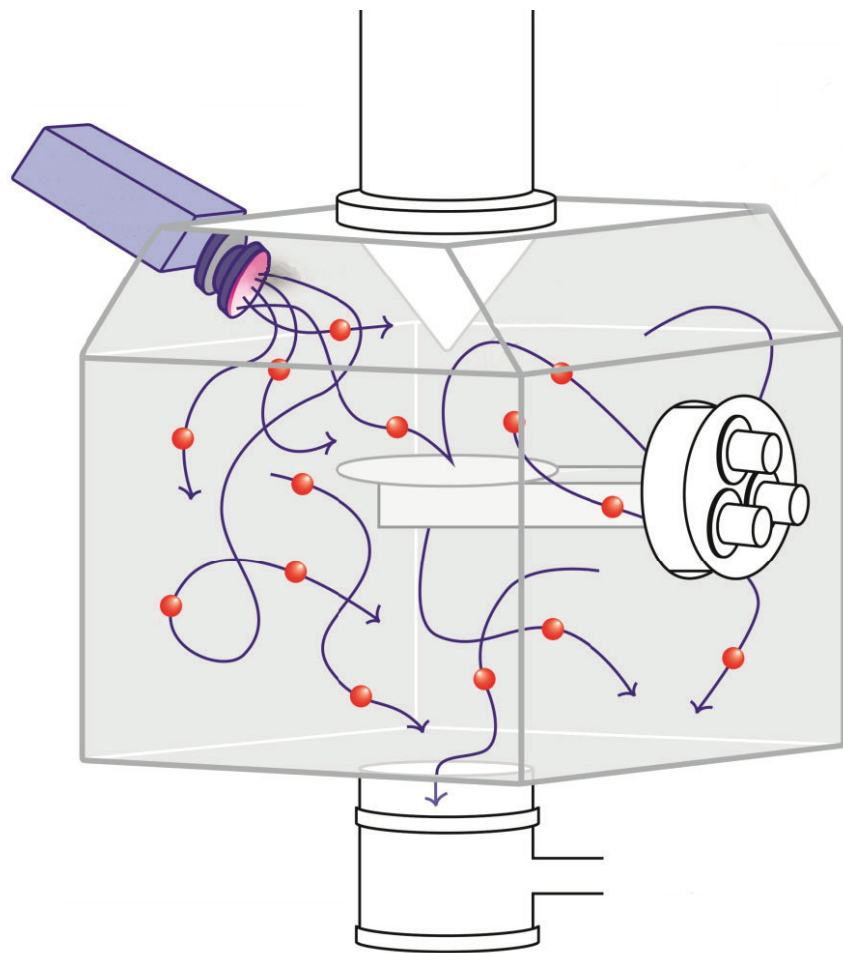


Plasma Cleaner Add On Integration Pack for MultiSEM

Instruction Manual



ZEISS

Plasma Cleaner Add On
Integration Pack for MultiSEM

Original instructions

Carl Zeiss Microscopy GmbH

Carl-Zeiss-Promenade 10
07745 Jena, Germany
microscopy@zeiss.com
www.zeiss.com/microscopy



Carl Zeiss Microscopy GmbH

Carl-Zeiss-Straße 22
73447 Oberkochen, Germany

© by Carl Zeiss Microscopy GmbH

Document name: Instruction Manual Plasma Cleaner Add On for MultiSEM

Revision: en00

Effective from: February 2015

3XXXXX-XXXX-000

This document or any part of it must not be translated, reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information or retrieval system. Violations will be prosecuted.

The use of general descriptive names, registered names, trademarks, etc. in this document does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Software programs will fully remain the property of Carl Zeiss Microscopy. No program, documentation or subsequent upgrade thereof may be disclosed to any third party, unless prior written consent of Carl Zeiss Microscopy has been procured to do so, nor may they be copied or otherwise duplicated, even for the customer's internal needs apart from a single back-up copy for safety purposes. Due to an ongoing process of improvement Carl Zeiss Microscopy reserves the right to make modifications of this document without notice.

1. About this manual 5
 1.1. Definition of terms..... 7

2. Safety summary 8
 2.1. Intended use 8
 2.2. Prevention of accidents and of improper use 9

3. Description 10
 3.1. Overview 10
 3.2. Principle of operation 11
 3.3. Technical data 12
 3.4. Customer service 13

4. Installation..... 13

5. Operation..... 14
 5.1. Switching on the Plasma Cleaner Add On..... 14
 5.2. Switching off the Plasma Cleaner Add On..... 16

6. Maintenance and repair 17
 6.1. Repair 17
 6.2. Troubleshooting 17

7. De-installation and disposal..... 18

8. Abbreviations..... 18

▪

1. About this manual

This instruction manual is considered to be part of the Plasma Cleaner Add On.

