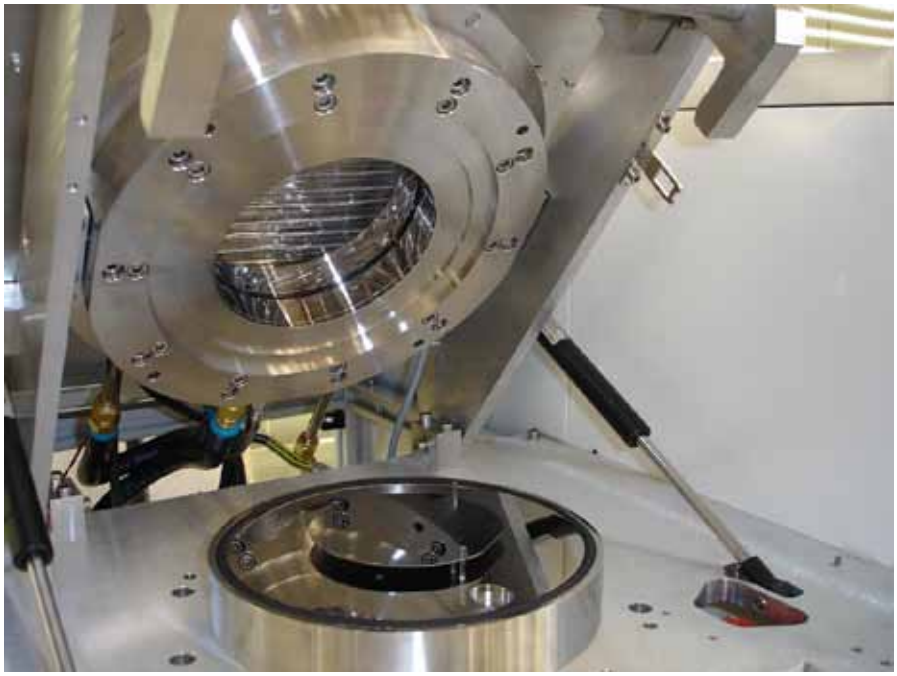
Rapid Thermal Processor AS-One 100

Technical manual



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Rapid Thermal Processor AS-One 100– Technical Manual	2.02	May 26, 2014	ASOne100_Technical_Manual_V2-02.docx

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1. CONSTRUCTOR'S FOREWORD

This manual contains original instructions for the manufacturer of the machine.

⚠ WARNING

SAFETY INSTRUCTIONS
The user must carefully read the following instructions.
The user is responsible for installing the system in safe conditions and in an environment that complies with the local regulation.

The Annealsys system can be used for various applications. Many different types of gases can be used in the system; consequently, the user must take all the necessary precautions to prevent hazardous mixtures occurring inside the process chamber.

The customer must be aware of the effects of process gases and vapors used during the process and their consequences on the machine, accessories and vacuum pump. All manuals must be carefully read in order to check the conditions of operations.

The constructor declines all responsibility for any incidents caused by insufficient precautions or handling errors, and their consequences.

The constructor specifies that the Annealsys system has no protection against any possible toxic emanations.

The responsibility for installing the machine in an environment which complies with the relating legislation is left entirely to the initiative and charge of the user, who is considered to be aware of the effects of the gases that he uses, as well as those of the decomposition products and gases generated by the processes in operation.

The user shall be responsible for connecting the exhaust line and the pump exhaust of the system to a gas scrubbing installation which is compatible with the process gases and gas flows and that complies with local regulation.

The user is responsible for ensuring that supply pipes and cables as well as exhaust are routed in such a way to eliminate trip hazard. Also, floor surface is to be suitable and must reduce as far as possible any slip hazard for the operator or others in the vicinity of the machine. Adequate lighting and any fire suppression system is also the responsibility of the user

The constructor also specifies that the quartz, ceramic and graphite parts and all parts in contact with vacuum or process gases must only be handled with gloves to avoid any pollution.

All maintenance and servicing work should be carried out by skilled personnel and, where specified, in relation with Annealsys Customer Service Department.

If applicable, the EC declaration of conformity is available in the installation manual and the user's manual.

2. SAFETY INSTRUCTIONS

The signal words for the safety instructions and labels are DANGER, WARNING and CAUTION.

⚠ DANGER

DANGER is the signal word used to indicate an imminently hazardous situation that, if not avoided, will result in death or severe injury.

⚠ WARNING

WARNING is the signal word used to indicate a potentially hazardous situation which, if not avoided, could result in death or severe injury.

⚠ CAUTION

CAUTION is the signal word used to indicate a potentially hazardous situation which, if not avoided, could result in moderate or minor injury. It may also be an alert against unsafe practices.

2.1 Pictogram definitions

	**Hot surface** **Burn hazard while touching hot parts.** **This label warns the user from eventual burning hazards.**
	**Electricity, Electrical hazard** **Contact may cause electric shock or burn** **This label warns the user of eventual electrical hazards**
	**Toxic material, poison** **This label warns the user from the danger and lethal risks involved when using toxic or corrosive chemicals**
	**Pinch hazard** **Possible pinch hazard with mechanical moving parts.** **This label warns the user of eventual mechanical hazards**
	**Flame hazard** **Possible fire hazard with process gases or chemicals.** **This label warns the user of eventual fire hazards**
	**General warning** **This label warns the user from eventual hazards with possible injury or damage to the system.**

2.2 Personnel qualifications

All installation or maintenance operations should only be carried out by persons who have suitable technical training and the necessary experience.

2.3 Safety information

2.3.1 Process gases

⚠ WARNING

Toxic gases
Some gases are toxic and inhaling them should be avoided.
Take steps to ascertain whether or not the gases being used are known toxic substances. Refer to the Material Safety Data Sheets covering the gases in question

2.3.2 Adjustments of sensors

⚠ WARNING

Electrical shock hazard
Some parts inside the system may remain powered-up for adjustment procedure.
These operations must be carried out by trained and authorized technicians only.

2.3.3 Burn hazard

⚠WARNING

Burn hazard
If maintenance operations are carried out after a process or heating, some parts including lamps and quartz window may remain at high temperature.
Wait for parts to cool down before operation.

2.3.4 Electrical shock hazard

⚠WARNING

Electrical shock hazard
The power supply line and the furnace circuit breakers must be switched off and locked before starting maintenance operations.
These operations must be carried out by trained and authorized technicians only.

