



**EOS M 290**  
Machine



Operating instructions







## EOS M 290

Laser-sintering system for metal powder



## 1 Important basic information

1.1	Operating instructions .....	1.1
1.1.1	Scope, contents .....	1.1
1.1.2	Target group .....	1.1
1.1.3	Conventions .....	1.2
1.1.3.1	Terms .....	1.2
1.1.3.2	Representations .....	1.2
1.1.4	Marking of notices and information .....	1.3
1.1.5	Marking of safety information .....	1.3
1.1.5.1	Safety instructions .....	1.3
1.1.5.2	Warning symbols .....	1.4
1.1.5.3	Prohibition symbols .....	1.4
1.1.5.4	Instruction symbols .....	1.5
1.2	Instruction, training .....	1.5
1.3	Legal notes .....	1.5
1.3.1	Copyright .....	1.5
1.3.2	Disclaimer .....	1.6
1.4	EOS support .....	1.6

## 2 Safety

2.1	Basic instructions .....	2.1
2.1.1	Operating instructions .....	2.1
2.1.2	Qualification of the personnel .....	2.1
2.1.3	Obligations of the operating organisation .....	2.2
2.1.4	National regulations .....	2.2
2.2	Usage of the machine .....	2.3
2.2.1	Correct usage .....	2.3
2.2.2	Foreseeable misuse .....	2.3
2.3	Behaviour in case of an emergency .....	2.4
2.4	Safe operation .....	2.5
2.4.1	Machine .....	2.5
2.4.2	Materials .....	2.5
2.4.2.1	Metal powders in category A .....	2.5
2.4.2.2	Metal powders in category B .....	2.6
2.4.2.3	Metal condensate .....	2.7

# Contents

EOS M 290

2.4.3	Inert gas.....	2.8
2.4.4	Cleaning equipment for metal powder and metal condensate.....	2.9
2.5	Safety warnings on the machine .....	2.10
2.6	Hazards and safety measures .....	2.12
2.6.1	Hazard due to fire and explosion.....	2.12
2.6.2	Hazard while fire-fighting .....	2.14
2.6.3	Hazard due to electrical power .....	2.15
2.6.4	Hazard due to electromagnetic effects.....	2.16
2.6.5	Hazard due to laser radiation.....	2.16
2.6.6	Mechanical hazard .....	2.17
2.6.7	Thermal hazard .....	2.18
2.6.8	Chemical hazard .....	2.18
2.6.8.1	Metal powder.....	2.18
2.6.8.2	Rubbing alcohol.....	2.19
2.6.8.3	Inert gas.....	2.19
2.6.8.4	Argon .....	2.20
2.7	Personal protective equipment.....	2.20
2.8	Disposal.....	2.21
2.8.1	Machine.....	2.21
2.8.2	Materials .....	2.22

## 3 Technical data

3.1	Laser and optics .....	3.1
3.2	Mechanical axes, co-ordinates .....	3.1
3.2.1	Building volume.....	3.1
3.2.2	Recoating system .....	3.1
3.2.3	Elevator system .....	3.2
3.3	Building platform heating.....	3.2
3.3.1	Temperature regulation .....	3.2
3.3.2	Heater element .....	3.2
3.4	Argon supply.....	3.3
3.5	Noise emission .....	3.3
3.6	Components and accessories .....	3.3

## 4 Layout and function

4.1	Layout.....	4.1
4.1.1	Front of machine .....	4.1
4.1.2	Rear of machine .....	4.2
4.1.3	Process chamber.....	4.3
4.1.4	Recoating system.....	4.3
4.1.5	Elevator system.....	4.3
4.1.6	Optical system .....	4.4
4.1.6.1	Adjustment of the beam expander optics.....	4.5
4.2	Function description .....	4.6
4.2.1	Physical principle .....	4.6
4.2.2	Building process .....	4.6
4.3	Main components .....	4.7
4.3.1	Process chamber.....	4.7
4.3.1.1	Recoater .....	4.7
4.3.1.2	Elevator system.....	4.7
4.3.1.3	Building platform .....	4.8
4.3.2	Optics chamber.....	4.8
4.3.2.1	Collimator .....	4.8
4.3.2.2	Beam expander optics .....	4.8
4.3.2.3	Scanner .....	4.9
4.4	Parameter sets.....	4.9
4.4.1	Exposure types for the parameter sets.....	4.9
4.4.2	Parameter editor.....	4.9
4.5	Data flow .....	4.10
4.5.1	Overview .....	4.10
4.5.2	Data preparation.....	4.10
4.5.3	Job preparation.....	4.11
4.5.4	Building task generation .....	4.11
4.6	Safety concept.....	4.12
4.6.1	Emergency stop circuit.....	4.12
4.6.2	Process chamber door safety circuit.....	4.13
4.6.3	Process chamber oxygen safety circuit.....	4.13
4.6.4	Recirculating filter system oxygen safety circuit.....	4.13

# Contents

EOS M 290

## 5 Controls and indications

5.1	Controls and indications on the machine .....	5.1
5.1.1	Front of machine.....	5.1
5.1.2	Building platform adjusting panel.....	5.2
5.1.3	Rear of machine .....	5.3
5.2	Controls and indications on the monitor.....	5.4
5.2.1	Main monitor.....	5.4
5.2.2	Dialog box .....	5.5
5.2.3	Buttons.....	5.5
5.2.3.1	Buttons and their significance.....	5.5
5.2.4	Screen layout.....	5.6
5.2.4.1	Messages workspace.....	5.7
5.2.4.2	Dashboard workspace .....	5.9
5.2.4.3	Status bar.....	5.10
5.2.4.4	Status information .....	5.10
5.2.4.5	Text / Icon .....	5.11
5.2.4.6	Login / Change user.....	5.11
5.2.4.7	Action bar .....	5.11
5.2.4.8	Navigation bar.....	5.12
5.2.5	Home workspace.....	5.13
5.2.6	Wizards workspace .....	5.16
5.2.7	Building tasks workspace .....	5.18
5.2.8	Manual operation workspace.....	5.22
5.2.8.1	Axes workspace.....	5.23
5.2.8.2	Process conditions workspace .....	5.25
5.2.9	Settings workspace .....	5.26
5.2.9.1	User settings workspace.....	5.27
5.2.9.2	Settings workspace .....	5.28
5.2.9.3	Process settings workspace .....	5.32
5.2.10	Maintenance workspace.....	5.39

## 6 Operation

6.1	Configuring user interface .....	6.1
6.1.1	Setting language .....	6.1
6.1.2	Administering operating levels .....	6.1
6.1.2.1	Adding a user .....	6.1
6.1.2.2	Edit user.....	6.2
6.1.3	Setting up dashboard.....	6.3
6.2	Managing licences.....	6.3
6.3	Prepare the machine.....	6.4
6.3.1	Running up / shutting down / restarting system.....	6.4
6.3.1.1	Running up system.....	6.4
6.3.1.2	Running up the system after an emergency stop .....	6.4
6.3.1.3	Shutting down system .....	6.4
6.3.1.4	Restarting system.....	6.5
6.3.2	Opening/closing process chamber door .....	6.5
6.3.2.1	Opening process chamber door.....	6.5
6.3.2.2	Closing process chamber door.....	6.5
6.3.3	Removing/fitting extraction nozzle .....	6.6
6.3.3.1	Removing extraction nozzle.....	6.6
6.3.4	Fitting extraction nozzle .....	6.7
6.3.5	Adjusting beam expander (defocus) (option).....	6.8
6.4	Set-up machine.....	6.10
6.4.1	Filling dispenser duct.....	6.11
6.4.2	Positioning collector platform.....	6.12
6.4.3	Fitting building platform .....	6.13
6.4.4	Adjusting building platform.....	6.16
6.4.4.1	Adjusting building platform coarsely .....	6.17
6.4.4.2	Adjusting building platform finely .....	6.20
6.4.4.3	Setting up first layer.....	6.23
6.4.5	Checking recoater blade / scraper lip / brushes.....	6.24
6.4.6	Checking window for the F-Theta module, clean if necessary .....	6.25
6.5	Preparing building process .....	6.28
6.5.1	Setting material .....	6.28
6.5.2	Loading building task.....	6.28
6.5.3	Warming up building platform .....	6.29
6.5.4	Recoating first layer.....	6.29
6.5.5	Activating process peripherals.....	6.30

# Contents

## EOS M 290

6.6	Building.....	6.31
6.6.1	Starting building process .....	6.31
6.6.2	Interrupting building process.....	6.33
6.6.3	Cancelling building process .....	6.34
6.7	Taking machine out of operation .....	6.35
6.7.1	Unpacking parts .....	6.35
6.7.2	Emptying collector duct .....	6.39
6.7.3	Cleaning process chamber .....	6.41
6.8	Changing the type of metal powder.....	6.43
6.8.1	Emptying dispenser duct .....	6.44
6.8.2	Cleaning lower injection nozzle and lower injection duct.....	6.45
6.8.3	Cleaning ducts.....	6.46

## 7 Troubleshooting

7.1	Fuses – location and marking .....	7.1
7.2	Fault tables.....	7.1
7.2.1	Building process .....	7.1
7.2.2	Recoating and elevator system .....	7.4
7.2.2.1	Recoater module .....	7.4
7.2.2.2	Building platform / Z-axis .....	7.4
7.2.3	Process chamber .....	7.5
7.2.4	Inert gas supply.....	7.6
7.2.4.1	Laser .....	7.6
7.2.4.2	Scanner .....	7.7
7.2.5	Other malfunctions .....	7.8

## 8 Maintenance

8.1	Servicing .....	8.1
8.1.1	Servicing certificate .....	8.1
8.1.2	Annual machine service .....	8.1
8.2	Inspection and servicing schedule .....	8.2
8.2.1	Machine .....	8.2
8.2.2	Inert gas supply .....	8.3
8.2.3	Components and accessories .....	8.3

8.3	Inspection and servicing work .....	8.4
8.3.1	Performing platform or recoater homing .....	8.4
8.3.2	Checking correct function of the process chamber door lock .....	8.4
8.3.3	Checking process chamber door .....	8.5
8.3.4	Check, clean building area lighting window .....	8.6
8.3.5	Checking, cleaning camera window .....	8.7
8.3.6	Checking coiled strip cover .....	8.8
8.3.7	Replacing switching cabinet air filter mats .....	8.9
8.3.8	Checking correct function of the main switch .....	8.10
8.3.9	Checking correct function of the emergency stop circuit .....	8.11
8.3.10	Checking correct function of the safety circuit .....	8.12
8.3.11	Checking power connection .....	8.13
8.4	Repair work .....	8.14
8.4.1	Removing / fitting recoater cassette .....	8.15
8.4.1.1	Removing recoater cassette .....	8.15
8.4.1.2	Fitting recoater cassette .....	8.17
8.4.2	Unclamping recoater blade (steel blade / ceramic blade) .....	8.19
8.4.3	Turning, replacing recoater blade (steel blade / ceramic blade) .....	8.21
8.4.4	Replacing scraper lip (soft recoating) .....	8.24
8.4.5	Replacing brush recoater (brush recoater) .....	8.26
8.4.6	Moving clear recoater .....	8.29
8.4.7	Changing window for the F-Theta module .....	8.30
8.4.8	Checking top process chamber lighting .....	8.31
8.4.9	Calibrate oxygen sensor .....	8.32

## 9 Spare parts and consumables

9.1	Important information .....	9.1
9.2	Machine .....	9.1
9.2.1	Wearing parts .....	9.1
9.2.2	Consumables .....	9.1
9.3	Building process .....	9.2
9.3.1	Consumables .....	9.2
9.3.2	Accessories .....	9.4

## Contents

---

EOS M 290

---

## Important basic information



## 1.1 Operating instructions

### 1.1.1 Scope, contents

The *Operating instructions* for the EOS M 290 comprise the following elements:

- Manuals
  - *Installation Conditions*  
contains all requirements that must be met prior to the delivery of the machine as well as all information on the installation on the machine.
  - *Machine*  
contains information on the safe operation of the machine, on technical data and the layout of the machine, as well as all descriptions necessary for the operation and maintenance of the machine, as well as for troubleshooting.
  - *Components and accessories*  
contains information and technical data on the components required for the operation of the machine and optional accessories, as well as all descriptions necessary for the operation and maintenance of these components and the optional accessories, as well as for troubleshooting.
- *Machine folder*  
The Machine folder contains the declaration of conformity, safety data sheets for materials, inspection and acceptance logs, the wiring diagram for the machine, as well as documentation on bought-in parts.  
It is also a loose-leaf collection of the information you receive from EOS from time to time.

### 1.1.2 Target group

The *Operating instructions* are aimed at trained specialist personnel at the organisation operating the machine.

This *Machine* manual is intended for the operators and maintenance personnel at the organisation operating the machine.

# Important basic information

EOS M 290

## 1.1.3 Conventions

### 1.1.3.1 Terms

- EOS  
is used to refer to EOS GmbH - Electro Optical Systems, as well as its subsidiaries
- Machine  
is used to refer to the laser sintering system EOS M 290
- Component  
is used to refer to a machine assembly
- Accessories  
is used to refer to the standard accessories, optional accessories or peripherals
- *EOSPRINT*  
is used to refer to the data preparation software necessary to add and prepare building tasks
- EOS service personnel  
is used to refer to service personnel from EOS GmbH or service personnel authorised by EOS GmbH.

### 1.1.3.2 Representations

- Shown in **bold**:
  - Terms for menus, options, buttons, check boxes, data entry and read-only fields, group boxes, software functions
  - Keyboard commands
- Shown in *italics*:
  - Terms for screen windows, screen areas, tabs, software dialog boxes
  - Operating level, parameters, paths, operating modes, values entered or displayed
  - System messages
  - Settings for controls on the machine and the accessories
  - Cross-references
- Shown in *UPPER CASE ITALICS*:
  - Terms for controls on the machine and the accessories
  - Product names
- Shown in *<italics in angle brackets>*:
  - Placeholders for file names.

Buttons with symbols are also printed as pictograms in the margin in addition to the term.

#### 1.1.4 Marking of notices and information

**NOTICE**

Notice

advises of situations that could cause damage if the instructions are not followed.



Information

draws your attention to information that you should note.

#### 1.1.5 Marking of safety information

##### 1.1.5.1 Safety instructions

**⚠ DANGER**

**Danger!**

Safety instructions with this symbol advise of hazardous situations that will result in fatality or serious injuries if the instructions are not followed.

**⚠ WARNING**

**Warning!**

Safety instructions with this symbol advise of hazardous situations that may result in fatality or serious injuries if the instructions are not followed.

**⚠ CAUTION**

**Caution!**

Safety instructions with this symbol advise of hazardous situations that may result in minor or moderate injuries if the instructions are not followed.

# Important basic information

EOS M 290

## 1.1.5.2 Warning symbols



Warning about hazardous electrical voltage



Warning about hazardous laser radiation



Warning about electromagnetic radiation



Warning about crushing to the hands and the arms



Warning about hot surface



Warning about flammable materials



Warning about the risk of an explosive atmosphere

## 1.1.5.3 Prohibition symbols



Eating and drinking forbidden



Smoking forbidden



No naked flames, fire, open sources of ignition and smoking forbidden

#### 1.1.5.4 Instruction symbols



##### Use protective gloves

The type of protective gloves to be worn is defined in the text for the related safety instruction.



##### Use safety glasses with side protection (comparable with EN 166)



##### Use face mask (comparable with EN 143, filter category P3)



##### Use full face mask with particle filter (comparable with EN 143, filter category P3) and integrated dust protection for the eyes made of polycarbonate



##### Use closed safety shoes with protection against ESD (comparable with EN 61340-4-3 and EN ISO 20345, safety class S1)



##### Use closed protective clothing made of flame-retardant material (comparable with EN ISO 11612)



##### Unplug from the mains

## 1.2 Instruction, training

After machine commissioning, the operating organisation will be instructed on the operation of the machine by EOS.

In addition, EOS provides specific training courses lasting several days on the machine and its applications.

## 1.3 Legal notes

### 1.3.1 Copyright

The Operating instructions must not be electronically or mechanically reproduced, distributed, amended, transmitted, translated into other languages or used in any other way - either in full or in part - without the express written approval of EOS.

EOS®, DMLS®, EOSPRINT® and EOSTATE® are registered trademarks of EOS.

All terms from the software *Windows* are registered trademarks of Microsoft.

## Important basic information

EOS M 290

### 1.3.2 Disclaimer

EOS shall not be liable for damage resulting from non-compliance with the Operating instructions either in full or in part.

EOS shall not be liable for damage due to the installation or usage of spare parts from other manufacturers.

EOS shall not be liable for damage caused by inspection and servicing work or repair work performed incorrectly.

EOS shall not be liable for damage due to the installation or the operation of software not approved by EOS.

EOS shall not be liable for damage due to the usage of materials not approved by EOS.

## 1.4 EOS support

<b>EOS customer portal</b>	<a href="https://my.eos.info">https://my.eos.info</a>
<b>E-mail</b>	<a href="mailto:servicehotline@eos.info">servicehotline@eos.info</a>
<b>Address</b>	EOS GmbH Electro Optical Systems Robert-Stirling-Ring 1 D-82152 Krailling / München
<b>Homepage</b>	<a href="http://www.eos.info">www.eos.info</a>

Ensure you have to hand all the information relevant for EOS support enquiries, including

- Machine type
- Machine serial number
- Version number
  - for the data preparation software *EOSPRINT*
  - for the machine software *EOSYSTEM*.



2

---

Safety



## 2.1 Basic instructions

### 2.1.1 Operating instructions

A lack of knowledge about how to operate the machine can result in incorrect operation, uncontrolled machine states and, as a consequence, hazards for the health along with significant damage.

Personnel who operate the machine or perform maintenance work must have read and understood the Operating instructions prior to working on the machine. The contents of the Operating instructions must be followed during all tasks.

The Operating instructions must always be available at hand at the machine.

In addition to the safety instructions in this manual, the safety instructions in all other manuals that form part of the Operating instructions are to be followed.

In addition to the safety instructions in the individual sections, all safety instructions for referenced activities are also to be followed.

Activities not described in these Operating instructions are only permitted to be performed by EOS service personnel.

### 2.1.2 Qualification of the personnel

The machine is only permitted to be operated and maintained by personnel trained and specially instructed by EOS and who have reached the minimum age stipulated by law.

Work on the electrical equipment on the machine and the electrical equipment on accessories is only permitted to be performed by a suitably qualified electrician or by instructed persons under the supervision of an electrician as per electrical regulations.

A suitably qualified person is anyone who due to his/her specialist training, knowledge, and experience, as well as knowledge of the applicable stipulations, can assess the work assigned to him/her and can recognise possible hazards.

Personnel to be trained, instructed, or taking general training are only permitted to work on the machine under the continuous supervision of an experienced person.

Only trained and authorised personnel are allowed to have direct access to the machine.

## 2.1.3 Obligations of the operating organisation

The organisation operating the machine is the entity/person who operates the machine for industrial or commercial purposes or provides the machine to a third party for utilisation / use. While the machine is operated, this entity/person bears the statutory product responsibility for the protection of the personnel and third parties.

The operating organisation must prepare the place where the machine is to be installed as per the local requirements that are described in the *Installation Conditions* manual.

During the operation of the machine, the ambient conditions defined in the *Installation Conditions* manual must be met.

Before personnel are allowed to work on the machine, the following measures must be taken:

- Make sure the personnel have read and understood the Operating instructions.
- Train personnel for the work on the machine.
- Inform personnel about possible hazards, safety measures and how to act in emergencies.
- Place the obligation on the personnel to wear protective equipment.

The operating organisation must ensure that during the operation of the machine all safety devices and safety features are present, correctly installed and fully functional.

All malfunctions and damage indicated by the system or determined by other means must be rectified without delay.

The safety warnings on the machine must always be complete, clearly visible and legible.

EOS service personnel must be briefed on the conditions at the place where the machine is installed prior to the start of servicing work (position of supply pipes, etc.).

## 2.1.4 National regulations

The operating organisation must follow locally applicable national regulations

- during the installation of the machine  
☞ *Installation Conditions* manual
- during all activities performed in relation to the machine and the accessories
- during the entire service life of the machine and the accessories, including commissioning and dismantling
- during the disposal of materials, oils, greases and other substances required for the operation of the machine.

## 2.2 Usage of the machine

### 2.2.1 Correct usage

Incorrect usage of the machine can result in incorrect operation, uncontrolled machine states and, as a consequence, hazards for the health along with significant damage.

- The machine is only allowed to be used for laser sintering parts from materials specially developed for the metal sintering process.  
The machine is only intended to be used for industrial purposes.  
Only powder materials approved by EOS are allowed to be used to operate the machine.
- The installation, commissioning and transport conditions, the connection specifications, as well as the ambient conditions for the operation of the machine specified by EOS must be observed.
- The machine is only allowed to be operated as described in the *Operating instructions*.
- All inspection and servicing work must be performed as per the intervals stated in the inspection and servicing schedule.
- The machine is only permitted to be operated if all safety features and safety devices are present, correctly installed and fully functional.
- Only personnel who meet the requirements defined in the *Operating instructions* are allowed to be tasked with the operation of the machine
  - ☞ *2.1.2 Qualification of the personnel.*
- During the operation and maintenance of the machine, as well as during the handling of metal powder, the personal protective equipment stipulated in the *Operating instructions* for these tasks must always be worn
  - ☞ *2.7 Personal protective equipment.*
- During the installation and operation of the machine, locally applicable national regulations in the operating organisation's country must be observed.

### 2.2.2 Foreseeable misuse

- The machine is not allowed to be modified or changed without authorisation.  
Components of the machine are not permitted to be integrated into other production systems.
- Safety features must not be removed.  
Safety devices, warning devices, limit switches, valves and other control components are not allowed to be overridden.
- The composition of the materials approved by EOS must not be changed.
- During the operation of the machine there must not be any objects (e.g. tools) in the process chamber.
- Maintenance work other than that described in the section *Maintenance* is only permitted to be performed by EOS service personnel.

# Safety

EOS M 290

## 2.3 Behaviour in case of an emergency

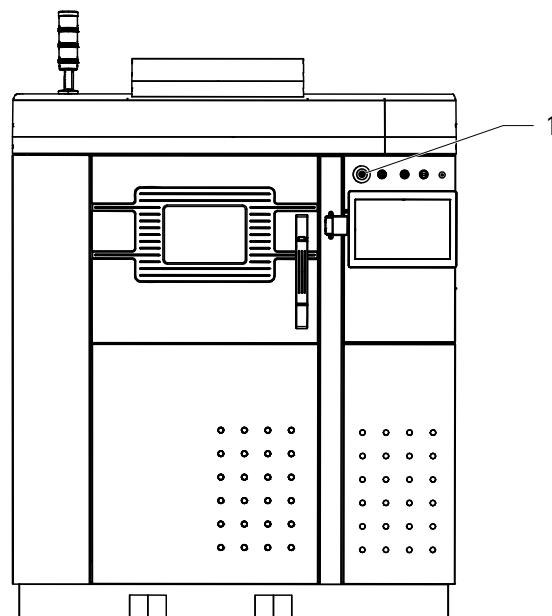
In an emergency the machine must be shut down immediately by pressing the *EMERGENCY STOP* button on the front of the machine.

Authorised personnel who can determine the cause of the emergency and rectify the problem must be informed without delay.

The machine is not allowed to be operated again until the cause of the emergency has been rectified.

If the *EMERGENCY STOP* button on the machine is pressed, the machine's *MAIN SWITCH* remains switched on. The following elements are still live:

- the machine including its mains cable
- all elements connected ahead of the machine, such as a transformer or UPS (Uninterruptible Power Supply)
- accessories for the machine.



*EMERGENCY STOP* button

## 2.4 Safe operation

### 2.4.1 Machine

- The machine is only allowed to be put into service by EOS service personnel.
- If safety features are temporarily removed or safety devices are overridden to undertake servicing work, the machine and the accessories are only allowed to be operated by EOS service personnel.
- Only EOS service personnel are allowed to operate the machine using the *SERVICE* key-operated switch.
- Only EOS service personnel are allowed to work on the laser.

### 2.4.2 Materials

Only metal powders approved by EOS are allowed to be used to operate the machine.

**i** Contact EOS support if you want to use metal powder approved by EOS that is not included in the following categories.

Not all the metal powders listed in the following categories are approved for usage with the machine.

**i** You will find information on the compatibility of the metal powders with the machine in the *material information*.

#### 2.4.2.1 Metal powders in category A

Metal powders in category A involve the following potential hazards:

- Hazard due to fire and explosion:
  - Metal powders are flammable
    - ☞ *2.6.1 Hazard due to fire and explosion*
- Hazard for the health
  - in case of skin and eye contact
  - in case of inhaling and swallowing
    - ☞ *2.6.8 Chemical hazard*

# Safety

EOS M 290

Category A currently includes the following metal powders:

- EOS CaseHardeningSteel 20MnCrZr
- EOS CobaltChrome MP1
- EOS Copper Cu
- EOS Copper CuCP
- EOS CopperAlloy CuZrCr
- EOS MaragingSteel MS1
- EOS NickelAlloy HX
- EOS NickelAlloy IN625
- EOS NickelAlloy IN718
- EOS NickelAlloy IN939
- EOS StainlessSteel 17-4PH
- EOS StainlessSteel 254
- EOS StainlessSteel 316L
- EOS StainlessSteel 316L Vpro
- EOS StainlessSteel CX
- EOS StainlessSteel PH1
- EOS StainlessSteel SuperDuplex
- EOS ToolSteel 1.2709

## 2.4.2.2 Metal powders in category B

Metal powders in category B involve the following potential hazards:

- Hazard due to fire and explosion:
  - Metal powders are highly flammable
  - An explosive atmosphere can be produced in combination with air by swirled up metal powder
- 2.6.1 *Hazard due to fire and explosion*
- Hazard for the health
  - in case of skin and eye contact
  - in case of inhaling and swallowing
- 2.6.8 *Chemical hazard*

Category B currently includes the following metal powders:

- EOS Aluminium AlF357
- EOS Aluminium AISi10Mg
- EOS Aluminium Al2139-AM
- EOS Titanium Ti64
- EOS Titanium Ti64ELI
- EOS Titanium Ti64 Grade 5
- EOS Titanium Ti64 Grade 23
- EOS Titanium TiCP Grade 2

#### 2.4.2.3 Metal condensate

Process by-products can be produced during the processing of metal powders. During the processing of metal powders approved by EOS with the parameter sets provided by EOS, currently the only process by-products known are metal condensates.

Metal condensates are dark-brown to black, soot-like deposits on surfaces. They can cover these surfaces entirely or occur in the form of flakes.

Metal condensates involve the following potential hazards:

- Hazard due to fire and explosion:
  - Metal condensate is highly flammable
  - Metal condensate can spontaneously ignite if swirled up
  - An explosive atmosphere can be produced in combination with air by swirled up metal condensate
- 2.6.1 *Hazard due to fire and explosion*
- Hazard for the health:
  - in case of skin and eye contact
  - in case of inhaling and swallowing
- 2.6.8 *Chemical hazard*

Metal condensates can be produced with all metal powders approved by EOS.

# Safety

EOS M 290

## 2.4.3 Inert gas

The inert gas necessary for processing the related type of metal powder is used for fire and explosion prevention as well as for safeguarding the quality of the parts.

There will be the following potential hazards if inert gas is not used correctly:

- Hazard due to fire and explosion:  
Titanium powder and titanium condensate can react exothermically in conjunction with nitrogen
  - ☞ *2.6.1 Hazard due to fire and explosion.*
- Hazard for the health:  
A high argon or nitrogen concentration in the atmosphere can result in fatality due to asphyxiation
  - ☞ *2.6.8 Chemical hazard.*

Metal powder is only allowed to be processed with inert gas as per the following table.



Contact EOS support if you want to process metal powder that is not included in the following table.

Type of metal powder	Permissible inert gas	
	Nitrogen	Argon
EOS CaseHardeningSteel 20MnCrZr	X	
EOS CobaltChrome MP1	X	
EOS Copper Cu		X
EOS Copper CuCP		X
EOS CopperAlloy CuZrCr		X
EOS MaragingSteel MS1	X	
EOS NickelAlloy HX		X
EOS NickelAlloy IN625		X
EOS NickelAlloy IN718		X
EOS NickelAlloy IN939		X
EOS StainlessSteel 17-4PH		X
EOS StainlessSteel 254		X
EOS StainlessSteel 316L		X
EOS StainlessSteel 316L Vpro	X	

Type of metal powder	Permissible inert gas	
	Nitrogen	Argon
EOS StainlessSteel CX		X
EOS StainlessSteel PH1	X	
EOS StainlessSteel SuperDuplex		X
EOS ToolSteel 1.2709		X
EOS Aluminium AlF357	X	
EOS Aluminium AlSi10Mg		X
EOS Aluminium Al2139-AM		X
EOS Titanium Ti64		X
EOS Titanium Ti64ELI		X
EOS Titanium Ti64 Grade 23		X
EOS Titanium Ti64 Grade 5		X
EOS Titanium TiCP Grade 2		X

#### 2.4.4 Cleaning equipment for metal powder and metal condensate

Metal powders in categories A and B as well as metal condensate must be cleaned up using the Wet separator available from EOS together with the related conductive accessories.

The following potential hazard will arise if cleaning equipment is not used correctly:

- Hazard due to fire and explosion:

An explosive atmosphere can be produced in combination with air by swirled up metal powder or metal condensate. On the usage of an unsuitable item of cleaning equipment, the equipment may ignite this atmosphere due to sparks or electrostatic discharge

☞ *2.6.1 Hazard due to fire and explosion.*

# Safety

EOS M 290

## 2.5 Safety warnings on the machine



### EMERGENCY STOP button

Sticker on the *EMERGENCY STOP* button on the front of the machine.



### Warning about hazardous electrical voltage

*Switch off main switch before opening the housing!*

Sticker on the switching cabinet door.



### Warning about hazardous electrical voltage

*Electrical components are live with main switch switched off!*

Sticker on the rear of the machine beside the *MAIN SWITCH*.



### Warning about hazardous laser radiation

*LASER RADIATION*

*DO NOT STARE INTO BEAM*

*LASER CLASS 2M*

*Max. output of laser radiation: 1 mW*

*Wavelength: 600 - 700 nm*

Sticker on the right on the exterior of the process chamber behind the process chamber door.



### Warning about hot surface

Sticker on the right on the exterior of the process chamber behind the process chamber door.



### Class 1 laser product

Sticker on the left trim panel on the rear of the machine.



### Classification

The machine has been classified in accordance with the standard  
EN 60825-1:2014

Safety of laser products

Part 1: Equipment classification and requirements.

Sticker on the left trim panel on the rear of the machine.

**Warning about flammable materials.**

No naked flames, fire, open sources of ignition and smoking forbidden.

Wear unpowdered, disposable nitrile protective gloves (comparable with EN ISO 374-1, type A) for protection against chemical hazards.

Wear safety glasses with side protection (comparable with EN 166).

Sticker on the top on the exterior of the process chamber behind the process chamber door.

**Wear a face mask (comparable with EN 143, filter category P3).**

Wear closed protective clothing made of flame-retardant material (comparable with EN ISO 11612).

Wear closed safety shoes with protection against ESD (comparable with EN IEC 61340-4-3 and EN ISO 20345, safety class S1).

