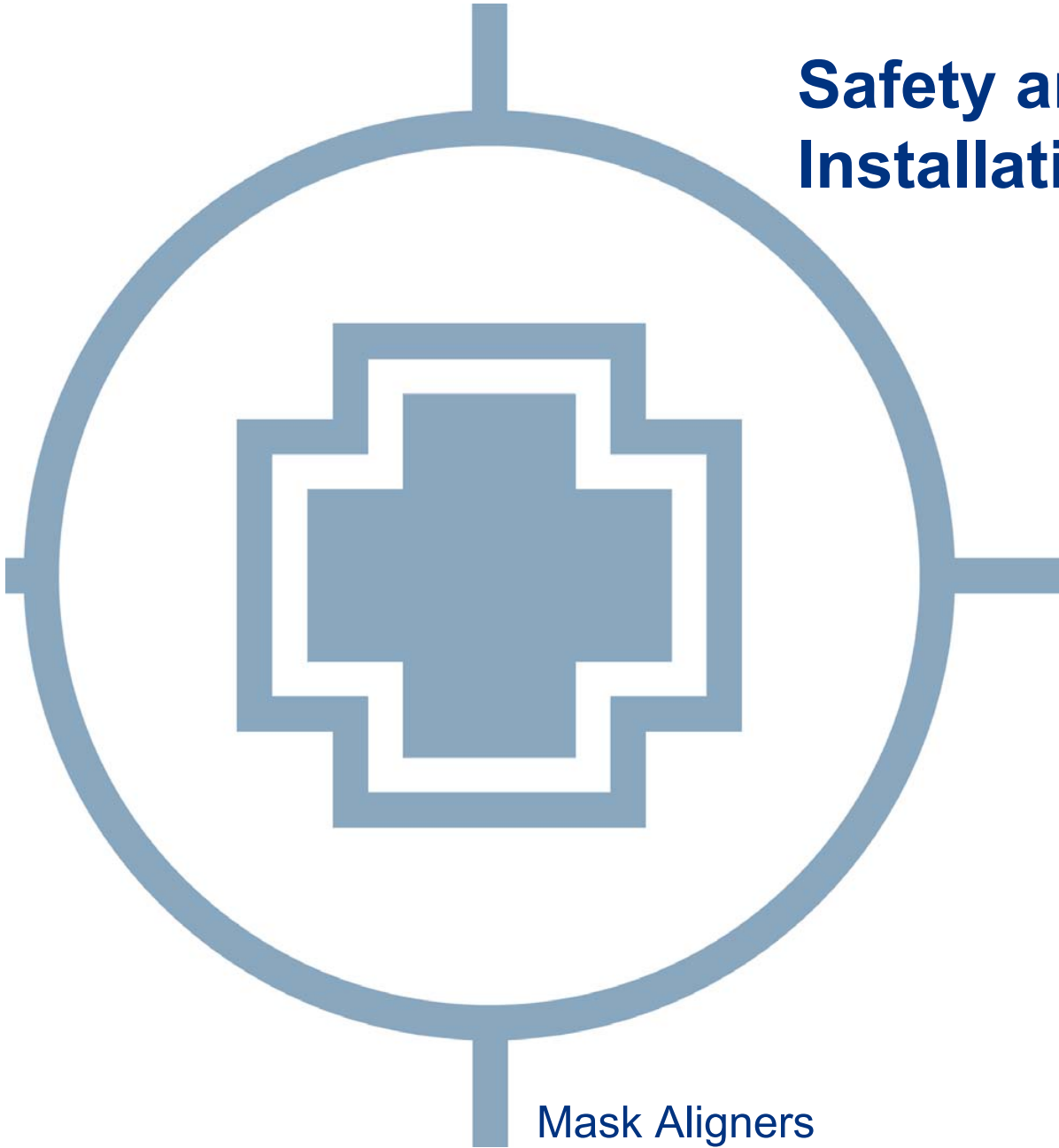


Safety and Installation



Mask Aligners

MA6-MA8

Rev 00/04-06

CONTENTS

Contents	1
1. Warnings and Safety Precautions	1
1.1. General Safety Information	1
1.1.1. User Requirements	1
1.1.2. Definition of Qualified Personnel	2
1.1.3. Tasks to be Performed by Personnel and related Training Requirements	2
1.2. Recommended Safety Equipment	3
1.3. Safety-Related Terms and Symbols	4
1.4. Intended Use of the Laboratory Mask Aligner	5
1.5. Transport and Installation	6
1.6. Maintenance and Service	6
1.7. Safety Hazards Inherent to the Machine	7
1.7.1. Electrical Hazards	7
1.7.2. Mechanical Hazards	8
1.7.3. Thermal Hazards	9
1.7.4. Noise Emission Hazard	9
1.7.5. Radiation Hazards	9
1.7.6. Chemical Hazards	10
1.7.7. Increased Hazard after Extraordinary Events	12
1.8. Safety Systems and Procedures	13
1.8.1. Interlocks	13
1.8.2. Emergency OFF (EMO)	17
1.8.3. Location of Potential Hazards in the Machine	17
1.8.4. Hazard Alerts	20
1.8.5. Lockout/Tagout Procedures	21
1.8.6. Resource Conservation	23
1.9. Warranty and Void of Warranty	24
1.10. Working with the Mask Aligner	24
1.10.1. General Description	24
1.10.2. Replacement of the Exposure Lamp	24
1.10.3. N2-Control Unit	25
1.10.4. Operating Procedures	25



- 2. Installation of the MA6-MA827**
 - 2.1. General Requirements 27
 - 2.1.1. Preparation of the Installation Site27
 - 2.1.2. Receiving.....27
 - 2.1.3. Transport of the Machine Crates27
 - 2.1.4. Storage of the Machine Crates.....28
 - 2.1.5. Disposal of Packaging Materials28
 - 2.1.6. Transport Without Pallet.....28
 - 2.1.7. Decommissioning30
 - 2.2. Warranty and Limitations31
 - 2.3. Utilities31
 - 2.3.1. Environmental Requirements32
 - 2.3.2. Weight of the MA6/MA833
 - 2.3.3. Dimensions.....34
 - 2.3.4. Earthquake Tie-Down Layout.....38
 - 2.3.5. Pneumatic Connectors39
 - 2.3.6. Lamp Cooling40
 - 2.4. Mode Set-Up: MaskAligner or BondAligner43

1. WARNINGS AND SAFETY PRECAUTIONS

1.1. General Safety Information

IMPORTANT: This section contains information that the operator must know and understand in order to minimize the risk of injuries.

This section describes general safety precautions and procedures which must be observed and followed by all persons working with the equipment covered by this manual. After a thorough review by qualified safety personnel, the user should generate specific safety procedures with regard to particular application and configuration of the equipment and local codes. Operators must be thoroughly familiar with these procedures which should also be posted in an accessible location so that all equipment operators are exposed to the information on a continuing basis.

In addition to the specific safety precautions detailed in this section, anyone working with or in close proximity to the equipment described in this manual should observe normal precautions and safe operating practices generally applicable to the operation of semiconductor production and processing equipment.

1.1.1. User Requirements

The management responsible for the safety of the installed equipment must ensure the following:

- Only qualified and adequately trained personnel is permitted to carry out work on or with the system.
- These persons are able to consult the instructions supplied with the system and other product documentation at any time and they follow the instructions in this documentation consistently.
- Non-qualified personnel do not carry out any work on or in the vicinity of the system.
- The user must install adequate safety procedures to guarantee that only specifically trained personnel get access to situations presenting increased hazards or requiring specific knowledge - for example firm rules- to avoid that the key for getting access to Teach-/Service Mode will be available for others.
- The user must provide all personnel having contact with or working in the proximity to the equipment with all safety information contained in each of the equipment manuals, and ensure that they have been properly trained in the safety requirements of the system as well as trained in the use of required Personal Protective Equipment.
- The user must ensure that all personnel working with the equipment have been properly trained in its operation, and that all personnel follow at all times all applicable operating instructions and/or procedures contained in this manual.
- The user must adhere to all safety information provided in this manual and all other applicable safety and site preparation information supplied or referred to by SUSS MicroTec Lithography GmbH.
- The user must provide applicable safety information on all materials processed by the machine, if such material is rated as being toxic, carcinogenic or irritating - especially Material Safety Data Sheets (MSDS).
- The user must not remove, modify, obscure, or in any other way alter the content or readability of any safety labels or placards located on or inside the equipment.
The user must not install additional labels or placards or make any other additions or modifications that have the effect of drawing attention away from, or reducing the effectiveness of, any safety labels or placards installed by SUSS MicroTec Lithography GmbH.
- The user must not take action on the system other than described in the manual!
- The user must not change or modify the system without the prior written permission of the manufacturer.

- The User must replace defect system components.
- The User must use only original spare and wear parts.
- Operators must not run the system with removed covers or defeated interlocks.

1.1.2. Definition of Qualified Personnel



Caution!

The instructions contained in this manual are for qualified personnel only. Do not attempt to run the machine unless you are entitled to do so.

