electronic diener
Plasma-Surface-Technology

TRANSLATION OF THE OPERATING- AND MAINTENANCE MANUAL FOR PARYLENEBE COATING SYSTEMS

Parylene P6
with Serial Number 123425
of the year 2023

Please read through this operating manual before using the system!
This operating and maintenance manual must be stored near to the system!

Stand 09/2022

Parylene coating is used for coating surfaces with a thin, transparent parylene film. The coating is used in electronics, aviation and aerospace, sensor technology, medical/ pharmaceutics, industry and automotive engineering.

This parylene coating system can be used for the deposition of parylene N, parylene C, parylene D and parylene F-VT4. Layer thicknesses of 0.05 to 20 micrometres can be reached depending on the parylene type.

In parylene coating, the dimers are vaporised in a vacuum. In the next stage, the dimers are thermally split into monomers on the hot walls of the pyrolysis tube. Now the monomers polymerise primarily on the colder areas in the recipient and on the component surfaces. It is a very gentle process with virtually no temperature increase of the substrate surface.

ADVANCED INFORMATION

This operating and maintenance manual is an integral component of the product and descibres the safe and proper handling of the system. It contains important information on operating safety and must therefore be

- Read carefully prior to use
- Stored for the entire service life
- Made accessible for the operating and maintenance staff at all times
- Forwarded to each subsequent user
- Updated with each supplement received from the manufacturer

All details and information are made to our best knowledge in consideration of our current experience and knowledge.

The information contained in this operating and maintenance manual and the documents provided do not make any claims or guarantees about the completeness and accuracy.

Photos and other illustrations can contain components that are not part of the scope of delivery of Diner electronic GmbH & Co.KG.

This operating and maintenance manual was created based on the requirements of the EC Machinery Directive.

This operating and maintenance manual refers to the scope of services of Diener electronic GmbH & Co. KG and provides you with basic information on the function and the correct handling of the system as well as possible risks that can occur through the operation of the system.

More information and specifications must be obtained from the documents provided by the component manufacturer.
Please observe the provided documentation/ operating and maintenance manuals of the component manufacturer, e.g. safety information and danger warning, safety date sheets, plans, schemes etc.!

The specifications from the operating and maintenance manuals of the component manufacturer must be considered with priority to the basic information listed here.

Equipment that is not part of the scope of services *of Diener electronic GmbH & Co. KG is ignored.*

This operating and maintenance manual must be stored near the system!

Diener electronic GmbH & Co. KG does not assume any liability for damages resulting from improper use.

The German version of this operating and maintenance manual is legally binding.

Terminology / glossary

As an operating and maintenance manual, this inevitably makes use of specialised technical terms.

Explanations of the most important terms can be found on our website at
https://www.plasma.com/plasmatechnik/lexikon/

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1 GENERAL INSTRUCTIONS - EC DECLARATION OF CONFORMITY - CORRECT AND PROPER USE

1.1 Product ID

If you have any questions about the system, please specify also is serial number and the year it was manufactured.
The serial number and the year of manufacture can be found on the system's type plate and on the cover sheet hereof.

If you are operating more than one of our systems, check before using the operating and maintenance manual that it agrees with your system's serial number.
Even the same system type and appearances may differ in their equipment and operation.

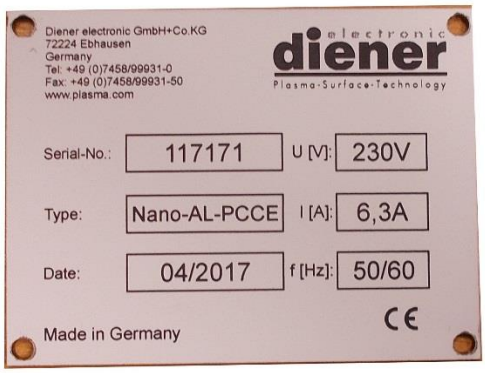

Figure 1: Example type plate

1.2 Manufacturing specifications

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Fax +49 (0) 7458 / 999 31 – 50
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Internet: www.plasma.com

1.3 Copyright

1.4 EC Declaration of Conformity

We hereby declare that the system described in the following

System type	Parylene-Coating System
Type	Table Top P6 / P6+ / P8 / P8+
Serial-Nr.	100017851 /100023746 / 100033655
Year of manufacture	2023
Costumer	31.01.2023

Owing to is concept design and make and in the version we have placed on the market

- Conforms to the pertinent conditions in the EX machinery Directive, including is amendments applying at the time this declaration was issued
- Corresponds to the essential health and safety requirements in the EX Machinery Directive for the interfaces described in the operating and maintenance manual
- Conforms also to the pertinent conditions in the following EX Directives, including their amendments applying at the time this declaration was issued:

Applied EC Directives:

2006/42/EG	EC Machinery Directive - Essential health and safety requirements Annex I
2014/35/EU	EC Low Voltage Directive
2014/30/EU	EMC Directive
2002/95/EG	RoHS-Directive

Applied harmonised standards, specifically*:

DIN EN ISO 12100:2011	Safety of machinery - General principles for deign - Risk assessment and risk reduction
DIN EN 60204-1:2019	Safety of machinery - Electrical equipment of machines - General requirements
EN 61000-6-2:2019	Electromagnetic compatibility (EMC) - Generic standards - Immunity standard for industrial environments (EMC immunity standard)
EN 61000-6-4:2020	Electromagnetic compatibility (EMC) - Generic standards - Emission standard for industrial environments (IEC 61000-6-4:2006+A1:2010), Germany version EN61000-6-4(EMC emission standard)
EN 61000-4-3:2006 + A1:2008 + A2:2010	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test.

* the applied standards were valid at the time this declaration was issued, this list does not include the directives and standards named in the suppliers' EC Declarations, see here the suppliers' EC Declaration.

This declaration becomes void when the system is modified or used for any purpose without our prior agreement.

Date: 2024-02-23

Signature

Diener electronic GmbH & Co. KG
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1.5 Correct and proper use/ Limits of use

In general, Diener electronic GmbH & Co. KG provides a system for producing a parylene coating.

Possible fields of application are:

- Coating tool surfaces

Based on the order specific

- Coating characterisitcs and
- Work piece characteristics,

each coating system is indivudally equipped for the requirements of the specified processes in the course of "Process development".

The description of the system's

- Possible processing methods
- The approved gases, substances

From the process, development implemented by Diener electronic GmbH can be found in the chapter "Overview of technical data/ Approved processes, gases, and substances".

CAUTION!

Only those processes may be applied and those gases/ substances used that Diener electronic GmbH & Co. KG has released for the system.

DANGER!

The use of processes and gases/ substances for which the system has not been designed and equipped may cause serious damage to the system, hazards, and grievous!

The system is used correctly and properly when the process development has been implemented through or with the cooperation of Diener electronic GmbH & Co. KG and the process and is configuration have been released in writing by Diener electronic GmbH & Co. KG.

The operator assumes sole responsibility when he modifies processes or configures and implements new processes.
Furthermore, any and all liability and/ or warranties of Diener electronic GmbH & Co. KG become void with immediate effect.

This is also the case when the operator has requested Diener electronic GmbH & Co. KG to release protected safety functions and parameters, or persons instructed by Fa. Diener electronic GmbH & Co. KG have communicated or otherwise made accessibnle safety passwords to unauthorised parties.

Diener electronic GmbH & Co. KG shall assume no liability for direct and indirect damages resulting from improper use of the system.

Please observe the provided documents, plans and schemes, control documentation, electrical schematics and the documents of the component manufacturer, which are also an integral component of this correct and proper use.

Basic requirements for normal operatin

The system must only be used, if it is ensured that it can be safely operated. This includes among other things.

- *Setup, connection, commissioning, shutdown and dismantling of the system only by qualified personal of the operating company that has been instructed by Diener electronic GmbH & Co. KG*
- *The integrity and function of all safety devices (such as safety switches, complete and correct attachment of all covers*
- *The reliable functioning of Emergency Stop devices, annunciators and alarm devices.*
- *The undamaged, sound condition and reliable functioning of all components and fittings installed in the system.*
- *Adequate tightest of the vacuum system*
  the seals on the chamber door and feedthrough's in the chamber must be undamaged and tight.
- *Operation of a work on the system only by instructed and adequately qualified personnel.*
- *Sufficient expertise and training of persons entrusted with the handling of the substances/ gases that are used.*
- *Sufficient expertise and instructions by Diener electronic GmbH & Co. KG for persons who change process and system parameters, so that the processes can be carried out safely and adequately in a accordance with the system (also see the section "Training/ Instruction")*
- *Observing the information in the safety datasheets for the media and material used*
- *Using the required personal protective equipment*
- *Ensuring that the gases/ Substances that are used, the work pieces and the chosen process and system parameters are suitable for the processes being carried out and cannot lead to any hazards and/ or damage* ***(see the chapter "Process development")***
- *Ensuring that the correct program is selected and the correct settings for all process parameters are verified.*
- *Ensuring that the dimer is in the intended containers in the system*
- *Ensuring that hat system is properly set up in regards to the work piece carriers and work pieces, suitable work piece carriers that hold the work pieces securely in their intended position must be used.*

- *Adherence to the warnings and safety instructions on this operating and maintenance manual, the safety instructions attached on site to the system or is components, and the information in the component manufacturers' documentation*

Mobile systems and components must be sited so that

- *These cannot be damages e.g. by the choice of a suitable site, cut-out safety equipment etc.*
- *These are fixed securely at their intended locations, e.g. brakes engaged on the system cabinet's wheels, if fitted, the components are secured in place (pump, gas bottles in frames secured against falling over, etc.)*
- *There can be no hazards e.g. as a result of tripping, lines being pulled out, etc..*
  All lines (electricity, compressed air, gases, etc.t) must be strain-relieved.

Further requirements for correct and proper use and operation are

- Compliance with the legal provisions as well as guidelines from authorised institutions
- Compliance with the specifications made in the chapter "Technical Details". The operation of the system must take place under normal conditions (permissible temperature and humidity)
- The timely and technically reliable execution of inspection and maintenance work
- The use only of wear and spare parts, materials, and auxiliaries approved by Diener electronic GmbH & Co. KG, e.g. oils, lubricants, and cleaning agents for the system's components
- The technically accurate - based on the delivery date unchanged - condition of the system, particularly all safety equipment.

Process development

Process development carried out by Diener electronic GmbH & Co. KG and the related equipment of the system and/ or the approval of the substances that are used are part of the intended use of the system.

A parylene system is only

- Capable of Operation and suitable for use
- Safe and
- Environmentally friendly,

when large number of potential influencing factors and parameters have been matched to each other. the system must have been matched or equipped to the planned processes and used gases/ substances if it is to be operated correctly, properly, safely and in an environmentally friendly way

This includes criteria that must be observed, e.g. the determination and selection

- the Dimers
- the required type of vacuum generation (pumps and other equipment),
- Required materials for the system and its equipment (vaporiser, pyrolysis oven, coating chamber, seals, pumps, valves etc.)
- The required safety and protective equipment for the system and work environment
- The required measuring and control devices,
- The process and system parameters and settings
- The required exhaust air purification (pump protection, cooling trap, noise control, exhaust duct), and
- Consideration to the ambient conditions at the installation site and to the production environment
- etc.

Further details on the system's setup and function can be found e.g. in the chapter "General description" in this operating and maintenance manual

Instructions on the used/ permitted gases and substances from a process development implemented by Diener electronic GmbH & Co. KG can be found in the chapter " Technical data"

Changing configuration parameters, programming etc. the system control

Note our instructions in the chapter "Basic requirements for normal operation" and "Process development" and in the chapter "Training/ Training and instruction of the operator's personnel"

There may be no changes to the programs generated/ supplied by Diener electronic GmbH & Co. KG nor to the limit values set by Diener electronic GmbH & Co. KG.
if programs and updates are freely available, these may be installed only after the written permission of Diener electronic GmbH & Co. KG.

Configuration parameters and programs the operator may modify may be changed only by authorised, instructed personnel within the permitted reference/ operating range.

A change exceeding the reference values (min/max) set by Diener electronic GmbH & Co. KG is not permitted. If a change has been made without the written release of Diener electronic GmbH & Co. KG, all warranties and liability on the part of Diener electronic GmbH & Co. KG become void.

DANGER!

Mistakes in changing/ setting parameters for the processes and systems and/ or mistakes in setting gas mixtures may cause serious damage and can result in hazards!

Manually definable configuration parameters on the system, e.g. at the pumping unit, etc. may be changed only by authorised personnel within the approved operating range.
At the same time, it must be ensured that these changes cannot cause damage or hazards. If necessary, the reference values have been specified directly on the components or can be taken from the specifications in this operating and maintenance manual or the component manufactures' documentation

If settings are specially protected, e.g. with special locks/ seals, etc., these settings may be changed only after the written approval of Fa. Diener electronic GmbH & Co. KG.

NEVER

Change settings that have been protected with seals or locks!

There is a risk of malfunction, damage, and possibly grievous injury!

Changes and modifications to the system

It is not permitted to use the system for a purpose other than that described in Chapters 1.8 ff without the modifications to the system agreed in writing with Fa. Diener electronic GmbH & Co. KG.

All interventions in the circuitry for the purpose of modifying hardware or software as well as all electrical and mechanical changes or additions to the system structure may be performed only by service technicians of Diener electronic GmbH & Co. KG.

There may be no structural changes and no attachments to the delivered scope of the Diener electronic GmbH & Co. KG.

Spare components must be those makes and types specified by Diener electronic GmbH & Co. KG.

Decommissioning the system

See also chapter "Decommissioning the system - Recommissioning"

Within the framework of warranty/ guarantee, the system can only be decommissioned by the services of Diener electronic GmbH & Co. KG.

Out of warranty/ guarantee, the system must only be decommissioned by specialists that were trained by. Diener electronic GmbH & Co. KG and whose training is documented in writing. Training must not be more that 2 years ago. The operator can decommission the system with the exclusion of any liability on part of Diener electronic GmbH & Co. KG.

After a downtime within the framework of warranty/ guarantee and after a decommissioning duration of more than 6 month, the system can only be recommissioned by the services of Diener electronic GmbH & Co. KG

A recommissioning after a decommissioning duration out of warranty/ guarantee of less than 6 months must only be carried out by specialists that were trained by Diener electronic GmbH & Co. KG and whose training is documented in writing. Training must not be more than 2 years ago. In doing so, it must be determined and approved that the system can be operated in a safe and functional manner.
The operator can recommission the system within the exclusion of any liability on part of Diener electronic GmbH & Co. KG.

The first work to dismantle the system or is parts renders void the Declaration of Conformity and any agreed warranty, guarantee, and liability on the part of Diener electronic GmbH & Co. KG.

Interfaces / Duties of the operator

The duties of the operator include:

- the choice of installation site;
  also applicable are our instructions in the chapter "Technical data" and "Commissioning, transport, siting, decommissioning/ dismantling".
- The safe siting of the system and is components (pumps, filter, etc.)
- The safe siting of the vessels for the gases/ substances, securing in place of the gas bottles/ vessels against falling over and damage
- The safe routing of lines, e.g. for electricity and the process and flushing gases, etc.
  the supply lines connecting the system must be routed so that they are protected and strain relieved and cannot be pulled our or pose a tripping hazard-
- If necessary, the installation of an extractor when hazardous gases/ substances cannot escape e.g. when vessels are changed
- The safe and ergonomic design of the work stations. Adequate freedom of movement for the assigned work, no tripping hazards, etc.
- The provision of adequate lighting and ventilation at the working site.
- The design and implementation of the necessary protective measures for hazards, which can result from the interfaces to operation and production, e.g. the installation of cut-out safety equipment when the system is set up at traffic routes, etc. .

The system may not be damages or exposed to impermissible loads.
If the system / system components is/ are installed on road ways, these must have additional protection

Damages from the system components can result in hazards to persons and/or the environment!

The operator must ensure a clean and unobstructed production environment so that a safe and functional operation is possible.

- The provision of personal protective equipment and safety data sheets
  personal protective equipment and safety data sheets for the gases/ substances used must be provided by the operator for the user on site and must always be available.

Heed the safety data sheets when handling the employed process gases and substances!

Always use personal protective equipment required for the work task!

Instructing and training employees

The operator must ensure that all employees working on the system are sufficiently trained/ qualified and instructed for the respective task.
Operating the control/ PRS requires and adequate level of experience.
If this is not the case, the operator must arrange for repeated training provided by the services of. Diener electronic GmbH & Co. KG.

The system must only be operated and worked on by trained and sufficently qualified personnel.

Indivuals that change processes and provess and system parameters must be trainied to do so by Diener electronic GmbH & Co. KG and must have sufficient expertiese so that the processes can be executed in a safe, functional system-specific-manner

Language skills

The users must have a command of the language (German, English, agreed language according to specification etc.), which the interfaces of the system and the programs are designed in and possibly, the language in the operating manual.

Please observe our instructions in the chapter "Training and instruction of the operator's personnel"

Handling dimers

Various dimers are used on the system depending on the process.

DANGER!

The lack of knowledge of the properties of the gases/ substances used can result in hazards and severe injuries if use incorrectly.

The individuals responsible for dealing with he substances/ gases used must have sufficient expertise and must be trained.

The individuals must know the content of the safety data sheets and observe the safety information and hazard warnings contained therein!

Misconduct/misuse

- Misconduct/misuse occurs as a result of
- Allowing people to work on the system without the necessary expertise/ training and/ or are not sufficiently instructed.
- The non-observance in this operating and maintenance manual of the hazard warnings and safety information on the individual components and the operating and maintenance manuals of the component manufacturer
- Processes, which the system was not designed or constructed for (see operating and maintenance manual Chapter "Correct and proper use/ Process development")
- The misuse of system or is parts
- The negligent/ intentional activation/ triggering of the system's functions, e.g. during work inside the system, etc.
- Overriding the protective equipment
- Climbing on Units, components
- etc.

The system operator/ user is responsible for the safe operation of the system and is components at all times!

Prevent misuse and misconduct on the system!

Reporting of safety related incidents and events

Safety related incidents and events must be reported immediately to Diener electronic GmbH & Co. KG!

The proper and correct use of the Diener electronic GmbH & Co. KG system includes the prompt reporting of safety related incidents and events that may arise during the operation, control, inspection, maintenance, servicing, repair and dismantling of the system.

If the plant or one of is parts has been subjected to unusual loads, e.g. damage to system parts, etc., the system must be shut down immediately, the extent of damage ascertained by an expert, and the system examined as to whether it may continue operating without danger or loss of safety or functionality.

If the analysis of the extent or consequences of damage do not return unambiguous findings as to whether safe operation without danger is possible, the services of Diener electronic GmbH & Co. KG must be consulted without delay.

If the system continues to be operated after a heavy load and/or after sustaining damage without the prior written consent of Diener electronic GmbH & Co. KG, any and all agreed warranties, guarantees, and liability on the part of Diener electronic GmbH & Co. KG become void automatically and immediately.

1.6 System Dangers

The system was constructed and designed according to the state of the art and recognised safety-related rules and relevant provisions of engineering.

Nevertheless, not all dangers to the user's or third party's life or damage to the system and ist material assets can be excluded.

The greatest possible safety is guaranteed if:

- The system is only used for proper use
- The system is only operated with complete and functional safety and security equipment, alarm and signalling units
- Access to the hazardous areas by unauthorised personnel is prevented
- The personnel supervising the system are always informed when persons enter and have left the system's danger zones and when work is to be performed on the system or inside the protective housing
- All the work is executed by qualified personnel trained for these tasks
- The general as well as specific safety, accident prevention and operation specifications of Diener electronic GmbH & Co. KG are followed.
- No unauthorised changes are made to the system
- Inspection and maintenance work and necessary tests/ repeat tests are performed in a conscientious and timely manner
- The system is cautiously and responsibly operated so that wear and ageing are recognises early on and can be repaired.

	Hazards to persons can occur on the system, e.g.
	• When using harmful gases/ substance, if the vessels, screw connections, pipelines, exhaust air filters, and ducts, etc. are leaking •
	• If the negative pressure/ vacuum system, e.g. at the chamber door, etc., is leaking
	• At accessible hot sites on the system, e.g. on the internal walls, electrodes, work piece carriers in the plasma chamber, of these are not cooled adequately • During work inside the system cabinet or on the pump and filter when the system has not been switched OFF or not been cooled adequately
	• From moving system parts e.g. inside the plasma chamber when a rotary drum is used
	• At sharp functional edges on the guides and work piece carriers

- When the door to the plasma chamber is closed

- By pressurised system components (containers, pipeline system, fittings, devices etc.), if these are not depressurised proper to maintenance and repair work
-

- When supply lines to the system have not been routed according to the safety regulations

- Touching electrical equipment that has not been disconnected from the power or is unprotected/ damaged

CAUTION!

The system contains equipment (generators) that are under high voltage!

Please observe our information in the chapter "General safety and accident- prevention information" and in the individual chapters of this operating and maintenance manual as well as the documentation of the component manufacturer.

Environmental impacts

- Electrical energy as the main supply for the system operation, type of energy and quantity see type plates on the control cabinets as well as in the documentation of the component manufacturer.
- Pneumatic energy via the compressed air network of the operator. The consumption of air depends on the process.
  The sound level of the system for normal operation is specified in the chapter "Technical Details".

Exhaust air purification must be configured to the known processes.
If necessary, the exhaust air is purified e.g. through an activated carbon filter and/ or with other measures, e.g. a fitted cleaning source.
Further precautions may have to be taken depending on the gases/ substances used, e.g. for further processes during the system's operating period

1.7 Guarantee / Liability

The contents agreed and confirmed in the contract between Diener electronic GmbH & Co. KG and the contractual partner/ operator are decisive.

Unless otherwise agreed, the guarantee period amounts to 12 months from the date of invoice. Parts subject to war and parts exposed to corrosive media must excluded from the guarantee, if these are not expressly contained in the order

Furthermore, the guarantee and liability claims are excluded if one or several of the following conditions were the caus.:

- Force majeure and external influences
- Improper use and handling of the system (see operating and maintenance manual chapter "Correct and proper use")
- Processes, which the system was not designed or constructed for (see operating and maintenance manual chapter "Correct and proper use/ Process development")
- Non-observance of the general and special safety, accident prevention information, hazard warnings and operating instructions.
- Unsupervised persons in the danger zones or unsupervised system operation
- Unprofessional or unauthorised handling with: operation, control, inspection, maintenance, servicing, repair and dismantling
- Failing to conduct the prescribed tests
- Noncompliance of the prescribed (legal) maintenance, service and testing intervals
- Insufficient monitoring of signs of wear and ageing
- Changes and modifications to the use of the system or ist programs/ controls without the written approval from. Diener electronic GmbH & Co. KG
- Non-reporting/ untimely reporting of safety-related incidents and events during operation, control, inspection, maintenance, servicing, repair and dismantling the system.