2.3.5 Eyes damage

⚠WARNING

Possible eye damage
The lamp furnace emits strong visible and infrared light during operations. Some light can be seen from the rear exhaust duct.
Never look furnace light from the rear of the system during operation. This may lead to eye damage. A warning label affixed on the backside lid warns the user of potential hazard

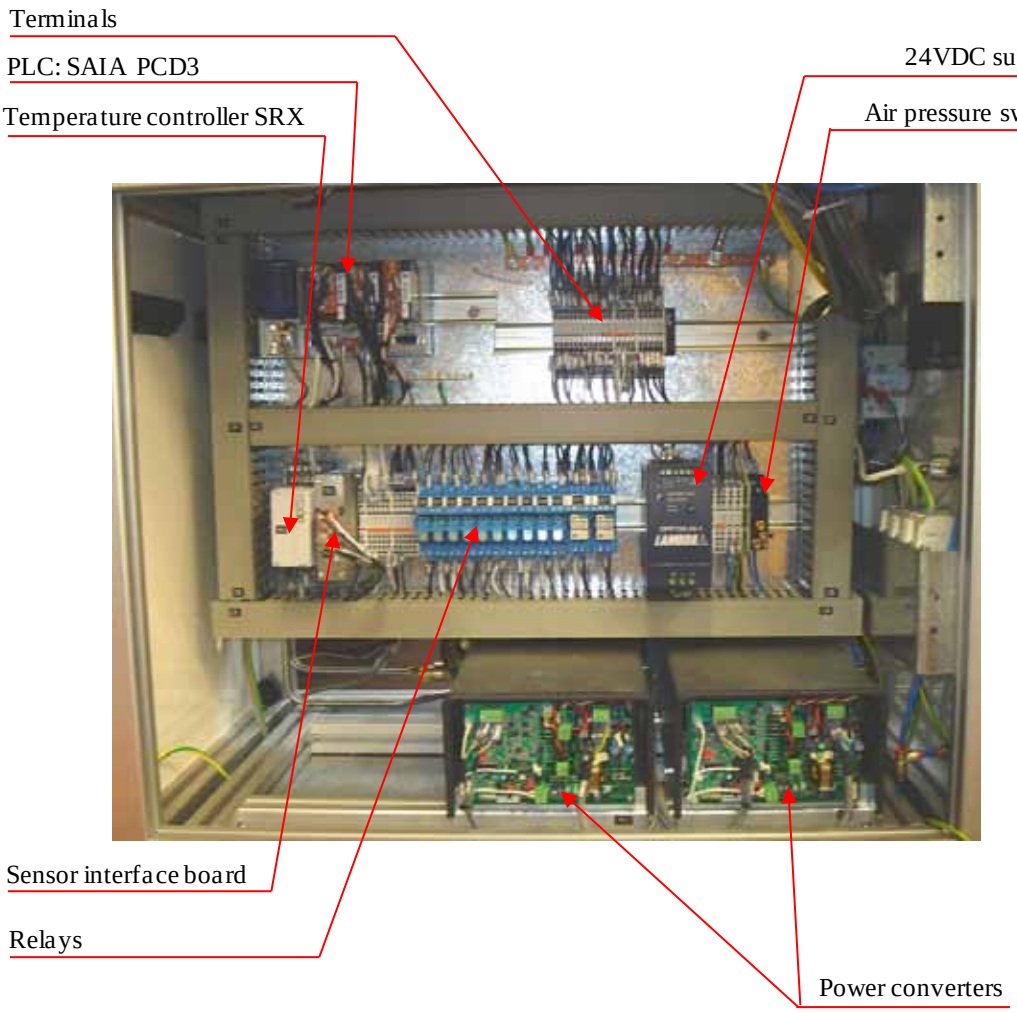
3. ELECTRICAL PANEL

3.1 Electrical panel description

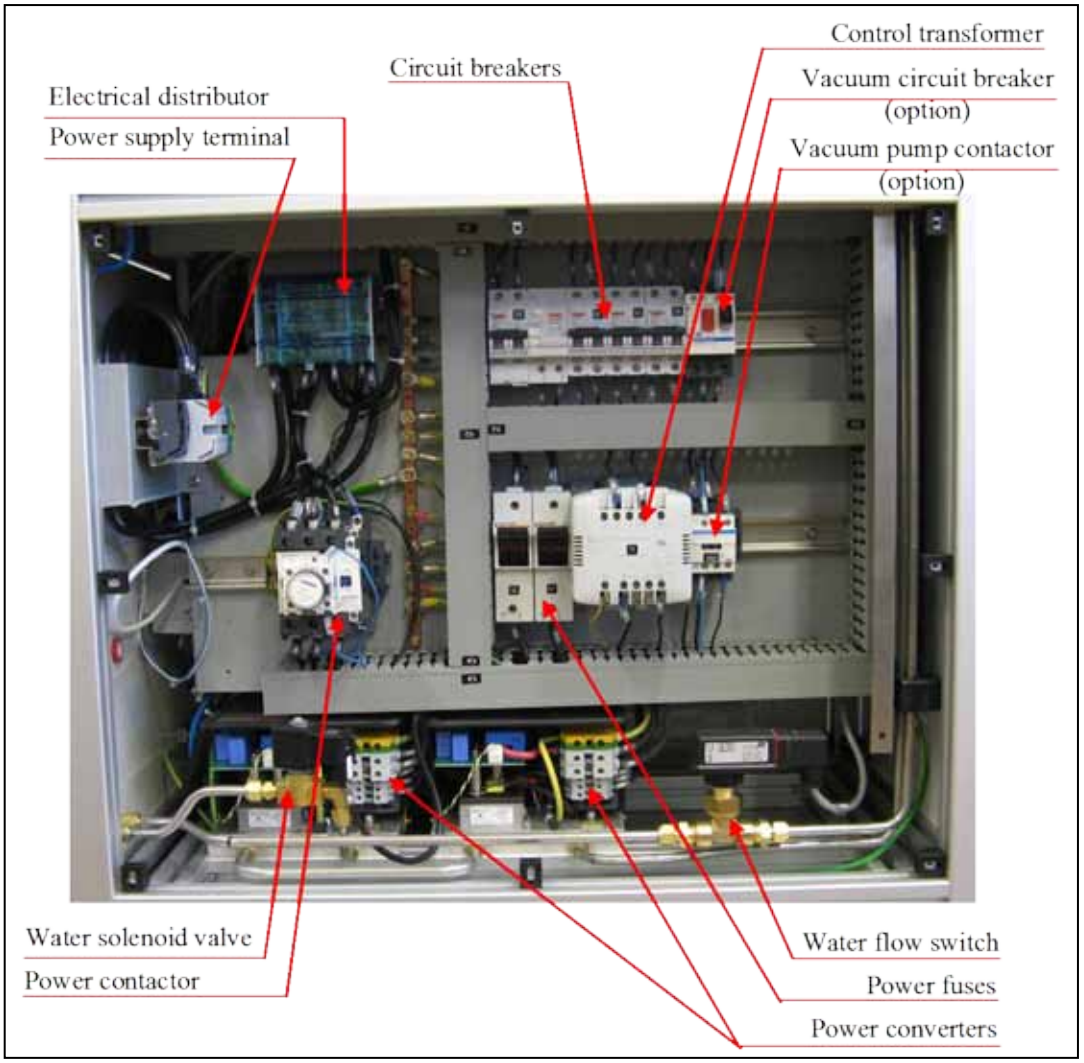
The electrical panel is located lower part of the system. Remove the lower right side and left side panels to access the electrical panel.