Read the instructions carefully. Keep the instruction manual nearby the Plasma Cleaner Add On and hand it over to future owners of the instrument.

This instruction manual is designed for users who have been trained by an authorised Carl Zeiss Microscopy expert to operate the workstation, the Plasma Cleaner Add On is built in. Operators of the Plasma Cleaner Add On must not deviate from the instructions provided in this document.



IMPORTANT

It is assumed that the operator is already familiar with general functions of the ZEN mSEM Software and the operation of the MultiSEM workstation.

Reference to related documents

For detailed information regarding the MultiSEM workstation and the operating software refer to the Zeiss MultiSEM Instruction Manual.

Safety instructions

The safety instructions in this manual are classified as follows:



DANGER

This safety symbol and signal word indicates an imminently hazardous situation. Disregarding this warning WILL result in death or serious injury.



CAUTION

This safety symbol and signal word indicates a potentially hazardous situation. Disregarding this warning MAY result in minor or moderate injury.

CAUTION

This signal word used without a safety symbol indicates a potentially hazardous situation. Disregarding this warning MAY result in property damage.

Moreover you will find the following type of information:



IMPORTANT

This symbol and signal word draws your attention to important and useful information.

1. About this manual

Typographical conventions For the description of software, the following typographical conventions are used:

Typography	Meaning
Push <ENTER>.	Push the ENTER key on the keyboard.
Type <key1, key2>	Type key 1 first, then type key 2 on the keyboard.
Type <Ctrl + Alt + Del>.	Simultaneously type CTRL key, ALT key and DEL key on the keyboard.
Click on the tab Plasma Cleaner Control . Select Object Chamber from the drop-down list.	Icons, buttons and menus are printed in bold.
Select Plasma time <i>00:10:00 minutes</i> . Set Plasma powet to <i>20 Watt</i> .	Values to be selected are printed in italics.

Text	Meaning
Click...	Press the left mouse button.
Right-click...	Press the right mouse button.
Double-click....	Press the left mouse button twice.

1.1. Definition of terms

The following terms are used in this manual:

Plasma Cleaner Add On	An optional component to clean the specimen chamber or the specimen.
ZEN mSEM	Operating software for ZEISS MultiSEM
Operator	A trained person, who is assigned to operate the workstation. <i>Basic operator:</i> Person who has been trained to perform fundamental operation sequences. <i>Specially trained operator:</i> Electrically skilled person who has been trained to perform basic maintenance tasks.
User	A person or organisation that uses products of Carl Zeiss Microscopy.
Carl Zeiss service engineer, Carl Zeiss service staff	Specially trained service expert, either Carl Zeiss staff or authorised service partner of Carl Zeiss Microscopy.

2. Safety summary

2.1. Intended use

The Plasma Cleaner Add On is used to generate reactive gas-phase radicals in a plasma. This plasma is fully contained in the Plasma Cleaner unit. The radicals migrate into the specimen chamber and chemically react with unwanted hydrocarbons.

This is useful for:

- **Fast specimen decontamination**
Decontamination time can be adjusted to fit the customer needs. Typically, 2-5 minutes to clean the sample, or 10-30 minutes runs for in-depth decontamination of stage and chamber.
- **Safe decontamination**
It is completely safe for the equipment.
- **Improved image quality**
Contamination compromises achievable image resolution.
- **Improved measurement accuracy**
Sample features can be measured accurately.

2.1.1 Recommended cleaning processes

Different plasma cleaning processes can be selected. For detailed information regarding the controller of the Plasma Cleaner refer to the XEI Manual.

The corresponding parameters for some selected process can be found in the table below.

Cleaning type / Conditions	Turbo	Plasma pressure / power („T-pump“ is ~0.02 mbar)	Ignition pressure [mbar]	Time [min]
Specimen cleaning in object chamber (MultiSEM)	yes	T-pump/20W	0.270	2
Specimen cleaning in loadlock	no (deactivated)	0.270mbar/15W	0.270	2
Loadlock chamber cleaning (MultiSEM)	no (deactivated)	0.270mbar/20W	0.270	10
Object chamber cleaning (MultiSEM)	yes	T-pump	0.270	30

Table 1.1: Plasma cleaning processes



IMPORTANT

If Plasma Cleaner Add On is used continuously over several hours the grease of the stage can get affected by loosing its lubricious properties.