Read and follow the Operating instructions.

Sticker on the top on the exterior of the process chamber behind the process chamber door.

## 2.6 Hazards and safety measures

The machine is built to the state-of-the-art and recognised safety rules. Nevertheless, hazards for life and limb can arise for the operators and maintenance personnel or third parties, or damage may be caused.

Read and observe the following safety instructions before you work on the machine.

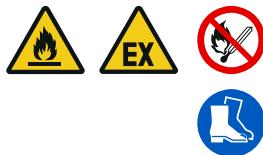
General hazards and safety measures that apply to the entire Operating instructions are described in this section.



You will find information on hazards that may arise on the operation of accessories, as well as safety measures against these hazards in the *Components and accessories* manual.

### 2.6.1 Hazard due to fire and explosion

#### ⚠ WARNING



#### Highly flammable metal powder/metal condensate, explosive atmosphere!

Metal powders in category B and metal condensate are highly flammable.

Metal condensate can spontaneously ignite if swirled up.

An explosive atmosphere can be produced in combination with air by swirled up metal powder or metal condensate.

- Keep sources of ignition away from the working area.
- Avoid electrostatic charging:
  - Wear closed safety shoes with protection against ESD (comparable with EN IEC 61340-4-3 and EN ISO 20345, safety class S1).
  - Ensure that the anti-static mat in front of the machine is always connected to the machine via an equipotential bonding wire.
  - If the floor covering is not electrically conductive or anti-static: When operating the machine, always ensure you are standing on the anti-static mat in front of the machine.
  - Only use the Wet separator with the related electrically conductive original accessories available from EOS for cleaning up metal powder or metal condensate.
  - Do not use the round brush from the accessories for the Wet separator for cleaning up metal condensate, instead use the steel attachment pipe without an attachment or the steel crevice nozzle.
- Never operate the machine without the inert gas supply.
- Only operate the machine with the inert gas allowed for the related type of metal powder.
- Ensure the inert gas supply complies with the specification  
☞ *Installation Conditions* manual, section *Inert gas supply*.

- Follow the information on fire and explosion hazards in the latest *safety data sheet* for the metal powder used.
- Avoid swirling up metal powder or metal condensate.
- Do not shake off used protective clothing.
- Do not store highly flammable materials in the machine's working area or in the area where metal powder is handled.
- Only store metal powder in tightly sealed original bins.

**⚠ WARNING****Explosive atmosphere!**

A chemical reaction between metal powder or metal condensate containing aluminium and water will create an explosive atmosphere of hydrogen and air.

- Avoid contact between metal powder or metal condensate containing aluminium and water.
- Store metal powder containing aluminium in a dry, cool place in sealed original bins.

**⚠ WARNING****Explosive atmosphere!**

Titanium powder and titanium condensate can react exothermically in conjunction with nitrogen.

- On a material change, clean the Recirculating filter system and change the cartridge filters and the particle collecting bin in the pre-filter stage of the Recirculating filter system if there is titanium powder or titanium condensate in the Recirculating filter system and nitrogen is to be used as the inert gas after the material change.
- Only operate the machine with argon as the inert gas if you use titanium powder.

**⚠ WARNING****Exothermic reaction!**

Metal condensate containing aluminium can react exothermically in conjunction with metal condensate containing iron and oxygen.

Make sure that there is never metal condensate containing aluminium and metal condensate containing iron in the Recirculating filter system at the same time.

During a related material change, clean the Recirculating filter system and change the particle collecting bin.

# Safety

EOS M 290

## ⚠ WARNING



### Explosive rubbing alcohol!

While cleaning the window for the F-Theta module, rubbing alcohol vapours can form an explosive atmosphere in combination with air.

- Keep sources of ignition away from the working area.
- Avoid electrostatic charging.
- Do not smoke while working.
- Follow the information on hazards in the *safety data sheet* for the rubbing alcohol used.

## 2.6.2 Hazard while fire-fighting

Fire extinguishers for fire-fighting must be suitable for the related type of fire:

- For fighting metal powder fires of limited size, special fire extinguishers for metal fires (fire class D in accordance with EN 3 or equivalent) are suitable.
- For fighting electrical fires on the machine, CO<sub>2</sub> fire extinguishers are suitable.

## ⚠ WARNING



### Hazardous electrical voltage!

Extinguishing fires on an electrically live machine or electrically live accessory using electrically conductive extinguishing agents can result in an electric shock.

- Match the extinguishing medium and the extinguishing equipment to the general conditions on-site.
- During fire-fighting observe the locally applicable national regulations.

## ⚠ WARNING



### Flammable metal powder, highly flammable metal powder/metal condensate!

Metal powders in category A are flammable.

Metal powders in category B and metal condensate are highly flammable.

- To extinguish metal powder fires of limited size, use special fire extinguishers for metal fires (fire class D in accordance with EN 3 or equivalent).
- Place a special fire extinguisher for metal fires beside the machine  
☞ *Installation Conditions* manual, section *Installation plans - Machine*.
- Match the extinguishing equipment to the general local conditions.
- During fire-fighting observe the locally applicable national regulations.
- Note the fire-fighting measures in the *safety data sheets* for the metal powder used.



EOS recommends the provision of a special fire extinguisher for metal fires with a capacity of at least 12 kg.

**⚠ WARNING****Explosive atmosphere!**

Vacuum cleaning burning or glowing metal powder or metal condensate particles can result in a deflagration.

Never clean up burning or glowing particles.

**⚠ WARNING****Explosive atmosphere!**

A chemical reaction between burning metal powder or metal condensate and water can create an explosive atmosphere.

Do not extinguish a metal powder fire or a metal condensate fire using water or foam.

### 2.6.3 Hazard due to electrical power

**⚠ WARNING****Hazardous electrical voltage!**

Direct or indirect contact with electrically live parts can result in an electric shock.

- The switching cabinet is only allowed to be opened by an electrician.
- Prior to opening the switching cabinet, the *MAIN SWITCH* must be switched off.
- All work on the electrics is only allowed to be performed by an electrician.
- Prior to working on the electrics, unplug from the mains or isolate the power connection. The mains plug must be secured against plugging back in or the power connection secured against switching back on. If the power connection is disconnected from the electrical supply by an additional main switch as per UL-489, this switch must be secured against switching back on.
- Do not operate the machine with switching cabinet doors open.

**⚠ DANGER****Hazardous electrical voltage!**

If the mains cables or plugs are damaged, direct or indirect contact can result in an electric shock.

- Ensure that the mains cables to the machine and the accessories are not damaged by trolleys/vehicles passing over them, by crushing, pulling, etc.
- Do not touch mains cables or plugs if they are damaged.
- Secure the hazard area against physical contact and without delay contact authorised personnel who are able to eliminate the hazard.
- Do not operate the machine or the accessories with a damaged mains cable or damaged mains plug.

# Safety

EOS M 290



The electrical components are not protected against water spray.  
Appropriate safety precautions must be taken by the operating organisation.

## 2.6.4 Hazard due to electromagnetic effects

### NOTICE



High-frequency devices can interfere with the operation of the machine.

Do not operate any equipment that emits high-frequency radiation in the room where the machine is installed.

## 2.6.5 Hazard due to laser radiation

If used correctly, the machine corresponds to a class 1 laser device.

### ⚠ WARNING



#### Invisible class 4 laser radiation!

During the building process, class 4 laser radiation is emitted vertically downward from the process chamber roof. The irradiation of eyes or the skin by direct or scattered laser radiation of this class can cause severe injuries.

For protection against laser radiation the process chamber door is locked during the building process and cannot be opened.

Regularly check the function of the process chamber door lock as per the requirements in the inspection and servicing schedule

☞ *8.3.10 Checking correct function of the safety circuit.*

The laser is equipped with a class 2M alignment laser for positioning measuring instruments during the commissioning and maintenance of the machine by EOS service personnel.

### ⚠ CAUTION



#### Visible class 2M laser radiation!

While the alignment laser is in operation, class 2M laser radiation is emitted vertically downward from the process chamber roof.

Looking into this laser beam can cause temporary loss of vision.

- Do not look into the laser beam.
- Do not directly view the laser beam using optical instruments.

## 2.6.6 Mechanical hazard

### ⚠ CAUTION



#### Broken optical components!

Broken optical components can have very sharp corners and edges. Physical contact can result in lacerations.

- Handle broken pieces with great care.
- Wear strong rubber gloves when disposing of the waste.

### ⚠ CAUTION



#### Falling building platform!

On removal from the machine, the building platform with the sintered parts may fall and crush the feet. Depending on the building platform used and the size/quantity of sintered parts, the weight can be up to 50 kg.

While setting down the building platform, hands and arms may be crushed between the building platform to be set down and the surface.

- Remove and transport the building platform with the sintered parts using the Lifting truck or the Electrical Lifting truck if necessary.
- Wear closed safety shoes with protection against ESD (comparable with EN IEC 61340-4-3 and EN ISO 20345, safety class S1).
- Do not place hands and arms in the hazard area.

### ⚠ CAUTION



#### Heavy building platform!

Depending on the building platform used and the size/quantity of sintered parts, it can weigh up to 50 kg. Fitting and removing the building platform can place an excessive load on the back. Fingers and hands may be crushed on fitting and removing the building platform.

- To fit or remove the building platform use the Lifting truck or the Electrical Lifting truck, if necessary.
- Do not reach into the hazard area.

### ⚠ CAUTION

#### Open ends of compressed air hoses!

Open ends of compressed air hoses under pressure can move in an uncontrolled manner and cause injuries.

- Always depressurise the machine prior to starting work on compressed air supply.
- Ensure connecting cables are not damaged by trolleys/vehicles passing over them, by crushing, dragging, or similar.

# Safety

EOS M 290

## 2.6.7 Thermal hazard

### ⚠ CAUTION



### Hot parts, machine parts!

The parts and the building platform are hot during the building process, immediately after the end of the building process, as well as during the cooling period. Physical contact can result in burns.

Wear heat-resistant gloves (comparable with EN 407, marking 413X4X, with cuffs) in case of physical contact with parts and the building platform.

## 2.6.8 Chemical hazard

### 2.6.8.1 Metal powder

#### ⚠ WARNING



#### Harmful metal powder/metal condensate!

Skin and eye contact with metal powder or metal condensate, as well as inhaling and swallowing these substances can be harmful to the health.

- Wear personal protective equipment while operating, troubleshooting and maintaining the machine, as well as while handling metal powder  
☞ *2.7 Personal protective equipment*.
- Follow the information on hazards for the health in the latest *safety data sheet* for the metal powder used.
- Refer to the *safety data sheet* for information on the reactivity of the metal powder used with other substances.  
Avoid contact of the metal powder with these substances.
- Do not eat, drink, take snuff or smoke when working.
- After contact with metal powder, thoroughly clean skin with soap and water.
- Avoid swirling up metal powder.
- Ensure that metal powder does not build up in the room where the machine is installed or storage rooms.
- Clean up deposits of metal powder or metal condensate using the Wet separator.
- Collect metal powder waste in closed, non-flammable bins.
- Store metal powder in a dry, cool place in sealed original bins.
- Only transport metal powder within the production facility in closed bins.
- Make sure there are no other persons in the working area while you are undertaking work on the machine involving contact with metal powder.



EOS recommends setting up a wash basin with eye washing facility in the vicinity of the working area.

### 2.6.8.2 Rubbing alcohol

**⚠ CAUTION****Harmful rubbing alcohol!**

Skin and eye contact with rubbing alcohol, as well as inhaling and swallowing rubbing alcohol while cleaning parts of the machine can be harmful to the health.

Follow the information on hazards for the health in the *safety data sheet* for the rubbing alcohol used.

### 2.6.8.3 Inert gas

**⚠ WARNING****Harmful inert gas!**

The supply of the machine with inert gas from a supply system in the building or gas cylinders can reduce the oxygen content in the air in the room where the machine is installed. This situation can result in the loss of consciousness and fatality due to asphyxiation.

- The waste gas from the machine must be discharged safely to the outside, either directly or using an internal waste air extraction system in the building.
- The waste gas from the machine is not allowed to be fed back to the room where the machine is installed.
- The pipework must be equipped with a non-return flap so that waste gas cannot flow back.
- There must not be any build-up of waste gas in the pipework.
- If the waste gas is fed to the outside using an internal waste air extraction system in the building, it must be ensured that the waste gas is completely and permanently drawn out of the machine.
- Ensure the room where the machine is installed is adequately ventilated.

# Safety

EOS M 290

## 2.6.8.4 Argon

### DANGER

#### Harmful argon!

Escaping argon is heavier than air. It can collect in closed rooms, particularly on the floor or in lower-lying areas. A high argon concentration in air for breathing can result in fatality due to asphyxiation. Symptoms can be the loss of the ability to move and consciousness. The victim does not notice that he/she is asphyxiating.

- The waste gas from the machine must be discharged safely to the outside.
- Ensure the room where the machine is installed is adequately ventilated.

First aid on inhaling:

- Take the injured person out into the fresh air using a respirator independent of the ambient air.
- Keep the person injured warm and quiet.
- Give injured person artificial respiration in case of respiratory arrest.
- Call a doctor.

## 2.7 Personal protective equipment



Personal protective equipment that meets the following minimum requirements is necessary to operate the machine.

You will find information on personal protective equipment when operating accessories in the *Accessories and Options* manual.

### WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment for all work during which you will come into contact with metal powder:

- Disposable protective gloves (comparable with EN ISO 374-1, type A)
- Safety glasses with side protection (comparable with EN 166)
- Face mask (comparable with EN 143, filter category P3)
- Closed protective clothing made of flame-retardant material (comparable with EN ISO 11612)
- Closed safety shoes with protection against ESD (comparable with EN IEC 61340-4-3 and EN ISO 20345, safety class S1).



You will find information on personal protective equipment on the operation of accessories in the *Components and accessories* manual.

## 2.8 Disposal

The responsibility for the disposal of the machine and the materials used lies with the organisation operating the machine.

### 2.8.1 Machine

#### NOTICE

On the disposal of the machine and the disposal of oils, greases and other substances used to operate the machine, the environment must not be polluted.

On the disposal of the machine, follow the locally applicable national regulations on the protection of the environment and on recycling.

On the disposal of the machine, follow the information and instructions in the Installation Conditions

➤ *Installation Conditions* manual, section *Safety - Disposal*.

EOS recommends having the machine disposed of by a specialist disposal organisation.

The following must be disposed of:

➤ Components of the machine:

- Mechanical components
- Electrical components
- Electronic components
- Optical components
- Components made of plastic

➤ Oils, greases and other substances used for the operation of the machine

- Lubricant
- Rubbing alcohol.

# Safety

EOS M 290

## 2.8.2 Materials

### ⚠ WARNING



#### Highly flammable metal condensate!

Metal condensate is highly flammable.

Metal condensate can spontaneously ignite if swirled up.

- Store passivated particle collecting bins for at least 24 hours in a place suitable for hazardous goods before disposal. Pay attention to the storage conditions  
☞ Components and accessories manual, section *Technical data*.
- Transport passivated particle collecting bin upright and secure the bin against tipping and falling over.
- Passivated particle collecting bins are not allowed to be thrown or allowed to drop.
- Do not shake out passivated particle collecting bins.
- Inform your specialist waste disposal organisation about the substances in the bins.

### NOTICE

Metal powder and metal condensate must not enter mains drains, surface water or soil.

Dispose of metal powder, elements that are soiled with metal powder and filters clogged with metal condensate in accordance with the locally applicable national regulations

☞ Safety data sheet for the metal powder used.



3

---

**Technical data**



### 3.1 Laser and optics

- Laser type: Yb (Ytterbium) fibre laser
  - Nominal power: 400 W
  - Power in the building area: 370 W
  - Wavelength: 1060 - 1100 nm
  - Wavelength of the pumping beam: 960 - 980 nm
- Alignment laser
  - Wavelength: 600 - 700 nm
  - Power output: 1 mW
- Laser beam steering with beam expander optics and flat-field lens
  - Focal length of the F-Theta module: 410 mm
  - Diameter of the focussed beam: approx. 0.1 mm
  - Divergence (solid angle): approx. 20 - 30 µrad
- Laser beam deflection
  - High speed rotating mirror deflection with precision galvanometer scanners with temperature compensation, integrated servo electronics and interface electronics, digital data transmission from control computer and digital signal processor
  - Exposure speed: ≤ 7000 mm/s

### 3.2 Mechanical axes, co-ordinates

#### 3.2.1 Building volume

- Building volume (W x D x H): 250 x 250 x 325 mm  
(height incl. building platform)

#### 3.2.2 Recoating system

- Travel: ≥ 550 mm
- Travel speed: 40 - 500 mm/s
- Recoating speed: process-dependent

# Technical data

EOS M 290

## 3.2.3 Elevator system

➤ Building system	
- Size of the building duct:	255 x 255 mm
- Building stroke incl. building platform:	≥ 325 mm
- Capacity incl. building platform:	approx. 0.021 m <sup>3</sup>
- Travel speed:	≤ 5 mm/s
- Position repeatability:	≤ ± 0.005 mm
- Minimum layer thickness:	0.02 mm
➤ Dispenser system	
- Size of the dispenser duct:	255 x 230 mm
- Elevating gear travel:	≥ 440 mm
- Capacity:	approx. 0.026 m <sup>3</sup>
- Travel speed:	≤ 5 mm/s
- Position repeatability:	≤ ± 0.2 mm
➤ Collector system	
- Size of the dispenser duct:	255 x 130 mm
- Elevating gear travel:	≥ 390 mm
- Capacity:	approx. 0.013 m <sup>3</sup>
- Travel speed (load-dependent):	20 - 27 mm/s

## 3.3 Building platform heating

### 3.3.1 Temperature regulation

- Resistance temperature sensor (PT-100 4-wire sensor)
- Electronic temperature controller with
  - Sensor characteristic linearisation
  - Sensor break detection.

### 3.3.2 Heater element

- Max. heating power: 950 W at 230 V
- Operating temperature (depending on the type of metal powder): 35 - 200 °C

### 3.4 Argon supply

Argon consumption

- Max. argon consumption on starting the building process: 3 m<sup>3</sup>
- Average argon consumption during building: approx. 0.6 m<sup>3</sup>/h

### 3.5 Noise emission

- Noise pressure level emissions from the machine: < 70 dB(A)

### 3.6 Components and accessories

You will find the technical data on the components and accessories in the *Components and accessories* manual.

## Technical data

EOS M 290

# 4

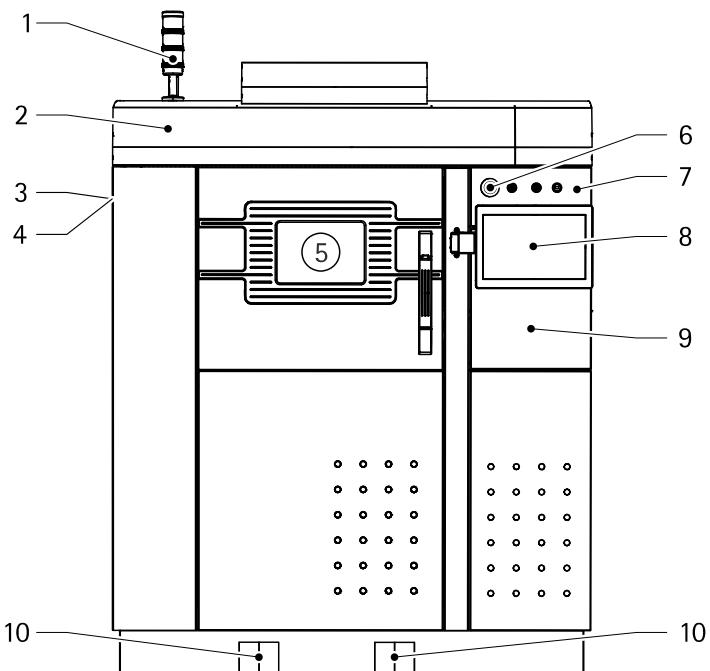
---

**Layout and function**



## 4.1 Layout

### 4.1.1 Front of machine

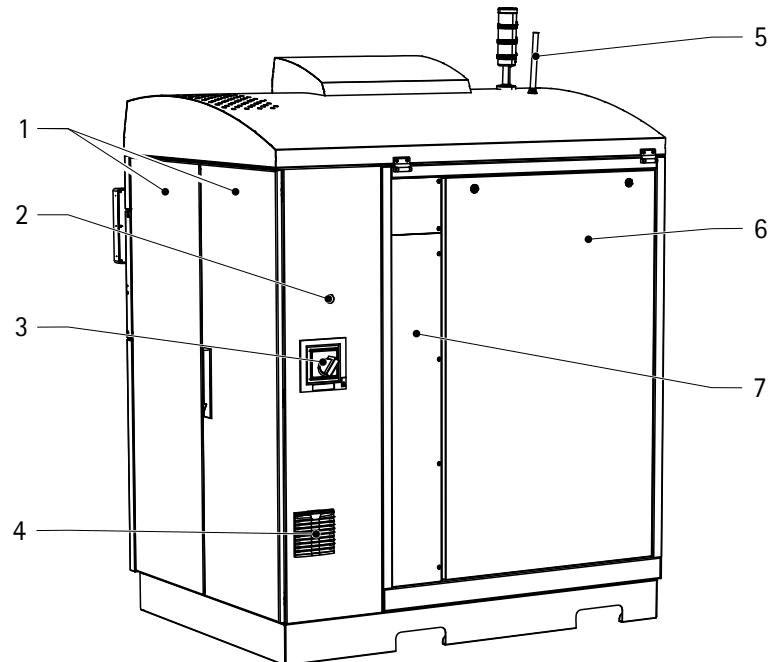


- |  |                                      |
|--|--------------------------------------|
| 1 Indicator  | 6 EMERGENCY STOP button              |
| 2 Optics cover<br>(only for EOS service personnel) | 7 Anti-static wrist strap connection |
| 3 Equipotential bonding wire connection            | 8 Monitor (pivots out)               |
| 4 Anti-static wrist strap connection               | 9 Pivoting shelf                     |
| 5 Process chamber door                             | 10 Lifting truck opening             |

# Layout and function

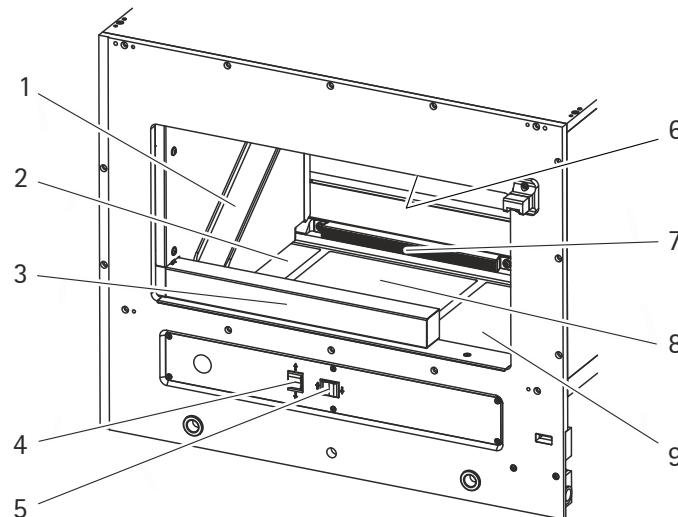
EOS M 290

## 4.1.2 Rear of machine



- |   |  |   |   |
|---|--|---|---|
| 1 | Switching cabinet doors (left / right)   | 5 | Temperature & atmospheric humidity sensor |
| 2 | <i>ACKNOWLEDGE EMERGENCY STOP</i> button | 6 | Service cover                             |
| 3 | <i>MAIN SWITCH</i>                       | 7 | Machine connections service cover         |
| 4 | Switching cabinet ventilation cover      |   |   |

#### 4.1.3 Process chamber



- |   |                                 |   |                     |
|---|---------------------------------|---|---------------------|
| 1 | Recoater                        | 6 | Top inlet nozzle    |
| 2 | Collector platform              | 7 | Bottom inlet nozzle |
| 3 | Extraction nozzle               | 8 | Building platform   |
| 4 | ADJUSTMENT Y-AXIS rocker switch | 9 | Dispenser platform  |
| 5 | ADJUSTMENT X-AXIS rocker switch |   |                     |

#### 4.1.4 Recoating system

The recoating system comprises

- Linear axis with servomotor
- Recoater with steel blade, ceramic blade, Soft Recoating (NBR- or silicone scraper lip) or brush recoater.

The recoater is in the process chamber.

#### 4.1.5 Elevator system

The elevator system is behind the front cover and comprises the sub-systems

- Building system
- Dispenser system
- Collector system.

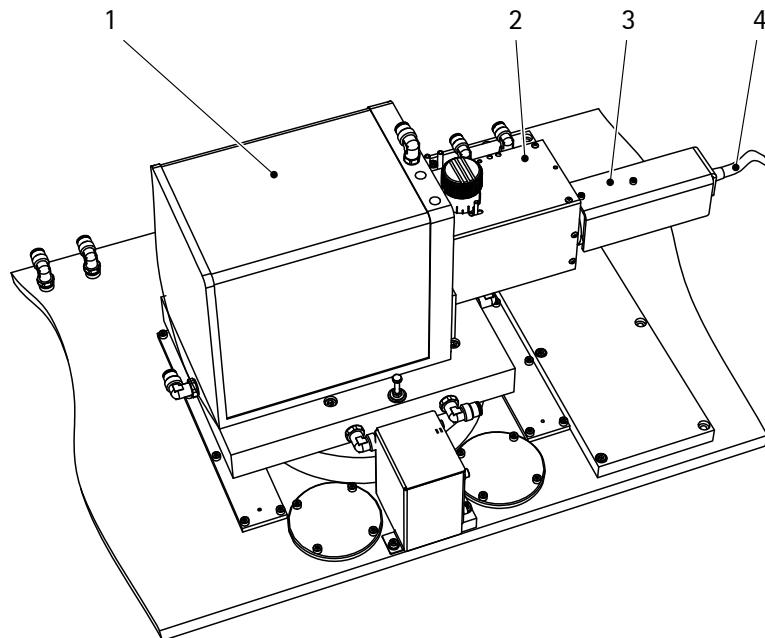
Each of these sub-systems comprises a platform that is mounted in a duct with a linear guide.

# Layout and function

EOS M 290

## 4.1.6 Optical system

The optical system is under the optics cover.



1 Scanner with protective covers

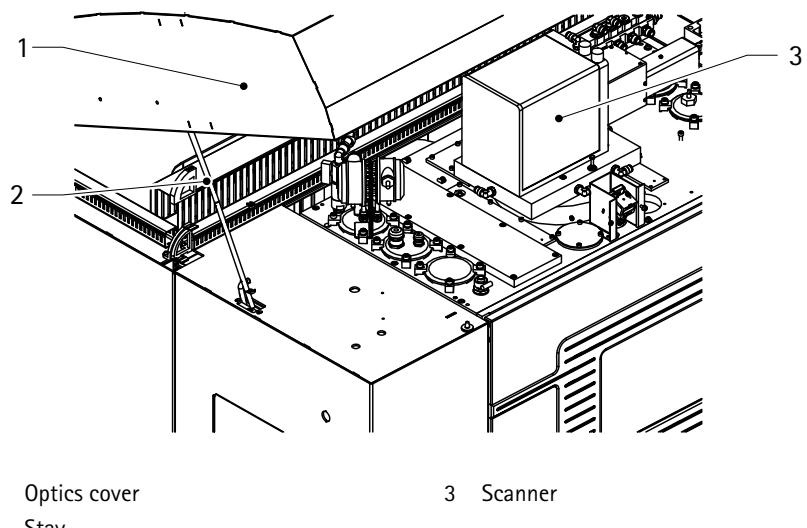
2 Beam expander optics

3 Collimator with holder and protective cover

4 Optical fibre

#### 4.1.6.1 Adjustment of the beam expander optics

The machine has adjustable beam expander optics using which the intensity of the radiation from the laser can be adjusted. The *BEAM EXPANDER ADJUSTMENT* knob with which the operator can make adjustments as necessary is on the beam expander optics under the optics cover.



# Layout and function

EOS M 290

## 4.2 Function description

### 4.2.1 Physical principle

In a few hours the machine produces parts in a single work step by melting fine metal powders using a laser beam

- with geometry of almost any complexity
- with final strength that can be used immediately
- without the usage of tooling.

The basis for these parts is formed by CAD data with three-dimensional geometries from which metal parts are built directly on the machine.

### 4.2.2 Building process

Thin layers of powder are applied to a building platform and exposed using a laser in the areas to be solidified.

During the exposure of the first layer, a metallurgical joint is generated between the building platform and the solidified metal powder. In this way the part produced is bonded to the building platform directly, or using supporting structures.

The building process is a cyclic process in which a solid part is produced by continuous repetition of individual process steps:

- Lower building platform:  
The building platform is lowered by one layer thickness.
- Move recoater:  
The recoater moves from the left end position to the right end position.
- Provision of metal powder:  
The dispenser platform is raised and in this way provides a defined amount of metal powder for the recoating.
- Recoat:  
The recoater moves from the right end position to the left end position. During this movement the metal powder protruding from the dispenser duct is distributed as a thin layer over the building area by the recoater. Excess powder falls into the collector duct.
- Exposure:  
Part contour and interior areas are exposed.

To optimise the building process, individual process steps can be added, changed or the order changed.

## 4.3 Main components

### 4.3.1 Process chamber

The laser sintering process takes place in the process chamber.

During the building process there is an inert gas atmosphere in the process chamber; this atmosphere is monitored by sensors. In the inert gas cylinder, injection nozzles produce a continuous flow of inert gas that removes process by-products from the inert gas atmosphere that may interfere with the building process. The inert gas is extracted via an extraction nozzle and fed to the recirculating filter unit for purification.

The high purity of the inert gas atmosphere prevents the metal powder in the process chamber oxidising due to atmospheric oxygen during the melting process and prevents the production of undesirable process products.

The process chamber door cannot be opened during the building process for safety reasons and to ensure that the process is reliable.

The laser beam necessary for the laser sintering process enters the process chamber at the top through a protective glass window. The protective glass window seals the laser entry aperture so that it is gas-tight and in this way protects the F-Theta module above the protective glass window. A lens clearing nozzle guides a continuous flow of inert gas over the protective glass window. This flow of inert gas keeps the protective glass window free of deposits that could impair process reliability during the building process.

#### 4.3.1.1 Recoater

A stepper motor moves the recoater horizontally over a building plate from one side to the other. The metal powder is applied evenly to the building area by moving the recoater unit from front to back.

#### 4.3.1.2 Elevator system

The building, dispenser and collector platforms are raised and lowered using spindles.

➤ Building system:

During the building process, the building system lowers the building platform by one layer thickness after each exposure. When the building process is complete, the operator can move the building platform with the sintered part to the removal position.

➤ Dispenser system:

The dispenser platform conveys the metal powder required for the building process from the dispenser duct to the process chamber.

# Layout and function

EOS M 290

## ➤ Collector system:

Excess metal powder falls onto the collector platform in the collector duct. When the building process is complete, the operator can raise the collector platform and push the excess metal powder into the dispenser duct for re-use.

The level in the collector system is displayed in the machine software status window.

### 4.3.1.3 Building platform

The parts are built on a removable building platform. The building platform comprises a flat metal plate that is fastened to the building platform carrier prior to the start of the building process.