Any further liability is excluded provides it is not legally mandatory. In no event is Diener electronic GmbH & Co. KG liable for downtime, lost profits or opportunities, loss of orders or goodwill, production downtimes, reduced capacity, downtimes costs, or any other indirect or consequential damage. This also extends to the personnel, representatives, and subcontractors of Diener electronic GmbH & Co. KG.

The liability limitations and exclusions affecting Diener electronic GmbH & Co. KG do not apply to cases of intent or wilful deceit.

All compensation claims become void two years after the occurrence of the damage

2 GENERAL SAFETY - AND ACCIDENT PREVENTION INFORMATION

This chapter titled "General safety and accident prevention information" contains a selection of safety and accident prevention information and extracts from the separate chapters of hits operating and maintenance manual, e.g. "correct and proper use", "General description", etc.

The safety and accident prevention information in each of the chapters must be observed!

2.1 Symbols used

This operation manual uses graphical symbols that are intended to draw the system user's attention to special safety and operating situations. These symbols have the following meanings:

General information, useful tips, and information on the work.

This information describes how the system can be handled to better effect or refers to other applicable documents or to other chapters in this operating manual.

Imminent danger to life, limb and property.

Failing to observe this information may cause detrimental effects to health, including life threatening injury, and damage to equipment and other property.

Depending on the risk, this information may be supplemented with signal words such as e.g. DANGER OF DEATH, DANGER, CAUTION, WARNING, etc.

Imminent danger from electricity.

Failing to overserve this information may cause detrimental effects to health, including life threatening injury from electricity, and damage to equipment and other property.

Warning of hazardous substances

Warning of hot surfaces

Warning of pinch zones between wheels/ rotation parts

Warning of crushing injury to hands

	*Warning of slippery surfaces*
	*Warning of tripping hazards*

2.2 General instructions

The system's layout corresponds to the state of the art, It has been designed and manufactured with consideration to the general regulations and statutory orders applying to plant construction. Nevertheless, the greatest possible operating safety is obtained only when the system is operated properly and exclusively by trained, responsible personnel and is used only for is intended purpose.

Activities and interventions can be performed without danger and error only when the personnel assigned to these activities have the specific knowhow and heed the information and specifications on both our system documentation and the documents of the component manufacturers.

The precautionary measures demanded in the documents of Fa. Diener electronic GmbH & Co. KG do not claim to be complete and refer exclusively to the scope of services and how our product are handled.

Also additional national regulations and laws **applying to special handling methods**, must be observed without prompting on our part and must be treated with greater priority than our instructions.

For incurred direct and indirect damage

Diener electronic GmbH & Co. KG is not liable for any direct or indirect damage resulting from improper use or failure to observe the hazard and safety instructions provided by us (see operating and maintenance manual chapter "Warranty/Liability")
(

Before commencing work, observe our danger and sfety instructions in the chapters

- *"Correct and proper use"*
- *"General description"*
- *"Technical data"*
- *"Training and instruction of the operator's personnel"*
- *"Commissioning, transport, siting, decommissioning, dismantling"*
- *"Equipping"*
- *"Operation"*
- *"Maintenance"*
- *"Process, auxiliary, and operating materials/ Disposal"*
- *"Fire protection"*
- *And the provided*
- *Operating and maintenance manual of the component manufacturers*

2.2.1 Instructions according to the Directive on the Use of Work Equipment

The operator of a machine/ system in the European Union is obliged to implement the requirements under the EU Directive on the Use of Work Equipment.

The implementation must comply with national laws and ordinances, etc.

In Germany, the Directive on the Use of Work Equipment is implemented in the form of the BetrSichV (Industrial Safety Ordinance) and the ArbSchG (Occupational Safety Act)

The operator is obliged to comply with the national laws and ordinances when integrating the machine/system in his production environment so that there can be no avoidable hazards and/or malfunctions.

Under the applicable laws, Fa. Diener electronic GmbH & Co. KG assumes that the operator fulfils these obligations.

Note the chapter "Inspection and maintenance instructions" and our details on the mandatory intervals for repeat tests"!

2.2.2 The operator's / personnel's obligations

The operator is obliged to assign only those personnel to work at and on the plant who have familiarised themselves with the underlying occupational safety and accident prevention regulations and have been instructed in how to handle the system. Moreover, they must have read and understood the safety chapter and the warnings in the operating and maintenance manual and in the provided documents for subassemblies and system elements. This instruction must be documented in writing.

Assign only trained or instructed personnel. Define the responsibilities of the personnel assigned to transport, site connect, operate, equip, inspect, service, repair, clean, decommission, and dismantle the system.

The manufacturer of the system assumes that only those personnel work at and on the system who master is possible operating methods and process to such an extent that they cannot pose a hazard. Non instructed persons must be kept away from the system. The employer is obliged to observe the ArbSchG when setting up the work station.

All personnel assigned to work on or at the system are obliged to observe the underlying occupational safety and accident prevention regulations and, bevor commencing their work, to read the safety chapter and the warnings in the documents provided for the subassemblies and system elements.

2.2.3 **Specialists**

Specialists are persons whose technical training, experience, and instruction have given them knowloedge of the pertinent standards, conditions, and accident prevention regulations.

Furthermore, they must be able to assess their assigned their assigned work and identify potential hazards. The specialists must be authorised to perform their assigned work.

Please observe our instructions in the chapter "Training and instruction"!

2.3 **Personal protective equipment**

Always use personal protective equipment required for the work task!

Heed the safety data sheets when handling the employed process gases and substances!!

2.4 Instructions from the chapter „Correct and proper use“

Process development

Please observe our instructions in the chapter "Correct and proper use" - Process development".

The substances and process and flushing gases approved for the system, e.g. for polymerisation, can be found in the chapter "Technical data - Process devolvement" “.

The system is used correctly and properly only when the process development has been implemented through or with the cooperation of Diener electronic GmbH & Co. KG and the process and is configuration have been released in writing by Diener electronic GmbH & Co. KG.

The operator assumes sole responsibility when the modifies processes or configures and implements new processes.
Furthermore, any and all liability and/ or warranties of Diener electronic GmbH & Co. KG. Become void with immediate effect.

This is also the case when the operator has requested Diener electronic GmbH & Co. KG to release protected safety functions and parameters, or persons instructed by Diener electronic GmbH & Co. KG have communicated or otherwise made accessible safe passwords to unauthorised parties.

CAUTION!

Only those processes may be applied and those gases/ substances used that Diener electronic GmbH & Co. KG has released for the system.

DANGER!

The use of processes and gases/ substances for which the system has not been designed and equipped may cause serious damage to the system, hazards, and grievous injury!

General requirements for proper operation

The system must only be used, if it is ensured that it can be safely operated. This includes among other things.

- *Setup, connection, commissioning, shutdown and dismantling of the system only by qualified personal of the operating company that has been instructed by Diener electronic GmbH & Co. KG*
- *The integrity and function of all safety devices (such as safety switches, complete and correct attachment of all covers*
- *The reliable functioning of Emergency Stop devices, annunciators and alarm devices.*
- *The undamaged, sound condition and reliable functioning of all components and fittings installed in the system.*
- *Adequate tightest of the vacuum system*
  the seals on the chamber door and feedthrough's in the chamber must be undamaged and tight.
- *Operation of a work on the system only by instructed and adequately qualified personnel.*
- *Sufficient expertise and training of persons entrusted with the handling of the substances/ gases that are used.*
- *Sufficient expertise and instructions by Diener electronic GmbH & Co. KG for persons who change process and system parameters, so that the processes can be carried out safely and adequately in a accordance with the system (also see the section "Training/ Instruction")*
- *Observing the information in the safety datasheets for the media and material used*
- *Using the required personal protective equipment*
- *Ensuring that the gases/ Substances that are used, the work pieces and the chosen process and system parameters are suitable for the processes being carried out and cannot lead to any hazards and/ or damage* ***(see the chapter "Process development")***
- *Ensuring that the correct program is selected and the correct settings for all process parameters are verified.*
- *Ensuring that the dimer is in the intended containers in the system*
- Ensuring that hat system is properly set up in regards to the work piece carriers and work pieces, suitable work piece carriers that hold the work pieces securely in their intended position must be used.
- *Adherence to the warnings and safety instructions on this operating and maintenance manual, the safety instructions attached on site to the system or is components, and the information in the component manufacturers' documentation*

Mobile systems and components must be sited so that

- *These cannot be damages e.g. by the choice of a suitable site, cut-out safety equipment etc.*
- *These are fixed securely at their intended locations, e.g. brakes engaged on the system cabinet's wheels, if fitted, the components are secured in place (pump, gas bottles in frames secured against falling over, etc.)*
- *There can be no hazards e.g. as a result of tripping, lines being pulled out, etc..*
  All lines (electricity, compressed air, gases, etc.t) must be strain-relieved.

Changing configuration parameters, programming etc. the system control

DANGER!

Mistakes in changing/ settings parameters for the processes and system and/ or mistakes in setting gas mixtures may cause serious damage and can result in hazards!

NEVER

Change settings that have been protected with seals or locks!

There is a risk of malfunction, damage, and possibly grievous injury!

Interfaces/ Duties of the operator

The system may not be damaged or exposed to impermissible loads.
If the system/ system components is/ are installed on road ways, these must have additional protection.
Damages from system components can result in hazards to persons and/ or the environment!

The operator must ensure a clean and unobstructed production environment so that a safe and functional operation is possible.

Heed the safety data sheets when handling the employed process gases and substances!

Always use personal protective equipment required for the work task!

Instructing and training employees

The system must only be operated and worked on by trained and sufficient qualified personnel.

Individuals that change processes and process and system parameter's must be trained to do so by Diener electronic GmbH & Co. KG and must have sufficient expertise so that the processes can be executed in a safe, functional system-specific manner.

Misconduct/ misuse

The system operate/ user is responsible for the safe operation of the system and is components at all times!

Prevent misuse and misconduct on the system!

Notices from the section "Inteded use/ System hazards"

Hazards for personnel may arise on the system,. for example:

- When using harmful gases/ substance, if the vessels, screw connections, pipelines, exhaust air filters, and ducts, etc. are leaking

- *When handling liquid nitrogen*
- *If the negative pressure/ vacuum system, e.g. at the chamber door, etc., is leaking*

- *On accessible hot system components, for example on the interior walls and door to the vaporiser, when they have not cooled adequately.*
- *During work inside the system cabinet and on the pump and filter when the system has not been shut down and has not cooled adequately.*

From moving system parts e.g. inside the plasma chamber when a rotary drum is used

- *At sharp functional edges on the guides and work piece carriers*

- *When closing the door.*
- By pressurised system components (containers, pipeline system, fittings, devices etc.), if these are not depressurised proper to maintenance and repair work

- *When the door to the plasma chamber is closed*

- *When supply lines to the system have not been routed according to the safety regulations*

- Touching electrical equipment that has not been disconnected from the power or is unprotected/ damaged

CAUTION!

The system contains equipment (generators) that are under high voltage!

Please observe our information in the chapter "General safety and accident- prevention information" and in the individual chapters of this operating and maintenance manual as well as the documentation of the component manufacturer.

2.5 Emergency off equipment/ Emergency system shutdown

Emergency off equipment is marked with a red mushroom head on a yellow base.

Pressing these locks them in place. They must be unlocked after the emergency situation has been remedied and bevor the system is restarted.

Figure 2: Emergency OFF

The control/ PRS monitors the system statuses and parameters relevant to safety.
If a system function relevant to safety is signalled not OK, the system enters fault mode (see also the chapter "General description/ System functions relevant to safety").

The emergency off equipment must be freely accessible at all times, and the paths to this may not be obstructed.

Never use the emergency off equipment to switch OFF the system!

After eliminating the cause of the emergency off situation, make sure that the system can resume operations without prejudice to safety or is functionality !

Only instructed experts and specialised electricians may remedy emergency off situations!

Note our instructions in the chapter "General description - Emergency off equipment“.

2.6 Work on electrical equipment

Information on particular dangers - electricity

- Only a specialised electrician may open the systems and work on electrical systems or operating materials with consideration to the relevant rules for electricity.
- Secure the system and is parts against reactivations!

The system is disconnected when is mains plus is pulled from the power supply
The main switch (QB1) is on the right side of the lockable system cabinet, on the rear side of the table housing in 400V systems, or on the front of the table housing in 230V systems.
Even when the main switch is at "0" or "OFF", there is still life threatening voltage e.g. across the following parts:

- *At the mains supply line*
- *At the main switch*
- *At all sites marked with a warning sign*

- Keep the system closed and locked at all times, and keep the key in a safe place!
- Always note the provided circuit diagrams!
- Before connecting to the electrical power supply, make sure that all lines and units containing liquid media are tight. Do not route lines containing liquid media over control cabinets or system parts. .
- System parts undergoing inspection, maintenance, or repair work must be disconnected from the power supply to all pins and secure against inadvertent reactivation. First check that there is no voltage across the parts disconnected from the power supply, then earth and short circuit these and insulate them from neighbouring live parts!
- If live parts require work, a second person should be assigned to cut off the power supply at the main switch of the emergency off button in an emergency. Cordon off the work area with a red and white safety chain and a warning sign.
- Use only original fuses with the prescribed amperage!
  Switch OFF the system immediately the electrical power supply starts malfunctioning!
- Note the minimum cross sections and the details on the circuit diagrams and parts lists!
- The electrical equipment of a system must be inspected/ tested at regular intervals Faults such as e.g. loose connections or damaged cables must be remedied immediately.
- After leaks or other discharging media, check that there can be no danger to the work on the electrical equipment.

CAUTION!

Never pull the connecting line's mains plug from the socket!

If the connecting line is damages, the system must be shut down immediately and the line replaced!

Electrical equipment may be repaired only by the services of Diener electronic GmbH & Co. KG.

NEVER

Open the housing, etc!

2.7 Work on pressurised/ negative pressure/ media carrying systems /

Information on particular dangers

- Pressurised/ negative pressure system parts must be inspected/ tested at regular intervals
- If the positive or negative pressure generator leaks or is damaged, the system must be shut down immediately and repaired by expert personnel!
- Check regularly the displayed actual values against the specified reference values.
  Reference or specified maximum values may not be exceeded!
- Always note the provided diagrams/ plans (e.g. for gas flow, flushing gas, compressed air, etc.)!

DANGER!

Even after

- The system has been switched OFF
- The system has entered standby mode or
- Emergency off has been activated

There can still be high residual positive/ negative pressures in the system parts!!

Before disconnecting the system parts, make sure that the systems have been depressurised and vented.
Systems may be depressurised, drained, and vented only by instructed expert personnel consulting the provided diagrams and the documentation issued by te component manufacturers!

If systems have not been depressurised, drained, or vented properly or fully, there may be hazards e.g.

- From discharging media or thrashing hose lines, etc., under high pressure
- From negative pressures generating high noise levels and sucking in objects and parts of the body

ALWYAS make sure that the pressure has been equalised!
NEVER use force to open connections, lines, or parts, and always secure against inadvertent opening all shutoff valves and drifting that must be closed during work on the system,

CAUTION!

Vessels and line systems may contain media, e.g. hazardous gases/ substances, whose contact and/ or discharge may pose hazards. Note the provided safety data sheets and use the requisite personal protective equipment!

DANGER!

Electrical equipment in the vicinity of spraying water, e.g. for cooling the pump, must be protected accordingly!

Do not route lines containing liquid media over control cabinets or system parts.

- Before all work on pneumatically or hydraulically powered or controlled fittings or units, they must first be depressurised and secured against inadvertent reactivation.
- Before generating a positive or negative pressure, make sure that all lines and units are thigh and that all shutoff fittings have been set to the correct position!
- Use only original spare parts!

2.8 Information on particular dangers – hazardous constitutents

The substances and process and flushing gases approved for the system, e.g. for polymerisation, can be found in the chapter "Technical data - Process devolvement".“.

The auxiliary and operating materials needed for the system can be found in the chapter "Technical data - Overview of technical data for selected system elects" an in the documentation provided by the component manufacturers.

The system may contain hazardous substances, e.g. in the gas system and the system components (pumps, etc.), whose discharge or contact may pose hazards or cause injury..

The general rules when hazardous substances/ media are being handled:

- Make sure bevor commencing work on or at the system that you know the hazardous substances currently in the system or system parts.
- Note the safety data sheets, and use the requisite personal protective equipment!
- The substances must be disposed of properly and in compliance with the legal specifications for the protection of the environment!
- **Process gases/-substances**
  Only those gases/ substances may be used that have been defended in the process development, the required specifications, and the specifications of Diener electronic GmbH & Co. KG
  The gases/ substances may be changed only after the written release of Fa. Diener electronic GmbH & Co. KG.
- **Operating and auxiliary materials**
  Only those operating and auxiliary materials may be used that correspond to the required specifications and the specifications of the component manufacturers. The auxiliary materials may be changed only after the written release of Diener electronic GmbH & Co. KG.
- Note the information in the component manufacturers' documentation and the safety data sheets!
- The operator is responsible for adherence to the occupational safety and environmental protection regulations when using hazardous and auxiliary materials.

Handling hazardous substances

DANGER!

The lack of knowledge of the properties of the gases/ substances used can result in hazards and severe injuries of use incorrectly!

The individuals responsible for dealing with the substances/ gases used must have sufficient expertise and must be trained.

The individuals must know the content of the safety data sheets and observe the safety information and hazard warnings contains therein!

Tightness of the systems

DANGER!

Depending on the gas/ substances used, leaks in the exhaust air system or during a gas/ substance change with open vessels, e.g. monomer/bubbler bottles, may release volatiles to the ambient air, endangering persons and/ or the environment.

The gas, flushing, ventilation, and exhaust air system must be tight at all times!

3 GENERAL DESCRIPTION

This chapter presents general information on the system's functions and is components and parts.

Not our instructions in the chapters "Correct and proper use" and "Safety and accident prevention information"

Learn the details of the components by consulting the operating and maintenance manual provided by the component manufactures.

A selection of the key technical data can be found in the chapter "Technical data"

General information on the inspection/ maintenance/ cleaning/ repair can be found in the chapter "Inspection/ maintenance/ cleaning/ repair".

Decisive are the instructions in the documentation provided by the component manufacturer!

With respect to the functions, note the wiring diagrams, pneumatics plans, and other documentation provides by the component manufacturers!

Intervention by unauthorised persons without extensive technical knowledge can cause considerable damage to the units and equipment and, in extreme cases, pose a danger to life and limb.

3.1 Using the system/ functions

In general, Diener electronics GmbH & Co. KG provides a system for producing a parylene coating.

Possible fields of application are:

- Coating tool surfaces

- Based on the following defined in the order
- Coating characteristics and
- Work piece characteristics,

each parylene system is individually equipped for the requirements of the specified processes in the course of "Process development".

Please observe our instructions in chapter
"correct and proper use/ Limits of use“

The description of the system's

- Possible processing methods
- The approved gases, substances

From the process, development implemented by Diener electronic GmbH can be found in the chapter "Overview of technical data/ Approved processes, gases, and substances".

1. Vaporiser door
2. Vaporiser
3. fan (PWM)
4. pyrolysis oven
5. pyrolysis tube
6. vacuum chamber/ recipient
7. chamber heating (optional) *1
8. rotation drive for the carousel
9. heatable pirani on the vacuum chamber
10. ventilation valve
11. cooling trap (optional) *2
12. edge valve to the vacuum pump
13. bypass for soft-pump function
14. vacuum pump

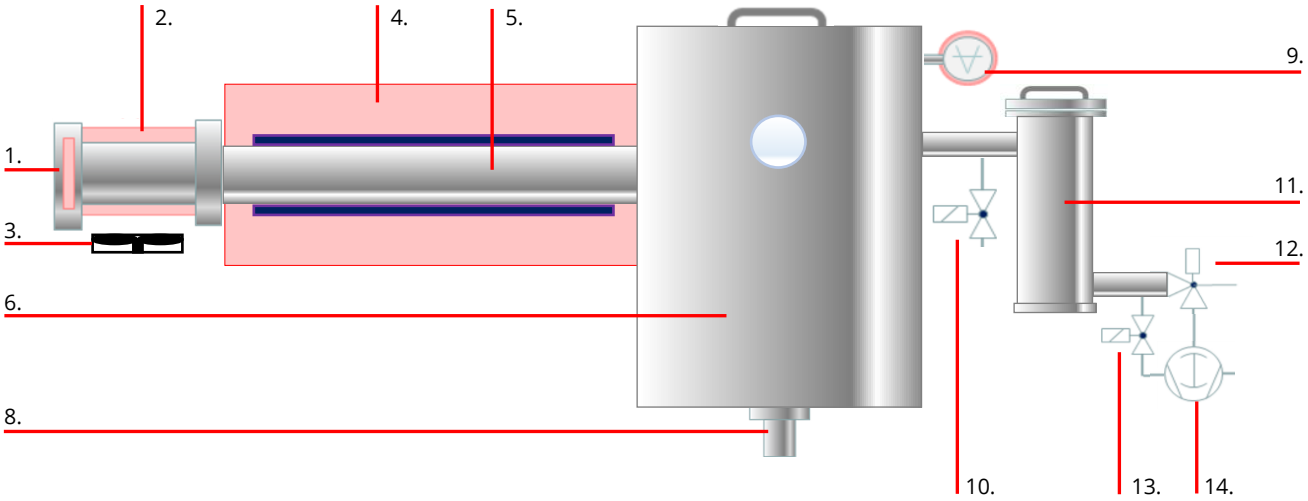


figure 3: Schematic illustration parylene plant

* Red surfaces indicate heated zones
*1 chamber heating for optimized separation of Parylene D (optional)
*2 cold trap - optinally with manual valve on the output flange to reduce pumping speed/ process adjustment for type N and F-VT4 volatile monomers.