Qualified personnel are persons, who on account of the training and instruction they have received and their experience and knowledge of relevant standards, specifications, accident prevention regulations and operating conditions, have been authorized by those responsible for the safety of the system to carry out any necessary work and who are able to recognize possible dangers.

All system users are advised to become familiar with the contents of these safety instructions prior to operating the system. They also should have read and understood the operating instructions. In addition, always comply with local health and safety regulations and company safety requirements regarding safe usage of equipment.

Knowledge of the first aid and the local rescue facilities is also required.

1.1.3. Tasks to be Performed by Personnel and related Training Requirements

1.1.3.1. Operating the MA6-MA8

This requires:

- knowledge of how to handle process material safely.
- knowledge of the microscope alignment process in the machine and of the EISS sub-system use.
- understanding the exposure process
- and understanding the presentation of the pro-

cess status in the User Interface.

1.1.3.2. Start-up, Shut-down and Configure the MA6-MA8

This requires (in addition):

- knowledge of how to start the machine and the UV lamp.
- knowledge of how to select and start alignment and exposure programs.
- knowledge of how to handle photo-masks safely during loading and unloading
- and understanding how to identify potential problems with the machine.
- knowledge of how to use the MA6-MA8 EISS sub-system for configuration and programming
- Understanding the parameters to be programmed and the inherent risk of damage to material or equipment caused by a wrong process.

1.1.3.3. Perform Light Measurement and Adjustment

This requires:

- knowledge of how to use the SUSS light measurement probes
- practice of preparing measurement protocols
- understanding the potential hazard originating from UV-radiation.
- knowledge of how to adjust lamp power at the CIC
- knowledge of how to adjust light uniformity using the lamp positions adjustment - and in complex situations also the lens positions.

1.1.3.4. Perform Safety Checks on the MA6-MA8

This requires:

- understanding the hazards caused by UV-radiation, by a hot UV-lamp, by mechanical movements and by electrically energized parts- also the understanding of how to avoid all these hazards.
- understanding how all interlock and safety functions of the machine are working.
- knowledge of how to check the safety on the machine and how to defeat and reinstall interlocks.
- practice in filling of safety check reports.

1.1.3.5. Exchange of UV-Lamp

This requires:

- special training for exchanging the exposure lamp:
i.e. handling of the lamp, performing electrical connections to the lamp, checking and adjusting lamp positions, checking of lamp cooling, ability to identify degraded mirrors.

1.1.3.6. Perform General Trouble Shooting and Maintenance

This requires:

- special training for Maintenance Access Points
- understanding machine states and processes
- experience in using the service program (ServiceGUI)
- knowledge in handling of cleaning agents- including flammable liquids - and grease
- detailed knowledge of mechanical machine components

1.1.3.7. Perform Service Tasks

This requires:

- special training for dedicated service by a SUSS MicroTech Lithography trainer.

1.2. Recommended Safety Equipment

At a minimum, it is recommended that the user supplies the following personal safety protective equipment (PPE) and make it readily available at the machine installation site:

- Optical Safety Glasses filtering UV-radiation (according to EN170) for extended working at the exposure area (i.e. during light measurement) or near the uncovered light beam (i.e. lens adjustment). SUSS recommends part# 185245.
- Face Shield or Mechanical Safety Goggles (according to EN166) during the handling (exchange) of an UV-lamp, or when fragments of substrates must be handled.
- Chemically Resistant Clean Room Gloves and Lab Coat and Apron, for handling poisonous substrates, wafer fragments or cleaning agents.
- Optional special safety equipment, if recommended by an MSDS or the material supplier, for handling of custom specific materials having a potential impact on operator's health.

Note:

Always read the instruction sheet for the respective safety device and follow supplier's instructions!

1.3. Safety-Related Terms and Symbols

The terms **DANGER**, **WARNING**, **CAUTION** and **NOTE** are used in these instructions and at warning labels on the machine to point out particular dangers or unusual information to which special attention must be paid.

Danger!

indicates an imminently hazardous situation which, if not avoided, could result in death or serious personal injury;

Warning!

indicates a potentially hazardous situation which, if not avoided, could result in death or serious personal injury; - substantial damage to property could also result if proper precautions are not taken.












Caution!

indicates that personal injury or damage to property can result if proper precautions are not taken.

Note!

draws attention to special technical product information which may not be immediately obvious even to qualified personnel.

The following ISO 3864 symbols are used in the manual and at the machine to alert to specific hazardous situations

	Electric Shock Hazard Warning
	Crush or Pinch Point Warning
	Intensive Light + Potential Eye Damage Warning with UV insert: Invisible Ultraviolet Light without insert: Invisible Infrared Light and/or visible Light
	Laser Beam Warning
	Hot Surface Warning
	Explosion Warning
	General Warning Symbol (always with Explanation)
	Wear Appropriate Safety Goggles - Action Symbol
	Wear Face Shield Action Symbol
	Wear Gloves or Gauntlets Action Symbol
	Read Instruction Symbol

The transport, assembly, operating and maintenance instructions and other technical data (in the instructions, product documentation and on the product itself) which is not specially emphasized as described above must also be observed in order to avoid faults which may, in turn, directly or indirectly result in severe personal injury or damage to property.

1.4. Intended Use of the Laboratory Mask Aligner

The system described in this manual has been manufactured according to the technical standards, safety regulations and EC guidelines.

If not installed properly or not used as directed, dangerous situations or damage might occur.

The mask aligner is designed as a photo-lithographic system for 1:1 direct projection of structures from a photo mask to photo-sensitive coated substrates, which have been adjusted to the mask. As light source a closed UV-source is used together with adapted exposure optics.

Integrated components - like the lamp power supply - are designed strictly with the specific use in mind.

Any other use of the machine than as a photo-lithographic system or of its components is not intended by design!

Note:

After manual reconfiguration of the mirror house position and of the alignment stage adapter followed by a restart, the machine can be used as a bond aligner (substrate-to-substrate aligner) without the exposure



Danger!

Owing to its functional characteristics, equipment of this type may cause serious personal injury or material damage if it is not used or operated in the correct manner, is not sufficiently maintained or if unqualified personnel have access to it.

If, in special cases, the systems are to be used for applications where requirements may be more stringent, compliance with such requirements must be assured during installation by the provision of additional protective measures on site.

Any uncertainties regarding this, especially if detailed product-specific information is not available, must be clarified with the appropriate Suss MicroTec Lithography service centre. The system type and serial number must be quoted when making inquiries.

You are advised to make use of the support and services offered by the competent SUSS MicroTec Lithography service centre with regard to planning, installation, commissioning and servicing.

See the last page of manuals (resp. last cover page of printed folders) for a list of SUSS units and representatives worldwide - valid at the time of manual publication.

For the latest contact list go to www.suss.com !



Warning!

Only use accessories authorized by Suss MicroTec Lithography GmbH in order to avoid fire or other damages to the system. Accessories authorized by Suss MicroTec Lithography GmbH are compatible with the system.

Any unauthorized changes or modifications to the system or use of incompatible accessories would void all warranties. Please consult SUSS MicroTec Lithography GmbH before implementation of any change or modification.

When working with hazardous process materials the local laws, regulations, codes and Material Safety Data Sheets (MSDS) regarding these materials have to be considered and observed.

Always make sure that all covers are in place and closed **before** the machine is switched on.

1.5. Transport and Installation



Warning!

It is assumed that all basic planning work concerning installation and all work regarding transport, assembly, commissioning, maintenance and repair will be carried out by qualified personnel and/ or monitored by responsible, skilled personnel.

Particular attention must be paid to the following:

- technical data and information concerning permitted use (assembly, connection, supply and exhaust adjustments, ambient and operating conditions) specified in the brochure, order documents, manuals, instructions and other product documentation.
- the general installation and safety regulations,
- the proper use of tools and transportation devices,
- the local requirements and
- system-specific specifications.
- the obligation of those responsible for the installation to provide employees with suitable safety instruction in accordance with local accident prevention regulations.

The product documentation contains instructions which must be followed by qualified personnel in situations in which the equipment is used for its intended purpose.

The transport, assembly, operating and maintenance instructions and other technical data (in the instructions, product documentation and on the product itself) which is not specially emphasized as described above must also be observed in order to avoid faults which may, in turn, directly or indirectly result in severe personal injury or damage to property.

See particularly Chapter 2. Installation and also the installation instructions of optional components and/ or OEM subassemblies (i.e. CIC Lamp Power Supply and eventual special equipment)

For safe environmental conditions see section Environmental Requirements below.

1.6. Maintenance and Service

Specific maintenance and service related safety instructions are defined within a special maintenance section of the user manual.



Warning!

Only qualified and equipment specific trained personnel are allowed to run the equipment in service mode because incorrect machine handling could result in serious damage to the machine and in personnel suffering injuries. Under no circumstances should users with only operator or manager authorization operate the machine in this mode or perform service tasks.



Warning!

Only use accessories, spare parts and consumables authorized by SUSS MicroTec in order to avoid personal injury or damage to the machine. Authorized parts are compatible with the system. If incompatible parts are used, the system may become severely damaged.