If the system is provided with the turbo pump option then open the metallic door which is beside the panel on the right side.

Electrical panel from right side

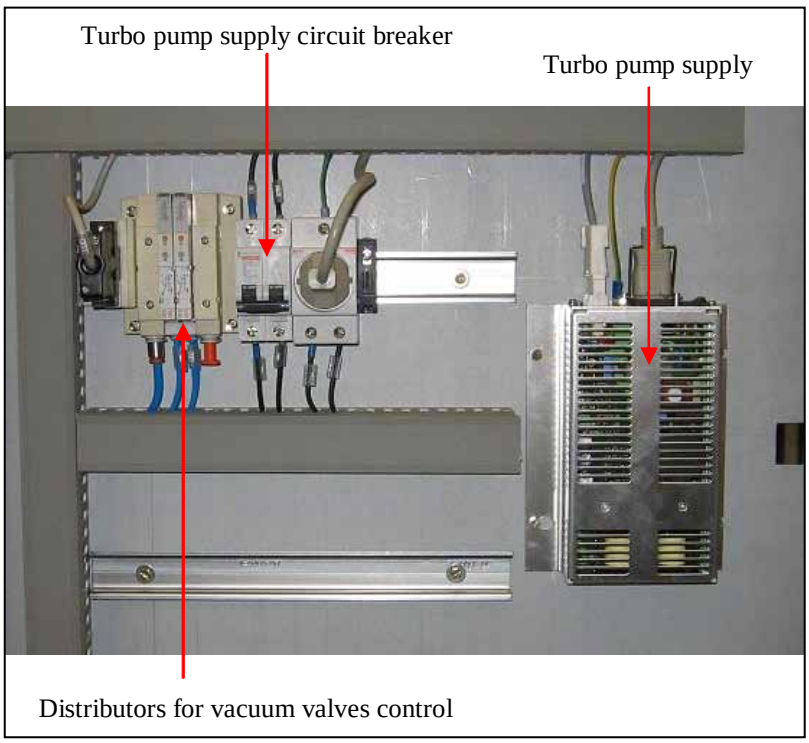


Electrical panel from left side



3.1.1 Turbo pump option

Turbo pump control panel (option)



3.2 Electrical energy isolation

3.2.1 General circuit breaker

The system is provided with a general circuit breaker installed on the rear panel and that has the following specifications:

Version	Voltage rating (system voltage)	Standard	Current rating	Current interrupting capacity (amperes interrupting capacity: AIC)
AS-One 100	3x400V+N	CE	63 A	15 kA
	3x220V	UL/CSA	100 A	18 kA

The circuit breaker is provided with a padlockable system.

3.2.2 Isolation procedure

When maintenance operations have to be performed the system must be powered off using the following procedure (see paragraph 5 for the detailed shut-down procedure):

- Stop all process and manual operation on the system
- Check that the process chamber is not under process gas atmosphere
- Purge down the process chamber with neutral gas
- Unlock and open the chamber
- Shut-down the control software
- Switch off the computer that is energized by the system rear panel sockets
- Switch-off the general circuit breaker on the system rear panel
- Install locking system and padlock
- Switch-off power line to the system and lock line circuit breaker.

4. ADJUSTMENTS

⚠ WARNING

Electrical shock hazard
Some parts inside the system may remain powered-up for adjustment procedures.
These operations must be carried out by trained and authorized technicians only.

4.1 Adjustment of the air pressure switch

The air pressure switch is a black module installed on the upper right side of the electrical panel (see the picture).

The compressed air pressure switch checks that the compressed air pressure is above 4 bars in order to have a good actuation of the pneumatic valves.

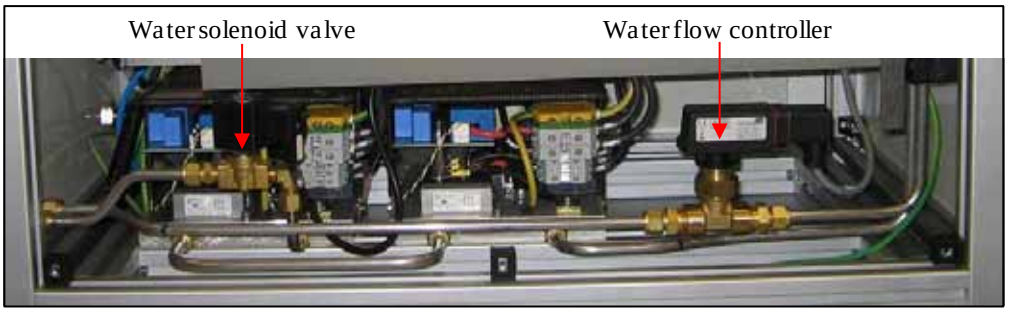
Procedure to adjust the air pressure switch threshold value:

- Supply the system with compressed air
- Remove the right side metallic panel to access switch (open metallic door if installed)
- Power up the system
- Start the control software and display diagnostics DI for the pressure switch status (KA)
- Use the brass screw on the pressure switch to adjust it.
- Adjust the air pressure in order to have the "OK" message when the pressure is over 4 bars. As the sensor has hysteresis it will switch on above 5 bars. The pressure switch should be off as soon as the pressure is below 4 bars in order to insure a good actuation of the valves.
- Adjust the screw of the pressure switch until you get this result
- Re-install the right side metallic panel

4.2 Adjustment of the water flow controller

The water cooling circuit is an essential feature for the cooling of the chamber and the safety of the equipment. All water-cooled components are installed is a serial way: power blocks, process chamber and lamp reflector.

A water solenoid valve switches on the wafer flow on when required for the cooling. A water flow controller provides a safety interlock. They are located on the lower left side of the tool.



The water flow switch is factory adjusted and does not require any adjustment.

The cooling water flow may be reduced depending on the process conditions. The system is equipped with a flow controller that is set to 4 l/min. If water flow is lower the system cannot operate. If the water flow is between 4 l/min and 10 l/min the system may operate but is subject to overheating alarm if long or high temperature processes have to be performed.

