A PASSION FOR PERFECTION

PFEIFFER VACUUM

ATH 500 M - ATH 500 MT

Magnetically levitated turbopump

Operating instructions

Translated from original version

EN

adixen
by PFEIFFER VACUUM

ATH 500 M/MT
Magnetically levitated turbo pumps

Welcome

Dear Customer,

You have just purchased an adixen magnetically levitated turbo pump. We would like to thank you and are proud to count you as one of our customers.

This product has benefited from adixen Vacuum Products many years of experience in the field of turbomolecular pump design.

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

The integrator of this component must provide all operator safety measures mainly against hot surfaces.

This pumping component must not operate in an area with risk of explosion. Consult us to study a solution.

APPLICATIONS:

SEMICONDUCTOR APPLICATIONS : plasma etching, Ion implantation, sputtering, plasma deposition.

OTHER APPLICATIONS: research and development, high energy physics, space simulation, accelerators.

OTHER INDUSTRIES: glass-coating, flat panel display, leds, deposition coating, hard disk manufacturing.

ADVANTAGES:

High throughput - Quiet and clean vacuum - Corrosion proof - High MTBF - Minimum size, volume and weight - Smart and compact electronic controller - Reliability - Maintenance free - Battery free - Easy integration.

In order to ensure the best possible performance of the equipment and your complete satisfaction in using it, we advise you to read this manual carefully before any intervention on your pump and to pay particular attention to the equipment installation and start-up section.

GB 03357 - Edition 05 - Jan 13

ATH 500 M/MT
Magnetically levitated turbo pumps

This product complies with the requirements of European Directives, listed in the Declaration of Conformity contained in G 100 of this Manual.

GB 03357 - Edition 05 - Jan 13

Manual reference: 114436
Edition: 06 - april 2014

General contents

ATH 500 M/MT Operating instructions

Translated from original version

GB 03358 - Edition 06 - 07/2013

Manual reference: 114436
Edition: 06 - april 2014

General contents

ATH 500 M/MT Operating instructions

Translated from original version

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

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

Before switching on the appliance, study the user's manual and make sure you follow the safety instructions it gives. 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.

GB 03358 - Edition 06 - 07/2013

Manual reference: 114436
Edition: 06 - October 2013

General contents

ATH 500 M/MT Operating instructions

Translated from original version

Symbols, labels	Description
	Warning : hot surface
	Warning : hazardous voltage
	Caution : risk of danger. Refer to the operating instructions before use
	Operating status
48 V ⎓ 12 A	Power supply
	Do not touch when the pump is running
	Use of glove is recommended
	Moving parts present
	Heavy object
	Lock the electrical connector before using the pump and during operation
Purge	Purge port
Pump exhaust	Exhaust of the pump
Water	Water cooling circuit connection
Water max Pr.7 bar/101 psi	Max. cooling water pressure
PWR	Pump power on
	Direction of rotation of the pump

GB 03358 - Edition 06 - 07/2013

A Introduction

ATH 500 M/MT Operating instructions
Detailed contents

GB 03359 - Edition 02 - Jan. 12

A 150

Introduction to the ATH 500 M/MT

A magnetically levitated hybrid turbo pump

ATH 500 M/MT with integrated electronic

Five active axes
Rotor position control in 5 directions.

Unbalanced force rejection control
Lowest possible levels of noise and vibration.
Compensation for any unbalance of the rotor.
Maintenance free

Inert gas purge
Eliminate corrosion of the motor and magnetic bearing coils.

Battery free
In case of a power failure, the pump motor acts like a generator to transform the rotor energy into electrical power to supply the electronic.

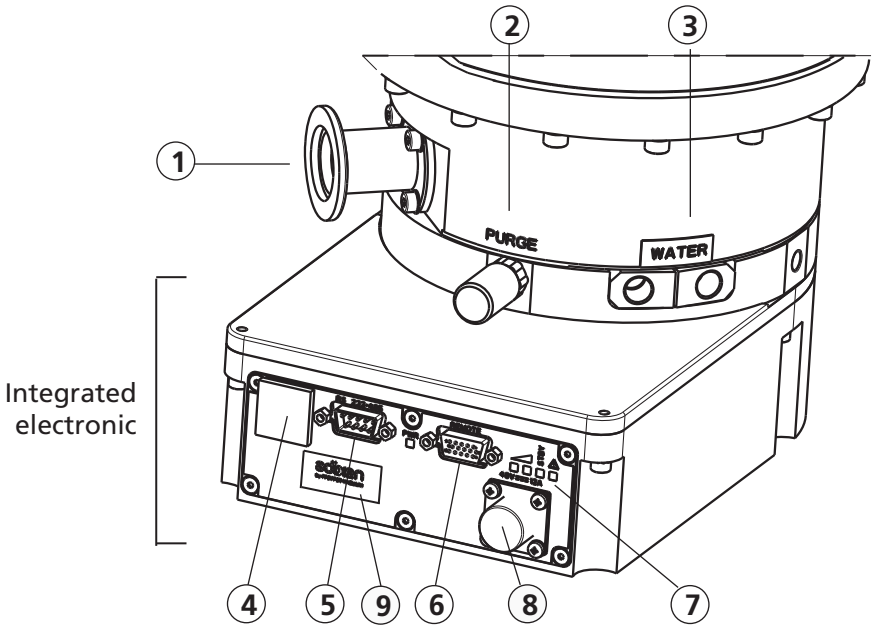
Electrical power supply 48 V DC (accessory) **A 510.**

GB 03360 - Edition 04 - Jan 13

Introduction to the ATH 500 M/MT

ATH 500 M Model

For OEM version, see its own specific technical sheet.

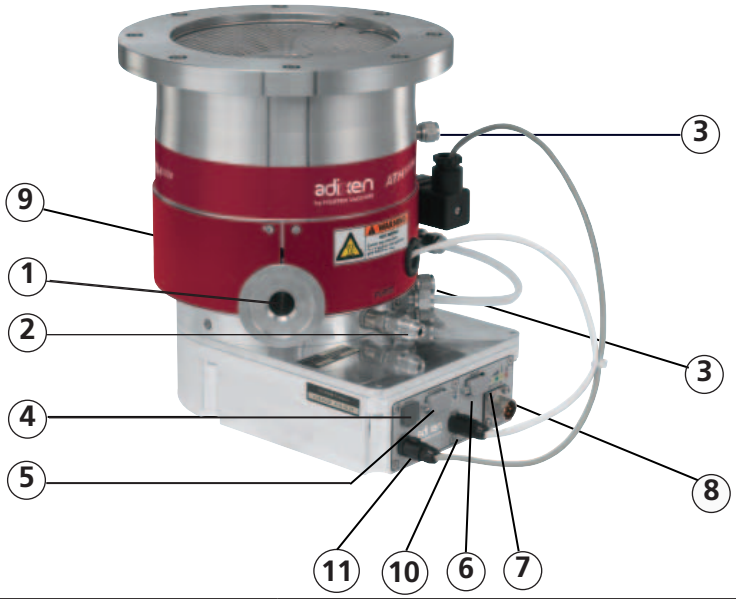


1	Exhaust port	DN25 ISO KF
2	Integrated purge (50 sccm)	1/8 "BSPP female equipped with a filter **B 330**
3	Water fittings	1/8 NPT female **B 340**
4	Service	Used by service and HHR.
5	RS232 or RS485 serial links	The serial link RS 232 or RS 485 is used to monitor and control the pump from a computer. The serial link RS 485 allows the installation and the control of many pumps in a network. **B 450** and **C 800**
6	Remote connector	The remote control connector is used for the remote control of START/STOP/STANDBY functions to allow the copy of pump status via dry contact outputs. **B 430**
7	Pump status indicator lights	**C 200**
8	Power supply connector	Used to plug a 48 VDC power supply **B 400**
9	Profibus- Devicenet connectors	Industrial network connectors and indicator areas (Profibus - Devicenet)

GB 03360 - Edition 04 - Jan 13

Introduction to the ATH 500 M/MT

ATH 500 MT Model

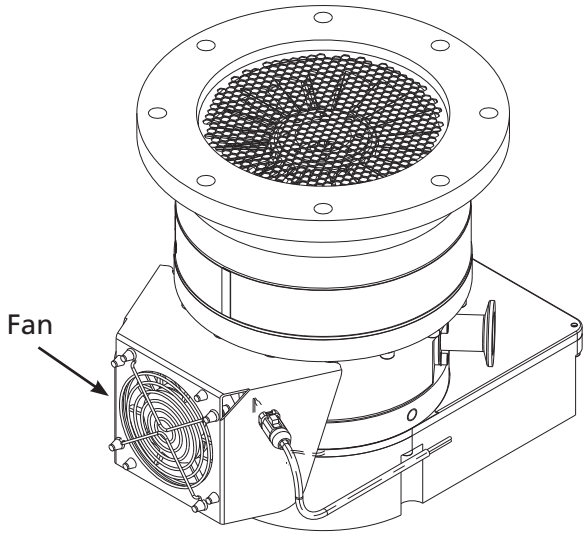


1	Exhaust port	DN40 ISO KF
2	Integrated purge (50 sccm)	1/4 VCR **B 330**
3	Water fittings	1/4 double ring **B 340**
4	Service	Idem ATH 500 M
5	RS232 or RS485 serial links	Idem ATH 500 M
6	Remote connector	Idem ATH 500 M
7	Pump status indicator lights	Idem ATH 500 M
8	Power supply connector	Idem ATH 500 M
9	Heater band	The heating band keeps the inner surface of the pump up to 65 °C to avoid condensation effects. The temperature is controlled by the controller.
10	Supply heater band	Connect the heater band to the controller
11	Supply water valve	Connect the water valve to the controller

GB 03360 - Edition 04 - Jan 13

Introduction to the ATH 500 M/MT

Air cooled
ATH 500 M Model



The fan must be supplied by an external power supply 48 VDC, either ordered as an accessory (**A510),** or provided by the customer.

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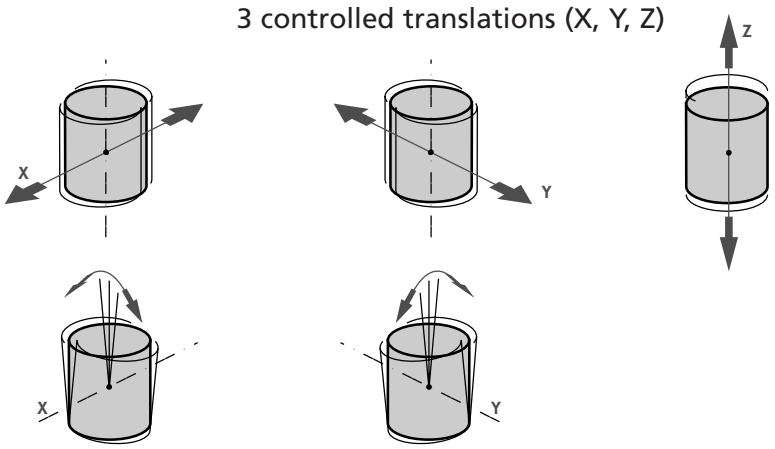
Control loop of the pump

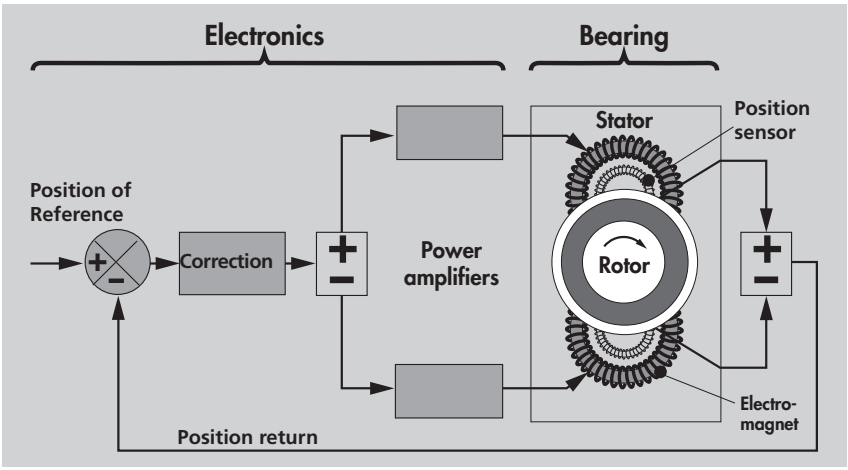
5 active axis

The mobile assembly formed by the turbo rotor and the shaft is known as the rotor. The rotor is driven by the motor and held in suspension by magnetic fields generated by electromagnets housed in an active bearing.

The mobile rotor has 5 axes of freedom monitored by 5 active magnetic bearings.



Movements in relation to these axes are monitored by position sensors. According to the position data recorded, the controller corrects differences to bring the rotor back to its optimum position, by varying the current in electro-magnets.

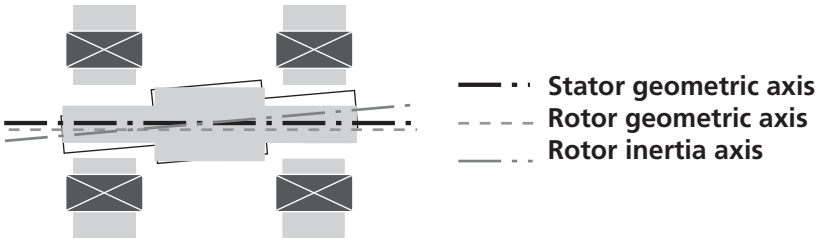


GB 02721 - Edition 04 - Aug 07

Control loop of the pump

Unbalanced force rejection control

The **unbalanced force rejection control** is an electronic function, that monitors the rotor position, allowing it to rotate in its own axis of inertia.
Changes in the rotor balance, due to deposit built-up during the life time of the pump, are automatically compensated by the **unbalanced force rejection control.**
It ensures the lowest possible levels of noise and vibration.



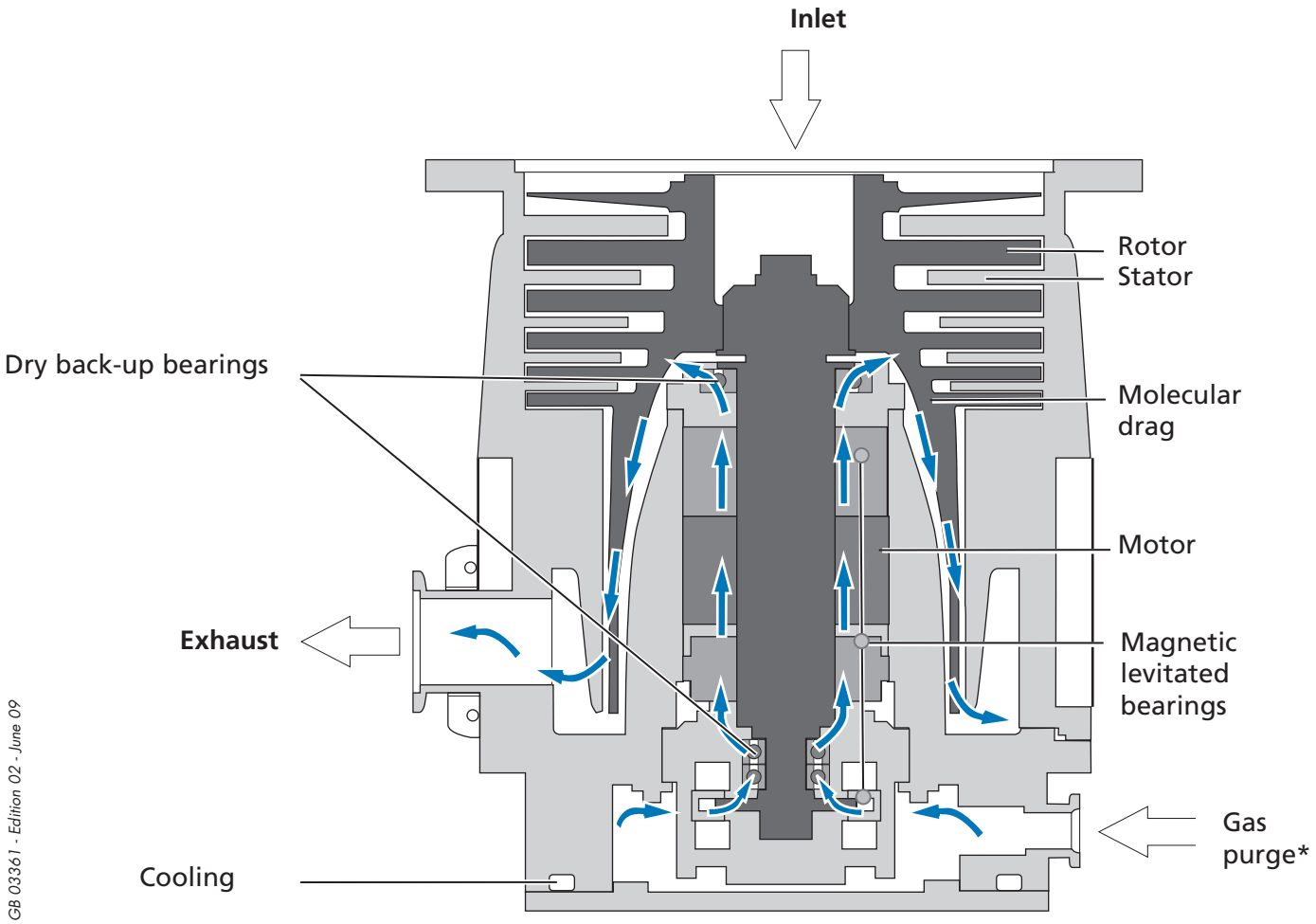
GB 02721 - Edition 04 - Aug 07

The pump operating principle

Pumping principle

The ATH 500 M pump integrates the advantages of a multi-staged turbomolecular pump with a spiral helix molecular drag section.