2.2. Prevention of accidents and of improper use



CAUTION

Risk of injury or damage due to improper operation of the option.

Read the user documentation carefully.

Do not operate the option until you have completely read and understood this instruction manual and the entire user documentation delivered with the workstation.

You will find the user documentation in the document folder.

CAUTION

Risk of property damage due to improper maintenance, service or repair.

The warranty might be voided.

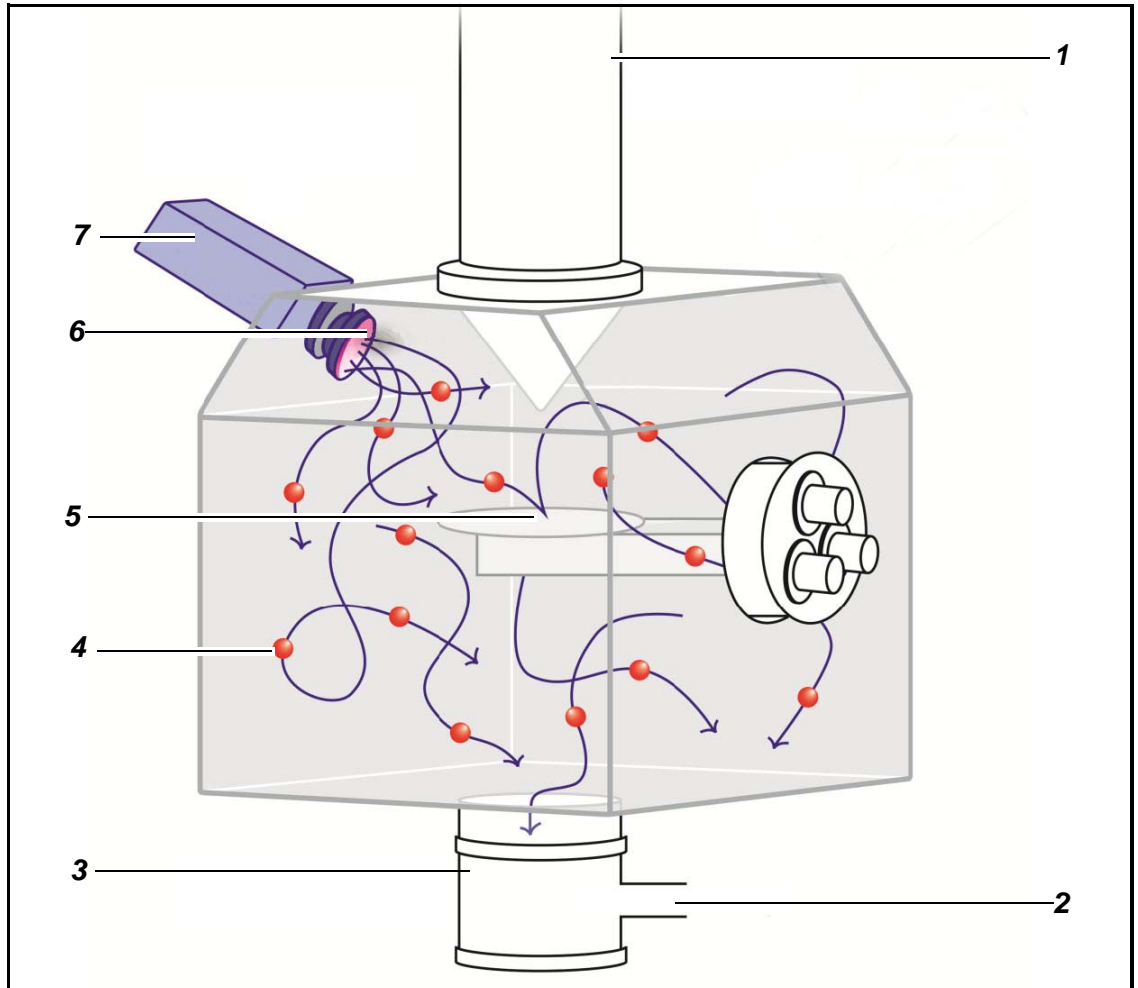
Follow the instructions given in this instruction manual.