5. SYSTEM SHUT DOWN

The system shut-down is performed using the following procedure:

- Shut down software
- Switch-off the system
- Shut down the computer
- Equipment isolation
- Verify isolation

5.1 Shut-down software

If the system is equipped with a turbo pump stop the turbo pump using the manual mode before system shut-down. If the software is temporary shut-down but not the system, then the turbo pump can remain running.

⚠ CAUTION

Turbo pump control

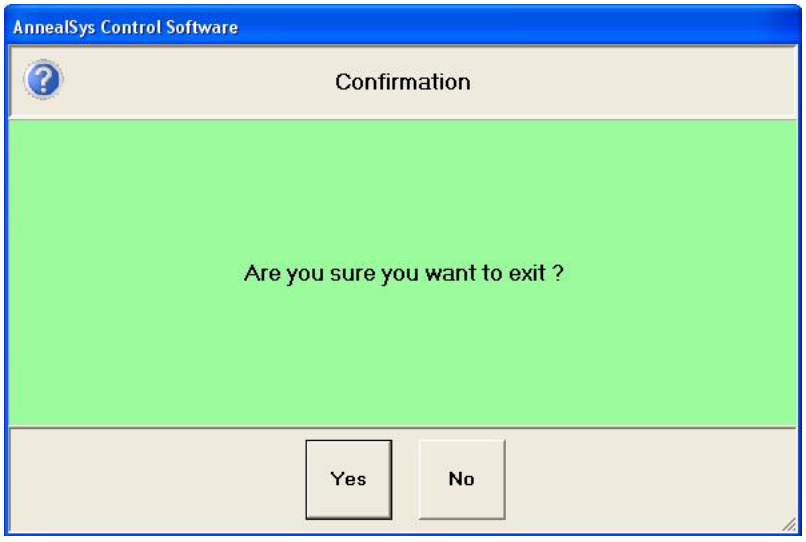
If the furnace is equipped with a turbo pump and if the furnace is going to be stopped, then the turbo pump must be stopped using the manual mode before switching off the furnace.

The PC software can be shut-down without stopping the turbo pump if the furnace is not going to be switched off.

The software can be shut-down using the "Shut-down" button in the main navigation bar or by a right click on the mouse.

The PC software can be stopped even if the machine is running. Nevertheless it is recommended to stop both PC and machine.

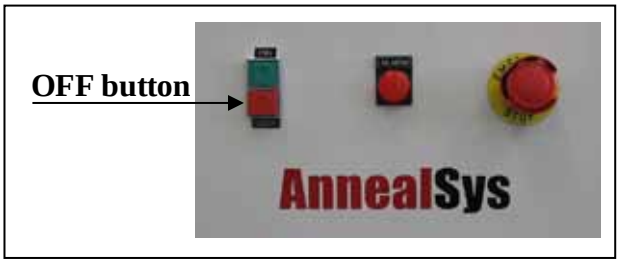
The system will ask for shut-down confirmation:



Confirm by "Yes" to exit.

5.2 Switch-off the system

Switch-off the system by pressing the red OFF button on the front panel.



5.3 Shut down computer

The computer is usually supplied by the sockets installed on the system backside. When the general circuit breaker is switched off these sockets are de-energized.

The computer must be shut down before switching off the general circuit breaker and isolating the system.

5.4 Equipment isolation 3x220V version

The equipment can be isolated using the general circuit breaker on the backside panel.

For the 3x220V version: Turn the handle on the left side (white part on top the circuit breaker is ON).

Circuit breaker ON

Circuit breaker OFF

Lockout of the circuit breaker:

The circuit breaker can be lockout when it is in off position. Pull the small plastic slider to open the hole for the installation of a padlock.

5.5 Equipment isolation 3x400V+N version

The equipment can be isolated using the general circuit breaker on the backside panel.

For the 3x400V+N version: Push the handle down.

	
Circuit breaker ON	**Circuit breaker OFF**

When the circuit breaker is in OFF position the locking device that is provided with the system can be installed with a padlock to lock the general circuit breaker in isolating position.

Insert the 2 metallic end of the locker inside the small groove in the black part on the circuit breaker handle and under the white enclosure as shown on the picture. Then push the orange plastic part and install a padlock between the orange part and the metal ring.

5.6 Stored energies

The power blocks include power capacitors but they are equipped with resistors to dissipate stored energy. It takes less than 2 seconds to relieve the stored energy. The power blocks can be dismantled without risk after the system has been isolated.

5.7 Verify isolation

In addition of the general circuit breaker it is recommended to isolate the equipment supply line and to check that there is no more energy by measuring the voltage on the supply cable terminal.

⚠ WARNING

Electrical shock hazard

If the power line is not isolated the supply cable terminal and wires to the main circuit breaker will remain energized.

The service operations must be carried out by trained and authorized technicians only.

If the power line remains energized the isolation of the system from the general circuit breaker can be checked on control circuit breaker and power contactor inlets.

6. MAINTENANCE

6.1 Periodicity of maintenance operation

Respect the periodicity of maintenance operations.

The periodicity of operation is strongly linked with process applications and must be adapted to the application.

The metallic housing protects the operator form contacts with powered parts.

During maintenance the system must be powered off.

⚠ WARNING

Electrical shock hazard

The power supply line and the furnace circuit breakers must be switched off and locked before starting maintenance operations.

These operations must be carried out by trained and authorized technicians only.

6.1.1 Reactor

Operation	Periodicity	Comment
Clean the reactor quartz window	When needed	Depends on process
Clean the processing chamber	When needed	Depends on process
Clean the pyrometer window	1 year	
Pyrometer calibration	When using new substrate and at least once a year	See user's manual

6.1.2 Furnace

Operation	Periodicity	Comment
Replacing lamps	When one filament is broken*	
Cleaning the reflector	When changing lamps	
Control of the lamp connections	2 months	

(*) We recommend changing the whole set of lamps as soon as one filament is broken and if the lamps are aging (filament not straight and bending, quartz colored or lamp connections corroded). If the other lamps are in good status only replace the broken lamp.

For further information, please feel free to contact Annealsys engineers.