The turbomolecular section provides high pumping speeds and high ultimate vacuum. The molecular drag section provides a high compression ratio and extends the forevacuum tolerance up to the range of mbar.



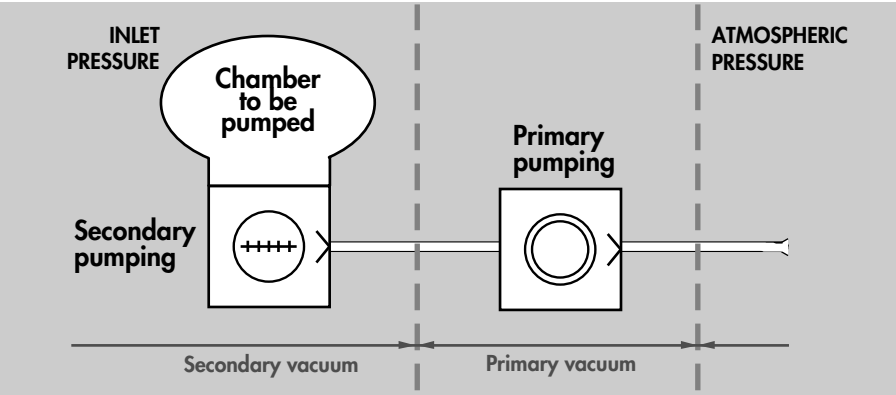
* The gas purge provides an excellent protection for corrosive applications and the rotor cooling.

GB 03361 - Edition 02 - June 09

The pump operating principle

The hybrid-turbo pump in an installation

At the pump exhaust, the gases are evacuated to atmosphere by a primary pump.
The ATHM compression ratio is set by the design. The pumping performances depend on the primary pump and on the installation.



GB 03361 - Edition 02 - June 09

The pump operating principle

The back-up ball bearings

They are dry-lubricated ball bearings.
They are never used in normal operation, since the rotor is not in contact with the ball bearings.
The back-up bearings are only used to protect the pump in accidental air in-rushes, accidental shocks or power failure.

No maintenance

By design, the pump doesn't include parts liable to wear and doesn't need preventive maintenance. However, the back-up ball bearings used in case of accidental shut-downs have to be changed when the controller indicates it: the percentage of landing time to be deducted depends on the number of incidents. For maximum life time of the rotors, see **(D 150)**.

Battery free

In case of a power failure, the motor acts like a generator, supplying enough power for the magnetic bearings.
When the rotation speed is too low, the pump shuts down and lands on the back-up ball bearings.

Variation of the pump rotational speed

The ATHM pump rotation speed can be selected and set between a minimum speed and the maximum speed. This makes it possible to optimize pumping characteristics according to each customer application (for example, high pressure pumping (**A 400**).

A distinction is made between the following speeds:
- **reduced speed (STANDBY speed)** which can be set between the low speed value and the maximum speed.
- **nominal speed** preselected at factory.

GB 03361 - Edition 02 - June 09

Technical characteristics of the pumps

The performances of the pumps

Characteristics		UNITS	ATH 500 M		ATH500MT
Flange (IN)		ISO-F	DN 100	DN 160	DN 160
Flange (OUT)		ISO-KF	DN 25		DN 40
N2 purge flange			1/8 BSPP (ISO 228)		1/4VCR
Pumping speed *	N2	l/s	350	550	
	Ar	l/s	320	530	
	He	l/s	310	390	
	H2	l/s	170	190	
Compression ratio	N2		$> 2 \cdot 10^7$		
	Ar		$> 8 \cdot 10^6$		
	He		$> 1 \cdot 10^4$		
	H2		$> 2 \cdot 10^2$		
Gas throughput ** (1) (2)	N2	hPa l/s	67.6		8.5
	Ar	hPa l/s	42.2		5
	He	hPa l/s	> 169		> 16.9
	He	hPa l/s	> 169		> 16.9
Inlet vacuum max (2)	N2	hPa	1		0.04
	Ar	hPa	1		0.02
	He	hPa	10		> 0.1
	H2	hPa	10		> 0.1
Fore vacuum max (3)	N2	hPa	2.6		
	Ar	hPa	3.3		
	He	hPa	1		
	H2	hPa	0.25		
Maximum heating temperature		°C	N/A		65
Leaktightness		hPa l/s	$< 5.10^{-8}$		
Ultimate pressure (4)		hPa	$< 1.10^{-8}$		
Nminal rotation speed		rpm (Hz)	50 000 (833)		
Standby speed		rpm (Hz)	15 000 (250) to 50 000 (833)		
Sound level : EN ISO 2151 at nominal speed		dB (A)	< 42		
Maximum baking temperature		°C	120		
Recommended purge flow rate **		SCCM	50		
Vibration level at nominal speed		μm	< 0.01		
Mounting orientation			Any		
Pump Protection Index			IP 40 (except air cooling IP 20)		

(1) At nominal speed (cold for M, at 65°C for MT), water temperature = 25 °C

(2) With a low exhaust pressure, depends on external conditions (water temperature, water flow, ambiant temperature).

(3) With ratio inlet pressure/ exhaust pressure > 100, max. throughput reduced.

(4) With ISO-K, ISO-F flange, better with CF-F flange.

* Without inlet screen

** Standard reference conditions: T0 = 273.15 K - P0 = 1013.25 hPa

GB 03362 - Edition 05 – 07/2013

Technical characteristics of the pumps

The performances of the pumps

Characteristics	UNITS	ATH 500 M	ATH500MT
Run-up TIME (5)	mn	< 2	
Start up supply	watt	< 560	
Power consumption at ultimate pressure	watt	< 100	
Standby power	watt	< 50	
Power supply	V DC	48	
Maximum leakage current (6)	mA	not applicable; polarity (-) connected to the earth	
Cooling water flow rate	l/mn	1	
Maximum water line pressure	hPa	$7 \cdot 10^3$	
Water temperature (5)	°C	5 < T < 40	15 < T < 25
Control mode option	Profibus	in option	no
	Remote	oui	
	Devicenet	non	
Weight	kg (lb)	17 (37)	18(39)
Recommended backing pump		ACP	
Air cooling	option	oui	non
Environmental conditions:			
Use of the product		Indoor only	
Ambient operating temperature	°C	5 < T < 45	5 < T < 25
Maximum altitude	m/ft	2000 / 6562	
Pollution degree applicable		2	
Maximum relative humidity		Maximum relative humidity of 80 % for temperature until 31 °C with a linear decrease until 50 % relative humidity at 40 °C	
Three phase motor characteristics (Max. values) :			
• Voltage between phases	Vrms	29	
• Supply frequency	Hz	1666	
• Phase current	A	9,5	
Supply output characteristics (accessory)			
Nominal voltage	V DC	48 ± 5 %	
Minimum nominal power	W	550	
Current limitation	A	15 max.	
Network transitory voltage • must accept tempory overvoltages on the power line		Category II mini	

(5) Up to 90 % of full rotatin speed, with exhaust pressure < 0,1 hPa.

(6) Value for pump and controller. Not all the leakage current is necessary evacuated through the earth wire : it depends on the pump earth connection regarding the equipment to which the pump is connected.

(7) > 25 °C : apply a derating. Change the operating conditions to reduce the nominal power. Contact the Customer Service.

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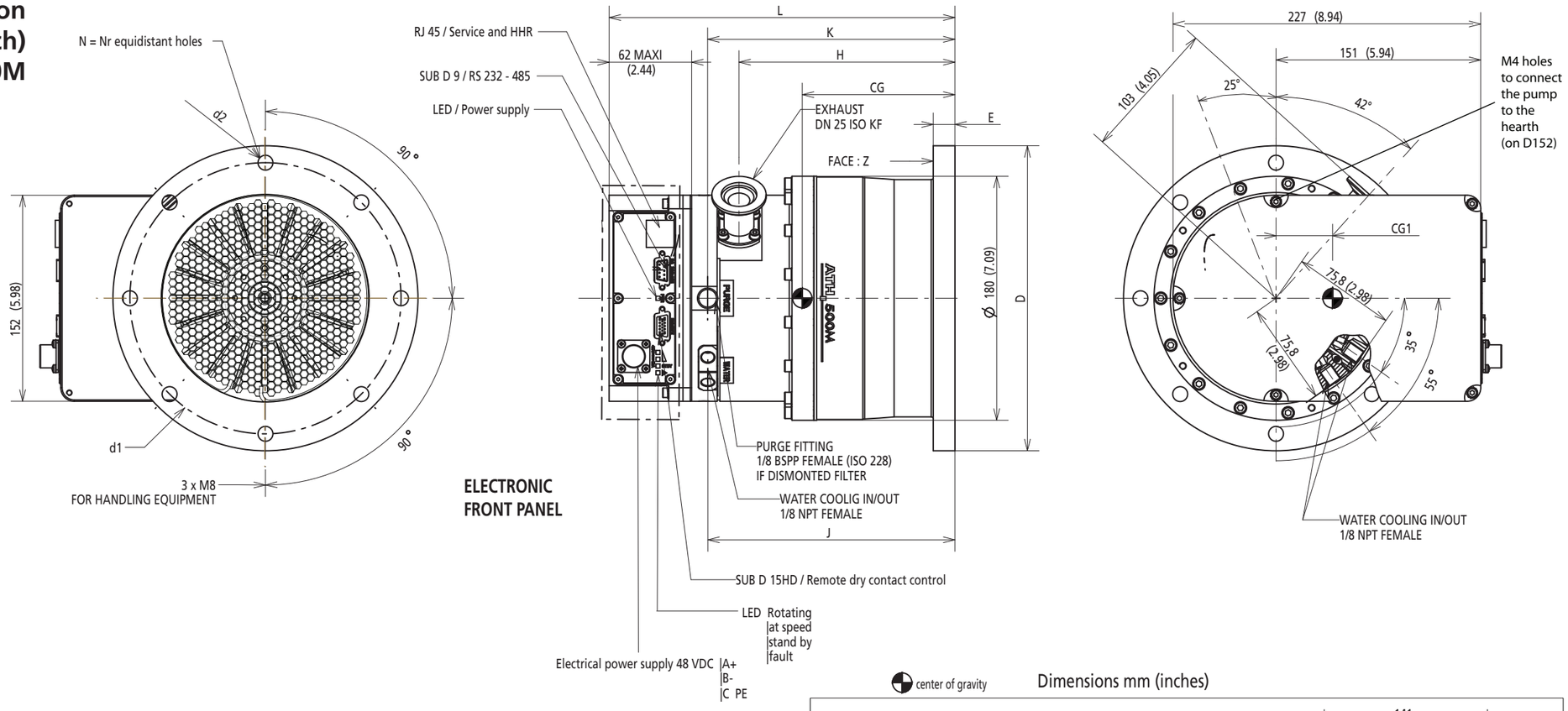
A 400

Technical characteristics of the pumps

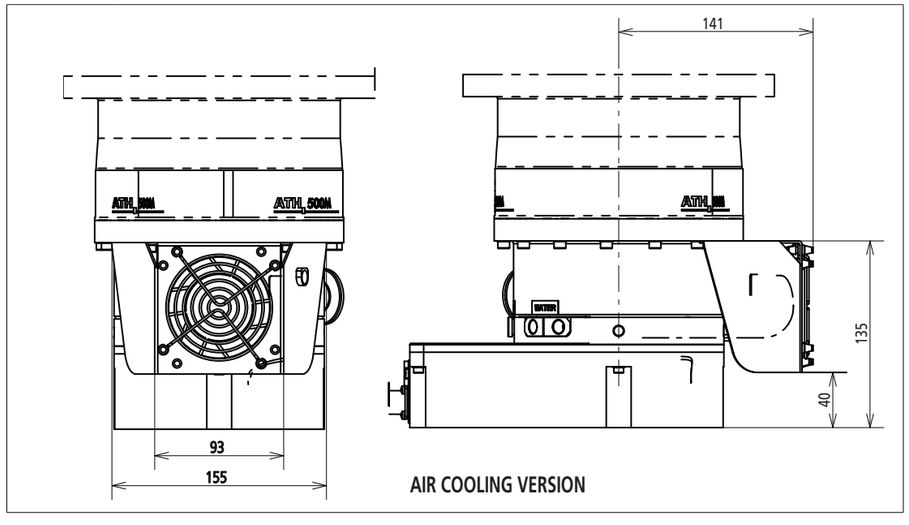
Dimension mm (inch) ATH 500M



Inlet flange		E	H	J	K	L	D	d1	d2	N	CG	CG1
DN 160 ISO F	mm	16	159.3	182.5	182.2	254.9	225	200	11	8	112.6	9.7
	inch	0.63	6.27	7.18	7.17	9.94	8.86	7.87	0.43	-	4.43	0.38
DN 160 ISO K	mm	12	159.3	182.5	182.2	254.9	180	-	-	-	128.6	11.3
	inch	0.47	6.27	7.18	7.17	9.94	7.09	-	-	-	5.06	0.44
DN 160 CF-F	mm	20	180.3	203.5	203.2	275.9	198	181.1	8.6	20	114.1	10.1
	inch	0.79	7.1	8.01	8	10.76	7.79	7.13	0.34	-	4.49	0.39
DN 100 ISO K	mm	12	199.3	222.5	222.2	294.5	130	-	-	-	116.1	10.2
	inch	0.47	7.85	8.76	8.75	11.48	5.12	-	-	-	4.57	0.4
DN 100 CF-F	mm	16	209.3	232.5	232.2	304.9	148.5	130.2	8.6	16	109.5	9.8
	inch	0.63	8.24	9.15	9.14	11.89	5.85	5.13	0.34	-	4.31	0.39

center of gravity

Dimensions mm (inches)