**IMPORTANT**

All pursuing tasks of maintenance, service, and repair not described in this instruction manual have to be performed by authorised Carl Zeiss service staff only.

3. Description

3.1. Overview



- | | | | |
|---|-----------------------|---|-----------------------------|
| 1 | Electron column | 5 | Specimen stage |
| 2 | Vacuum exhaust | 6 | Plasma |
| 3 | High vacuum pump | 7 | Plasma radical source (PRS) |
| 4 | Reactive gas radicals | | |

Fig. 1.1: Operation principles of the Plasma Cleaner Add On

3.2. Principle of operation

When starting the Plasma Cleaner via the Plasma Cleaner menu the chamber to which the Plasma Cleaner is attached is vented above at least 3mbar. Then the corresponding chamber is pumped again. When the pressure approaches the preset ignition pressure of the plasma cleaner, a valve (connected to air) in the plasma cleaner (PRS) is opened, stabilizing the pressure close to the PRS in the chamber to the preset ignition pressure. After ignition the PRS stabilizes the pressure to the preset plasma pressure value. When the preset plasma time is over, pump down continues.

Ignition pressure, plasma pressure, plasma power and plasma time must be set by the user (see also the plasma cleaner manual from XEI, the table on page 9 and the note below).



IMPORTANT

Depending on the specimen material, it is possible that the Plasma Cleaner Add On might damage the specimen. It is recommended to test this before cleaning important specimens.

3.3. Technical data

The Plasma Cleaner Add On consists of two major components:

- Plasma Radical Source (PRS)
- Controller

These components are connected by a cable bundle.

Environmental requirements	
Pollution degree	2
Installation category	II

Electrical supplies
Connected to power supply

Specifications of the Plasma Cleaner Add On electronics	
Rise time	< 50 ns (10% to 90%)
Decay time	< 50 ns (90% to 10%)
Delay time	250 ns ± 50 ns
Repetition rate	Nominal frequency 200 kHz; maximum 1 MHz for 30 s

Control	
ZEN mSEM V1.02 or higher	Fully integrated starting from ZEN mSEM
.NET Framework 4.5 Client Profile	Precondition to work with the Plasma Cleaner Add On

4. Installation

3.4. Customer service

For customer service, contact your local Carl Zeiss service engineer.

A list of Carl Zeiss Microscopy locations and authorised service partners can be found at:

<http://www.zeiss.com/microscopy>

4. Installation

The Plasma Cleaner Add On is either factory-installed or retrofitted by authorised Carl Zeiss service staff.

5. Operation



IMPORTANT

For detailed information about the Plasma Cleaner, refer to the XEI Manual.

Procedure

- 1 If there are several plasma cleaners attached to the MultiSEM (object chamber and/or load lock), the plasma cleaner for the desired cleaning process can be chosen in the first line of the ZEN menu **Plasma Cleaner Control**.

Note

It is only possible to run one plasma cleaner at a time.

Before starting the plasma cleaning process choose **Ignition pressure**, **Plasma pressure**, **Plasma time** and **Plasma power** according to your desired cleaning process (see table on page 9).

Important

Depending on the specimen material, it is possible that the Plasma Cleaner Add On might damage the specimen.

It is recommended to test this before cleaning important specimens.

- 2 To start the plasma cleaning process press **Start cleaning**.

By starting the cleaning process the **Plasma Cleaner Control** is enabled, the corresponding chamber is vented and pumped down again.

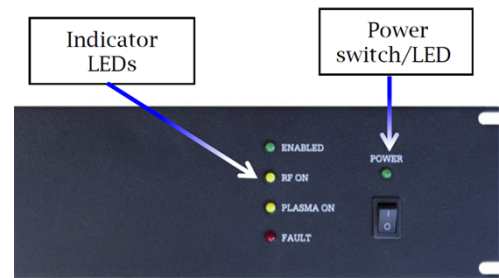
When reaching the selected **Ignition pressure**, the pressure is stabilized by the plasma cleaner, the radio frequency (RF) is switched on automatically and, after some seconds normally, the plasma ignites.

When reaching the selected **Plasma time** the plasma switches off and pump down for the corresponding chamber is continued.
- 4 With **Stop cleaning** the cleaning process can be stopped in advance.