At regular intervals check all supply lines and fittings to prevent loose fittings and leakage. Also perform maintenance tasks as described in the Preventive Maintenance Manual of the machine.

When Service tasks are completed and the machine should be set to operation mode, make sure that all covers are in place, interlocks are activated before the system is switched on again.



Warning!

With only operator authorization do not run the machine if it is still in service mode. Call for maintenance/ service technician to complete his task and to set back the machine into automated operation mode.

1.7. Safety Hazards Inherent to the Machine

This section describes specific safety hazards or potential hazards which may be associated with the use of this equipment, the possible consequences of human interaction with the hazard and the method(s) for avoiding the hazard.

Hazards described in this section are:

- Electrical Hazards by potentially lethal voltages or by energy high enough to ignite fire.
- Mechanical Hazards by rotating and moving machinery parts or by disploding UV-lamp bulbs
- Thermal Hazards by hot surfaces or hot internal parts
- Noise Emission Hazards
- Chemical Hazards by specific materials or agents (Contamination, spill, ...)
- Non-Ionizing Radiation Hazards

1.7.1. Electrical Hazards

Protection against electrical hazards is provided in general by closed, grounded cabinets for the electrical devices using dangerous voltages.

Those are the central section of the machine, power supplies for UV-lamps, electronics and computer.

Dangerous voltage is also present in the lamp house.

All boxes are marked with the electrical hazard label.



Warning - Hazardous Voltage!

When the covers or connectors are removed from any component of the machine, hazardous voltages may be exposed.

Hazardous voltages can cause severe injury or death. Never remove the rear or side panels of the modules or any other equipment housing, cover or shroud while the power line is connected.



Warning!

For maintenance works - at first always try to work at a fully de-energized „electrical cold“equipment.

Follow the Lockout/Tagout procedures described in the machine documentation or by your in-house instructions.

Energized Electrical Work - Voltage Types (SEMI S2-0302, Sect. 11)

- TYPE 1 Equipment is fully de-energized (electrical „cold“)
- TYPE 2 Equipment is energized. Energized circuits are covered or insulated. Work is performed at a remote location to preclude accidental shock.
- TYPE 3 Equipment is energized. Energized circuits are exposed and accidental contact is possible. Potential exposures are less than 30 volts rms. 42,4 volts peak, 240 volt-amps and 20 joules.
- TYPE 4 Equipment is energized. Energized circuits are exposed and accidental contact is possible. Voltage potentials are greater than 30 Volts rms, 42,4 Volts peak, 240 Volts-amps. 20 Joules or radio frequency (rf) is present.

It should never be necessary for the operator to open the cover of an electrical portion of this machine. If any electrical problem occurs, turn the machine off and notify a supervisor or maintenance staff immediately.

If working at a fully de-energized equipment is not possible, only specifically trained technicians are authorized to service the electrical system of an energized „electrical hot“equipment - When performing so, always observe and obey your safety in-house instructions.



Important!

In case of danger for a person servicing „electrical hot“equipment actuate the Emergency Off Button (EMO) immediately!

**Danger - High Voltage!**

The machine operates under high voltage!

Voltage may be still present in supply sub systems when the machine is switched off, but still connected to the mains power supply.

All power to the system must be completely disconnected before servicing electrical systems to prevent the risk of electrical shock.

Prior to opening system disconnect system from mains power supply completely (main switch in OFF position). Maintenance, adjustment etc. on the electrical system must be performed by specifically qualified personnel with the corresponding access permission only. Electrical drawings must be available during such work and must be fully understood by the service technician.

In case of any fuse replacement use fuses only of the same type and with the same load as the replaced fuse. Never use auxiliary fuses or short circuit the fuse block.

When removing internal components (capacitors, motor regulators) from the equipment observe the warning labels (on them or in the schematics) and make sure that the respective device has been discharged.

Do not remove or cut off any ground wire of the system or the power supply.

1.7.2. Mechanical Hazards**1.7.2.1. Moving Parts**

Improper operation of the machine may result in serious injury from moving actuators such as alignment stage, mirror house or displacement of the microscope. Such positions are marked by a nearby crush warning symbol (if attachable)

**Warning!**

Your fingers could be jammed or body parts could be hurt by a machine part in action.

Do not take any action during operation of the machine to remove any obstructing element until a stop command is sent to the active actuator.

1.7.2.2. Pressurized Lamps

Improper handling of an UV lamp may result in injury from fragments of the exploding pressurized lamp. Lamps must be protected from mechanical impacts during all handling, i.e. during lamp exchange. A hot lamp has high inside gas pressure - extreme temperature shock to a hot lamp could cause also explosion. This could happen by premature opening of the lamp house.

**Warning!**

Fragments of an exploding UV lamp could severely injure eyes or other body parts.



An UV lamp not enclosed in the original manufacturer's box must be handled only with gloves and protected by a face shield or by mechanical safety goggles!



High power lamps (2 kW and more) are pressurized also when cold. They must be handled with special care and only when protected by a face shield and chest protector (see section Safety Equipment above).

Always follow also the instructions (inside the original transport box) given

by the lamp manufacturer

Premature opening of the hot lamp house may result in lamp explosion.

Lamp explosion also results in release of mercury - liquid when cold and vaporized when hot. For further details see section Chemical Hazards below.

After lamp explosion immediate decontamination is mandatory, because mercury represents a potential serious threat to health and pollutes the environment (see also section Chemical Hazards).

1.7.2.3. Compressed Gases

The machine uses compressed air for many functions and for vibration damping. Compressed air has the potential of harming people if abused or in cause of a fierce leak. Do not lacerate pneumatic tubes or disconnect a pressurized tube!

Always make sure that the gas supplies (CDA and Nitrogen) are switched off prior to work at the pneumatic system.

1.7.3. Thermal Hazards

Thermal hazards will result from premature contact with heated portions of the equipment and may arise by premature opening of the lamp house door. The UV lamp bulb and sockets are extremely hot when ON. After switching off the lamp the interior of the lamp house needs further cooling.

During normal operation the upper exhaust duct of the lamp house on back of the machine can attain the temperature of about 70°C. Do not touch!
The lamp house is labeled by a hot surface symbol.

Halogen lamps for microscope illumination will be also very hot when switched ON - Do not touch. Before changing halogen lamps, wait some minutes to cool down.



Warning!

Before opening the door of the lamp house allow the UV-lamp and the interior of the lamp house to cool down at least 10 minutes for the LH1500 and 20 minutes for the LH5000.

1.7.4. Noise Emission Hazard

The sound level measured in the operator area is well below 70dB (A) during all operation modes. No hazard is caused by noise.

1.7.5. Radiation Hazards

The high energy of the ultra violet (UV) light produced by the exposure lamp can cause severe eye damages and skin burns.

Personnel entrusted with the adjustment of the exposure lamp should wear eye and skin protection against UV radiation.

In most applications the UV light uses the wavelength region between 440 nm and 340 nm. This UV light is accompanied by some visible blue light. This wavelength interval may be limited -depending on the application- by filters.

Shorter wavelengths could be applied using special exposure optics. In this case the light beam could be hardly visible!

The full spectrum of the UV-lamp (without optics and selective mirrors) is given in section 3.1.4 Components of the Exposure Optics.



Warning!

Invisible high energy UV light may damage your eyes or skin if the machine is not used as intended.

When performing light uniformity checks, wear UV protective glasses.

Do not work on a machine if shielding covers of the light beam are detached - if unavoidable for service purposes wear UV protective glasses and cover your skin.

Sections where UV radiation could harm your eyes are marked with the wear safety goggles action symbol.



Be especially aware of hazards to eyes and skin resulting from invisible UV-exposure, when working with short wave UV-light by applying UV250 or UV300 optics.

The halogen lamps for microscope illumination do not only emit visible light but also invisible Infrared (IR) light.

The covers over light sources for microscope illumination as lamps and light guide adapters are necessary to safeguard against excessive IR light exposure; do not remove such covers. After changing a bulb or a light guide component, make sure, that all covers are fixed on the right place.

Small RF radiation or EM field is emitted by all electronic subsystems. The frequency depends on the clock rates used inside the systems, and can be especially high from the computer system.

The intensity of this radiation or fields is low and generally not known to be harmful for humans. But persons with pacemakers should avoid to perform maintenance or service tasks inside the machine (when electronics are still energized).

1.7.6. Chemical Hazards

1.7.6.1. Chemicals used or produced by the Machine

1.7.6.1.1. Mercury (Hg)

The UV lamp contains a small amount of toxic mercury (Hg) (for lamps from 200 W to 1000 W the content is between 0,1 g and 1,0 g Hg). Hg enclosed in an unharmed lamp bulb cannot affect humans or the environment.

If an UV lamp breaks or bursts, counter measures to contain the mercury content are to be taken immediately.

A broken cold lamp spills liquid mercury, which must be caught.

An effective way to collect visible droplets is by suction with a syringe or vacuum device (but never use personal respiration).