6.1.3 Electricity

Operation	Periodicity	Comment
Control tightness of the electrical connections	1 year	
Change PLC battery	2 years	To be changed when battery led is lighting on the PLC

**** See disposal information hereafter for the lithium battery.***

6.1.4 Gas and vacuum

Operation	Periodicity	Comment
Check tightness of the gas lines	1 year	
Change the gas filters	1 year	
Perform a leak test of the process chamber	1 year	

6.1.5 Water and compressed air

Operation	Periodicity	Comment
Check water circuit tightness	1 year	

6.1.6 Safety interlocks

Operation	Periodicity	Comment
Check water flow safety interlock	1 year	Start a process without supplying the system with water
Check compressed air safety interlock	1 year	Start a process without supplying the system with air

6.2 Quartz liner

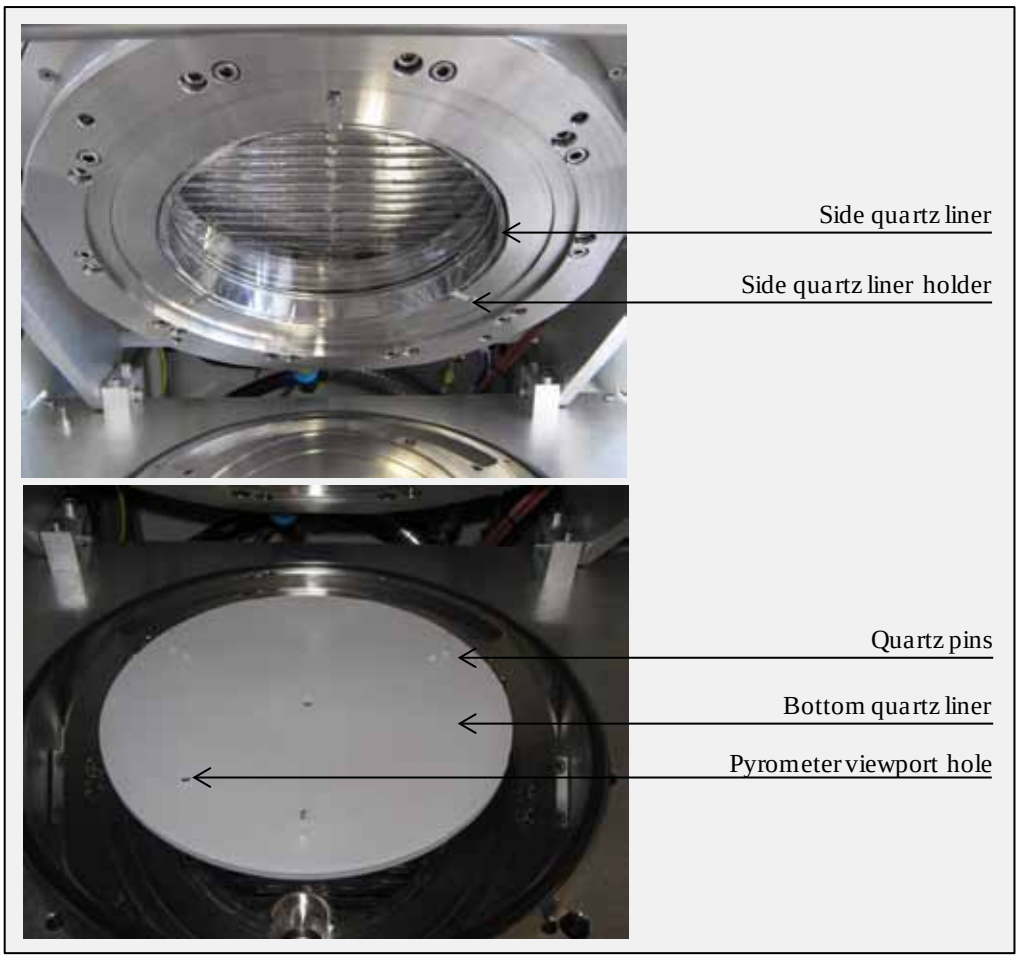
The chamber can receive a quartz liner as an optional feature.

The quartz liner is made in two parts: side quartz liner and bottom quartz liner.

The side quartz liner is a cylindrical part that is inserted inside the process chamber. This part is held by 3 small stainless steel holders bolded on the bottom side of the chamber flange and that come in the corresponding grooves of the quartz part.

The bottom liner just lies on top of the stainless steel bedplate and is positioned by the quartz pins.

The installation of the two parts is fast and easy.



When installing the bottom quartz liner, check that the hole for the side pyrometer viewport is on top of the corresponding hole on the bedplate.

6.3 Reactor cleaning

The cold wall chamber technology allows performing processes under ultra clean conditions and without any contamination from the chamber.

In some case the substrate can outgas some materials during the process and these process by-products may deposit on the process chamber walls or on the quartz window.

For this reason it may be necessary to clean the process chamber when some deposition is noticed on the walls or on the quartz window.

6.3.1 Cleaning procedure

If the system is equipped with the quartz liner remove it and clean it separately (see above).

The standard process procedure is to wipe the chamber walls and the quartz window with a lint-free cloth or paper and some IPA (Isopropyl alcohol).

	**⚠WARNING** **Burn hazard** **If this operation is carried out after a process or heating, the quartz window may remain at high temperature.** **Wait for window to cool down before operation.**

	**⚠WARNING** **Flame hazard** **Flammable solvents like IPA are common source of fire.** **If this operation is carried out after a process or heating, the quartz window may remain at high temperature. Wait for window to cool down before operation.**

Always check the cleanliness of the pyrometer window. Deposition or dust on the pyrometer window will reduce the transmission of the infrared radiation and will modify the temperature measurement parameters.

The pyrometer window is made of barium fluoride. **Never clean it with water.**

If the chamber cannot be cleaned with cloth and IPA other methods have to be used. Contact Annealsys service department for further information.

	**⚠WARNING** **Flame hazard** **Dispose of all IPA-exposed lint-free paper/cloth into a fireproof container, while ensuring all proper safety procedures and precautions are being followed**

6.3.2 Pyrometer window cleaning

If the pyrometer window is dirty the pyrometer receives less infrared signal from the substrate for the same actual temperature and therefore provides a wrong temperature signal that is compensated by the temperature control by applying more power to the lamps. This has of course a negative impact on the process.

If there is a drift in the pyrometer signal or in the power of the process for a usual temperature setpoint, the pyrometer window cleanliness must be checked and if necessary the pyrometer window must be cleaned.

Remove the pyrometer window using the following procedure:

Remove the 2 screws of the pyrometer holder

Remove the 4 screws of the pyrometer window flange

Carefully remove the flange with the window on top

The upper O-ring may stick on the bedplate

Remove the pyrometer window from its flange and it is now ready for cleaning (see next page).

⚠ CAUTION

Pyrometer window cleaning
The pyrometer window is made of Barium Fluoride. This material reacts with water.
The pyrometer window must not be cleaned with water.
Note that this material is very brittle. Handle window with great care.

The standard cleaning procedure to clean the pyrometer window is to wipe it with a lint-free cloth or paper and some IPA (Isopropyl alcohol).

