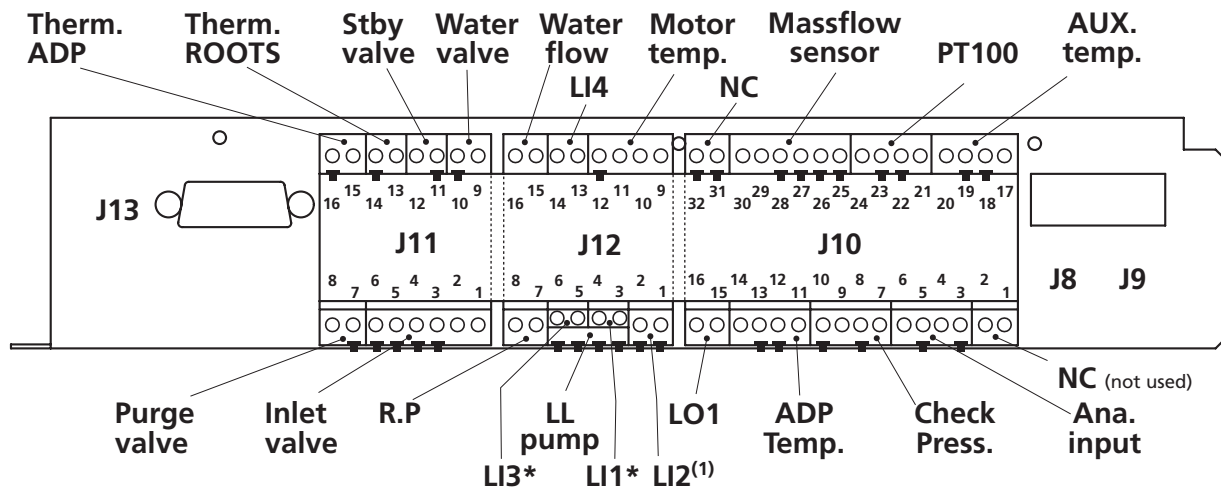
Pump	Voltage	RT1	RT2	RT3
A203H	LV 200 to 230 V - 50/60 Hz	16 A	-	-
	HV 380 to 460 V - 50/60 Hz	13 A	-	-
A803H	LV 200 to 230 V - 50/60 Hz	16 A	10 A	1 A
	HV 380 to 460 V - 50/60 Hz	13 A	6 A	0.7 A
A1503H / A1803H	LV 200 to 230 V - 50/60 Hz	16 A	16 A	1 A
	HV 380 to 460 V - 50/60 Hz	13 A	13 A	0.7 A
A1503H / A1803H ELT version	LV 200 to 230 V - 50/60 Hz	16 A	16 A	1 A
	HV 380 to 460 V - 50/60 Hz	13 A	13 A	0.7 A
A 1503 / A1803H EHT version	LV 200 to 230 V - 50/60 Hz	16 A	16 A	2.5 A
	HV 380 to 460 V - 50/60 Hz	13 A	13 A	2.5 A

Electrical interfaces lay-out at the rear of the pump



First level of maintenance

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



* Parameters and displays of logic inputs are worded "Li1 LOG - Li3 LOG" on the HHR (see **C 42**).
 (1) logical input not used.

Diagnosis and troubleshooting

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 performance 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 3
- Display is showing a message or an alarm page 4

Mains presence light indicator does not switch on

Incident	Cause	Troubleshooting
Mains presence green indicator light 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. • Switch it on (📖 D 10). • Switch it on (📖 D 10). 📞 Call customer service center.

Hand-held remote is not lighting up

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


Pump or Roots does not start

HHR doesn't work or displays a message


Incident	Cause	Troubleshooting
<p>HHR is showing</p> <pre>ALCATEL-AVTF MONITORING V2.0F PRESS ENTER OR AUTO-CONNECTION</pre>	<ul style="list-style-type: none"> ▶ Hand-held remote is on soft loading configuration ▶ Other problem 	<ul style="list-style-type: none"> • Set the switch S1 to "OFF" (📖 D 10). • Switch OFF for 10s, then switch "ON" again. • Check the connection. 🕒 Call customer service center.
<p>HHR is showing</p> <pre>Wait ???</pre>	<ul style="list-style-type: none"> ▶ No communication between M4 and HHR ▶ Electronic is in "slave" mode: without hand-held remote controls ▶ Other problem 	<ul style="list-style-type: none"> • Check the connection. • Set the coding wheel S2 to "OFF" position (📖 D 10). • Stay OFF for 10s, then set to "ON" position again. 🕒 Call customer service center.
<p>HHR is showing</p> <pre>XXH LOC. N2 ROOTS PUMPING STOPPED MM/DD/YY HH:MM</pre> <p>... by pressing on any key ...</p> <pre>XXH LOC. N2 ROOTS COMMAND NOT ALLOWED MM/DD/YY HH:MM</pre>	<ul style="list-style-type: none"> ▶ Pump is used with several HHR ▶ Other problem 	<ul style="list-style-type: none"> • Only one HHR can monitor the pump. • Press on CONTROL to disable the monitoring on other HHR displays. • Press on CONTROL on the requested HHR to monitor the group. • Wait for the display: <pre>XXH LOC. N2 ROOTS PUMPING STOPPED MM/DD/YY HH:MM</pre> 🕒 Call customer service center.
<p>HHR is showing</p> <pre>STOCK</pre>	<ul style="list-style-type: none"> ▶ Pump in storage mode 	<ul style="list-style-type: none"> • Set the main switch to "0" to switch off the pump. • Switch it on again.
<p>HHR is showing</p> <pre>REM</pre>	<ul style="list-style-type: none"> ▶ In Remote mode: no cover plug or bad connection ▶ Other problem 	<ul style="list-style-type: none"> • Check the wiring of J14 connector (📖 B 70). 🕒 Call customer service center.
<p>Only Functionl Block starts No "Roots" message on the display</p>	<ul style="list-style-type: none"> ▶ Incorrect M4 configuration ▶ Roots CMD Enabled 	<ul style="list-style-type: none"> • Configure "Roots CMD" on Enabled • Press "ROOTS" key

The pump is running and then is showing a Warning or Alarm message

Warning message «WXX»

- the yellow light is lighting up.
- the buzzer is activated (if parameter configured  C42).
- the pump is not stopped.

Alarm message «DXX»

- the red light is lighting up.
- the buzzer is activated (if parameter configured  C42).
- the pump stops.

Message list

Warning «W»	Alarm «D»	Nb	Message	page
X	X	01	EXHAUST PRESSURE	2
X	X	03	FB POWER	2
		04	ANALOG INPUT	
opt	opt	05	LOGIC INPUT 1	2
X	X	07	SPEED CONTROL	
X		08	WATER FLOW	3
X	X	09	POWER SUPPLY	3
X	X	10	FB. MOTOR TEMP.	3
opt		11	INLET VALVE	3
opt	opt	12	LOGIC INPUT 3	2
X	X	13	PURGE	4
X	X	15	T° HIGH HP FB	5
X		16	T° LOW HP FB	5
X	X	17	ROOTS MOTOR T°	5
X		19	SYS : 1	5
X		20	SYS : 2 ⁽¹⁾	5
X		32	OVERHAUL MAINT.	5
	X	34	MOTOR BREAKER	5
	X	35	EMERGENCY STOP	6
	X	36	FB CONTACTOR	6
	X	37	ROOTS BREAKER	6
	X	38	FB BREAKER	6
	X	39	ROOTS CONTACTOR	6
X	X	57	T° HIGH LP FB	6
X		58	T° LOW LP FB	7

(x) Standard management.

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

(1) only on SEMI version.