Principile function:

The crucible filled with dimer powder is loaded into the vaporiser. After closing the door, the vaporiser door, pyrolysis tube and pressure gauge are heated to a set value and a vacuum is generated. Finally the vaporiser is continuously heated in a controlled process (pressure controlled). The heat and vacuum sublimates the dimers and splits them into monomers in the pyrolysis oven. The pump transports the gaseous monomers on into the vacuum chamber. In the vacuum chamber, the temperature is closed to room temperature. This temperature drop causes the monomers to resublime on the surfaces and they react with each other to form parylene. Excess monomers are caught in the cooling trap. It is filled with liquid nitrogen. Due to the temperature of -180!C, the remaining monomers also re-sublimate and react to form parylene before they can reach the vacuum pump.

3.2 Overview - the system and its components

The system consist essentially of the following subunits/ subassemblies

Pos.	Subunit / subassembly	Brief description of equipment/ function
1	System	• Cabinet/ housing for taking the system's equipment, e.g. plasma chamber, gas and flushing system, electrical componentry (main switch, generator, screen, fan, emergency off button, etc.) • Connections to the power supply, vacuum pump and gases on the side • Indicator lamp (option)
2b	Vaporiser	In the vaporiser, the dimer is heated at approximately 0.01 mbar of vacuum supplementation of the dimer begins at a temperature of approximately 80°C and the compound changes from the solid to the gaseous state.
4	Pyrolyse tube	The temperature in the pyrolysis oven goes up to 750°C. This causes thermal splitting of the gaseous dimers to form monomers, primarily on the hot walls of the pyrolysis tube.
5	Coating system	The ambient temperature in the coating system is about 25-30°C. Polymerisation of the gaseous monomers occurs preferably on cold surfaces of the work pieces and chamber walls, forming parylene. The work pieces lie on a carousel. It turns regularly to achieve even coating.
8	Venting system	The venting system equalises the pressure between the coating chamber and the environment.
12	Vacuum system	Vacuum pump for generating the vacuum in the coating chamber. Water cooling is needed depending on the type of pump.
	Exhaust air system	For exhaust gas purification.
9	Cooling trap	There is a container filled with liquid nitrogen in the cooling trap. The low temperature causes the monomers that did not polymerise in the coating chamber to condense on the outside of the container filled with liquid nitrogen. This prevents the pump from being coated with parylene and/ or plugging, which would impair its functionality or break the pump. There always has to be liquid nitrogen in the cooling trap.
	control / Parylene-Reaktor-control (PRS)	Operation is fully automated via the operator panel on the front. PRS is used to control the system functions and configure the processes. Only the fill level in the cooling trap has to be checked every so often and topped up with liquid nitrogen as needed.
	Compressed air system	Option – used to control the compressed air.driven valves.

3.3 Siting location and approved ambient conditions

The operator of the system selects the suitable siting locations.

Details on the siting specifications and the ambient conditions can be found in the chapters "correct and proper use", "Technical data!, and "Transport/ siting"

3.4 Work stations

See the chapter "Interfaces/ duties of the operator" for design of the work stations

Work stations for operating the system can be found

- On the front of the system (vaporiser door and operator panel of the controller)
- On the right side of the system for filling the cooling trap with liquid nitrogen.

Hazards may occur at the workstations

- *When opening/ closing the vaporiser door, due to movements of the door.*
- *When loading and unloading the work pieces and cleaning the coating system, due to hot zones inside the system.*
- *When filling/ handling liquid nitrogen.*

Personal protective equipment

During all work, use the personal protective equipment needed for this, e.g. googles, gloves, safety shoes, and hard hat.

Always use personal protective equipment required for the work task!

Heed the safety data sheets when handling the employed process gases and substances!

3.5 Danger zones/ Safety concept

The system (control cabinet) has the following danger zones

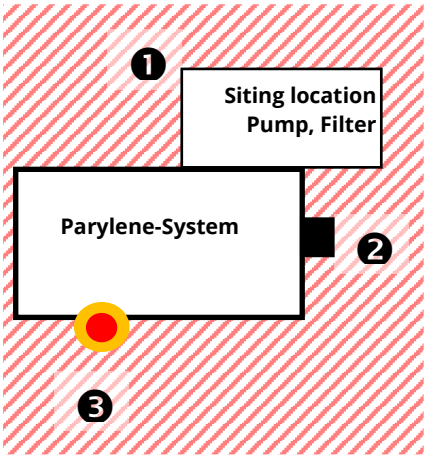


figure 4: Danger zone

Pos.	Danger zone Possible assignments	Position of personnel Safety measure
1	In front of the vaporiser with the door open • Observations during ongoing operation	In "Automatic" operating mode
	• Work on the control/PRS	In "Standby" operating mode
	In front of the coating chamber with the door open • Setting up the work pieces • Inspection, cleaning, maintenance, repair	Only with the master switch in the "Off" position
2	Cooling trap • Refilling the container with liquid nitrogen	***Danger!*** *Risk of burs due to liquid nitrogen.*
3	Inside the system cabinet • Inspection, cleaning, maintenance, repair	Only when main switch set to "OFF"

- ***Note the instructions in the chapter "General safety and accident prevention information" and "Correct and proper use/ System dangers"!***

3.5.1 Emergency off equipment

(See also the chapter "General safety and accident prevention information/ emergency off equipment/ Emergency system shutdown"

The system is fitted with the following emergency off equipment (emergency off buttons)

- On the front of the system

Pressing an emergency off button

- Aborts the process with immediate effect
- The system is disconnected from the power supply up to the main switch's connecting terminals in the system, i.e. the generator, pump, and gas supply are switched OFF.
  the control **is not disconnected from the mains** and is still in operation.
- The control outputs a correspond info text
- If fitted, the indicator lamp signals "Malfunction" (red)

The emergency off equipment is intended for emergencies only and may not be used to switch OFF the system under normal conditions!!

CAUTION!

Pressing emergency off equipment may involve a risk of damage and injury!

CAUTION!

Pressing emergency off equipment aborts an ongoing process with immediate effect.

After emergency off equipment has been pressed, there is still life threatening voltage inside the system, e.g. across the following parts:

- At the mains supply line and
- At the main switch!

Remedying emergency off situations

After an emergency off situation, this must be remedied before the system can be restarted.

Procedure

1st Eliminate the cause of the fault and, if necessary, the consequences of shutdown.
After the remedial work, check whether the process can be restarted, e.g. whether the work pieces may continue to be used and other measures may have to be implemented such as repairs, cleaning, reconfigurations, etc.

Only instructed experts and specialised electricians may remedy emergency off situations
If necessary the services of Diener electronic GmbH & Co.KG must be consulted
(see also the chapter "Correct and proper use/ Reporting of safety related incidents and events")

DANGER!

After an emergency off situation, system parts may still be carrying residual or high gauge pressures!!

After eliminating the cause of the emergency off situation, make sure that the system can resume operations without prejudice to safety or ist functionality .

---

2. Unlock the emergency off button
3rd Acknowledge the remedied emergency off situation at the control
4th Restart process
the system may not be

Figure 5: Emergency off button

3.5.2 System functions relevant to safety

System states and parameters relevant to safety are monitored by the control/PRS or the safety line board installed in the system. These include e.g.

- Emergency off
- Compressed air switch
- Overtemperature vaporiser
- Overtemperature pyrolysis

If a system function relevant to safety is signalled not OK, the system enters fault mode. If necessary, the emergency off function is activated (see the chapter "Emergency off equipment").

3.5.3 Main switch

The main switch is on the rear side of the system at 400V Systems

Figure 6: main switch 400V

The main switch is on the front side of the system at 230VSystem.

Figure 7: Main switch 230V

Even when the main switch is at "0" or "OFF", there is still life threatening voltage in the housing, e.g. across the following parts::

- *At the mains supply line*
- *At the main switch*

3.5.4 **Access to the inside of the system**

(see also chapter "General safety and accident prevention information“).

The inside of the system can be accessed through the cabinet door.

The components are mounted directly on the cabinet housing or an on fixed intermediate floors.

The required compact design restricts visibility and accessibility

Access to the components inside the cabinet is necessary only in exceptional cases, e.g. for repair/ troubleshooting work by expert personnel of. Diener electronic GmbH & Co. KG.

Only instructed, specialised electricians may open the system cabinet!

DANGER OF DEATH!

Caution when the system cabinet door is open: life threatening voltage inside!

Always withdraw the key to the system cabinet door, and keep it in a safe place!

3.6 Description of the system

3.6.1 Vaporiser

The key features of the vaporisers are:

- Heater installed in the door
- Door swinging sideways
- Door guard control with threaded connection
- Rubber seals between door and vaporiser

1. Guard
2. HEating
3. Container for dimer
4. door seals

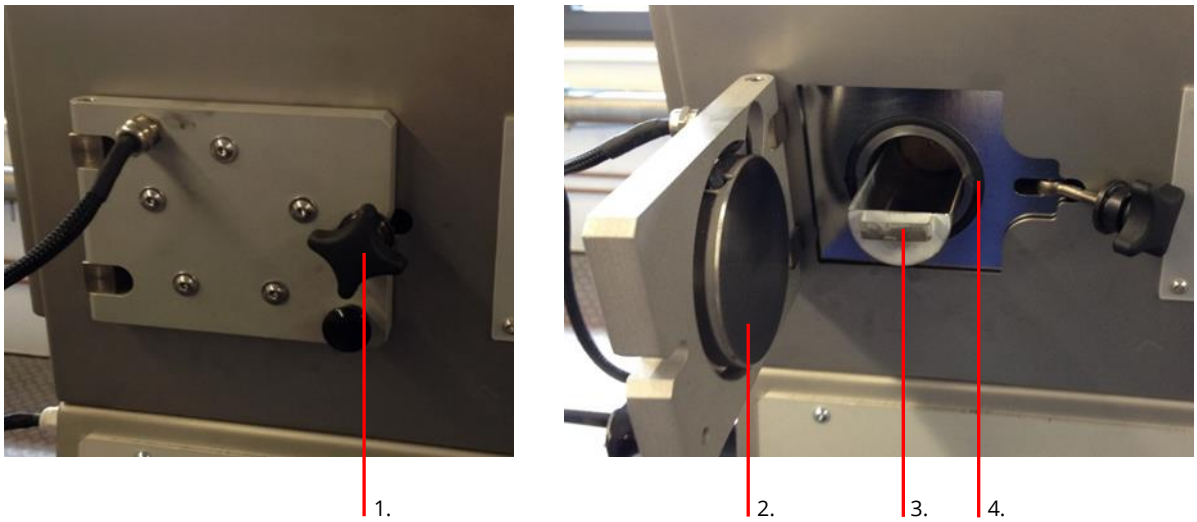


Figure 8: Picture vaporiser door(left) and open vaporizer with dimer container

The chamber door swings sideways

Seals / Tightness of the door

The plasma chamber door must close tightly if the required vacuum is to be generated for this purpose, seals have been fitted in the door and is seats.
if the door is not tight, the process cannot be performed, on only with great difficulty.

DANGER!

Generating a negative pressure behind a door that is not tight poses the danger of objects or parts of the body being sucked in!

Note our instructions in the chapter "General description/ seals".

Door kept closed with permanent magnets/ Preventing the chamber door from opening during ventilation

The permanent magnets serve to keep the door closed properly and to prevent it from opening when it is being vented.

If the chamber door opens during ventilation, the retaining magnets must be replaced.

3.6.2 Silane vaporiser (Optional)

Key features

- 14 mm Swagelock-inlet on the topside of the system
- Heating for silane vaporiser chamber and pipe
- Filling with 1ml syringe
- Must be heated in all coating processes (min 130°C)

Figure 8: silane evaporator

3.6.3 Pyrolysis oven

Key features

- Heating up to 750 °C
- Made of stainless steel
- Connects the vaporiser and coating chamber

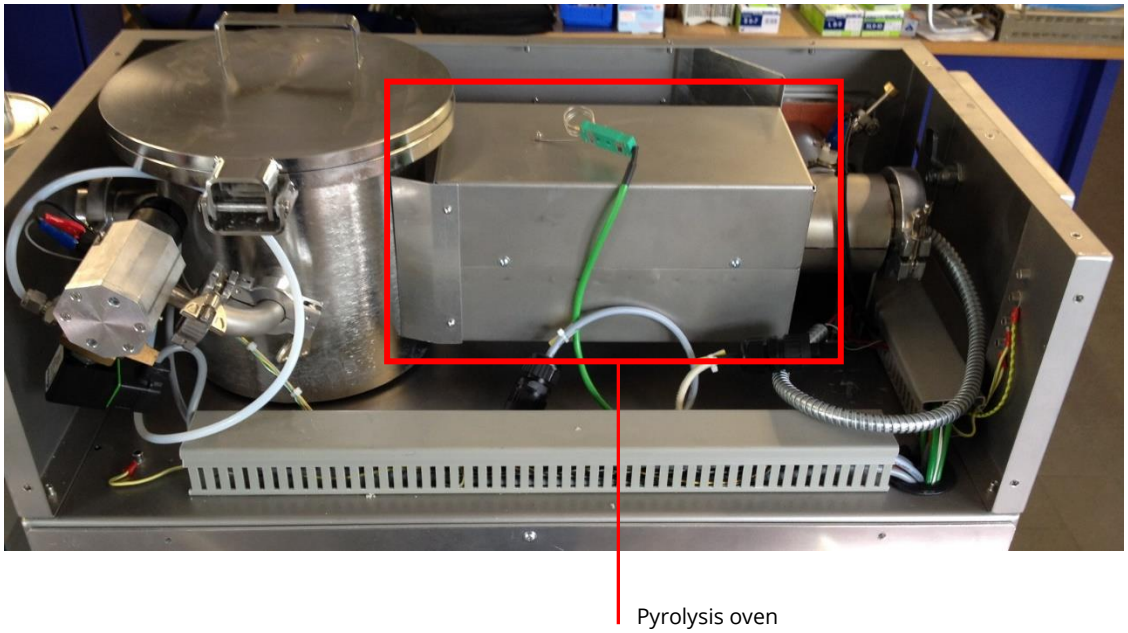


Figure 9: picture pyrolysis oven (example)

DANGER!

Risk of burns when touching the pyrolysis oven.

3.6.4 Coating chamber

The key featurs of the coating chamber are:

- Door that swings open
- Inspection glass for observing the coating process
- Rubber seals between door and chamber
- Turntable to rotate the carousel;

1. Inspection
2. Door
3. Seal
4. Turntable

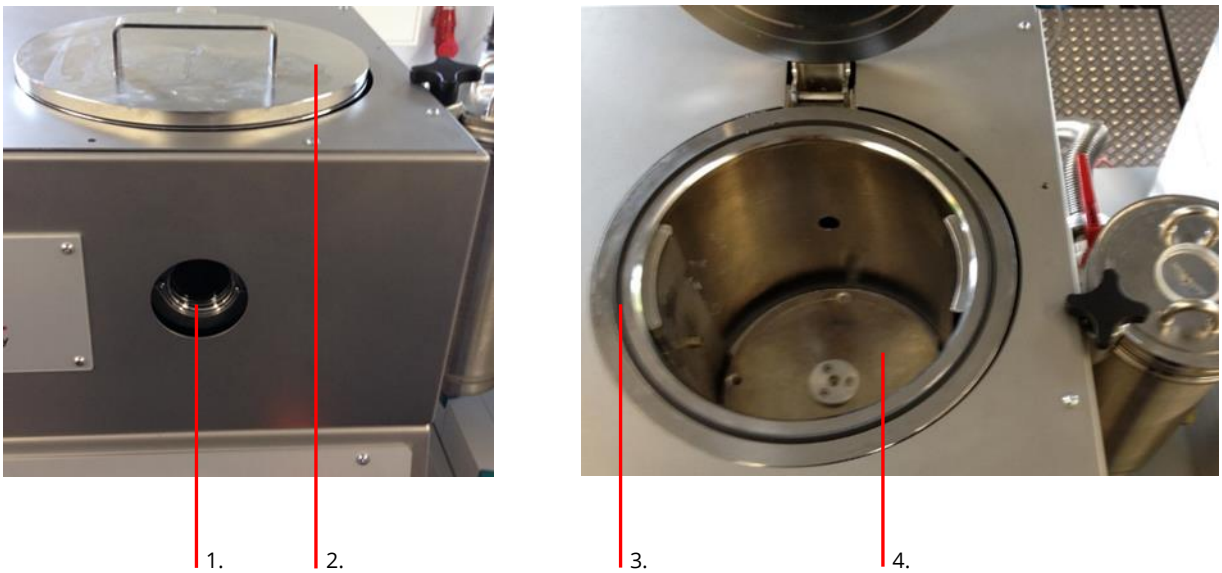


Figure 10: Picture coating chamber

Seals/ tightness of the door

The coating chamber door has to seal tightly so the required vacuum can be biult up.
Seals are installed for this purpose in the door and ist contact surfaces.
If the door is not tight, carrying out the process is not possible or more difficult.

DANGER!

If the door is not tight, there is a risk of suctioning body parts and objects when generating the vacuum.

DANGER!

The door is pulled in when the vacuum is generated. Risk of crushing fingers..

Note the information in the section "General description/ Seals".

3.6.5 **Connection panel**

There is a connection panel for supply media on the rear wall (electrical connection of the parylene system to the mains network, vacuum pump, LAN connections. USB is on the front side)

1. Mains
2. Pump
3. edge valve
4. Pirani display
5. LAN-Connection
6. USB-Connection

Figure 11: picture connection panel

Supply lines to the system connection point have to be installed so that they are protected, with strain relief, cannot tear off, and so that tripping hazards are avoided.

Ensure that all connections are properly attached.

There is a risk of malfunctions, damage, environmental damage and possibly serious injuries!

3.6.6 Pressure measurement

VGC 301 pressure gauge with Pirani CVG101

Pressure measurement of vacuum systems

Technical data	
Pressure range that can be measured	0,0001 to 1 Torr
Absolut tolerance	10 %
Heating temperature	150°C
Power supply	24 +/- 10 % V DC
Power supply.	50 mA
Mass (sensor head)	85 g
Mass (Controller)	250 g
Flange connection	KF 16

Interface: RS485 or RS232 for embedded mode in process control is available.

3.6.7 Ventilation system

The ventilation system is part of the gas system

Basic function

The ventilation system equalises the pressure between the plasma chamber and the surroundings. Before the system can be ventilated, the chamber may first be flushed to rid it of any hazardous gases.

The system is vented through valves with filter.

Basic function - slow ventilaton

The ventilation system equalises the pressure between the plasma chamber and the surroundings. Before the system can be ventilated, the chamber may first be flushed to rid it of any hazardous gases.

The system is vented through valves with filter. This filter is so fine that the pressure in the vacuum chamber builds up only slowly and no components can whirl about.

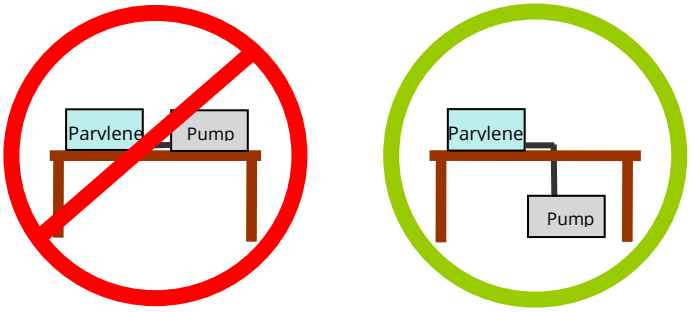
(See also "Gas flow diagram" in the system documentation".)

CAUTION!

The ventilation valves can be hot!

3.6.8 Vacuum generation – Pump

Connect the vacuum pump to the chamber. Set the pump onto the floow. Otherwise, there is a risk of pump oil flowing into the chamber in case of a pump malfunction (for example due to reversed phases on the electrical connection).



Connect the exhaust air hose. Exhaust air has to be discharged to the outdoors.

- Connect the pump to the "pump" jack
- Install the pump lines and hoses so they are protected, with strain relief, and cannot tear off.

basic function

the pump is connected to the plasma system and regulated by the control. The pump is released as soon as the following requirements have been fulfilled.

- Emergency off not pressed
- Chamber door closed,
- Temperature in the chamber OK,
- Vacuum generation released by control

Basic function - slow pumping off

The pump and the bypass valve are regulated by the control.
The valves are released as soon as the following requirements have been fulfilled.

- Emergency off not pressed
- Chamber door closed,
- Temperature in the chamber OK,
- Vacuum generation released by control

Slow pumping off through the bypass valve prevents small components from whirling about the chamber.

Information on the delivered pump type and manufacturer can be found in the chapter "technical data"

Further information on our functions, operation, inspection, maintenance, etc. can be found in the documents provides by manufacturer

CAUTION!

There may be hot sites on the pump and the piping systems!

There is a danger of burning injury

3.6.9 Cooling trap

The cooling trap purifies the exhaust air from the coating chamber and upstream systems.

Exhaust air always has to be discharged unimpeded to the outdoors. The exhaust air openings must be kept clear.

Attention!

There may be cold zones on the components of the exhaust air system

Risk of cold burns!

The cooling trap is installed directly after the coating chamber. Monomers that do not polymerise in the deposition process are captured by stainless steel walls cooled with liquid nitrogen in the cooling trap. The monomers fully condense on the cold surfaces before they can continue on towards the vacuum pump.

A positive side effect of the cooling trap is the additional pumping effect, so that the required base pressure - usually about 0.01 mbar - can be reached more quickly.

The cooling trap has to be refilled regularly during the process. Filling the cooling trap at a pressure of less than 0.1 mbar is recommended.

Manual cooling trap:

The manual cold trap must be replenished regularly during the process. It is recommended to fill the cold trap from a pressure of less than 0.1 mbar.

1. LN_2

2. Input
3. Output

Figure 9: picture cooling trap

The cooling trap has to be cleaned after each coating process. All of the white, porous solid material must be removed. See the section "Troubleshooting/ inspection (cleaning and maintenance/ repair" for further information.

Observe the safety datasheets and use personal protective equipment for handling liquid nitrogen!

Maintenance and repairs on the cooling trap may only be carried out by qualified personnel of. Diener electronic GmbH & Co. KG. Failure to comply voids the warranty.

Electrician cold trap:

The electric cooling trap cools the colling finger automatically. All settings for the cooler are made ex works and do not have to be adjusted later.