Following general clean up - including invisible remaining - shall be done using a mercury absorbing agent like sulfur powder or a specialized Hg-catcher like Mercurysorb by Carl Roth (available as SUSS articles PO. 192656 and 192657).

Missing to collect the spilled mercury completely will result in a risk for long-term emission of toxic Hg vapor (see Warning below).

During the cold clean up no special respiratory precautions are needed, because short-term exposure is not critical. But wear Latex gloves and goggles.

- All debris as well as the materials used in the cleanup should be treated as hazardous waste

and disposed off accordingly (following local rules and law for Hg waste).

If an explosion of a hot lamp happens, the mercury content will be blown away as vapor.

SUSS recommends the following course of action following a lamp explosion in order to avoid the inhalation of mercury vapor:

- Turn off electric power to the lamp supply and machine immediately
- Do not turn off the exhaust system for the lamp house. Exhausting is the most effective way to remove the Hg vapor.
- Do not open the lamp house for the time being.
- Evacuate the immediate area of the machine.
- Ventilate the room (as effective as possible).
- Wait for about 30 minutes before returning to the machine area.
- Remove glass fragments, bulb sockets and potential mercury residue, deposited inside the lamp house. This should be done only when wearing Latex gloves and goggles.
- Decontaminate the empty lamp house as described above for liquid mercury spillage.
- Finally use lint free paper, which is slightly dampened by a residue free liquid, to wipe optics very gently.
- All debris as well as the materials used in the cleanup should be treated as hazardous waste and disposed off accordingly (following local rules and law for Hg waste).

To minimize the risk of lamp explosion - as well as to optimize lamp life in general - follow these rules:

- run UV lamps only with a SUSS lamp power supply (i.e. CIC), which respects the technical data of each lamp type approved by SUSS.
- select only a lamp type which is explicitly authorized by SUSS for use with the SUSS power supplies. (See sections „Cooling the Exposure lamp“ in Installation for approved lamp types.
- watch for the lamp life - this is specified in the data sheets typically as 1000h and controlled correspondingly by the SUSS power supply - but frequent ignitions shorten the life expectancy.

- take special care to adjust cooling of the UV lamp according to the tables listed in the installation section of the manuals.
- Make sure that the N₂-cooling tubes are not de-adjusted but blow correctly to the lamp sockets.
- Check the color of the metal sockets of the used lamp - it must be similar to the new lamp or slightly gold-colored at the maximum. If a socket is darker, then it has not been cooled correctly. In this case carefully check and adjust cooling conditions and electrical connections.
- do not open a still hot lamp house because premature opening generates a temperature shock to the lamp.
- when inserting a new lamp, avoid any mechanical stress to the bulb.
- insert the lamp correctly with respect to direction and polarity (the 500 W deep UV lamp is reversed to all others).
- inspect the electrical connections between lamp and feed through of the lamp house for degradation of contact surfaces with every lamp exchange - if degradation is detected, change also the bad component.
- if the type or model of lamp has been changed, select the correct lamp type at the lamp power supply menu before starting.
- for more details see also CIC-manual and chapter Maintenance of this manual in sections Replacement of the exposure lamp and N₂-control.

**Warning!**

Mercury is very toxic. Incorporated mercury can result in chronic heavy disease. Incorporation is typically possible by extended exposure to mercury vapor, which will be a result of spilled and than hidden mercury.

The only sure way to avoid this risk, is to avoid a spillage event - or if this happened by accident, to remove all mercury from the location by recommended procedures and agents as described above!

**Warning!**

A hot mercury lamp is highly pressurized and can explode if mistreated, causing mechanical hazard by fragments and chemical hazard by Hg vapor.

Carefully avoid any of the above listed severe treatments.

Store and transport UV lamps - including disused lamps - only in the manufacturer's original box! Disused mercury UV lamps must be disposed - according to local rules and law - as hazardous waste, because of its Hg content.

In principle mercury lamps could be returned to the supplier. But the heavy restriction is, that they must not be shipped by air other than declared as dangerous goods (UN 2809) together with an IATA shipper's declaration and specially packed.

The UV lamp has a limited life time and is sensitive to rough handling. Therefore it is seen as a consumable.

1.7.6.1.2. Ozone (O₃)

Ozone affects the human respiratory tract, if ozone concentration is increased above a certain level. The effect is cumulative.

The exposure lamps produce ozone due to the interaction of the UV light with the oxygen of the air. The spectral distribution of normal UV lamps (340 - 440 nm) is not especially effective in producing ozone: the seldom used dUV-lamp (with increased intensity below 315 nm) produces more ozone.

Exhaust of the lamp house is mandatory for lamps with 500 W or higher, to cool the lamp to a safe temperature. This exhaust takes also the produced ozone away.

During the very first minute following lamp ignition the ozone production of standard lamps is significantly increased about the normal level. Because of this ozone, the exhaust should be also active, if a small lamp will be switched on only for a few minutes and cooling would not be an issue.

In the vicinity of mask aligner lamp houses never has been found an ozone concentration higher or near to OSHA acceptable maximum value, if the exhaust

has been correctly set. Also the ozone concentration in the exhausted air itself is regularly significantly below the limit.



Caution!

To avoid exposure to ozone adjust the exhaust flow for the lamp house to the correct settings.

1.7.6.2. Use of Toxic or Secret Process Materials (Substrates, Resists)

When using toxic or secret material (e.g. GaAs), the system's user has to make sure that his personnel is supplied with the necessary safety instructions and Material Safety Data Sheets to run the system in a safe way.

Note!

It is the user's responsibility to mark all containers and cassettes containing toxic materials with appropriate labels and warning signs.

1.7.6.3. Working with Cleaning Agents

Cleaning agents like isopropyl alcohol (IPA) are flammable solvents and must be used in accordance with Federal, State and local requirements. Some environmental regulatory restrictions may exist concerning the total amount of such solvents allowed at a facility. Proper precautions must be taken in the storage, use and disposal of this cleaning agent, which should be treated as hazardous materials.

Use solvents only in well-ventilated areas, away from flames and sparks. Avoid skin contact and breathing vapors.

For effective cleaning of optical parts see this special section in chapter Maintenance.



Danger - Flammable Media!

Solvent vapors and liquids are easily flammable! Flammable chemicals can cause injury or death if ignited!

Keep away ignition sources! The machine must be switched off when working with liquid flammable solvents.

In the event of chemical spillage, notify a supervisor immediately.

To clean components of the mask aligner -especially optical parts - no other cleaning agents than IPA and water should be used.

Only properly trained personnel should be engaged in handling isopropyl alcohol for cleaning.



Always wear recommended protective equipment (safety goggles, gloves, face shield etc.) in accordance with the chemicals you are handling!



Consider and observe Material Safety Data Sheets of the corresponding materials.

1.7.6.4. Working with other Chemicals

When using other chemicals always wear recommended personal protective equipment (safety goggles, gloves, face shields etc.) in accordance with the chemicals you are handling.

Prior to starting work with chemicals the user must read and understand the advice outlined in the respective Material Safety Data Sheets.

1.7.7. Increased Hazard after Extraordinary Events

Following an extraordinary event - heavy malfunction of equipment, overheating, seismic event, etc. - the equipment may be damaged without evidence. To avoid hazards for personnel and additional damage to the machine, do not run the machine without prior careful checks by service technicians. For details see the Maintenance and Service sections.

Check forthwith that the UV-lamp is undamaged. If any indication of bulb breakage is seen, proceed as described above for Chemical Hazards/ Mercury!

If a chiller is used, check if liquid has spilled!

1.8. Safety Systems and Procedures

1.8.1. Interlocks



Warning!

Operation of the system with bypassed or defeated safety interlocks can pose major risk to personnel. Only specifically trained persons are authorized to do so.

1.8.1.1. Interlock and Warning for Lamp Cooling Failure

Lamp cooling devices are monitored by a circuit inside the lamp power supply.

If this circuit detects a failure signal from a detector, the CIC power supply will first signal the failure with an acoustic beep and display „N₂-error“.

If this failure continues for an extended time interval - which duration depends on the lamp type to guarantee a safe operation - the output voltage to the lamp, and in effect the lamp, will be switched off by the CIC.

1.8.1.1.1. Nitrogen Failure Warning/ Interlock

Especially important for lamp cooling is a flow of Nitrogen directed to the lamp sockets. The flow intensity is adjustable by a pressure gauge (see description in section „N₂-Control Unit“ and lamp dependent setting values in the installation chapter section „Lamp Cooling“ - and the service chapter for description of all gauges). The N₂-pressure is readable at the pressure meter on front of the microscope bridge. An additional limit switch activating the warning signal to the CIC, if the N₂-pressure falls below the setting is located in the pneumatic compartment.



Warning!

The adjustment of the Nitrogen cooling flow as well as the limit adjustment for the monitor is to be done carefully during installation of the machine - or following a change of the lamp type or any part exchange in the cooling system - and must not be modified later. Only specifically trained personnel is allowed to modify settings.

If the lamp cooling warning beep sounds, it is probably caused by a breakdown of the Nitrogen supply. If the supply can be restored within the lamp specific hold time, no switch off would happen.