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Warning message</p> <p>W01 EXHAUST PRESSURE</p>	<ul style="list-style-type: none"> ▶ Exhaust pressure > 1650 hPa ▶ Sensor problem (P < 500 hPa) ▶ Other problem 	<ul style="list-style-type: none"> • Check the N2 flowrate setting value (☰ B 40). • Check the exhaust pipe. • Check the sensor connection on CHECK PRESS connector. ☎ Call customer service center.
<p>Alarm message</p> <p>D01 EXHAUST PRESSURE</p>	<ul style="list-style-type: none"> ▶ Pump does not start Exhaust pressure > 1500 hPa ▶ Pump is running Exhaust pressure > 1990 hPa ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Check the exhaust pipe. • Check the N2 flowrate setting value (☰ A 40). • Check the exhaust pipe. • Check the sensor connection on CHECK PRESS connector. ☎ Call customer service center.
<p>Warning message</p> <p>W03 FB POWER</p>	<ul style="list-style-type: none"> ▶ FB Incorrect rotation direction ▶ Incorrect threshold setting (power value > set warning) ▶ Other problem 	<ul style="list-style-type: none"> • Check the direction of rotation of the pump (☰ B 51). • Check the settings of monitoring thresholds. ☎ Call customer service center.
<p>Alarm message</p> <p>D03 FB POWER</p>	<ul style="list-style-type: none"> ▶ FB Incorrect rotation direction ▶ Incorrect threshold setting (power value > set alarm) ▶ Other problem 	<ul style="list-style-type: none"> • Check the direction of rotation of the pump (☰ B 51). • Check the settings of monitoring thresholds. ☎ Call customer service center.
<p>Warning or Alarm message</p> <p>W04/D04 ANALOGIC INPUT</p> <p>Logic input is used only on A803H</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration ▶ Other problem 	<ul style="list-style-type: none"> • Check that "ANALOGIC INPUT" menu is DISABLED if input is not used. • Check the Warning or Alarm thresholds. • Check that the voltage is in accordance with M4 display. ☎ Call customer service center.
<p>Warning or Alarm message</p> <p>W05/D05 LOGIC INPUT 1</p> <p>W12/D12 LOGIC INPUT 3</p> <p>Logic input 1 or 3 is used only if "ROOTS 2" menu is DISABLED</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration ▶ Other problem 	<ul style="list-style-type: none"> • Check that "LOG INPUT 1" (or 3) menu is DISABLED if input is not used. • Check the Warning or Alarm thresholds. • Check the wiring of the sensors (☰ D 10). ☎ Call customer service center.

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Warning message</p> <p>W07 SPEED CONTROL</p> <p>On A803Hc, A1503H and A1803H only</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration ▶ The Roots does not run at nominal speed ▶ Motor problem <p>On A1803H only:</p> <ul style="list-style-type: none"> ▶ Roots motor temperature is > 120 °C ▶ Sensor problem on Roots 1803 ▶ Other problem 	<ul style="list-style-type: none"> • Check that "SYSTEM SELECT" menu is properly configurated • Check the RP cover plug (📖 D 10). • Mechanical problem <p>📞 Call customer service center.</p> <ul style="list-style-type: none"> • Refer to water flow defect W08 • Check the sensor connection on the "LI4" connector (see D10) <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D07 SPEED CONTROL</p> <p>on A1803H only</p>	<ul style="list-style-type: none"> ▶ The functional block does not run at nominal speed ▶ Other problem 	<ul style="list-style-type: none"> • Mechanical problem • Check the frequency converter • Check the sensor connection on the "LI4" connector (see D10) <p>📞 Call customer service center.</p>
<p>Warning message</p> <p>W08 WATER FLOW</p>	<ul style="list-style-type: none"> ▶ No water flow ▶ Insufficient water flow (< 60 l/h) ▶ Sensor not wired ▶ Other problem 	<ul style="list-style-type: none"> • Check the water supply. • Check the main valve connection on WATER VALVE connector (📖 D 10). • Check that the main valve, the flowmeter and the pipes are not clogged. • Check the setting value of the flowmeter (📖 B 30). • Check that there are no leaks. • Check the sensor connection on the WATER FLOW connector (📖 D 10). <p>📞 Call customer service center.</p>
<p>Warning and Alarm message</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. <p>📞 Call customer service center.</p>

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Warning message</p> <p>W10 FB MOTOR TEMP.</p>	<ul style="list-style-type: none"> ▶ FB203 motor temperature is > 120 °C ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Refer to warning W08 WATER FLOW. • Check the sensor connection on MOTOR TEMP. connector (📖 D 10). 📞 Call customer service center.
<p>Alarm message</p> <p>D10 FB MOTOR TEMP.</p>	<ul style="list-style-type: none"> ▶ FB203 motor temperature is > 150 °C ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Check the sensor connection on MOTOR TEMP. connector (📖 D 10). • Refer to warning W08 WATER FLOW. • Check the sensor connection on MOTOR TEMP. connector (📖 D 10). 📞 Call customer service center.
<p>Warning message</p> <p>W11 INLET VALVE</p> <p>There is no isolating valve at inlet</p>	<ul style="list-style-type: none"> ▶ Incorrect monitoring configuration ▶ Other problem 	<ul style="list-style-type: none"> • Check that "INLET VALVE OPTION" is DISABLED. 📞 Call customer service center.
<p>Warning message</p> <p>W11 INLET VALVE</p> <p>There is an isolating valve at inlet</p>	<ul style="list-style-type: none"> ▶ The valve does not close at pump stop or does not open at start-up ▶ Other problem 	<ul style="list-style-type: none"> • Check that "INLET VALVE OPTION" is ENABLED. • Check compressed air supply. • Check valve conditions. 📞 Call customer service center.
<p>Warning and Alarm message</p> <p>W13/D13 PURGE</p>	<ul style="list-style-type: none"> ▶ No purge flow ▶ Insufficient purge flow ▶ Incorrect threshold setting ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Check nitrogen supply. • Check the main valve connection on PURGE VALVE connector (📖 D 10). • Check the N2 flowrate setting value (📖 A 40). • Check that there is no leak. • Check the warning threshold (📖 C 42). • Check the sensor connection on MASSFLOW SENSOR connector (📖 D 10). 📞 Call customer service center.

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Warning message</p> <p>W15 T° HIGH FB HP</p>	<ul style="list-style-type: none"> ▶ Temperature control valve supply problem ▶ Cooling problem ▶ Defective control valve ▶ Other problem 	<ul style="list-style-type: none"> • Check the temperature control valve connection on THERM. ADP connector (📖 D 10). • Refer to warning W08 WATER FLOW. 📞 Call customer service center. 📞 Call customer service center.
<p>Alarm message</p> <p>D15 T° HIGH FB HP</p>	<ul style="list-style-type: none"> ▶ Defective temperature sensor ▶ Other problem 	<ul style="list-style-type: none"> • Check the sensor connection on ADP TEMP connector (📖 D 10). 📞 Call customer service center.
<p>Alarm message</p> <p>D15 T° HIGH FB HP</p> <p>Pump temperature is higher than Alarm threshold</p>	<ul style="list-style-type: none"> ▶ Temperature control valve supply problem ▶ Cooling problem ▶ Defective control valve ▶ Other problem 	<ul style="list-style-type: none"> • Check the temperature control valve connection on THERM. ADP connector (📖 D 10). • Refer to warning W08 WATER FLOW. 📞 Call customer service center. 📞 Call customer service center.
<p>Warning message</p> <p>W16 T° LOW FB HP</p> <p>Pump temperature is < (Set temp. - 15 °C)</p>	<ul style="list-style-type: none"> ▶ Temperature control valve supply problem ▶ Cooling problem ▶ Water supply too cold ▶ Defective control valve ▶ Other problem 	<ul style="list-style-type: none"> • Check the temperature control valve connection on THERM. ADP connector (📖 D 10). • Refer to warning W08 WATER FLOW. • Check that the temperature is between 10 °C and 25 °C. 📞 Call customer service center. 📞 Call customer service center.
<p>Warning message</p> <p>W17 ROOTS MOTOR T°</p>	<ul style="list-style-type: none"> ▶ Roots motor temperature is > 120 °C ▶ Sensor problem ▶ Other problem 	<ul style="list-style-type: none"> • Refer to warning W08 WATER FLOW. • Check the sensor connection on LI4 connector (📖 D 10). 📞 Call customer service center.