## 4.3.2 Optics chamber

On its way to the process chamber, the laser beam passes under an optics cover bolted to the machine frame.

### 4.3.2.1 Collimator

The optical fibre from the laser ends in a collimator. The collimator is fastened to the beam expander optics with a holder and is protected with a protective cover.

### 4.3.2.2 Beam expander optics

The beam expander optics shape the laser beam arriving from the collimator and define the way the light reaches the scanner and the related focusing capability.

#### 4.3.2.3 Scanner

The scanner has a significant impact on the part accuracy. It guides the laser beam arriving from the beam expander optics along a defined path over the building area using two mirrors operated by galvanometers.

An integrated auto-calibration feature (home-in function) checks the mirror positions and regulates the positions if necessary. In this way offset drift and gain drift are significantly reduced.

The laser beam is focussed on the building area using an F-Theta module.

### 4.4 Parameter sets

For the production of parts with different requirement profiles, special parameter sets with qualified material and process properties are available. They are matched to the materials and correspondingly optimised.

#### 4.4.1 Exposure types for the parameter sets

To provide different properties within the parameter sets, the parts can be allocated different optimised exposure types. These can be allocated automatically or manually to one or more parts

☞ *EOSPRINT manual, section Exposure types.*

#### 4.4.2 Parameter editor

Using the *Parameter editor* module, new, custom exposure types with custom parameters can be prepared from existing basic exposure types.

These parameters in the *Parameter editor* are pre-defined such that it is possible to build parts on which there are no special requirements. By deriving a new, custom exposure type and changing the parameters, special requirements for applications and parts can be met.

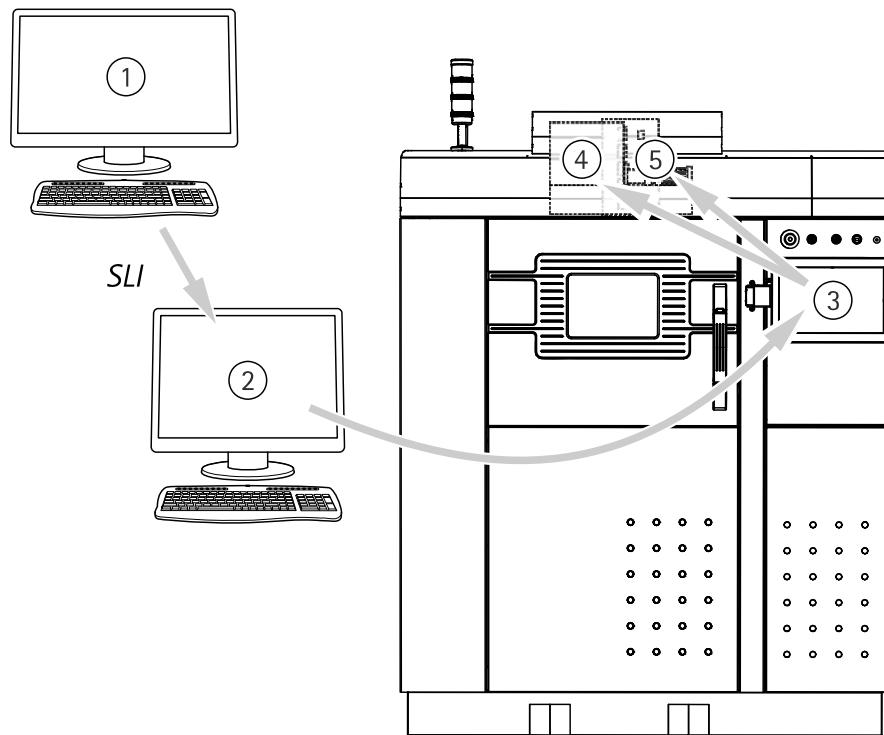
The *Parameter editor* module is suitable for special requirements on applications, for parts with unusual geometries, as well as for applications from research and development in the area of laser sintering.

# Layout and function

EOS M 290

## 4.5 Data flow

### 4.5.1 Overview



- 1 CAD data preparation
- 2 Generation of building task
- 3 Machine computer

- 4 Laser deflection head
- 5 Laser

### 4.5.2 Data preparation

To prepare the geometry data, CAD data in the STL standard format are used. The part described by the STL file must be sliced into layers.

The STL data are prepared using software such as *EOS Build Processor*, *EOS RP-Tools* or other appropriate software:

- Support generation
- Data format conversion
- Slicer
- SLI-Viewer
- Skin-core generation.

The result is/are one or more SLI files.

#### 4.5.3 Job preparation

In the *EOSPRINT* software, one or more SLI files are loaded into a job file. Using transformation, the parts can be positioned such that the building chamber is optimally utilised and as a result the building time and the metal powder consumption minimised. By allocating exposure parameters, the properties of the parts, e.g. surface finish quality or part strength can be changed to suit the requirements of your application. The job file is saved after entering all data.

#### 4.5.4 Building task generation

To be able to start the building process, the job file saved must be converted into a building task and transferred to the machine. For this purpose, the *EOSPRINT* software calculates the exposure data and sends this data in the form of a building task over the network to the machine's controller. The required building task can be selected and started on the machine's monitor in the list of building tasks.

# Layout and function

EOS M 290

## 4.6 Safety concept

The machine and the accessories are state-of-the-art in relation to the prevention of mechanical, electrical, thermal and chemical hazards, as well as in relation to the protection against invisible laser radiation.

During the operation of the machine the following protective circuits protect the operator against possible hazards:

- Emergency stop circuit
- Safety circuit for protecting the process chamber door
- Process chamber oxygen safety circuit
- Oxygen safety circuit for the Recirculating filter system.

### 4.6.1 Emergency stop circuit

#### WARNING



#### Hazardous electrical voltage!

The machine is not electrically isolated by triggering the emergency stop circuit. The *MAIN SWITCH* remains in the *ON* position.

To isolate the machine electrically, switch the *MAIN SWITCH* to *OFF*.

The emergency stop circuit is activated by pressing the *EMERGENCY STOP* button on the machine.

If the emergency stop circuit is triggered

- the recoating and elevator system axis movements are stopped
- the laser is shut down
- building platform heating, compressed air supply and cooling system (in the standard installation an EOS Cooling system) are shut down
- the lock on the process chamber door is released
- the operation of the Recirculating filter system is stopped
- an error message appears on the monitor.

#### 4.6.2 Process chamber door safety circuit

The safety circuit for protecting the process chamber door is triggered by opening the process chamber door.

If the safety circuit is triggered

- the recoating and elevator system axis movements are stopped
- the laser is shut down
- the supply of inert gas is interrupted
- an error message appears on the monitor.

After starting the building process, the process chamber door is locked for safety reasons and cannot be opened.

#### 4.6.3 Process chamber oxygen safety circuit

The oxygen safety circuit is a safety precaution against

- metal powder and metal condensate fires
- the formation of an explosive atmosphere by swirled up metal powder in combination with air.

The oxygen safety circuit is triggered as soon as the oxygen content in the process chamber exceeds the threshold of 2.5 %.

If the process chamber oxygen safety circuit is triggered

- the recoating and elevator system axis movements are stopped
- the laser is shut down.
- an error message appears on the monitor during the building process.

#### 4.6.4 Recirculating filter system oxygen safety circuit

The oxygen safety circuit for the Recirculating filter system is tripped as soon as the oxygen content in the Recirculating filter system exceeds the threshold of 2.5 %.

If the Recirculating filter system oxygen safety circuit is triggered

- the operation of the Recirculating filter system is stopped and the fan switched off
- the pinch valves are closed
- an error message appears on the monitor during the building process.

## Layout and function

EOS M 290

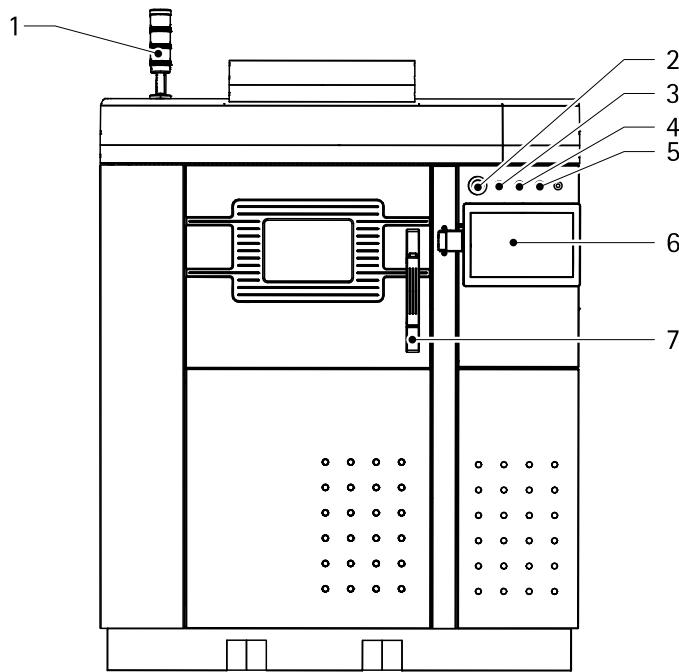
---

## Controls and indications



## 5.1 Controls and indications on the machine

### 5.1.1 Front of machine



- |                               |                               |
|-------------------------------|-------------------------------|
| 1 Indicator                   | 5 SERVICE network connection  |
| 2 EMERGENCY STOP button       | 6 Monitor                     |
| 3 SERVICE key-operated switch | 7 Process chamber door handle |
| 4 INERT GAS selector switch   |                               |

#### Indicator

The indicator indicates messages on the machine.

- Red flashing,  
possibly an acoustic signal: Critical error that must be acknowledged
- Red: Critical error
- Yellow flashing: Warning that must be acknowledged
- Green, yellow flashing: Information that must be acknowledged
- Green: Building process in progress

#### EMERGENCY STOP button

Pressing the *EMERGENCY STOP* button triggers the emergency stop circuit.

#### SERVICE key-operated switch

The SERVICE key-operated switch must be switched off for the normal operation of the machine (key removed).

#### INERT GAS selector switch (key-operated switch)

Confirms the inert gas selection stipulated by loading the building task.

# Controls and indications

EOS M 290

## SERVICE network connection

The *SERVICE* network connection is used only for service activities undertaken by trained EOS service personnel and connects a computer to the internal machine network.

## Monitor

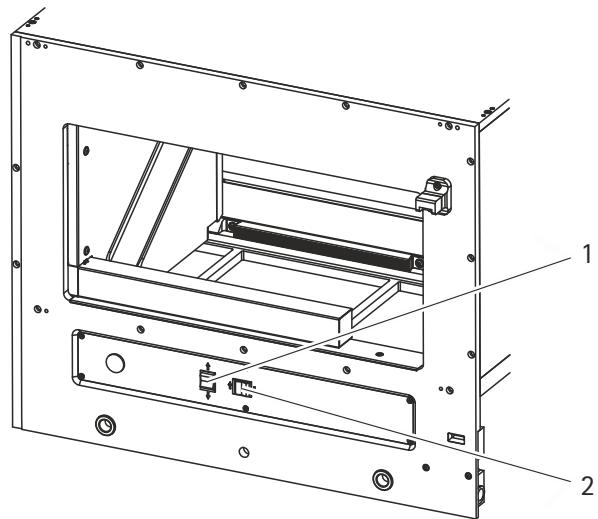
The machine is operated via the touch-sensitive monitor

☞ [5.2 Controls and indications on the monitor.](#)

## Process chamber door handle

Opens, closes and locks the process chamber door.

### 5.1.2 Building platform adjusting panel



1 ADJUSTMENT Y-AXIS rocker switch

2 ADJUSTMENT X-AXIS rocker switch

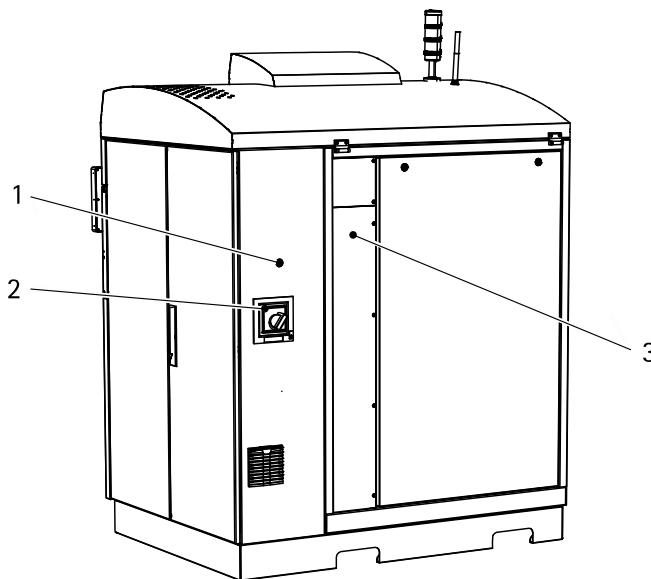
#### ADJUSTMENT Y-AXIS rocker switch

- Up  
Raises the front left of the building platform.
- Down  
Lowers the front left of the building platform.

#### ADJUSTMENT X-AXIS rocker switch

- Left  
Raises the middle right of the building platform.
- Right  
Lowers the middle right of the building platform.

### 5.1.3 Rear of machine



- 1 ACKNOWLEDGE EMERGENCY STOP button  
2 MAIN SWITCH  
3 Network connection

#### ACKNOWLEDGE EMERGENCY STOP button

The *ACKNOWLEDGE EMERGENCY STOP* button enables the emergency stop circuit in hardware after an emergency stop.

Illuminates if the emergency stop is enabled.

Goes out as soon as the emergency stop has been activated.

#### MAIN SWITCH

The *MAIN SWITCH* switches on and off the supply of power to the machine.

#### WARNING



#### Hazardous electrical voltage!

Direct or indirect contact with electrically live parts can result in an electric shock.

- The switching cabinet is only allowed to be opened by an electrician. Prior to opening the switching cabinet, the *MAIN SWITCH* must be switched off.
- All work on the electrics is only allowed to be performed by an electrician. Prior to working on the electrics, unplug from the mains or isolate the power connection.
- Never operate the machine with the switching cabinet door open.

#### Network connection

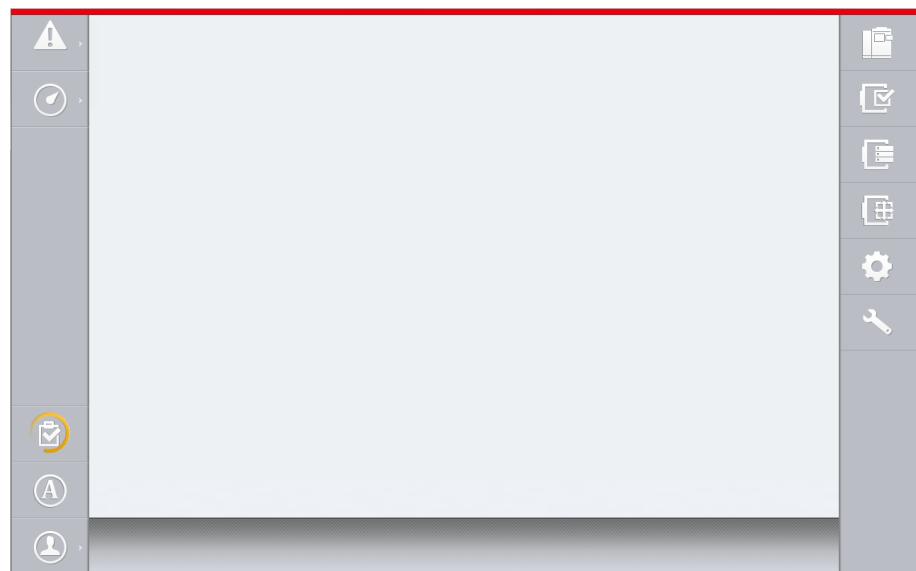
Connection of the machine to the customer's network.

# Controls and indications

EOS M 290

## 5.2 Controls and indications on the monitor

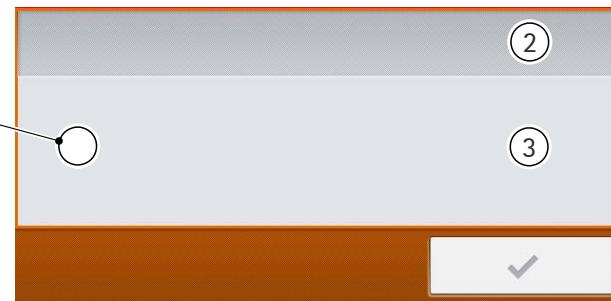
### 5.2.1 Main monitor



The machine is operated using a touch-sensitive monitor that contains all the indications and buttons necessary for the operation of the machine.

The indications on the screen provide continuous information on the actual state of the system.

### 5.2.2 Dialog box



1 Dialog box text

2 Dialog box name

3 Dialog box description



#### OK button

Accepts the action described in the dialog box text and closes the window.



Depending on the nature of the content, the window is displayed in different colours.

### 5.2.3 Buttons

Buttons are activated by gently touching the monitor with your finger.

Buttons activated by touching are displayed briefly with an orange border.

#### 5.2.3.1 Buttons and their significance

The way in which the buttons are displayed provides a range of information to the operator.



Buttons not activated

Buttons not activated that trigger an immediate action on the machine.



Activated buttons

Buttons that have been activated.

Some buttons remain active after touching, others only remain active as long as they are touched.



Inactive buttons

Buttons that are inactive, i.e. they have no effect if touched.

## Controls and indications

EOS M 290

- Status box not activated  
Status boxes not activated indicate an action or option on the machine that is not activated.
- Activated status box  
Activated status boxes indicate that an action or option on the machine has been activated.
-  Selector switch  
Buttons that change between two options on switching.
-  Field  
If the field is touched a data entry window with keyboard appears in which the text can be entered.

### 5.2.4 Screen layout



- |                             |                                     |
|-----------------------------|-------------------------------------|
| 1 <b>Messages</b> button    | 6 <b>Login / Change user</b> button |
| 2 <b>Dashboard</b> button   | 7 Action bar                        |
| 3 Status bar                | 8 Navigation bar                    |
| 4 <b>Status info</b> button | 9 Workspace                         |
| 5 <b>Text / Icon</b> button |                                     |

### 5.2.4.1 Messages workspace



#### Messages button

Opens the *Messages* workspace in which error messages, warnings and notes are listed sorted in ascending order by time of occurrence.

There are different types of messages:



##### ➤ Error message

A message that can result in a state that can cause the interruption of the building process.



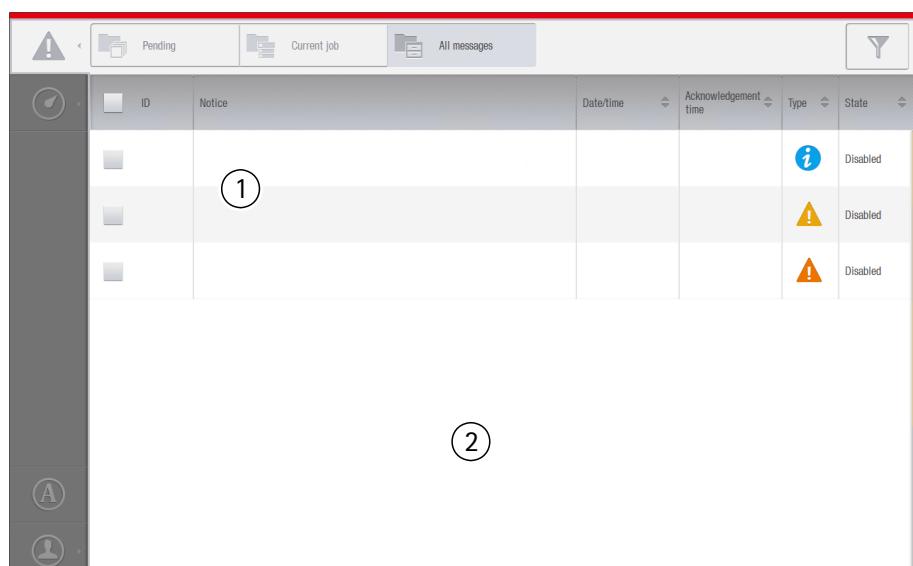
##### ➤ Warning

A message that can result in a state that can cause a degradation in part quality.



##### ➤ Notice

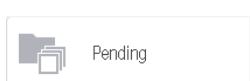
A message that provides information on a state or a state-changing process.



ID	Notice	Date/time	Acknowledgement time	Type	State
					Disabled
					Disabled
					Disabled

1 Message

2 Messages workspace



#### Pending button

Filters the display for active error messages, warnings and notes.

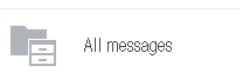


#### Current job button

Filters the display for error messages, warnings and notes for the current building task.

## Controls and indications

EOS M 290



**All messages** button

Filters the display for all archived and active error messages, warnings and notes.



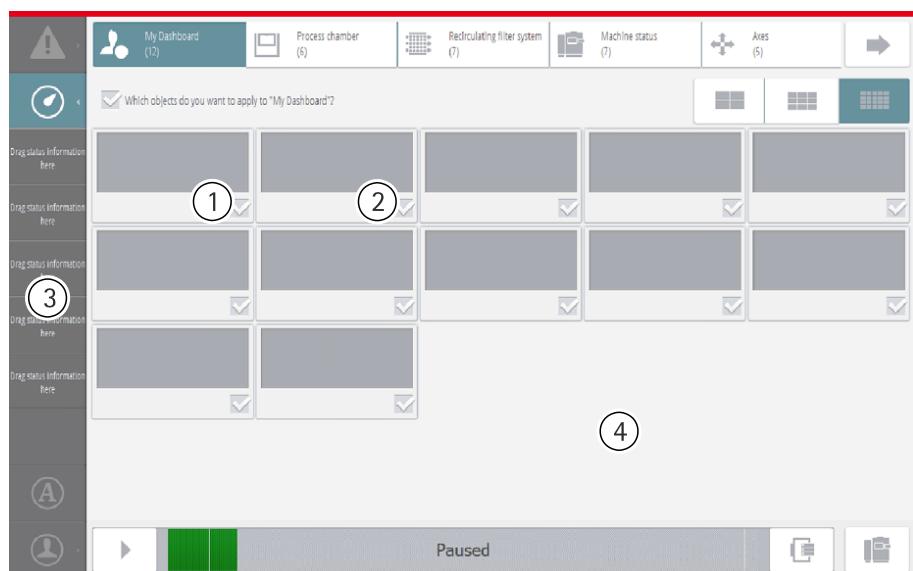
**Activate / Deactivate filter** button

Activates / deactivates the *filter* dialog box using which the display can be filtered by ID, Notice, Date/Time, Acknowledgement or Type.

### 5.2.4.2 Dashboard workspace

**Dashboard button**

Opens the *Dashboard* workspace in which process monitoring information, e.g. the temperature of the building platform or the oxygen content in the process chamber, can be opened.



1 Status box (not selected)

2 Status box (selected)

3 Status bar

4 *Dashboard* workspace

Touch the check box for the related status box to copy it to the *My Dashboard* tab for the specific user profile. This status box can be removed again by clearing the check box on the *My Dashboard* tab.

Of all the items of process monitoring status information, up to five items of status information can be dragged to the status bar using Drag and Drop.

These items of information are always visible on the screen independent of which workspace is active.

These items of status information can be removed again from the status bar by dragging them to the open *Dashboard* workspace.

**4 boxes per page** button

Shows 4 items of process monitoring status information per page.

**9 boxes per page** button

Shows 9 items of process monitoring status information per page.

**20 boxes per page** button

Shows 20 items of process monitoring status information per page.

# Controls and indications

EOS M 290

## 5.2.4.3 Status bar

Indicates the status information selected in the *Dashboard* workspace. The status bar is always present on the screen, independent of which workspace is active.

## 5.2.4.4 Status information



### Establish readiness for building button

Opens the *Establish readiness for building* window via which the values necessary to start the building process, e.g. oxygen concentration in the machine, are displayed.

Nominal values are displayed in green. Actual values are displayed in brown.

The *Establish readiness for building* window can only be opened if a building task has been started or the **Establish readiness for building** button is active.



1 *Establish readiness for building* window



### Building platform temperature

Indicates the nominal temperature and the actual temperature of the building platform.



### Oxygen concentration upper process station top

Indicates nominal concentration and the actual oxygen concentration in the process chamber.

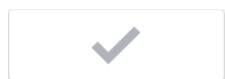


### Oxygen concentration recirculating filter system

Indicates nominal concentration and the actual oxygen concentration in the Recirculating filter system.

**Turbine control nominal pressure**

Indicates the nominal and actual differential pressure inside the Recirculating filter system.

**OK button**

Closes the *Establish readiness for building* window.

**Stop button (only automatically establish process conditions)**

Stops the establishment of readiness for building.

#### 5.2.4.5 Text / Icon



Changes the display of the buttons in the user interface between **Icon** and **Text** display.

On display as **Icon** all buttons in the user interface are displayed with symbols.

On display as **Text** all buttons in the user interface are displayed with text.

#### 5.2.4.6 Login / Change user



Opens the *Login / Change user* dialog box or the machine computer can be restarted. An operator profile can be logged in, logged out or changed.

**Restart button**

Restarts the machine computer.

**Lock screen button**

Locks the touch-sensitive screen.

**User management button**

Opens the *User management* window for logging in and logging out a user profile on the machine.

**Services & applications button**

Opens the *Services & applications* window that contains information on the software version installed in the machine computer.

#### 5.2.4.7 Action bar

The action bar is always present on the screen, independent of which workspace is active and permits quick access to elementary functions depending on the workspace open.

## Controls and indications

EOS M 290

### 5.2.4.8 Navigation bar

The navigation bar is always present on the screen, independent of which workspace is active and permits access to the elementary machine functions.



**Home** button  
Opens the *Home* workspace.



**Wizards** button  
Opens the *Wizards* workspace.



**Building tasks** button  
Opens the *Building tasks* workspace.



**Manual operation** button  
Opens the *Manual operation* workspace.



**Settings** button  
Opens the *Settings* workspace.

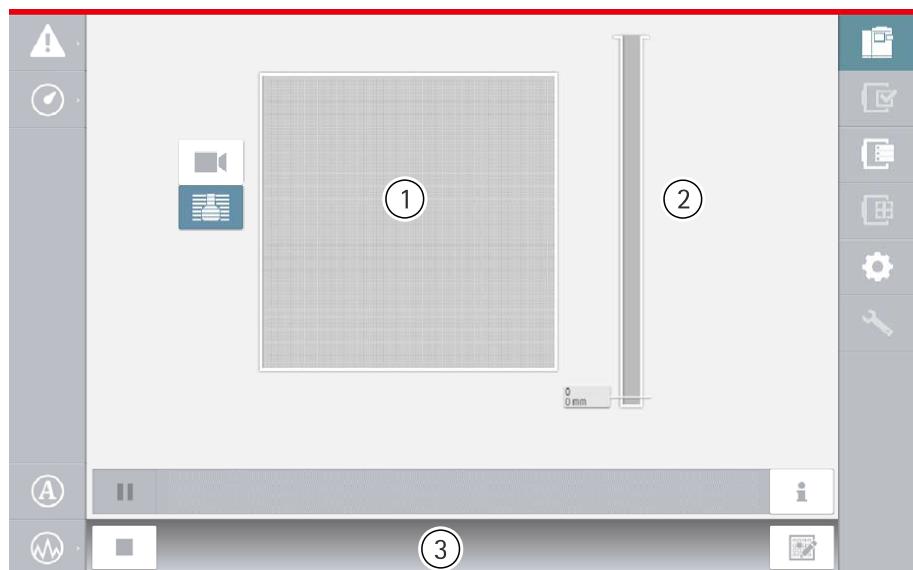


**Maintenance** button  
Opens the *Maintenance* workspace.

### 5.2.5 Home workspace

**Home button**

Opens the *Home* workspace on which the current building process can be monitored. The workspace can only be opened if a building process is in progress.



1 Building area view

3 Action bar

2 Building height group box

①

**Building area view**

Shows the individual layers in a job. The geometry and the position of parts as well as the type of exposure are shown in the layer displayed.  
During the building process, the job layer currently exposed is displayed.

②

**Current building height (Z co-ordinate) area**

If the **Contour** button is selected, the actual status of the building process is displayed.

Using the scroll bar slider you can page through all the layers for a job.

**Camera button**

Changes the building area view to the *Camera* mode.

The camera shows a photograph of the building area after the last recoating.

**Contour button**

Changes the building area view to the *Contour* mode.

The current layer of the job loaded is displayed.

**Start / Pause building process button**

Starts / pauses the building process loaded / in progress.

**Building task detail button**

Opens the *Info* window in the *Building tasks* workspace

☞ [5.2.7 Building tasks workspace](#).

# Controls and indications

EOS M 290

## Elements on the action bar



### Stop button

Stops the current building process.



### Single recoating button (active if building task is paused)

Carries out a single recoating of the building task loaded.



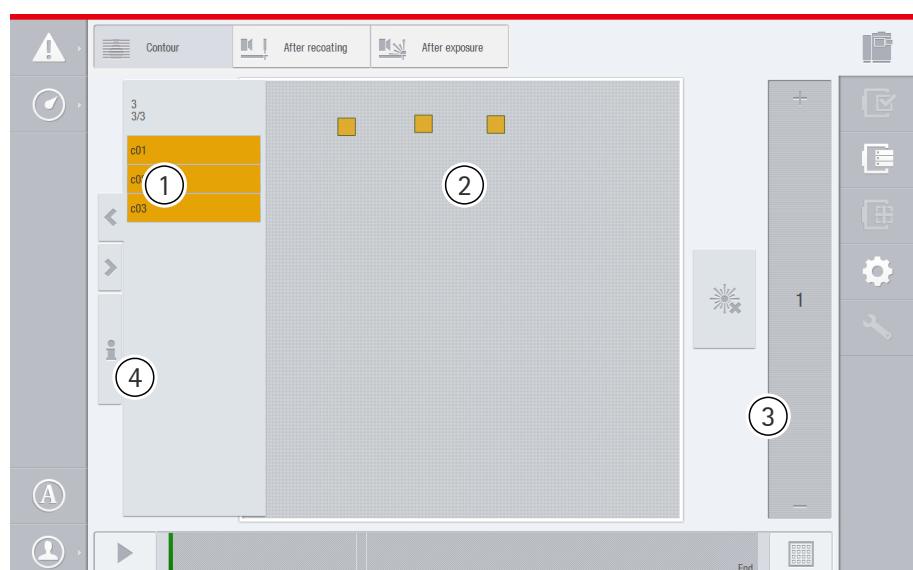
### Single exposure button (active if building task is paused)

Carries out a single exposure of the building task loaded.



### Edit building task button

Opens the *Full screen view of the building area* workspace that shows the building area in an enlarged view.



1 Building task list (with parts selected)

2 Full screen view of the building task

3 Scroll bar with slider

4 Part information

②

➤ **Full screen view** of the building task

Shows the parts in the building task loaded and displayed using the **scroll bar**. The parts are displayed in the **Parts list**.

③

➤ **Scroll bar** with slider

Using the scroll bar slider you can page through all the layers for the building task.

The actual building process progress is displayed in green.

➤ **Contour** button

Changes the building area view to the *Contour* mode.

The current layer of the job loaded is displayed.





- **After recoating button (EOSTATE Powderbed module)**  
Displays a current camera image after the last recoating undertaken.