Switching on, starting the cooling and error monitoring is done via the control/ PRS

The cooling trap has to be cleaned after each coating process. All of the white, porous solid material must be removed. See the section "Troubleshooting/ inspection(cleaning and maintenance/ repair" for further information.

Maintenance and repairs on the cooling trap may only be carried out by qualified personnel of. Diener electronic GmbH & Co. KG. Failure to comply voids the warranty.

3.6.10 **Seals**

The seals in a plasma system enjoy a special status because these can have considerable effects on the system's malfunction and failure rate
Leaks on the system raise the risk of injury: parts of the body or objects can then be sucked in.

All seals, z.B.

- On the chamber door
- At the inspection ports
- At lead through/ holes drilled in the chamber housing for fitting encoders
- etc.

Are made of a material that can withstand the expected mechanical and thermal loading or feature properties that are not changed in the gases used.
These materials were selected with consideration to the specific project's conditions and requirements.

The seals have a limited service life depending on the application conditions.

The time when seals must be replaced can be recognised

- By a leakage rate higher than "normal" in the system or.
- When they exhibit cracking or other damage.

The intervals specified in the chapter "Inspection/ cleaning" must be observed without fail.

Damaged seals may be replaced only by the services of Diener electronic GmbH & Co. KG.

Before changing to gases with other properties or to gases that the system has not been designed for, first check in consultation with Diener electronic GmbH & Co. KG whether the system's present seals and components are suitable and what measures must be taken. Only Diener electronic GmbH & Co. KG may make any necessary modifications.

3.7 Work pieces and work piece carriers

The analysis of system requirements resulting from the work pieces' properties forms part of process development.

General requirements for the work piece and work piece carriers on the system side are:

1. No release of particles/ substances that can compromise the system's process's function, e.g.:

- Damage,
- Detriment to processes (coating),
- Distortion of measured results or damage to measuring probes etc.
- Reactions with the monomers used
- Hazardous substances (health/environment)

2. the work pieces

- May not release any harmful constituents
- No adhesions etc.
- Must have the correct/ allowable dimensions and weights
- Must not touch the chamber walls
- Must withstand the temperatures in the chamber without change to their properties
- Must be held securely at their processing position, if necessary with suitable work piece carriers (forces generated by ventilation and vacuum pump)
- May not be able to charge like a capacitor→ ***DANGER OF DEATH is possible!***

3. Work piece carrier

- Are loaded into a carousel
- The carousel is loaded into the deposition chamber by a guide.

Note the information on the section "General description"

The work pieces being processed/ treated must be suitable for the configured max. temperature so that they are not damaged and their properties are not impaired.

Carousel

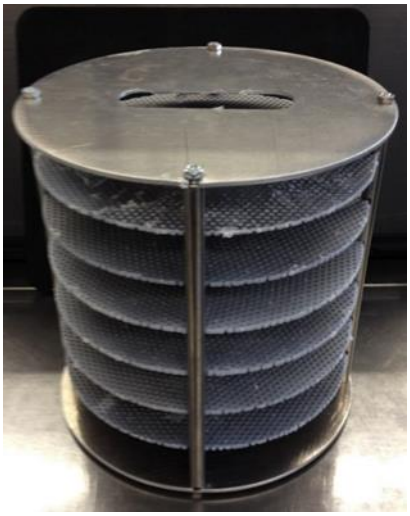
1-6 perforated discs can be loaded into the carousel in the standard version.

The carousel has to be taken out of the coating chamber for loading and unloading. Discs are put in or taken out individually.

To take the discs out of the carousel, 2xM4 screw must be removed, respectively one from the floor and cover. The brace can be removed.

The speed if the carousel should be even and depends on the desired result.

1. Floor
2. Brace with 2 screws
3. Cover
4. perforated discs



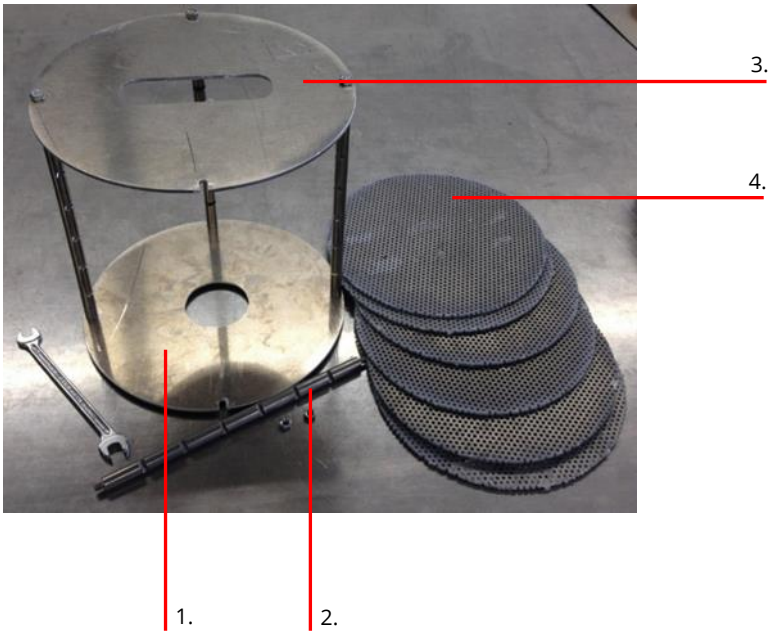


Figure 10: Picture carousel

Note the maximum load capacity!

Always close the carousel properly!!

Attention!

There may be sharp edges on the carousel due to its functionality!
Wear personal protective Equipment (gloves)!

3.8 System Control / Parylene-Reactor-Control (PRS)

The system is controlled via the screen

Please observe our instruction in the chapter "Correct and proper use"

- *Process development*
- *Changing configuration parameters, programming etc. the system control*
- *Instructing and training employees*

Function

- For the emergency stop devices, see the section "General/ Emergency stop devices"
- For the master switch, see the section "General description/ Masterswitch/ Circuit breaker"

The system can be started only,

- When the main switch has been set to "ON" and the control has powered up.
- When all conditions queried by the control for a start have been confirmed OK

PRS/ control via PC

The user control PRS (plasma reactor control) is a user interface serving to control the process, i.e.

- Process control, e.g.
  - Calling and modifying processes within the set limit values
    → Auto mode
  - Creating new processes - if these are permitted by the operator
- Outputting operating, fault, and malfunction messages
- Editing limit values for the process control and intervening in the system control
  → Manual Mode.
  Manual mode is available only to the services of Diener electronic GmbH & Co. KG.

The permitted passwords for the operator are protected by personal passwords.

The passwords must be kept under seal.

A description of how to operate the plasma reactor control (PRS) can be found in the chapter "Operation/ control" or in the documentation provided separately for the PRS.

Only expert personnel instructed by Fa. Diener electronic GmbH & Co. KG may operate the control/ PRS. This instruction must be documented in writing.

Operating statuses / modes

The system's operating statuses and modes are as follows

There is no voltage across the system;
the mains switch on the system is set to OFF or the system has been disconnected from the mains at the plug.

Mains witch is „ON“
See also the chapter "General description - main switch"

- The PC and screen power up, and the start screen appears. Clicking the button "Start" opens the main screen for the PRS.
- **All other system parts are switched OFF or free of voltage**

Standby, i.e. all programs/ processes have ended.
or no program/ prograss has started

- **All system parts are in a safe state, e.g.**
- No gases in the plasma chamber or in the system
- The coating system can be vented or evacuated
- The pump is switched OFF
- etc.

See also the chapter "General description/ system functions relevant to safety"

The system's modes are as follows:

Auto mode
the preparations for auto mode involve calling the programs listed on the PRS menu "auto mode", editing the pre-set, released parameters within the defended limit values, and saving/ creating these as variants,

possible parameters may be e.g.

- Preparation
- Coating
- Cooling and venting

Once the process has been created and is within the permitted reference values, the process can be called and started.

For the auto mode, the system must have been fully equipped and configured and the desired program called.
Auto mode cannot be started until

- All protective equipment is active (e.g. chamber door, cabinet door closed, etc.),
- all defined safety parameters are within the reference range and
- the control button "ON" has been pressed

Pressing the button "start program" starts operation, and the system is now in **auto mode**.

Manual mode

manual mode is intended only for commissioning and services and is available only to the services of Diener electronic GmbH & Co. KG
If necessary, also **individuals functions are available to the operator**, that have been released explicitly by Diener electronic GmbH & Co. KG.
for these functions, a password is assigned to the person that has been instructed in this work. (Not the case for systems with 3.5" screen)

Possible released functions may be e.g.:

- Changing the working pressure and base pressure in the chamber
- Rotary plate for the carousel
  - Changing the rotational speed
- Vaporiser
  - Changing the door temperature
  - Changing the end temperature of the vaporiser
  - Changing the temperature of the additional installed heating pad.
- Pyrolysis oven
  - Changing the temperature
- Pump
  Open the chamber's visualised valves, and switch in the pump manually
  → Generating negative pressure in the chamber

- ***Settings relevant to safety are particularly protected and may only be changed by the services of . Diener electronic GmbH & Co. KG.***

Fault display

- Operating, fault, and incident messages in the control/ PRS, e.g in the form of
- Display fields (red/green)
- Dialog windows
- Highlights , if necessary, text fields
- In the form of an indicator lamp
- Incidents additionally with a horn

Indicator lamp/ Horn - Option

- green: auto mode
- yellow: system in standby or manual mode“
- red: Fault

Figure 111: indicator lamp

Remedied fault messages are confirmed at the RESET button.
If no faults relevant to safety are pending, the system enters standby mode, the signal lamp turns yellow, and the horn stops sounding. The system can be restarted.

If an incident cannot be reset, the services of Diener electronic GmbH & Co. KG must be notified.

4 OVERVIEW OF TECHNICAL DATA/ APPROVED PROCESSES, GASES, AND SUBSTANCES

This chapter provides an overview of the system's most important technical data.

IT presents an informative overview of the performance data selected system components.

Note the documents provides by the component manufacturers!

The details in the component manufacturers" documents are binding!

Further technical data for the components can be found in the system documentation.

4.1 Ambient conditions and installation site

System side	Closed/ air conditioned building Note our specifications in Chapter 5 "Transport/ siting"
Permissible ambient temperature for operation and in case of decommissioned system[°C] ±	20-30 °C
Max. air humidity [% r.H.] ±	80 %
Permissible geographical height	2000 m above sea level
Atmosphere	No aggressive air, no explosive atmosphere.
Purity of indoor air	Normal, unpolluted outside air without particulate or foreign body content. No Hazardous additions/ concentrations of toxic and/ or potentially flammable/& explosive substances, media, dusts
Floor quality	Level floor of adequate load bearing capacity with dust supressing and oil proof paint/ coating.

Noise emissions	Sound pressure level measured in the work station at a height of 1600 mm. Process step: Ventilation Lp= ca. 75 db(A)
	 *It is the operator's responsibility to determine the actual sound pressure level in the work stations, to affix signs demanding the use of suitable hearing protection, if necessary, and to provide the operator with this hearing protection.*
	 The noise emission values for each of the devices used can be found in the documentation provided by the component manufacturers
Min. lighting levels for the work stations	Min. 500 Lux
	 *The operator must ensure that ensure that adequate lighting has been provided on site.*

4.2 Measurements of the housing

Configuration of the system Type A	Unit	Description
Width	mm	850
Height	mm	750
Depth	mm	500

 The measurements and weight of each provided component (e.g. pump etc.) can be taken from the setup plans and documents provided by the component manufacturers.

w

4.3 Coating chamber

Configuration of the system Type P6/ P6+	Unit	Description
Round stainless steel coating chamber		
Diameter	mm	200
Height	mm	200
Door		Manual door made of aluminium/ stainless steel.
Type P8	**Unit**	**Description**
Round stainless steel coating chamber		
Diameter	mm	200
Height	mm	250
Door		Manual door made of aluminium/ stainless steel.

Configuration carousel Type P6/ P6+	Unit	Description
Made of stainless steel with 4 removable braces		
diameter	mm	176
height	mm	172
		6 levels, approximately 22.5 mm apart
Type P8	**Unit**	**Description**
Made of stainless steel with 4 removable braces		
diameter	mm	176
height	mm	224
		8 levels, approximately 22.5 mm apart

Configuration product carrier		
Perforated discs		
Diameter	mm	Ca. 158

Configuration of dimer		
Stainless steel container		
Volume	cm^3	Ca. 72

Seals		
Material	Silicon or FKM	
	Stainless steel/FFKM Stainless steel pipe work	

Note our instructions in the chapter "General description/ Seals"!

4.4 Connecting to the electricity mains

Operating voltage	230V/16A or 400V/16A
Frequency	50/60 Hz
	 The power ratings of each component can be taken from the setup plans and documents provided by the component manufacturers.
Splash guard	
Protection glass	IP 44 or better For all equipment/ units not installed in the housing
	 *It is not permitted to clean with water/ steam jets, etc.!!*
Electricity consumers	
	All electricity consumers are supplied from the system's mains connection. • Vacuum pump
HEat load	
Heat load of heating elements [W]	• Heating band 200 W • Heating cartridge 100W • Heating cartridge 1600W

4.5 Pump

Information about the pump can be found in the enclosed documentaiton of the pump manufacturer.

4.6 Pressure sensor

	TYPE X
Designation	Pirani with Controller
Manufacturer	InstruTech
Quantitiy	2
Measuring range	0,0001 to 1 Torr

Further specifications can be found in the data sheets provided by the component manufacturer.

4.7 Temperature mesurement

Temperate sensor		
Thermoelement Type K	Measuring range: 0 to 200°C	Measuring range:: 0 to 800°C

4.8 Process development – Processes and process and flushing gases used and permitted

The system has been designed and built exclusively for the following gases/ substances and work pieces.

If other gases/ substances are to be used, a written approval from Diener electronic GmbH & Co. KG will be necessary.

Please observe our instructions in the chather "correct and proper use" and "general description""!

Note the safety data sheets for the gases/substances used!

Use the requisite personal protective equipment!

DANGER!

If gases/ substances are used that are not approved by. Diener electronic GmbH & Co. KG there is a risk of negative process results, malfunctions, damages, environmental damages and possibly, severe injuries!

If gases are used other than those the system has been designed and constructed or the system and ist processes approved for, this will take place at the sole responsibility of the operator and will make any guarantee and liability on the part of Diener electronic GmbH & Co. KG void.

ONLY mix permitted gases in the permitted mixing ratio!
Always ensure that no hazardous mixtures can occur!

DANGER!

Legends / footnotes / important information

*1	CAS	This is an international identifying standard for chemical substances. Every chemical substance registered in the CAS database (including bio sequences, alloys, and polymers) has a unique CAS number.
*2	pressure	Gas supply pressure at the pressure regulator
*3	Approved materials	For the basic requirements see the chapter "General description/ General requirements for the work pieces and work piece carriers"". the general specifications permit the use of the following materials
*4	pressure	Setting

4.9 Process development – Approved substances

Liquid nitrogen	
Use	Using the cooling trap
Identification / CAS-No.	28804-46-8
specification	Purity 95 %
Gas connection no.	Manual filling of the cooling trap
Dichloro – [2,2] – Paracyclophane for the depostion of parylene C	
Use	Coating
Identification / CAS-No.	28804-46-8
specification	purity >=98,5 %
[2,2] – Paracyclophane for the depostion of parylene N	
Use	Coating
Identification / CAS-No.	1633-22-3
specification	purity >=99 %
Octafluoro – [2.2] – Paracyclophane for the depostion of parylene F-VT4	
Use	Coating
Identification / CAS-No.	1785-64-4
specification	purity >=98%
Tetrachloro – [2,2] – Paracyclophane for the depostion of parylene D	
Use	Coating
Identification / CAS-No.	30501-29-2
specification	purity >=85%
	*Wash hands after handling.* *Wash contaminated clothing befire wearing it again.* *Avoid contact with the eyes, skin and clothing.* *Observe the supplied safety datasheets!*
Methacrylsäure-3-trimethoxysilylpropylester (Silan)	
Use	Bonding agent
Identification / CAS-No.	2530-85-3

5 TRAINING AND INSTRUCTION OF THE OPERATOR'S PERSONNEL

Personnel are instructed by Diener electronic GmbH & Co. KG during the commissioning stage.

Correct and proper use includes the assurance that only instructed and adequately qualified personnel work on and at the system.

If the owner/ operator of the system or the personnel change, the instruction must be provided according to the following table

All instruction must be documented in writing.

Operating and working directly on the system parts requires specialised knowhow, e.g. when the system parts are being transported, sited, connected, equipped, inspected, cleaned, or serviced.

Therefore, all work may be performed only by expert personnel who

- *Have and can verify adequate knowhow or the training needed for this work.*
- *Are familiar with the general accident prevention regulations, the special safety regulations required for this work, and the occupational safe regulations.*
- *Have adequate qualifications for work in the danger zones or are instructed and supervised by expert personnel*
- *Have been instructed by Diener electronic GmbH & Co. KG, and this instruction has been documented in writing.*

This mandatory if the system and is parts are to be controlled, transported, sited, connected, equipped, inspected, cleaned, and operated correctly and safely.

Special requirements apply e.g.

- *To the dismantling, transport, siting and connecting of the system*
- *To the changing of configuration parameters and*
- *To the correct handling of and activities with the gases/ substances used (parametrisation, mixing, etc.)*

To the changing of processes or the creation of new ones(e.g. gases/ substances, work pieces, etc.) when this has been released in writing by Diener electronic GmbH & Co. KG.

These activities may be performed only by persons who have the qualifications needed for this..

Personnel without these qualifications may not work at or on the system!

A distinction is drawn between

- *Expert personnel*
- *Specialised electrician who may work on the electrical installations*
- *Operator*
- *Assistants who clean and who load and unload the work piece carriers/ fleece rollers.*

The personnel deployed must have a command of the language (agreed language according to specification etc.), which the interfaces the interfaces of the programs are designed in and the language in the operating manual.

The responsibility for ensuring that only persons with adequate knowhow are assigned to the respective activities lies with each of the superiors supervising this assigned personnel and with the operator's safety officer.

5.1 Requirements for the personnel

Please observe our instructions in the chapters

- *"correct and proper use“*
- *"General safety and accident prevention information"*
- *"General description"!*

	personnel	Work	Requirements	Instruction by
FK	**Expert personnel**	• Operating the control / PRS • Changing configuration parameters, within the set limit values • Simple troubleshooting based on messages. Conducting inspections maintenance • Supervising the system and all work in the safety zones, auto mode, equipping, exchanging gas bottles and vessels	Training/ instruction in how to operate the control/ PRS, the function of the entire system, and how to operate this, its system parts and its components parts. The operator of the control/PRS must have adequate knowhow, experience, and practice in handling the control/PRS if he is to operate the system safely. He must be able to draw the right conclusion from the operating, fault, and incident messages and to implement the suitable measures Allocation of an individual password	Fa. Diener electronic GmbH & Co. KG
FK	**Expert personnel**	• Handling dimers and parylene • Handling liquid nitrogen.	Training/ knowhow/ instruction concerning the dangers and the safety and accident prevention measures, etc., for working with and handling hazardous substances, e.g. • Knowledge of the contents of the safety data sheets for the gases/ substances used • Required personal protective equipment and accident prevention measures • TRGS 509 storage of hazardous substances in stationary vessels • TRGS 510 storage of hazardous substances in mobile vessels • TRGS 800 fire protection measures	Operator's expert personnel Safety officer Expert personnel for hazardous substances

	personnel	Work	Requirements	Instruction by
FK	**Expert personnel**	• Changing parameters and switching functions in manual mode	Training/ instruction by Diener electronic GmbH & Co. KG e.g; -. plasma technology Special additional instruction Allocation of an individual password.	Fa. Diener electronic GmbH & Co. KG
FK	**Technicians** **Engineers**	• Mixing gases • Selecting new processes	Training concerning the dangers and the safety and accident prevention measures, etc., for working with and handling hazardous substances. • Knowledge of regulations, standards and technical rules e.g. TRGS 407 activities with gases 407 • TRGS400 Assessment of risks for activities with hazardous substances Instructions in the chapters • "Correct and proper use" • "Correct and proper use- changing configuration parameters, programming etc. the system control" Must be observed!	The operator must check. the adequacy of qualifications and ensure that only adequately qualified personnel perform these activities!

	Personal	Arbeiten	Anforderungen	Einweisung durch
B	**Operator**	• Operating the system - in auto mode - without changing configuration parameters, etc. • Loading and unloading after the end of the process • Restarting auto mode process after loading	**Instructing in the safe and appropriate performance of all work.** **Communication the safety and danger information is obligatory.** **This is supervised by the expert personnel.**	The operator's instructed expert personnel
H	**Assistant**	• Handling hazardous gases/ substances e.g. - storage and transport - Cleaning up discharged substances • etc.	Instruction concerning the dangers and the safety and accident prevention measures, etc. for working with and handling hazardous substances, e.g. • Knowledge of the contents of the safety data sheets for the gases/ substances used. • Required personal protective equipment and accident prevention measures • TRGS 509 storage of hazardous substances in stationary vessels • TRGS 510 storage of hazardous substances in mobile vessels • TRGS 800 fire protection measures	Operator's personnel Safety officer Expert personnel for hazardous substances
H	**Hilfskraft**	• Cleaning the coating system • Refiling liquid nitrogen • Cleaning up/ disposing of auxiliary materials	Instruction concerning the dangers and the safety and accident prevention measures Knowledge of how to handle correctly the substances, specifically the hazardous substances, in the system. Knowledge of the safety and accident prevention regulations/ contents of the safety data sheets	The operators expert personnel and supervision
Für Transport, Anschließen / Trennen, Inspektion-, Wartung-, Instandhaltung				
FK	**Expert personnel**	General inspection and maintenance work Basis: The operating and maintenance manual for the system or the operating and maintenance manual of the component manufacturers	Expert personnel with unprofessional experience in inspections/maintenance **Instructing in the safe and appropriate performance of all work.** **Communicating the safety and danger information is obligatory.**	Fa. Diener electronic GmbH +Co. KG

	Personal	Arbeiten	Anforderungen	Einweisung durch
EFK	**Specialised electrician**	• Connecting and disconnecting the system and its components	Acknowledged training for specialised electricians	
FK	**Expert personnel Specialised electrician**	• Decommissioning the system < 6 Mon. duration or recommissioning after decommissioning < 6 Mon. duration	Instructing the safe and appropriate performance of all work. Communicating the safety and danger information is obligatory. *Note the instructions in the chapter "Correct and proper use/ Decommissioning the system"* ***CAUTION!*** *Training must not be more than 2 years ago.*	Fa. Diener electronic GmbH & Co. KG

The instruction provided to expert personnel, operators, and assistants and its contents must be documented and maintained at the latest level.