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Alarm message</p> <p>D17 ROOTS MOTOR T°</p>	<ul style="list-style-type: none"> ▶ Roots motor temperature is > 150 °C ▶ Sensor problem <p>On A803H Large Volume and A1503H Large Volume only:</p> <ul style="list-style-type: none"> ▶ The block does not run at nominal speed ▶ Problem on functional block motor ▶ Frequency converter problem of block <p>On A803Hc and A1503H only:</p> <ul style="list-style-type: none"> ▶ Sensor problem on RSV1203 <p>On A803Hc only:</p> <ul style="list-style-type: none"> ▶ Exhaust pressure > 1990 hPa ▶ Other problem 	<ul style="list-style-type: none"> • Refer to warning W08 WATER FLOW. • Check the sensor connection on LI4 connector (📖 D 10). • Mechanical problem • Call the customer service center. • Check the sensor connection on the «LI4» connector (see D10). • Check the sensor connection on the «LI4» connector (see D10). • Check the exhaust pipe <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>W19 SYS : 1</p>	<ul style="list-style-type: none"> ▶ Memory failure of the electronic M4 	<p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>W20 SYS : 2</p>	<ul style="list-style-type: none"> ▶ Positioning error of the coding wheel S2 ▶ Other problem 	<ul style="list-style-type: none"> • Check S2 coding wheel at the rear of the monitoring on 0 or 1 (📖 C 10). <p>📞 Call customer service center.</p>
<p>Warning message</p> <p>W32 OVERHAUL MAINT.</p>	<ul style="list-style-type: none"> ▶ The maintenance threshold of the pump is reached ▶ Other problem 	<ul style="list-style-type: none"> • Check the warning threshold (📖 C 42). <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D34 MOTOR BREAKER</p> <p>Alarm message used on A803Hc and A1503H only</p>	<ul style="list-style-type: none"> ▶ LI2 cover plug disconnected ▶ Other problem 	<ul style="list-style-type: none"> • Connect the LI2 cover plug (📖 D 10). <p>📞 Call customer service center.</p>
<p>Alarm message</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. <p>📞 Call customer service center.</p>

The pump is running and then is showing a Warning or Alarm message

Incident	Cause	Troubleshooting
<p>Alarm message</p> <p>D36 FB CONTACTOR</p>	<ul style="list-style-type: none"> ▶ KM1 FB203 contactor not closed ▶ Other problem 	<ul style="list-style-type: none"> • Check CB2 (📖 D 10). • Connect the EMO cover plug (📖 B 100). • Check that there is a strap between pins 2 and 3 of the EMO (📖 B 100). • Check motor temperature sensor on FB203 <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D37 ROOTS BREAKER</p>	<ul style="list-style-type: none"> ▶ Roots breaker (RT2) in "OFF" position ▶ Other problem 	<ul style="list-style-type: none"> • Check RT2 breaker setting (📖 D 10). • Switch the RT2 breaker in "ON" position (📖 D 10). <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D38 FB BREAKER</p>	<ul style="list-style-type: none"> ▶ FB203 breaker (RT1) in "OFF" position ▶ Other problem 	<ul style="list-style-type: none"> • Check RT1 breaker setting (📖 D 10). • Switch the RT1 breaker in "ON" position (📖 D 10). <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D39 ROOTS CONTACTOR</p>	<ul style="list-style-type: none"> ▶ KM2 ROOTS contactor not closed ▶ Other problem 	<ul style="list-style-type: none"> • Check CB2 (📖 D 10). • Connect the EMO cover plug (📖 B 100). • Check that there is a strap between pins 2 and 3 of the EMO (📖 B 100). • Check motor temperature sensor on FB203 <p>📞 Call customer service center.</p>
<p>Warning message</p> <p>W57 T° HIGH LP FB</p> <p>Pump temperature is > 10 °C to the temperature control setting value</p>	<ul style="list-style-type: none"> ▶ Temperature control valve supply problem ▶ Cooling problem ▶ Defective control valve ▶ Other problem 	<ul style="list-style-type: none"> • Check the temperature control valve connection on the AUX. TEMP. connector (📖 D 10). • Refer to warning W08 WATER FLOW. <p>📞 Call customer service center.</p> <p>📞 Call customer service center.</p>
<p>Alarm message</p> <p>D57 T° HIGH LP FB</p>	<ul style="list-style-type: none"> ▶ Defective control valve ▶ Other problem 	<ul style="list-style-type: none"> • Check the sensor connection on the AUX. TEMP. connector (📖 D 10). <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"> • FB203 maintenance ☎ Call customer service center.
	▶ Internal oil leak	<ul style="list-style-type: none"> • FB203 maintenance ☎ Call customer service center.
Mechanical noise	▶ Damaged ball bearing	<ul style="list-style-type: none"> • FB203 maintenance ☎ Call customer service center.
	▶ Rotors seizing	<ul style="list-style-type: none"> • FB203 maintenance ☎ Call customer service center.
	▶ Unsynchronized gears	<ul style="list-style-type: none"> • FB203 maintenance ☎ Call customer service center.
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 HHR).



Maintenance sheet

Operating instructions – A3H Series

E 010	<i>Exchange standard repair</i>
E 011	<i>Safety instructions for pump relocation</i>
E 012	<i>Draining of the water cooling circuit</i>
E 013	<i>Saving and loading of the pump configuration</i>
E 014	<i>Disconnecting the pump from the installation</i>
E 015	<i>Conditioning the pump for shipping</i>
E 020	<i>Increase of the maintenance parameters</i>

Exchange standard repair

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**:

Safety instructions for pump relocation.....	E 11
Draining of the water cooling circuit.....	E 12
Saving and loading of the pump configuration.....	E 13
Disconnecting the pump from the installation	E 14
Conditioning the pump for shipping	E 15
Declaration of contamination.....	G 200
Installing a new pump.....	B
Remote loading of pump configuration	C 44

Safety instructions for pump relocation

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.

WARNING

Maintenance must be performed by a skilled maintenance operator trained in the relevant health and safety aspects (EMC, electrical hazards, chemical pollution, etc.).

Isolate the product from all energy sources (mains electricity, compressed air, etc.) before starting work.

WARNING

Electric shock hazard on touching.

When the main isolator is switched to the «0» position, items located between the mains connection and the isolator are still under mains voltage.

Disconnect the mains cable from all power sources before commencing any maintenance work on the product.

WARNING

Electric shock hazard.

Some components have capacitors charged to over 60VDC. When power is switched off, they keep their charge for a time. Residual voltages from the filter capacitors can cause electric shocks all the way back to the mains plug. Wait 5 minutes after power-off before commencing any work on the appliance.

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.

Safety instructions for pump relocation

Protection against corrosive gases

⚠ 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 regulations.

⚠ DANGER

Chemical supplies coming from the tool, as well as the water and the nitrogen need also to be locked out/tagged out.

Users are advised:



Stop the pump according to «Shutdown procedure for discontinuous operation» safety instructions, see C00.

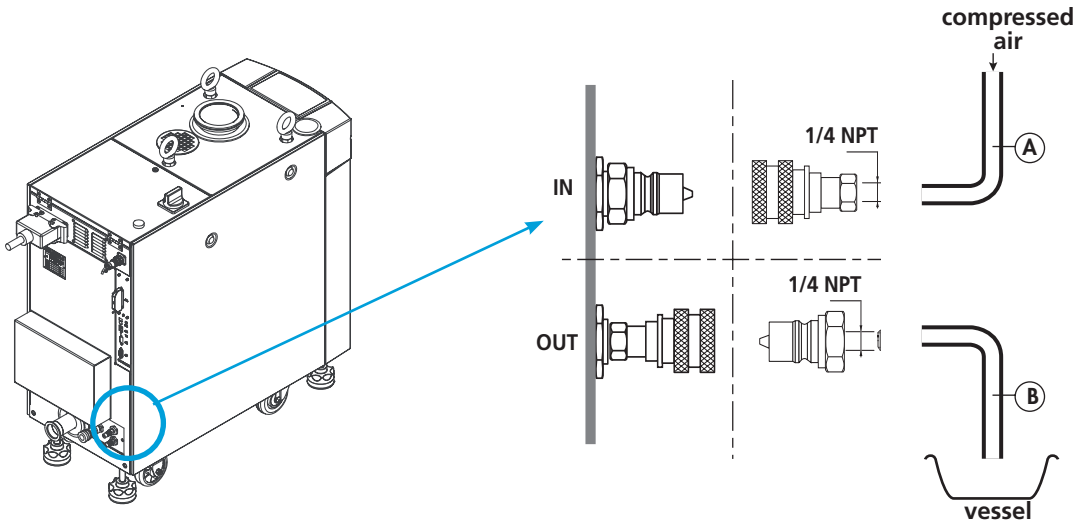
- Wear gloves, protective glasses, any appropriated safety equipment,
- Ventilate the premises well,
- Do not eliminate maintenance waste via standard disposal channels. Have it destroyed by a qualified company if necessary,
- Install the inlet and exhaust blanking plates, thus delivered with the pump or available as accessories (refer to E15) .

Continue by Draining of the water cooling circuit **E 12**

Draining of the water cooling circuit

Disconnecting the cooling circuit

Water must be drained to avoid hoses freezing up during shipment. Disconnect the water inlet and outlet pipe quick connectors.



Prepare a flexible pipe **(A)** with a quick 1/4 NPT female connector and another flexible pipe **(B)** with 1/4 NPT male connector.