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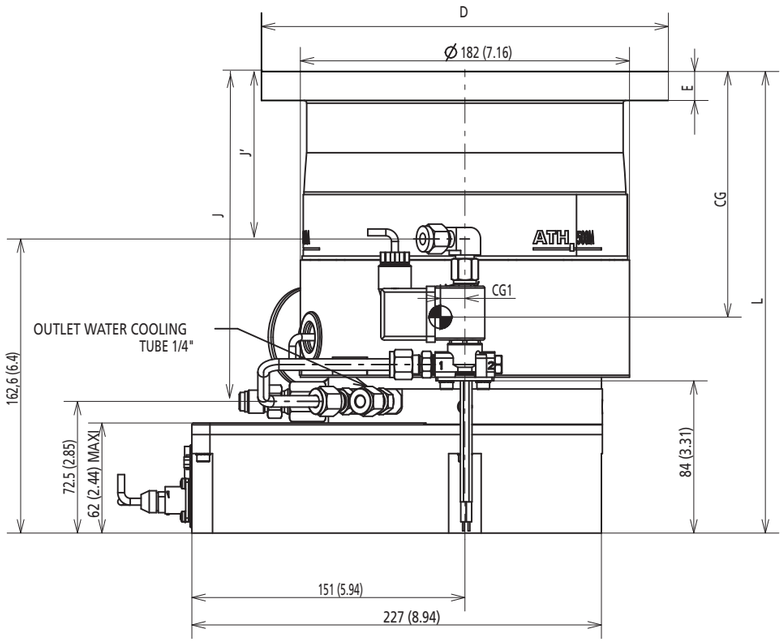
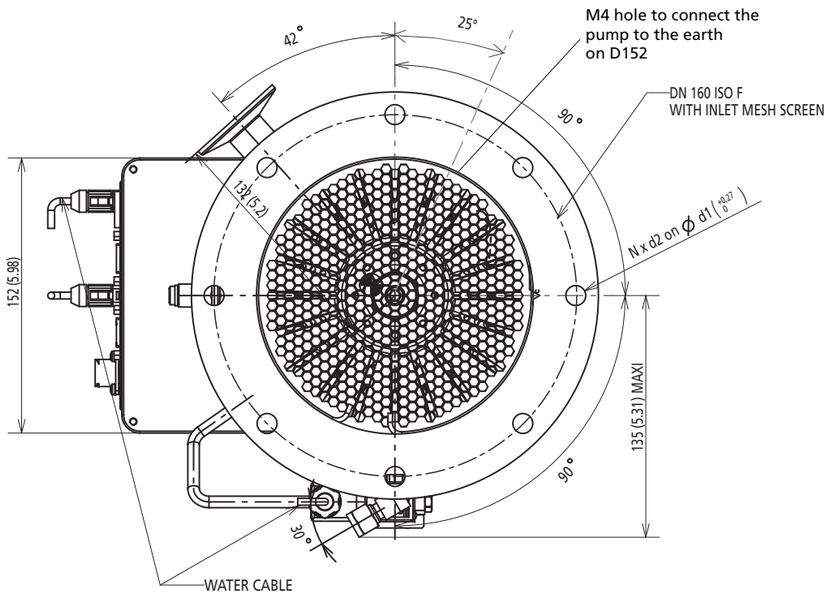
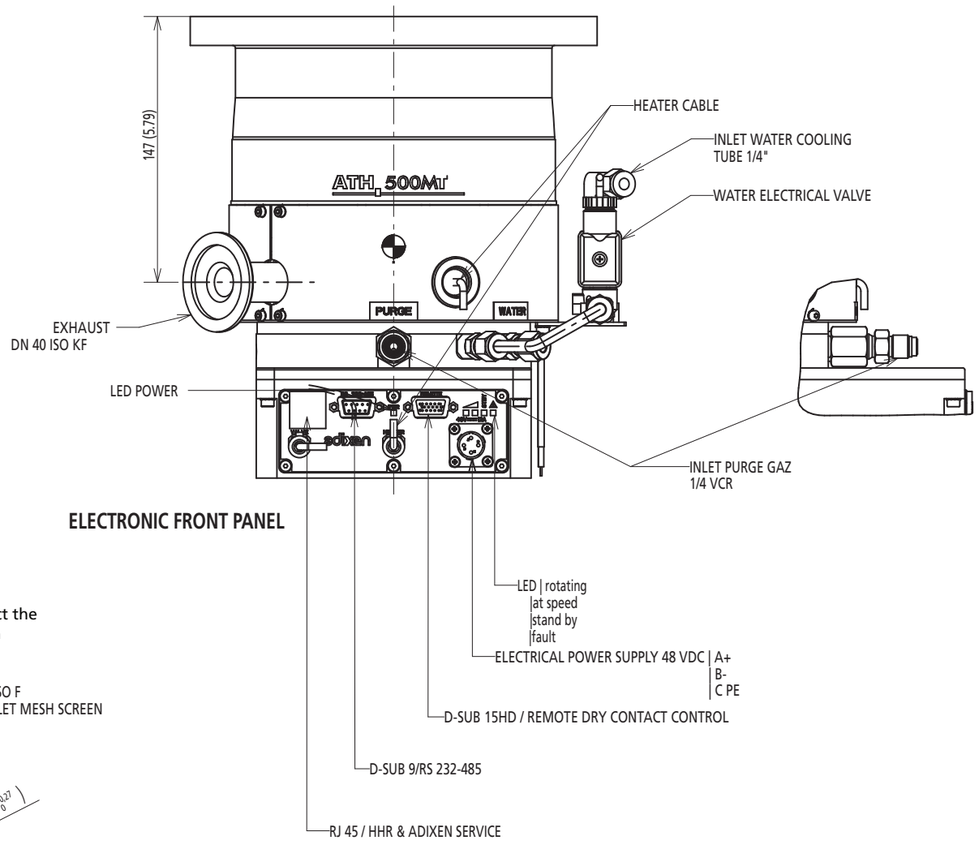
A 400

Technical characteristics of the pumps

Dimensions mm (inch)
ATH 500 MT







center of gravity Dimensions in mm (inches)

Inlet flange		E	H	J	K	L	D	d1	d2	N	CG	CG1
DN 160 ISO F	mm	16	159.3	182.5	182.2	254.9	225	200	11	8	112.6	9.7
	inch	0.63	6.27	7.18	7.17	9.94	8.86	7.87	0.43	-	4.43	0.38
DN 160 ISO K	mm	12	159.3	182.5	182.2	254.9	180	-	-	-	128.6	11.3
	inch	0.47	6.27	7.18	7.17	9.94	7.09	-	-	-	5.06	0.44
DN 160 CF-F	mm	20	180.3	203.5	203.2	275.9	198	181.1	8.6	20	114.1	10.1
	inch	0.79	7.1	8.01	8	10.76	7.79	7.13	0.34	-	4.49	0.39
DN 100 ISO K	mm	12	199.3	222.5	222.2	294.5	130	-	-	-	116.1	10.2
	inch	0.47	7.85	8.76	8.75	11.48	5.12	-	-	-	4.57	0.4
DN 100 CF-F	mm	16	209.3	232.5	232.2	304.9	148.5	130.2	8.6	16	109.5	9.8
	inch	0.63	8.24	9.15	9.14	11.89	5.85	5.13	0.34	-	4.31	0.39

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The accessories of the pump

Power supply (external)

Description	P/N
48 V DC 600 W 230V (±15%) 50-60 Hz	114866

Delivered with power connector but without power line cable to be ordered separately.

Power line cable

Cable to connect the power supply 48 V DC to the pump

Description	P/N
3.5 m - 48 V DC	A331328-035
5 m - 48 V DC	A331328-050

HHR (Hand Held Remote)

It ensures Man-Machine interface for local use.

Description	P/N
HHR (with cable)	114461

Mounting bolts kit

Screws and washers used to secure the pump on the installation

Flange type	P/N
DN160 ISO F DN 100/160 CFF	110676S 118690

Purge plug

A plug can be connnected instead of the filter.

Description	P/N
Plug with o-ring	115298S

Purge valve kit

The cable to be ordered separately

The purge valve must be driven by the customer (not used on the MT version)

Description	P/N
Purge valve kit 24 V DC - 5W	115303S

Valve cable

Dimensions	P/N
1 m	A462403-010
3,5 m	A462403-035
5 m	A462403-050
10 m	A462403-100
20 m	A462403-200

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The accessories of the pump

Isolation valve at inlet or exhaust pump

The isolation valve is used to maintain the vacuum in the chamber while the pump is reset to atmospheric pressure.

See the manufacturer's products catalog.

Copper seals for pumps with CF-F flanges

Flange type	P/N
100 CF-F	303291*
160 CF-F	303292**

* kit of 10 parts
** kit of 5 parts

Inlet screen

The screen protects the pump inlet against solid particles.

Description	P/N
DN 100 ISO F (mesh and ring)	118001
DN 160 ISO F (mesh and ring)	118002

Air cooling kit

Description	P/N
Air cooling kit	118543S

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B Start-up

ATH 500 M/MT Operating instructions
Detailed contents

GB 03364 - Edition 02 - Sept. 11

B 100

Safety instructions for pump and controller installation

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).

Overview

Before switching on the product, study the Operating instructions 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.

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

For emergencies

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

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.

GB 03365 - Edition 04 - 07/2013

Safety instructions for pump and controller installation

The turbomolecular pumps can't evacuate at atmospheric pressure, they are connected to a roughing pump. For a transient period, they can start to run at atmospheric pressure.

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.

⚠ 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.

Handling

⚠ WARNING

■ Heavy product:
It must be removed from its crate only by staff trained in heavy materials handling :
- either manually (weight around 18 kg)
- either by screwing hoisting rings in the threated holes located on the pump housing (hoisting ring supplied by customer)
- then, use slings from a length over 230 mm.
- tighten the pump to the handling device.

■ Risk of tilting: although the product meets EEC safety regulations , it is advisable to guard against the risk of tilting during handling, installation, and use. ( chapter A for the location of the center of gravity).

Installation

⚠ DANGER

■ Pump connection to the installation:
It is strongly recommended to secure the maglev turbopump installation to prevent any safety hazard to the user in standard operating conditions : ( B 300).

■ Risk of cut injury:
The access to the rotor of a turbomolecular pump with an unconnected inlet port is dangerous. In the meantime, if the pump is not switched on, it may be driven by another pump in operation.
Always connect the pump inlet port before starting the pump.

CAUTION

Make sure all parts and chambers connected to the inlet, exhaust and purge of the maglev pump can withstand a negative pressure of 100 kPa below atmospheric pressure and that they are impervious to damage from vacuum (seals, etc.).

GB 03365 - Edition 04 - 07/2013

Safety instructions for pump and controller installation

Installation (cont'd)

⚠ 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 turbomolecular pump's exhaust to a rough pumping line compatible with the process gases. Check that pump is correctly connected to the equipment (B310).

⚠ DANGER

■ If any corrosive, reactive, flammable, pyrophoric, oxidizing process gases can be sent to the pump, then an exhaust extraction system monitor should be used to ensure that gas flow to the pump is stopped when exhaust gas extraction system is lost.
If flammable materials are sent to the pump, the customer will need to provide a hardware based LEL detection in the exhaust extraction system (detection capability at 25% of the LEL) that will stop chemical supply to the pump when gas is detected over 25% of LEL for that flammable material.

■ For non clean process.
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 pyrophoric materials above the LEL (lower explosive limit) 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.

⚠ CAUTION

■ The product's EMC rating is obtained on the understanding that it is installed in compliance with EMC rules.
Specially: in environments that are prone to emit interference, use shielded cables and connections on interfaces.

■ 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.

■ This pump is not equipped with a lock out/tag out (LO/TO) device because it is designed for use on process tools.
In order to properly secure the pump for installation or/and maintenance, the entire tool needs to be properly locked-out/tagged out in accordance with OSHA requirement 29 CFR.1910.147.

■ If access to the IEC connector is restricted an additional isolation device should be provided, which will be easily accessible by an operator.

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Safety instructions for pump and controller installation

Installation (cont'd)

⚠ WARNING

■ **Electric shock hazard.**
The voltages and currents in use can induce electric shock.
Isolate and lock out power line to the product before maintaining it /or removing the cover.
Only skilled, authorized people may carry out maintenance work.
If a main isolator is installed by the customer, it must be in compliance with local regulations, with a minimum interrupting short circuit current of 10kA.

■ **Electric shock hazard.**
Some components have capacitors charged to over 60VDC, or motor operating as generator. When power is switched off, they keep their charge for a time. Take precautions concerning the access to the connector pins. Wait at least 5 minutes after the pump comes to complete stop before starting any work.

■ **The user and/or OEM must check that all electric circuits connected to the pump, must be in compliance with standard 61010-1 chapter 6.3, regarding no dangerous voltages.**

■ **Other located hazardous energies.**
Water cooling circuit and nitrogen purge are pressurized hazardous energies. Release pressure before servicing:
1 - for the N2 purge, disconnect the gas line ;
2 - for the water cooling circuit, disconnect the input connector and leave the output connected. Don't forget to put a vessel (≥ 1 l) under the water output.

■ **Operation in local mode**
There is no device to warn that the pump operates in local mode. When the pump is not integrated in the equipment/host tool, the user must provide a device to warn that the pump operates in local mode.

■ **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.**

■ **Specific operating conditions may exist that require extra caution from users due to the high temperatures generated (outer surfaces > 70° C):**
Wear protective gloves and leave the pump to cool before working on the product.

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Safety instructions for pump and controller installation

Installation (cont'd)

⚠ DANGER

Safety interlock.
The pump motor is protected against overload through the drive «start/stop» and enable control circuitry of the variable speed controller. The drive start/stop includes solid state components. If hazards due to accidental contact with moving machinery or unintentional flow or liquid, gas or solids exist, an additional hardwired stop circuit is required to remove input power.
It is never required to override this interlock during installation, use or maintenance.
Once activated power will be switch 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. It is required to switch power off and on to clear the fault.

CAUTION

- **If the product is used in applications where solid particles or condensable gases are present, we advise on avoiding any deposition into the pumping line. Contact our customer service.**

- **The manufacturer guarantees the right operation of the pump if it is used in an uniform magnetic field up to 0.5 mT.**
From 0.5 to 5 mT the limit of the right operation depends on the cooling and the gas loads.
Exceeding 5 mT can cause excessive rotor heating due to the eddy generated currents. It is therefore necessary to provide suitable shielding in such cases.
The pump standalone is resistant to radiation at levels up to 10^3 Gy.

- **The units containing control circuits are designed to guarantee normal safety conditions taking their normal operating environment into account (use in rack).**
In specific cases of use on tables, make sure that no objects enter the ventilation openings or block the openings when handling the units.

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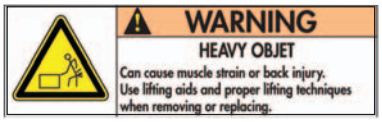
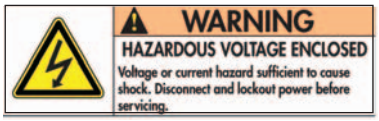
Safety instructions for pump and controller installation

Labels stuck on the product

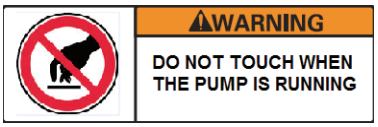


This label indicates that handling the pump can cause muscle strain or back injury.
For all product handling, use the appropriate handling devices.



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.

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.

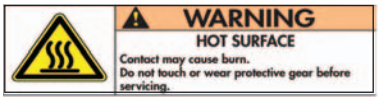


Avoid causing a shock on a pump when the rotor is moving, it can block the right operation.

Other labels

Customer is in charge to stick these labels on the ATHM on the most appropriate location to warn the operator regarding the probable hazards.

This label informs the user that moving parts present inside the pump coud cause personal injury, like crushing or cutting. The user must keep all body parts away from moving parts.



The «hot surface» sticker must be sticked conspicuously on the pump housing.

The user must label visibly the product to warn against pumped process gas that could be dangerous and toxic and could cause severe injuries or death. It precises that any preventive maintenance operation can only be performed by trained personnel.

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Unpacking and storage of the pump

Unpacking

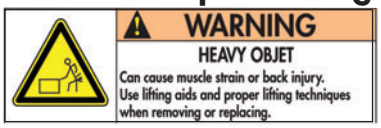
Make sure the equipment shows no sign of transport damage. If it has been damaged, take the necessary steps to record this with the carrier and inform the manufacturer. In all cases, we recommend keeping the packaging (reusable materials) for further transport of the equipment or for prolonged storage.

The packaging depends on the configuration of the pump. It can also contain other cardboard boxes for the accessories like: inlet screen, air inlet valve, purge device, high temperature sticker, electric cable...

CAUTION

Pollution risk:
Unclean and contaminated components can increase the pump down time. Use only dry and clean pipe lines, and wear glooves to make the pump connections.

Pump handling



This label indicates that handling the pump can cause muscle strain or back injury.
For all product handling, use the appropriate handling devices.

⚠ WARNING

- **Heavy product:**

It must be removed from its crate only by staff trained in heavy materials handling :
- either manually (weight around 18 kg)
- either by screwing hoisting rings in the threated holes located on the pump housing (hoisting ring supplied by customer)
- then, use slings from a length over 230 mm.
- tighten the pump to the handling device.
Pump installation with inlet housing facing up: connect the pump to the customer's handling device using the threaded holes located at the pump housing (📖 chapter A400).

- **Risk of tilting: although the product meets EEC safety regulations , it is advisable to guard against the risk of tilting during handling, installation, and use (📖 chapter A for the location of the center of gravity).**

Pump storage

CAUTION

If you are storing the new pump, keep it wrapped in to its protective film. Our product can be stored in the following conditions:
- in a clean, dry and contamination free environment,
- at an ambient temperature between - 5°C and + 50°C,
- for a period of 1 year maximum.
If you need to store a pump which has run on clean process, don't forget to blow out the water line and to purge the pump with N2. Seal the inlet, exhaust and purge ports with blanking plates. Don't store the pump more than 6 months in a clean and dry environment.
Never store a pump which has been used on corrosive process. Return it to a repair service center (📖 E100)

GB 03366 - Edition 02 - Jan 12

Unpacking and storage of the pump

⚠ WARNING

The product is supplied with the inlet and exhaust blancked off. This prevents foreign bodies entering the pump during transport and storage. Do not remove these blanking plates until you are ready to install the product on the vacuum line.

Inlet ASA, ISO or CF-F blanking flange (depends on the model).

Exhaust Blanked with a DN40 ISO-KF or DN25 ISO-KF blanking plate (depending on the models)

Connection purge device Closed with a purge plug.

Electrical connectors The connectors are protected by plastic caps. Left them in place for storage of the product.

GB 03366 - Edition 02 - Jan 12

Pump connections to an installation

Equipment installation conditions

⚠ WARNING

The equipment frame on which the pump is installed must be sufficiently rigid to absorb the kinetic energy of the rotor in case of pump rotor crash. For this, take into account :
- the maximum loads to calculate the equipment attachment devices,
- the flange dimensions,
- the quality and the number of bolts.