- **After exposure button (EOSTATE Powderbed module)**  
Displays a current camera image after the last exposure undertaken.



- **Activate / Deactivate part button**  
Parts can be deactivated while a building task is in progress. The parts deactivated are not further built. The building task in progress is not interrupted.



If a part has been deactivated, it cannot be activated again during the entire building process.

(4)

- **Info part button**  
Shows the names, the exposure type set, the height of the first layer as well as the height of the last layer for the part selected in the **Parts list**.



- **Start / Pause building process button**  
Starts / pauses the building process loaded / in progress.



- **Back button**  
Closes the *Full screen view of the building area workspace*.

# Controls and indications

EOS M 290

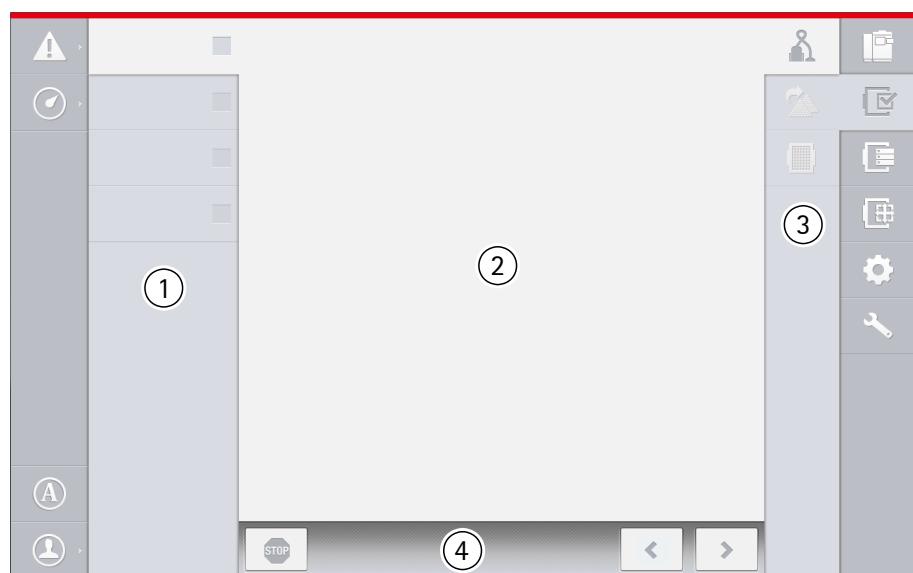
## 5.2.6 Wizards workspace



**Wizards button**

Opens the *Wizards* workspace in which a material change can be undertaken, or the machine can be set-up or taken out of operation with the aid of steps in a wizard.

The *Wizards* workspace is only active if a building task is selected.



1 *Wizards* tabs

2 *Wizards* workspace

3 *Wizards* sub-navigation

4 Action bar

(1)

*Wizards tabs*

Indicates the activities to be undertaken in the wizard selected in the *Wizards* sub-navigation.

Activities that have already been undertaken are shown here with a check mark.

### Elements for wizard sub-navigation



#### **Wizard Take out of operation button**

Opens the *Take out of operation* wizard that will take you through the necessary activities, step-by-step.



#### **Wizard Clean button**

Opens the *Clean* wizard if the next building task in building task list contains the same material as in the previous building task. The wizard will take you through the necessary activities step-by-step.



#### **Clean with material change button**

Opens the *Clean with material change* wizard if the next building task in building task list contains a different material to the previous building task or a different material has been selected manually in the *Settings* workspace. The wizard will take you through the necessary activities step-by-step.



#### **Wizard Set up button**

Opens the *Set up* wizard that will take you through the necessary activities, step-by-step.

### Elements on the action bar

The buttons necessary to undertake the related activity appear in the action bar. The following buttons are always present:



#### **Acknowledge all wizard steps button**

Acknowledges all steps for the selected wizard.



#### **Stop button**

Stops the movement of all axes.



#### **Back / Next button**

Navigates through the individual work steps for the activities to be undertaken.

# Controls and indications

EOS M 290

## 5.2.7 Building tasks workspace



**Building tasks button**

Opens the *Building tasks* workspace in which the building tasks loaded on the machine can be opened, sorted and deleted.

No.	Name	Building time	Building height	Material set	Layer thickness	Note	
1	(1)						
2	(2)						
3	(3)					Attention, licences necessary to build this building task are missing!	
4	(4)					Attention, licences necessary to build this building task are missing!	
5	(5)					Attention, licences necessary to build this building task are missing!	
6	(6)					Attention, licences necessary to build this building task are missing!	
7	(7)					Attention, licences necessary to build this building task are missing!	

1 Not selected, modified building task

4 *Building tasks* workspace

2 Selected building task

5 Action bar

3 Incompatible building task



Touch the status box for the related building task in the *Building tasks* workspace to select the building task.



The pencil symbol next to the status box indicates that a building task has been modified.



**Start / Pause building process** button

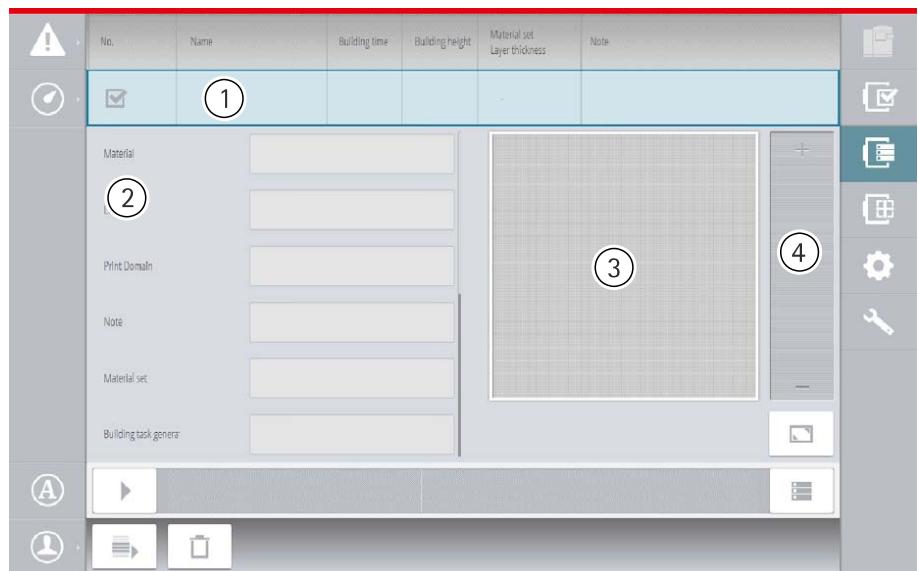
Starts / pauses the building process selected.



The button is inactive if a building process is already in progress.

**Info button**

Opens the *Info* workspace that contains information on the selected building task.



1 Selected building task

2 Information on selected building task

3 Building area view for the selected building task

4 Currently displayed layer of the selected building task

④

➤ **Scroll bar** with slider

Using the scroll bar slider you can page through all the layers for the building task.

➤ **Full screen** button

Opens the *Full screen* window.

➤ **Building task list** button

Opens the *Building tasks* workspace.

# Controls and indications

EOS M 290

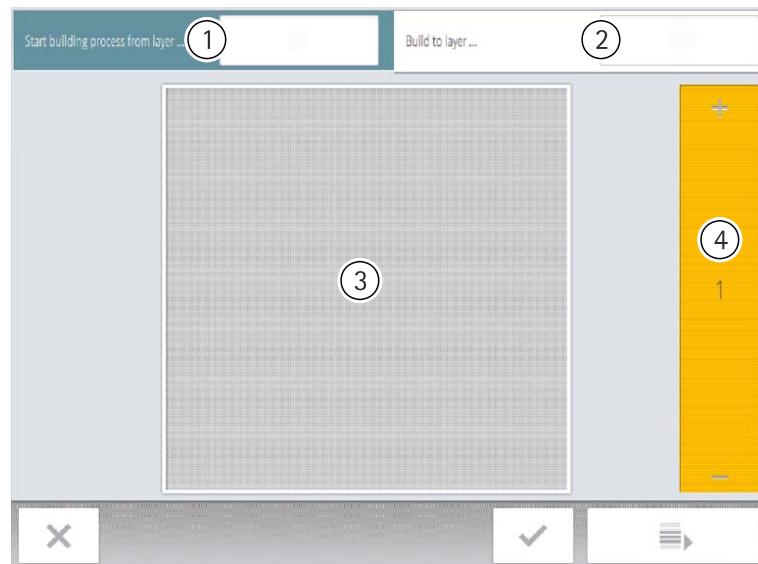
## Elements on the action bar

These buttons only appear if a building task is selected.



### Start building process from layer ... button

Opens the *Start building process at layer ... / Start building process to layer ...*



- |   |   |   |                        |
|---|---|---|------------------------|
| 1 | Start building process at layer ... field | 3 | Building area view     |
| 2 | Start building process to layer ... field | 4 | Scroll bar with slider |

- ① ➤ **Start building process at layer ...** button with field  
Opens a field for entering the layer at which the building process is to start.
- ② ➤ **Start building process to layer ...** button with field  
Opens a field for entering the layer at which the building process is ended.
- ④ ➤ **Scroll bar** with slider  
Using the scroll bar slider you can page through all the layers for the building task.  
You can select the layer at which the building process is to start or at which the building process is to stop using the scroll bar.
- **Cancel** button  
Cancels the entry for the *Start building process at layer ... / Start building process to layer ...*



➤ **OK button**

Accepts the entry in the buttons **Start building process at layer ... / Start building process to layer ...**



The building task processed is added to the job list as a new building task and marked as modified.

➤ **Start building process** button

Accepts the entry in the **Start building process at layer ... / Start building process to layer ...** buttons and starts the building task edited.

**Delete building task** button

Deletes the selected building task from the job list.

**Move up building task** button

Moves the selected building task up one position in the job list.

**Move down building task** button

Moves the selected building task down one position in the job list.

# Controls and indications

EOS M 290

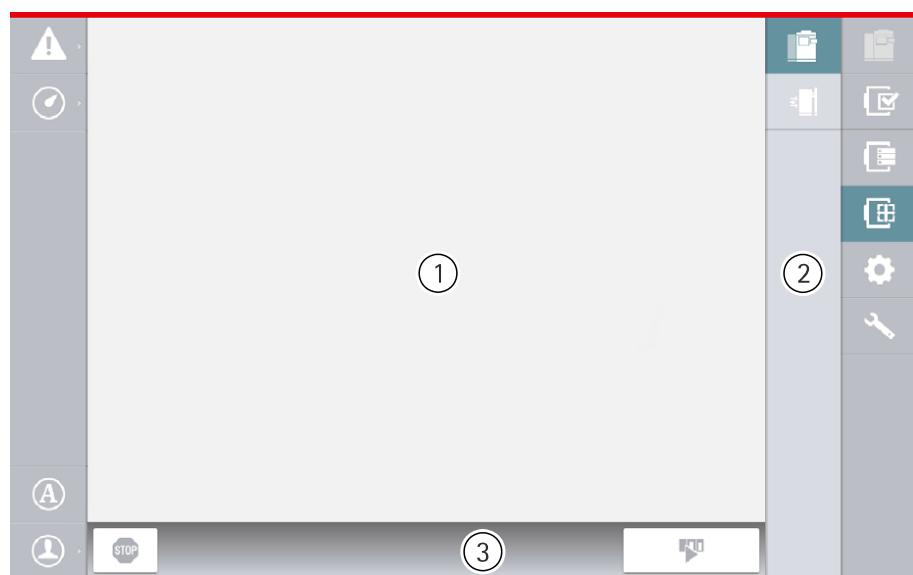
## 5.2.8 Manual operation workspace



### Manual operation button

Opens the *Manual operation* workspace in which the platforms and the recoater can be moved manually and the machine modules can be flooded separately with inert gas.

Using the *Manual operation* sub-navigation you can select the *Axes* and *Process conditions* workspaces.



1 *Manual operation* workspace

2 *Manual operation* sub-navigation

3 Action bar

### Elements on the action bar



#### Stop button

Stops all movements of the axes.



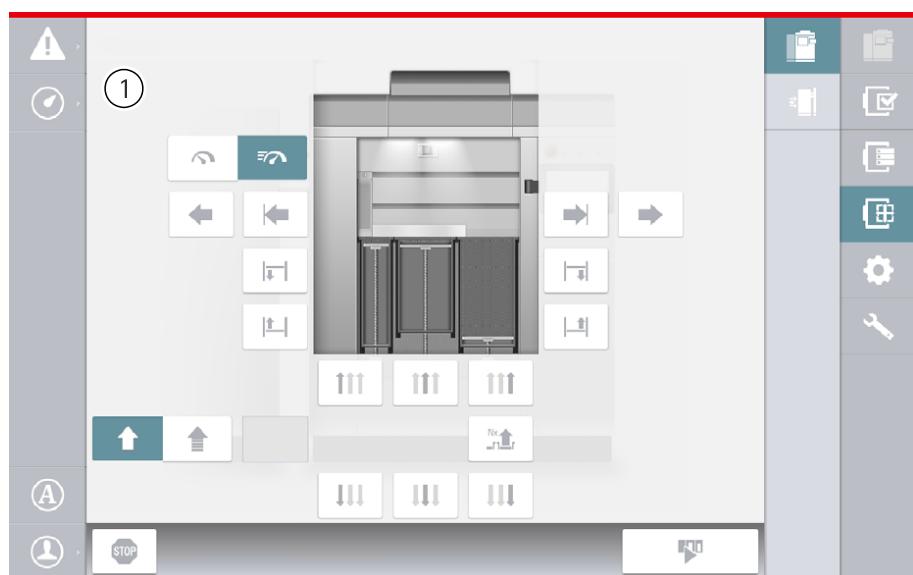
#### Automatically establish process conditions button

Floods the machine and the Recirculating filter system and activates the building platform heating until process conditions are established.

### 5.2.8.1 Axes workspace

**Axes button**

Opens the Axes workspace in which all platforms as well as the recoater can be moved.



1 Axes workspace

**Adjusting recoater speed selector switch**

Sets the speed of the recoater to adjust mode (slow) or normal mode (fast).

**Inching run recoater to left / right position button**

Moves the recoater to the left / right, as long as the button is touched.

**Move recoater to left end / right end position button**

Moves the recoater to the left / right end position.

**Lift / Lower building platform left button**

Raises / lowers the building platform on the left side.

**Lift / Lower building platform right button**

Raises / lowers the building platform on the right side.

**Platforms inching run / step movement selector switch with field**

Changes the movement of the platforms between inching and step movement. If step movement is selected, the required distance can be entered in the field.

**Inching run collector platform up / down button**

Moves the collector platform up / down as long as the button is touched.

# Controls and indications

EOS M 290



## Inching run building platform up / down button

Moves the building platform up/ down as long as the button is touched.



## Inching run dispenser platform up / down button

Moves the dispenser platform up/ down as long as the button is touched.



## Step movement collector platform up / down button

Moves the collector platform down / up by a defined value.



## Step movement run building platform up / down button

Moves the building platform down / up by a defined value.



## Step movement dispenser platform up / down button

Moves the dispenser platform down / up by a defined value.



## Raise dispenser platform by 0.05 mm button

Moves the dispenser platform up by 0.05 mm.

### 5.2.8.2 Process conditions workspace

**Process conditions button**

Opens the *Process conditions* workspace in which the individual machine modules can be flooded separately with inert gas.

The status of the flooding process is indicated as follows during this process:

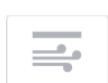
- Areas with a yellow border are currently being flooded.
- Areas with a green border are already flooded with inert gas.



1 Process conditions workspace

**Flood recirculating filter system button**

Floods the Recirculating filter system with inert gas.

**Lens clearing button**

Activates / deactivates the lens clearing on the window for the F-Theta module.

**Flood process chamber button**

Floods the process chamber with inert gas.

**Activate / Deactivate building platform heating button**

Activates / deactivates the building platform heating.

**Flood elevating system button**

Floods the elevator system under the process chamber with inert gas.

## Controls and indications

EOS M 290



**Raise all platforms button**

Moves all platforms to the position in which they were before lowering.



**Lower all platforms button**

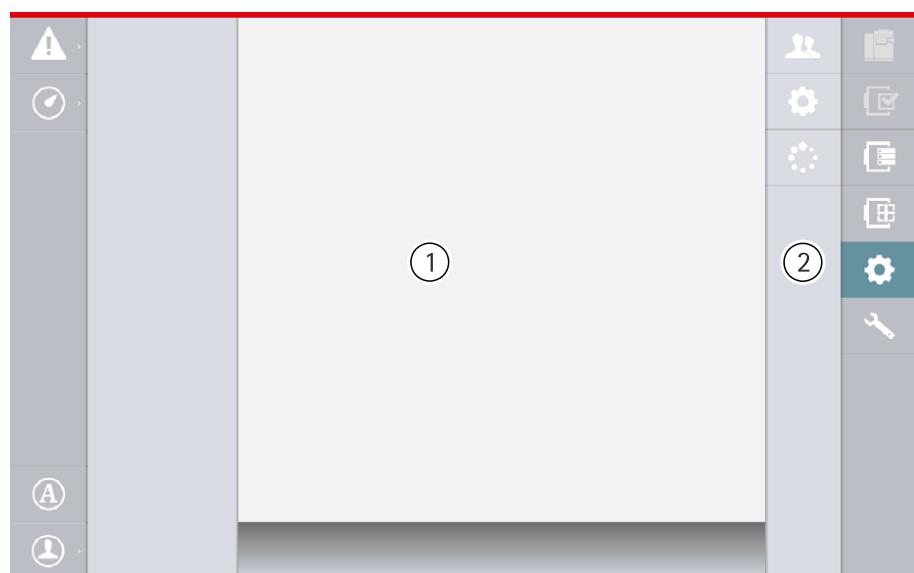
Moves all platforms to the bottom end position.

### 5.2.9 Settings workspace



**Settings button**

Opens the *Settings* workspace in which settings can be made on the machine and in the user profile.



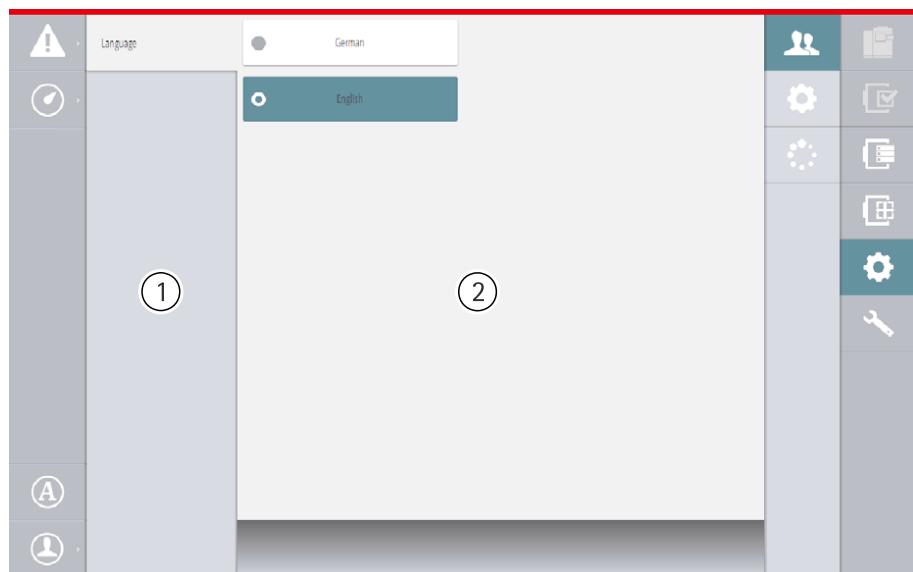
1 *Settings* workspace

2 *Settings* sub-navigation

### 5.2.9.1 User settings workspace

**User settings button**

Opens the *User settings* workspace in which settings can be made that only affect the user profile logged in.

1 *User settings tab*2 *User settings workspace**Language* dialog box

Opens the *Language* dialog box.

- **German** button  
Displays the software user interface in German.
- **English** button  
Displays the software user interface in English.
- **French** button  
Displays the software user interface in French.
- **Italian** button  
Displays the software user interface in Italian.

# Controls and indications

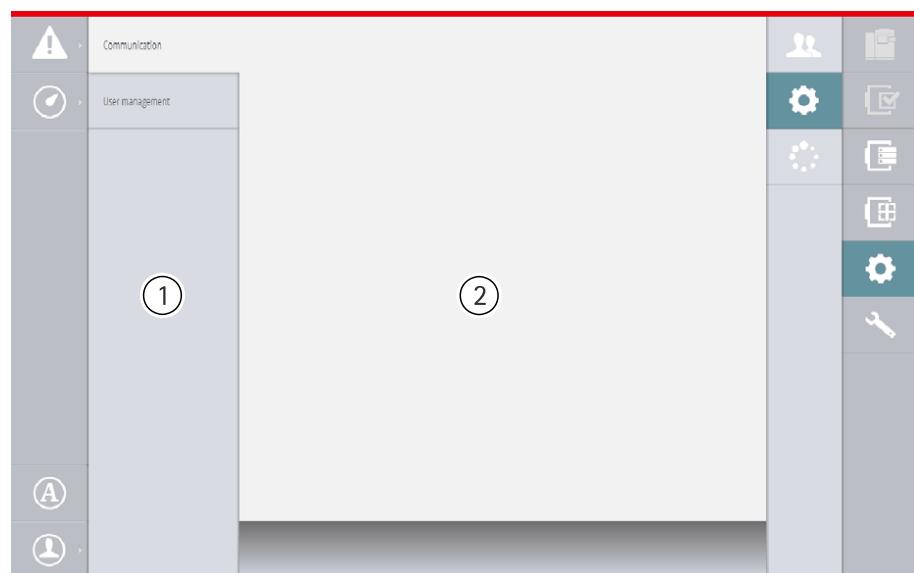
EOS M 290

## 5.2.9.2 Settings workspace



**Settings button**

Opens the *Settings* workspace using which information on the machines, network and users can be opened and set.

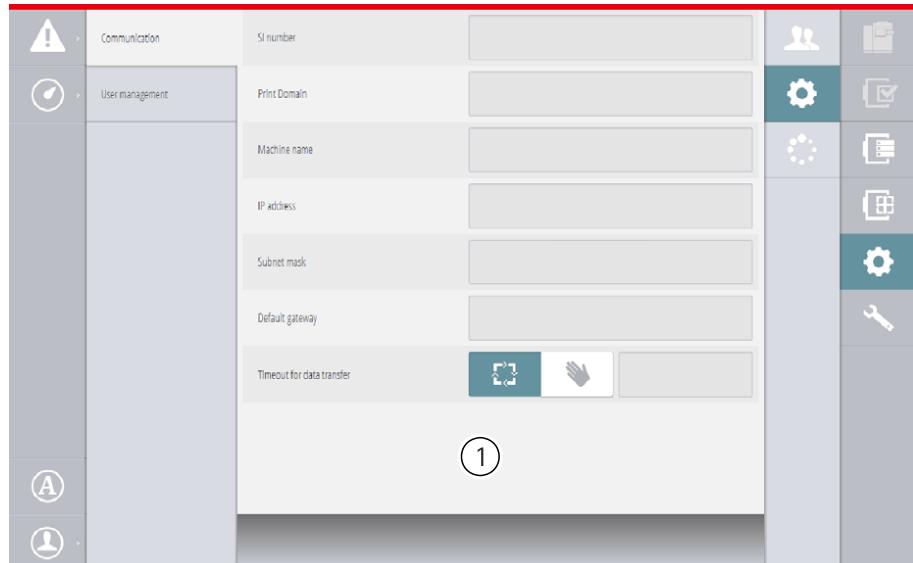


1 *Settings* tab

2 *Settings* workspace

Communication

*Communication dialog box*  
Opens the *Communication dialog box*.



1 *Communication dialog box*

- **SI number** indication  
Shows the machine's SI number.
- **Print Domain** indication  
Indicates the print domain assigned to the machine.



A print domain combines several machines into a logical group. Material licences are always bound to a print domain. Outside their print domain, the material licences are invalid.

- **Machine name** indication  
Shows the machine's network name.
- **IP address** indication  
Shows the machine's IP address.
- **Subnet mask** indication  
Indicates the machine's subnet mask.
- **Default gateway** indication  
Shows the machine's default gateway.
- **Timeout for data transfer** selector switch  
**Automatic mode** button  
Sets the timeout for the data transfer automatically.  
**Manual** button  
Sets the timeout for the data transfer to the value set in the field.



# Controls and indications

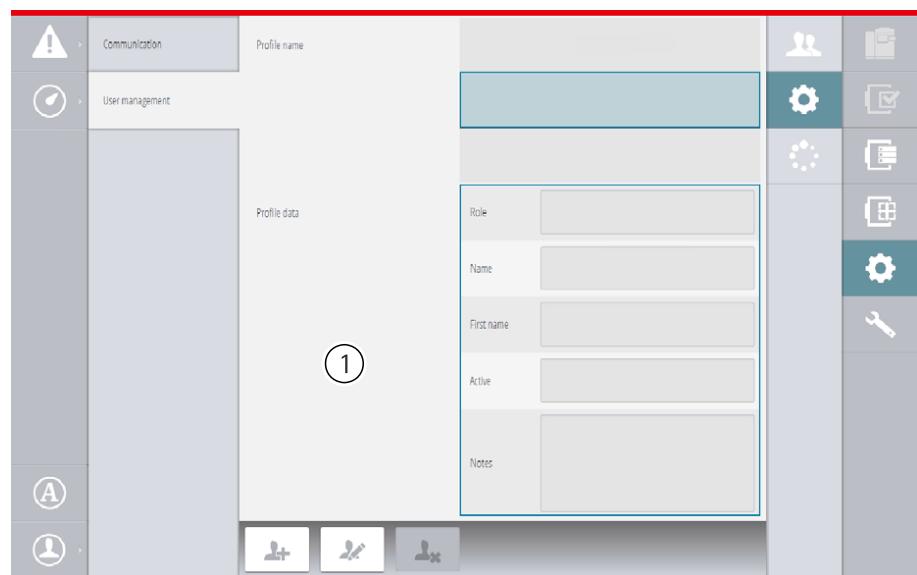
EOS M 290



*User management dialog box*

Opens the *User management* dialog box.

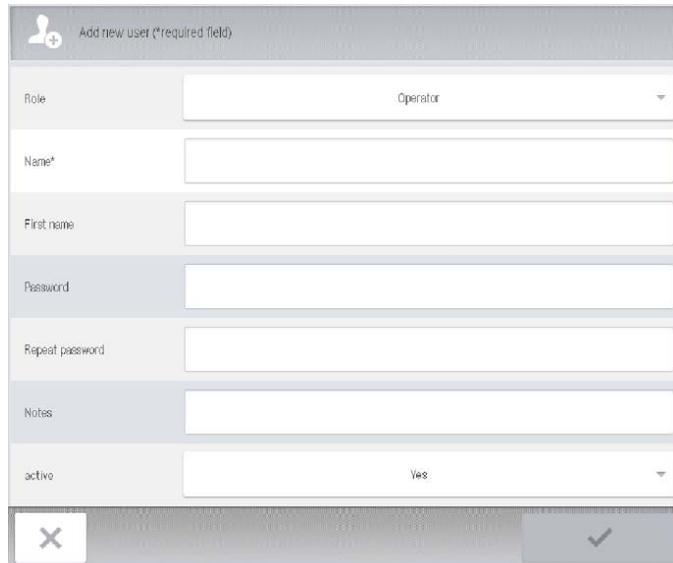
The field with the border at the top of the workspace provides information on profile data (access rights, name, status, etc.) for the selected user.



1 *User management dialog box*



- **Add new user button**  
Opens the *Add new user* dialog box.



The screenshot shows the 'Add new user (\*required field)' dialog box. It contains the following fields:

- Role: Operator
- Name\*: [empty input field]
- First name: [empty input field]
- Password: [empty input field]
- Repeat password: [empty input field]
- Notes: [empty input field]
- active: Yes

At the bottom are two buttons: a red 'X' and a green checkmark.



- **Edit user button**  
Opens the *Edit user...* dialog box



- **Delete user button**  
Deletes the currently selected user.

# Controls and indications

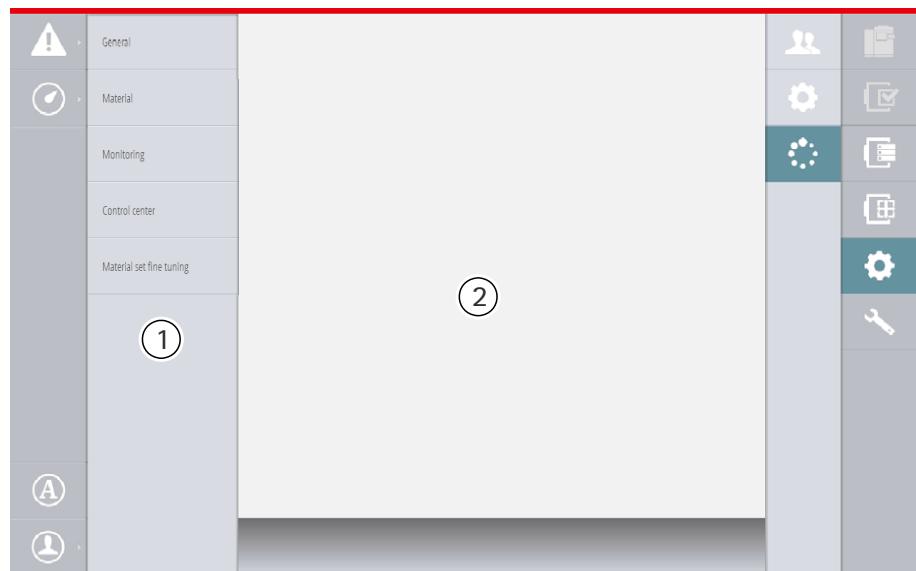
EOS M 290

## 5.2.9.3 Process settings workspace



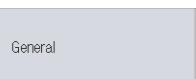
**Process settings button**

Opens the *Process settings* workspace using which settings can be made that affect the building process and the metal powder used.

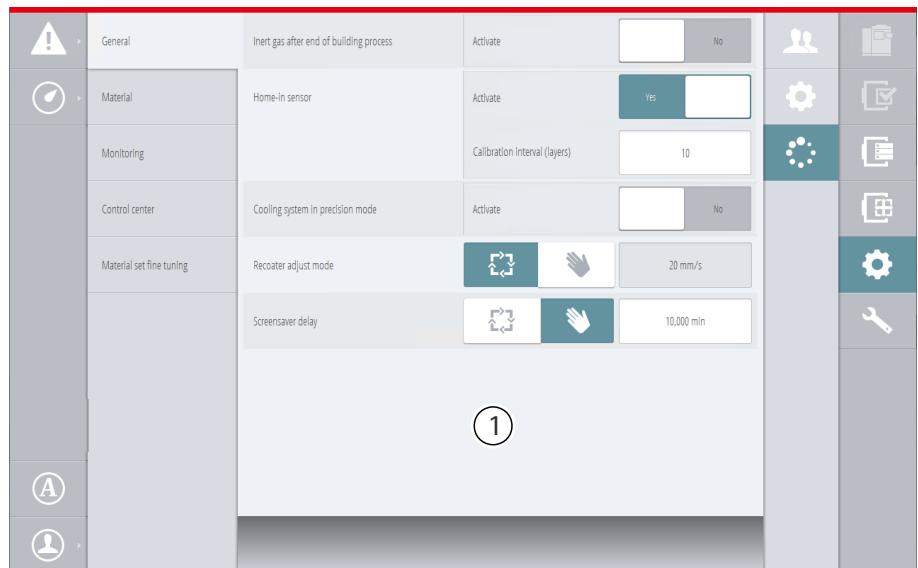


1 *Process settings* tab

2 *Process settings* workspace



*General* dialog box  
Opens the *General* dialog box.