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

Connect one end of pipe **(A)** at location of **"IN"** and connect the other end to a compressed air circuit (2 to 5 · 10³ hPa).

Draining the water volume

Inject compressed air into the pump until the water has been completely evacuated from the circuit.

Note: as the water circuit is equipped with water valve normally closed, some water stays into a part of the circuit. It's not a problem for shipping. Complete water draining will be done during pump overhaul.

Continue by Saving the pump configuration

E 13

Saving and loading 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 HHR to the adixen 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**.

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

The following screen appears:

Validate with **ENTER** button.

The pump configuration is then duplicate into theHHR memory.

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

Disconnect the hand-held remote.

```

MAINTENANCE
>>> MANAGEMENT <<<
OPERATING TIME
LAST ACTIONS
  
```

```

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

```

CONFIG SAVE
CONFIRM ?
  
```

Continue by Disconnecting the pump from the installation

E 14

Disconnecting the pump from the installation

Study the safety instructions for pump relocation before disconnecting the pump (see **E 11**).

Switch off the pump

Switch off the pump by positioning the main switch to "0".

Switch off the customer main circuit breaker.

Disconnect the main plug or the main wires from the main disconnect switch (see **B 50**).

Before disconnecting the pump from the installation, be sure to have at your disposal the connecting accessories to blank-off the inlet and exhaust ports. Refer to **E 15** for connecting accessory part numbers.

Disconnecting the pumping system

Disconnect all electrical connectors (J1, J14, RS232 and RS485...).

Do not forget to connect the "REMOTE CONTROL" and "EMERGENCY STOP" plugs (supplied with the pump).

Disconnect the water inlet and outlet quick connectors.

Disconnect the N₂ purge connector.

Disconnect the pump from the inlet piping and fit a blanking plate on the inlet.

Disconnect the secondary exhaust port from the customer application.

Disconnect the pump from the exhaust piping and fit a blanking plate on the exhaust.

Adjust the levelling feet so that the pump rests on the castors.

Remove the pump from the installation (see **B 20** for inverse procedure).

Continue by Conditioning the pump for shipping.....

E 15

Conditioning the pump for shipping

Study the safety instructions for pump relocation before disconnecting the pump (E 11).

Preparing the pump for expedition

Water line must be drained to avoid hoses freezing up during shipment (E 12).

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

Seal the inlet and exhaust

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

Inlet connecting accessory	DN 50 ISO K	DN 100 ISO-K	DN 160 ISO-K
Inlet blank-off flange	106314	090467	104456
Equipped centering ring with 1/8 gas connector	087168	068349	068186
Double-claw clamps (set of 4)	-	303056	303057
1/8 gas connector	082981	082981	082981
Claw clamp	303003	-	-

Exhaust connecting accessory	DN 40 ISO-KF
Inlet blank-off flange	068197
Equipped centering ring	068230
Releasable clamp	303002

Pressurizing the pump

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

Block the inlet port with the flanges supplied.

Connect the nitrogen to the gas connector.

- Pressurize the pump with dry nitrogen to a relativ pressure of 200 hPa.
- When the nitrogen flows out of the exhaust, seal it shut with the accessories provided.
- Disconnect the nitrogen supply.

Whenever you return the product to an adixen repair service center, please make sure you follow the «procedure for returning products » and fill in the declaration of contamination found at the end of the operating instructions or on our website.

Fill in the declaration of contamination

G 200


Conditioning the pump for shipping


Flange the pump A803H model

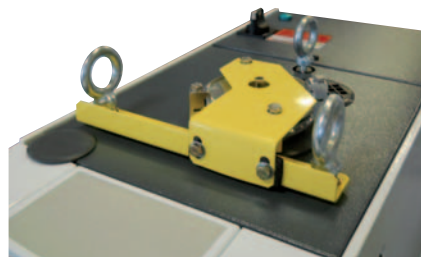
Remove 2 hoisting rings to install the clamping bar.

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.

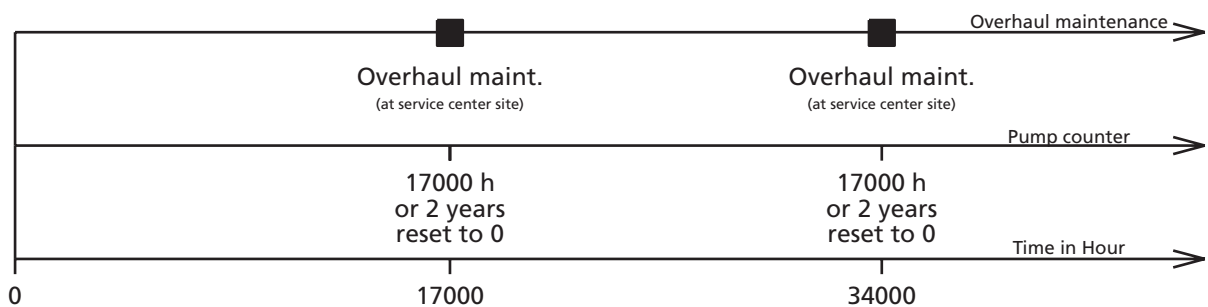


Increase of the maintenance parameters

When the maintenance of an element has been done, **it is necessary to increase to the next maintenance time to stop the warning** of this element.

The zero-set-up of the maintenance parameters will be done in a service center during a total maintenance.

Table of maintenance



Increase of the maintenance parameters

Access to the parameter programming

Press the **SET** key.
 Press the key **+** and **-** until the code is obtained (factory setting = 0)
 Validate with the **ENTER** key.

```
ENTER PASSWORD
«0»
```

Access to chosen parameter menu

Press the **+** key repeatedly to access to **MAINTENANCE** menu.
 Validate with the **ENTER** key.

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

Press the **+** key repeatedly to access to the chosen menu.
 Validate with the **ENTER** key.

```
>>> OVERHAUL WARNING <<<
```

The fresh screen appears.
 Use the **+** keys to increase the maintenance duration time.
 Validate with the **ENTER** key.