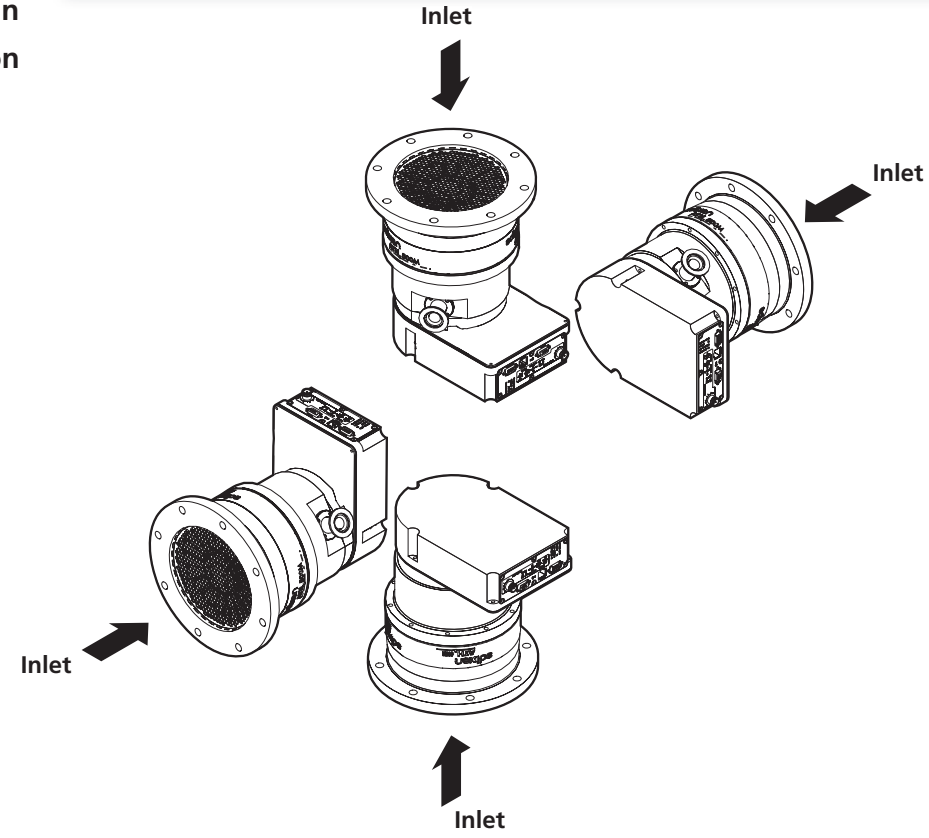
Do not use bellows on the pump inlet flange and the chamber Reducing adapter must be correctly dimensioned.

When the pump is connected according to the manufacturer recommendations (B300) , in case of overpressure resulting from an incident, the pump enclosure can withstand a maximum static pressure of 1100 kPa for 1 minute.

⚠ WARNING

Pump installation :
- connect the pump to the customer's handling device using the threaded holes located at the pump housing (A400).

The pump can operate in any position



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Pump connections to an installation

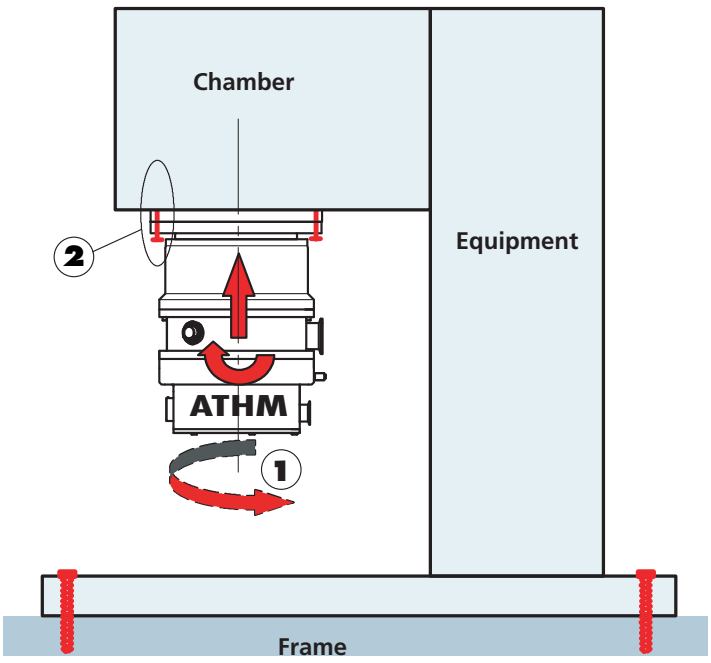
Pump connection instructions. Why securing pump installation?

Hybrid Turbopumps are designed so as to prevent any safety hazard to the user in standard operating conditions.
However, some operating conditions may generate hazards for the user and the environment : **the kinetic energy stored in a turbopump is high. In case of a mechanical failure an improperly installed pump could be ejected from the equipment if the kinetic energy was transferred to the pump body.**

⚠ WARNING

It is absolutely necessary to install the pump according to the following installation specifications to secure the user and the equipment.
The adixen constructor declines any responsibility if the pump installation is not designed in accordance with the installation specifications described in this section.

Installations specifications



Pump connection instructions

Respect the items 1 and 2.

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Pump connections to an installation

Worst Case Turbo Pump Crash Scenario Definitions

The kinetic energy of the rotor has to be absorbed by the installation if **the pump seizes suddenly.**
The maximum resulting loads have been estimated: simulation of a worst case Turbo pump crash with **a rotor split into 2 parts at nominal speed.** The impact of the rotor parts creates the following **transient loads**.

Axial loads (a)

The rotor parts can be ejected out of the pump inlet flange and can impact on the plate of the valve or any other part of the system. If this is placed close to the turbo pump and if it has high stiffness the impact can create a high axial load on the system. Such axial force has not been observed on a standard pendulum valve.

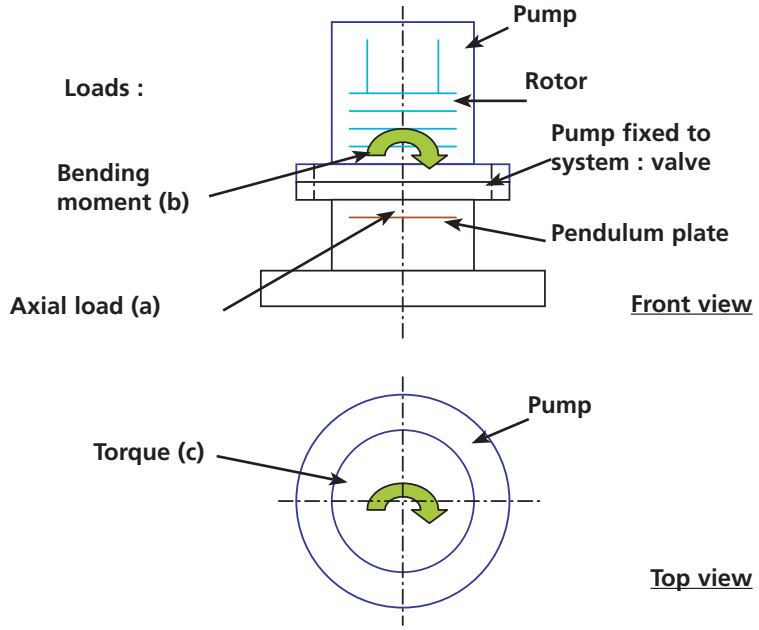
Bending moment (b)

The impact of the rotor parts on the housing will create a radial force on the housing. This radial force will create a bending moment on the system as a function of the distance to the pump.
The deceleration of the rotor parts creates a torque value on the pump housing, which is transmitted to the system.

Torque (c)

The maximum values of the axial force and the bending moment occur at approximately the same time. A delay of up to several ms has been observed for the maximum torque value.

Loads transmitted to the system (item 1)



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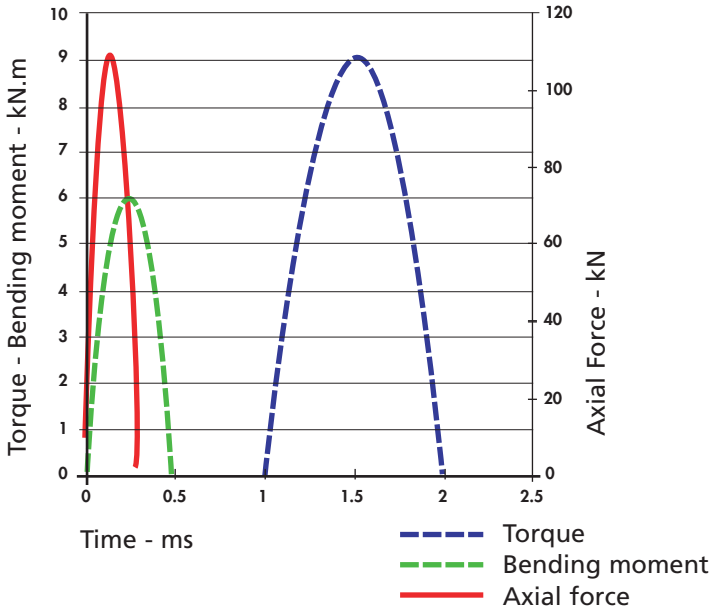
Pump connections to an installation

Loads transmitted to the system (cont.)

ATH 500 M/MT
Estimated transmitted forces



Pump model	Unit	ATH 500 M/MT
Nominal speed	rpm	50 000
Energy	kN·m	24
Torque	Max. kN·m	9
	Duration ms	1
	Delay ms	1
Bending moment	Max. kN·m	6
	Duration ms	0.5
	Delay ms	0
Axial force *	Max. kN	0 to 110
	Duration ms	0.3
	Delay ms	0

* Max. axial force occurs if the pump inlet is obstructed with high stiffness parts. There is no load if the system has low stiffness (i.e. valve).

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Pump connections to an installation

Inlet flange installation conditions (item 2)

The resulting maximum loads from a crash have to be taken into account by the pump assembly bolts.
Design and secure the pump frame so that it can withstand the loads.

Mounting holes at inlet flanges	ATH 500 M/MT			
Inlet flange (with centering ring)	DN160 ISO-F or ISO-K	DN100 ISO-F or ISO-K	DN160 CFF	DN100 CFF
Type of bolts *	M 10	M 8	M 8	M 8
Number of bolts *	8	8	20	16
Length of bolts (mm)	≥ 35	-	≥ 40	≥ 35
Bolt metric grade *	12-9	12-9	12-9	12-9
Installation torque per bolt (N·m)*	30	20	20	20
Total clamping force (N)	108000	88500	222000	177000

* Type, Number, Grade and Torque are mandatory

⚠ DANGER

For safety reasons, it is important to tighten the bolts with a torque wrench according to the specified values :
- lower torque: risk of loosened bolts
- higher torque: risk of damaging the bolts.

⚠ DANGER

We strongly recommend the use of ISO-F or CF-F flanges. ISO-K type flanges are not recommended to fasten turbomolecular because:
The ISO-K flanges do not prevent accidental rotation of the pump on the equipment flange in case of pump rotor crash. This rotation could damage the foreline and the purge gas line which would generate hazards for the user.
- For ISO-K flanges, we recommend to use a rotatable flange. In case of use of claw clamps, mount the same number of claw clamps (in stainless steel), as the number of screws recommended for the ISO-F flange.

Equipment installation conditions

If the equipment cannot withstand the maximum loads in case of rotor crash, please contact the manufacturer for further consultations.

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Inlet and exhaust connections

Vacuum connections

⚠ 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.

⚠ CAUTION

Risk of injury by cutting.
Contact with the pump rotor cell may cause cuts. Alternatively, protective gloves may be worn when servicing the product.

CAUTION

Make sure all parts and chambers connected to the inlet, exhaust and purge of the maglev pump can withstand a negative pressure of 100 kPa below atmospheric pressure and that they are impervious to damage from vacuum (seals, etc.).

⚠ CAUTION

For safety reasons, use accessories on the inlet and exhaust lines whose materials and sealing properties are compatible with the gases being used.

Materials in direct contact with process gases	
COMPONENTS IN THE PUMP	**MATERIALS**
From inlet to outlet	Stainless steel, aluminium alloy
O-ring	Fluorinated elastomers, FPM

⚠ WARNING

Pump installation :
- connect the pump to the customer's handling device using the threaded holes located on the housing of the pump (A400).

CAUTION

Pollution risk
Unclean and contaminated component use can increase the pumping down time. Use only dry and clean pipe lines, and wear gloves to make the pump connections.

After connecting the product to the pumping line, check for leaks along the entire line to ensure proper connections (pump, pipes, valves, etc.).

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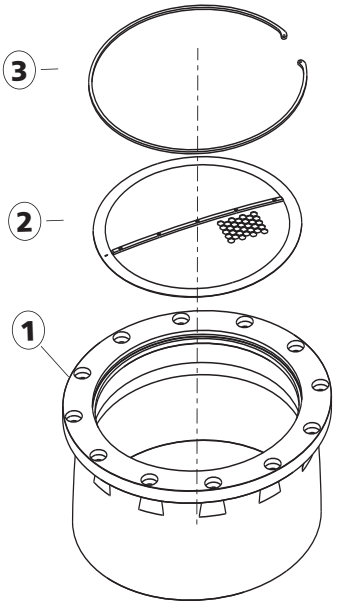
Inlet and exhaust connections

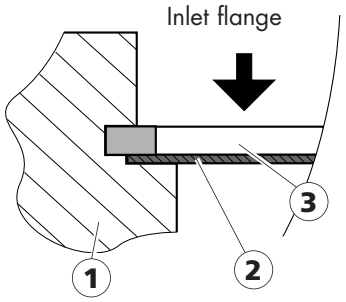
At inlet:

Check that an inlet screen accessory is installed on the pump ; if not, install it. (pumps are delivered with inlet screen filter).

Mounting of the inlet screen

Position the screen (2) into the inlet housing groove (1), bend side opposite to the rotor. Position the ring (3) and press it manually into the groove bottom all over its circumference.





CAUTION

It is recommended to install an isolation valve between the chamber to allow chamber venting without stopping the pump.

At exhaust

The turbomolecular pumps can't evacuate at atmospheric pressure, they are connected to a roughing pump. For a transient period, they can start to run at atmospheric pressure.

⚠ WARNING

When pumping on corrosive gases, or aggressive gases, the gas can cause injury or death. The exhaust of the turbopump must be connected to roughing pump line compatible with process gases.

CAUTION

It is highly recommended to install an isolation valve (closed when power is off) between the turbo pump and the roughing circuit.

GB 03368 - Edition 04 - Jan 13

Nitrogen purge connections

Characteristics of filtered dry nitrogen supply

A filtered dry nitrogen supply with the following characteristics is required:

- H_2O concentration : < 1 ppm
- O_2 concentration : < 1 ppm
- Dew point < 22 °C
- Dust < 1 μm
- Oil vapor < 0.1 ppm
- Absolute pressure of 100 to 120 kPa.

⚠ WARNING

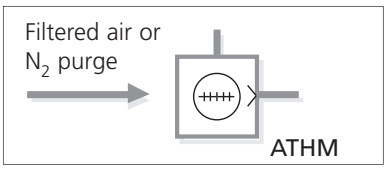
- **When the inert gas purge is stopped, the pumped gases can pass from rough vacuum side to high vacuum side and damage the maglev bearings. It is advised to maintain the purge flow as long as the rotor is running to protect pump internal parts.**
- **The maximum pressure of the purge must not exceed 200 kPa.**

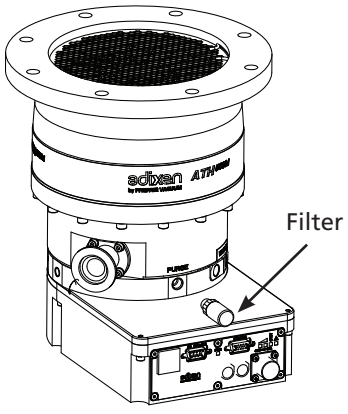
Purge device (50 sccm)

The purge flow is continuous.

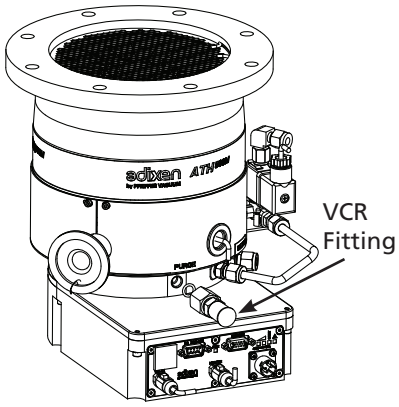
The integrated nitrogen flow reduction device controls the pressure and guarantees a flow rate of 50 SCCM at pressure 110 kPa.

When used in dusty conditions, replace the filter regularly.





M Model



MT Model

Connection

Connect directly the nitrogen pipe instead of the filter or the purge plug (connection 1/8 BSPP-ISO 228), or on the VCR connection (depending on pump model).

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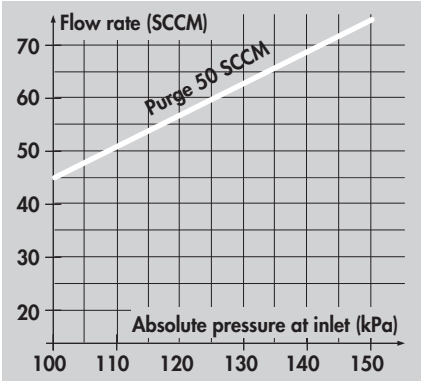
Nitrogen purge connections

Adjust the flow rate

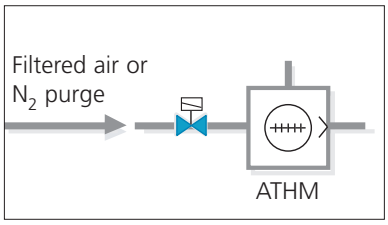
Feed the nitrogen purge throughout pumping according to the flow rate and pressure value in the scale given.