If the Nitrogen supply is nevertheless stable, the settings of the Nitrogen monitoring device should be checked and adjusted by qualified personnel.

1.8.1.1.2. Exhaust Flow Failure Interlock (Option)

Some lamp configurations are additionally equipped with a flow sensor in the lamp house exhaust system (located in the input air tube). In case of exhaust shortfall the flow sensor interrupts the same interlock circuit to the CIC as the N₂ limit switch described for N₂ failure.

How to set the limit for the flow sensor correctly can also be found in the installation and maintenance chapters of the manual.



Warning!

The adjustment and the interlock limit setting for Nitrogen flow and exhaust must be done by trained service personnel only.

Operation of the system with bypassed or defeated safety interlocks can pose risk to personnel or machine.

1.8.1.2. Lamp House Door Interlock of LH1500/ 1000

The lamp house door is closed by 3 screws and monitored by a safety switch.

When the lamp house door opens, the lamp power supply module will be switched off immediately by a safety interlock relay as part of the EMO circuit.

To restart the lamp following an activated lamp house door interlock, the lamp house door must be closed, locking all 3 screws, the lamp power supply must be restarted, lamp cool down time (indicated at the CIC power supply) has to be waited, then the lamp can be regularly restarted.



Warning!

The lamp house interlock can only prevent the direct access to lamp voltage and the exposition to very intense UV light.

But the lamp and the interior of the lamp house will be still extremely hot. Also a lamp explosion could be caused by temperature shock.

Never open the lamp house door when the lamp is ON!!

Note for LH350 (small Lam house)!

The LH350 is not equipped with a door interlock, nor does it have access by a side door. For details see Lamp House 350W in section Maintenance.

Note!

The lamp house door interlock only switches off the CIC; it does not directly influence the machine.

1.8.1.3. Detailed Description of the Interlock

1.8.1.3.1. Location and General Actions of Interlocks

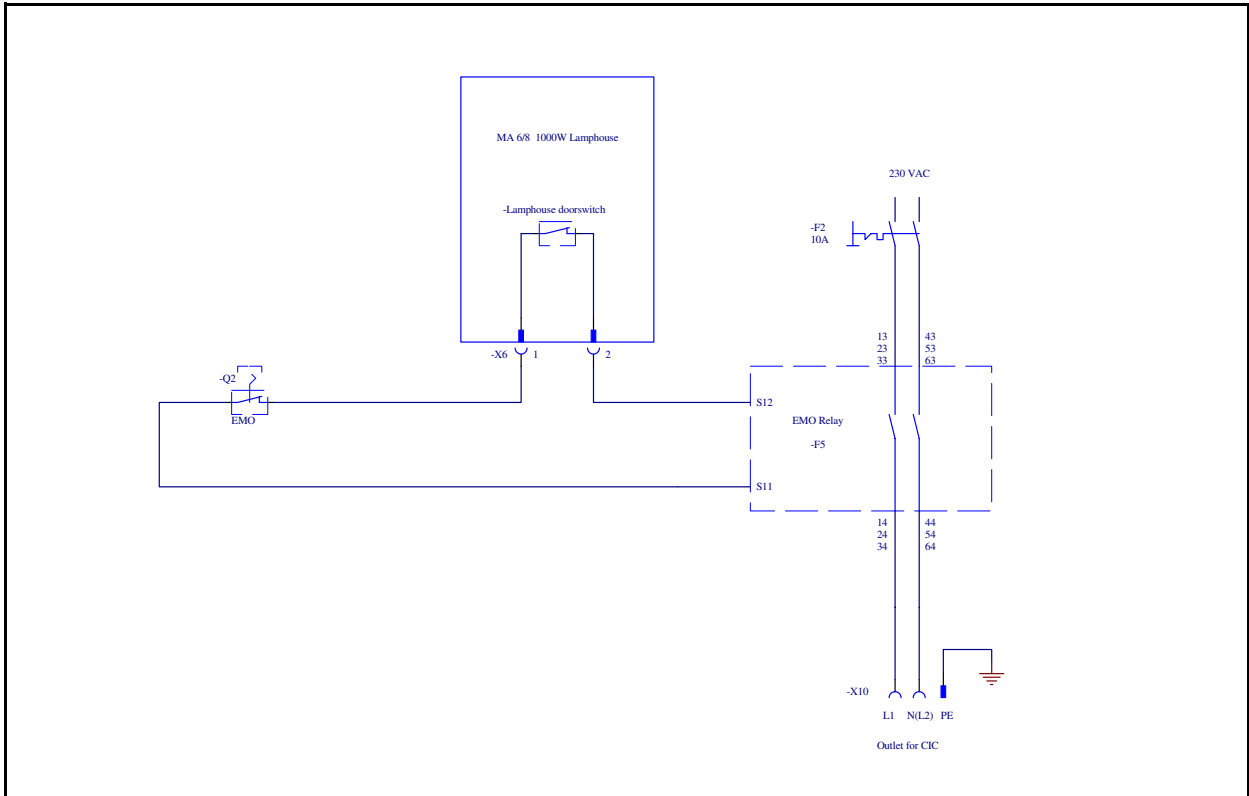
- The **lamp house door interlock** is activated by a single switch in the lamp house. Opening the lamp house door switches an EMO relay in the power supply section of the machine, which switches the CIC power supply OFF immediately.
- The **lamp cooling warning/ interlock** uses the pressure switch in the pneumatic compartment to monitor the nitrogen cooling of the lower lamp socket. The CIC checks the (pressure underrun warning) output of this switch and activates an audible and visible alarm as well as a timer if it

detects the flow being too small. This gives operating technicians a chance to detect and remedy the cooling flow failure. When CIC's timer expires, the CIC will switch OFF its power output. If the lamp house in-flow tube is equipped with an (optional) exhaust flow sensor this works identically by wiring the flow sensor limit switch in series to the N₂ pressure sensor switch.

- The **Emergency Off circuit** is activated by the EMO knob, which is red on a yellow background – the EMO knob is located on left of the machine. If the EMO knob is activated, it triggers the EMO-relais to switch off all power supplies, which are not necessary for the EMS function itself .
- Details for all Interlock functions can be seen in the following schematic diagrams.

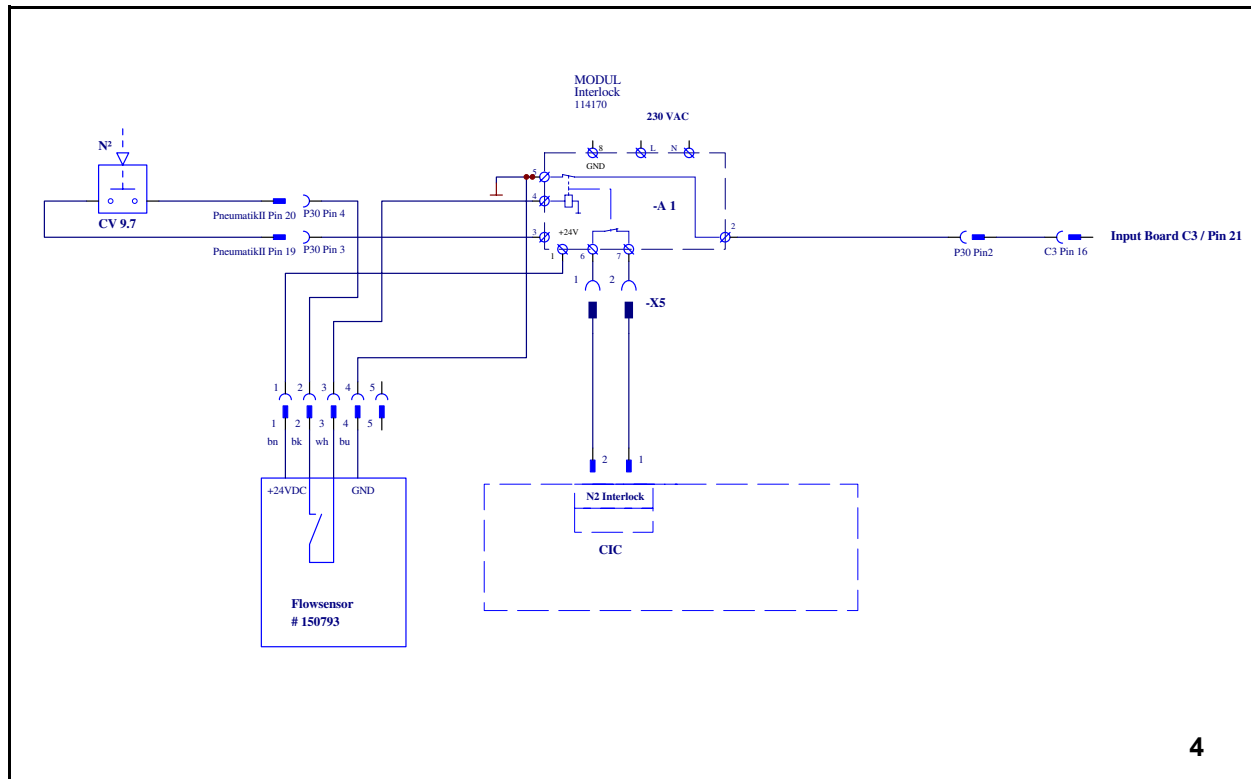
1.8.1.3.2. Interlock Schematics

Lamp House Door Interlock



Opening the lamp house door will immediately open the door switch, effectively turning off the CIC power supply the same way as by activation of the EMO button. The EMO-relay F5 will switch off all 3+3 parallel contacts supplying the CIC main power (on machine output X10).