The instruction logs must be kept in a safe place and presented on request.

5.2 Introduction/ coordination and implementation of measures in the event of an alert

The operator must provide one or more named persons on site who can assess the emergent alert/ incident situation and introduce the required measures.

This persons or these persons must supervise the work on or at the system when personnel are inside the safety zones!

The introduction and coordination of the measures must be simulated in actual example cases.

5.3 Passwords/ Keys

Trained and instructed personnel receive a password corresponding to their training level that they can enter to operate the system.

These passwords are hierarchical so that only those functions can be executed that correspond to the operator's training level.

Passwords and keys must be kept under lock and key and may not be freely accessible!

6 COMMISIONING, TRANSPORT, SITING, DISMANTLING

6.1 Safety instructions for dismantling, transport, siting, connecting

Before commencing work, observe our specifications and instructions in the chapters

- "Correct and proper use"
- " General Safety and accident prevention information“
- "General Description"
- "Technical data"
- "Training and instruction of the operator's personnel"
- "Operation"
- "Maintenance"

And the provided

- Operating and maintenance manual of the component manufacturers
- Plans and diagrams and
- Safety data sheets

Special knowhow is needed to dismantle, transport, site, connect, commission, and decommission the system. Therefore, all work may be performed only by expert personnel who have been instructed.

DANGER!

Work being performed by unauthorised person's without adequate knowledge may entail grievous injury and/or considerable damage to the system and its components.

DANGER!

Hazards and grievous injury are the consequences on failing to observe the danger and safety information in the chapters of this operating and maintenance manual and in the component manufacturers' documentation.

The national regulations and laws prescribed for the work must be observed and treated with higher priority than our instructions.

The operator must ensure adherence to the safety and accident prevention information.

- The personal protective equipment corresponding to the assigned activities (e.g. protective gloves, safety shoes, hard hat, goggles, etc.) must be used.
- The system must be disconnected as specified from the components, e.g. pump, filter, gas bottles, etc.
- All potentially moving system parts must be parked at a safe location and, if necessary, secured in addition with adequate mechanical means, e.g. wire, wedges, etc.
- Sharp edged system parts must be covered with suitable material (padding).
- The system cabinet/ table housing may be hoisted only at the sites provided for this purpose!
- The equipment used (hoists, forklifts, etc.) must be sized adequately for the transported loads.
- Owing to the high potential for damage, the unpackaged system may not be transported with a crane and attached cables/ transport belts, etc.

CAUTION!

There is a risk of tipping due to the gravity position of the system!

- Before and during transport, the transported goods must be secured with suitable measures against shifting, tipping, and turning, eg.g ant slip mats on the forklift tines, attached cinching belts and securing blocks, screw unions with the pallet, etc..
- The goods must be transported slowly, in a controlled manner, and without collisions with other objects.
- Use only tools and load handling attachments that are in perfect working order!

CAUTION!

Failing to overserve these instructions when transporting systems and system parts poses the risk of damage and grievous injury!

DANGER!

NEVER reach with your hands under the transported goods or move under suspended loads.

Secure adequately the transported goods!

Observe adequate safety distances when turning/ manoeuvring the transported goods in tight spaces!!

6.2 Commissioning and instructing the operator

The system is commissioned at Diener electronic GmbH & Co. KG.

This includes the siting and connection of the required components, e.g. pump, activated carbon filter, etc.

Also tests are conducted either prior to or during the commissioning, eg.

- **Safety checks on the electrical installations**
- **Tests on the safety equipment**
- **In addition, a test run is performed that checks all of the system's functions.**
- **If commissioned, the process (process development) are run and optimised.**

As part of commissioning, expert personnel from Diener electronic GmbH & Co. KG instruct the operator's expert personnel (see also chapter "Training and instruction of the operator's personnel").

On request, the system may be commissioned at the customer's location.

Tests

Commissioning conducts the tests listed in the following.

A rested system must be subjected to the specified tests.

If a test doeas not return agreement with the reference state, the system may not be put into operation!

Note our instructions in the chapter "Recommissioning after decmissioning"!

No.	Test	Test to be conducted on a resisted system	Comments
P1	• Test for damage on all equipment that may have been sustained during transport, e.g. - Housing - cables and wiring - Operator panel, indicator lamp generator operation - Pump - State of the chamber door seals - inspection port in the chamber door and, if fitted, the protective grille - system accessories	**X**	Visual check
P2	• No foreign bodies, contaminants, damage, loose parts, etc., inside the system	**X**	Visual check inside the housing
P3	• Check of correct fastenings	**X**	Visual check of the fastenings/ sittings of the pump, gas bottles, etc.
P4	• No sharp edges, cutting sites, etc., on the components	**X**	Visual check for damage
P5	• Check of the components' compliance with the manufacturer's specifications	**X**	Pump
P6	• Check at the installation site - Adequate accessibility - Protection of system parts against damage - Reliable stability/ fastenings (pumps, rollers braked, etc.)	**X**	Visual check
P7	• Correct connections of the system and its components, e.g. - Pump, gas ballast, flushing N2 Connection sites on the system - filter, exhaust air routed to the outside - gas bottles, pressure reducers, connecting points on the system secure fastening of the gas bottles - Polymerisation accessories - if fitted - Extractor effectiveness, if necessary	**X**	Visual examination by expert personnel and specialised electrician

Fortsetzung Tabelle

Nr.	Prüfung	Durchzuführende Prüfungen bei einem Ortswechsel	Bemerkungen
P8	Protected routing and correct secruing of electrical and pneumatic lines (e.g. no tripping, scraping, or crushing hazards)	**X**	Visual check
P9	Checks for the electrical installations as defined in DIN EN 60204-1	**X**	Visual examination by specialised electrician
P10	Cirrect connection/ tightness and pressure losses in the gas supplies and their vessels, if necessary, measures to prevent hazardous gases from mixing (see also the chapter "Operation")	**X**	Visual examination of the connection/ tightness of gas bottles, pressure reducers, plugged connections to the system, etc.
P11	Correct setting values	**X**	On gas bottles, etc., and check of the configuration values in the control
P12	Function of the emergency-off chain (emergency off button, chamber door switch, vacuum switch, door in the houising)	**X**	Test or visualisation via PRS
P13	Function of the ventilationd and emergency ventilation	**X**	Test or visualisation via PRS
P14	Protective equipment/ cladding, etc., has been fitted correctly and completely	**X**	Functions of housing covers
P15	Functions of signalling and alarm units	**X**	Test or visualisation via PRS
P16	Checks for the generatrion of vibrations that may compromise functionality and/ or stability	**X**	The installation site selected must prevent vibrations from being transferred out of the production environment
P17	Noise levels, effectiveness of sound insulation		
P18	Correct labelling, e.g. danger information, component designations		
P19	The system's agreement with the documentation		

Testing the control/ programs

The programs are tested for their correct and reliable functionality during commissioning, the trial run for the system functions, and the trial for the processes.

Defective programs and program sections are corrected.

Practical tests on the logic floes, e.g.

- Correct functioning of the work flows
- Correct functioning of the safety equipment
- Correct limit values
- Protection of the limit values and of the programs and program sections that the operator may not alter or adjust.
- etc.

Trial run for system functions

The trial run for the system functions serves to configure and optimise the system parameters.

This tests the system and the emergency functions.

The trial run includes leakage tests on the gas system, vacuum generation, and exhaust air system and the determination of the leakage rate.

Trial run for processes

Please observe our instructions in the chapter "Correct and proper use/ Process development"

The process and configuration parameters are set and optimised specifically for the processes (gases/ gas mixtures, work pieces, etc.) supplied by Diener electronic GmbH & Co. KG.

The set limit values are tested.

Release

Once it has been verified that the system runs perfectly and can be operated safely, the acceptance log/ commissioning report is issued and the system released by the ordering party.

6.3 Transporting, siting, and dismantling the system

Owing to the system's resitting capabilities, the operator may change the system's location.

If the system is to be resisted, relocated, or placed in storage, it must first be dismantled.

The system is dismantled and resisted and its components connected

- **By the operator's instructed expert personnel,**
- **On the basis of the documents provided by. Diener electronic GmbH & Co. KG and the component manufacturers.**
- **Based on the provided circuit diagrams and schemes.**

We recommend commissioning Diener electronic GmbH & Co. KG with the initial and all flowing sittings at your locations.

. Diener electronic GmbH & Co. KG does not accept any warranty claims or liability for any direct or indirect damage incurred by the operator during transport or as a result of mistakes in the siting, connecting, commissioning, or dismantling of the system or its components

DANGER!

An incorrect procedure may entail danger and the associated injuries!

Always use the required protective equipment!!

6.3.1 Preparing for transport/ Separation of the subassemblies

Requirements

(see also chapter "Decommissioning and recommissioning the system")

- The system has been flushed during its last use.
- There are no hazardous substances in the system;
  gas bottles, monomer vessels, etc., have been removed.
- The system has been cleaned
- All loose parts, e.g. work piece carriers, etc. have been removed

Before transport, the system must first be separated into the following subassemblies:

- System
- Housing
- Pump
- Filter
- Hose lines
    - Housing, pump.
      the hose remains attached to the system and is disconnected only from the pump.
      the hose must be protected against damage during the transport, e.g. it is secured to the housing, etc.
    - Pump, exhaust air filter
    - Of necessary, exhaust air filter, routing out of the room
- The indicator lamp may have to be removed (by instructed specialised electrician only)

Please note:

- All open connections must be sealed
- Close and, if necessary, secure doors (housing and chamber)
- Protect cables and wiring
- Remove or secure all loose parts from the chamber

CAUTION!

Place padding over all connections for gases and, if fitted, for the polymerisation accessories, screen, operating elements, etc. , so that they cannot sustain damage during the transport!

6.3.2 Packaging

The best packaging for your parylene system is the original packaging.

Please keep them safe!

6.3.3 Hoisting/ transsprting with a fork lift

Protection of the system parts/ components against damage during transport

Design the packaging with consideration to the specific requirements such as shipping mode/ route, ambient conditions, etc., e.g. against the effects of external forces, soiling, wetting, condensed water, etc.

Place padding over the system sites that may sustain damage during transport or lead to injury.

Packaging recommendations

System cabinet/ Housing	On a pallet in a robust crate, if necessary in waterproof sheet or with desiccants
Accessories	In crates, if necessary, with padding

6.3.4 Lifting/ transporting with lift truck

The system cabinet may only be lifted with a forklift or lift truck. There is a risk of damage when using cables etc.

- The panels at the bottom of the system cabinet must first be removed before the lifting equipment is moved underneath.
- The system cabinet must be secured against tipping before and while it is being

6.3.5 Transport position and transport locks

The system cabinet/ housing may be transported vertically only

Recommended transport locks

- Use the provided crate for the system
- Secure the system against slipping
  for example, with wooden blocks or other fillers.
- Use sheeting to protect the cover against breaking/ scratching.

6.3.6 Special transport and storage instructions

The system must be transported in compliance with the national regulations and laws for accident prevention.

The packaging, transport mode and route, and storage selected must ensure that the system cannot sustain damage from transport effects, e.g. heat, high air humidity, vibrations/shock, infestation by rodents/ insects, etc.

Storage and transport are subject to the specifications in the chapter "Technical data/ ambient conditions and installation site".

CAUTION!

The transported/shipped system and its equipment may not be exposed to vibrations/shock!

Vibrations/shock may cause damage to the system parts, e.g. of the electronic/electrical systems.

6.3.7 Internal transport

If the system is to be resisted at the same production location, the system cabinet/ housing may generally be transported with a forklift/ dolly. Make sure that the system cabinet/ housing cannot tip over.

Disconnected systems on rollers can be pushed to the new installation site.

Requirements

- Only in the completely dismantled state(see "Preparing for transport/ Separation of the subassemblies")
- No obstructions or other hindrances in the transport route
- If necessary, place padding on the system

CAUTION!

Transporting the system cabinet may involve a risk of tipping when it is pushed at the wrong place!

The transport route must be free of obstacles and other hindrances if it is not to tip over!

6.3.8 Installation site

See also the chapter "Recommissioning after decommissioning"

The system has been designed and built specifically for the required functions and ambient conditions.

Changing or deviating from thins concept may give to risks affecting the system's functions and safety.

Please observe our instructions in the chapter "Technical data"

The operator of the system selects the suitable siting location.

The system's installation site must fulfil the following conditions, or the installation site selected must be such that

- **It is level and free of obstacles**
- **The system cannot be damaged e.g. by superstructures on the traffic routes, effects from adjacent production areas, etc.**
- **All work places can be accessed and there is adequate room for movement for safe working**
- **There is adequate lighting, ventilation, and if necessary, extraction.**
- No electrical interference fields
- No vibrations or oscillations
- No contaminates in the intake or ambient air
- No static or dynamic loads
- No heat, cold, or moisture sources
- Cab affect the system and its equipment, etc.

The exhaust air from the system must always be routed unobstructed to the outside.

The operation of the system must take place under normal conditions (see the chapter "Technical data" for permissible temperature and humidity). The system has not been designed for operations in a potentially flammable and/or explosive environment. .

After changes to the system's working environment, e.g. conversions or installations in the system's adjoining areas, the operator must verify that the siting conditions are fulfilled and check whether any protective measures are necessary for the system.

- If hazardous gases/substances are used, the operator must check whether suitable extraction is necessary at the connecting points.

6.3.9 Siting

The sited system and accessories must allow access to all operating and maintenance points without hazards.

The system and accessories must be sited in such a manner that

- There is adequate working space
- There are no impact or tripping hazards
- Gas bottles, pump, etc., are placed as close as possible to the system
- Secure gas bottles against falling over
- Cover lines with e.g. ramps
- If necessary, attach strain relief devices

DANGER OF DEATH!

Electrical wiring tearing off and damage to connections, etc., caused e.g. by tripping hazards, may pose DANGER OF DEATH!!

- There can be no damage, e.g. personnel may not stand on components, loads not placed on lines, etc.
- There is good accessibility to all work and maintenance sites
- The system is in the field of visibility
- The system fans are kept unobstructed

CAUTION!

All of the system cabinet's rollers must be locked at all times!.

Tests

CAUTION!

Siting must also examine the system and its components for damage (see the chapter "Tests" and "Recommissioning after decommission")

6.4 Connecting the system

Requirements

- The system is set up in the intended location
- The pump has been set on the floor

Procedure

1st Connect the pump to the system
2ndConnect the filter to the pump
3rd Connect the system to the mains network
4th Turn the pump master switch on
5th Turn the master switch on.

Connect the pump to the system

Procedure

1st Inspect the pump for damage.
2ndRemove the cover caps from the pump connections on the pump and system.
3rd Install the gasket between the corrugated hose and pump input. Secure the corrugated hose on the pump with a clip.
4th Install the gasket between the exhaust gas filter and pump out. Secure the exhaust gas filter in the pump with a clip. With a dry running pump, the filter is not needed and the exhaust gas hose can be connected directly to the pump out.
5th Check the oil level and top it if required (see the documentation of the pump manufacturer)
6th Connect the power supply for the pump to the system (plug)
7th After completing all work before powering up the system: Turn on the master switch on the pump.

1. Wellschlauch
2. Eckventil
3. Filter Abgasschlauch

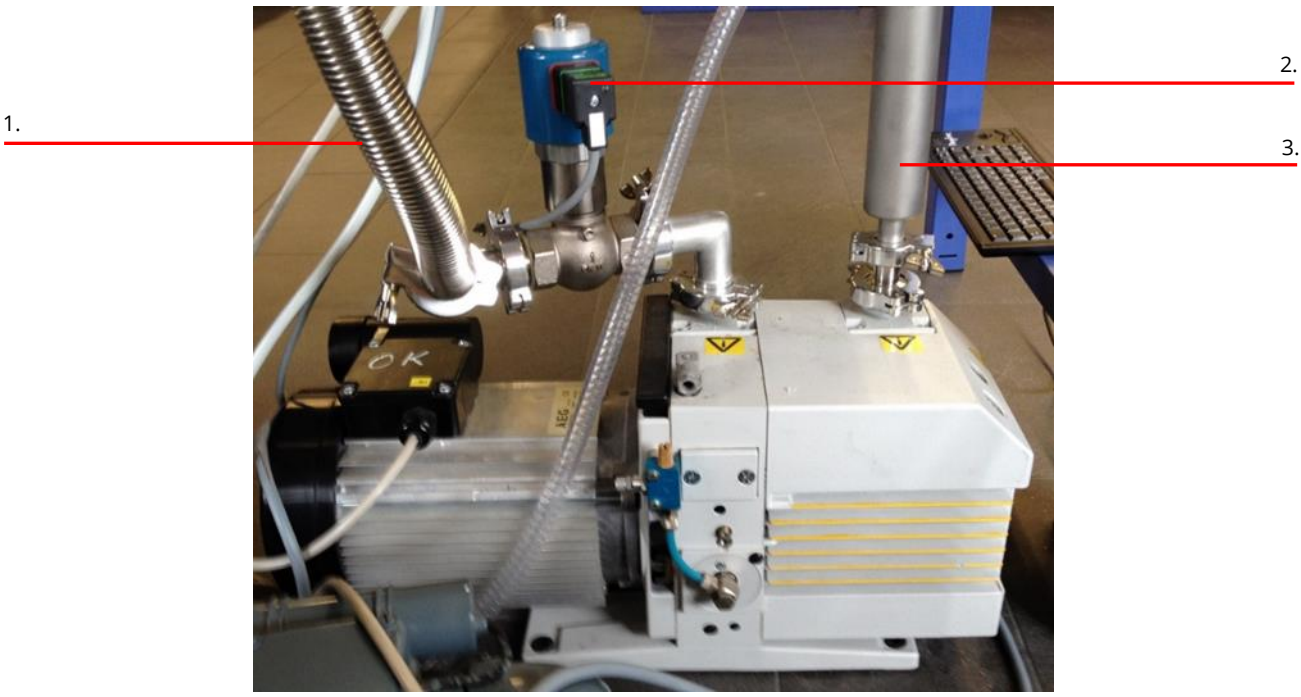


Figure 12: Picutre vacuum pump (pump can vary)

Connecting to the electricity supply

The system is connected with a plug to the mains.
See also the chapter "General description/ main switch", "Technical Data“.

Network, USB Connections

The connection panel on the right side and under the PC offers additional connections, e.g for an external network, USB

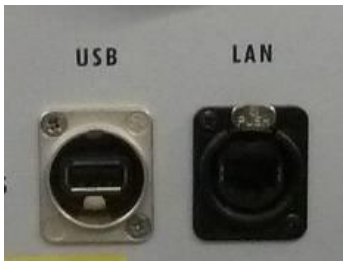


Figure 13: Network connections

Designation	Function
USB	For program and data back ups
Network connection	This allows e.g. TeamViewer or similar to access the system and transmit data over a LAN link to the internal computer, e.g. for • Remote maintenance • Data filing

6.5 Decommissioning and recommissioning the system

See also the chapter "Preparing for transport/ Separation of the subassemblies"

If the system is to be shut down for a longer period or transported to another site, precautions must be taken to ensure that the system's components and its equipment are not damages as a result of decommissioning.

Please also overserve the instructions issued by the component manufacturers in the provided documentation.

Within the framework of warranty/ guarantee, the system can only be decommissioned by the services of Diener electronic GmbH & Co.KG

Out of warranty/ guarantee, the system must only be decommissioned by specialists that where trained by Diener electronic GmbH & Co. and whose training is documented in writing. Training must not be more than 2 years ago. The operator can decommission the system with the exclusion of any liability on part of Diener electronic GmbH & Co. KG.

Please observe our instructions in the chapter "Correct and proper use - decommissioning the system" and "Training and instruction of the operator's personnel"!

During decommissioning, the following work needs to be performed:

- Run cleaning program, and vent system;
  if fitted, flush polymerisation system, and remove vessel, clean and protect connections
  if necessary, use padding
- Back up the system's and process data
- "Power down/ switch OFF" PRS
- Set switch on the pump to "OFF"
- Depressurise the gas bottles, and disconnect them from the system.
- Secure the main switch at the OFF position against inadvertent reactivation
- Disconnect electrical connection cable (plug) from the mains.
- Remove work piece carriers, and clean the plasma chamber and door seal (see the chapter "Maintenance/ cleaning")
- Perform decommissioning and preservation work on the pump (see the pump manufacturer's operating and maintenance manual)
- Perform decommissioning and preservation work on the (optional) water cooling circuit (see the pump manufacturer's operating and maintenance manual)
- Clean the outside of the system, and protect it against contamination, e.g. with sheets, covers, by sealing the connections.
- Attach and secure firmly all cladding
- Attach visible and permanent notices on the system that the system was decommissioned and recommissioning requires a prior and thorough inspection and if necessary, repeated inspections may be required.
  Attach date of decommissioning clearly and permanently.

During the decommissioning period of the system, it must be kept within the permissible temperature range.

The system must be decommissioned in such a manner that no condensate can form in the housing or on the electrical parts.

Recommissioning and decommissioning

See also the chapter "Installation site, siting and connecting the system".

The recommission the system, the changes performed for decommissioning must be reversed. This involves scrutinising the system and all components for damage and conducting the tests prescribed under the chapter "Tests".

Furthermore, the condition of all gaskets must be examined.

After a down time within the framework of warranty/ guarantee and after a decommissioning duration of more than 6 month, the system can only be recommissioned by the services of Diener electronic GmbH & Co. KG.

A recommissioning after a decommission duration out of warranty/guarantee of less than 6 months must only be carried out by specialists that were trained by Diener electronic GmbH & Co. KG and whose training is documented in writing. Training must not be more than 2 years ago. In doing so, it must be determined and approved that the system can be operated in a safe and functional manner. The operator can recommission the system with the exclusion of any liability on part of Diener electronic GmbH & Co. KG.

Please observe our instructions in the chapter "Correct and proper use - Decommissioning the system" and "Training and instruction of the operator's personnel"

CAUTION!