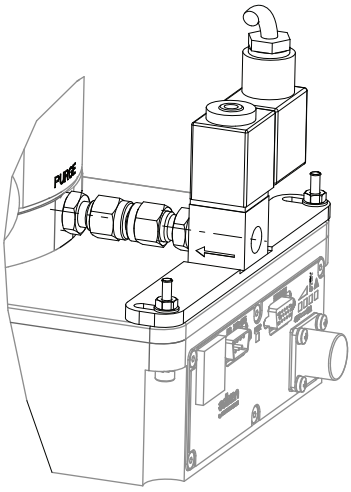


Valve with built-in purge device (50 sccm)

This is an accessory directly installed on the ATH500M models (B333).

The power of the valve is the responsibility of the customer (24 V DC).





When using this valve, close it before making a leak detection test.

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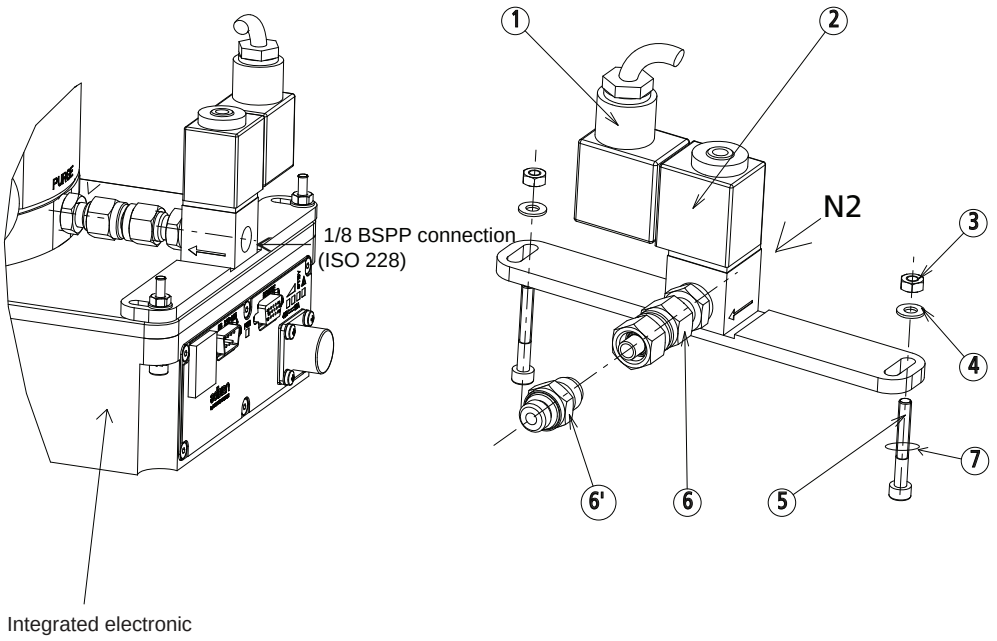
Assembly of the purge kit

Installation purge kit on ATH 500M



1 - Replace the screws M4-16 of electronic by the screws (5) and the washers (4) and (7).

2 - Remove the silencer or purge plug from the purge port.

3 - Screw the union (6') on the purge port.

4 - Install the assembly (2) on the top of the electronic box using screws (5) through the plate.

5 - Line the connection (6) up with the connection (6') before to screw the nut.

6 - Tighten the nuts (3) with the washer (4).

7 - Test the vacuum tightness.

GB 04734 - Edition 02 - 07/2013

Water cooling connection

Characteristics of water cooling

In order to avoid corrosion and clogging of the cooling pipes, 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 $CaCO_3$ calcium carbonate)
  = 35° f (French degree)
- Resistivity: 1 500 Ω.cm < R < 20 000 Ω.cm
- Solid pollution: < 100 mg/dm^3
- Solid particle size (maxi): 0.2 mm
- Pressure range: < 700 kPa
- Temperature *: 15°C < T < 40 °C for ATH 500M
  15°C < T < 25 °C for ATH 500MT
- Flow rate: 60 l/h

* In case of water temperature is < 20 °C, there is a risk of condensation.

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 water circuit.

■ 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 used to prevent growth of such micro-organisms.

Water cooling connections M model

- Provide a water inlet pipe and a tap to adjust the flow rate.

- Connect the water inlet line to one of the water fittings and the other fitting to the water draining circuit.

- Check there is no leak.

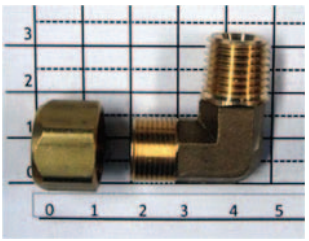
IN/OUT water
(either direction)

GB 03369 - Edition 05 - 04/2014

Water cooling connection

For the ATH-M products, 3 types of fitting are used :
- Thread fitting
- Compression fitting, simple ring
- Compression fitting, double rings

Thread fitting

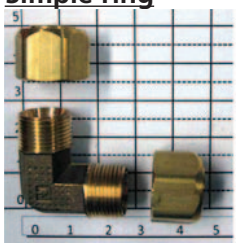
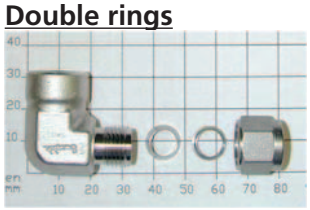


These fittings are on the pump and on the OBC.
In the ATH-M series, there are 2 diameters :
- 1/4 NPT and 1/8 NPT (only ATH 500 M).

Thread fitting	Model	Clamping torque
1/8 NPT	ATH 500-M	10 N·m maxi
1/4 NPT	Other models ATH-M	15 N·m maxi

To ensure the water tightness , the fittings must be assemble with Téflon™ tape or glue Oleoetanche.

Compresion fittng

		Crimping and assembly procedure
Simple ring 	The simple ring is used to connect the flexible type of the ATH-M pump to the OBC	- Ensure the PVC flexible pipe is cut perpendicular of the pipe - Insert the flexible pipe into the fitting and put it to abutment - Screw manually the fitting - Finish the crimping with open end spanner (1 turn 1/2), while maintaining the other part
Double rings 	The double rings is used for the rigid pipes (stain-less steel, nickel plated copper,etc).	- Insert the rigid pipe into the fitting and put it to abutment - Screw manually the fitting - Finish the crimping with open end spanner (1 turn 1/4), while maintaining the other part

GB 03369 - Edition 05 - 04/2014

Water cooling connection

Water cooling connections MT model

- Provide a water inlet pipe and a tap to adjust the flow rate.
- Connect the cooling circuit (tube 1/4') on the provided fittings in accordance with the flow direction (inlet water on the valve).

CAUTION

Water leak risk : maintain the water valve inlet fitting with a flat wrench during the water line connection (pipe equipped with connector), this to avoid fitting damage.

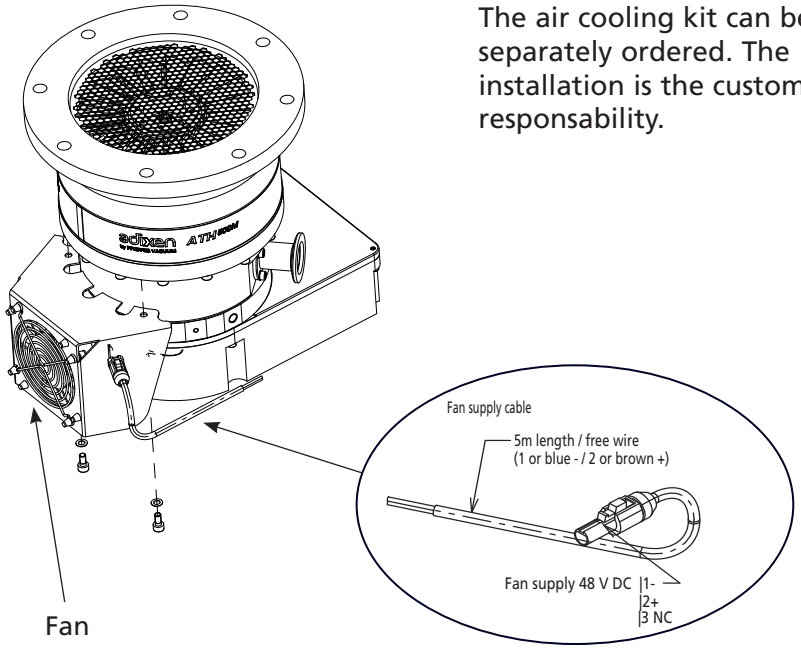
⚠ WARNING

Do no install water fittings above electrical components : there is a risk of electrical discharge in case of a leak at the water fitting connection.

GB 03369 - Edition 05 - 04/2014

Air cooling connection

Fan installation on the pump



The air cooling kit can be separately ordered. The installation is the customer's responsability.

When the pump is supplied with an air cooling unit, this one is equipped with a power cable.

Fan electrical connection

The power supply fan requires a 48 V DC external power supply, supplied by the customer. The accessory suggested by the manufacturer (**A510**) is used to power the pump and the fan.

Perform wiring of the fan in accordance with the marks of the terminals and son (see diagram above) (**B400**) .

Instructions to disconnect the fan

WARNING

The power supply should never be switched off as long as the rotor is moving.

WARNING

Switch off the power supply, before disconnecting the power supply from the pump

GB 04638 - Edition 01 - Jan. 2012

Safety instructions and electrical connections

⚠ WARNING

- **Risk of electric shock:**

Make sure that main switch is off during electrical connection.
Disconnect any main power sources from the product prior to servicing.

CAUTION

- **The pump without AC/DC power supply is a product class III equipment. The connection to the earth is not obligatory but recommended in pertubated electromagnetical environments ⏚ .**

⚠ CAUTION

- **Differential circuit breaker at the input AC/DC power supply**

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 30mA. 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 product manufacturer for advice. In all cases, comply with current local regulations.

- **When units containing control circuits are equipped with dry contact outputs, it is the responsability of the customer to use these outputs in compliance with extra low voltage installation and safety standards (SELV). It concerns Remote, Profibus and RS connectors except main power connector.**

- **Ensure that all electrical wiring is safely secured so that people cannot trip on them.**

⚠ WARNING

- **Installation protection with circuit breaker**

The user must supply the product from facilities equipped with a main circuit breaker, curve D or C (IEC 60947-2) adapted to the power supply, in accordance with local regulations and with a minimum short circut interrupting current of 10 kA.
This protection device should be in close proximity to the pump (no further than 7m (25 ft) within line of sight of the pump.

- **This pump is not equipped with an emergency stop EMO device because it is designed for use on process tools and integration with the process tool EMO. Check that the pump is correctly connected to the equipment emergency stop device.**

GB 03370 - Edition 05 - 07/2013

Safety instructions and electrical connections

⚠ WARNING

■ The integrated electronic is connected to the main power with a main cable separately delivered. Voltage and current are present on power cable and on the heater power line (if installed). Avoid to pinch or pull these cables and route them safely.

■ Electric shock hazard.
The voltages and currents in use can induce electric shock.
Isolate and lock out power line to the product before maintaining it /or removing the cover.
Only skilled, authorized people may carry out maintenance work.
If a main isolator is installed by the customer, it must be in compliance with local regulations, with a minimum interrupting short circuit current of 10kA.
■ If access to the IEC connector is restricted, an additionnal isolation device should be provided, which will be easily accessible by an operator.

For electrical connection, the user must:
- Provide a power switch or a circuit breaker in the electric installation ;
- Put it correctly, easily accessible by an operator ;
- Mark it visibly as an electrical interrupting device of the product.

ATH 500 electrical connection

The pump runs with a 48 V DC electrical power supply:
- either ordered as an accessory **(A510),**
- either supplied by the customer.

48 V DC power supply characteristics

Internal protection fuse:
■ Surface mount fuse
■ Time-Lag T, L, 16A
■ Breaking capacity 125A, 300ms
According to the peak power delivered by the supply power on 48 V, add an additional protecting system on the pump power input of 48 V DC.

If the pump is connected on a main 48 V DC network (network within the meaning of the standard 61000-6), it is necessary to add a filter and a system of overvoltage peak limiting at the input of the power line of the pump: contact the Customer service.

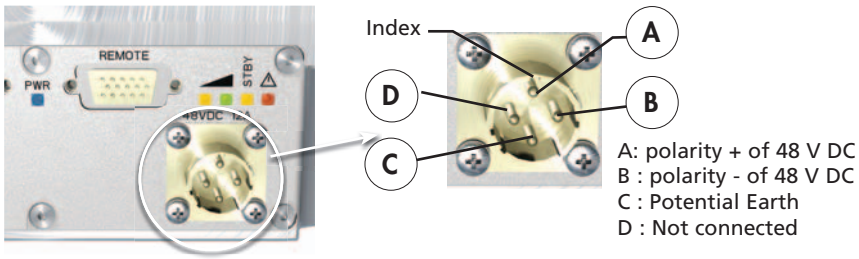
Internally, the «-» pin of 48 V DC is connected to the earth.

GB 03370 - Edition 05 - 07/2013

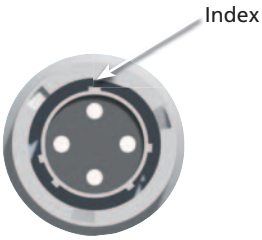
Safety instructions and electrical connections

Pump electrical connection

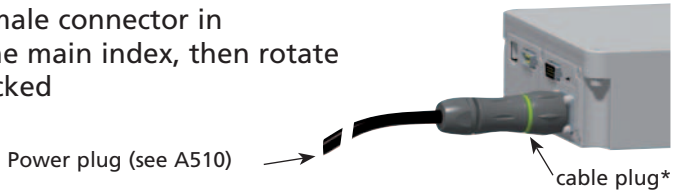
1 - Identify the main index on the male connector of the pump.



2 - Identify the main index on the female connector of the power supply's cable.



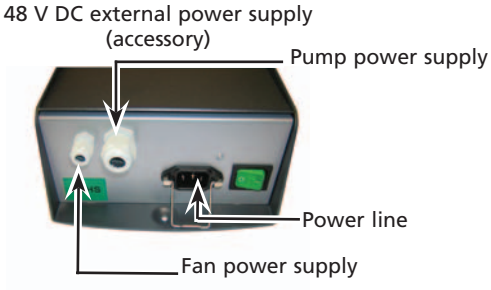
3 - Insert the female connector in accordance to the main index, then rotate the ring until locked



* Power plug: (P/N UTS6JC104S - Souriau - France)

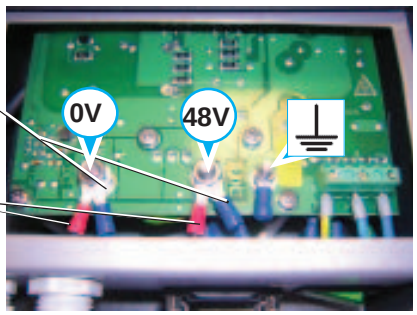
■ The power cable must be compatible with the current and voltage of the pump (48 VDC, 12 A).

4 - If the pump is equipped with a fan, supply it in 48 V DC. The external power supply (accessory) allows to power the fan.



Pump power supply.
+++ : 48 V
- - - : 0 V

Fan power supply.
(1) blue - (0 V)
(2) brown + (48V)



ATH 500MT only

5 - Check that the heater band and the water valve are both supplied (connected on 'HEATER' and 'VALVE' electronic front panel).

ATH 500M only

6 - If the pump is equipped with a purge valve, connect the valve to the 24 V DC power supply (customer supplied).