1 *General* dialog box

➤ *Inert gas after end of building process* screen area

*Inert gas after end of building process* Yes / No selector switch

**Yes** button

The inert gas supply remains switched on after the end of the building process.

**No** button

The inert gas supply is switched off automatically after the end of the building process.

➤ *Home-in sensor* screen area

- **Activate Home-in sensor** Yes / No selector switch

**Yes** button

Activates the home-in sensor.

**No** button

Deactivates the home-in sensor.

- **Calibration interval (layers)** field

Opens a field in where you can set the layer interval for the home-in measurement.

# Controls and indications

EOS M 290

- *Cooling system in precision mode* screen area



**Cooling system in precision mode Yes / No** selector switch

**Yes** button

Activates continuous operation of the Cooling system and in this way makes possible high scanner precision.

**No** button

Deactivates continuous operation of the Cooling system. The Cooling system operates in the more energy-efficient automatic mode.

- *Recoater adjust mode* screen area



**Recoater adjust mode** selector switch

**Automatic mode** button

Sets the recoater speed in the adjust mode to a fixed value of 20 mm/s.

**Manual** button

Activates a field in which you can manually set the recoater speed in the adjust mode (in mm/s).

- *Screensaver delay* screen area



**Screensaver delay** selector switch

**Automatic mode** button

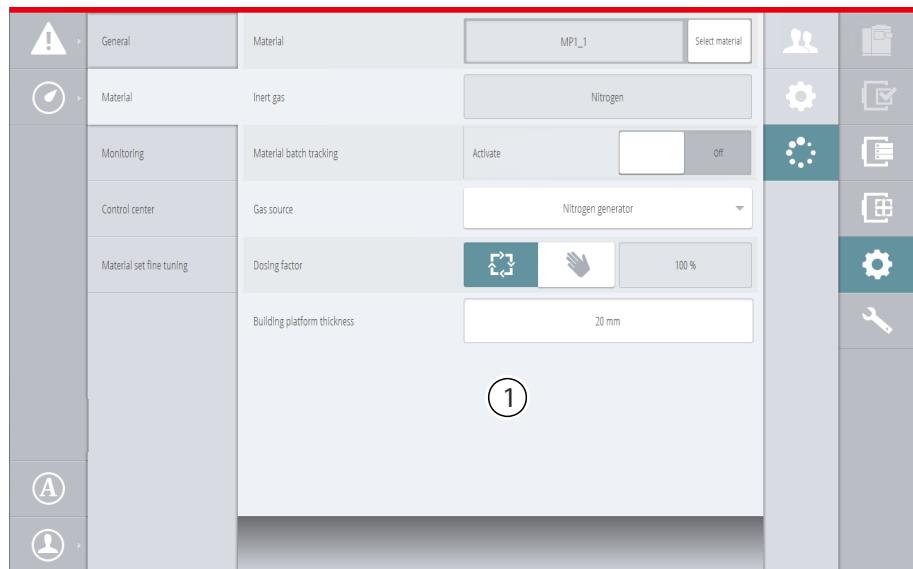
Sets the delay before the screensaver activates to a fixed value of 10 min.

**Manual** button

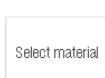
Activates a field in which you can manually set the delay until the screensaver is activated (in min).



*Material*  
Opens the *Material* dialog box.



1 *Material* dialog box



➤ **Select material** button  
Opens the *Select material* window where you can select the type of metal powder for the building task loaded.



➤ *Inert gas* indication  
Shows which inert gas is suitable for the selected material.

➤ **Material batch tracking On / Off** selector switch

**On** button

Activates the *Material batch tracking* function.

**Off** button

Deactivates the *Material batch tracking* function.

➤ **Gas source** button

Opens a list of the available gas sources for the machine.

➤ **Dosing factor** selector switch

**Automatic mode** button

Sets the dosing factor for the metal powder to 100 %.

**Manual** button

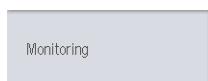
Activates a field via which the dosing factor can be adjusted (in %).

➤ **Building platform thickness** field

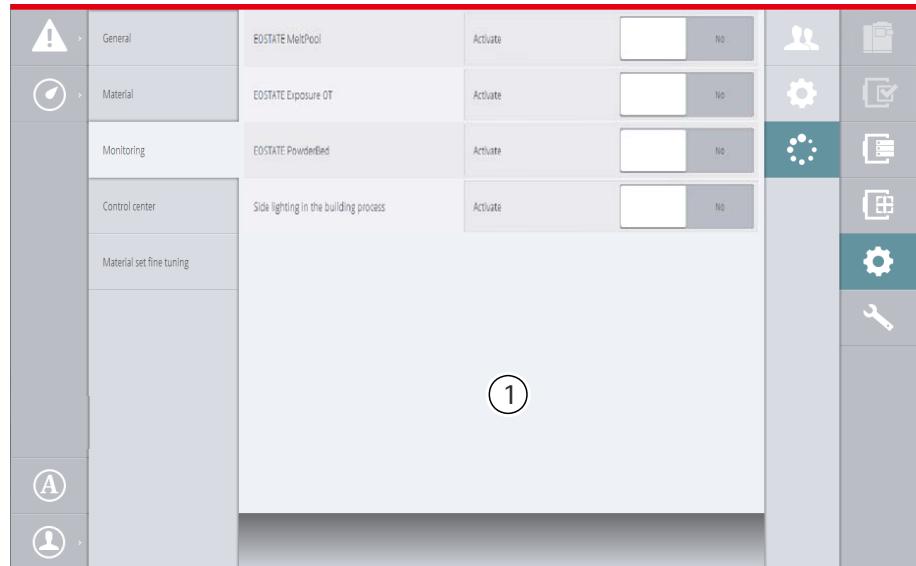
Opens a field in which you can enter the thickness of the building platform.

# Controls and indications

EOS M 290



*Monitoring dialog box*  
Opens the *Monitoring dialog box*.



1 *Monitoring dialog box*

- *EOSTATE Meltpool* screen area:

**Activate EOSTATE Meltpool Yes / No** selector switch

**Yes** button

Activates the *EOSTATE Meltpool* monitoring function.

**No** button

Deactivates the *EOSTATE Meltpool* monitoring function.

- *EOSTATE Exposure OT* screen area

**Activate EOSTATE Exposure OT Yes / No** selector switch

**Yes** button

Activates the *EOSTATE Exposure OT* monitoring function.

**No** button

Deactivates the *EOSTATE Exposure OT* monitoring function.

- *EOSTATE PowderBed* screen area

**EOSTATE PowderBed Activate YES / NO** selector switch

**Yes** button

Activates the *EOSTATE PowderBed* function using which the pictures from the recoating process are saved in a database.

**No** button

Deactivates the *EOSTATE PowderBed* function.

- *Sidelight in the building process* screen area



**Activate sidelight in the building process** Yes / No selector switch

**Yes** button

Activates the sidelight during the building process.

**No** button

Deactivates the sidelight during the building process.



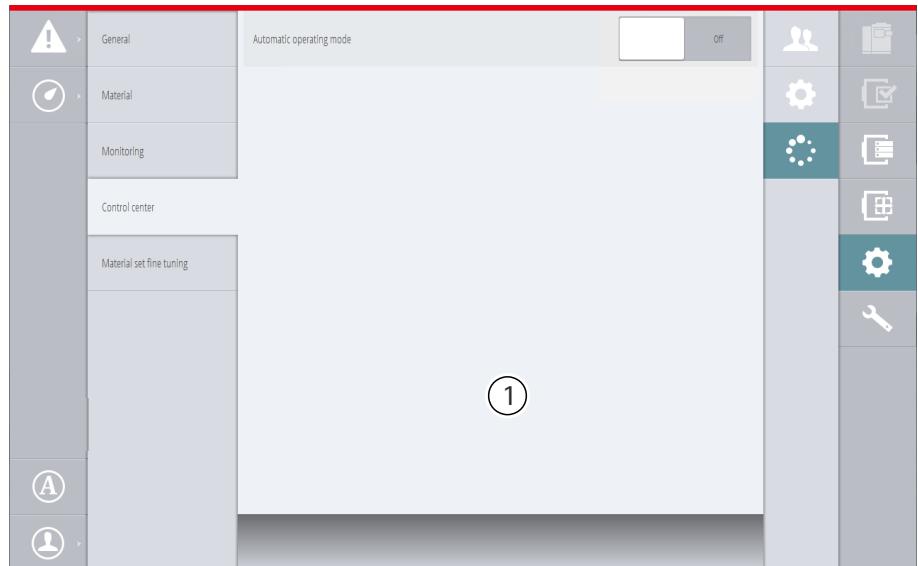
If EOSTATE Meltpool is used, changing the lighting situation can affect the acquisition results.

Pay attention to the notes in the *EOSTATE Meltpool* manual.



*Control center* dialog box

Opens the *Control center* dialog box.



1 *Control center* dialog box

- **Automatic operating mode** Yes / No selector switch

**Yes** button

The Control centre makes possible the completely automatic monitoring of the machine.

**No** button

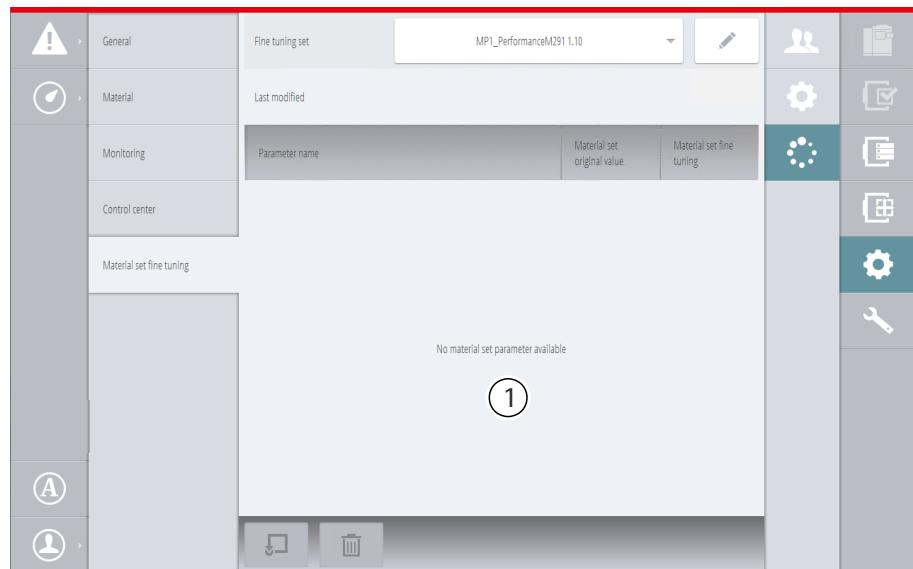
The machine is operated in the standard mode.

# Controls and indications

EOS M 290



*Material set fine tuning dialog box*  
Opens the *Material set fine tuning* dialog box.



1 *Material set fine tuning dialog box*

- *Material set fine tuning* list box  
Indicates the available material sets.
- *Last modified* list  
Indicates the material set parameters changed last.

## Elements on the action bar



**Restore default** button  
Resets all values to the default value.

### 5.2.10 Maintenance workspace

**Maintenance button**

Opens the *Maintenance* workspace in which you can undertake actions for the maintenance of the machine, for diagnostics and for calibration.



1 Maintenance tab

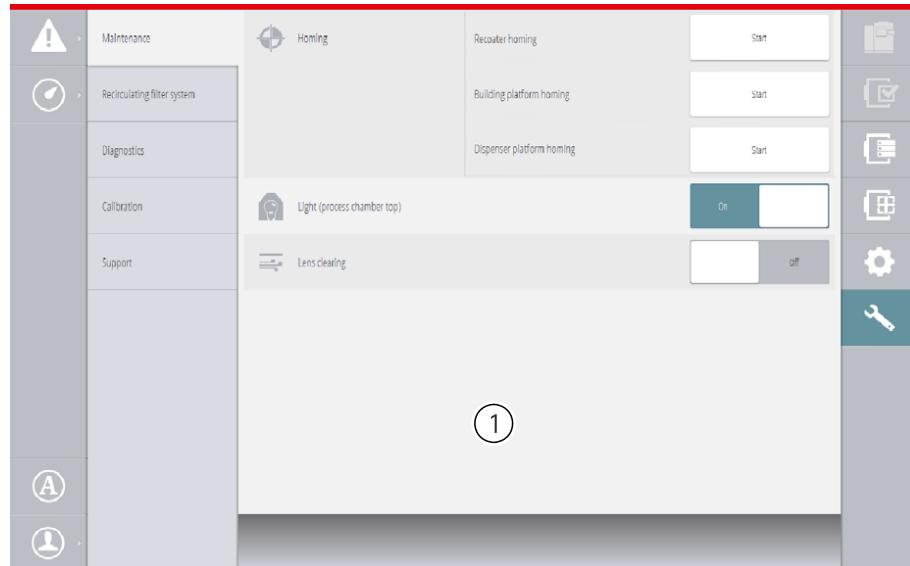
2 Maintenance workspace

# Controls and indications

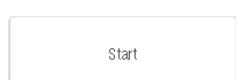
EOS M 290



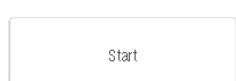
*Maintenance dialog box*  
Opens the *Maintenance dialog box*.



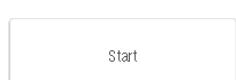
1 *Maintenance dialog box*



- **Start homing recoater** button  
Starts homing of the recoater.



- **Start homing building platform** button  
Starts homing of the building platform.



- **Start homing dosing platform** button  
Starts homing of the dispenser platform.



- **Light (process chamber top) On / Off** selector switch  
**On** button  
Activates the lighting in the top of the process chamber.

**Off** button  
Deactivates the lighting in the top of the process chamber.

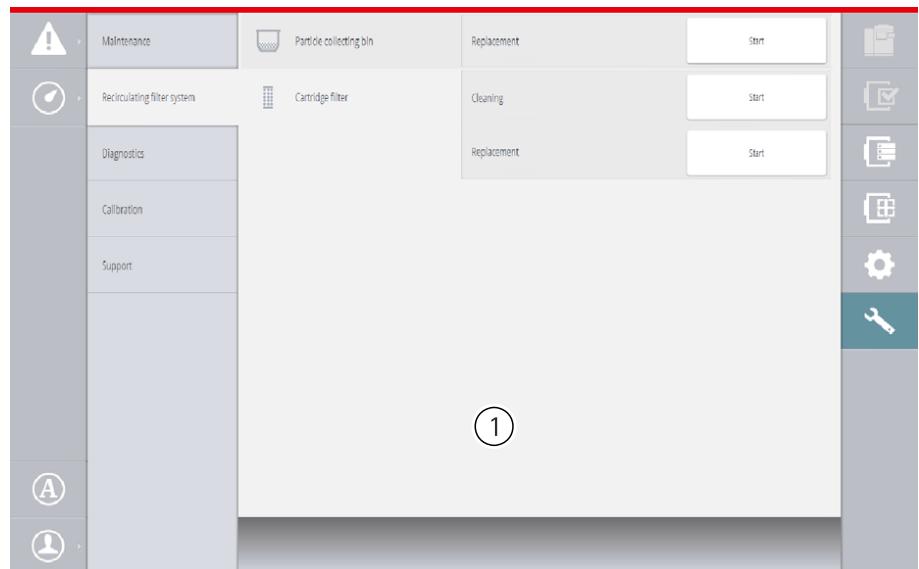


- **Lens clearing On / Off** selector switch  
**On** button  
Activates the lens clearing on the window for the F-Theta module.

**Off** button  
Deactivates the lens clearing on the window for the F-Theta module.



*Recirculating filter system dialog box*  
Opens the *Recirculating filter system dialog box*.



1 *Recirculating filter system dialog box*

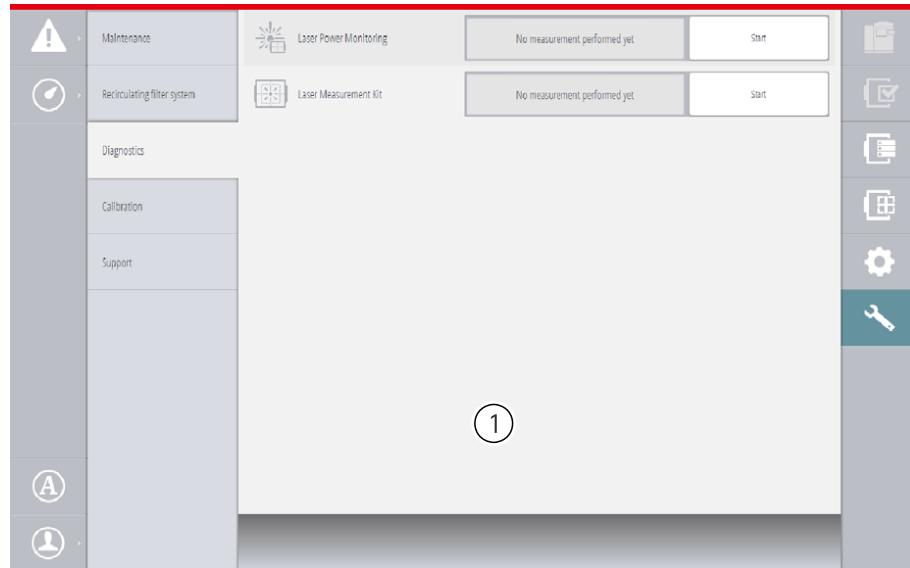
- **Start replacement of particle collecting bin button**  
The *Replace particle collecting bin* wizard is started and will take you through all the necessary actions step-by-step.
- **Start cartridge filter cleaning button**  
Starts the cleaning of the cartridge filter in the Recirculating filter system.
- **Start replacement of cartridge filter button**  
The *Replace cartridge filter* wizard is started and will take you through all the necessary actions step-by-step.

# Controls and indications

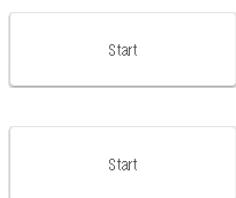
EOS M 290



*Diagnostics* dialog box (option)  
Opens the *Diagnostics* dialog box.



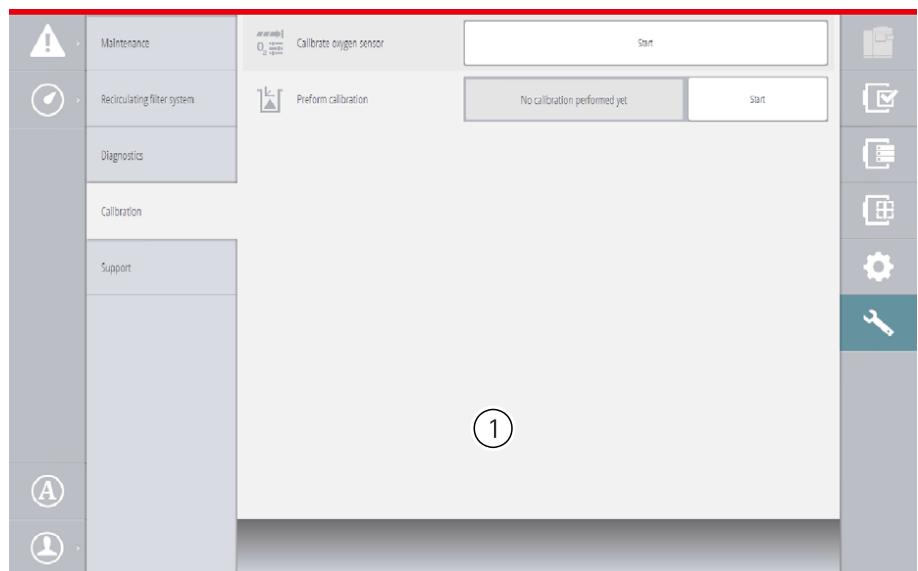
1 *Diagnostics* dialog box



- **Start Laser Power Monitoring** button (option)  
Opens the window for the manual measurement of the laser power using the Laser power monitoring.
- **Start Laser Measurement Kit** button (option)  
Opens the window for the manual measurement of the laser power using the Laser measurement kit.

Calibration

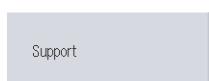
*Calibration dialog box*  
Opens the *Calibration dialog box*.

1 *Calibration dialog box*

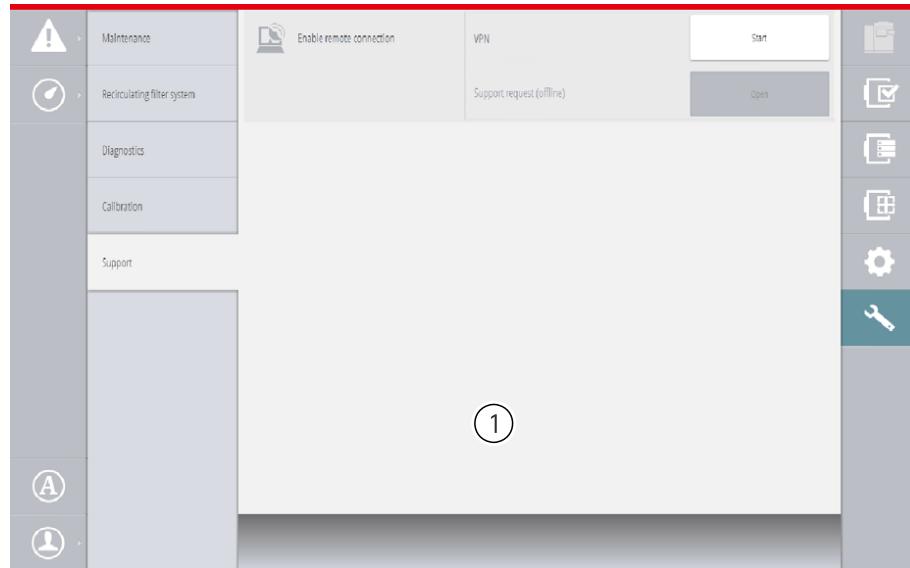
- **Start calibrating oxygen sensor** button  
Starts the calibration of the oxygen sensor.
- **Start preform calibration** button (option)  
Starts the *Preform calibration* wizard. The wizard will take you through the necessary activities step-by-step.

# Controls and indications

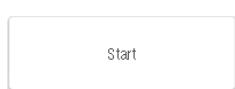
EOS M 290



*Support dialog box (option)*  
Opens the *Support* dialog box.



1 *Support dialog box*



- *Enable remote connection group box*
- **VPN start / stop button (option)**  
Activates / deactivates the ability to access the machine remotely with the aid of another computer.
  - **Open Support request (offline) button**  
Prepares a remote request ticket.



6

---

Operation



## 6.1 Configuring user interface

### 6.1.1 Setting language



1. On the *Settings* navigation bar, select the *User settings* workspace.
2. Select one of the languages indicated by touching the related button.

### 6.1.2 Administering operating levels

Two different operating levels can be set on the machine's screen to suit the level of training and knowledge held by the operator.

- **Operator**
- **Supervisor**

Both operating levels can be protected with the aid of passwords.

#### 6.1.2.1 Adding a user

Displays, settings and functions on the machine can be adapted to the related operator.



New operators can only be added at the **Supervisor** operating level.



1. On the *Settings* navigation bar, select the *Settings* workspace.



2. In the *Settings* workspace select the *User management* dialog box.



3. Add new operator:

Touch the **Add new user** button.

A dialog box opens in which the following entries can be made:

- **Role** (mandatory field)  
Select the operating level to be assigned to the new user.
- **Name** (mandatory field)  
Enter name of the operator.
- **First name**  
Enter first name of the user.

# Operation

EOS M 290

- **Password / Repeat password**

If the operator account is to be password protected, enter a password and repeat in the field underneath.

- **Notes**

You can enter descriptive information in this field.

- **active**

Use this button to define whether this user can log into the system.

4. Accept entries by touching the **OK** button.



## 6.1.2.2 Edit user



1. On the *Settings* navigation bar, select the *Settings* workspace.

2. In the *Settings* workspace select the *User management* dialog box.

3. If necessary, touch the arrow buttons to page through the list of users saved on the machine and select user by touching the name.

4. Touch the **Edit user** button.

5. If necessary enter the password.

A dialog box opens in which the following entries can be edited:

- **Role** (mandatory field)

Select the operating level to be assigned to the new user.

- **Name** (mandatory field)

Enter name of the operator.

- **First name**

Enter first name of the user.

- **Password / Repeat password**

If the operator account is to be password protected, enter a password and repeat in the field underneath.

- **Notes**

You can enter descriptive information in this field.

- **active**

Use this button to define whether this user can log into the system.

6. Accept entries by touching the **OK** button.



### 6.1.3 Setting up dashboard



1. Select *Dashboard* workspace on the left of the screen.

2. Select one of the tabs at the top edge of the screen.

The status boxes in the workspace contain information on values for monitoring the building process and status.



3. Select a value that is to be displayed on the *My Dashboard* tab.

Touch the check box for the related status box to copy it to the *My Dashboard* tab for the specific user profile.

This status box can be removed again by clearing the check box on the *My Dashboard* tab.



Of all the items of process monitoring status information, up to five items of status information can be dragged to the status bar using Drag and Drop. These items of information are always visible on the screen independent of which workspace is active.

These items of status information can be removed again from the status bar by dragging them to the open *Dashboard* workspace.

## 6.2 Managing licences

To operate the machine, build with EOS materials and use process and exposure parameters, corresponding licences are required. This licence information can be saved on a dongle that is plugged into the machine computer inside the machine.

It is necessary to manage the licences on the machine if:

- a new product is to be added to the machine configuration
- the validity period of licences has expired.

The licences on the machine are modified using the *EOSYSTEM SmartService* software

☞ *EOSYSTEM SmartService* manual - section *Managing machine licences*.

# Operation

EOS M 290

## 6.3 Prepare the machine

### 6.3.1 Running up / shutting down / restarting system

#### 6.3.1.1 Running up system

1. Switch on machine:  
On the switching cabinet, set *MAIN SWITCH* to *ON*.  
The Recirculating filter system is supplied with power.  
The machine computer boots automatically and the screen switches on.
2. Switch on Cooling system  
 *Components and accessories manual*, section *Cooling system - Switching on Cooling system*.
3. Press *ACKNOWLEDGE EMERGENCY STOP* button on the rear of the machine.
4. If necessary, enter password on the screen.

#### 6.3.1.2 Running up the system after an emergency stop

1. Rectify cause of the emergency stop  
 *7 Troubleshooting*.
2. Unlock *EMERGENCY STOP* button.
3. Press *ACKNOWLEDGE EMERGENCY STOP* button on the rear of the machine.
4. Accept error messages.

#### 6.3.1.3 Shutting down system

1. Wait for end of the building process or cancel building process  
 *6.6.3 Cancelling building process*.

#### NOTICE

Switch off the machine and the accessories at the earliest 10 min after completion of the building process. Laser cooling is aided by leaving the Cooling system to continue to run for a while and a possible build-up of heat in the laser is avoided.

2. Switch off Cooling system  
 *Components and accessories manual*, section *Cooling system - Switching off Cooling system*.
3. Switch off machine:  
On the switching cabinet, set *MAIN SWITCH* to *OFF*.  
The Recirculating filter system is shut down.  
The machine computer shuts down automatically and the screen switches off.

### 6.3.1.4 Restarting system



1. Select *Login / Change user* dialog box.



2. Touch **Restart** button.  
The machine computer is restarted.

### 6.3.2 Opening/closing process chamber door

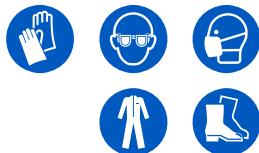
If the process chamber door is opened the safety circuit triggers

☞ *4.6.2 Process chamber door safety circuit.*

During the building process, the process chamber door is locked for safety reasons and cannot be opened.

#### 6.3.2.1 Opening process chamber door

##### **WARNING**



##### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

1. Press unlocking button in the process chamber door handle and at the same time pivot process chamber door handle upward.

#### 6.3.2.2 Closing process chamber door

1. Pivot process chamber door handle upward and close process chamber door.
2. Pivot process chamber door handle downward until the locking engages audibly.

# Operation

EOS M 290

## 6.3.3 Removing/fitting extraction nozzle

### 6.3.3.1 Removing extraction nozzle

#### **WARNING**

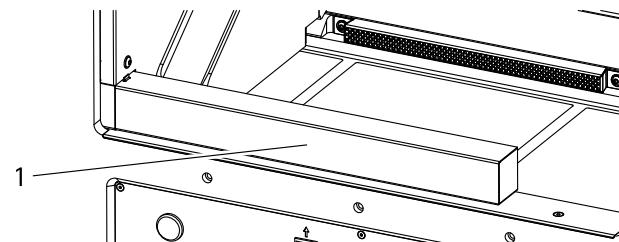


#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
 [2.7 Personal protective equipment.](#)

1. Open process chamber door  
 [6.3.2.1 Opening process chamber door.](#)
2. Lift extraction nozzle on the right and remove from the inert gas extraction duct.



1 Extraction nozzle

3. Set down extraction nozzle outside the process chamber.
4. Close process chamber door  
 [6.3.2.2 Closing process chamber door.](#)

### 6.3.4 Fitting extraction nozzle

#### **WARNING**



#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber

 *2.7 Personal protective equipment.*

1. Open process chamber door  
 *6.3.2.1 Opening process chamber door.*
2. Pick up extraction nozzle so that the open end points to the left and the extraction openings point towards the process chamber.
3. Insert extraction nozzle to the stop in the extraction duct in the left side trim panel in the process chamber.
4. Position right end of the extraction nozzle such that the fixing lug on the extraction nozzle fits in the fixing bore in the process chamber door threshold and the extraction nozzle is in contact with the process chamber door threshold.
5. Close process chamber door  
 *6.3.2.2 Closing process chamber door.*

# Operation

EOS M 290

## 6.3.5 Adjusting beam expander (defocus) (option)

The machine has adjustable beam expander optics using which the intensity of the radiation from the laser can be adjusted. This function is only available with a corresponding licence (developer licence) and can be activated via the software *EOSPRINT 2*.

1. Shut down system  
☞ [6.3.1.3 Shutting down system](#)
2. Open optics cover:

### ⚠ CAUTION

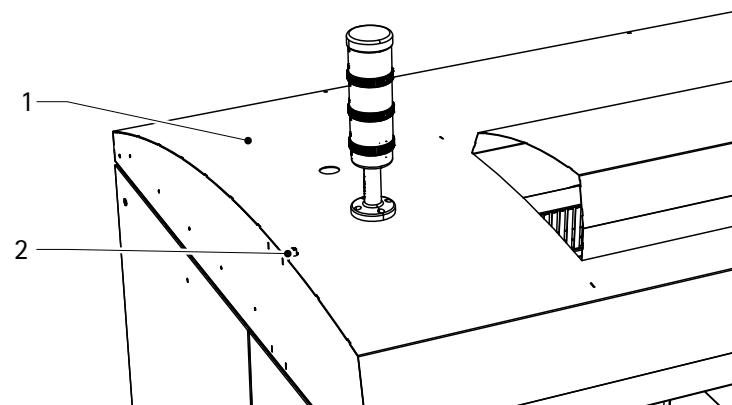


### Falling optics cover!

On opening/closing the optics cover, the cover can fall without any braking action and crush fingers, hands or arms.