Depending on the duration of decommissioning, repeated inspections are mandatory prior to recommissioning.

Please contact us so that the correct procedure can be coordinated.

This is the only way to ensure that a safe recommissioning is possible.

7 EQUIPPING

7.1 Safety instructions for equipping

Before commencing work, observe our specifications and instructions in the chapters

- *"Correct and proper use"*
- *"General safety and accident prevention information"*
- *"General description"*
- *"Technical data", "Approved processes, gases and substances"*
- *"Training and instruction of the operator's personnel"*
- *„Initial siting, commissioning, transport, siting, decommissioning, dismantling"*

DANGER!

Work being performed by unauthorised persons without adequate knowledge may entail grievous injury and/or considerable damage to the system and its components!

7.2 Overview of equipping processes

- Introduction of work pieces int to chamber
- Fill the cooling trap
- Fill the vaporiser

7.3 Equipping/ Introducing work pieces

Details on work piece and work piece carrier requirements can be found in the chapter "General description/ General requirements for the work pieces and work piece carriers"

Details on the installation site and the ambient conditions can be found in the chapters "Correct and proper use", "Technical data", and "Transport/ siting".

Nr	Description and instructions
1	**Initial situation/ requirements** • The correct program has been called in the PRS, all parameters have been set correctly, and the previous program has ended. the system is in standby mode (main switch to "ON" + "PRS ON - Main Screen") • The chamber and its equipment have cooled down sufficiently for safe working • The coating chamber and the cooling trap are clean.
2	**Procedure** • Remove the loading rod • Load the perforated discs • load the work pieces on the perforated discs • Load the carousel into the coating chamber • Close the door, ensuring that the door is in contact with the chamber and the switch on the chamber door is activated.

Attention!

Make sure that the work pieces do not touch the chamber wall!

sharp edges may be encountered during handling/ working due to the products/ functions!
Risk of cuts!
Wear protective gloves!

7.4 Filling the cooling trap

Information on the approved gases/ substances is found in the section "process development - Processes and process substances that are used/permitted" and the section "commissioning and instruction of the operating company"

No	Description and notices
1	**Initial situation/ prerequisites** • The cooling trap was cleaned after the last coating cycle. • A pressure of 0.1 mbar or less has been reached • The process is started
2	**Procedure** • Fill the cooling container with liquid nitrogen.

Attention!
Liquid nitrogen can cause burns!

Observe the safety datasheets and use the required personal protective equipment.

7.5 Filling the silane evaporater (Option)

Information on the approved gases/ substances is found in the section "process development - Processes and process substances that are used/permitted" and the section "commissioning and instruction of the operating company"

•

No	Description and notices
1	**Initial situation/ prerequisites** • System is in stand-by. Vaporizer has about 20°C or max 40°C • For Start with Silane coating min 1 Process without silane has to be done.
2	**Procedure** • Filling the silane pipe with silane through the 14mm Swagelock connector using a syringe.

Attention!

Observe the safety datasheets and use the required personal protective equipment.

7.6 Filling the vaporiser

Information on the approved gases/ substances is found in the section "process development - Processes and process substances that are used/permitted" and the section "commissioning and instruction of the operating company"

No	Description and notices
1	**Initial situation/ prerequisites** • The vaporiser is at room temüerature or no higher than 40 °C • The seals on the vaporiser door are clean. • The stainless steel container has been cleaned.
2	**Procedure** • Line the container with aluminium foil • Add the required quantiity of dimer • Make sure that no dimer projects beyond the edge on the opening side of the container. • Loa the container into the vaporiser, ensuring that it is not in direct contact with the door (optimum distances to door approximately 0.5 to 1cm) • Close the door and lock it with the guard control

Attention!
Using caution when handling dimer.
Avoid contact with the eyes and do not inhale the dust.

Observe the safety datasheets and use the required personal protective equipment.

7.7 Option: extended/ shorten the chamber

No	Description and notices
1	**Initial situation/ prerequisites** • The correct program has been called in the PRS, all parameters have been set correctly, and the previous program has ended. the system is in standby mode (main switch to "ON" + "PRS ON - Main Screen") • The chamber and its equipment have cooled down sufficiently for safe working • The coating chamber and the cooling trap are clean.
2	**Procedure** • Remove the baffle plates • Place the longer baffle plates in the chamber • The chamber extension cover is placed over the baffle plates and located in a centric way on the viton gasket.

Figure 15: Picture long baffle plates

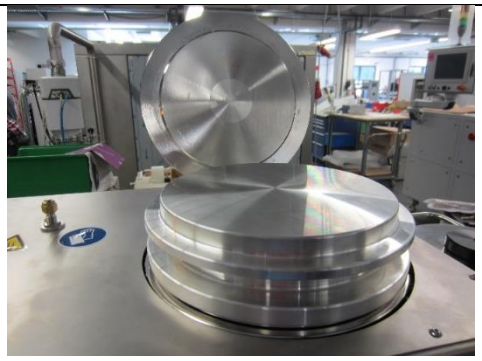


Figure 14: picture long baffle plates

Attention!

Never use the long baffle plates with the integrated cover!

Only use the additional cover

3	**Procedure shorten the chamber** • Remove the baffle plates • Place the short baffle plates in the chamber • Use the integratet cover

Attention!

Never use the baffle plates with the addional cover!

Only use the integrated cover

8 OPERATING/ CONTROL PRS

8.1 Safety instructions for operating the system

Before commencing work, observe our specifications and instructions in the chapters

- "Correct and proper use"
- " General Safety and accident prevention information“
- "General Description"
- "Technical data"
- "Training and instruction of the operator's personnel"
- "Commissioning/ transport/ siting"
- "Equipping"
- Safety data sheets

Operating the system and its components requires specialised knowhow. Therefore, all work may be performed only by expert personnel who have been instructed.

DANGER!

Work being performed by unauthorised person's without adequate knowledge may entail grievous injury and/or considerable damage to the system and its components.

DANGER!

Hazards and grievous injury are the consequences on failing to observe the danger and safety information in the chapters of this operating and maintenance manual and in the component manufacturers' documentation.

Programming/ Creating/ Changing processes and settings - General definitions

DANGER!

Programming and creating processes and defining and configuration process parameters require a high level of expertise with respect to the gases used, the materials, and the permitted environmental and process parameters!

Inadequate of lack of expertise may have serious consequences involving grievous, potentially fatal injury.

For this reason, this work may be performed only be those persons who have and can verify adequate expertise, are sufficiently practised in handling the system and its programs, and have been instructed by Diener in writing!

This instruction must be repeated at least every two years.

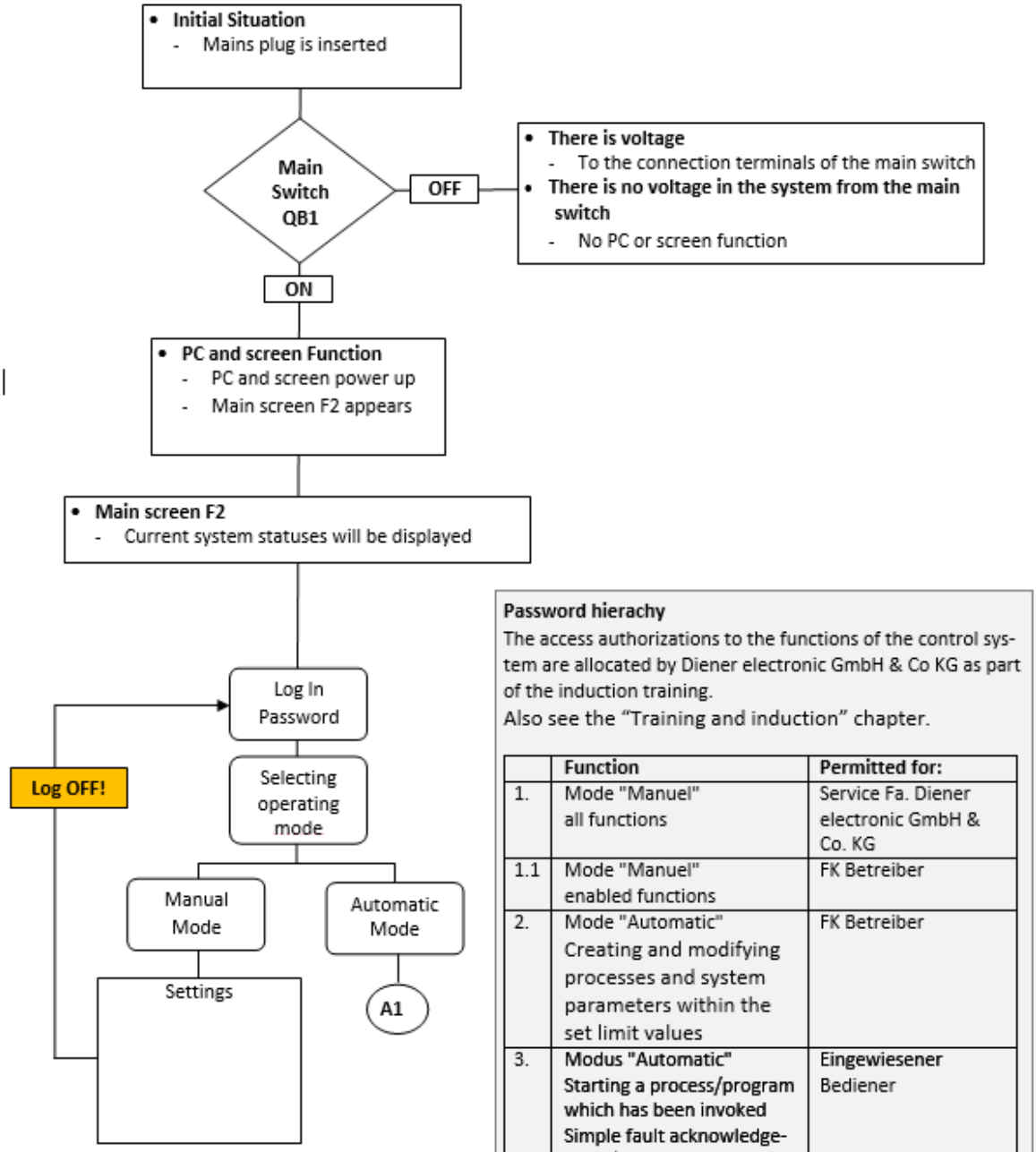
Safe state of the system

Before commencing production (auto mode), you must make sure that the system has been equipped correctly (see chapter "Equipping), and the system and its components are in a safe and perfect working order.

All safety and protective equipment must have been fitted, must be fully functional, and may never be bypassed or rendered inoperable.

8.2 System Control / Parylene-Reaktor-Control (PRS)

OVerview of sequence switch on/ Operation/ Use

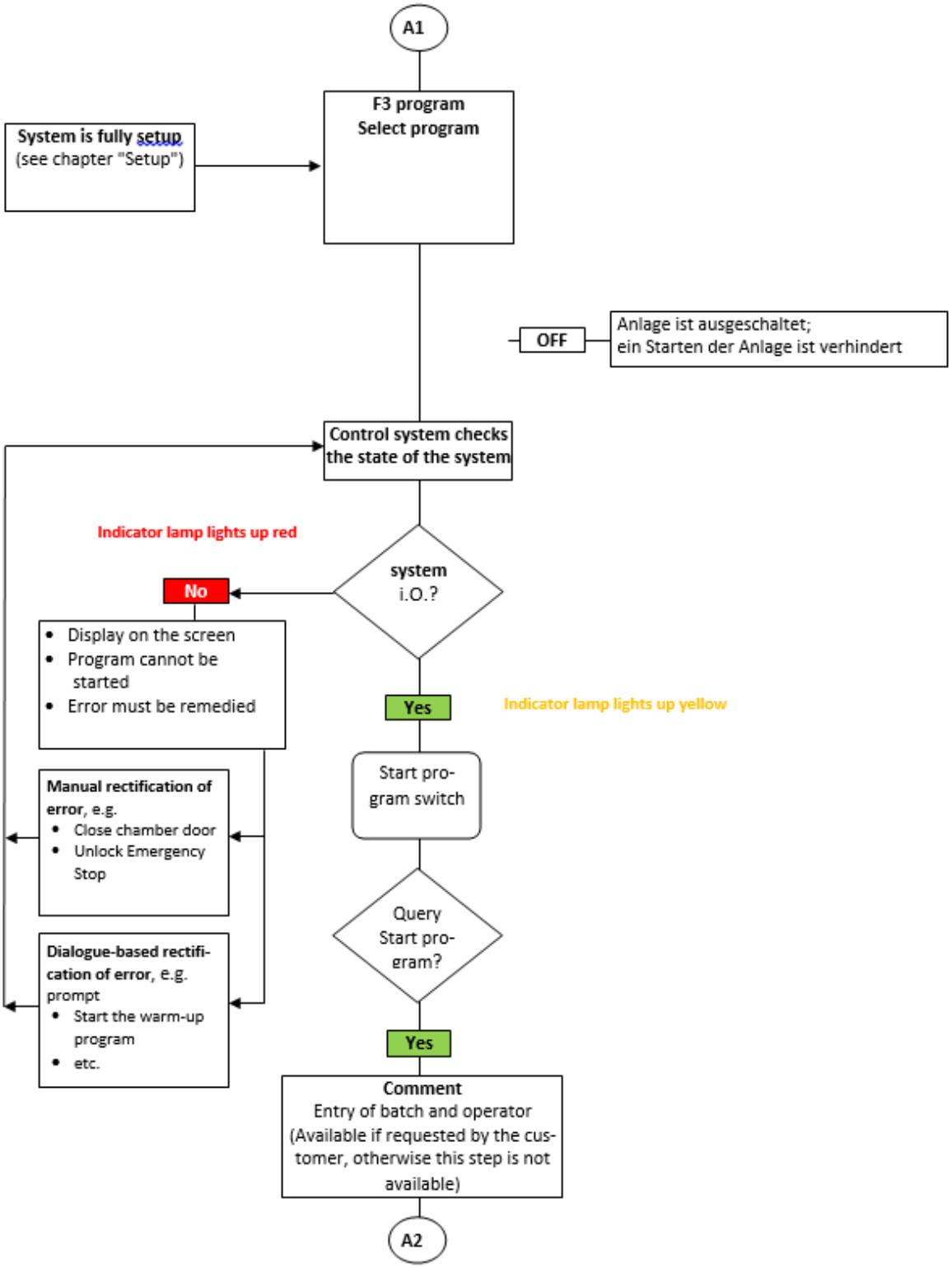


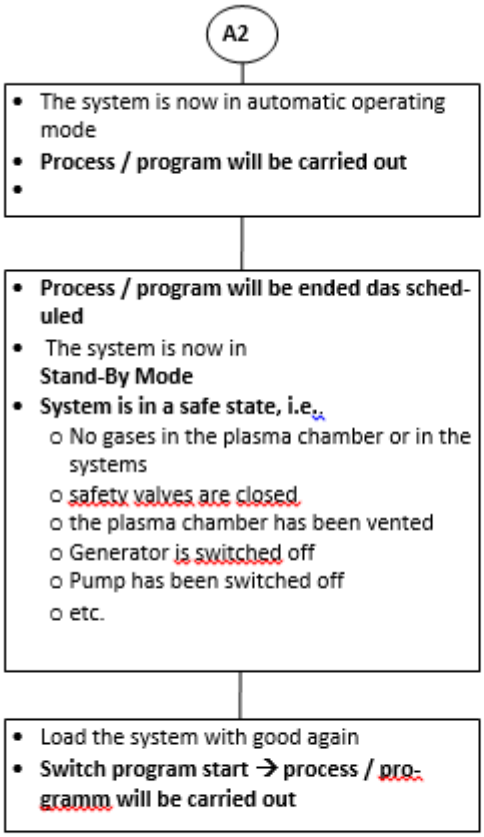
Password hierachy

The access authorizations to the functions of the control system are allocated by Diener electronic GmbH & Co KG as part of the induction training.

Also see the "Training and induction" chapter.

	Function	Permitted for:
1.	Mode "Manuel" all functions	Service Fa. Diener electronic GmbH & Co. KG
1.1	Mode "Manuel" enabled functions	FK Betreiber
2.	Mode "Automatic" Creating and modifying processes and system parameters within the set limit values	FK Betreiber
3.	Modus "Automatic" Starting a process/program which has been invoked Simple fault acknowledgement/ restart	Eingewiesener Bediener


A1
F3 program
Select program
System is fully setup
(see chapter "Setup")
OFF
Anlage ist ausgeschaltet;
ein Starten der Anlage ist verhindert
Control system checks
the state of the system
Indicator lamp lights up red
system
i.O.?
No
Display on the screen
Program cannot be started
Error must be remedied
Yes
Indicator lamp lights up yellow
Start pro-
gram switch
Manual rectification of error, e.g.
Close chamber door
Unlock Emergency Stop
Query
Start pro-
gram?
Dialogue-based rectification of error, e.g. prompt
Start the warm-up program
etc.
Yes
Comment
Entry of batch and operator
(Available if requested by the customer, otherwise this step is not available)
A2


A2
The system is now in automatic operating mode
Process / program will be carried out
Indicator lamp lights up green
Process / program will be ended das scheduled
The system is now in Stand-By Mode
System is in a safe state, i.e.,
No gases in the plasma chamber or in the systems
safety valves are closed
the plasma chamber has been vented
Generator is switched off
Pump has been switched off
etc.
Indicator lamp lights up yellow
Load the system with good again
Switch program start → process / programm will be carried out

Process step:

Regardless of the controller type, there are **5 Process steps:**

1a	**Evacuation**	The chamber is evacuated to the configured base pressure usually 0.01 mbar.
1b	**Silanisation (Optional)**	Silane evaporation pipe is heated. After all Silane is evaporated and the base pressure (usually 0.01 mbar) is reached again, next process is started.
2.	**Heating**	The pyrolysis oven (720°C -750°C - depending on dimer type), heating on Pirani sensor (130°C). Once the aforementioned components have reached their set temperature, the door of the vaporiser is heated to its set value (170°C)
3.	**Coating Process**	Once all set values for evacuation and the heating phase have been reached, the coating process starts. The vaporiser is heated using pressure control and the actual value that is measured with the heated Pirani pressure sensor on the vacuum chamber. Vaporisation of the dimer begins at around 80°C. the configurator maximum heating temperature or end temperature of the vaporiser is reached when the dimer is used up. The chamber pressure drops to a pressure below the base/start pressure.
4.	**Cooling the vaporiser**	The pump runs and the vaporizer with door is cooled to approximately 40°C
5.	**Wait time and venting**	A wait time (usually 30 minutes) for venting the chamber can be set since it is advantageous for the coating quality to let the parylene rest in the vacuum for some time after the process.

8.3 Operation

The complete documentation on how to control your parylene can be found attached to this operating manual

9 TROUBLESHOOTING/ INSPECTION/ CLEANING AND MAINTENANCE/ REPAIR

9.1 Safety instructions for troubleshooting/ inspection/ cleaning/ maintenance/ repair

Before commencing work, observe our specifications and instructions in the chapters

- "Correct and proper use“
- "General safety and accident prevention information“
- "General description"
- "Technical data"
- " Training and instruction of the operator's personnel"
- "Commissioning“
- "Operation"
- And the provided
- Operating and maintenance manual of the component manufacturers
- Plans and diagrams and
- Safety data sheets.

Special knowhow is required for troubleshooting, inspection, cleaning , maintenance, and repair work on the system and its components. Therefore, all work may be performed only by expert personnel who have been instructed.

DANGER!

Work being performed by unauthorised persons without adequate knowledge may entail grievous injury and/ or considerable damage to the system and its components!

DANGER!

Hazards and grievous injury are the consequence on failing to observe the danger and safety information in the chapters of this operating and maintenance manual and in the component manufacturers' documentation!

Repair work

Repair work may be performed only by personnel of. Diener electronic GmbH & Co. KG or following consultation, only by the manufacturer of the component or other specialised companies released in writing by Diener electronic GmbH & Co. KG!

Safe state of the system

Before the commencement of troubleshooting, inspection, cleaning, maintenance, and repair work, it must be verified

- *That the system and its components are in a safe state and perfect working condition*

Or, if there are malfunctions, defects, etc.

- *What kind of malfunctions, defects, etc. there are, and*
- *What safety and accident prevention measures must be implemented before the start of the work and how the work can be performed without prejudice to functionality or safety.*

Before all troubleshooting, inspection, cleaning, maintenance, and repair work, the system must first have been switched OFF at the main switch (set to OFF) or, if necessary, must first be in standby mode.

Depending on the assignment, the main switch in the control cabinet must be set to OFF or the system disconnected from the power supply.

CAUTION!

There may be hot sites on the system!
Before commencing work, leave the system to cool down!

Hazards/ Access and supervised stay in the danger zones

Under certain circumstances, the working sites may not be fully visible from the operating console. Also persons may be working at these sites that are not visible.

A second person must always be assigned to supervise that stay of persons in the danger zones

Keep the system cabinet door closed and locked!

Open the system cabinet only when this is absolutely necessary for the assignment!

Only instructed specialised electricians may work in the system cabinet when it is switched ON!

CAUTION! DANGER OF DEATH!

If the main switch is at ON, there is voltage across the system parts!

Work on high places

Use suitable ladders and scaffolding for work on high places!

DANGER!

NEVER climb on system parts!
There is a risk of damage and grievous injury!

Concluding the work

To conclude the work, the responsible expert personnel must examine and verify that the work has been performed correctly and the system can be operated without prejudice to safety or functionality

Please observe our instructions in the chapter "Checks after concluded troubleshooting, inspection, cleaning, maintenance, and repair work"!

Wear and spare parts, materials, and auxiliaries

Use only the wear and spare parts and auxiliaries released by Diener electronic GmbH & Co. KG, e.g. seals, seal cleaning agents, filters, pump oils, lubricants, etc.!.!

CAUTION!

The use of unsuitable war and spare parts and auxiliaries may cause serious damage to the system, malfunctions, and possibly grievous injury!

Reporting of safety related incidents and events

Please observe our instructions in the chapters "Correct and proper use"!

Safety related incidents and events must be reported immediately to. Diener electronic GmbH & Co. KG!

9.2 Incidents and troubleshooting/ Fault messages

The system's control/ PRS displays fault, and operating messages (see also the chapter "General description/ Operating statuses/ modes")

The fault must be remedied immediately fault/ incident messages appear. Bear in mind that locating (Inspection) and eliminating faults may be performed only when the system is in a safe sate if there is to be no danger.