5. Operation

The LEDs in the Plasma Cleaner Control menu reflect the state of the LEDs on the Plasma cleaner control front panel



5.1. Possible Errors

Note

If the plasma cleaner was not in use for a longer time period, the PRS may be oxidized and the first ignition of the plasma may take several minutes.

If the Plasma Cleaner in the **Plasma Cleaner Control** menu is not connected, check if the power supply of the plasma cleaner control unit is on. If not, switch power on and press the **Reconnect** button.

6. Maintenance and repair

6.1. Repair

CAUTION

*Risk of property damage due to improper maintenance, service or repair.
The warranty might be voided.
Strictly follow the instructions given in this instruction manual.*

The Plasma Cleaner Add On is not user-serviceable.
In case of a defect contact your local Carl Zeiss Microscopy service engineer for assistance.

6.2. Troubleshooting

For detailed information, refer to the XEI Manual.

If you cannot solve the problem, contact your local Carl Zeiss service engineer.



DANGER

*Danger to life: Hazardous voltage inside the workstation.
Only service engineers trained and authorised by Carl Zeiss Microscopy are allowed to service the Plasma Cleaner Add On and the workstation and to perform work on the electrical system.*

7. De-installation and disposal

De-installation and disposal for Plasma Cleaner Add On can be looked up in the original manual from XEI Evactron 25Z/40Z/45Z De-Contaminator RF Plasma Cleaning System.

8. Abbreviations

PRS	Plasma Radical Source
mSEM	Multibeam scanning electron microscope
RF	Radio frequency

<p>A</p> <ul style="list-style-type: none"> Abbreviations 18 About this manual 5 <p>C</p> <ul style="list-style-type: none"> Customer service 13 <p>D</p> <ul style="list-style-type: none"> Definition of terms 7 De-installation and disposal 18 Description 10 <p>I</p> <ul style="list-style-type: none"> Installation 13 instruction 5 Intended use 8 <p>M</p> <ul style="list-style-type: none"> Maintenance and repair 17 <p>O</p> <ul style="list-style-type: none"> Operation 14 Operator 7 Operator, basic 7 Operator, specially trained 7 <p>P</p> <ul style="list-style-type: none"> Prevention of accidents 9 Principle of operation 11 <p>R</p> <ul style="list-style-type: none"> Repair 17 <p>S</p> <ul style="list-style-type: none"> safety instructions 5 Safety summary 8 Switching off the Beam Blanker 16 Switching on the Beam Blanker 14 <p>T</p> <ul style="list-style-type: none"> Technical data 12 Troubleshooting 17 Typography 6 <p>U</p> <ul style="list-style-type: none"> User 7 <p>Numerics</p> <p>75026</p> <ul style="list-style-type: none"> Z3.3_headline_3 2.1.1 Recommended cleaning processes 9 <p>A</p> <ul style="list-style-type: none"> Abbreviations 18 About this manual 5 	<p>C</p> <ul style="list-style-type: none"> Customer service 14 <p>D</p> <ul style="list-style-type: none"> Definition of terms 7 De-installation and disposal 18 Description 11 <p>I</p> <ul style="list-style-type: none"> Installation 14 instruction 5 Intended use 8 <p>M</p> <ul style="list-style-type: none"> Maintenance and repair 17 <p>O</p> <ul style="list-style-type: none"> Operation 15 Operator 7 Operator, basic 7 Operator, specially trained 7 <p>P</p> <ul style="list-style-type: none"> Prevention of accidents 10 Principle of operation 12 <p>R</p> <ul style="list-style-type: none"> Repair 17 <p>S</p> <ul style="list-style-type: none"> safety instructions 5 Safety summary 8 Switching on the Beam Blanker 15 <p>T</p> <ul style="list-style-type: none"> Technical data 13 Troubleshooting 17 Typography 6 <p>U</p> <ul style="list-style-type: none"> User 7
--	---

Carl Zeiss Microscopy GmbH
Carl-Zeiss-Promenade 10
07745 Jena
Germany
microscopy@zeiss.com

Carl Zeiss Microscopy Ltd.
509 Coldhams Lane
Cambridge
Cambridgeshire
CB1 3JS
UK
microscopy@zeiss.com

Carl Zeiss Microscopy, LLC
One Zeiss Drive
Thornwood, NY 10594
USA
microscopy@zeiss.com

Plus a worldwide network of distributors

www.zeiss.com/microscopy

Due to a policy of continuous development, we reserve the right to change specifications without notice.

© Carl Zeiss Microscopy GmbH, Oberkochen