```
OVERHAUL WARNING
17000
>>> MIN: 1000H <<<
MAX: 65500H
```

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



Maintenance components

Operating instructions – A3H Series

F 000

Spare parts - Instructions of use

F 010

Delivered accessories (spare parts)

Spare parts - Instructions of use

Replacement of parts and use of non genuine parts

Our products are designed to comply with current EC regulations and guarantee optimal operating conditions with maximum safety conditions for the user.


Any modification of the product made by the user is liable to lead to non-compliance with the regulations, or even to put into doubt the performance of the product and the user's safety.

Replacement of defective components with parts that are not genuine, jeopardizes the initial safety conditions of the equipment.

In such cases, the EC declaration of conformity becomes null: The manufacturer withdraws responsibility for such operations.

Besides, counterfeiting and unfair trading of parts are condemned under civil and criminal laws.

The manufacturer urges the user not to use «imitation parts», or the misappropriation and pirating of intellectual property performed by some dishonest operators.

The manufacturer supplies maintenance components, spare parts or kits to perform the maintenance of its products ( F).

Delivered accessories (spare parts)

Accessories provided with the pump

Equipment	Part number		
	A203H	A803H	A1503H A1803H
Operating instructions	114515		
Funnel	107381		
EMO plug	106587		
Remote control plug	107222		
Nitrogen quick connector	107142		
A113 oil (2.5L)	064659		
A113 oil (0.5L)	064657		

Water quick couplings

Equipment	Part number		
	A203H	A803H	A1503H A1803H
1/4 stainless steel*	076720 (out) / 076721 (in)		
3/8 stainless steel*	115509 (out) / 115510 (in)		
1/4 brass	101772 (out) / 101773 (in)		
Adaptator (1/4) NPT/BSPP	106089		

* according to the ordering guide



Operating instructions – A3H Series

G 100

Declaration of conformity

G 110

A3H Series – Electrical schematic

G 200

Declaration of contamination

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

A203H
A803H
A1503H
A1803H

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

2006/42/EC: Machinery directive

2006/95/EC: Low voltage directive

2004/108/EC: Electromagnetic Compatibility Directive

2002/95/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:

Annecy, February 6, 2012

Authorized person to compile the relevant technical documentation:



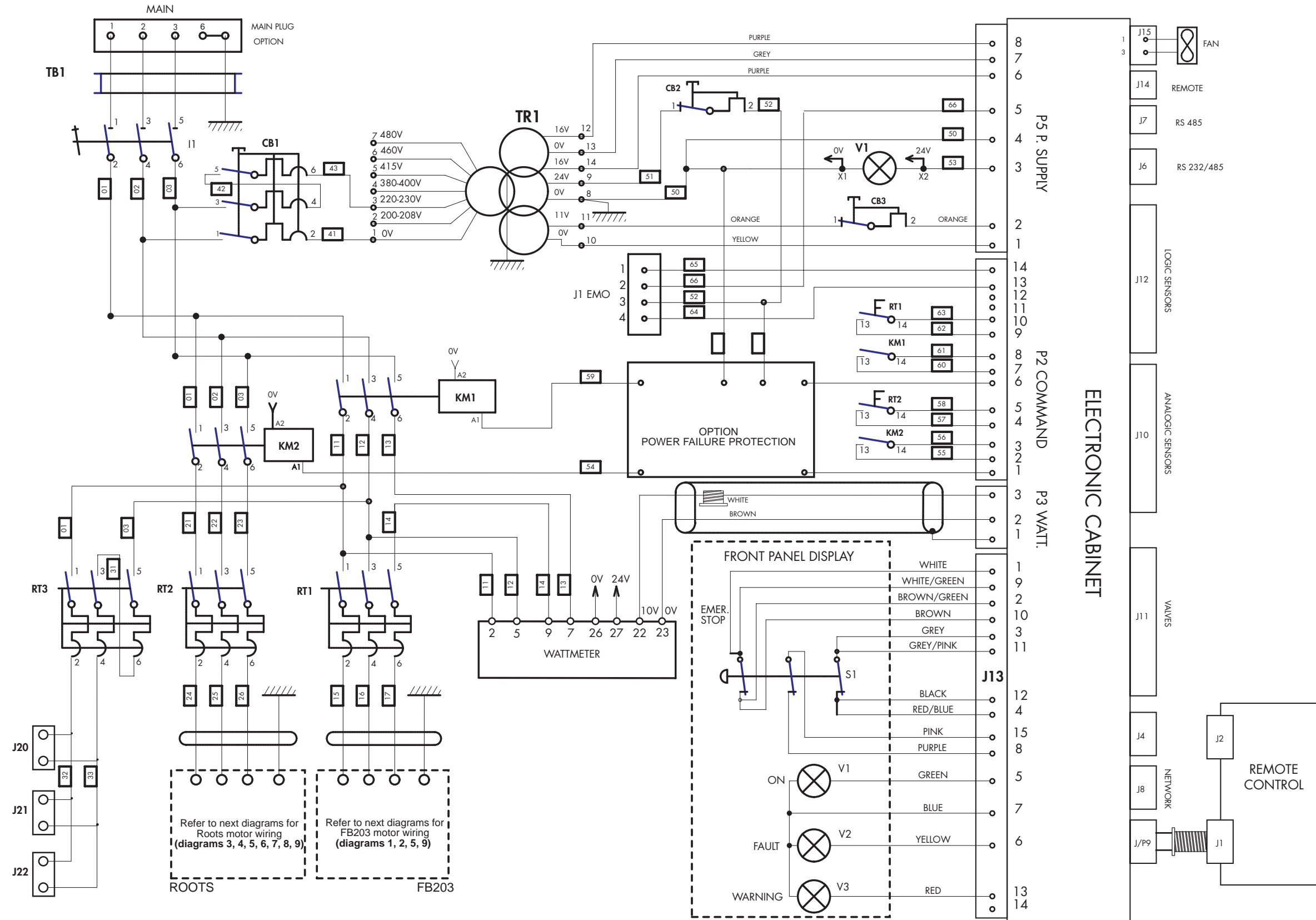
Mr. Eric TABERLET
President