Only a portion of the possible faults can be detected by the diagnosis system in the PRS, so it is important that the system's components are always inspected at regular intervals in the form of a visual examination and, in some cases, the removal of individual components.

The fault messages are described in the chapter "Operation/ control - Description of the fault messages".

The reference settings are stored in the PRS and can be found in the chapter "Technical data", the documents provided by the component manufacturers, the control/ PRS displays, and the information affixed directly to the components.

Before all troubleshooting, cleaning, maintenance, and repair work, the system must be disconnected from the electricity supply and secured against reactivation!
(See the chapter "Maintenance/ safe state of the system".)

DANGER!

Only instructed expert personnel or specialised electricians may perform troubleshooting work.

At the same time, it must be ensured that the troubleshooting work can be performed without prejudice to safety or functionality.

In case of doubt, please consult the services of Diener electronic GmbH & Co. KG!

Details on troubleshooting can be found in the chapter "Operating/ control - Operating and fault messages/ troubleshooting", in this chapter and under "Inspection and maintenance plan - Overview", and in the documentation provided by the component manufacturers.

Example software incident messages

	Fault	Possible cause	Solution
1.	The maximum pumping off duration has been exceeded	Edge valve not opening	Check whether edge valve jammed - only by services of Fa. Diener electronic GmbH & Co. KG
			Check whether 24VDC at edge valve - only by services of Diener electronic GmbH & Co. KG
		Pumping off duration too short	Increase pumping off period
		Pump switched OFF	See "Pump not running" under hardware incidents
2.	The actual pressure is too low	Set pressure error limit setting incorrect	Check limits in the program under "coating"
		Dimer initial weight is too low to reach the actual pressure	Check limits in the program under "Coating" and reduce if necessary
3.	The actual value is too high	Too much dimer in the dimer container	Only use enough dimer so the powder does not extend beyond the edge of the containers opening side.
		The filled dimer container is in direct contact with the hot vaporiser door	Maintain a gap of 0.5 to 1 cm between the dimer container and vaporiser door
		Set pressure limits/ tolerance settings in the program too low.	Check the limits in the program under "coating" and increase if necessary.

	Fault	Possible cause	Solution
4.	The actual pressure is less than 1 mbar and the vacuum switch is not on	Vacuum switch defective	Bypass the vacuum switch to test - only by the service department of Diener electronic GmbH & Co. KG
			Install a new vacuum switch - only by the service department of Diener electronic GmbH & Co. KG
		Pirani sensor defective	Wait until all heating elements have cooled vent the chamber and evacuate. If the pressure does not change, replace the Pirani/ Baratron - only by the Service department of Fa. Diener electronic GmbH & Co. KG
		Possible cause of a defective pirani sensor/ Baratron: Heating element and/or temperature sensor defective and therefore coated with parylene	Functional test of the heating element and temperature sensor on the Pirani pressure gauge, replace if needed - only by the Service department of Diener electronic GmbH & Co. KG

Example hardware incidents

	Fault	Possible cause	Solution
1.	Chamber door cannot be opened	Ventilations valve not responding	Check ventilation valve
			Check valve's power supply
2.	Pumps' motor circuit breaker tripping	Pump is too cold (room temperature < 20° C)	Make sure room temperature > 20 °C
	Pump not running	Pump's main switch is at OFF	Switch ON pump
		Pump's motor circuit breaker has tripped	Check pump, switch motor circuit breaker to ON
3.	A heating element turns off or does not turn on	Short circuit	Check supply lines, eliminate short circuit

9.3 Cleaning

The system must be operated in a "clean" environment so that heavy contamination becomes improbable.

The outside of the system should be rubbed off with dry cloths when it is soiled visibly.

Clean the inside of the test chamber when there is heavy soiling or sedimentation or when this affects the process quality.

Only instructed personnel may perform cleaning work in the system, and these must be supervised by an expert.

At the same time, it must be ensured that the troubleshooting work can be performed without prejudice to safety or functionality..
Note the safety and occupational safety regulations applying at your place of work!

It is also assumed that the expert personnel choose the cleaning methods and agents appropriate to the parts and without jeopardy to safety.

Before all troubleshooting, cleaning, maintenance, and repair work, the system must be disconnected from the electricity supply and secured against reactivation!

Only specialised electricians may perform cleaning work on electrical equipment.

Constituents

CAUTION!
Before cleaning up discharge media, first consult the safety data sheets for the requisite cleaning methods, personal protective equipment, and safety measures!

Cleaning methods for selected system components

Basically, the components have been designed for cleaning with a moist cloth..

NEVER
Clean the system with hosed water, high pressure equipment, compressed air, or steam!

DANGER!
The uncontrolled dispersion of solid, liquid, or gaseous substances may cause them to penetrate system components and compromise functionality (short circuit, soiling, corrosion, etc.)

There is a danger of grievous injury!

Note the specifications of Diener electronic GmbH & Co. KG and the component manufacturers

The cleaning agents used may not be harmful to health and/ or the environment and must be chosen according to these criteria.

If the use of agents harmful to health or the environment cannot be avoided, the corresponding safety data sheets must be consulted and their specifications observed.

The cleaning agents are chosen by the expert personnel according to the current soiling situation and the specifications of the component manufacturers or after consultation with these.

The agents employed may not cause damage to the system parts, etc..

Periods

There must be cleaning

- When soiling is detected, e.g. during equipping, etc.
- Before all inspection, maintenance, and repair work
- According to the specifications in the inspection and maintenance plan
- According to the component manufacturer's specifications
- After completing a coating process

Legend

b	If needed
r	Regularly after 300 to 500 g dimer
p	After each process

Executing persons

(further details can be found in the chapter "Commissioning/ instruction")

FK	Expert personnel
B	Operator
H	Assistant
IH	Expert personnel
EFK	Specialised electrician
DFK	Expert / Service Fa. Diener electronic GmbH & Co. KG

Pos	System part	Procedure/ comments	Executor	Interval
1.	Cooling trap	If liquid nitrogen remains in the container/ cooling fingers, it must be brought to room temperature. To do so remove the container from the cooling trap under consideration of the safety datasheets. Then hold the container under water. Preferable under a fume cupboard. Then the container can be cleaned with dish liquid and dried.	H	p
	Electrical cooling trap	To clean the cold trap, observe the supplied manufacturer documentation	H	p
2.	Vaporiser	Remove the parylene film from the seal, container and contact surfaces with a cloth moistened with alcohol. Remove the parylene layer with a sponge. Then wipe with a cloth soaked in alcohol.	H H	P r
3.	Silane vaporiser (Option)	Filling with isopropanol every 50 evaporations to dissolve possible residues. Open Swagelock screw and blow free from chamber side with pressured air or nitrogen.	H	b
4.	Pyrolysis oven	Allow to cool before cleaning. Remove the KF50 clamping ring, disassemble the heat shield. Make sure the spacers do not break. Clean accessible parts with a rough sponge and then wipe with a cloth soaked in alcohol. Use a suitable rotary brush to clean the tube. Residues can be cleaned up with a vacuum cleaner and then wiped out with a cloth.	H	r
5.	Coating chamber and carousel	Remove the carousel and rotary plate. Remove all 8xM4 screws from the carousel. Spray tje four braces and the outer solid plate of the carousel (not the perforated plates - these are consumables) and the rotary plate with parting agent. Remove both stainless steel cover plates and spray them with parting agent. Spray all other parts with parting agent. Cover she pyrolysis opened with adhesive tape. The place all parts into the chamber and close the door. Now allow the parting agent to work for 1 to several hours. Then remove the parylene film. To do so, take all parts out of the coating chamber. The individual components may be encapsulated in parylene. In this case the layer has to be carefully removed or peeled off, for example with a razor blade or scalpel.	H	r

Pos	System part	Procedure/ comments	Executor	Interval
6.	Coating chamber, continued.	Clean all components to remove the parylene coating. You can cut into the film in the edges. This makes it easier to remove. Remove/disconnect the threaded connection to the venting valve. Clean the PTFE hose. The hose has to be replaced if it is excessively soiled. Finally, remove the parting agent from the single components under water. Then wipe them with a cloth moistened with alcohol and remove minor reside with a vacuum cleaner.	H	r
7.	Seal	Cloth lightly moistened with cleaning agent. The seals must be replaced when needed.	H	b
	Approved cleaning agents for the system	Isopropanol or Ethanol parting agent for parylene		
		*the cleaning agent depends on the characteristics of the seals that are used! Special cleaning agents may be required for the seals!* *Note the information in the section "General description/ seals"!*		
8.	Inspection window	Wipe with a damp cloth in case of minor soiling. In case of heavy soiling, carefully remove the parylene layer with a knife or razor blade.	H	r
9.	Venting valve	Remove and clean the hose. Replace the hose in case of heavy soiling.	H	r
10.	Cleaning the interior of the housing and electrical installation. Replacing the filter mats in the housing etc.	Only in case of heavy soiling, e.g. usually after conversion measures etc. Disconnect of all terminals for the system rom the network (Master switch "OFF" and mains plug pulled) Drying cleaning or vacuuming	DFK	b
11.	Exterior of the parylene system	Damp cloth	H	b
12.	All points where leaks have occurred, for example oil discharged from the pump etc.	Cloth, oil binder if necessary	H	b
		in case of leaks of the pump, shut down the system and pump immediately! Do not continue operating the system! Have the pump repaired by the manufacturer!		

9.4 Recurrent/ repeat inspections

CAUTION!

Repeat inspections are prescribed at regular intervals for the system, e.g. after an pil change, after the specified useful life has been reached, after extended downtimes, or after repairs or changes to the system or system elements.

Please observe our instructions and specifications in the chapter "Commissioning, transport, siting - Tests"!

Inspections may be conducted only by those persons who have received and can verify the special authorisation prescribed for this work..

The specifications of the component manufacturers and from EU legislation, e.g.

Repeat inspections are prescribed for the purpose of safeguarding the system's compliance with the operating, functionality, and safety requirements.

Moreover, repeat inspections must be conducted e.g.

- After a change of site
- According to the component manufacturers' specifications, e.g. for safety switches, etc. .
- After work compromising stability.
- After downtimes exceeding six months (see also the chapter "Correct and proper use - shutdown/ partial shutdown of the system or its parts")
- After replacement/ repair of components, e.g. valves, units, pumps, motors, instrumentation, regulators, controllers, etc.
- After work on the electrical power supply and the instrumentation system
- For gas bottles and gas regulating equipment:
  Gas bbottles must be examined regularly by an authorised body, generally the gas bottle supplier.
  After successful examination, the examiner affixes an inspection sticker.
  Observe the inspection deadlines also for gas bottles that are not currently in use.

Consult the original wording of the directives and standards, e.g. for gas bottles, pressure vessels, etc., for information on contents, requirements, and deadlines.

Observe the information in the operating manuals issued by the component manufacturers and the other applicable expertise, acceptance reports, etc.

Implementing EU Directives according to national law

Recurrent inspections, e.g. for equipment based on the EC PED and for vessels containing hazardous substances, are specified in national regulations intended for the operator. For example, the EX PED is implemented in Germany in accordance with BetrSichV (Industrial safety ordinance) and GefStoffV (Hazardous Substances Ordinance).

It prescribed recurrent inspections, e.g. for systems that must be monitored. BetrSichV refers e.g. to pressure equipment, pressurised equipment, and potentially explosive areas. Moreover, inspections and inspection intervals are specified for pressure equipment according to its grouping into categories.

BetrSichV is embodied in national technical rules, e.g. TRB for pressure vessels, TRGS 407 for activates with gases, etc.

We recommend consulting the following tables for the inspections and inspection intervals when the national regulations or the manufacturers' documentation makes little or no reference to them.

9.5 Inspection and maintenance plan - Overview

The inspection and maintenance plan given here gives you a basic overview of the work to be performed in the system's components.

The overview is based

- On the findings returned by the risk assessments conducted for the entire system and
- Contains, if necessary, further information and experts from the component manufacturers' maintenance manuals

And does not claim to be complete.

The documentation issued by the component manufacturers may list further instructions/ inspection and maintenance work, safety instructions, and procedures that must be observed.

Observe die documentation/ operating and maintenance manuals provided by the component manufacturers.

Only Diener electronic GmbH & Co. KG may repair and replace defective elements!!

The component manufacturers' documentation/ operating and maintenance manuals can be found in the system documentation.

The object of inspection work is to discover deviations from the reference state before incidents occur. Inspection also extends to repeat inspections.

The fitted components come with operating and maintenance manuals. The component manufacturers' specifications are decisive for the inspection and maintenance.

Maintenance includes e.g. readjustment, lubrication, cleaning for maintaining functionality, preservation, replenishing or replacement of operating materials and consumables, and scheduled replacement of wear parts.

PRS

As soon as its time for maintenance, a red display field will flash red in the main image next to the maintenance button.

periods

t	daily
R	After every equipping/ fitting/ detaching
w	weekly
m	monthly
j	yearly
b	When necessary

Executing persons
(further details can be found in the chapter "Commissioning/ instruction")

FK	Expert personnel
B	Operator
H	Assistant
IH	Expert personnel
EFK	Specialised electrician

Pos.	System parts	Comments	Executor	interval
1. Protective equipment				
1.1	Door of the system cabinet and cladding etc.	Function check - lock ability and function of the safety switch. Visual inspection for • Completeness • Correct fastening and • Damages	B	t
1.2	Emergency off button	Visual examination for damage	B	t
		Function check (test)	B	w
1.3	Indicator lamp/ horn	Visual examination for damage	B	t
		Function check (test)	B	w
1.4	Switch for chamber door	Visual examination for damage and correct functioning	EFK	m
			See "Control / operator panel" for function checks.	
2. chamber/ vaporiser				
2.2	Closure magnets	Check of flawless function	B	r
2.3	Seals	See also "leckage measurements"		

The cleaning agent depends on the properties of the fitted seals! The seals may require special cleaning agents!

Note our instructions in the chapter "General description/ Seals"!!

CAUTION!

The gases/ substances used may damage the seals! The door seals and the seals in the chamber must be in perfect working condition at all times, and seal reliably the plasma chamber. They are there for indispensable for the reliable process run without incident!!
the door seals and if necessary, the seals in the plasma chamber must therefore be replaced at regular intervals!

If cracked or damaged visibly, the seals must be replaced immediately!

These damaged components may be replaced only by the services of Diener electronic GmbH & Co. KG!

Pos.	System parts	Comments	Executor	interval
2.3.1	Chamber door seal	Visual examination for damage. Wiping off with cleaning agent (see the chapter "cleaning")	H	R/t
		Visual examination for damage	FK	m
2.3.2		Replacement of the door seals	DFK	b
2.4	Seals on the plasma chamber • Inspection ports • Electrode lead-Through • Lead - through/ connections for cables, ventilation, extraction • Fittings • Polymerisation accessories - if fitted • etc. • Chamber door seal	Inspection and, if necessary, replacement	DFK	1/2 j
		Visual examination for damage. Wiping off with cleaning agent (see the chapter "cleaning")	H	R/t
3. Leakage test on negative pressure/ vacuum system				
3.1	Leakage measurements	The tightness of the negative pressure/ vacuum system is tested in the form of leakage "Measurements" in the PRS A change to the leakage rate provides information on the state of the system's seals.-	FK/ DFK	m Min. 1/2 j
	 *Leaks may also be detected by the noise generated by outside air entering the system.* ***DANGER!*** ***NEVER** touch possible intake areas/ suspected leaking sites!* *There is a danger of objects and parts of the body being sucked in!*			
4. Inspection/ maintenance of the ventilation system				
4.1	Lines/ connections, etc.	Visual examination for damage, e.g. cracks, etc.	FK	m Min. 1/2 j
6. Inspection cold trap				
6.1	Lines/ connections, etc.	Visual examination for damage, e.g. cracks, etc.	FK	m Min. 1/2 j
		inspection	DFK	1/2 j
7. Inspection of the exhaust air system				
7.1	Lines/ connections, etc.	Visual examination for damage, e.g. cracks, etc.	FK1	m

Pos.	System parts	Comments	Executor	interval
8. Inspection/ maintenance of the pump				
		***ACHTUNG!*** ***Anlage/ Pumpe vor dem Beginn von Arbeiten abkühlen lassen! Teile der Pumpe bzw. Teile in deren Umfeld können heiß werden! Es besteht Verletzungsgefahr durch heiße Stellen und die Gefahr durch Verschütten beim Nachfüllen von Öl!***		
8.1	Pump	Inspection and maintenance work according to the manufacturer's specifications and the experience of Diener electronic GmbH & Co. KG	DFK	1/2 j
		The inspection and maintenance interval is stored in the PRS. if the deadline is pending, a message appears on the PRS, or the remaining time can be viewed.		
		Note the documentations provided by the manufacturer!		
		***ATTENTION!*** *Maintenance work on the pump requires special knowhow with respect to the functions and requirements of pumps conveying hazardous gases (e.g. tightness, etc.). Incorrectly performed maintenance work may cause serious damage to the pump and leaks!* *Only the service of Diener electronic GmbH & Co. KG may perform inspection and maintenance work in the pump!*		
		***ATTENTION!*** Failing to perform the scheduled inspection and maintenance work renders void all warranties and liability on the part of Diener electronic GmbH & Co. KG.		
8.2		Overhauling the pumps	manufacturers / DFK	6 j
9. Inspection/ tests of electrical and measuring equipment				
		***Only specialised electricians may perform all work, including cleaning work, in the system cabinet and on/ in electrical equipment!*** ***Switch OFF the equipment to be cleaned/ disconnect if from the mains to all pins, and secure it against reactivation!*** ***Note the information under "work on electrical equipment"!***		
9.1	**Inspection/ testing of safety-related sensors**	Display in PRS	DFK	1/2 j
		Tripping test. No approval issued if the contactors are not btidged.	DFK	1/2 j
	• **Door switch**	Attachemnt of the switch and ist normally open contact	DFK	1/2 j
		Attachment and condition of tha cables	DFK	1/2 j
		Switch function	DFK EFK	1/2 j m

Pos.	System parts	Comments	Executor	interval
	• **Emergency off button**	state	EFK	m
		function	EFK	m
9.3	**Inspection of measuring technology devices; depending on use:** • **- Baratron** • **- Pirani**	Calibration	DFK	b
		Condition of the lines and plugs on the system cabinet	DFK	j
		Condition of the connection cables and plugs	DFK	1/2 j
9.4	Inspection/ tests/ maintenance work inside control cabinets and on electrical equipment e.g. on • Cleaning of fans in control cabinets • Contact sites when soiled heavily • etc. (see also the chapter "Cleaning“)	Check and clean the control cabinet's fan system, if necessary, replace filter mats	EFK	m
		Check that all screw unions on the electrical equipment sit tightly (motors, coupling, buttons, switches, plug connectors, etc.), particularly the connecting sites of the protective conductor Dry cleaning or extraction	DFK	j
		Check that all screw unions on the electrical equipment sit tightly (motors, coupling, buttons, switches, plug connectors, etc.), particularly the connecting sites of the protective conductor Dry cleaning or extraction	DFK	
10.1	Safety control components • Electrical equipment, e.g. emergency off buttons, safety switches, etc. • Safety, shutoff, and partition valves, control valves (some pneumatic)	***Safety control parts must be replaced before the predefined service life has been reached.*** ***If not specified otherwise by the manufacturer or Diener electronic GmbH & Co. KG, the components must be replaced after ten years at the latest.*** ***Only original parts of an identical or higher category/ PL may be used in accordance with EN13849-1,3***	DFK	b 10j
11. Control/ operator panel				
11.1	Operator panel	Check all operating elements for damage, e.g. • Emergency off button • Mains witch • etc.		
11.2	Emergency off equipment and bypass sensor in the plasma chamber (see also 10.1)	Function check of emergency off equipment	EFK	m

Only instructed specialised electricians may conduct the system/ functions tests.

Pos.	System parts	Comments	Executor	interval
	The emergency off button must be fully functional and freely accessible at all times!			
11.3	System test/ control function test		EFK	t
		*Only instructed specialised electricians may conduct the system/ function tests.*		

9.6 **Repair**

If the system inspection discovers wear or damage on the components, these must be put back in their target state.

Repair work may be performed only by personnel of Diener electronic GmbH & Co. KG or, following consultation, only by the manufacturer of the component or other specialised companies released in writing by. Diener electronic GmbH & Co. KG!

All repair work on the system must be performed only after it has been depressurised and disconnected from the power supply.

Only personnel of Diener electronic GmbH & Co. KG may modify the programs and control!

Note the information in the documentations/ operating manuals provided by the component manufacturers!

Before performing certain activities, first heed the corresponding details and the special safety instructions in the relevant chapters of the system documentation.

Use only original spare parts by Diener electronic GmbH & Co. KG and its component manufacturers.

Repairs on electrical components

Repair work on electrical components must include repeat inspections for detecting the effects of ageing, war, and mechanical loading on these components.

Conducted in addition must be repeat inspections as defined in EN 60204-1 and EN 60204-11.

Replacing saftey control parts

Only original components released by Diener electronic GmbH & Co. KG may be used that attain the performance level(PLr) demanded under DIN EN ISO 13849-1

Parts may be replaced only by Diener electronic GmbH & Co. KG or a specialised company authorised by Diener electronic GmbH & Co. KG!

Repairing/ Replacing parts complying with PED requirements

Repaired components or replaced parts subjects to the PED must undergo without fail the repeat inspections listed in this Directive and its applicable standards,

see also the chapter "recurrent inspections of pressure equipment".

Repairs on the negative/ positive pressure system

After repairs on the negative/ positive pressure system, the repeat inspections demanded under EN ISO 4414 must be performed by a qualified person.

9.7 Checks after concluded troubleshooting, inspection, cleaning, maintenance, and repair work

After concluding troubleshooting, inspection, cleaning, maintenance, and repair work, the responsible expert must verify that the system can be operated without prejudice to ist safely or functionality

This includes:

- The proper performance of the work
- The proper state and fastening of all safety equipment, and the correct operation of safety and emergency switches. There is a danger of grievous injury for as long as safety equipment has been put out of operation (e.g. for the system's danger zone)
- The examination of the fastenings of all parts, connections, etc., that have been detached or removed and reattached during the work.
- The correct configuration of manual fittings, in particular after troubleshooting, equipping, maintenance, and repair work, e.g. the shutoff devices for each of the supply or pneumatic systems
- Proper charging and pressurisation
- Verification that the system has been equipped properly (see the chapter "equipping" and the correct gas connections, etc.)
- Examination of the called/ edited/ entered parameters or the control programs
- Examination of manually configured positions
- Performance of function tests
- A trail run

Production/ auto mode may not begin until it has been verified that the system and the processes can run without prejudice to safety or functionality!