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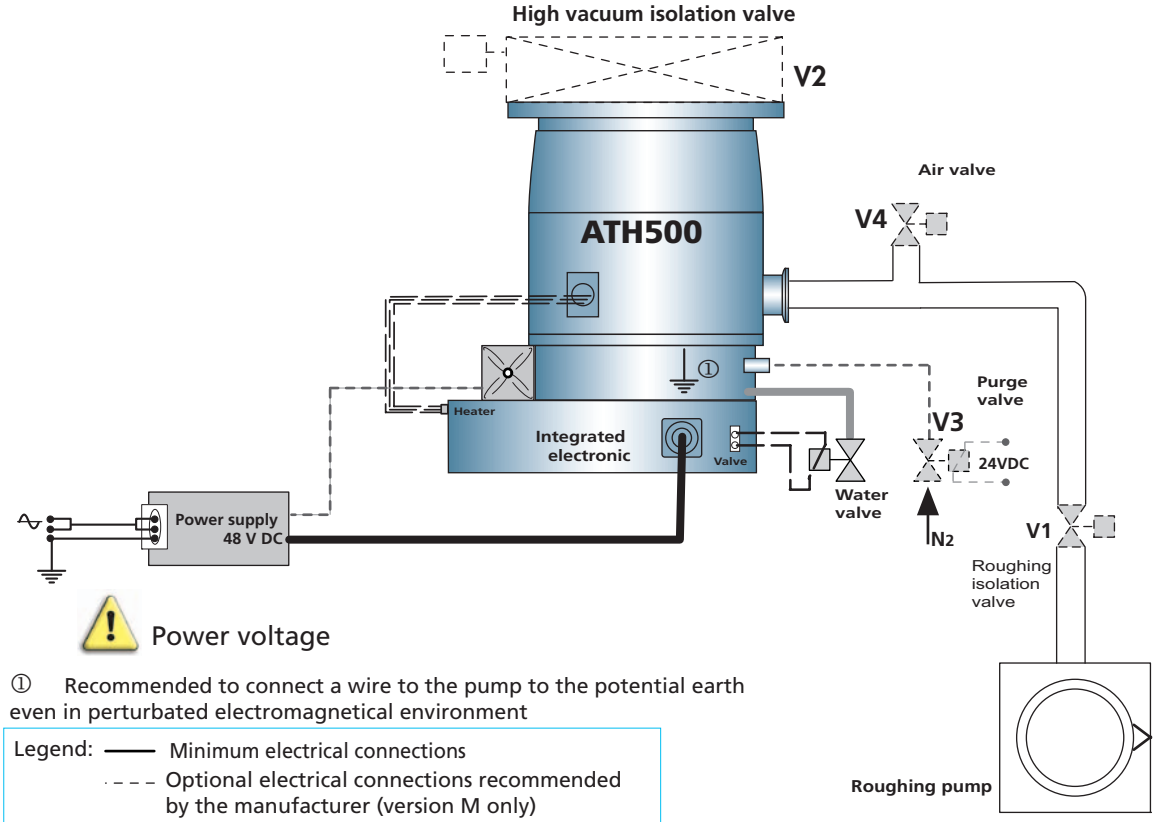
Safety instructions and electrical connections

Typical connection:

In this installation, we use:
A primary isolation valve V1 between the turbo pump and the roughing pump;
- a secondary isolation valve V2 between the turbo pump and the chamber to be pumped;
- a purge valve V3;
- a venting valve V4.



Power voltage

① Recommended to connect a wire to the pump to the potential earth even in perturbated electromagnetical environment

Legend:
- —— Minimum electrical connections
- - - - Optional electrical connections recommended by the manufacturer (version M only)
- — — Electrical connections (version MT only)

Wiring diagram (typical)

GB 03370 - Edition 05 - 07/2013

⚠ WARNING

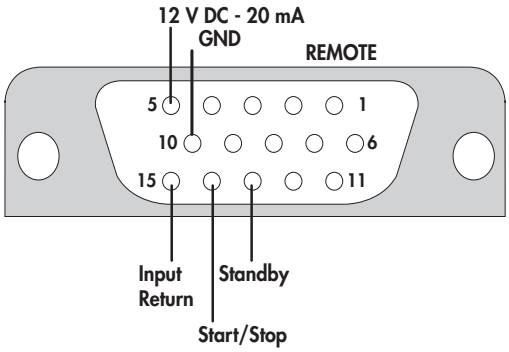
We recommend that you fit a separate earth (ground) conductor to earth pump. Use an un-insulated braid or a separate insulated green/yellow conductor with a minimum 9AWG (3mm^2) conductor. Use a M4 x 8 screw and a shakeproof washer fitted to the earth hole from the pump to secure the earth conductor to the pump. The impedance between the pump-body and the earth connection point must be < 0.1 Ohm at 25 A.

"Remote control" connector wiring

CAUTION

When units containing control circuits are equipped with dry contact outputs, it is the responsability of the customer to use these outputs in compliance with extra low voltage installation and security standards. It concerns Remote, Profibus and RS connectors, excepted main power connector.

The inputs dry contacts Sub D 15 Pts Fem:

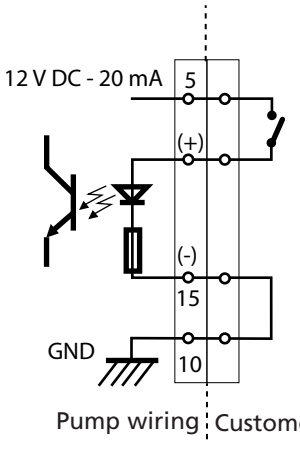


The control by voltage

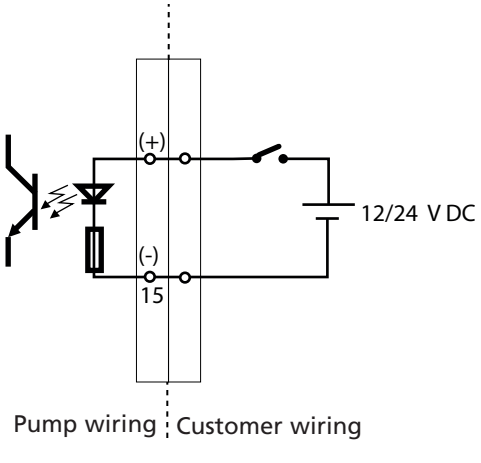
12 V or 24 V DC

Remote function if "Remote hard" mode selected	**Remote start/stop**	**14(+) 15(-)**	- Active signal starts the pump rotation. - Inactive signal stops the pump rotation.
	Remote standby	**13(+) 15(-)**	- When the "Standby" is validated, the rotational speed corresponds to the selected speed. - When the "Standby" is disabled, the rotational speed corresponds to the nominal speed.

Provided power supply by the pump:



External power supply:



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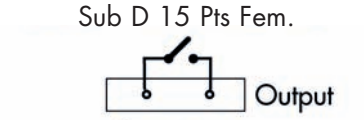
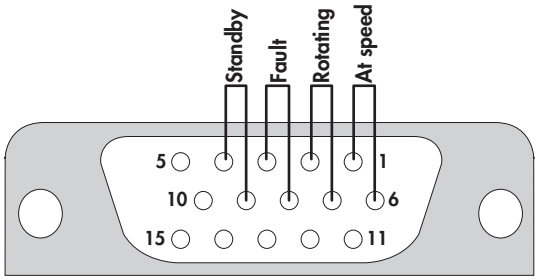
"Remote control" connector wiring

The output dry contacts

Sub D 15 Pts Fem.



Dry contact
30V DC - 2Amax
Resistive load



OUTPUT**	Independant of the "Remote hard" mode (safety)	**Standby**	**4 - 9**	- The contact is closed when the standby mode is activated
		Rotating	**2 - 7**	- The ROTATING contact is closed when the speed is >120 rpm - The ROTATING contact is open when the speed if <100 rpm. - The ROTATING contact is closed when the motor is in acceleration phase. It remains closed until the selected speed is reached. - The ROTATING contact is open when a STOP or INHIBIT action is taken into account
		Fault	**3 - 8**	- The FAULT contact is closed following the appearance of any fault (temperature, frame, motor, etc...). - The contact is open if there are no faults.
		At speed	**1 - 6**	- The AT SPEED contact is closed when the selected speed is reached or when the pump is in overspeed mode (in the event of modification of reference speed), - The AT SPEED contact is opened when a STOP action is taken into account, or when the speed decreases under the threshold "relay speed" selected*.

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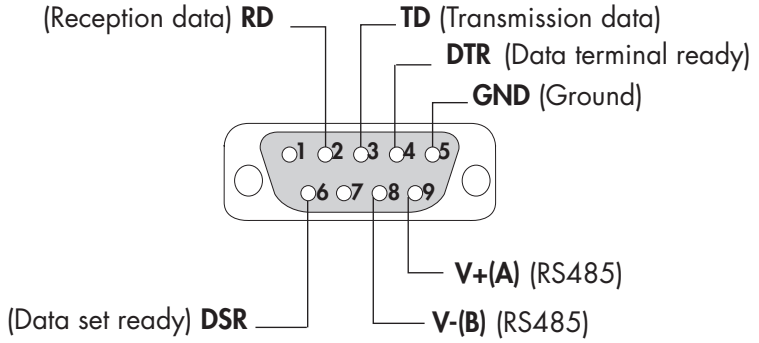
* this threshold can be set between - 3 % and - 50 %.
** To avoid any bad interpretation of the reading of the contacts, we advise to install an «one second filtering» on the reading of the contacts STANDBY, ROTATING, FAULT and AT SPEED.

RS 232 or RS 485 link wiring

The initial configuration of the serial link is as follows:

- Type: **RS 232**
- Transmission speed: **9600 bauds**
- Data length: **8 bits**
- Parity: **NONE**
- Stop bit: **1**

RS 232/485 connector wiring



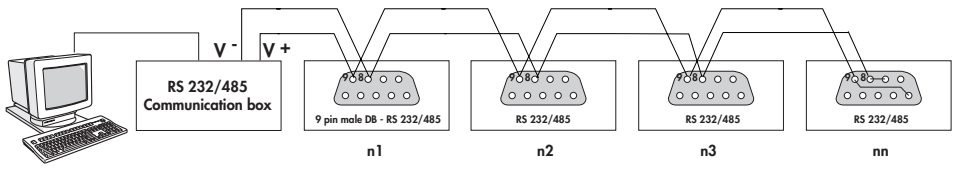
DB 9 contacts, male connector.

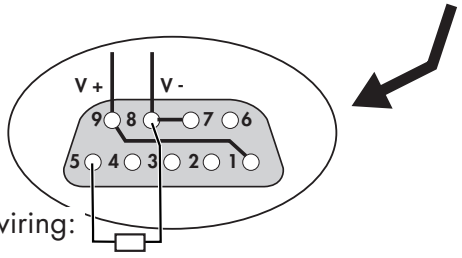
Examples of possible connection RS 232 with a single controller

RS 232 connector on ATH 500 M pump

Serial link RS 485

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





End of the line wiring:

1.5 K Ω - 1/4 W

GB 03372 - Edition 02 - June 09

Operation

ATH 500 M/MT Operating instructions
Detailed contents

GB 03373 - Edition 03 - Jan. 12

Safety instructions for product use

⚠ WARNING

Before using pump and controller, make sure that the mechanical and electrical connections have been made according to the safety recommendations: refer to chapter B from pump operating instructions.

CAUTION

It is highly recommended to use:
- an inlet screen at the pump inlet;
- an isolation valve between the chamber to be pumped and the pump;
- an isolation valve between the pump and the roughing pump.

⚠ WARNING

- Do not operate the pump until it is securely fixed. If the pump seizes, the stored energy of the rotor may cause further damage and injury to people. (B300).

- Risk of cut

The access to the rotor of a turbomolecular pump with an unconnected inlet port is dangerous. In the meantime, if the pump is not switched on, it may be driven by another pump in operation.
Always connect the pump inlet port before starting the pump.

- Specific operating conditions may exist that require extra caution from users due to the high temperatures generated (outer surfaces > 70 °C): wear protective gloves and leave the pump to cool before working on the product. .

- Pump damage

Make sure that exhaust pipe line and pump internal parts are not clogged by process by-products (e.g. condensable products ...). If exhaust line is not clear, contact the customer service.

- As loss of cooling water creates a significant risk for the pump, regularly check the right operation of the cooling circuit.

⚠ DANGER

- Risk of injury by cutting.

The inlet of the pump musn't be disconnected as long as the rotor is moving and without having disconnecting the power line cable.

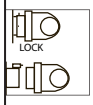
⚠ WARNING

Risk of electrical shock.
The turbopump and the controller must only be disconnected from each other when the turbopump is completely at rest and the controller disconnected from the power supply.
Never unplug the pump by disconnecting the main cable. Only the authorized and trained technicians can perform intervention on the product.

GB 03374 - Edition 03 - Jan 12

Safety instructions for product use

DANGER



- Use only specific cable.
- Lock connector before use.
- Do not unplug when the pump is on.

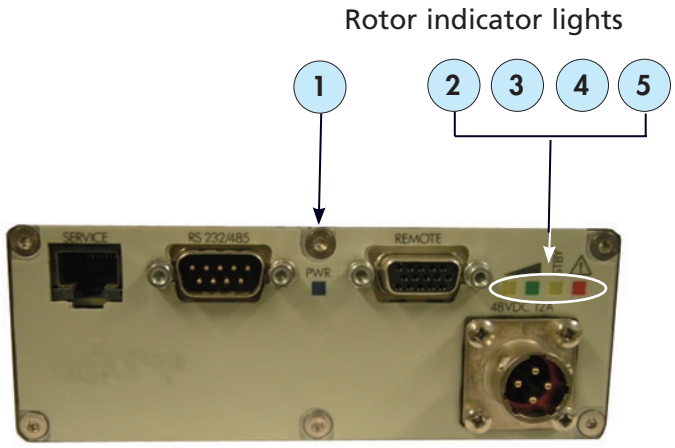
Located on the controller, this label indicates that the controller musn't be disconnected when the pump is running.

WARNING

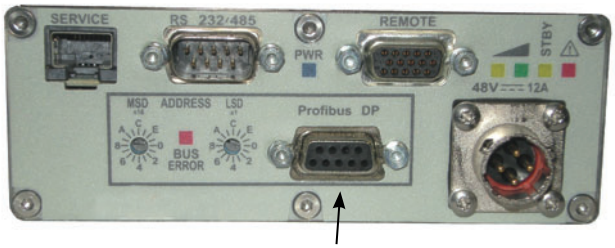
Standard precautions before any maintenance operations:
Before performing a maintenance operation, stop the pump. When the pump is at rest, switch off the pump by setting the controller main switch to «0», wait 5 minutes before disconnecting the main cable.
If this last one remains connected, some components will still be energized. Be sure that the controller status is visible from the operator otherwise disconnect the cable from the pump.

GB 03374 - Edition 03 - Jan 12

The front panel



ATH 500 M



Profibus interface

ATH 500 MT

Light	Status	Information
1	Blue liting	The pump is powered.
2	Yellow liting	The pump accelerates.
	Yellow flashing	The pump decelerates.
3	Green liting	The pump has reached the selected speed
	Green flashing	The pump rotational speed is higher than the selected speed (decrease of the selected speed during operation)
4	Yellow liting	Standby mode selected
5	Red liting	The pump is faulty
	Red flashing	An alert appears

Wiring and communication protocol are available in a specific Operating Instructions (contact us).

GB 03375 - Edition 03 - Jan. 12

Configuring the ATH 500 M/MT pump for the application

Pump parameter configuration

PARAMETERS	RS COMMANDS	VALUES	FACTORY CONFIGURATION
Modify the Standby speed	RPM and SBY	15 000 to 50 000 rpm	15 000
Modify the speed contact threshold	SET 30	- 3 to -50%	- 3%
Modify the thermostating threshold (only MT model)	SET 31	30 to 65 °C	65 °C*
Modify the bearing alert threshold	SET 32	0 to 100%	20%
Remote mode	OPT 14	0 : Keyboard (HHR) 1 : Remote 2 : RS 232 5 : Profibus **	1 for standard pump or 5 for Profibus
Inhibition mode	OPT 25	0 : inactive 1 : active	0
Thermostatage mode	OPT 29	0 : inactive 1 : active	0 : for ATH 500 M 1 : for ATH 500 MT
Contact mode	OPT 33	0 : Rotating 1 : Accelerating	0

* Depends on the pump model
** Only with Profibus option

RS232/RS485 serial link settings

PARAMETERS	RS COMMANDS	VALUES	FACTORY CONFIGURATION
Transmission speed	-	-	9600 bauds
Data length	-	-	8 bits
Parity	-	-	None
Number of STOP bits	-	-	1 bit
Data separating characters	SEP	0 to 255	44 (comma)
Number of controller in a link	ADR	0 to 255	0
Authorize transmission on STA at pre-set intervals on the serial link, when ON is set	DLR	ON or OFF	OFF
Set interval transmission	DLI	0 to 4 min 15s or 255 s	0 mn 1s

GB 04243 - Edition 03- June 2012

Detailed description of RS 232 and RS 485 commands

Conventions applicable to the syntax of all commands

adr = address, from 000 to 255
<CR> Carriage Return (ascii 13)

Status values Error messages

OK : command executed correctly
Err0 : adjustment error (out of bounds)
Err1 : command error (syntax)
Err2 : parameter error (e.g. non-hexadecimal character)
Err3 : context error
Err4 : checksum error

*ADR — Specifies the address of the device for networking

Syntax

#adr**ADR**,aaa<CR>
adr = address of the device before the command
aaa = new address of the device
condition : 000 ≤ aaa ≤ 255

Result

#aaa,OK ou Err2

This command is used to allocate a specific number to each of the products making up a network.

Note: it is important to note down the number allocated to each device.

DEF — List of the faults

Syntax

#adr**DEF**<CR>
List of the faults historic and of the active faults.

Result

#adr,OK if there is no fault

*DLI — Defines the DataLogger transmission interval

Syntax

#adr**DLI**xxx<CR>
xxx: DataLogger send interval in seconds
condition: 001 ≤ xxx ≤ 255

Result

#adr,ok or Err2

See also : **DLR**

Note: if ok, the interval sent is stored in user memory.

*DLR — Enables DataLogger operation

Syntax

#adr**DLR**<CR>

See also: **DLI, SEP, STA**

The main characteristics of the pump and its controller (see also STA command) are sent over the RS link, at the rate defined by the **DLI** command.