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

G 110

A3H Series – Electrical schematic



A3H Series – Electrical schematic

Summary of FB 203 and Roots configurations

To identify the wiring of the FB 203 and Roots for the pump version corresponding to yours, use the following table.

Pump model	Version	refer to diagrams*
A203H	Standard	1
	Large Volume	2
A803H	Standard	1 + 3
	Large Volume	2 + 5
A1503H	Standard	1 + 6
A1503H	Harp	2 + 7
A1803H	Standard	1 + 8
	Large Volume	2 + 9

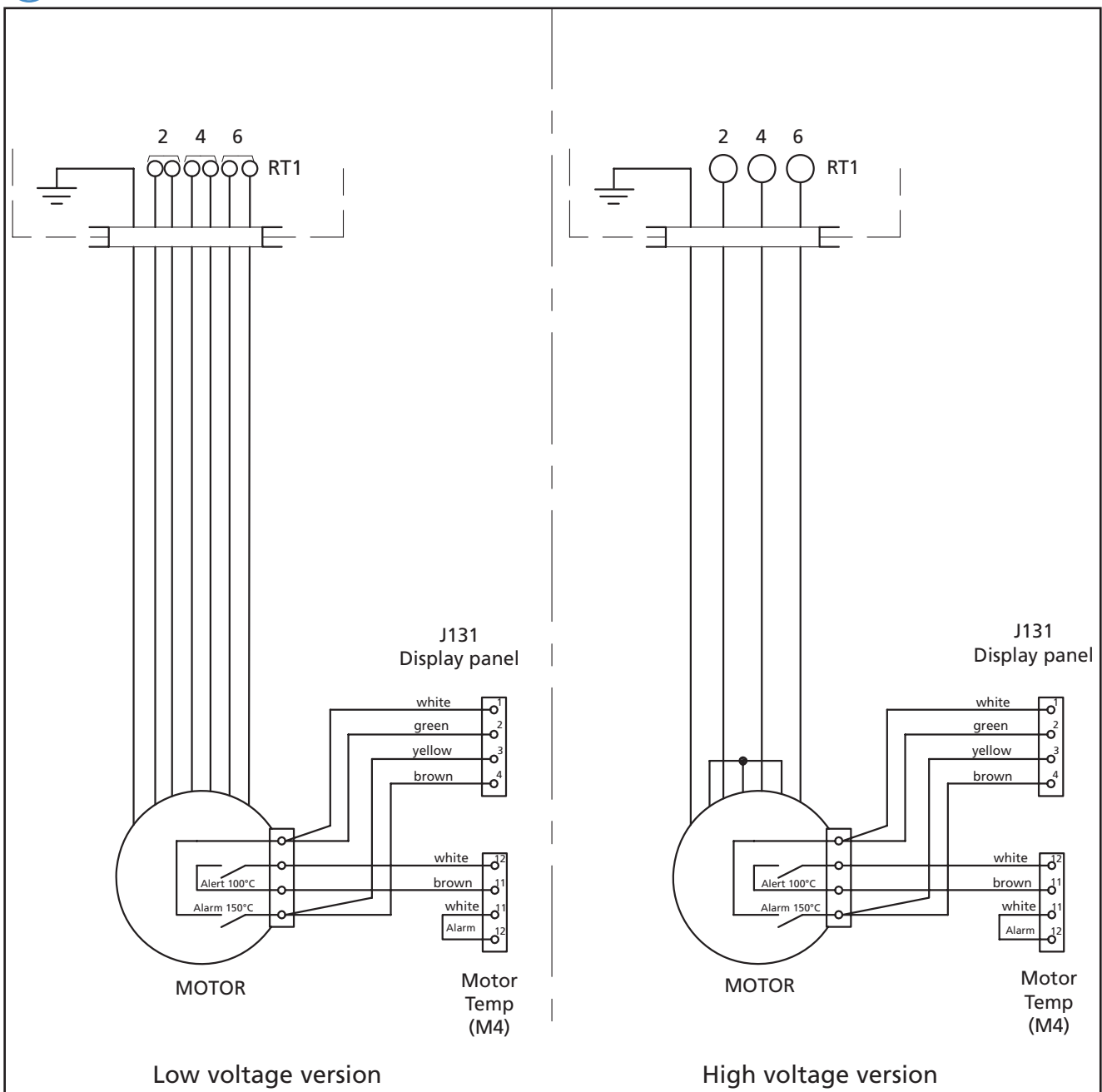
* Figures refer to wiring diagrams available in next pages.

A3H Series – Electrical schematic

The following diagrams must be used to complement the first one (p1/8).
All these diagrams describe the electric wiring depending on the model of the pump.

FB203 without frequency converter

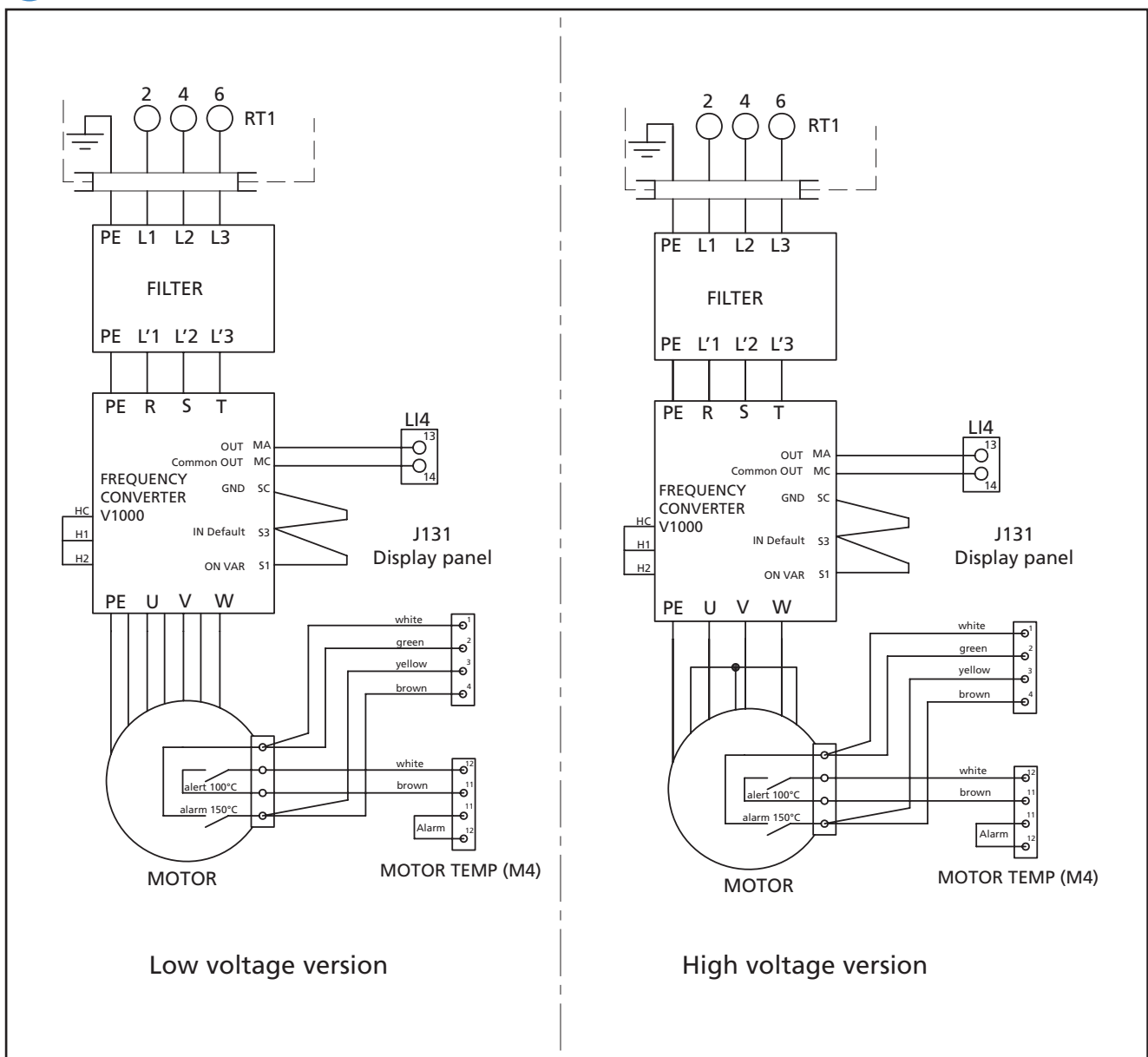
①



A3H Series – Electrical schematic

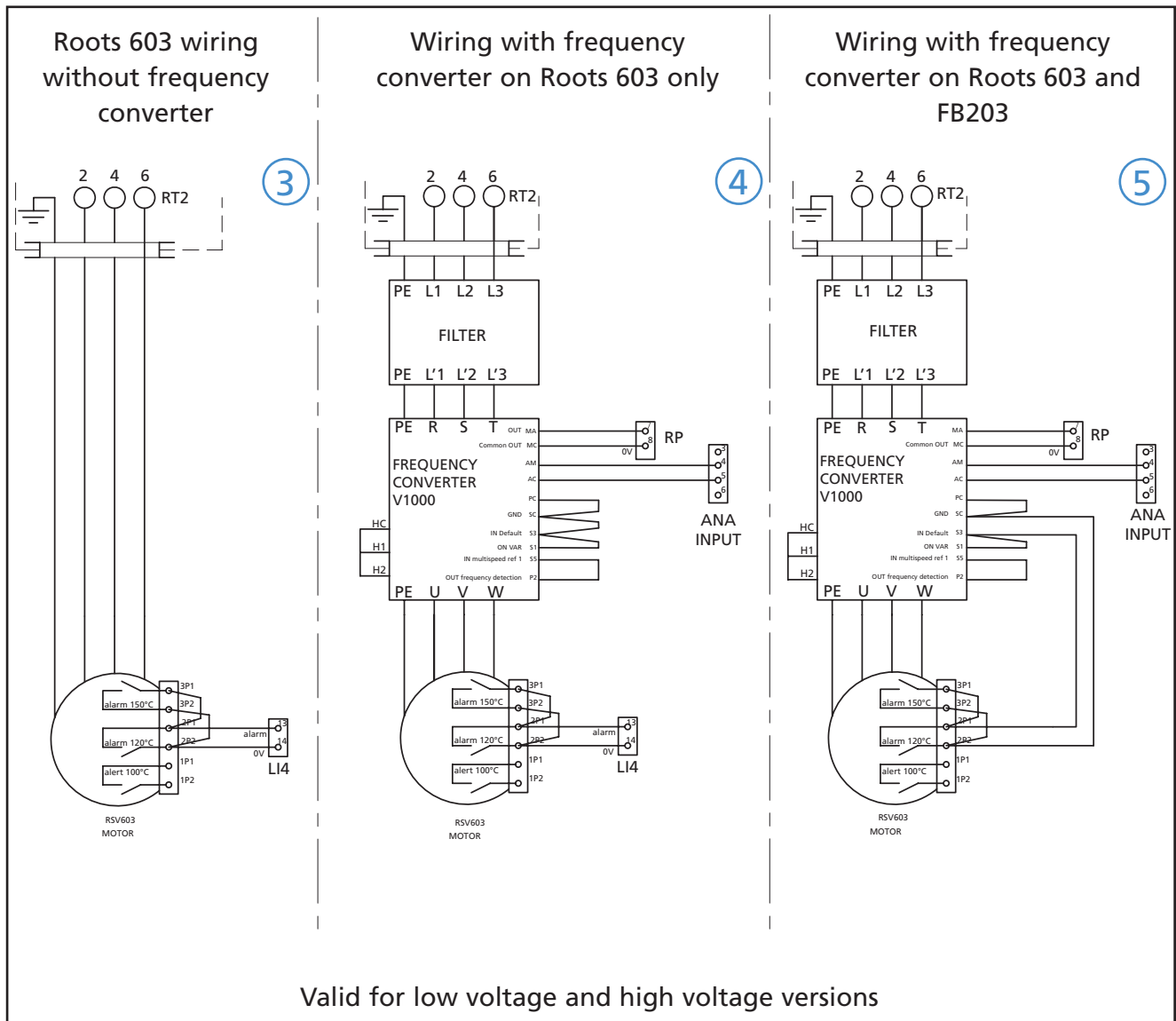
FB203 wiring equipped with a frequency converter

②



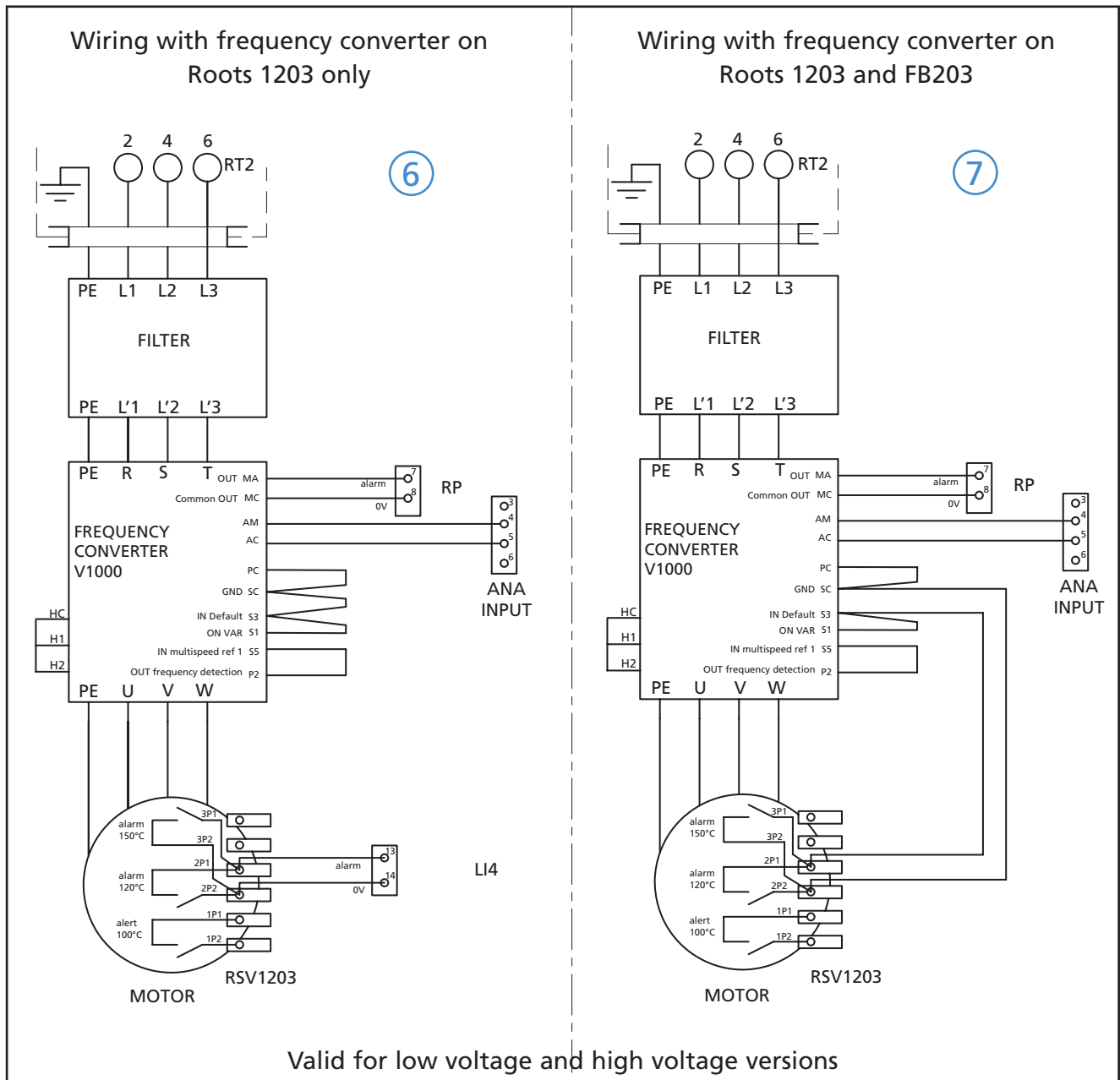
A3H Series – Electrical schematic

Roots 603



A3H Series – Electrical schematic

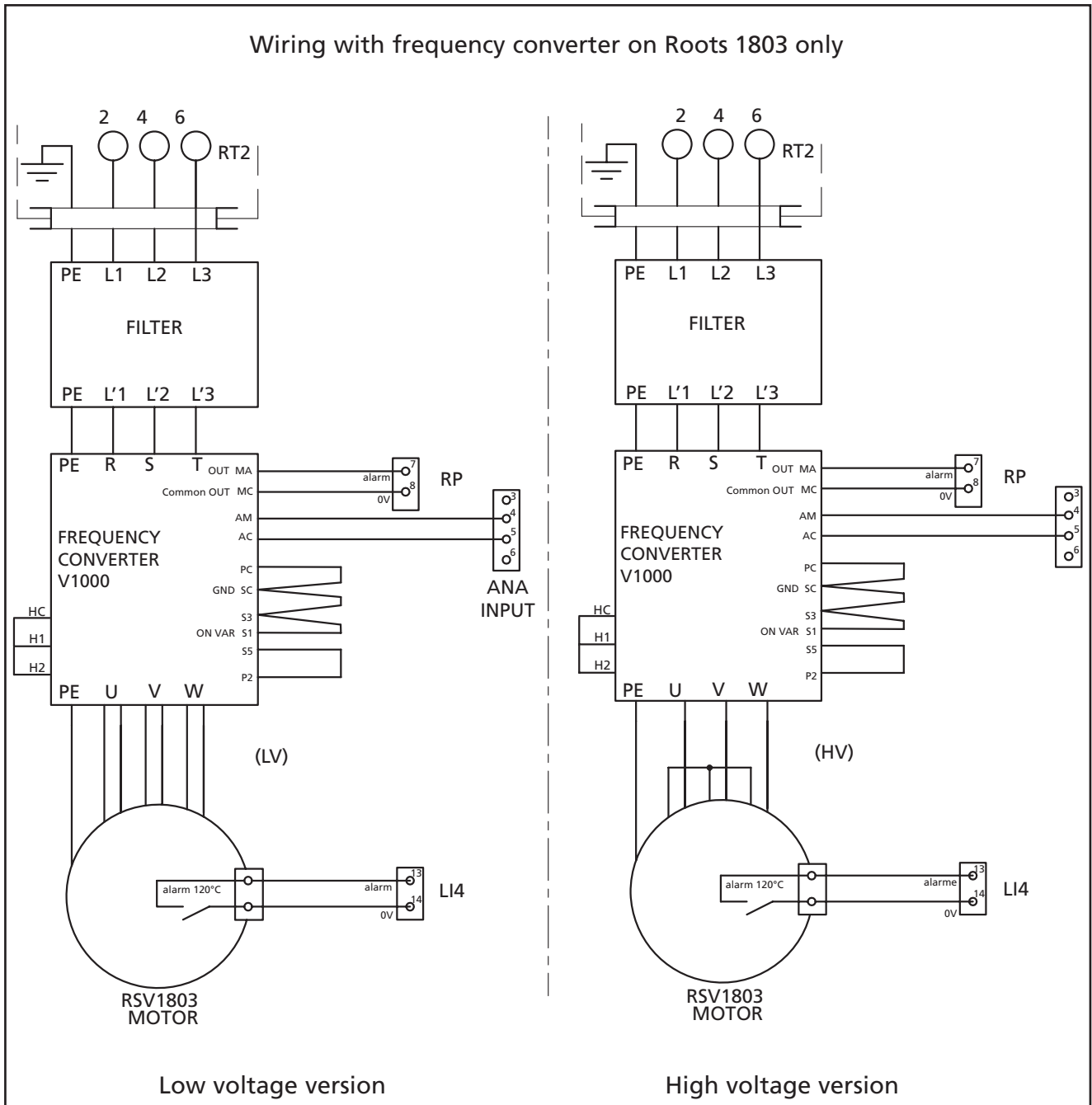
Roots 1203



A3H Series – Electrical schematic

Roots 1803

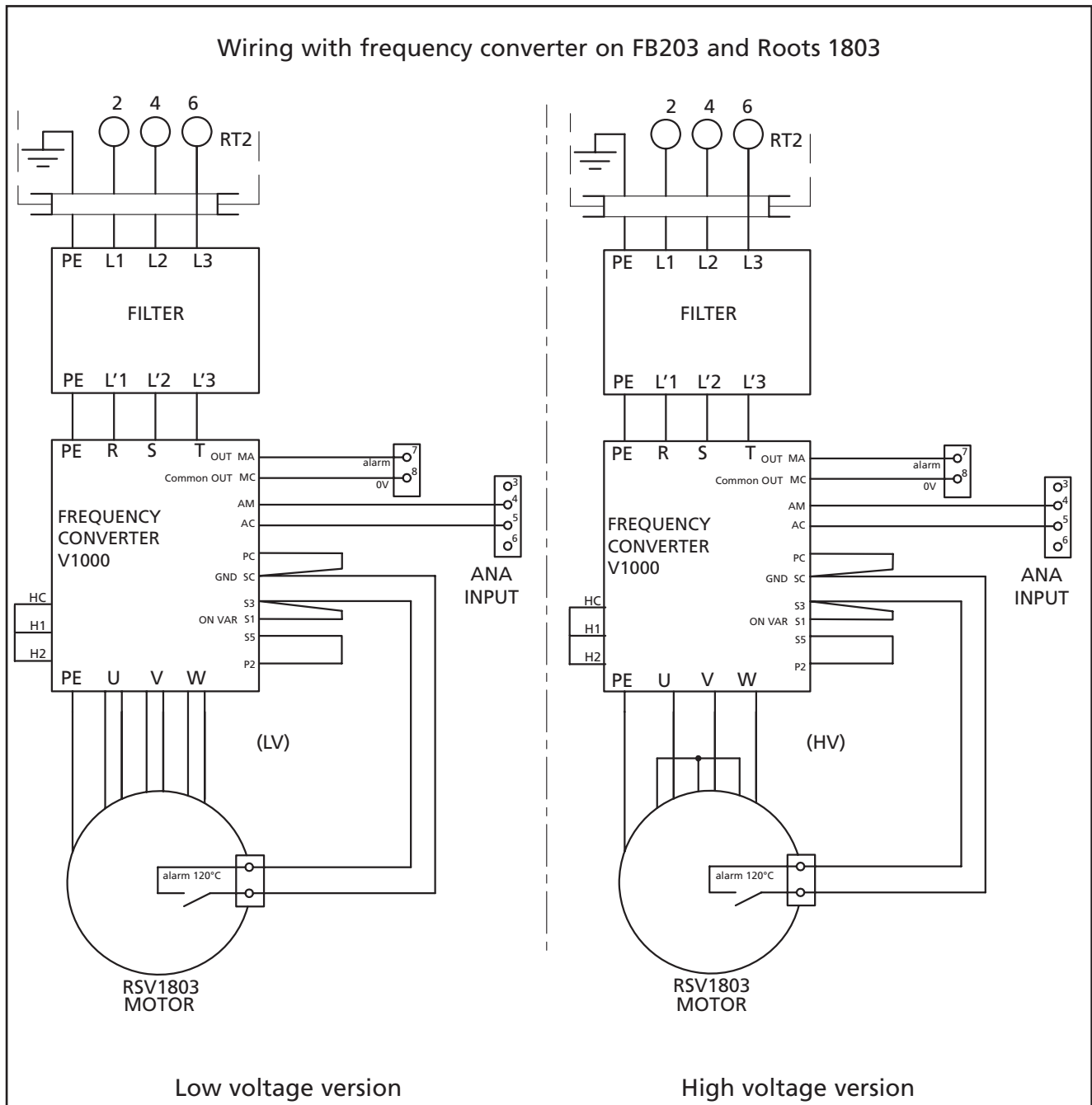
8



A3H Series – Electrical schematic

Roots 1803

9



Declaration of contamination

Procedure for returning adixen products

You wish to return an adixen by Pfeiffer Vacuum product for maintenance. The equipment will be dismantled and possibly cleaned by a technician from our Service Centre.

In compliance with European Community's L360 directives, French labor code L231 - R231 and Federal OSHA Safety Standard 1910-1200, adixen by Pfeiffer Vacuum requires this form to be completed to preclude the potential health risk to its service personnel that can occur when receiving, disassembling, or repairing potentially contaminated products.

Please fill in the present DECLARATION OF CONTAMINATION, print it and attach it to the product before shipping to your closest service center. Equipment returned without this form fully completed, and secured to outside of package, will be returned to customer unprocessed, at his cost. If following inspection and quotation, customer elects to not proceed with repair, he will be subject to service fee to cover product decontamination, disassembly, cleaning and evaluation costs. Please contact service center for any further recommendations.