Always open or close the optics cover using both hands.

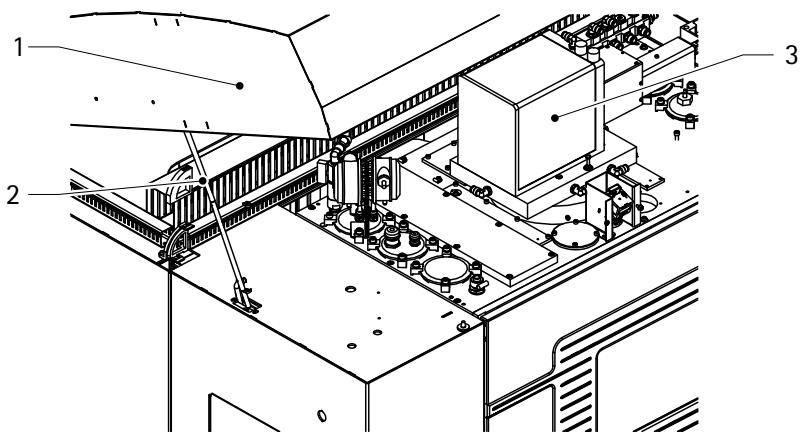
- Loosen the fastening bolt for the optics cover.
- Grasp optics cover with both hands and hinge upwards slowly.



1 Optics cover

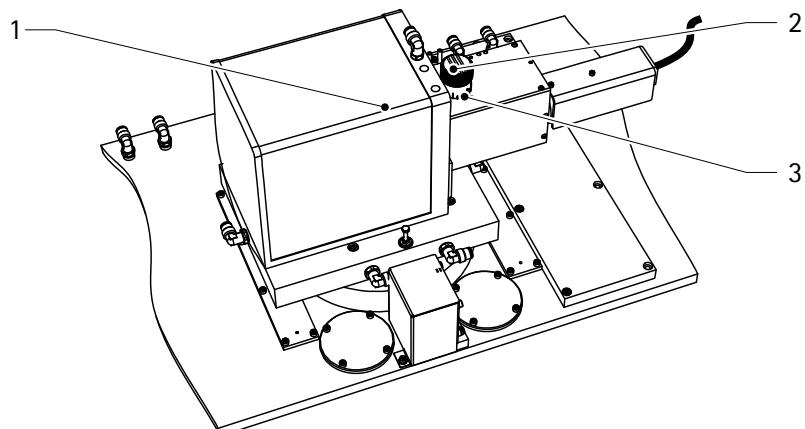
2 Fastening bolt

The stay engages automatically.



1 Optics cover  
2 Stay  
3 Scanner

3. Adjust beam expander to the required value:  
Turn *BEAM EXPANDER ADJUSTMENT* knob to the position required on the scale fitted.



1 Scanner  
2 BEAM EXPANDER ADJUSTMENT knob  
3 BEAM EXPANDER ADJUSTMENT scale

### NOTICE

An incorrect beam expander adjustment can result in problems with the quality of the parts or even in a building process crash.

# Operation

EOS M 290

## 4. Close optics cover:

- Grasp optics cover with both hands and hinge downwards slowly.
- Tighten fastening bolt.

### **WARNING**



#### **Invisible class 4 laser radiation!**

An optics cover that is not closed can result in direct or scattered laser radiation of class 4 irradiating the eyes or skin. This situation can cause serious injuries.

Only operate the machine with the optics cover closed.

## 5. Close optics cover on the machine.

## 6.4 Set-up machine

Prior to set-up the following tasks must be completed:

- Clean process chamber
  - ☞ *6.7.3 Cleaning process chamber*
- Unpack parts
  - ☞ *6.7.1 Unpacking parts*
- Empty collector duct
  - ☞ *6.7.2 Emptying collector duct*

### **NOTICE**

For reasons of process reliability, perform the work steps

- Fit building platform
    - ☞ *6.4.3 Fitting building platform*
  - Adjust building platform coarsely
    - ☞ *6.4.4.1 Adjusting building platform coarsely*
  - Adjust building platform finely
    - ☞ *6.4.4.2 Adjusting building platform finely*
  - Set up first layer
    - ☞ *6.4.4.3 Setting up first layer*
  - Check recoater blade
    - ☞ *6.4.5 Checking recoater blade / scraper lip / brushes*
  - Check, clean window for the F-Theta module
    - ☞ *6.4.6 Checking window for the F-Theta module, clean if necessary*
- one after the other without delay.



Alternatively, you can also use the *Set up* wizard to set-up the machine. For this purpose on the *Wizards* navigation bar, select the *Set up* wizard.

#### 6.4.1 Filling dispenser duct

##### **WARNING**



##### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber

☞ *2.7 Personal protective equipment.*

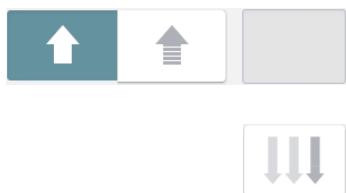


EOS recommends using the optionally available Filling module to fill the dispenser duct.

☞ *IPC/M extra Operating instructions, Components manual, section Filling module.*



1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Move dispenser platform to the bottom end position:
  - Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.
  - Touch **Inching run dosing platform down** button on the screen until the bottom end position is reached.
3. Open process chamber door  
☞ *6.3.2.1 Opening process chamber door.*
4. Connect equipotential bonding wire from the sieve for the metal powder used to the connector on the right side wall of the process chamber.
5. Insert sieve in the dispenser duct.
6. Fill dispenser duct with new powder or sieved metal powder:
  - Open powder bin and pour metal powder from the powder bin onto the sieve in stages.

##### **NOTICE**

The temperature of the metal powder added must be same as the ambient temperature or higher to prevent moisture condensing on the metal powder.

or

- Feed back metal powder from the building or collector system
  - ☞ *6.7.1 Unpacking parts*
  - ☞ *6.7.2 Emptying collector duct.*
- Carefully scrape all the metal powder through the sieve using a spatula, do not apply pressure.  
Add at least as much metal powder as you will need for the subsequent building process.

# Operation

EOS M 290

- Disconnect equipotential bonding wire for the sieve on the right side wall of the process chamber.
- Remove empty sieve from the dispenser duct and remove from the process chamber.
- Vacuum clean any adhering metal powder residue from the sieve.
- Compact metal powder in the dispenser duct:  
Using force, repeatedly stab the metal powder with a spatula across the entire surface in the X and Y direction.

## NOTICE

Ensure you do not damage the walls of the dispenser duct.

- Close process chamber door  
 *6.3.2.2 Closing process chamber door.*

## 6.4.2 Positioning collector platform

Prior to starting the building process, the collector platform must be lowered by approx. 40 mm so that it can accommodate excess metal powder.

During the building process the collector platform is gradually lowered to suit the progress made in the building process.

1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Move collector platform to approx. 40 mm below the top edge of the web between the collector duct and building duct:

- Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
- In the field for the **Platforms inching run / step movement** selector switch enter the value **40** and accept using **OK**.
- Touch **Step movement collector platform down** button on the screen.



### 6.4.3 Fitting building platform

#### ⚠️ WARNING



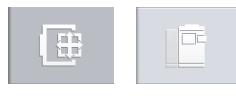
#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

#### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.

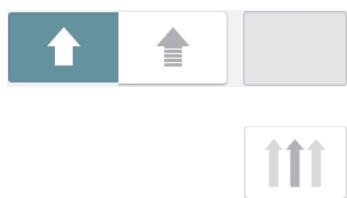


1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Move recoater to the left end position:

Touch **Move recoater to left end position** button on the screen.



3. Move building platform carrier to the top end position:

- Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.
- Touch **Inching run building platform up** button on the screen until the top end position is reached.

#### NOTICE

In the upper end position, the building platform carrier protrudes beyond the building plane. If the recoater collides with the building platform carrier during movement, damage may be caused.

Do not move the recoater.

4. Open process chamber door

☞ [6.3.2.1 Opening process chamber door](#).

5. If necessary, clean building platform carrier using the Wet separator.

6. Thoroughly clean holes and threads in the building platform carrier.

#### NOTICE

If there is metal powder in the holes and threads for fastening the building platform, the threads or holes will be damaged when the fastening bolts are tightened or the positioning pins are tapped in.

Therefore thoroughly clean the threaded bores prior to fitting the fastening bolts.

# Operation

EOS M 290

7. On the usage of a building platform that can be fixed using positioning pins, carefully tap two positioning pins into the holes using a rubber hammer.
8. Fit building platform to the building platform carrier and insert fastening bolts in the threaded bores.

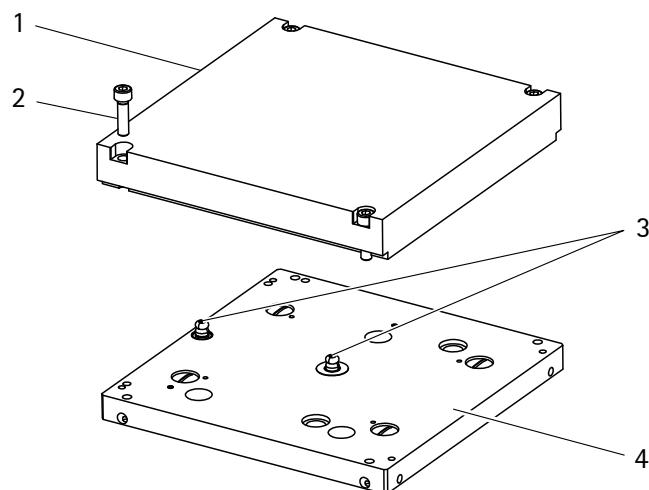
## ⚠ CAUTION



### Heavy building platform!

While fitting the building platform, fingers and hands may be crushed between the building platform and the building platform carrier.

Do not reach into the hazard area.



1 Building platform

2 Fastening bolt

3 Positioning pin

4 Building platform carrier

## NOTICE

Only use the correct combination of building platform and fastening bolts, as otherwise the building platform carrier may be damaged:

Combination 1:

Building platform thickness: 22 mm

Fastening bolt: M8 x 25 mm

Combination 2:

Building platform thickness: 36 mm

Fastening bolt: M8 x 40 mm

Once screwed in, the bolts are allowed to protrude a maximum of 12 mm below the building platform.

9. Warming up building platform  
☞ [6.5.3 Warming up building platform.](#)
10. Firmly fasten building platform to the building platform carrier using the fastening bolts.

**11.** Close process chamber door

☞ *6.3.2.2 Closing process chamber door.*

**12.** Move building platform down until the top edge of the building platform is at the same height as the top edge of the web between the building duct and the dispenser duct:

Touch **Inching run building platform down** button on the screen until the required position is reached.

In this building platform position, the distance between the building platform and the bottom edge of the recoater blade is approx. 4 mm.

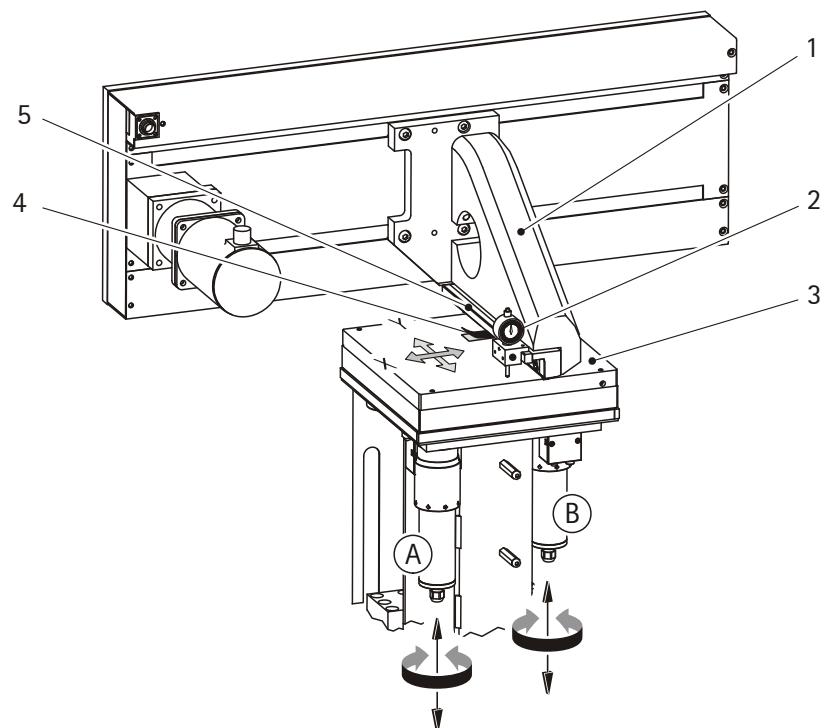
# Operation

EOS M 290

## 6.4.4 Adjusting building platform

To establish an optimal joint between part and building platform, the first layer of metal powder must be applied as thinly and evenly as possible over the entire area.

Due to manufacturing tolerances on the building platform, the building platform must be aligned in the X and Y direction parallel to the recoating plane prior to each building process.



- 1 Recoater
- 2 Dial gauge with bracket
- 3 Building platform
- 4 Feeler gauges (graduation 0.05 mm)
- 5 Measuring strip

- A Adjusting motor for adjusting the Y-axis
- B Adjusting motor for adjusting the X-axis

#### 6.4.4.1 Adjusting building platform coarsely

Prior to the coarse adjustment of the building platform, the top edge of the building platform must be at the same height as the top edge of the web between the building duct and the dispenser duct.

The recoater blade must not be displaced in its mounting (e.g. as a consequence of a collision with the recoater).

##### **WARNING**



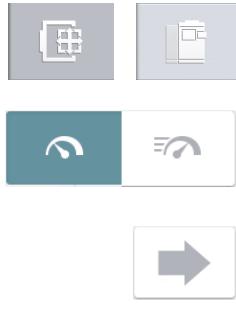
##### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

##### **NOTICE**

When moving the recoater, ensure there are no obstacles in the path of the recoater.

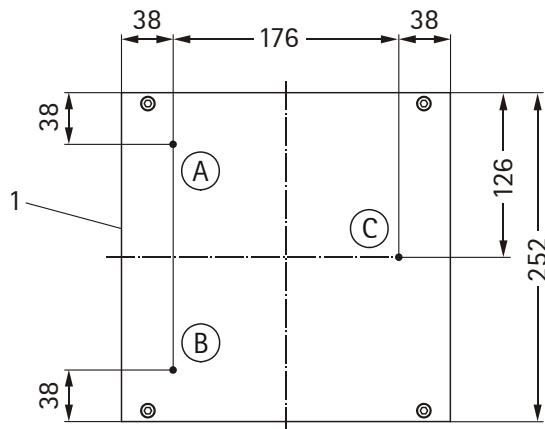


1. On the *Manual operation* navigation bar, select the Axes workspace.
2. Reduce speed of the recoater:  
Change **Adjusting recoater speed** selector switch by touching the **Adjust mode** button.
3. Move recoater to the middle of the building platform:  
Touch **Inching run recoater to right position** button on the screen until the required position is reached.
4. Move building platform down 2 mm:
  - Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
  - In the field for the **Platforms inching run / step movement** selector switch enter the value 2 and accept using **OK**.
  - Touch the **Step movement run building platform down** button.
5. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
6. Clean metal powder from measuring strip and dial gauge bracket.
7. Fit dial gauge with dial gauge bracket to the recoater measuring strip. The dial gauge bracket is clamped magnetically.
8. If necessary, adjust dial gauge:  
Undo clamping bolt on the dial gauge bracket, slide dial gauge down until it indicates a value and tighten clamping bolt.

# Operation

EOS M 290

- Slide dial gauge along the measuring strip until the measuring tip is at the same position in the Y direction as measuring point A.



Dimensions in [mm]

1 Building platform

A Measuring point A

B Measuring point B

C Measuring point C

- Close process chamber door  
☞ [6.3.2.2 Closing process chamber door](#).
- Move recoater to the left until the measuring tip is at measuring point A:  
Touch **Inching run recoater to left** button on the screen until the required position is reached.
- Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
- Set dial gauge to 0 using the adjusting ring.
- Move dial gauge along the measuring strip to the front until the measuring tip is at measuring point B.
- Raise or lower building platform at front left until the dial gauge indicates 0:  
Press **ADJUSTMENT Y-AXIS** rocker switch on the adjusting panel up or down until the required position is reached.

## NOTICE

Move to the required position from below to avoid incorrect adjustment due to mechanical play.

If the position of the building platform is too high prior to the adjustment, first move to below the required position and then up.

- Slide dial gauge along the measuring strip to the middle of the recoater until the measuring tip is at the same position in the Y direction as measuring point C.

17. Close process chamber door  
☞ 6.3.2.2 *Closing process chamber door.*
18. Move recoater to the right until the measuring tip is at measuring point C:  
Touch **Inching run recoater to right position** button on the screen until the required position is reached.
19. Open process chamber door  
☞ 6.3.2.1 *Opening process chamber door.*
20. Raise or lower building platform at middle right until the dial gauge indicates 0:  
Press **ADJUSTMENT X-AXIS** rocker switch on the adjusting panel left or right until the required position is reached.
21. Remove dial gauge with dial gauge bracket.
22. Close process chamber door  
☞ 6.3.2.2 *Closing process chamber door.*
23. Move recoater to the left end position:  
Touch **Move recoater to left end position** button on the screen.



# Operation

EOS M 290

## 6.4.4.2 Adjusting building platform finely

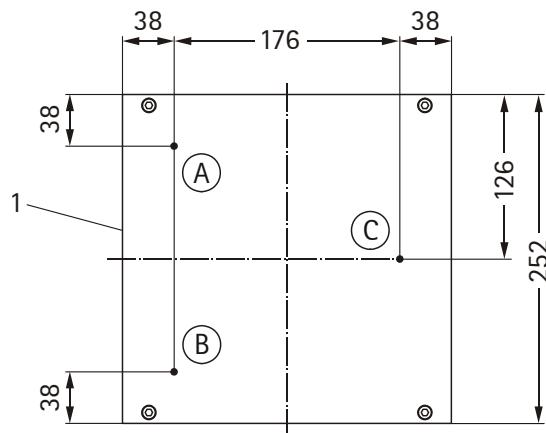
Prior to the fine adjustment of the building platform the coarse adjustment of the building platform must have been undertaken

☞ **6.4.4.1 Adjusting building platform coarsely.**

The top edge of the building platform must be at the same height as the top edge of the web between the building duct and the dispenser duct.

The recoater blade must not be displaced in its mounting (e.g. as a consequence of a collision with the recoater).

During the fine adjustment, the distance between building platform and bottom edge of the recoater blade is adjusted to exactly 0.5 mm at the measuring points A, B and C.



Dimensions in [mm]

1 Building platform

A Measuring point A

B Measuring point B

C Measuring point C

### **⚠ WARNING**



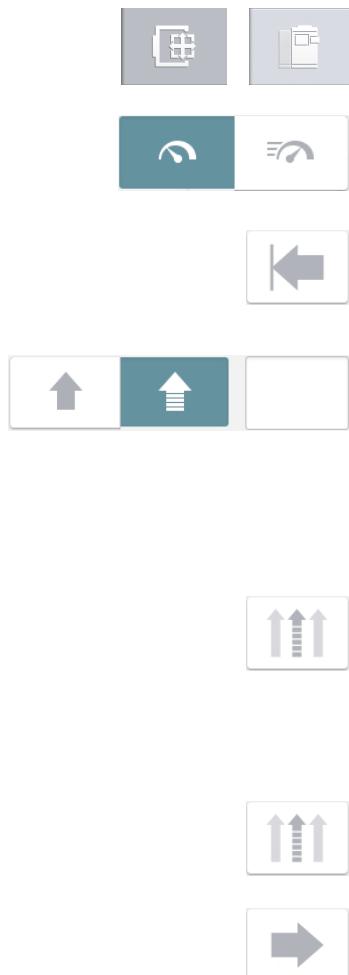
### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ **2.7 Personal protective equipment.**

### **NOTICE**

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the Axes workspace.
2. Reduce speed of the recoater:  
Change **Adjusting recoater speed** selector switch by touching the **Recoater adjust mode** button.
3. Move recoater to the left end position:  
Touch **Move recoater to left end position** button on the screen.
4. Move building platform upward:
  - Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
  - During the first adjustment, move the building platform up by 3 mm:
    - In the field for the **Platforms inching run / step movement** selector switch enter the value 3 and accept using **OK**
    - Touch the **Step movement run building platform up** button.
  - During all subsequent adjustments, move the building platform up by the value measured with the feeler gauges less 0.5 mm:
    - In the field for the **Platforms inching run / step movement** selector switch enter the value measured less 0.5 mm and accept using **OK**.
    - Touch the **Step movement run building platform up** button.
5. Move recoater over the measuring points A and B:  
Touch **Inching run recoater to right position** button on the screen until the required position is reached.
6. Open process chamber door  
 [6.3.2.1 Opening process chamber door](#).
7. Measure distance between the bottom edge of the recoater blade and measuring point A on the building platform using a feeler gauge and note the value measured.
  - Insert the feeler gauge in the gap from the right of the recoater as in this way it will be easier to insert the feeler gauge due to the chamfer on the right side of the recoater blade.
  - The measured value is correct if the feeler gauge can be pushed into the gap only with noticeable resistance.
8. Repeat steps 4. to 7. until the distance between the bottom edge of the recoater blade and measuring point A on the building platform is exactly 0.5 mm.
9. Measure distance between the bottom edge of the recoater blade and measuring point B on the building platform using a feeler gauge and note the value measured.

# Operation

EOS M 290

10. Raise or lower front left of building platform until the distance between the bottom edge of the recoater blade and measuring point B on the building platform is exactly 0.5 mm:  
Press **ADJUSTMENT Y-AXIS** rocker switch on the adjusting panel up or down until the required measured value is achieved.

## NOTICE

Move to the required position from below to avoid incorrect adjustment due to mechanical play.

If the position of the building platform is too high prior to the adjustment, first move to below the required position and then up.

11. Close process chamber door  
 [6.3.2.2 Closing process chamber door](#).
12. Move recoater over measuring point C:  
Touch **Inching run recoater to right position** button on the screen until the required position is reached.
13. Measure distance between the bottom edge of the recoater blade and measuring point C on the building platform using a feeler gauge and note the value measured.
14. Raise or lower middle right of building platform until the distance between the bottom edge of the recoater blade and measuring point C on the building platform is exactly 0.5 mm:  
Press **ADJUSTMENT X-AXIS** rocker switch on the adjusting panel left or right until the required measured value is achieved.

## NOTICE

Move to the required position from below to avoid incorrect adjustment due to mechanical play.

If the position of the building platform is too high prior to the adjustment, first move to below the required position and then up.

15. Move recoater to the right end position:  
Touch **Move recoater to right end position** button on the screen.

#### 6.4.4.3 Setting up first layer

Prior to setting up the first layer the fine adjustment of the building platform must have been undertaken

☞ **6.4.4.2 Adjusting building platform finely.**

The building platform must be exactly 0.5 mm below the bottom edge of the recoater blade.

##### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.

**1. Move building platform up 0.5 mm.**

- Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
- In the field for the **Platforms inching run / step movement** selector switch enter the value **0.5** and accept using **OK**.
- Touch the **Step movement building platform up** button.



Metal powder applied subsequently remains in recesses in the building platform caused by surface roughness or variations within the stipulated flatness tolerance.

**2. Move dispenser platform up until sufficient metal powder is available for recoating the first layer.**

- Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.
- Touch **Inching run dosing platform up** button on the screen until the required position is reached.



**3. Adjust recoater speed to the speed set during the building process:**  
Change **Recoater adjust mode** selector switch by touching the **Normal operation** button.

**4. Apply metal powder:**

Touch **Inching run recoater to left** button on the screen until the left end position is reached.

On the building platform there must be a thin layer of powder through which the surface of the building platform and the recesses for the fastening bolts can be seen.

##### NOTICE

Do not move the building platform again prior to starting the building process.

# Operation

EOS M 290

## 6.4.5 Checking recoater blade / scraper lip / brushes

The surface of a new layer of powder must be free of scoring. For this reason the recoater blade, the scraper lip for soft recoating or the brushes for the brush recoater must be checked regularly for damage that could cause scoring of the layer of powder.

### ⚠ WARNING



### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the Axes workspace.

2. Move recoater to the left end position:

Touch **Move recoater to left end position** button on the screen.

3. Move building platform approx. 100 mm below the building plane:

- Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
- In the field for the **Platforms inching run / step movement** selector switch enter the value **100** and accept using **OK**.
- Touch **Step movement run building platform down** button.



4. Move dispenser platform approx. 10 mm below the building plane:

- In the field for the **Platforms inching run / step movement** selector switch enter the value **10** and accept using **OK**.
- Touch **Step movement dosing platform down** button on the screen.



5. Move recoater to right edge of the building duct:

Touch **Inching run recoater to right position** button on the screen until the required position is reached.



6. Open process chamber door

☞ [6.3.2.1 Opening process chamber door](#).

7. Depending on the recoating variant used:

- Check recoating face of the recoater blade or the scraper lip for damage using the inspection mirror.
- Check the brushes for wear, in particular for areas with bristles broken off or shortened by wear.

If the recoating face is damaged or continuous scoring is visible in the direction of recoating:

Turn or replace recoater blade or scraper lip.

☞ *8.4.3 Turning, replacing recoater blade (steel blade / ceramic blade)*

☞ *8.4.4 Replacing scraper lip (soft recoating).*

If the brushes are damaged or worn:

Replace brushes

☞ *8.4.5 Replacing brush recoater (brush recoater).*

8. Close process chamber door

☞ *6.3.2.2 Closing process chamber door.*

9. Move recoater to the left end position:

Touch **Move recoater to left end position** button on the screen.



#### 6.4.6 Checking window for the F-Theta module, clean if necessary

Correct cleaning of the window is of major importance for the service life of the window and the part quality. Scratches and soiling on the window will result in a reduction in the laser power in the building area or even irreparable damage to optical components due to excessive absorption of power.

##### **WARNING**



##### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber

☞ *2.7 Personal protective equipment.*

##### **NOTICE**

Optics cleaning paper must be absolutely clean. In addition to the original packaging, the paper must be stored in a protective cover and in a clean place.

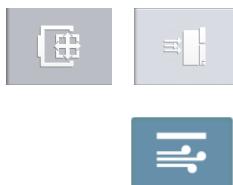
The rubbing alcohol (purity > 99.9 %, e.g. isopropanol) must be free of contaminants.

Never attempt to clean dirt from the lens by blowing with air that is not absolutely clean.

# Operation

EOS M 290

## 1. Deactivate lens clearing:



- On the *Manual operation* navigation bar, select the *Process conditions* workspace.

- Deactivate lens clearing:  
Touch **Lens clearing** button on the screen.

## 2. Open process chamber door

☞ [6.3.2.1 Opening process chamber door.](#)

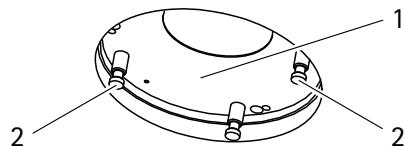
## 3. Roughly clean any soiling in the process chamber in the immediate vicinity of the window.

### NOTICE

Ensure you do not damage the window.

## 4. Remove nozzle ring:

Take hold of nozzle ring at the right and left grip, turn and remove downward.

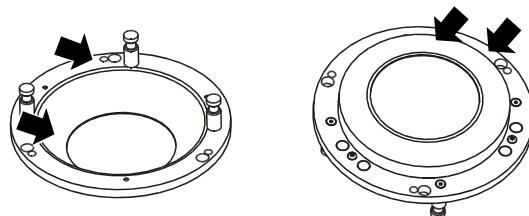


1 Nozzle ring

2 Grip

## 5. Clean nozzle ring:

Completely remove deposits with alcohol and cellulose.  
There must be no foreign bodies left on the contact surface.



## 6. Check window for damage using the inspection mirror.

If there are signs of damage on the window such as burning, scratches or cracks, the window must be replaced

☞ [8.4.7 Changing window for the F-Theta module.](#)

7. Clean window.

Also clean the window if no soiling is visible.

**NOTICE**

To protect the window, wear new disposable protective gloves.  
(comparable with EN ISO 374-1, type A).

- Remove optics cleaning paper from the protective cover and fold it to a handy size.
- Moisten optics cleaning paper with rubbing alcohol.
- Move moistened optics cleaning paper in a spiral action, starting from the centre of the window, outwards to the window's holder, while applying as little pressure as possible.

**NOTICE**

Do not touch the window with the protective gloves.

Do not move the optics cleaning paper back over the window once you have reached the holder.

Only ever use optics cleaning paper once.

Do not wipe dry afterwards, as static charging can result in heavier soiling and process problems.

- Check results of cleaning using the inspection mirror.  
There must be no smearing visible on the window.
- Repeat cleaning process until there is no longer any soiling or smearing visible.

8. Fit nozzle ring:

- Take hold of nozzle ring at grips on left and right so that the third grip is facing the rear.
- Fit nozzle ring straight and rotate carefully until it can be clearly felt to engage.

9. Close process chamber door

☞ *6.3.2.2 Closing process chamber door.*

10. Activate lens clearing:

Touch **Lens clearing** button on the screen.



# Operation

EOS M 290

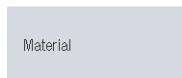
## 6.5 Preparing building process

Prior to preparing the building process the following tasks must be completed:

- Fill dispenser duct
  - ☞ 6.4.1 *Filling dispenser duct.*
- Prepare collector
  - ☞ 6.4.2 *Positioning collector platform.*
- Fit building platform
  - ☞ 6.4.3 *Fitting building platform.*
- Adjust building platform
  - ☞ 6.4.4 *Adjusting building platform.*
- Check recoater blade
  - ☞ 6.4.5 *Checking recoater blade / scraper lip / brushes.*
- Check, clean window for the F-Theta module
  - ☞ 6.4.6 *Checking window for the F-Theta module, clean if necessary.*

### 6.5.1 Setting material

It is only necessary to adjust the material manually if there is no building task on the machine with the related material and the process conditions are to be established in advance.



1. On the *Settings* navigation bar, select the *Process settings* workspace.

2. In the *Process settings* workspace select the *Material* dialog box.

3. Set material:

- Touch **Select material** button on the screen.

The *Select material* window appears.

- Touch button for the required material and accept using **OK**.

### 6.5.2 Loading building task



1. Select *Building tasks* navigation bar.

2. Touch required building task.

The required building task is displayed in orange.

The status box for the building task is selected.

### 6.5.3 Warming up building platform



1. On the *Manual operation* navigation bar, select the *Process conditions* workspace.
2. Activate building platform heating:  
Touch **Activate building platform heating** button on the screen.

**NOTICE**

Prior to activating the building platform heating make sure that there is no metal powder on the building platform, as metal powder on an unheated building platform can collect in the spaces between the building platform and building duct.

The building duct may be seriously damaged by the material expansion on heating.

**NOTICE**

Wait until the building platform is warmed up to the nominal temperature before you start the building process.