10 PROCESS, AUXILIARY, AND OPERTING MATERIALS - OVERVIEW AND DISPOSAL

10.1 Safety instructions for process, auxiliary, and operating materials

Before commencing work, observe our specifications and instructions in the chapters

- "Correct and proper use"
- " General safety and accident prevention information"
- "General description"
- "Technical data"
- "Training and instrucion"
- „Equipping“
- „Maintenance“
- Safety data sheet

How to handle process, auxiliary, and operating materials

The system may contain hazardous substances, e.g. in the gas system and the system components (pump, etc.), whose discharge or contact may pose hazards or cause injury.

The general rules when hazardous substances/ media are being handled.

- *Make sure before commencing work on or at the system that you know the hazardous substances currently in the system or system parts.*
- *Note the safety data sheets, and use the requisite personal protective equipment*
- *The substances must be disposed of properly and in compliance witht the legal specifications for the protection of the environment*
- *Process gases/ substances*
  Only those gases/ substances may be used that have been defined in the process development, the required specifications, and the specifications of. Diener electronic GmbH & Co. KG. The gases/ substances may be changed only after the written release of Diener electronic GmbH & Co. KG.
- *Operating and auxiliary materials*
  Only those operating and auxiliary materials may be used that correspond to the required specifications and the specifications of the component manufacturer. The auxiliary materials may be changed only after the written release of Diener electronic GmbH & Co. KG.
- *Note the information in the component manufacturers' documentation and the safety data sheets!*
- *The operator is responsible for adherence to the occupational safety and environmental protection regulations when using hazardous, auxiliary, and, operating materials.*

With respect to the substances used,

- *Suppliers and product properties*
- *Laws and regulations*

May change.

The information listed in this operating and maintenance manual is based on the state of the art at the time this operating and maintenance manual was drawn up.

Always heed the latest applicable issues of the safety data sheets!

10.2 Handling process, auxiliary, and operating materials

(no claims of completeness)

All contained substances must be properly recycled, reused and/ or disposed of.

Attention!

Substances with hazardous characteristics that may be classified as hazardous substances can be present in the system!

The prevent mixing up the substances, posting a notice regarding the substance that is used on the container is recommended

The substances approved for the system and the information for the required auxiliary materlas and supplies is found in the section "Technical data - process development".

Process subtances

Process substances are usually used up. Parylene that is not used up has to be disposed of.

Auxiliary and operating materials

Auxiliary and operating materials must be replaced when these no longer exhibit the desired/ requisite properties. The replacement criteria are generally specified by the supplier of the system components containing the auxiliary and operating materials, etc.

Auxiliary and operating materials	Auxiliary and operating materials	Auxiliary and operating materials	Auxiliary and operating materials
Lubricating oil for pump	–	See the chapters "Technical data" and "Safety data sheet"	A description of how to change the oil and empty the pump can be found in the manufacture's documentation.

10.3 Disposal of system components/ Removal

Before components of the system are dismantled, any process, operating and auxiliary materials that may be present must first be removed and disposed of in an environmentally friendly manner. Depending on the material properties and the construction of the system, the systems to be dismantled must be cleaned.

All parts of the installation must be properly recovered, reused and/ or disposed of.

WEEE-Reg.-Nr.

DE12160776

Information on electrical and electronic 8old) devices

The symbol of the crossed-out garbage can means that this electrical or electronic device must not be disposed of with household waste at the end of its service lift, but must be taken to separate collection by the end user. Users have the option of returning a B2B device placed on the market to us at the end of its service lift. We will the dispose of it properly. Please contact us using a one of the contact options to arrange a return.

If this is possible without destroying the old electrical or electronic device, please remove old batteries or accumulators and old lamps before you return them for disposal and take them to a separate collection. If the old electrical or electronic device contains personal data, you are responsible for deleting it yourself before you return it.

The symbol of the crossed-out garbage can on batteries or accumulators means that they must not be disposed of with household waste at the end of their service life. If batteries or accumulators contain mercury (Hg), cadmium (Cd) or lead (Pb), you will find the respective chemical symbol below the symbol of the crossed-out garbage can. You are legally obliged to rerun old batteries and accumulators after use. You can do this for free in the trade store.

Batteries may contain substances that are harmful to the environment and human health. Particular caution is required due to the special risks involved in handling lithium containing batteries. The separate collection and recycling of old batteries and accumulators is intended to avoid negative effects on the environment and human health.

Please avoid generating waste from old batteries us much as possible, e.g. by giving preference to batteries with a longer service life or rechargeable batteries. Please avoid littering public spaces by not leaving batteries or battery containing electrical and electronic devices lying around. Please explore ways to recycle a battery instead of disposing of it, such as reconditioning or repairing the battery.

11 FIRE PROTECTION - CONDUCT IN THE EVENT OF A FIRE

Remark:

This chapter is intended for those persons who are responsible for fire protection and firefighting

11.1 General information on conduct during a fire and on fire prevention

DANGER!

The system may contain substances that, in the event of a fire, may pose a danger to persons and(or the environment, e.g.

- Process substances
- The system's auxiliary and operating materials, e.g. substances in filters, greases, lubricating oils, etc.
- The system's construction materials, insulants, etc.

CAUTION!

The system contains vessels and components/ subunits that may be carrying negative pressure!

Observe the instructions and specifications

- In the chapter "Correct and proper use/ System dangers"
- In the chapter "General safety and accident prevention regulations"
- In the chapter "General description"
- In the chapter "Technical data" and
- In the safety data sheets and documentation provided by the component manufacturers for the substances used, etc.
- In the applicable legal regulations.

The system's components have been designed and built according to the specifications agreed between Diener electronic GmbH & Co. KG and the operator (see the chapter "Correct and proper use").

Fire alarms and firefighting equipment are not included in the scope of delivery by Diener electronic GmbH & Co. KG and may have to be provided by the operator.

Process, auxiliary, and operating materials contained in the system

The process, auxiliary, and operating materials included in the scope of delivery by Diener electronic GmbH & Co. KG can be found in the chapters "Auxiliary and operating materials", "Correct and proper use/ Process development", and "Technical data"

Note the safety data sheets and documentation provided by the manufacturers! The details they contain are binding.

CAUTION!

The system contains

- Parts carrying negative pressures, e.g. components connected to negative pressure or vacuum system.
- Pressurised vessels, e.g. gas bottle provided for the system

CAUTION!

Only those process, auxiliary, and operating materials may be used that do not damage the system or its components and that do not compromise its functions or safety!

The substances may not be potentially flammable and/ or explosive, and the system must have been designed and built explicitly for the use of these substances! (See the chapter "Correct and proper use").

Otherwise, there is a danger of components' failing with potentially dangerous system states and of dangerous atmospheres' forming

The use of process, auxiliary, and operating materials not released by. Diener electronic GmbH & Co. KG lies in the sole responsibility of the operator, without warranties and/ or liability on the part of. Diener electronic GmbH & Co. KG.

The operator must draw up and implement a fire protection concept/ emergency plan based on the properties, quantities, and uses of the process, auxiliary, and operating materials employed.

Firefighting and hazards posed by the substances used

Please read the information in the safety data sheets and the documents provided by the component manufacturer!

The safety data sheets for the substances used contain information on fire and explosion protection and instructions on fighting the fires.

Depending on the case/ location of damage and affected system parts, the appropriate firefighting equipment, the firefighting procedure, and the requisite protective and emergency measures must be defined and communicated in advance. We recommend drawing up emergency plans.

Firefighting is facilitated greatly when only those substances and auxiliaries needed for ongoing operations are provided at the system. It is forbidden to store process, auxiliary, and operating materials on site.

Vehicle and access routes to the system parts must be kept clear at all times!

Firefighting requires respirators with independent air supply. Firefighters should wear a respiration and protective clothing that prevents contact with the skin and/ or eyes.

Firefighting is hindered by the fitted protective partitions

Firefighting is hindered by the system design.

The door to the inside of the system is locked and and cannot be opened without the key.

Process substances/ gases and auxiliary and operating materials

The system may contain gases/ substances that may present a particular hazard potential affecting the spread of fire and firefighting measures.

The substances and process and flushing gases approved for the system, e.g. for polymerisation, and the specification of the required auxiliary and operating substances can be found in the chapter "Technical data - process development".

Materials of the system components

Materials of the system components	Example	Comments
Metals	• Basic system structure • Plasma chamber • Cladding • Piping systems • etc.	
Plastics	• Covers • Cable conduits • etc.	
Composites	• Insulating materials	
Electrical/ electronic devices and equipment	• PC • screen • generators • switch device • cable • etc.	***CAUTION!*** *Electrical equipment under high voltage!*

11.2 Hazards posed by firefighting water

DANGER OF DEATH!

There may still be high voltages across electrical equipment even after it has been disconnected from the power supply!

CAUTION!

Electrical equipment under high voltage!

There is danger of death when firefighting water contacts electrical equipment!

The experts assigned by the manufacturer must examine the system, its parts, and all affected electrical equipment for damage caused by fire and the firefighting water. Only when it has been verified that there are no hazards, may the system or its electrical equipment be put back into operation

The firefighting water may not enter groundwater, discharge substances/ media/ firefighting water must be disposed of in accordance with the environment laws.

11.3 Conduct in the event of fire on the system

In the event of a signal/ alarm, the procedure should be as follows

(Decisive here is the emergency plan drawn up by the operator):

On site::

- *Leave danger area immediately*
- *Make sure that there are no longer any persons in the danger area*
- *Press the emergency off button provided that there is time to do so*
- *Supervisory personnel must:*
- *Notify the fire brigade*
- *Switch OFF its disconnect from the power supply any additional equipment*

Designation	Delivery Times*	Order No.
2/2-way valve 214A FKM	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100002050
2/2- way valve 210A FKM	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100014914
Edge vlave 850A KF25 FKM	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100007178
Heating rod 100W	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100016026
Heating rod 1600W	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100016973
Silicone heating pad 100W	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100022110
Temperature sensor	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	1000002455
converter Typ212K	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100004582
converter Type L 0-800°C	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100016049
converter Type T -200-350°C	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100031122
fan 24V	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100006434
fan 230VAC	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100000571
Power supply 120W (DR-120-24)	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100001132

Designation	Delivery Times*	Order No.
Temperature switch 250°C	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100024237
15“PC	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100025166
Motor	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100004120
Rotary encoder	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100010087
Proximity switch	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100003446
Piranisensor	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100012889
Pirani Controller	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100012900
carousel (P6)	No Details possible	100028320
Tray carousel (P6)	No Details possible	100021810
carousel (P8)	No Details possible	100023903
Tray carousel (P8)	No Details possible	100013903

Status: 23.02.2024
Minimum order quantity: 100.00 EUR

All aforementioned spare parts must only be installed by specialists from Diener electronic GmbH & Co. KG.

If the installation is performed by the operator or a third person without authorisation from Diener electronic GmbH & Co. KG any guarantee and liability by. Diener electronic GmbH & Co. KG will immediately become void.

*** Delivery times subject to change**
For the latest price, please contact our service department at: service@plasma.com

Bezeichnung	Lieferzeiten*	Bestell Nr.
Centring ring with O-ring KF16 Viton	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100000691
Seal KF16 Viton	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100002214
Seal KF16 Silikon	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100003121
Centring ring KF16 VA	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100001247
Clamp KF16	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100000693
Centring ring with coarse sieve	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100008349
Centrin ring KF16 with sintered metal filter	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100003260
Centring ring with O- ring KF25 Viton	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100002883
Seal KF25 Viton	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100001716
Seal KF25 Silikon	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100002854
Centring ring KF25	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100001248
Clamp KF25	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100000548
Centring ring with coarse sieve	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100008350
Centring ring KF25 with sintered metal filter	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100004854

Bezeichnung	Lieferzeiten*	Bestell Nr.
Window sealing	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100013074
Inspection window	about. 2-3 working days (Germany) about. 5 working days (in the EU) about. 10 working days (outside of the EU)	100000980

Status: 23.02.2024
Minimum order quantity: 100.00 EUR

All aforementioned spare parts must only be installed by specialists from Diener electronic GmbH & Co. KG.

If the installation is performed by the operator or a third person without authorisation from Diener electronic GmbH & Co. KG any guarantee and liability by. Diener electronic GmbH & Co. KG will immediately become void.

*** Delivery times subject to change**
For the latest price, please contact our service department at: service@plasma.com

14 AFTER SALES SERVICE

We offer:

Maintenance agreements

- Yearly maintenance is recommended for safeguarding the perfect working order of your plasma system.
- If the average time of use exceeds for hours a day, we recommend a maintenance interval of six minths.
- The next maintenance date is given on the rear side of your system.

Calibrations of various components

- Pirani-Sensor

Examination of various components

- Generator
- Mass-Flow-Controller
- Vaccum pump
- Leackage test

Short delivery times

- Our high stock levels safeguard prompt shipping

Service technicians

- Our service technicians will be please to come to you
- For the best possible service, our technicians are in constant contact with our head.

Hotline support

Hotline support for minor malfunctions

Contact

Tel.: 07458/99931-200
E-Mail: service@plasma.com

15 RETURNS

If you detect an error during or after the guarantee period of you plasma system, please contact our service department.

Tel.: 07458/99931-200
E-Mail: service@plasma.com

If it is not possible to resolve the problem over phone, our service department will inform you.

To return your system, please complete the enclosed return slip "FB167: Return Form"
this must be attached to the system.

Package your plasma system well and send it to the follow address for repair purposes:

Diener electronic GmbH & Co. KG
Service departement
Nagolder Str. 61
72224 Ebhausen
Germany

Please enter the serial number of your plasma system as a reference number on the box.

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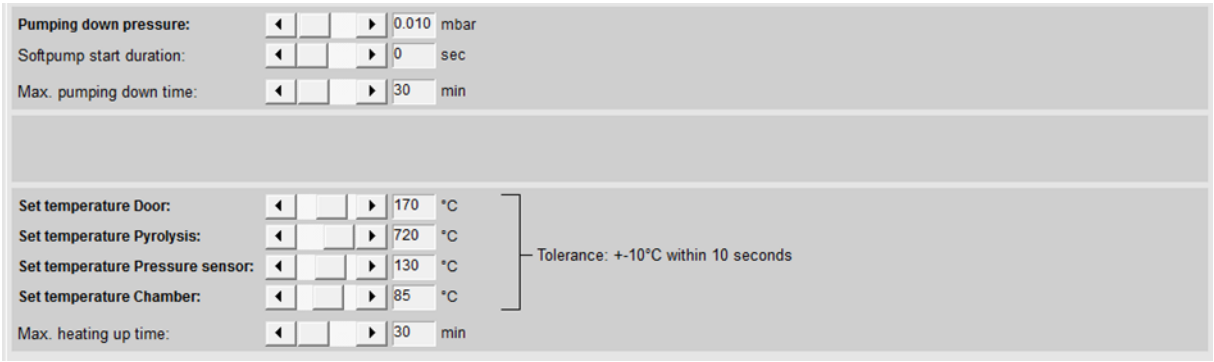
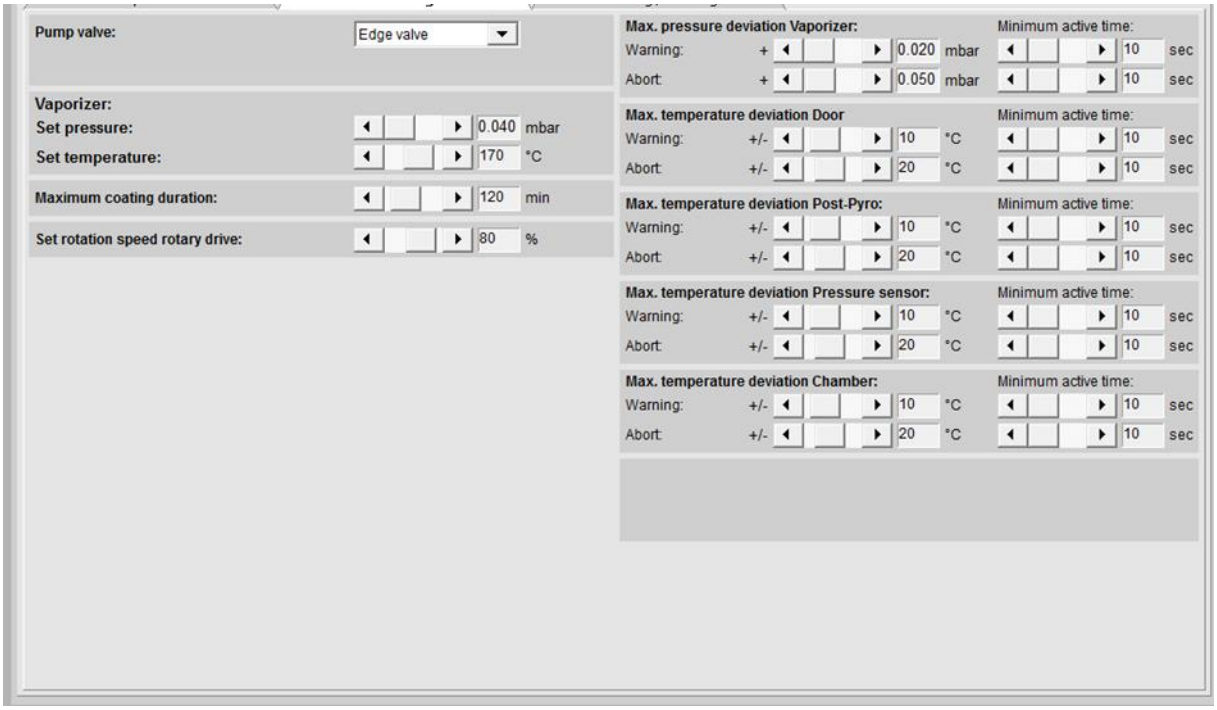
16 SAMPLE PROGRAM FOR PARYLENE C

Configure the following settings on the program tab:

Preparation time:

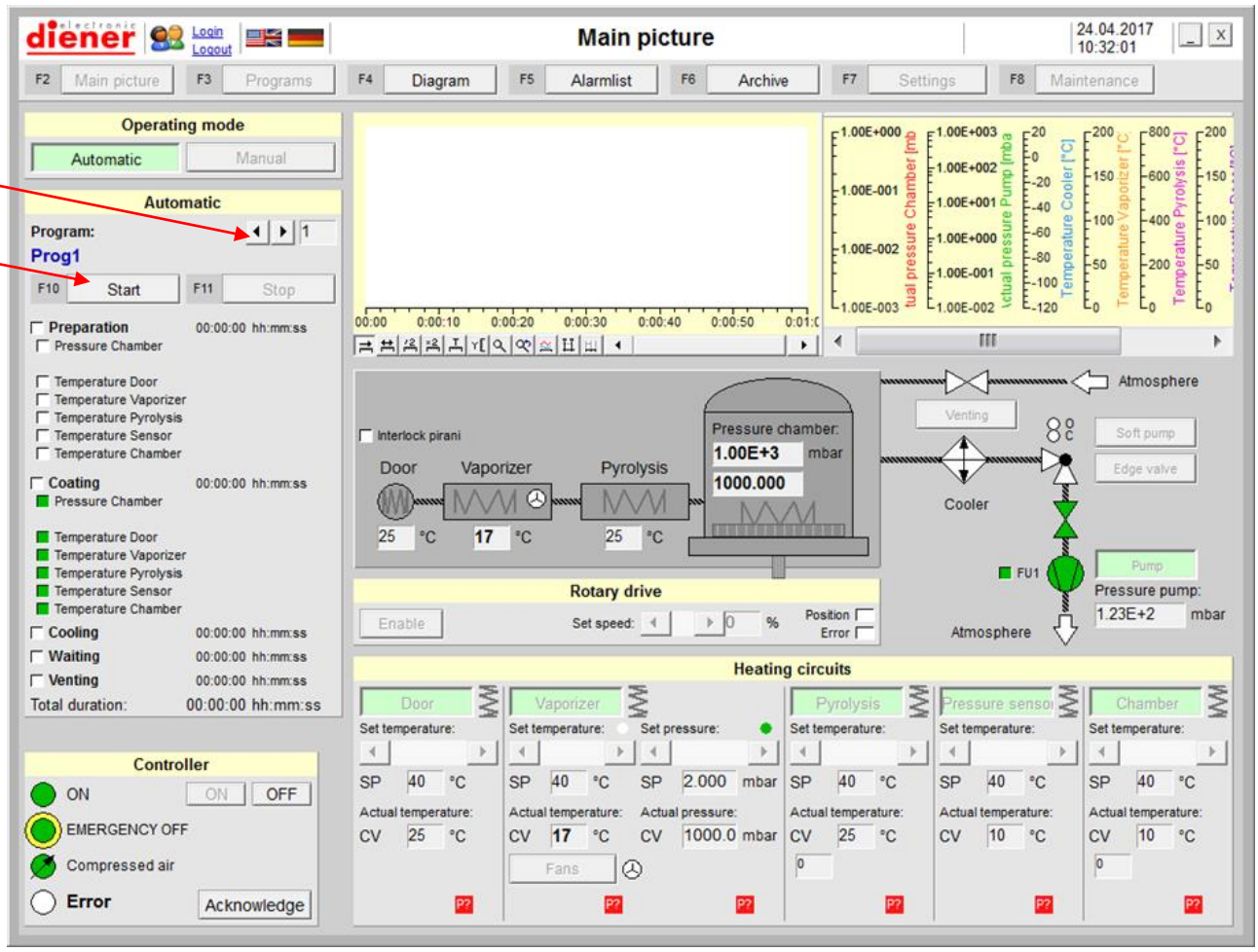


Coating time:



Venting time:

- Now fill your monomer container and load it into the vaporiser. Then load the coating chamber with your work pieces and close the cover.
- In the main picture, select the program you configured above and press start.



- You can remove your coated work pieces from the coating chamber after the program finishes.