We wish to draw your attention to the following points: Equipment must be drained of fluids and residue, securely packaged and shipped prepaid. Concerning the closing of the ports (inlet & outlets of the product), metallic airtight blank flanges should be used if toxic or copper gases have been pumped.

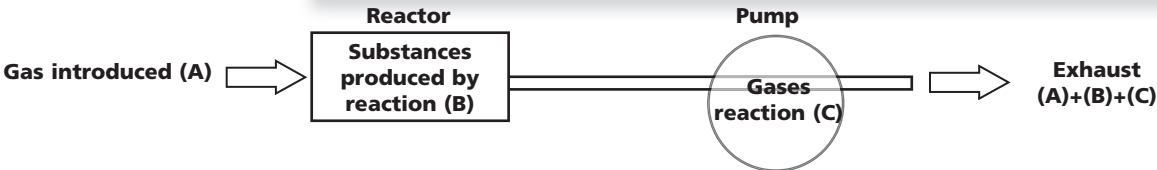
The risk may be of the following nature:

- **Chemical:** Danger to health, risks of explosion, fire, risks for the environment. Please indicate the chemical formula and name of the gases or substances that have been in contact with the equipment (pump or accessories, Leak detector, gauges...).
- **Biological:** In case of contamination (such as pathogenic germs, micro-organisms (bacteria, viruses, etc.) classes 1 to 4 and group E), we are currently unable to decontaminate and recycle such material without risk to the safety of our staff. **Please contact us before sending the product** to the service center.
- **Radioactive:** In case of contamination, our Service Center is currently unable to decontaminate and recycle such material without risk to the safety of our staff. **Please contact us before sending the product** to the service center.
- **Copper contamination:** Copper based by-products formed in sputtering or etching processes are considered as a poison in some semi-conductor processes. A specific treatment is required, which generates extra cost.



WARNING

In the event of chemical contamination, please indicate the following gases or substances:



- Gases (or substances) introduced into the reactor and which may be found at the exhaust (A).
- Gases (or substances) resulting from the reaction or process (B).
- Gases (or substances) that may possibly be formed inside the pump (due to a thermodynamic or chemical reaction, condensation, deposition, precipitation, etc.) (C).



Declaration of contamination of equipment and vacuum components

Repair and/or maintenance will be carried out on equipment and vacuum components only if a fully completed, correct declaration of contamination is provided. If this is not the case, the corresponding repair will be delayed or omitted. A separate declaration must be submitted for each device and each component.

This declaration can only be completed and signed by an authorized and qualified person.

<p>1 Description of equipment</p> <ul style="list-style-type: none"> - Equipment type/model: _____ - Reference (P/N): _____ - Serial No.: _____ - Invoice No.: _____ - Delivery date: _____ 	<p>2 Reason for return</p> <p>_____</p> <p>_____</p> <p>Return No.: _____</p> <p>Under Warranty: yes <input type="checkbox"/> no <input type="checkbox"/></p>
---	--