Lamp Socket Nitrogen Cooling Interlock



4

- As long as N₂ pressure is sufficient, the contact of pressure switch CV9.7 remains closed .
- If the pressure falls below the adjusted limit, the CV9.7 contact will open and deactivate the relay in the Interlock module A1..
- When the control unit of the CIC lamp power supply detects the error signal on input „N₂ Interlock“ it warns the operator about the cooling error by an acoustic and visible indication, it also starts a timer.
- After timely remedy of the error the indication will be off and normal work continues. If the error is not corrected, the timer overflow of the CIC control will switch off the power output of the CIC to the lamp.
- Additionally an optional exhaust flow sensor can be installed in the (lower) air intake duct of the lamp house LH1000/1500 which acts in series to the N₂ pressure switch CV9.7. If the exhaust flow will become too low, the CIC control unit reacts identically as described for the N₂ cooling.

EMO Interlock

Actuation of the red EMO knob activates the Emergency Off circuit via EMO relay F4 (for machine and IPC) and F5 (for CIC). Contactors then switch off the power supplies of all functional modules of the machine.

(CIC with lamp, motor drives, control, pneumatic control; IPC with EISS video system, microscope illumination.)

The following devices will be still energized after actuation of the EMS/EMO:

- Input wiring including Filter Z1 and breakers F1, F2
- EMO circuit itself (F4,F5)
- Pneumatic pressure system
- Optionally: IPC with EISS, if connected to a separate mains supply.

By manual release of the EMO button electric power will be already restored to the CIC by F5 and X10. Manual restart of the lamp can then be done at the CIC (as soon as the cool-down timer is ready).

1.8.2. Emergency OFF (EMO)

The machine is equipped with an emergency off circuit. When activated the circuit removes hazardous potentials from the machine by stopping all movements and switching off the electrical supply, which is not further necessary to restart the machine consistently.

The activation button is clearly labeled as EMO, is of red color and easily accessible.

In case of any danger originated from the machine actuate the emergency off button!!



Warning!

The EMO function cannot remove all residual hazards from the machine.

Although the UV lamp can be switched off immediately when the EMO has been hit, the lamp is still extremely hot and under high pressure.

Also a basic electric supply is still necessary to hold the machine in a state of readiness for restart.

To restart the mask aligner you must first release the EMO button and then switch on lamp and machine again.

Note that the lamp needs a minimum cooling time before it can be restarted, this will be controlled by the SUSS lamp power supply (CIC).

NOTE :

The machine always can be fully switched off using the main switch, which is located directly below the EMO button.

The Main switch is ON, when the bar is oriented vertical, and OFF when oriented horizontal, it can be locked – using the holes – in the OFF position.

1.8.3. Location of Potential Hazards in the Machine








1.8.3.1. Potential Hazards inside the Basic Machine

All hazards described above are related to specific components of the machine.

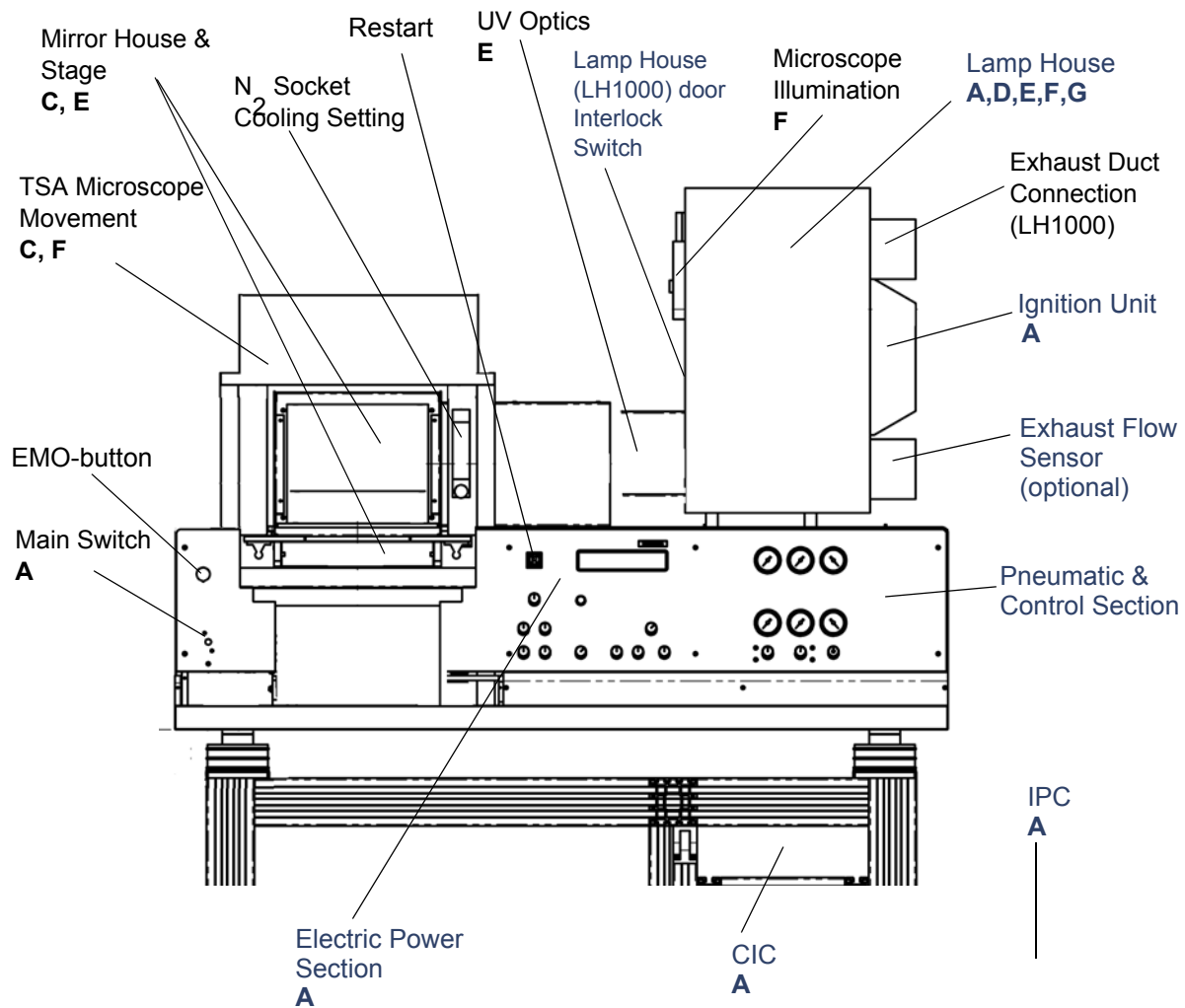
The locations of these hazards in the machine are displayed in the following drawings.

Also shown in these drawings are the locations of the safety interlocks:

Legend to Hazard Location Drawings

A 	B
C 	D 
E  UV	F  IR
G 	H 

FRONT VIEW



Notes:

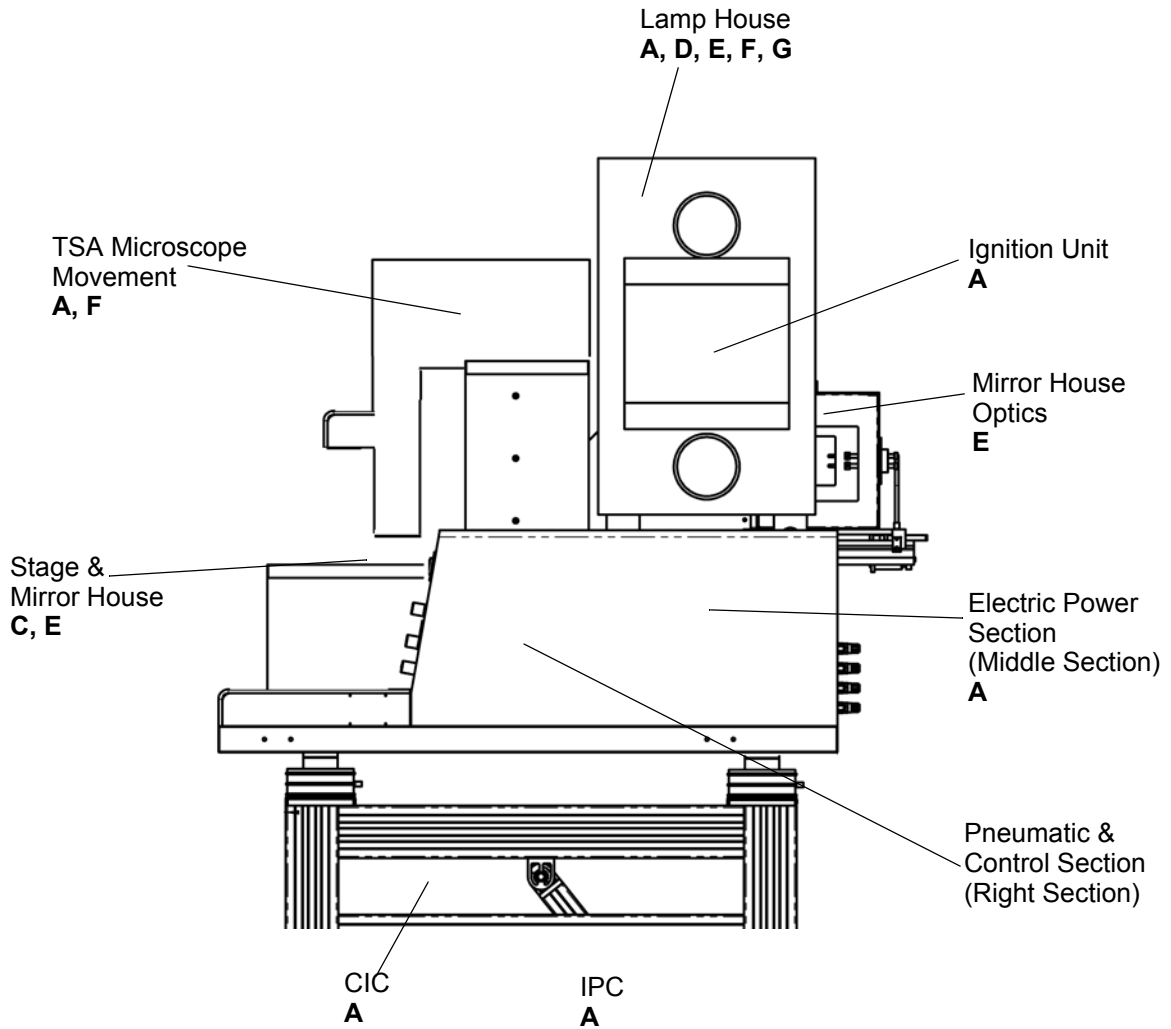
1) Mask Stage:

Mechanical hazards by forward moving of the mirror house. UV-light hazard by reflected light especially during light measurement (wear UV-goggles because direct looking to stage is required).

2) Lamp House:

- A - lamp sockets and supply wires ignition unit
- D - lamp may explode
- E, F - very intense light inside - all covers (incl. air intake duct to lamp house) are necessary
- G - extremely hot lamp bulb inside, hot exhaust duct on top.

SIDE VIEW (with IPC)



1.8.4. Hazard Alerts

1.8.4.1. Types and Locations of Hazards Alerts

Hazard Alerts are mostly realized as hazard warning labels which are fixed in the vicinity of the hazard or at a cover guarding against the hazard characterized on the label.

The labels also describe how to avoid the hazard. Labels are preferably used for a general description of potential hazards to unexperienced personnel.

Some temporary hazardous situations in specific machine states are displayed as line messages on the operator monitor which must be confirmed before the program can continue.

Actual hazardous states, asking for quick reaction, may be depicted by an audible alarm. Status lamps at the CIC may indicate states with a potential for actual endangerment. Adequate reaction requires well trained personnel.

1.8.4.2. Hazard Warning Labels

The Warning Labels consist of a keyword depicting the grade of hazard, one or more hazard warning symbols and a text describing the potential hazard as well as a method to avoid the risk.



CAUTION:

Do not remove or destroy warning labels. Use only recommended cleaning agent IPA, because more aggressive solvents could harm the labels. If a label may have become unreadable, renew the label by ordering it from SUSS. Warning labels are for users safety!

Warning labels are always positioned as close as possible to the respective hazard location or protective part covering the hazard - including outside covers.

The hazard location drawings above therefore describe also the positions of the respective warning labels.

1.8.4.3. Other Hazard Alerts

- Lamp Power Supply CIC - audible alarm & indicator lamps & "Display"
The CIC presents its status on a 8 digit display and some indicator lamps. In case of Nitrogen cooling alarm, both displaying methods are used together with an audible beep alarm. For more details see the CIC-manual
- MMI screen (messages)
The user interface presents status message.

1.8.5. Lockout/Tagout Procedures

Lockout/tagout is an essential safety procedure that protects workers from injury while working on or near electrical circuits or other parts of the equipment which can be energized.

Lockout involves applying a physical lock to the power source(s) of circuits and equipment after they have been shut off and de-energized. The source is then tagged out with an easy-to-read tag that alerts other workers in the area that a lock has been applied.

In addition to protecting workers from electrical hazards, lockout/tagout prevents contact with operating part: blades, gears, shafts, presses etc.

Also, lockout/tagout prevents the unexpected release of hazardous materials in areas where workers are present.

In order to make certain there is no danger of electrical shock or hazards during electrical service or maintenance work, all power should be disconnected at the source using the relevant in-house lockout/tagout procedures.

The lockout device/procedure should be in accordance with SEMI S2 (and especially for USA with OSHA CFR (Code of Federal Regulations) title 29, part1910, sections 147 and 331-335).

Note:

The customer has to provide the possibility to centrally switch off media supply (vacuum, compressed air, nitrogen etc.) for maintenance and service work.

The following procedure should be implemented in order to safely perform a type 1 service task to ensure that the machine is isolated from all potentially hazardous energy.

All equipment shall be isolated from all energy sources as described in the following sections and locked out or tagged out to protect against accidental or inadvertent operation when such operation could cause injury to personnel.

Make no attempt to operate any switch, valve, or other energy isolating device when it is locked or tagged out.

1.8.5.1. Responsibility

Appropriate employees shall be instructed in the safety significance of the lockout/tagout procedure. Appropriate employees include all technicians on the manufacturing floor and the manufacturing managers. Each new or transferred employee, affected employee and other employees whose work operations are or may be in the area shall be instructed in the purpose and use of the lockout/tagout procedure. It is the manager's responsibility to ensure that all appropriate employees are trained. The technician(s) will be responsible for ensuring that the machine is locked or tagged out before repair is attempted. In his/ her absence the machine room manager will assume responsibility.

1.8.5.2. Preparation

In preparation for lockout/tagout, survey the area to locate and identify all isolating devices in order to be certain which switch(es), valves or other isolating devices apply to the machine to be locked or tagged out, then observe the following steps for a danger free working:

- Notify all affected employees that a lockout/tagout procedure is going to be utilized and the reason therefore. The authorized employee shall know the type and magnitude of energy that the equipment utilizes and shall understand the hazards thereof.

1.8.5.3. Electrical Energy Isolation

If the machine is operating, shut it down by the normal shut down procedure.

- Switch off electrical power using the main switch on the machine or a central switch at the facility supplying the machine.
The system has to be separated from all electrical power supplies.
- Ground (short circuit) the machine frame.
- Check voltage free state: After ensuring that no personal are exposed, the voltage - free state (deadness) has to be checked at all terminals nearest to the operator station.
When using checking devices - comply with in-house regulations. Portable checking devices

and voltage testers are to be checked directly before and after use.

- Protect from restart: All switches taking off power have to be protected against restart (Switch ON), if possible with mechanical key locks. Use key locks to block the main switch at the machine. If there are no key locks available, choose a properly authorized method to protect the machine from being switched on. Unqualified operations must be noted with the appropriate warning labels.

Note!

If the machine is equipped with an additional main breaker attached on a box on back, this can be switched off instead of the main switch. The breaker can be locked in the OFF-position using the small locking device attached to the box by a wire.



Caution!

Return all operating controls to their 'neutral' or 'off' position.

When opening electrical compartments, observe if components like capacitors keep residual voltages after switch off. (If applicable this is marked close to the component).

Discharge components.

- Ground and short circuit components to be handled. The grounding / short circuiting devices must be connected to the grounding equipment first and then the components are to be grounded. Take the appropriate measures (jumper, grounding) prior to beginning work, if wires are to be cut or interrupted. Ensure that all grounding and short circuit measures remain effective during work.
- Cover/ barrier powered adjacent components: If components adjacent to the work location can't be switched off, they must have appropriate covers or barriers. Notice and comply with the regulations according to „working adjacent to powered components“. In general - working in close proximity of powered components (> 30 V RMS or 42,2 V peak) is only allowed, if any access to powered components is limited by the appropriate covers or barriers.

1.8.5.4. Pneumatic Energy Isolation

Switch off pressure supply for CDA (compressed air) and nitrogen. Prevent accidental re-pressurization of the media supply by marking the pressure valves with warning labels or other proven methods:

- If lockable valves are available at installation, switch these valves OFF, lock them and tag-out!
- Disconnect the supply tubing from the valves outlet to permit dissipation of any stored pneumatic energy.
- Check the depressurized state of the system by checking the gauges.