Re-install the pyrometer window using the reverse procedure. Check that the upper O-ring is installed. The window is installed on the lower O-ring on top of the window flange.

Re-install the pyrometer and perform a new calibration. The pyrometer may not be strictly at the same position after dismantling and a pyrometer calibration is required before performing new processes.

6.4 Changing lamps

⚠ WARNING

Electrical shock hazard
The power supply line and the furnace circuit breakers must be switched off and locked before starting maintenance operations.
These operations must be carried out by trained and authorized technicians only.

⚠ WARNING

Burn hazard
If this operation is carried out after a process or heating, some parts including lamps and quartz window may remain at high temperature.
Wait for parts to cool down before operation.

⚠ CAUTION

Quartz part handling
Contact of fingers or skin with quartz parts may lead to irreversible quartz damage.
Always use gloves to manipulate quartz parts, O-rings and reactor parts.

Procedure to change the lamps:

- Switch off the general circuit breaker on the back side of the system
- Remove the metallic panel on the left side of the system
- Unscrew the nut of the ground wire of the furnace upper lid (on the cross aluminum profile)
- If the high temperature option is installed there is an additional fan on the upper lid. Disconnect the fan small white connector inside the machine.
- Remove the 4 screws on the top of the furnace upper lid
- Place fingers in the backside holes of the furnace cover and pull it upwards
- Remove the 4 screws of the intermediate furnace lid: 2 on front and 2 on back
- Pull the intermediate furnace lid upwards to remove it
- Remove the 2 screws on the top of the furnace inner lid
- Tilt the furnace inner lid to the back and disconnect the ground cable that is inside
- Remove the furnace inner lid
- Tilt the furnace to the back side and use the blocking axis to keep it tilted
- The lamps can be checked when the furnace is open
- It is recommended to change all the lamps that no more have a straight filament
- To change a lamp remove the screws on the connections on each side
- Pull the lamp out of the furnace from the side
- Install a new lamp
- Reconnect both side
- Put the furnace back to the horizontal position
- Reinstall the 3 furnace lids using the reverse procedure of the dismantling
- Reinstall the metallic panel on the system left side

6.5 Changing the quartz window

⚠ WARNING

Burn hazard
If this operation is carried out after a process or heating, some parts including lamps and quartz window may remain at high temperature.
Wait for parts to cool down before operation.

⚠ CAUTION

Quartz part handling
Contact of fingers or skin with quartz parts may lead to irreversible quartz damage.
Always use gloves to manipulate quartz parts, O-rings and reactor parts.

If the system is equipped with the quartz liner remove it before changing the quartz window.

6.5.1 System without UHV kit tightness option:

If the system is **not** equipped with the **UHV kit option** (standard system version) the reactor gas inlet house may not be disconnected from the reactor flange.

If you want to disconnect it before dismantling the quartz window, the fitting is located on the reactor back side. Procedure:

- Dismantle the left panel of the system
- Disconnect the rear side fan (on the lid). There is a small white connector
- Remove the 4 screws that are inside the backside upper lid (2 on each side)
- Remove the backside upper lid
- Remove the 3 furnace lids
- Disconnect gas hose from the inlet fitting on the back side of the process chamber as shown on the picture

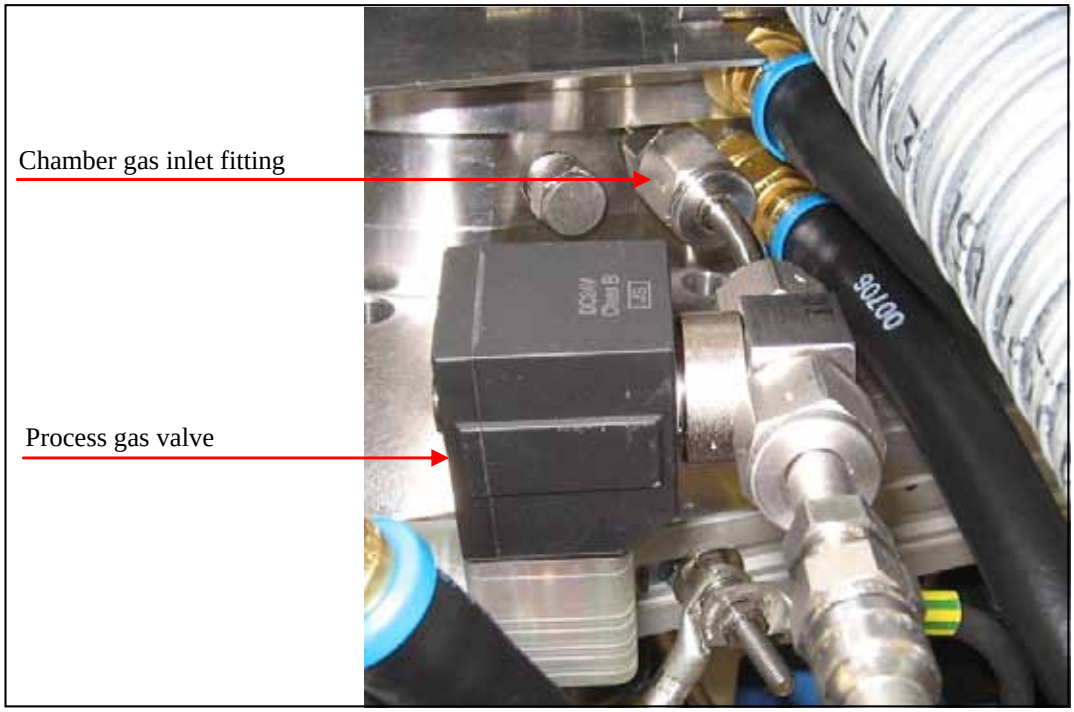
Chamber gas inlet fitting
Unscrew here

- Then follow the standard procedure hereafter

6.5.2 System with UHV kit option

If the system is equipped with the UHV kit option (like for turbo pump installation) the process gas valve must to be dismantled before dismantling the quartz window. The fitting is located on the reactor back side and the procedure is the following:

- Dismantle the left panel of the system
- Disconnect the rear side fan (on the lid). There is a small white connector
- Remove the 4 screws that are inside the backside upper lid (2 on each side)
- Remove the backside upper lid
- Remove the 3 furnace lids
- Dismantle the VCR gas inlet fitting on the backside of the process chamber as shown on the picture