<p>3 Equipment condition</p> <ul style="list-style-type: none"> - Has the equipment been used? yes <input type="checkbox"/> no <input type="checkbox"/> - Type of pump oil used: _____ - Has the equipment been cleaned? yes <input type="checkbox"/> no <input type="checkbox"/> - Cleaning detergent / method: _____ <p>Copper process</p> <ul style="list-style-type: none"> - Has the equipment been used on a Copper process? yes <input type="checkbox"/> no <input type="checkbox"/> <p><small>If yes, sealed package and specific label are required.</small></p>	<p>4.1 Process related contamination</p> <ul style="list-style-type: none"> - Is the equipment free from potential harmful substances? yes <input type="checkbox"/> no <input type="checkbox"/> - Toxic yes <input type="checkbox"/> no <input type="checkbox"/> - Carcinogenic yes <input type="checkbox"/> no <input type="checkbox"/> - Combustible yes <input type="checkbox"/> no <input type="checkbox"/> - Corrosive yes <input type="checkbox"/> no <input type="checkbox"/> - Explosive* yes <input type="checkbox"/> no <input type="checkbox"/> - Biological* yes <input type="checkbox"/> no <input type="checkbox"/> - Radioactive* yes <input type="checkbox"/> no <input type="checkbox"/> - other harmful substances yes <input type="checkbox"/> no <input type="checkbox"/> <p><small>* The equipment will be accepted only with a written decontamination certificate.</small></p>
--	---

4.2 Process and list of hazardous substances or by-products which may have come into contact with the equipment:

Chemical name (or symbol)	UN classes of dangerous goods	Risks and precautions associated with substances	Process description
1.			
2.			
3.			
4.			

5 Legally binding declaration

We hereby guarantee that the information in this declaration is correct and complete. I, the undersigned, am able to provide a true assessment. We are aware of our liability toward the contractor for damage resulting from incomplete or inaccurate details; we undertake to be responsible for any third-party claims based upon claims of contamination or other nonconformity with the statements herein.

Name of organization: _____

Address: _____ Post Code: _____

Te.: _____ Country: _____

Fax: _____ Email: _____

Name: _____

Function: _____ Legally binding signature and company seal: _____

Date: _____

**Vacuum Solutions
from a single Source**

Pfeiffer Vacuum stands for innovative and custom vacuum solutions worldwide, for 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.

**You are looking for a
perfect vacuum solution?
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