1.8.5.5. Thermal Energy Isolation

Thermal energy which may be stored within the machine -especially in the lamp house -should be rendered safe by waiting until any part of equipment or media which may have been heated during a process has had sufficient time to cool down to 40 °C or lower.



Warning - Danger of Burning!

Before touching any part of the equipment which may have been heated -especially before opening the lamp house-, be sure that it has cooled down to 40 °C or lower.

1.8.5.6. Lockout/Tagout Checklist

When performing lockout/tagout on circuits and equipment, you can use the checklist below.

- Identify all sources of electrical energy for the equipment or circuits in questions.
- Disable backup energy sources such as generators and batteries.
- Identify all shut-offs for each energy source.
- Notify all personnel that equipment and circuitry must be shut off, locked out, and tagged out. (Simply turning a switch off is NOT enough).
- Shut off energy sources and lock the main switch in the OFF position. Each worker should apply

his or her individual lock. Do not give your key to anyone.

- Test equipment and circuitry to make sure they are de-energized. This must be done by a qualified person.*
- Deplete store energy by bleeding, blocking, grounding, etc. Apply a tag to alert other workers that an energy source or piece of equipment has been locked out.
- Make sure everyone is safe and accounted for before equipment and circuits are unlocked and turned back on. Note that only a qualified person may determine when it is safe to reenergize circuits.

* OSHA defines a „qualified person" as someone who has received mandated training on the hazards and on the construction and operation of equipment involved in a task.

1.8.5.7. Restoring Machine to Normal Operation

After service and/or maintenance is complete and the equipment is ready for normal production operations, check the area around the machine to ensure that no personal are exposed.

After all tools have been removed from the machine, and guards have been reinstalled, remove all lock-out/tagout devices. Operate the energy isolating devices to restore energy to the machine.

Prior to leave the machine to operators, make sure that all interlock defeats have been cancelled.

1.8.6. Resource Conservation

1.8.6.1. Minimum Medium Consumption

Note!

Ensure that the consumption of media always should be kept to a reasonable minimum.

When the machine should be not used for an extended time, avoid energy and media consumption by stand-by status.

- Switch off the main switch as well as the external

valves for CDA, N2 and Vacuum.

- Do not switch off N2 before the hot UV-lamp has been cooled for at least 10 additional minutes.

1.8.6.2. Maintenance

Minimum consumption of cleaning liquids is taken for granted.

Cleaning agents isopropyl alcohol is flammable solvents and must be used in accordance with Federal, State and local requirements. Some environmental restrictions may exit concerning the total amount of such solvents allowed at a facility.

1.8.6.3. Installation

Packing materials should be disposed of according to the relevant local and environmental laws and regulations.

Separate materials and forward to a recycling process, if possible.

1.9. Warranty and Void of Warranty

Failure to adhere to any or all User Requirements specified within this manual will cause the equipment warranty and any other related contracts made between the purchaser and Suss Microtec Lithography GmbH to be voided.

Suss Microtec Lithography GmbH disclaims responsibility for any death, injury, property damage, or other loss caused by or resulting from failure to adhere to any of these User Requirements, as well as state, local, or federal guidelines and regulations.

Attention!

Read the instruction manuals before using the system!

Modification of the system, including operation of the system with bypassed or defeated safety interlocks can pose major risk to personnel and will void all warranties.

It should be noted that the contents of instruction manuals and product documentation shall not become part of or modify any prior existing agreement, commitment or legal relationship. The sales contract, which also contains the complete and solely valid warranty stipulations, contains all of the obligations that must be fulfilled by Suss Microtec Lithography GmbH. These contractual warranty stipulations are neither extended or limited by the statements made in the manual and documentation. Changes and repair work at the system may only be carried out if it is documented in the manual.

1.10. Working with the Mask Aligner

1.10.1. General Description

NOTE

This section contains information the operator must know and understand to minimize the risk of injuries.

Service of the machine should be performed by qualified personnel only. If any problems occur with the power supply, turn the machine off and notify maintenance immediately.

When performing any maintenance on the power supply, lamp housing or the lamp itself, make sure that the power line to the power supply is disconnected.

The light source for the UV light required to expose the substrate is a high pressure lamp. Special precautions must be taken when working with these lamps. The voltage and current required to run a high pressure lamp constitute a lethal combination. Starting ignition voltage is 30kV and the circuit potential ranges up to 180 VDC at currents between 5 - 50 A.



Caution!

The exposure lamp operates at very high pressure. The lamp may fail as a result of improper cooling, improper setting of the power supply et cetera.



Danger!

High pressure lamps even when cold should be handled with eye/ face protection and gloves. If a lamp should break, avoid touching the fragments and/ or breathing the mercury vapour.

1.10.2. Replacement of the Exposure Lamp

The UV lamp is a consumable. Lamp replacement is required after the operation life time, recommended by the manufacturer. This regularly is after 1000h - but may be different for specific lamps.

The high UV light energy produced by the exposure

lamp can cause eye damage and skin burns. Personnel entrusted with the adjustment of the exposure lamp should wear eye and skin protection against ultraviolet radiation (UV radiation). SÜSS MicroTec will not be responsible for injured arising from incorrect or unprotected work with these systems.

**Warning!**

Use only lamps approved for use by SÜSS MicroTec Lithography.

Check adequate lamp cooling. (Settings of N2 socket flow and exhaust flow according to lamp cooling table) and check that N2 nozzles are correctly directed to the lamp sockets.

The safety regulations of the original lamp manufacturers must be complied with!

Respect recommended maximum service life! When installing a new lamp re-set lamp life counter on CIC:

Prior to starting check that correct lamp type has been selected at CIC.

**Caution!**

The polarity of the 500W Hg/Xe lamp is opposite to all other lamps which have Anode (+ pole) on bottom.

**Caution!**

Do not open the lamp house before it cools down to room temperature. You could burn your fingers.

See section Lamp Replacement in Maintenance for more details!

1.10.3. N₂-Control Unit

The Nitrogen flow for lamp socket cooling is set by a Nitrogen gauge (located on right side of the mirror house - see pneumatic plan) and controlled by the pressure meter which is located in the pneumatic compartment.

The required setting value is given in section Lamp Cooling of the installation chapter.

Adjustment shall be done by experienced service technicians only and before any lamp will be started. Whenever the N₂ flow fails - i.e. if it drops below the

adjusted limit – then the lamp socket Nitrogen cooling alarm/interlock of the CIC will be activated. It turns off the lamp within a few minutes.

**Warning!**

Nitrogen cooling adjustment must comply with the value given by SÜSS in the manual. De-adjusted cooling could cause a lamp explosion.

The same applies for exhaust flow adjustment.

1.10.4. Operating Procedures

Before the machine becomes operational, turn on nitrogen, compressed air and vacuum.

1.10.4.1. Start Up Procedure

- Check- and if necessary- set primary pressure gauges with the corresponding regulators
 - Turn ON compressed air and adjust to 5 bar.
 - Turn ON nitrogen and adjust regulator to 2 bar. Turn on vacuum. The gauge should read < -0.8 bar.
 - Do not modify any secondary gauge if not especially trained for the required settings.

1.10.4.2. Ignition of Exposure Lamp

**Caution!**

Make sure the door of the lamp house is closed!

- Switch main power to ON (at power box door on rear) (left foot well).
- Switch ON power at the Constant Intensity Controller (CIC Unit).
- Press CP at CIC.
- The CIC performs a self calibration test.
- When CIC display shows **ready** press key START.

**Caution!**

Nitrogen Failure leads to a turn off of the exposure lamp after 1 to 3 minutes.

If equipped with an exhaust flow sensor the same applies for an exhaust failure.

1.10.4.3. Starting the Machine

- Turn the main switch Electronics ON / OFF (201) on the front panel in a clockwise direction into the ON position and let it spring back. The machine is initialised. Depending on the configuration, the display then shows the following header, for example:

"Ready for Start - press LOAD Button MA6-BA6-[M] V4.000 04.05.01 SW:P"

The second line shows the following information:

**Machine configuration Software version
Date Additional options included
(in this case: Purge)**

- The flashing LOAD key (307) on the lower control level should now be pressed. The display reads:

"WATCH OUT MACHINE IS STARTING!"

- Following an initialisation phase, the prompt

"Select machine configuration: MA6"

appears. The Y cursor keys must now be used to choose between the operating modes mask aligner and bond aligner.

- The display then reads:

"Ready for load"

The machine is now in basic status and is ready to work. All motorised manipulators (TSA, BSA and adjusting station) move to the default position. If you want them to move to the positions which they occupied before switching off, these must be stored as a program before switching off.

Additional advice:

- Pressing the key combination FAST-UNLOAD

(at an interval of approx. 200 ms) leads to a software reset.

- Switching on the main electronics switch ON / OFF (201) with the EDIT - PARAMETER key (311) depressed leads to reloading of the default values for all variables.
- To switch off, turn the main switch Electronics ON / OFF (201) on the upper control level in an anticlockwise direction into the OFF position and let it spring back.

**Note!**

In case of danger activate an EMO/EMS key to stop the process.