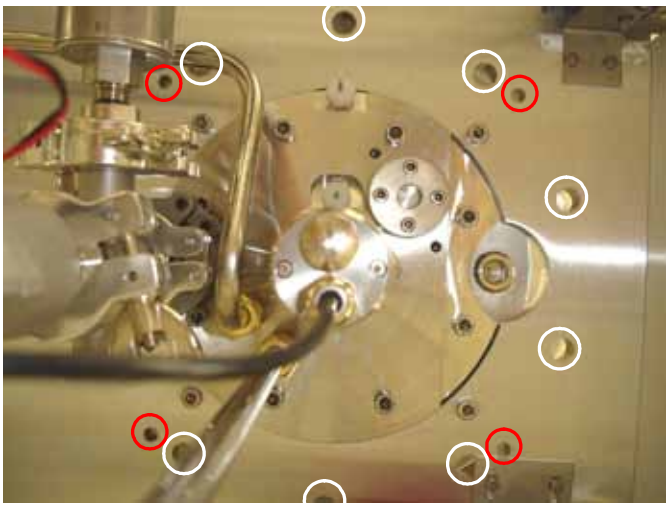


- Then follow the standard procedure hereafter

6.5.3 Standard procedure to dismantle the window

- The water circuit is not sealed by the quartz window but there is a water path between the 2 upper flanges and the water circuit must be purged. To drain the water circuit open the water valve using the manual mode of the software and flush the circuit with compressed air.
- Open the process chamber
- Loosen the 10 screws that are indicated by white circles but do not remove them has they hold the chamber with the quartz window

- Close the chamber
- When the chamber is closed remove the 10 screws from the bottom side of the base plate using the 10 holes in the base plate. The holes are indicated with white circles on the pictures (2 holes cannot be seen on the picture hereafter).
- Use 4 screws M6x60 (delivered with the system) to tight the chamber on the bedplate through the 4 holes indicated with red circles on the picture. (No need to firmly tight these 4 screws)



- Go to the manual mode on the software and unlock the chamber
- Lift the lamp furnace and gently push down the quartz window that may be stuck on the O-ring
- Open the chamber slowly (be careful as there is less weight the air spring will be stronger) and check that the quartz window is not going up with the upper flange. Otherwise push the quartz window again from the top.

6.5.4 Procedure to install the quartz window

- Install the window on the chamber
- Install the O-ring around the quartz window
- Gently close the top lid to have the upper flange coming on the chamber

⚠ CAUTION

Closing the top lid is the most delicate operation. If the top lid hits the edge of the quartz window, a small crack can form on the quartz that may lead to breakage of the quartz window in subsequent processes. Check that the window in correctly centered with the O-ring and that upper flange is centered on top of the quartz window.

- Close the chamber with the handle
- Remove the 4 screws that hold the chamber through the base plate (red circles)
- Install the 10 screws in the holes through the bottom side of the base plate
- Gently thigh this 10 screws
- Use the software to unlock the chamber
- Open the chamber
- Retighten the 10 screws. As the 2 flanges are coming in contact without direct tightening of the quartz window the screws can be tightened without risk. The quartz window tightness is made by pressing the Viton O-ring that is installed around it.

- If the system is **not** equipped with the **UHV kit option**, reinstall the gas hose on the inlet fitting, reinstall the backside cover, connect the fan and reinstall the 3 furnace lids and the backside panel.

- If the system is equipped with the **UHV kit option**, reinstall the gas inlet fitting with a new VCR gasket, reinstall the backside cover, connect the fan and reinstall the 3 furnace lids and the backside panel.

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- Replacement of the PLC battery

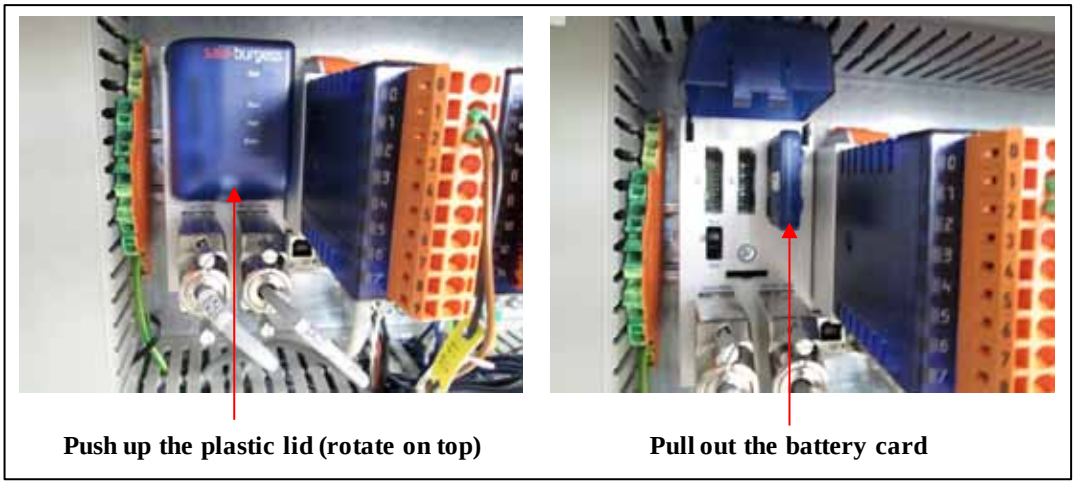
On the AS-One the PLC software is into a RAM memory that is supplied by a battery with a lifetime of about 2 years. For this reason, it is recommended to replace the RAM battery of the PLC every two years.

There is a backup of the PLC software in a Flash memory inside the PLC. In case of battery failure or any software corruption, the system will automatically restore the software from the Flash memory to the RAM memory so that the system can operate under safe conditions. This procedure is fully automatic and does not require any action from the user.

⚠ CAUTION

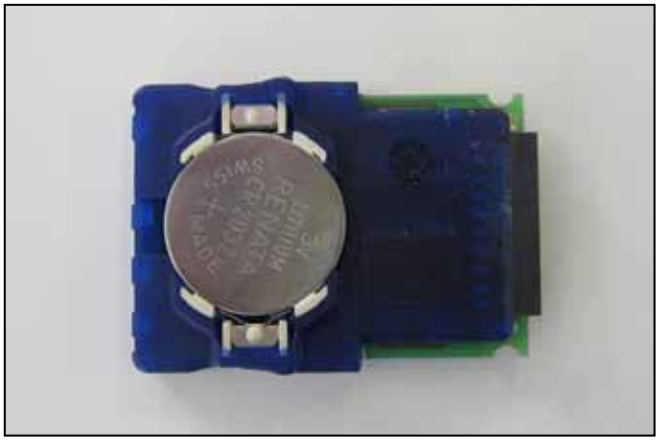
Do not switch-off the general circuit breaker.
The PLC must be powered when replacing the battery in order to avoid data loose.