* Only for RS 232

Note: any new characters arriving on the serial port (RS 232) will cancel the automatic DataLogger transmission.

GB 03376 - Edition 03 - June 2012

Detailed description of RS 232 and RS 485 commands

ECH — Enables or disables command echoing

Syntax

#adr**ECH**ON<CR>
enables all characters received to be echoed over the serial port (RS 232 only).
or
#adr**ECH**OFF<CR>
disables all characters received from being echoed over the serial port.

Result

#adr,ok

Comment:
- This command is disabled in RS 485 operation, the value OFF is required.

IDN — Identifies the device which is communicating, and its software version

Syntax

#adr**IDN**<CR>

Result

#adr, ATH500M - Vx.yy.zz

Returns the type and the software revision of variable drive superviser.

LEV10 — Returns the state of the parameters defined by SET

Syntax

#adr**LEV10**<CR>

Result

#adr,nnnnn,sssss,00000,0,ccccc,eeeee,00000,0000,0000,jj,kk,lll,mmm

Returns current values:

- **nnnnn** : nominal speed set point (in rpm)
- **sssss** : stand-by speed set point (in rpm)
- **ccccc** : pump working time (in hours)
- **eeeee** : electronic working time (in hours)
- **jj** : speed threshold for relay (3 to 50%)
- **kk** : temperature set point (30 to 65%)
- **lll** : bearing threshold (0 to 100%)
- **mmm** : bearing current value (0 to 100%)

Note: 0 = not used

NSP — Switches the speed set point to the nominal speed value

Syntax

#adr**NSP**<CR>

Result

#adr,OK

The speed set point for the pump is set to its nominal value.

GB 03376 - Edition 03 - June 2012

Detailed description of RS 232 and RS 485 commands

OPT — Used to select possible user choices

Syntax #adr**OPT**xx,n<CR>

Result #adr,OK

xx = OPTION OF PARAMETERS	n = value
14: Remote mode	n = 0 : Keyboard (for HHR) n = 1 : remote hard (give control to remote) n = 2 : serial link (give control to RS 232/485) n = 5 : Profibus
25: Inhibition mode	n = 0 : inactive n = 1 : active inhibition (the controller doesn't supply the motor)
29: Thermostage mode	n = 0 : inactive (for ATH500 M) n = 1 : active (for ATH500 M-MT)
33 : Contact mode	n= 0 : ROTATING (closed contact if speed>120rpm n= 1 : ACCELERATING (closed contact in phase of progress)

RDI — Returns the serial number of the product

Syntax #adr**RDI**<CR>

Result #adr,A123456789<CR>

RPM — Defines the speed set point in stand-by value

Syntax #adr**RPM,** nnnnn<CR>

Result #adr,OK *or*
#adr,ErrX

X = 1: out of range
X = 2: parameters
X = 3: context (not in standby mode)

SBY — Switches the speed set point to the stand-by value

Syntax #adr**SBY**<CR>

Result #adr,OK

Resets the stand-by speed to its Standby stored value, and allows it to be modified if a **«RPM»** command is sent.
This configuration is automatically stored in user memory.

GB 03376 - Edition 03 - June 2012

Detailed description of RS 232 and RS 485 commands

SEL10 — Returns the state of the parameters defined by OPT

Syntax

#adr**SEL10**<CR>

Result

#adr,0,0,1,0,r

r: Returns remote mode choice
- r=0: keyboard
- r=1: remote hard
- r=2: serial link
- r=5: Profibus

Result

#adr,OK

Note: 0 = not used
1 = not used

SEL 20 — Returns the state of the parameters defined by OPT which are not defined in SEL 10

Syntax

#adr**SEL20**<CR>

Result

#000,a,b,c,d,e,f,g,h,i,j,k,l,m,n,o,p,q,r,s,t,u,v,w,x,y,00,11,22,33,44,55<CR>

f :opt 25
j :opt 29
n :opt 33

SEP — Defines the character which separates the parameters in a reply

Syntax

#adr**SEP,**nnn<CR>

nnn: 3-digit decimal value of the ascii code of the desired character (with leading zeros).
condition: 000 ≤ nnn ≤ 255

Result

#adr,OK *or* #adr,ErrX if error

Allows the user to select the character which separates the parameters returned by the **DLR STA** and **LEV** commands.
Default value: comma «,» ascii code = 044
If ok, the selected value is automatically stored in user memory.

SET — Defines the internal operating parameters

Syntax

#adr**SET**10,ccccc<CR>: utilization time of the pump (in hours)
#adr**SET**30,jj<CR>: speed threshold for relay (3 to 50%)
#adr**SET**31,kk<CR>: thermostating threshold (30 to 65 °C)
#adr**SET**32,lll<CR>: bearing threshold (0 to 100%)
#adr**SET**33,MMM<CR>: bearing current value (0 to 100%)

Result

#adr,OK or ErrX

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Detailed description of RS 232 and RS 485 commands

STA

Returns the status of the internal dynamic parameters

Syntax

#adr**STA**<CR> or STA<CR>

Result

#adr,sss, rrrrr, vvv, www, xxx, yyy, zzz, aa, bbbbb, ccc, ddd, gggggggggggggg
321
gggggggggg<CR>

adr: adress

sss 1 **s1**: order status

Bit	7	6 INH	5 LOCAL	4 STOP	3 (serial link)	2 REM	1 STDBY	0 START
0		OFF	OFF	OK	OFF	OFF	OFF	OFF
1	1	ON	OK	fault	ON	ON	ON	ON

sss 2 **s2**: pump status

Bit	7	6 Fault	5 Warning temp	4 Braking	3 Nom. speed and Temp	2 Accele rating	1 Start	0 Power
0		OK	OK	OFF	OFF	OFF	OFF	
1	1	fault	warn.T	ON		ON	ON	ON

sss 3 **s3**: valve status

Bit	7	6 At speed	5 (free)	4 (free)	3 Water valve	2 Ther-mostat	1 Air inlet	0 Isol. valve
0		OFF	OFF	OFF	close	OFF	close	close
1	1	ON	OFF	OFF	open	ON	open	open

rrrrr: speed in rpm
vvv: Radial
www: Radial
xxx: Radial
yyy: Radial
zzz: Axial
aa: Current voltage in V
bbbbb: Current Value in mA
ccc: Pump temp (° C)
ddd: Electronic temp (° C)

sss : needs to be converted from ASCII to binary
123

GB 03376 - Edition 03 - June 2012

Detailed description of RS 232 and RS 485 commands

STA (continued)

Returns the status of the internal dynamic parameters (continued)

g	0 = OK	1 = ALERT	2 = FAULT
0	0		
1	0		
2	0		
3	0		
4	0		
5	0		over-current/sensor
6	0		
7	0		mag. suspens.
8	0	Power voltage	
9	0		
10	0		Yh radial
11	0		Xh radial
12	0		Yb radial
13	0		Xb radial
14	0		Z axial
15	0	bearing	Bearing change
16	0	electronic temp.	Electronic temp.
17	0	pump temp.	Pump temp.
18	0		
19	0		
20	0		Self check
21	0		
22	0		
23	0		
24	0		

TMP

Defines the operating state of the turbomolecular pump

Syntax

#adr**TMP**ON<CR>: start pump rotation
#adr**TMP**OFF<CR>: stop pump

Result

#adr,OK *or* #adr,Err3 if the pump is already in the state requested (context error)

VER

Defines the version of electronics «extension» + «frequency converter» + «magnetic bearing»

Syntax

#adr**VER**<CR>

Result

#adr,Interface : VX.YY.ZZ, cartridge :VX.YY, Type XXXXX<CR>

Interface VX.YY.ZZ:	interface board software version (Front panel)
Cartridge : VX.YY :	interface board software version
Type:xxxxx	type of connected pump (code)

GB 03376 - Edition 03 - June 2012

D

Maintenance

ATH 500 M/MT Operating instructions

Detailed contents

GB 03377 - Edition 03 - Jan. 12

D 100

Safety instructions for product removal

⚠ 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, water, gas ...) before starting work.

- **Standard precautions before any maintenance operation:**
Before performing a maintenance operation, stop the pump. When the pump is at rest, switch off the pump by setting the controller main switch to «0», wait 5 minutes before disconnecting the main cable. If this last one remains connected, some components will still be energized.
Be sure that the controller status is visible from the operator otherwise disconnect the cable from the pump.

- **Risk of injury by cutting:**
The inlet of the pump musn't be disconnected as long as the rotor is moving and without having disconnecting the power line cable.

- **After pumping on corrosive or toxic gases, it is strongly recommended to seal the pump with blanking plates in case of return to the repair service centers (E 100). Don't forget to label in a visible way the product for the operator.**

⚠ DANGER

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

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

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

GB 01739 - Edition 17 - Oct 13

D 100

Safety instructions for product removal

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 (E100) .

The outside of the product 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.

- Decontamination - product dismantling

According to the regulations 2002/96/CE about Waste of electrical and electronical equipments, and 2011/65/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 Pfeiffer Vacuum, containing i.e. all its components and sub-assemblies.
This obligation will not cover the shipping cost to an adixen Vacuum Products service center.

- Whenever your return the product to an repair service center, please make sure you follow the Service procedure and fill in the declaration of contamination found on our website.

How to contact us ?

The overhaul must be performed by manufacturer's trained personnel. Contact nearest service center or the service support at the following e-mail address: support.service@adixen.fr

GB 01739 - Edition 17 - Oct 13

Maintenance frequency

Back-up ball bearings

When the pump is running, the rotor is levitated magnetically. There is therefore no friction between moving and fixed parts.

The rotor remains levitated by magnetic ball bearings.

Only the back-up ball bearings require maintenance: they are designed to withstand many accidental shut-downs, or many landings of the rotor on the ball bearings at full speed.
These accidental shut-downs occur only in exceptional circumstances: broken power supply cable, strong shocks, faulty electronics. It is advisable to check the bearing counter and provide ball bearing maintenance, when needed.

The bearing counter

Back-up ball bearings are designed to withstand abnormal landings at full speed.
The wear of the back-up ball bearings is internally monitored by the controller, based on the rotation speed and the landing duration. Initial percentage value is set at 100%. When this percentage reaches 0%, an alarm is generated, pump can't restart, and back-up ball bearings need to be replaced by authorised Service Center.

Warning messages for pumps maintenance

The ball bearing alert threshold can be set on the menu ( **C300**).

The internal memory of the controller also informs the operator when the ball-bearings require maintenance (**D200**).

CAUTION

The life time of the rotor is at least 5 years under normal conditions with clean process. Please contact the Service Center to check your application.

Product maintenance

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

Only inlet screen, coil or pump valve replacement are authorized at the customer's site.

Contact the nearest service center or the service support at the following e-mail address: support.service@adixen.fr

GB 03378 - Edition 01 - Jan 12

Diagnosis and troubleshooting

When a defect appears

The «Fault» contact opens (**B430).**
Depending on the defect type:
- The «FAULT» signal can be on, for an alarm, and flashing for an alert, and the controller can stop the pump.
To start the pump after a default, the cause must be corrected, then switch power off and on to start the correct operation.

INCIDENT	CAUSE	CONSEQUENCE	REMEDY
No event occurs after power on	No mains current.		- Check that the pump is powered by a 48 VDC power supply (the blue lit lights on). - On switching, check if the indicator lights are lit in succession.
During the speed rise, the pump starts to vibrate	Abnormal working.		- Check that the pump is rigidly fixed to the frame, - Check that there are no vibrations on the pump frame, - Check that the attachment screws are correctly fastened (problem can be caused by an anti-vibration flagstone), • Contact the Customer Service.
The red light (on the front panel) lights on	The pump is faulty.		- Connect the serial link, - Enter the command: #DEF (**C800)** or via HHR (**G1000)** Example of faults: • unbalance fault • magnetic bearing • displacement fault • over temperature Example of warnings • int. comm • power volt - Electronic temp., - Switch off then switch on the power supply, - If the fault persists, • Contact the Customer Service.

GB 03379 - Edition 03 - 02/2014

Diagnosis and troubleshooting

INCIDENT	CAUSE	CONSEQUENCE	REMEDY
Displacement fault	The rotor position outside authorized limits or unbalanced.	The controller stops the motor, «START» contact open. The pump can not restart.	- Check that there are no vibrations on the pump frame, - Check that the attachments are correctly fastened, - Power off and on, if the message disappears, try to start the pump, - If the fault happens again, • Contact the Customer Service - On applications with dusty or condensable gases, the rotor can be blocked by process by products.
Unbalance fault			
Bearing overload			
Lower Radial Bearing			
Upper Radial Bearing			
Axial position			
No recovery			
Not Ecc Corrected	Ecc self test not finished.	The controller stops the motor, «START» contact open. The pump can not restart.	- Check that there are no vibrations on the pump frame, - Check that the attachments are correctly fastened, - Power off and on, if the message disappears, try to start the pump, - If the fault happens again, • Contact the Customer Service - On applications with dusty or condensable gases, the rotor can be blocked by process by products.
Safety shutdown	Mechanical or electrical problem.	The controller stops the motor, «START» contact open. The pump can not restart.	• Contact the Customer Service
Drive fault	Motor over current or Hall sensor fault.	The controller stops the motor.	- Reduce the flow rate, - Switch off the controller and restart it, - Try to restart the pump, - If the fault happens, • Contact Customer Service

GB 03379 - Edition 03 - 02/2014

Diagnosis and troubleshooting

INCIDENT	CAUSE	CONSEQUENCE	REMEDY
Hardware fault	The safety shutdown appears when a hardware fault is detected inside the electronics.	No magnetic levitation, the pump can not start.	- Check the electronic housing is correctly fixed to the pump body, - Check the pump is correctly fixed to the chamber (no vibration), • Contact Customer Service
Selfcheck failed	Mechanical or electrical problem.	No magnetic levitation, the pump can not start.	- Power off the controller, - Power on the controller, If the fault happens again, • Contact the Customer Service
Electr.Temperature	The controller temperature exceeds the authorized limit > 75 - 80 °C	The pump can not restart.	- Check the water supply to the pump.
Rotate while Powerup	When the pump is powered, the rotor is still or already rotating.	The pump can not start.	- Wait for the complete stop of the pump, then power off and power on the product., • Contact the Customer Service
Magnetic bearing	Mechanical or electrical problem.	No magnetic levitation. The pump can not start.	- Check that the rotor is free when rotating, • Contact the Customer Service
Pump Temperature	The pump temperature exceeds the autorized limit: ≥ 105 °C (heated pump) ≥ 110 °C (non heated pump).	The controller stops the motor as long as the temperature exceeds 105 or 110 °C. Then the motor starts again.	- Check that the pump cooling device is running.
Bearing Change	The authorized limit for the number of landings on the emergency bearings has been reached.	The pump can not restart.	• Contact the Customer Service to change the emergency bearings.
Seized Pump	Pumping cell seized.	The controller does not supply the motor.	- Check manually that the rotor rotates, otherwise • Contact the Customer Service

GB 03379 - Edition 03 - 02/2014

Diagnosis and troubleshooting

INCIDENT	CAUSE	CONSEQUENCE	REMEDY
Not Accelerating	When the speed of the pump is lower than 5000 RPM after to 10 mn (after start order).	The pump can not start.	- Check that the pump is correctly fixed to the chamber (no vibrations during accelerations), - Check that there is no leak, - Check that the primary pump is running, - Check (if any) the exhaust valve is opened • Contact the Customer Service

GB 03379 - Edition 03 - 02/2014

Maintenance instructions

ATH 500 M/MT Operating instructions
Detailed contents

GB 03380 - Edition 01 - February 07

Shipping procedure for contaminated pumps

⚠ WARNING

Study the safety instructions related to preventive maintenance D 100.

The user must stick this label on the product to warn against pumped process gas that could be dangerous and toxic and could cause severe injuries or death. It precises that any preventive maintenance operation can only be performed by trained personnel.

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 form (see our website, link Service).

⚠ WARNING

Risk of injury by cutting.
Contact with the pump rotor cell may cause cuts. Alternatively, protective gloves may be worn when servicing the product.

Pumps to be shipped must initially be decontaminated then pressurized with dry nitrogen (see procedure sheet 3/3).

To achieve this the user must have the following connection accessories:

Ⓐ Inlet port

Closing kits including o-ring, screws and nuts inlet blank flange and hoisting rings can be supplied upon order. For other inlet part types contact the customer service.

Closing kit	DN160 ISO F	DN160 ISO K	DN100 ISO K
P/N	114501	114502	118377

GB 03381 - Edition 04 - Jan 13

Shipping procedure for contaminated pumps

(B) Exhaust port* DN25 / DN40 ISO-KF

Description	DN 25	DN 40
Centering ring with seal	068189	068194
Clamping ring	083264	083267
Blank-off flange	068196	068197

(C) Purge port

Description	P/N
Plug 1/8"BSPP	115298S

(D) Exhaust port (pressurisation)

Description	DN25	DN40
1/8 BSPT Flange with anti-suckback valve	114419	065053
Injector	**106859**	

Characteristics of filtered dry nitrogen supply

A filtered dry nitrogen supply with the following characteristics is required:
- Dew point < 22°C
- Dust < 1µm
- Oil < 0.1 ppm
- Absolute pressure of 100 to 120 kPa.