### 6.5.4 Recoating first layer

**NOTICE**

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the *Axes* workspace.
2. Move building platform down 0.05 mm:
  - Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
  - In the field for the **Platforms inching run / step movement** selector switch enter the value *0.05* and accept using **OK**.
  - Touch the **Step movement run building platform down** button.
3. Move recoater to the right end position:  
Touch **Move recoater to right end position** button on the screen.
4. Move building platform up 0.05 mm:  
Touch the **Step movement run building platform up** button.



# Operation

EOS M 290

5. Move dispenser platform up 0.1 mm:

- In the field for the **Platforms inching run / step movement** selector switch enter the value **0.1** and accept using **OK**.
- Touch the **Step movement dosing platform up** button.



6. Move recoater to the left end position:

Touch **Move recoater to left end position** button on the screen.



7. Check first layer:

- There must be a thin layer of metal powder on the building platform through which the surface of the building platform shines.
- The area between the building platform and dispenser platform must be evenly filled with metal powder.

If the first layer does not meet the requirements:

Recoat first layer again.

## 6.5.5 Activating process peripherals



1. On the *Manual operation* navigation bar, select the **Axes** workspace.

2. Activate home-in function.

- On the *Settings* navigation bar, select the *Process settings* workspace.



- In the *Process settings* workspace select the *General* dialog box.

- In the *Home-in sensor* group box touch the **Yes** button for the **Activate** selector switch.

The home-in calibration is performed automatically during the building process.

- If necessary, change the calibration interval by touching the **Calibration interval (layers)** field.

3. Switch on Cooling system

☞ *Components and accessories* manual, section *Cooling system - Switching on Cooling system*.

## 6.6 Building

### 6.6.1 Starting building process

If, prior to the start of the building process, it is necessary to change the pre-filter on the recirculating filter unit, when the **Start building process** button is touched a message appears with a prompt to change the filter.

If starting the building process involves an inert gas change, during the building process start phase a message appears that an inert gas change will be undertaken.

Flooding the process chamber, the elevator system and the Recirculating filter system with inert gas as well an inert gas change can take up to 40 minutes.

#### 1. Fitting extraction nozzle

☞ [6.3.4 Fitting extraction nozzle](#).

#### NOTICE

If the building process is started without the extraction nozzle fitted, the even extraction of process by-products will not be ensured. This situation can degrade the quality of the parts.

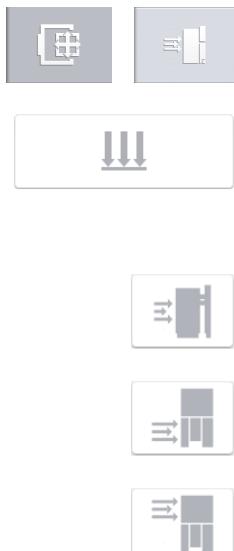
Fit the extraction nozzle prior to closing the process chamber door.

#### 2. Close process chamber door

☞ [6.3.2.2 Closing process chamber door](#).

#### 3. If necessary, expel the air trapped below the platforms if, after undertaking servicing work, or after the machine has been at standstill for an extended period, loading the building task involves an inert gas change to argon:

- On the *Manual operation* navigation bar, select the *Process conditions* workspace.
- Lower all platforms to the bottom end position:  
Touch **Lower all platforms** button on the screen.
- Flood Recirculating filter system, elevator system and process chamber on the machine with inert gas:
  - Flood Recirculating filter system:  
Touch **Flood recirculating filter system** button on the screen.
  - Flood elevator system:  
Touch **Flood elevating system** button on the screen.
  - Flood process chamber:  
Touch **Flood process chamber** button on the screen.



# Operation

EOS M 290



- Raise all platforms back to the initial position.  
Touch **Raise all platforms** button on the screen.  
The platforms move to the initial position.



The platforms are only allowed to be moved if the elevator system and the process chamber are completely flooded with inert gas.

## 4. Start building process:



- Select *Building tasks* navigation bar.



- Start building process:  
Touch the **Start building process** button on the screen.  
Readiness for building is established. The process chamber, the elevator system and the Recirculating filter system are flooded with inert gas.  
The **Status information** button for opening the *Establish readiness for building* window appears at the left edge of the screen.  
The building process starts as soon as all the necessary process conditions have been established.

## 6.6.2 Interrupting building process

### **WARNING**



### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

### **NOTICE**

For reasons of process reliability and parts quality, only interrupt the building process as long as absolutely necessary.

If you interrupt the building process for more than 15 min, the part may suffer slight distortion.

For reasons of process reliability and part quality, only open the process chamber door if absolutely necessary.



1. Select *Home* navigation bar.

2. Touch the **Pause building process** button on the screen.

The building process is continued until the current layer is recoated or exposed. The building process is then interrupted.

3. Make settings if necessary.

4. Open process chamber door if necessary  
☞ *6.3.2.1 Opening process chamber door.*

5. Make required change.

### **WARNING**



### **Explosive atmosphere!**

An explosive atmosphere can be produced in combination with air by swirled up metal powder.

Avoid swirling up metal powder.



6. Close process chamber door

☞ *6.3.2.2 Closing process chamber door.*

7. Select *Home* navigation bar:

Touch **Home** button on the screen.

8. Continue building process:

Touch **Continue building process** button on the screen.

The building process is continued with the next layer to be recoated or exposed as soon as all the necessary process conditions have been established.

# Operation

EOS M 290

## 6.6.3 Cancelling building process



1. Select *Home* navigation bar.



2. Touch **Stop** button on the screen.  
A message appears on the screen.
3. Accept message using **OK**.



The layer currently being processed is always exposed to the end before the building process is cancelled.

If you want to continue the building process, you must restart the building process

☞ [6.6.1 Starting building process](#).

In some circumstances it can be necessary to export the building task to the machine again.

## 6.7 Taking machine out of operation



Alternatively, you can also use the *Take out of operation* wizard to take out of operation the machine.

For this purpose on the *Wizards* navigation bar, select the **Take out of operation** wizard.

On completion of the building process, the building platform is in the position in which the last layer of the current job was exposed. All the space around the parts is filled with loose metal powder.

1. Accept completion of the building process by touching the **OK** button.



### 6.7.1 Unpacking parts

#### **WARNING**



#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

#### **NOTICE**

When moving the recoater, ensure there are no obstacles in the path of the recoater.



EOS recommends the use of the optionally available Conveying module to collect the metal powder on unpacking the parts.

☞ *IPCM M extra Operating instructions, Components manual, section Conveying module.*



1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Move dispenser platform to the bottom end position:

- Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.

- Touch **Inching run dosing platform down** button on the screen until the bottom end position is reached.

3. Open process chamber door

☞ *6.3.2.1 Opening process chamber door.*



# Operation

EOS M 290

4. Place sieve with mesh size suitable for the metal powder used in the dispenser duct.
5. Connect equipotential bonding wire for the sieve to the connector on the right side wall of the process chamber.
6. Close process chamber door  
☞ *6.3.2.2 Closing process chamber door.*
7. Move building platform up approx. 30 mm:



- Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
- In the field for the **Platforms inching run / step movement** selector switch enter the value **30** and accept using **OK**.
- Touch **Step movement run building platform up** button on the screen.



8. Open process chamber door  
☞ *6.3.2.1 Opening process chamber door.*
9. Uncover parts using a brush and push excess metal powder onto the sieve into the dispenser duct.

## ⚠ WARNING



### Explosive atmosphere!

An explosive atmosphere can be produced in combination with air by swirled up metal powder.

Avoid swirling up metal powder.

10. Carefully scrape the metal powder through the sieve using a spatula, do not apply pressure.
11. Repeat steps **7.** to **10.** until the building platform has reached its top end position, the parts are completely unpacked and all loose metal powder has been sieved into the dispenser duct.
12. Clean building platform and parts uncovered using the Wet separator.

## 13. Remove building platform with the sintered parts:

**⚠ CAUTION****Falling building platform!**

On removal from the machine, the building platform with the sintered parts may fall and crush the feet. Depending on the building platform used and the size/quantity of sintered parts, the weight can be up to 50 kg.

While setting down the building platform, fingers and hands may be crushed between the building platform to be set down and the surface.

- Remove and transport the building platform with the sintered parts using the Lifting truck or the Electrical Lifting truck if necessary.
- Wear closed safety shoes (comparable with EN IEC 61340-4-3 and EN ISO 20345, safety class S1).
- Do not reach into the hazard area.

- Separate building platform from the building platform carrier:  
Undo fastening bolts.
- Pick up building platform with the sintered parts using the Lifting truck or the Electrical Lifting truck and transport away.  
☞ Components and accessories manual, section *Lifting truck - Picking up, transporting, setting down standard building platform, Removing, transporting, setting down building platform with positioning bores / with pallet*.
- IPC M extra Operating instructions, Components manual, section *Lifting truck - Picking up, transporting, setting down standard building platform, Removing, transporting, setting down building platform with positioning bores / with pallet*.

**⚠ CAUTION****Falling machine parts!**

On picking up, transporting and setting down, the exchangeable frame may crush hands, arms or feet.

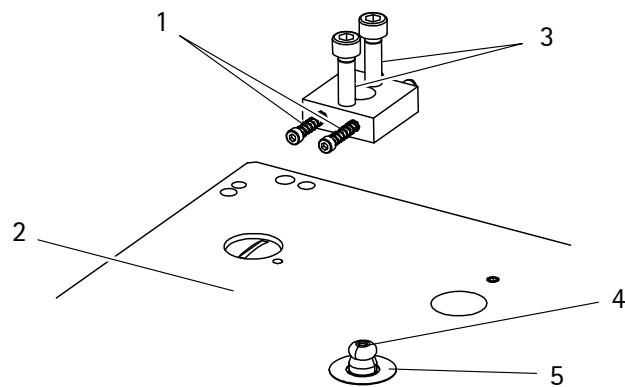
- Keep hands and arms out of the hazard area.
- Drive over unevenness on the floor, thresholds etc. only with extreme care. Always transport the exchangeable frame at the lowest possible height during this process.

# Operation

EOS M 290

14. In the case of the usage of a building platform that can be fixed using positioning pins, if necessary remove positioning pins:

- Place a protective washer centrally over both positioning pins on the building platform carrier.



- |   |  |
|---|--|
| <p>1 Pre-loading springs<br/>2 Building platform carrier<br/>3 Jacking bolt</p> | <p>4 Positioning pin<br/>5 Protective washer</p> |
|---|--|

- Press together the pre-load springs on the puller and fit puller to the positioning pin.
  - Screw bolts into the puller and remove positioning pins together with the puller.
15. Disconnect equipotential bonding wire for the sieve on the right side wall of the process chamber.
  16. Remove empty sieve from the dispenser duct and remove from the process chamber.
  17. Vacuum clean any adhering metal powder residue from the sieve.
  18. Close process chamber door  
 *6.3.2.2 Closing process chamber door.*

19. Move top edge of the building platform carrier to the height of the top edge of the web between building duct and dispenser duct:

- Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.
- Touch **Inching run building platform down** button on the screen until the required position is reached.



### 6.7.2 Emptying collector duct

#### ⚠ WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

#### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.



EOS recommends the use of the optionally available Conveying module to empty the collector duct.

☞ [IPCM M extra Operating instructions, Components manual, section Conveying module](#).

#### 1. Unpack parts

☞ [6.7.1 Unpacking parts](#).



Ensure that the top edge of the building platform carrier is at the same height as the top edge of the web between the building duct and the dispenser duct.



#### 2. On the *Manual operation* navigation bar, select the Axes workspace.



#### 3. Move dispenser platform to the bottom end position:

- Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.

- Touch **Inching run dosing platform down** button on the screen until the bottom end position is reached.



#### 4. Move recoater to the right end position:

Touch **Move recoater to right end position** button on the screen.



#### 5. Open process chamber door

☞ [6.3.2.1 Opening process chamber door](#).

#### 6. Place sieve with mesh size suitable for the metal powder used in the dispenser duct.

#### 7. Connect equipotential bonding wire for the sieve to the connector on the right side wall of the process chamber.

#### 8. Close process chamber door

☞ [6.3.2.2 Closing process chamber door](#).

# Operation

EOS M 290



9. Move up collector platform until the metal powder is at the height of the web between the collector duct and building duct:  
Touch **Inching run collector platform up** button on the screen.
10. Open process chamber door  
 *6.3.2.1 Opening process chamber door.*
11. Use a shovel to move protruding metal powder from the collector duct to the sieve in the dispenser duct.

## **WARNING**



### **Explosive atmosphere!**

An explosive atmosphere can be produced in combination with air by swirled up metal powder.

Avoid swirling up metal powder.

12. Disconnect equipotential bonding wire for the sieve on the right side wall of the process chamber.
13. Remove empty sieve from the dispenser duct and remove from the process chamber.
14. Vacuum clean any adhering metal powder residue from the sieve.
15. Close process chamber door  
 *6.3.2.2 Closing process chamber door.*

### 6.7.3 Cleaning process chamber

#### ⚠️ WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

#### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the Axes workspace.
2. Move dispenser platform to the bottom end position:
  - Change movement mode of the platforms to inching:  
Change **Platforms inching run / step movement** selector switch by touching the **Inching run** button.
  - Touch **Inching run dosing platform down** button on the screen until the bottom end position is reached.
3. Move recoater to the right end position:  
Touch **Move recoater to right end position** button on the screen.
4. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
5. Clean, remove extraction nozzle:
  - Clean extraction nozzle using the Wet separator.
  - Lift extraction nozzle on the right, pull out of the extraction duct and tip so that the extraction openings point upward.
  - Clean out the interior of the extraction nozzle.
  - Set down extraction nozzle outside the process chamber.
6. Protect metal powder in the dispenser duct against soiling:
  - Connect equipotential bonding wire from the sieve for the metal powder used to the connector on the right side wall of the process chamber.
  - Insert sieve in the dispenser duct.

# Operation

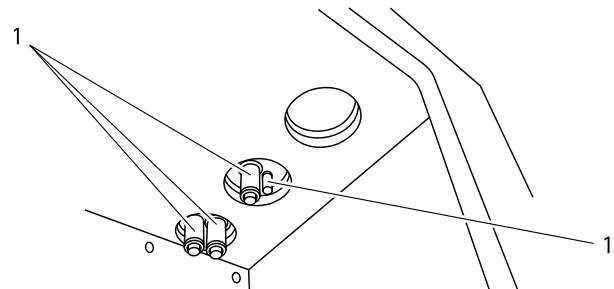
EOS M 290

7. Clean interior of the process chamber using the Wet separator.  
In particular, vacuum clean the following components in the process chamber:
  - Process chamber roof and walls

## NOTICE

Do not clean the window for the F-Theta module, as it may be scratched if touched with the attachment pipe or the crevice nozzle from the Wet separator.

- Inside of the process chamber door incl. window
- Oxygen sensors
- Camera viewing window
- Side lighting separating window



1 Oxygen sensors

## NOTICE

The oxygen sensors may be damaged on cleaning using the Vacuum cleaner due to the partial vacuum produced during this process or if touched with the attachment pipe or the crevice nozzle from the Wet separator.

Clean the oxygen sensors using the Vacuum cleaner from a distance of approx. 1 - 2 cm without touching them.

- Recoater incl. measuring strip
- Outer surface of the recoater axis and coiled strip covers
- Process chamber base plate.

8. Close process chamber door  
 6.3.2.2 *Closing process chamber door.*



9. Move recoater to the left end position:  
Touch **Move recoater to left end position** button on the screen.

10. Open process chamber door  
 6.3.2.1 *Opening process chamber door.*

11. Clean the areas in the process chamber previously covered by the recoater using the Wet separator.

12. Disconnect equipotential bonding wire for the sieve on the right side wall of the process chamber.
13. Remove empty sieve from the dispenser duct and remove from the process chamber.
14. Vacuum clean any adhering metal powder residue from the sieve.
15. Close process chamber door
  - ☞ *6.3.2.2 Closing process chamber door.*

## 6.8 Changing the type of metal powder

### **WARNING**



#### **Highly flammable, explosive metal condensate!**

Metal condensate is highly flammable.

Metal condensate containing aluminium can react exothermically in conjunction with metal condensate containing iron and oxygen.

Titanium powder and titanium condensate can react exothermically in conjunction with nitrogen.

If necessary, change the particle collecting bin and the cartridge filter for the Recirculating filter system.

☞ Components and accessories manual, section *Changing Recirculating filter system to different type of metal powder.*

### **NOTICE**

Do not mix different types of metal powder.

Clean the lower injection nozzle and the lower injection duct.

☞ *6.8.2 Cleaning lower injection nozzle and lower injection duct.*

Carry out on the Conveying module, on the Sieving module as well as on the Filling module all work for changing the type of metal powder.

☞ *IPCM M extra Operating instructions*, section *Changing the type of metal powder.*



Ensure the following steps have been completed in full on taking the machine out of operation before you start with the type of metal powder change:

- Unpack parts
- Empty collector duct
- Vacuum clean collector platform and building platform carrier
- Check recoater blade
- ☞ *6.7 Taking machine out of operation.*

# Operation

EOS M 290

## 6.8.1 Emptying dispenser duct

### **WARNING**



### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
 *2.7 Personal protective equipment.*



EOS recommends the use of the optionally available Conveying module to empty the dispenser duct.

 *PCM M extra Operating instructions, Components manual, section Conveying module.*



1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Move up dispenser platform until the metal powder protrudes approx. 30 mm above the web between the building duct and dispenser duct.

3. Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.

4. In the field for the **Platforms inching run / step movement** selector switch enter the value **30** and accept using **OK**.



5. Touch **Step movement dosing platform up** button on the screen.

6. Open process chamber door

 *6.3.2.1 Opening process chamber door.*

7. Shovel metal powder from the dispenser duct into a powder bin using a hand shovel.

### **WARNING**



### Explosive atmosphere!

An explosive atmosphere can be produced in combination with air by swirled up metal powder.

Avoid swirling up metal powder.

8. Close process chamber door

 *6.3.2.2 Closing process chamber door.*

9. Repeat steps **2.** to **8.** until the dispenser platform is at the top end position and the dispenser duct is completely empty.

## 6.8.2 Cleaning lower injection nozzle and lower injection duct

Metal powder residue may collect behind the lower injection nozzle and in the lower injection duct; this powder residue may contaminate the new metal powder after a change in the type of metal powder.

### ⚠ WARNING

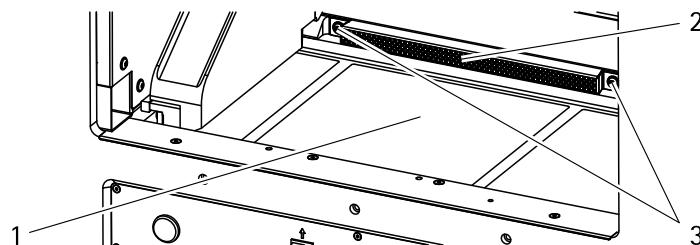


#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

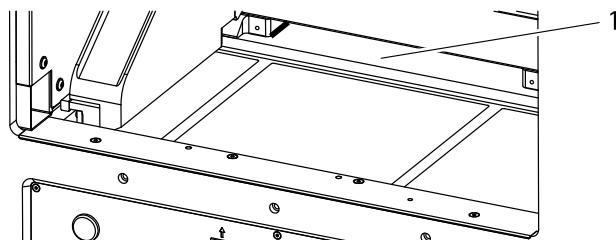
1. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
2. Undo fastening bolts on the left and right of the injection nozzle and remove.



1 Building platform carrier  
2 Lower injection nozzle

3 Fastening bolts

3. Remove injection nozzle from the injection duct and place on the building platform carrier.
4. Clean injection nozzle, injection duct and building platform carrier:  
Clean up metal powder residue that is adhering or that has collected using the Wet separator.
  - Clean interior and exterior of the injection nozzle.
  - Clean interior of the injection duct.



1 Injection duct

# Operation

EOS M 290

- Fit injection nozzle:
    - Fit injection nozzle in the injection duct.
    - Fit fastening bolts on the left and right of the injection nozzle and tighten.
  - Vacuum clean building platform carrier.
5. Close process chamber door
- ☞ *6.3.2.2 Closing process chamber door.*

## 6.8.3 Cleaning ducts

### ⚠ WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

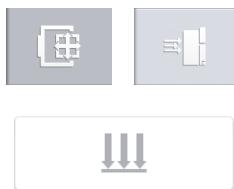
### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.

1. Unpack parts  
☞ *6.7.1 Unpacking parts.*
2. Empty collector duct  
☞ *6.7.2 Emptying collector duct.*
3. Emptying dispenser duct  
☞ *6.8.1 Emptying dispenser duct.*
4. Clean lower injection nozzle and lower injection duct  
☞ *6.8.2 Cleaning lower injection nozzle and lower injection duct.*
5. On the *Manual operation* navigation bar, select the Axes workspace.  

6. Move recoater to the right end position:  
Touch **Move recoater to right end position** button on the screen.
7. Open process chamber door  
☞ *6.3.2.1 Opening process chamber door.*
8. Clean process chamber base plate, collector platform, building platform carrier, dispenser platform and webs between collector duct, building duct and dispenser duct using the Wet separator.
9. Close process chamber door  
☞ *6.3.2.2 Closing process chamber door.*

**10.** Lower all platforms to the bottom end position:



- On the *Manual operation* navigation bar, select the *Process conditions* workspace.

- Touch **Lower all platforms** button on the screen.

**11.** Open process chamber door

☞ *6.3.2.1 Opening process chamber door.*

**12.** Clean collector, dispenser and building duct using the Wet separator.

**13.** Clean collector, dispenser platform and building platform carrier and wall of the ducts using moist paper towels:

- Moisten paper towels with rubbing alcohol.
- Wipe off surfaces of the collector and dispenser platform as well as of the building platform carrier using the most paper towels.
- Wipe off walls of the ducts from top to bottom.
- Thoroughly dry all surfaces wiped.
- If necessary clean the cleaned surfaces of adhering fluff using the Wet separator.
- Have used paper towels disposed of  
☞ *2.8 Disposal.*

**14.** Close process chamber door

☞ *6.3.2.2 Closing process chamber door.*

# Operation

EOS M 290



7

---

## Troubleshooting



## 7.1 Fuses – location and marking

### ⚠ WARNING



### Hazardous electrical voltage!

Direct or indirect contact with electrically live parts can result in an electric shock.

- The machine switching cabinet is only allowed to be opened by an electrician.
- Prior to opening the switching cabinet, the *MAIN SWITCH* must be switched off.
- All work on the electrics is only allowed to be performed by an electrician.



You will find the positions and functions of the fuses in the wiring diagram in the machine folder.

## 7.2 Fault tables

### 7.2.1 Building process

Malfunction / error message	Possible cause	Rectification
Recoater remains stuck over the surface of the bed of powder during powder application or collides with parts.	Layers become detached on the part.	☞ <i>Malfunction Layers become detached on the part.</i>
	Open layers on parts curl significantly.	☞ <i>Malfunction Open layers on parts curl significantly.</i>
	Uneven layer of powder, uneven horizontal surfaces on part	☞ <i>Malfunction Uneven layer of powder, uneven horizontal surfaces on part.</i>
	Building platform not lowered correctly.	Contact EOS support.
	Application of force by the recoating system is incorrect.	Contact EOS support.
	Optics system is incorrectly adjusted or faulty.	Contact EOS support.

# Troubleshooting

EOS M 290

Malfunction / error message	Possible cause	Rectification
	Window on the F-Theta module is soiled.	 <i>6.4.6 Checking window for the F-Theta module, clean if necessary.</i>
	Quality of the metal powder is degraded by incorrect storage.	Contact EOS support.
Layers become detached on the part.	CAD data are faulty.	Check CAD data, if necessary correct.
	Layer data have been prepared incorrectly.	Check SLI files, if necessary repeat preparation.
	Incorrect process parameters are assigned.	Check process parameters, correct if necessary.
	Optics are incorrectly adjusted or faulty.	Contact EOS support.
Open layers on parts curl significantly.	Support at the part is inadequate.	Generate new STL data with adequate support.
	Window on the F-Theta module is soiled.	 <i>6.4.6 Checking window for the F-Theta module, clean if necessary.</i>
	Extraction nozzle is not fitted.	Fit extraction nozzle in the process chamber.

Malfunction / error message	Possible cause	Rectification
Uneven powder application, uneven horizontal surfaces on part.	Recoater blade is worn.	 8.4.3 Turning, replacing recoater blade (steel blade / ceramic blade).  8.4.4 Replacing scraper lip (soft recoating)
	Motor final stage is not correctly adjusted.	Contact EOS support.
	Recoating system is faulty.	Contact EOS support.
	Optics are incorrectly adjusted or faulty.	Contact EOS support.
Uneven vertical surfaces on part.	Scanner is not correctly adjusted.	Contact EOS support.
	Incorrect positioning of the laser beam due to incorrect laser switching times, faulty scanner or incorrect operation.	Contact EOS support.
Layer offsets on the part.	Part layers become detached.	 Malfunction Layers become detached on the part.
	Scanner is faulty.	Contact EOS support.
Powder insufficient for a complete recoating.	Amount dosed is too low.	Increase amount dosed.

# Troubleshooting

EOS M 290

## 7.2.2 Recoating and elevator system

### 7.2.2.1 Recoater module

Malfunction / error message	Possible cause	Rectification
Recoater does not move.	Safety circuit is open.	Rectify cause of the opening of the safety circuit.
	Emergency stop circuit is open.	Rectify reason for the opening of the emergency stop circuit
Recoater module does not move to end position	Jammed parts torn out are blocking the path.	Remove jammed, torn out parts. Check recoater blade for soiling, clean if necessary.
	Amount of powder is excessive. Excess metal powder is blocking the path.	Remove excess metal powder and re-define amount dispensed.

### 7.2.2.2 Building platform / Z-axis

Malfunction / error message	Possible cause	Rectification
Building platform or Z-axis does not move.	Safety circuit is open.	Rectify cause of the opening of the safety circuit.
	Emergency stop circuit is open.	Rectify reason for the opening of the emergency stop circuit.
Start position is not correct.	Start position is incorrectly adjusted.	Contact EOS support.
Z-axis does not move to the removal position.	Removal position is incorrectly adjusted.	Contact EOS support.

Malfunction / error message	Possible cause	Rectification
Z-axis moves to the mechanical end stop.	Reference switch is faulty.	Contact EOS support.
Building platform is not locked.	There are foreign bodies between the building platform carrier and building platform.	Deactivate vacuum pump, remove foreign body between building platform carrier and building platform.
Building platform heating does not work	Safety circuit is open.	Rectify cause of the opening of the safety circuit.
	Emergency stop circuit is open.	Rectify reason for the opening of the emergency stop circuit.
	Controller malfunction.	Shut down system and re-start.

### 7.2.3 Process chamber

Malfunction / error message	Possible cause	Rectification
Process chamber door cannot be opened.	Process chamber door safety interlock is active.	 6.3.1.4 Restarting system.
It is possible to open process chamber door during the building process.	Process chamber door safety interlock is faulty.	Contact EOS support.
Process chamber is not illuminated.	Process chamber lighting is switched off.	Switch on process chamber lighting.
	LED lamp is faulty.	Contact EOS support.
	Process chamber light is faulty or the power supply is interrupted.	Contact EOS support.

# Troubleshooting

EOS M 290

## 7.2.4 Inert gas supply

Malfunction / error message	Possible cause	Rectification
Oxygen content in the process chamber is too high.	Inert gas supply is not switched on.	Switch on inert gas supply.
	Machine inert gas control unit is faulty	Contact EOS support.
	Gas leak in the machine.	Contact EOS support.
Oxygen sensor test is not successful.	Oxygen content in the process chamber is too low.	Perform oxygen sensor test correctly.
	Oxygen sensor in the oxygen safety circuit is faulty. Oxygen sensor circuit is faulty.	Contact EOS support.

### 7.2.4.1 Laser

Malfunction / error message	Possible cause	Rectification
Laser does not expose.	LASER key-operated switch is in the Laser Off position.	Turn LASER key-operated switch to Laser On position.
	Safety circuit is open.	Rectify reason for the opening of the safety circuit, see Enabling safety circuit.
	Emergency stop circuit is open.	Rectify reason for the opening of the emergency stop circuit ☞ <a href="#">6.3.1.2 Running up the system after an emergency stop.</a>
	Circuit breaker has tripped.	Check circuit breaker, reset if necessary.
	Laser fan is faulty.	Contact EOS support.

Malfunction / error message	Possible cause	Rectification
	Laser or laser fine fuse is faulty.	Contact EOS support.
	Laser does not switch on.	Switch off laser at the LASER key-operated switch, wait at least 30 s and switch on again.
	Optical fibre is broken or damaged.	Contact EOS support.
Part strength insufficient.	Laser power in the building area is too low due to soiling of the F-Theta lens or the window for the F-Theta lens.	Clean window  <a href="#">6.4.6 Checking window for the F-Theta module, clean if necessary.</a> For cleaning the F-Theta lens contact the EOS support.
	Laser power is set too low.	Correct Power exposure parameter in the exposure types.
	Optics are incorrectly adjusted.	Contact EOS support.
	Laser is faulty.	Contact EOS support.

#### 7.2.4.2 Scanner

Malfunction / error message	Possible cause	Rectification
Distortion / twist on the scanner field.	Calibration of the scanner field is incorrect.	Contact EOS support.
	Scanner is faulty.	Contact EOS support.
Layer offsets on the part.	Number of layers after which automatic calibration of the scanner mirrors is performed is too high.	Reduce number of layers.

# Troubleshooting

EOS M 290

## 7.2.5 Other malfunctions

Malfunction / error message	Possible cause	Rectification
Failure of individual machine components.	Related circuit breaker or fuse has tripped or is faulty.	Check circuit breaker or fuse, if necessary reset or replace.



8

---

Maintenance



## 8.1 Servicing

### 8.1.1 Servicing certificate



EOS recommends documenting the inspection and servicing work performed.

### 8.1.2 Annual machine service



For quality assurance, EOS recommends having an annual machine service performed.

- It is not possible to use the machine for production during the machine service.
- Contact EOS support early to agree a date for servicing.

The machine service includes extensive inspection and servicing work on the entire system in addition to the work described in the servicing schedule:

- Optics
- Mechanics
- Electrics
- Controller.