The PLC battery is installed on a small board on the left side of the PLC. Lift the blue cover to have access to the battery board



Push up the plastic lid (rotate on top) **Pull out the battery card**

Pull the battery module to have access to the battery. Remove the old battery and install the new one. See disposal instruction for the old battery.



Reinstall the battery card in the PLC and close the plastic lid.

7. SPARE PARTS LIST

⚠ CAUTION

Replacement of parts. Non-original parts utilization
Use of parts from other companies can results in functional disturbances. This could lead to serious injuries and to considerable equipment damage.
For maintenance operation always use original Annealsys parts.

7.1 Recommended spare part kit

Description	Part number	Qty	Delivery
Reactor quartz window D190x9	P111-017	1	1 week
Viton O-ring for bedplate 5.33x177.17	PV177.17FF80N	1	1 week
Viton O-ring for quartz window 185.00x4	PV185.00EA80N	1	1 week
Tubular halogen lamp 1200W 144V	P020-001	12	1 week
Thermocouple with connector lg. 76/10	P130-018	2	1 week
Set of 10 O-Ring for thermocouple feedthrough	P090-007	1	1 week
Set of 3 beveled quartz pins H12	P110-029SET	1	1 week
Set of 3 outer quartz pins H20.5	P110-057SET	1	1 week

7.2 Additional spare part kit

Description	Part number	Qty	Delivery
BaF_2 window for pyrometer D20x4	P111-005	1	1 week
Filter for purge gas line	P080-050	1	1 week
Filter for process gas line with mass flow controller	P080-050	1 per line	1 week
Chamber gas hose	D080-0021	1	1 week
Water hose for chamber (type 1)	D060-0072	2	1 week
Water hose for chamber (type 2)	D060-0073	1	1 week

7.3 Other spare parts

Description	Part number	Qty	Delivery
Power block power mode control board version 3	P010-4993	1	1 week
PLC battery	P013-071	1	1 week
Water solenoid valve 2/2 NF brass Viton 220V	P060-041	1	1 week
Flow controller 4 l/mn G1/2	P060-045	1	1 week
Inner Viton O-ring for upper flange 3.53x148.82	PV148.82DL80N	1	1 week
Outer Viton O-ring for upper flange 3.53x253.59	PV253.59DL80N	1	1 week
Inner Viton O-ring for chamber 3.53x132.94	PV132.94DL80N	1	1 week
Outer Viton O-ring for chamber 3.53x190.09	PV190.09DL80N	1	1 week
Water connection O-ring for chamber 3.53x12.29	PV012.19DL80N	1	1 week
Outer Viton O-ring for bedplate cover 3.53x123.42	PV123.42DL80N	1	1 week
Viton O-ring for bedplate cover 2.62x9.19	PV009.19CO80N	1	1 week
Viton O-ring for bedplate cover 2.62x7.59	PV007.59CO80N	2	1 week
Viton O-ring for bedplate cover 2.62x6.02	PV006.02CO80N	4	1 week
Viton O-ring for pyrometer window 2.62x13.94	PV013.94CO80N	2	1 week
Viton O-ring for edge pyrometer light beam 2.62x7.59	PV007.59CO80N	1	1 week
Viton O-ring for edge pyrometer light beam 2.62x13.94	PV013.94CO80N	1	1 week

7.4 Critical spare parts

Description	Part number	Qty	Delivery
Temperature sensor interface	P010-5030	1	1 week
Single power converter 220/220 15 kW Power control version 3 T. 20 **(for 3x220V supply AS-One version)**	P011-013C	1	1 week
Single power converter 400/440 15 kW Power control version 3 T.20 **(for 3x400V supply AS-One version)**	P011-014C	1	1 week
Short tangential Fan 24V	P012-076	3	1 week
SAIA PLC PCD3 M5340	P013-077	1	1 week
SAIA PCD3 E165 Board 16 digital inputs 24V	P013-063	1	1 week
SAIA PCD3 A465 Board 16 digital outputs 24V	P013-064	1	1 week
SAIA PCD3 W300 Board 8 analog inputs 12 bits 0-10V	P013-049	1	1 week
Air pressure switch	D070-0007	1	1 week
Pressure transducer NPT 1/4M	P091-014	1	1 week
Air spring 100 mm motion 230 N	D040-0105	1	1 week
Right angle vacuum valve SS KF16	P090-009	1	1 week
Solenoid Valve NC 220V SS/Viton G1/4	P080-003	1	1 week

For other spare parts refer to the part lists in the technical files.

8. ENVIRONMENTAL INFORMATION

8.1 Bill of materials

The materials of the main parts of the system are available in the parts lists in the technical files.

8.2 Disposal

8.2.1 Lithium battery

The SAIA PLC controller is equipped with a Lithium battery to save data. This battery in installed on a board on the left side of the controller.

Refer to local disposal regulation for lithium battery when this battery must go to waste.

Revision history

Revision History			
Document Title	**AS-One 100 Technical manual**		
Filename	**ASOne100_Technical_Manual_EN_V2-02.docx**		
Version Number	**2.02**		
Author	**Franck Laporte**		
Version	**Brief Description of Changes**	**Date of Issue**	**Initials**
1.6	Modification for SEMI-S2 compliance	January 28, 2006	FLA
1.7	Disconnect chamber gas fitting prior to dismantle the quartz window New power block part numbers (cooling plate 20 mm thick)	June 14, 2006	FLA
1.8	New electrical panel configuration. No more analog MFC interface board. Procedure to change the lamp is updated to the 3 furnace lids	July 26, 2006	FLA
1.8.1	High temperature option with additional fan on furnace lid	September 14, 2006	FLA
1.9.0	Added floor standing version Procedure to replace the PLC battery	January 30, 2007	FLA
1.9.1	Added automatic opening version	October 18, 2007	FLA
1.9.2	The benchtop version is removed as no longer manufactured	December 13, 2008	FLA
1.9.3	Sensor interface board replaces the converters	December 20, 2008	FLA
1.9.4	Quartz liner option	May 19, 2009	FLA
1.9.5	Pyrometer window cleaning	September 9, 2009	FLA
1.9.6	New logo	March 16, 2010	FLA
1.9.7	Flush of water circuit with compressed air to drain it	January 22, 2011	FLA
1.9.8	Additional warning in constructor's forewords	February 23, 2011	FLA
1.9.9	Additional caution on quartz window installation	October 31, 2011	FLA
2.00	Document contains original instructions of the manufacturer The EC declaration of conformity is available in the installation manual and the user's manual	December 27, 2012	FLA
2.01	Update of the procedure to exchange the PLC battery	January 10, 2014	FLA
2.02	Annealsys CT	May 26, 2014	FLA