Rough decontamination procedure

The pump must be disconnected from its installation and isolated electrically.

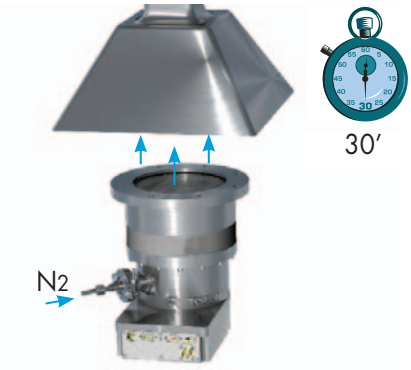
⚠ DANGER

Install the pump under an extractor hood.
It must remain there throughout the operation.

1 General flushing

Fit the DN 25 blank flange with anti-suckback valve on the exhaust port.

Flush with dry nitrogen using the injector at an absolute pressure of 100 to 120 kPa for 30 minutes.



* Standard connection accessories available in the manufacturer's product catalog.

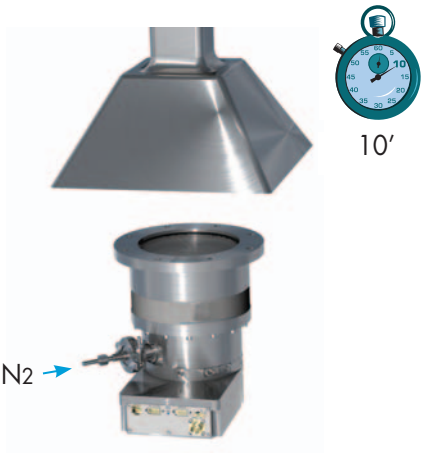
GB 03381 - Edition 04 - Jan 13

Shipping procedure for contaminated pumps

2 Pressurize the pump

Blank the inlet port and the purge port.

Pressurize the pump with dry nitrogen to an absolute pressure of 110 kPa using the injector.



GB 03381 - Edition 04 - Jan 13

Maintenance components

ATH 500 M/MT Operating instructions
Detailed contents

GB 03382 - Edition 02 - Jan 12

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**).

GB 01390 - Edition 04 - May 09

First level maintenance parts

For air inlet and purge valve

	P/N
Coil 24 V DC	038066

Dust filter

Replace regularly the dust filter when used in dusty air

	P/N
Dust filter	109229

Electrical cable of the air cooling device

	P/N
Cable	A464597

Water valve

		P/N
48 V DC water valve kit		119110
	Water valve boldy	115062
	Solenoid	119079
	Straight water connector	115304
	Angled water connector	119077

A complete range of connecting accessories is available in the manufacturer's catalogue (flanges, fittings...).

GB 04733 - Edition 02 - Nov 13

Appendix

ATH 500 M/MT Operating instructions
Detailed contents

GB 03385 - Edition 03 - June 13

DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY

We hereby declare that the product cited below satisfies all relevant provisions according to the following **EC directives :**

- **Machinery 2006/42/CE (Annex II, No. 1 A)**
- **Electromagnetic Compatibility 2004/108/EC**

The technical file is drawn up by Mr Gilles Baret, adixen Vacuum Products, Société par Actions Simplifiées [simplified joint stock compagny], 98, avenue de Brogny B.P. 2069, 74009 Annecy cedex, France.

ATH 500 M / ATH 500 MT

Harmonised standards and national standards and specifications which have been applied:

Standards NF EN-61000-6-2
Standards NF EN-61000-6-3
Standards NF EN-61000-6-4
Standards NF EN-61010-1
Standards NF EN-61010-2
Standards NF EN-1012-2

The relevant operating instructions are in compliance with appendix VII, part B.

This partly completed machinery must not be put into operation until the machinery into which it is to be incorporated has been declared in conformity with the provisions of the 2006/42/EC Directive.

We, authorized representatives undertake to transmit, in response to a reasoned request by national authorities, relevant information on the partly completed machinery

Signatures :

adixen Vacuum Product
98, avenue de Brogny
B.P. 2069
74009 Annecy
France

(M.Taberlet)
Président

(M.Baret)
Directeur Produits et Technologies

Date : 25/02/14

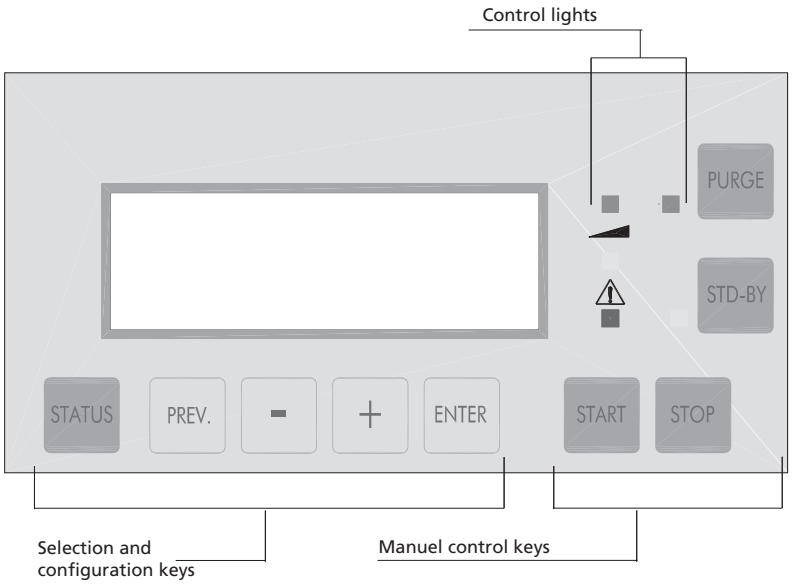
adixen
by PFEIFFER VACUUM

GB 03387 - Edition 03 - 03/2014

Hand Held Remote

Hand held remote description

The keyboard is used to control the pump and configure the parameters.



The function of the parameter selection and configuration keys

Symbol	Description	Functions
PREV.	Parameter setting mode access key	▪ Press to access the parameter setting mode ▪ Press to exit the various menus without validating the functions
− +	Selection keys	▪ Press to move to: - 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
ENTER	Configuration validation key	▪ Press to validate the selection of a menu, a parameter or a value ▪ Press to validate an answer to a requested information
STATUS	Display access key	▪ Press to leave the setting menu and display the pump parameters

Note: to modify the display contrast, press by holding down the Status key and adjust the value with the + / - keys.

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 by holding down the + / - keys. For all the other keys, press several times.

GB 04070 - Edition 05 - Oct 13

Hand held remote start up

Before using the HHR, check that the electrical connections have been made between the pump and the controller (refer to B400).

- Connect the hand held remote to the controller on «Service connector».
- Supply the pump controller.

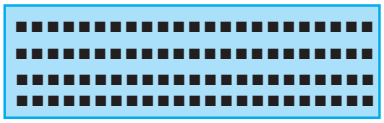
HHR Display initialization

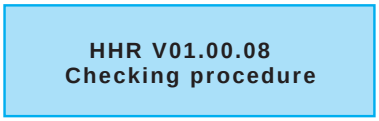
The controller performs a self-test and identifies the pumps to which it is connected.

The initialization time is approximately 15 seconds.

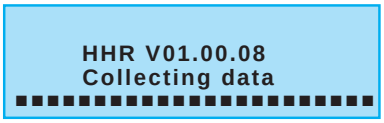
The equipment is identified, the program version is displayed, than communication test is done,

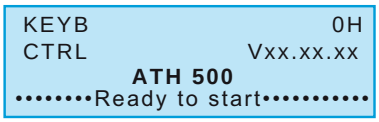
In the meantime, the Indicator lights are tested by lighting in succession.





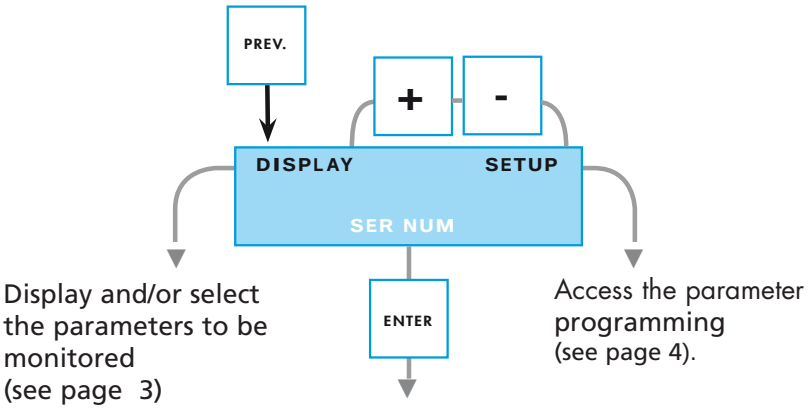
Finally, the working screen corresponding to the connected pump is displayed.





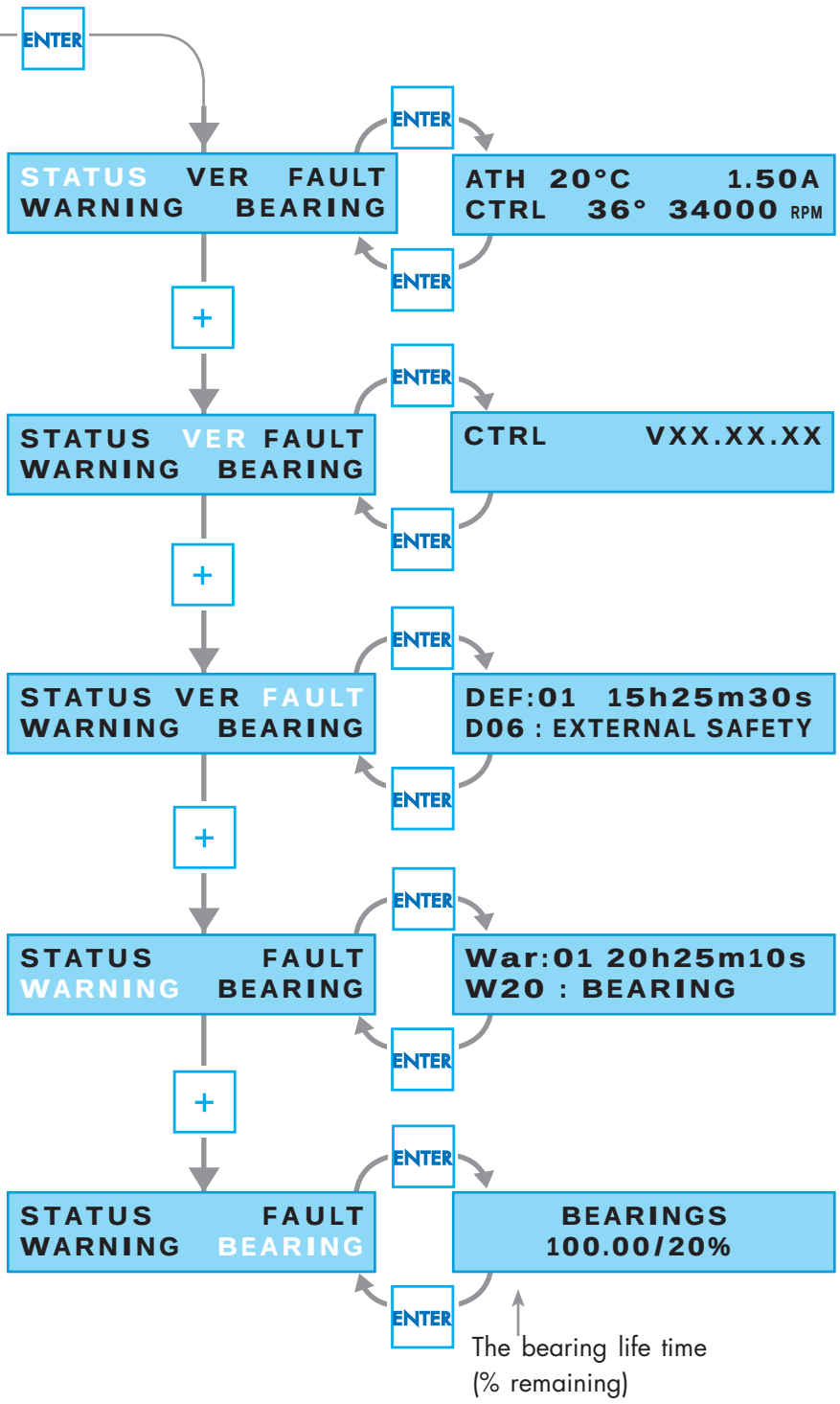
Access to the menus

Enter the sub-menus by pressing :



GB 04070 - Edition 05 - Oct 13

Hand held remote - Display menu



Pump and controller status

- pump temperature
- pump motor current
- controller temperature
- pump rotational speed

Controller version *

- HHR version
- Front panel version
- Speed controller
- DSP

Successive display of last 10 faults

- fault list with record number (1 to 10)
- fault title

Successive display of last 10 alerts

- fault list record number (1 to 10)
- alert title

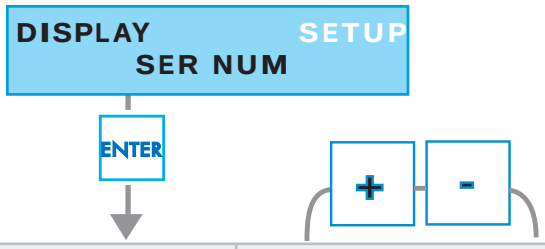
Bearing data

- the bearing life time (%) and the alert threshold (%).

* Display according to connected pump model.

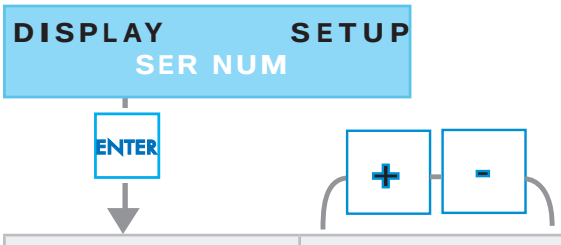
GB 04070 - Edition 05 - Oct 13

Hand held remote - Set up menu



Selection	Setting limits	Initial configuration	
ACCESS CODE	0 to 65535	0	Enter the access code and validate
REMOTE CONTROL	Keyboard/Remote hard/Serial link/Profibus/ Device Net	Profibus	Select the remote mode
STANDBY SPEED	15000 to nominal speed of the pump	15000	Modify the standby speed from 15000 to nominal speed *
BUZZER	ON /OFF	OFF	Activate or deactivate the buzzer.
THERMOSTAT	ON = adjustable temp. from 30 to 75 °C OFF	OFF	Regulate the pump temperature
RELAY AT SPEED	- 3 to - 50%	- 3	Modify the speed contact threshold.
FIELDBUS PROFILE (1)	0 or 1 (only for Profibus)	0	0 compatible with OBCV4 1 compatible with OBCV3
FIELDBUS ADDRESS (2)	Profibus : MSB and LSD DeviceNet: ID and Data Rate	XX and YY	Display the Profibus address or DeviceNet address, data rate
RS 232 SPEED	9K6 - 19K2 / 38K4 / 57K6	9K6	Modify the RS 232 speed.
RS 232 ECHO	ON / OFF	OFF	Authorize or not authorize the echo of characters received on the link
RS 232 SEPARATOR	0-255	44	Data separating chararcter (044 = comma).
RS 232 ADDRESS	0-255	0	Number of controller in a multiple link.
BEARING LIFE Warning limit	0 to 99%	20	Modify the bearing alert threshold.
NEW CODING	0 to 65535	0	Modify the access code.

* see Pump User's manual.



Selection	Initial configuration	
HHR	XXXXXXXXXX	Display the HHR serial number
CONTROLLER	YYYYYYYYYY	Display the front panel serial number
CARTRIDGE (2)	ZZZZZZZZZZ	Display the spindle serial number
MMCC06 (2)	AAAAAAAAA	Display the electronical board serial number

(1) When the HHR is connected to an OBC controller (2) When the HHR is connected to an ATH 500 pump

GB 04070 - Edition 05 - Oct 13

Service

Pfeiffer Vacuum offers first-class customer service!

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

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

Overhaul and repair in the Pfeiffer Vacuum Service Center

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

➔ Fill out the «Service Request/Product return» form and send it to your local Pfeiffer Vacuum Service contact.

➔ Include the confirmation on the service request from Pfeiffer Vacuum with your shipment.

➔ Fill out the declaration of contamination and include it in the shipment (mandatory!). The Declaration of contamination is valid for any product/ device including a part exposed to vacuum.

➔ Dismantle all accessories and keep them.

➔ Close all the ports flange openings by using the original protective covers or metallic airtight blank flanges for contaminated devices.

➔ If possible, send pump or unit in its original packaging.

Sending of contaminated pumps or devices

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

➔ Neutralize the pump by flushing it with nitrogen or dry air.

➔ Close all openings airtight.

➔ Seal the pump or device in suitable protective film.

➔ Return the pump/device only in a suitable and sturdy transport container and send it in while following applicable transport conditions.

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

Exchange or repaired devices

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

Service orders

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

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A PASSION FOR PERFECTION

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