# Maintenance

EOS M 290

## 8.2 Inspection and servicing schedule

### 8.2.1 Machine

w = weekly

m = monthly

Work to be performed	prior to start of Building process	after end of Building process	w	m
Check function of the process chamber door lock immediately after the start of the building process <i>☞ 8.3.2 Checking correct function of the process chamber door lock.</i>			X	
Clean process chamber <i>☞ 6.7.3 Cleaning process chamber.</i>	X			
Check condition of the recoater blade / the scraper lip. The surface of a new layer of powder must be free of scoring. Turn blade or replace <i>☞ 6.4.5 Checking recoater blade / scraper lip.</i>	X			
Check window for the F-Theta module for soiling and damage with the aid of the inspection mirror and clean, replace if necessary <i>☞ 6.4.6 Checking window for the F-Theta module, clean if necessary.</i>	X			
Check coiled strip covers on the recoater guide for correct seating and damage <i>☞ 8.3.6 Checking coiled strip cover.</i>	X			
Inspect power connection for damage <i>☞ 8.3.8 Checking correct function of the main switch.</i>			X	
Check MAIN SWITCH for correct function <i>☞ 8.3.8 Checking correct function of the main switch.</i>				X
Check emergency stop circuit for correct function <i>☞ 8.3.9 Checking correct function of the emergency stop circuit.</i>				X

Work to be performed	prior to start of Building process	after end of Building process	w	m
Check safety circuit for correct function ☞ <i>8.3.10 Checking correct function of the safety circuit.</i>				X

sm = six monthly

a = annually

Work to be performed	sm	a
Check process chamber door ☞ <i>8.3.3 Checking process chamber door.</i>	X	
Check, clean building area lighting window ☞ <i>8.3.8 Checking correct function of the main switch.</i>	X	
Check, clean camera window ☞ <i>8.3.5 Checking, cleaning camera window.</i>	X	
Replace switching cabinet air filter mat ☞ <i>8.3.7 Replacing switching cabinet air filter mats</i>		X

## 8.2.2 Inert gas supply

w = weekly

m = monthly

Work to be performed	prior to start of Building process	after end of Building process	w	m
Check inert gas supply hose to the machine for cracks, cuts, kinking.			X	
Check inert gas supply system.	See manufacturer's maintenance schedule.			

## 8.2.3 Components and accessories

You will find information about the inspection and servicing of peripherals in the Components and accessories manual.

# Maintenance

EOS M 290

## 8.3 Inspection and servicing work

### ⚠ WARNING

#### Undefined operating state!

Persons may be injured or the machine damaged by unauthorised operation of the machine on undertaking inspection and servicing work.

Mark the machine as long as you are undertaking inspection and servicing work.

### NOTICE

Unsatisfactory servicing of the machine can cause problems in relation to the part quality or damage to the machine.

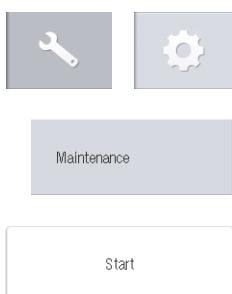
Perform all inspection and servicing work regularly as per the instructions described in this section.

### NOTICE

The installation or usage of spare parts from other manufacturers can cause problems in relation to the part quality or damage to the machine.

Only use original spare parts approved by EOS.

### 8.3.1 Performing platform or recoater homing



1. On the *Settings* navigation bar, select the *Maintenance* workspace.
2. In the *Maintenance* workspace select the *Maintenance* dialog box.
3. Touch **Start homing** button for the related platform or recoater to start the homing.

### 8.3.2 Checking correct function of the process chamber door lock

1. Starting building process
  - ☛ 6.6.1 *Starting building process.*
2. Press unlocking button in the process chamber door handle and at the same time try to pivot the process chamber door handle upward.  
It must not be possible to open the process chamber door while the building process is running
  - ☛ 6.3.2.1 *Opening process chamber door.*

### 8.3.3 Checking process chamber door

#### **WARNING**

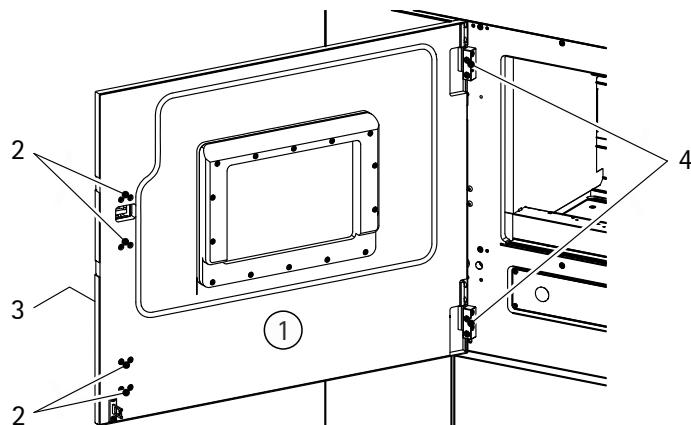


#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

1. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
2. Check door handle for damage, replace if necessary.
3. Check door handle for correct seating, tighten if necessary.
4. Check hinges on the process chamber door for damage.  
If a hinge is damaged:  
Contact EOS support.
5. Check process chamber door hinges for correct seating, tighten if necessary.
6. Check seal on the process chamber door for damage.



1 Process chamber door

3 Door handle

2 Door handle fastening bolts

4 Process chamber door hinges

If there is damage apparent on the seal:  
Contact EOS support.

# Maintenance

EOS M 290

## 8.3.4 Check, clean building area lighting window

### ⚠ WARNING

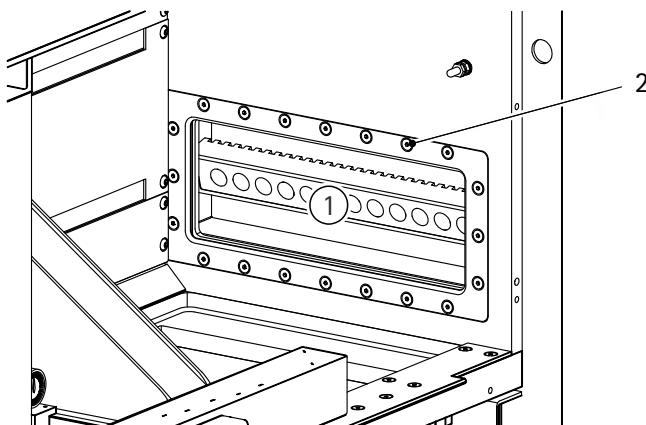


#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

1. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
2. Check building area lighting window for scratches and soiling, remove any soiling  
☞ [6.7.3 Cleaning process chamber](#).
3. Check all window fastening bolts for correct seating.



1 Building area lighting window

2 Fastening bolt

If fastening bolts are loose:  
Tighten fastening bolts.

### 8.3.5 Checking, cleaning camera window

#### **WARNING**

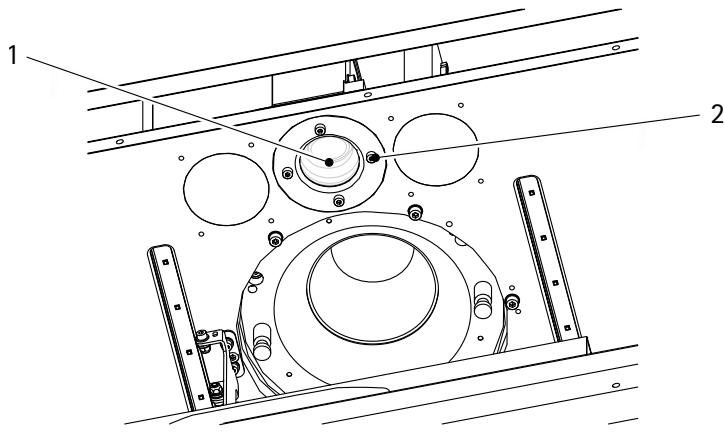


#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
 *2.7 Personal protective equipment.*

1. Open process chamber door  
 *6.3.2.1 Opening process chamber door.*
2. Check camera window for scratches and soiling, remove any soiling  
 *6.7.3 Cleaning process chamber.*
3. Check all window fastening bolts for correct seating.



1 Window

2 Fastening bolt

If the fastening bolts are loose:  
Tighten fastening bolts.

# Maintenance

EOS M 290

## 8.3.6 Checking coiled strip cover

### **⚠ WARNING**

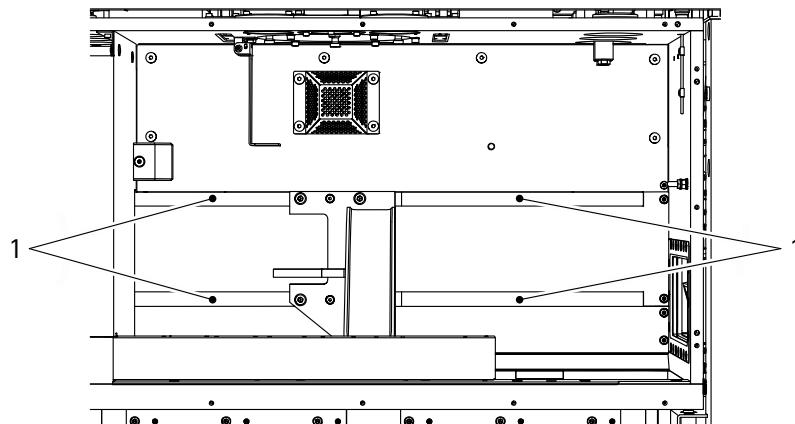


#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

1. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).
2. Check whether the coiled strip cover on the recoater guide fully covers the openings between the process chamber and the guide elements at the rear of the process chamber.  
If the openings are not fully covered:  
Contact EOS support.



1 Coiled strip cover

3. Check whether the coiled strip covers for the recoater guide are damaged.  
If there are cracks or signs of heavy wear on the coiled strip cover:  
Contact EOS support.

### **NOTICE**

If the coiled strip cover does not cover fully or is damaged, the guide elements will become soiled and wear prematurely.

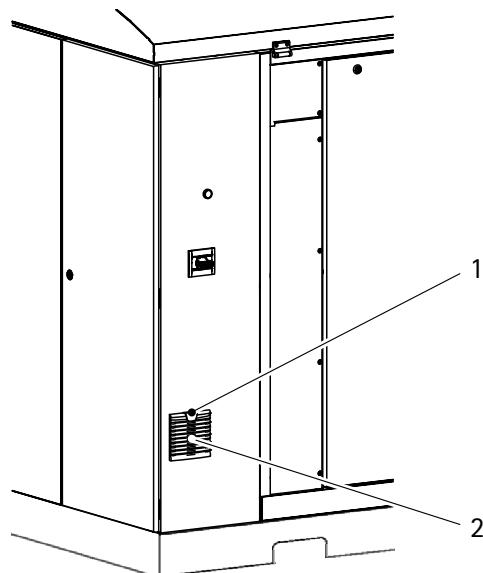
### 8.3.7 Replacing switching cabinet air filter mats

**NOTICE**

Remove the air filter mats when the fans are not running so that dust cannot enter the switching cabinet.

**1. Open fan grille:**

Lift catch on the fan grille and pivot down fan grille to the front.



1 Lug

2 Cover grille

**2. Remove air filter mat.**

**3. Fit new filter mat.**



Ensure that the rough, unmarked side of the filter mat is pointing toward the cover grille.

**4. Close fan grille:**

Hinge fan grille toward the switching cabinet flaps and close lugs.

# Maintenance

EOS M 290

## 8.3.8 Checking correct function of the main switch

### NOTICE

If you switch off the machine's *MAIN SWITCH*, the machine is electrically isolated. All unsaved data are lost.

1. Check whether the indicator on the machine is flashing.
2. Shut down system.  
☞ [6.3.1.3 Shutting down system.](#)



Once the *MAIN SWITCH* has been switched off, the machine computer shuts down and the system switches off. This process can take a few minutes.

3. Check whether the indicator on the machine is flashing.

### ⚠ WARNING



### Hazardous electrical voltage!

If the indicator on the machine has not gone out, the *MAIN SWITCH* is not functional.

If the *MAIN SWITCH* is not functional:

- Unplug the machine from the mains.
- Contact EOS support.

### 8.3.9 Checking correct function of the emergency stop circuit

**NOTICE**

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the Axes workspace.

2. Reduce speed of the recoater:

Change **Adjusting recoater speed** selector switch by touching the **Adjust mode** button.

3. Move recoater to the left end position:

Touch **Move recoater to left end position** button on the screen.

4. Check correct function of the emergency stop circuit:

• Move recoater to right:

Touch **Inching run recoater to right position** button on the screen.

• While the recoater is moving, press **EMERGENCY STOP** button.

The movement of the recoater must stop immediately.

A message must appear on the screen.

The EMERGENCY STOP circuit is not functional if

- the movement of the recoater is not stopped immediately or
- no message appears on the screen or
- the recoater can be moved with **EMERGENCY STOP** button pressed.

**⚠ WARNING****Emergency stop circuit not functional!**

If you operate the machine without a functional emergency stop circuit, serious injuries and damage may occur.

- Shut down the system  
☞ [6.3.1.3 Shutting down system](#).
- Secure the machine against switch on.
- Contact EOS support.

5. Accept message using **OK**.

# Maintenance

EOS M 290

## 8.3.10 Checking correct function of the safety circuit

### ⚠ WARNING



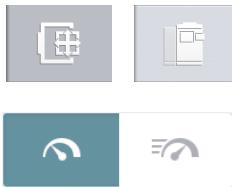
#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

### NOTICE

When moving the recoater, ensure there are no obstacles in the path of the recoater.



1. On the *Manual operation* navigation bar, select the Axes workspace.



2. Reduce speed of the recoater:  
Change **Adjusting recoater speed** selector switch by touching the **Recoater adjust mode** button.

3. Open process chamber door

☞ [6.3.2.1 Opening process chamber door](#).

4. Check movements:

- With the process chamber door open click one after the other the **Inching run right / left / up / down** buttons:  
No movement is allowed to take place.
- Close process chamber door  
☞ [6.3.2.2 Closing process chamber door](#).
- With the process chamber door closed, click one after the other the **Inching run right / left / up / down** buttons:  
Movement must take place.



5. Check correct function of the safety circuit:



- Move recoater to right:  
Touch **Inching run recoater to right position** button on the screen.
- While the recoater is moving, open process chamber door.  
The movement of the recoater must stop immediately.  
A message must appear on the screen.  
☞ [6.3.2.1 Opening process chamber door](#).

The safety circuit is not functional if

- the movement of the recoater is not stopped immediately or
- no error message appears on the screen or
- the recoater can be moved with the process chamber door open.

#### **WARNING**



#### **Safety circuit not functional!**

If you operate the machine without a functional safety circuit, injuries and damage may occur.

- Do not reach into the process chamber.
- Shut down the system
  - ☞ *6.3.1.3 Shutting down system.*
- Secure the machine against switch on.
- Contact EOS support.

### 8.3.11 Checking power connection

#### **DANGER**



#### **Hazardous electrical voltage!**

If the mains cable or the mains plug is damaged, direct or indirect contact with electrically live parts will result in an electric shock.

- Do not touch the damaged parts.
- Secure the hazard area against physical contact.
- Shut down the system
  - ☞ *6.3.1.3 Shutting down system.*
- Isolate the power connection and secure against switch on.
- Contact EOS support.

1. Inspect the machine's mains cable and plug for damage.

# Maintenance

EOS M 290

## 8.4 Repair work

### **WARNING**

#### **Improper repair!**

Persons may be injured or the machine damaged by improperly undertaken repair work.

- Repair work not listed in this section is only permitted to be performed by EOS service personnel.
- Contact EOS support.

### **WARNING**

#### **Undefined operating state!**

Persons may be injured or the machine damaged by unauthorised operation of the machine on undertaking repair work.

Mark the machine as long as you are undertaking repair work.

### **WARNING**

#### **Missing safety features on the machine!**

Persons may be injured if safety features are not fitted to the machine.

Install all safety features removed after completion of the repair work and ensure that they function correctly.

### **WARNING**



#### **Hazardous electrical voltage!**

Direct or indirect contact with electrically live parts can result in an electric shock.

- The machine switching cabinet is only allowed to be opened by an electrician.
- Prior to opening the switching cabinet, the *MAINSWITCH* must be switched off.
- All work on the electrics is only allowed to be performed by an electrician.
- Prior to working on the electrics, unplug from the mains or isolate the power connection. The mains plug must be secured against plugging back in or the power connection secured against switching back on. If the power connection is disconnected from the electrical supply by an additional *MAINSWITCH* as per UL-489, this switch must be secured against switching back on.

### **NOTICE**

The installation or usage of spare parts from other manufacturers can cause problems in relation to the part quality or damage to the machine.

Only use original spare parts approved by EOS.

## 8.4.1 Removing / fitting recoater cassette

### 8.4.1.1 Removing recoater cassette

#### ⚠️ WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

#### NOTICE



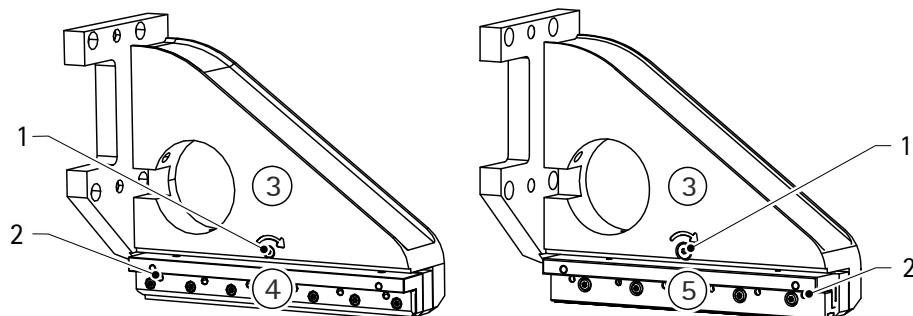
When moving the recoater, ensure there are no obstacles in the path of the recoater.

1. On the *Manual operation* navigation bar, select the Axes workspace.
2. Reduce speed of the recoater:  
Change **Adjusting recoater speed** selector switch by touching the **Recoater adjust mode** button.
3. Move recoater to the left end position:  
Touch **Move recoater to left end position** button on the screen.
4. Move building platform approx. 100 mm below the building plane:
  - Change movement mode of the platforms to step movement:  
Change **Platforms inching run / step movement** selector switch by touching the **Step movement** button.
  - In the field for the **Platforms inching run / step movement** selector switch enter the value **100** and accept using **OK**.
  - Touch **Step movement run building platform down** button on the screen.
5. Move dosing platform approx. 10 mm below the building plane:
  - In the field for the **Platforms inching run / step movement** selector switch enter the value **10** and accept using **OK**.
  - Touch **Step movement dosing platform down** button on the screen.
6. Move recoater to right edge of the building duct:  
Touch **Inching run recoater to right position** button on the screen until the required position is reached.
7. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door](#).

# Maintenance

## EOS M 290

8. Undo fastening bolts for the recoater cassette and unscrew.



- |   |   |
|---|---|
| 1 Clamping pin bolt                         | 4 Recoater cassette, steel blade / ceramic blade / brush recoater |
| 2 Fastening bolts<br>Recoater cassette (6x) | 5 Recoater cassette, soft recoating                               |
| 3 Recoater module                           |   |

9. Clamp clamping pin bolt on the recoater module:  
Turn clamping pin bolt clockwise by 90°.  
The clamping pin bolt is clamped when the resistance to rotation increases.
10. Remove recoater cassette with recoater blade fitted.

**⚠ CAUTION**



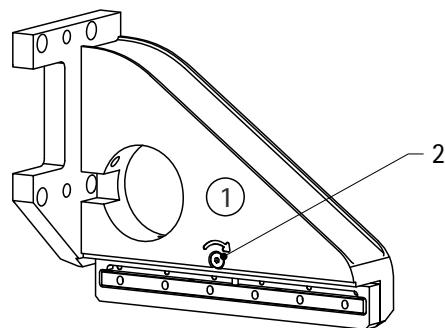
**Sharp recoater blade!**

There is a risk of cuts to the hands while removing the recoater cassette with steel blade / ceramic blade fitted.

Wear strong protective gloves (comparable to EN 388).

### 8.4.1.2 Fitting recoater cassette

1. Open process chamber door  
☞ [6.3.2.1 Opening process chamber door.](#)
2. Clamp clamping pin bolt on the recoater module:  
Turn clamping pin bolt clockwise by 90°.  
The clamping pin bolt is clamped when the resistance to rotation increases.



1 Recoater module

2 Clamping pin bolt

3. Insert recoater cassette into the machine's recoater module to the stop.

**⚠ CAUTION****Sharp recoater blade!**

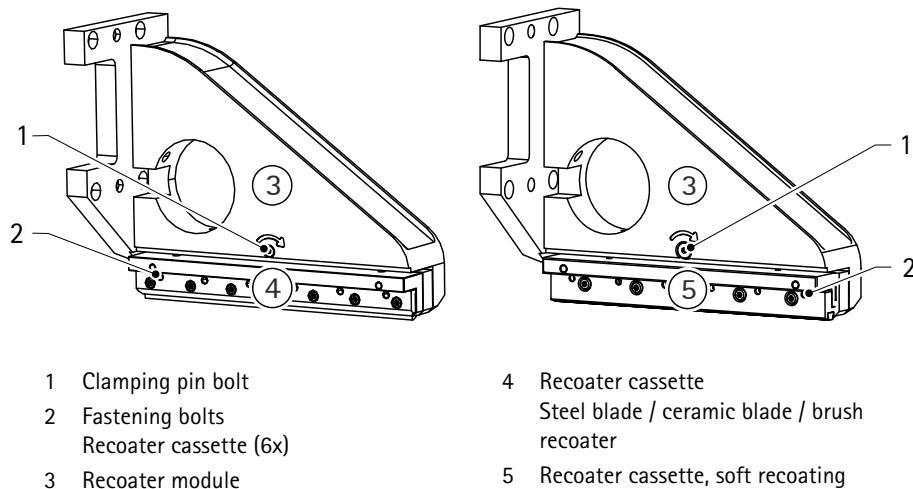
There is a risk of cuts to the hands while fitting the recoater cassette with steel blade / ceramic blade fitted.

Wear strong protective gloves (comparable to EN 388).

# Maintenance

## EOS M 290

4. Unclamp clamping pin bolt on the recoater module:  
Turn clamping pin bolt clockwise by 90°.  
The clamping pin bolt is unclamped when the resistance to rotation decreases.



After unclamping the clamping pin bolt, the blade module is fastened to the recoater module.

5. Screw in recoater cassette fastening bolts and tighten.
6. Close process chamber door  
☞ [6.3.2.2 Closing process chamber door](#).
7. Move recoater to the left end position:  
Touch **Move recoater to left end position** button on the screen.



### 8.4.2 Unclamping recoater blade (steel blade / ceramic blade)

If the recoater has collided with an obstacle, the recoater blade may have been distorted and moved.

The recoater blade must be released prior to the next job start if the recoater has collided with an obstacle. The recoater blade will then re-adopt the required shape and position.

#### **WARNING**

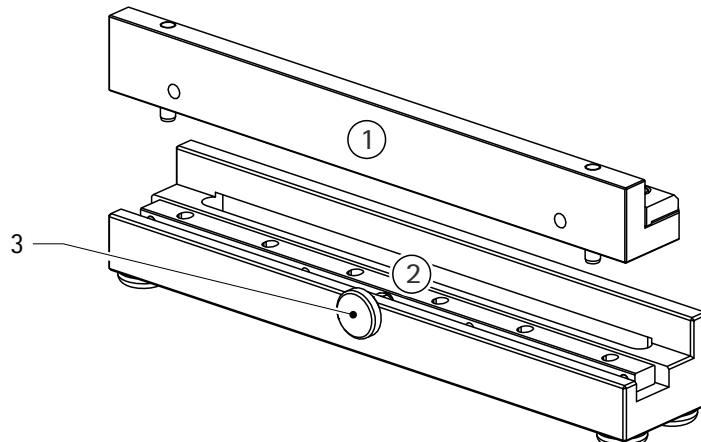


#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

1. Remove recoater cassette  
☞ *8.4.1.1 Removing recoater cassette.*
2. Clean up recoater blade, recoater cassette and recoater module using the Wet separator.
3. Fit recoater cassette in the adjustment aid:  
Press in clamping pin against the adjustment aid, insert the recoater cassette in the adjustment aid to the stop and release clamping pin.



1 Recoater cassette

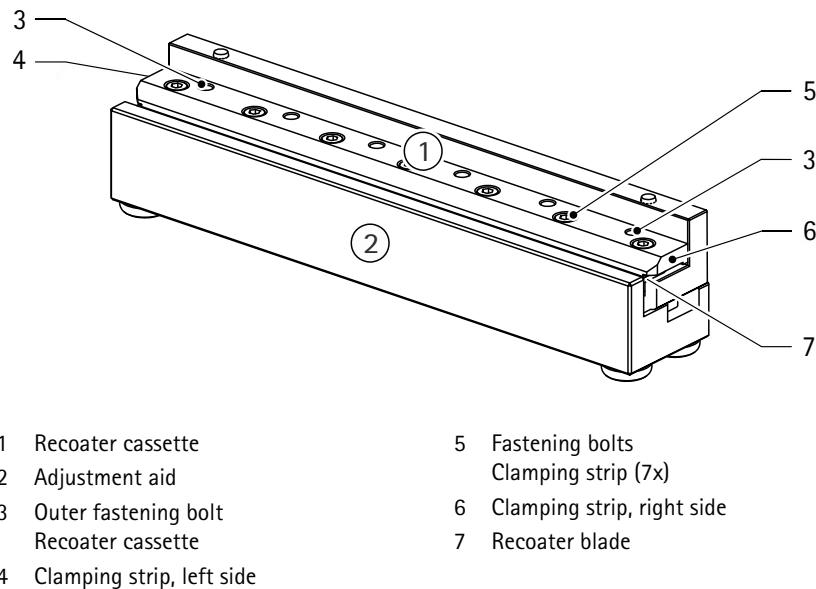
2 Adjustment aid

3 Recoater cassette clamping pin

# Maintenance

## EOS M 290

4. Fix recoater cassette in the adjustment aid:  
Fit outer fastening bolts to the recoater cassette and tighten hand-tight.



5. Unclamp recoater blade:  
Undo clamping strip fastening bolts until the clamping strip can be moved and the recoater blade is pressed against the adjustment aid.
6. Tighten fastening bolts to a torque of 8 Nm in sequence starting on the left side of the clamping strip.
7. Undo outer recoater cassette fastening bolts on the adjustment aid and unscrew.
8. Press in clamping pin against the adjusting aid and remove recoater cassette from the adjustment aid.
9. Fit recoater cassette  
 *8.4.1.2 Fitting recoater cassette.*

### 8.4.3 Turning, replacing recoater blade (steel blade / ceramic blade)

If there is scoring in the bed of powder in the direction of travel of the recoater, the recoater blade must be turned or changed.

#### **WARNING**



#### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
 *2.7 Personal protective equipment.*

#### **CAUTION**

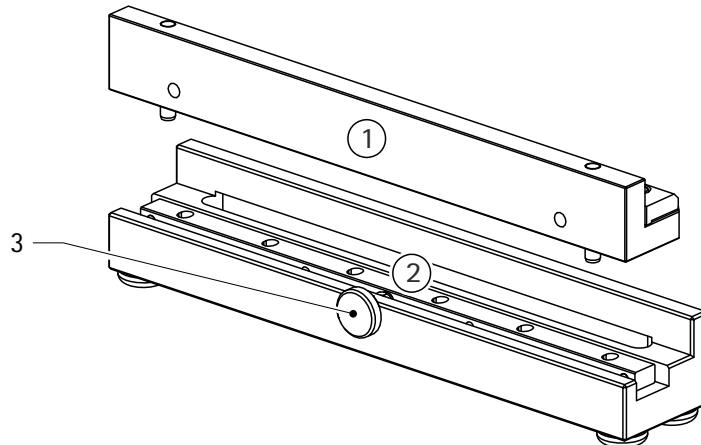


#### **Sharp recoater blade!**

There is a risk of cuts to the hands while removing and fitting the recoater blade.

Wear strong protective gloves (comparable to EN 388).

1. Remove recoater cassette  
 *8.4.1.1 Removing recoater cassette.*
2. Clean up recoater blade, recoater cassette and recoater module using the Wet separator.
3. Fit recoater cassette in the adjustment aid:  
Press in clamping pin against the adjustment aid, insert the recoater cassette in the adjustment aid to the stop and release clamping pin.



1 Recoater cassette

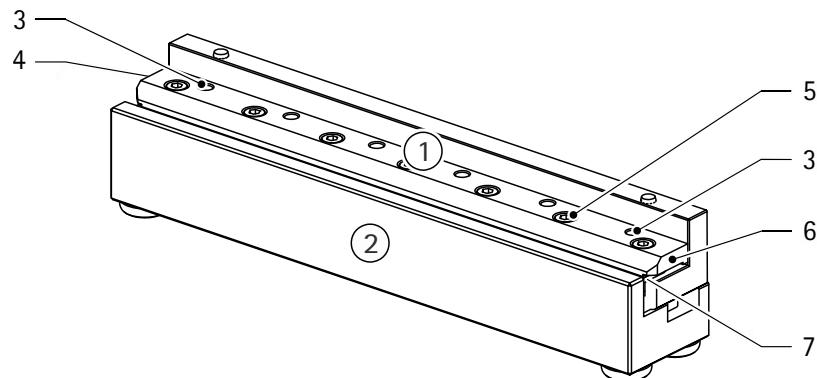
2 Adjustment aid

3 Recoater cassette clamping pin

# Maintenance

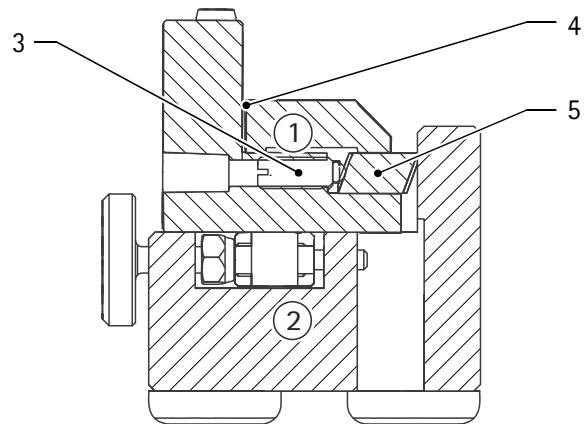
## EOS M 290

4. Fix recoater cassette in the adjustment aid:  
Fit outer fastening bolts to the recoater cassette and tighten hand-tight.



- |   |   |   |  |
|---|---|---|--|
| 1 | Recoater cassette                         | 5 | Fastening bolts<br>Clamping strip (7x) |
| 2 | Adjustment aid                            | 6 | Clamping strip, right side             |
| 3 | Outer fastening bolt<br>Recoater cassette | 7 | Recoater blade                         |
| 4 | Clamping strip, left side                 |   |  |

5. Undo fastening bolts for the clamping strip and unscrew.
6. Remove clamping strip.
7. Remove recoater blade.
8. Fit new recoater blade or turned recoater blade:
  - Fit recoater blade.



- |   |                   |   |                |
|---|-------------------|---|----------------|
| 1 | Recoater cassette | 4 | Clamping strip |
| 2 | Adjustment aid    | 5 | Recoater blade |
| 3 | Pressure pin      |   |                |



While fitting the recoater blade, make sure that

- the recoater blade is free of adhering powder
- the recoater blade is inserted with an unworn recoating face pointing downward
- the recoating face of the recoater blade is flat against the adjustment aid
- the right-angled edge of the recoating face is pointing away from the adjustment aid.

- Fit clamping strip to the recoater blade and loosely fit all fastening bolts.
9. Tighten fastening bolts to a torque of 8 Nm in sequence starting on the left side of the clamping strip.
  10. Undo outer recoater cassette fastening bolts on the adjustment aid and unscrew.
  11. Press in clamping pin against the adjusting aid and remove recoater cassette from the adjustment aid.
  12. Fit recoater cassette
    - ☞ *8.4.1.2 Fitting recoater cassette.*

# Maintenance

EOS M 290

## 8.4.4 Replacing scraper lip (soft recoating)

If there is scoring in the bed of powder in the direction of travel of the recoater, the scraper lip must be replaced.

### ⚠ WARNING

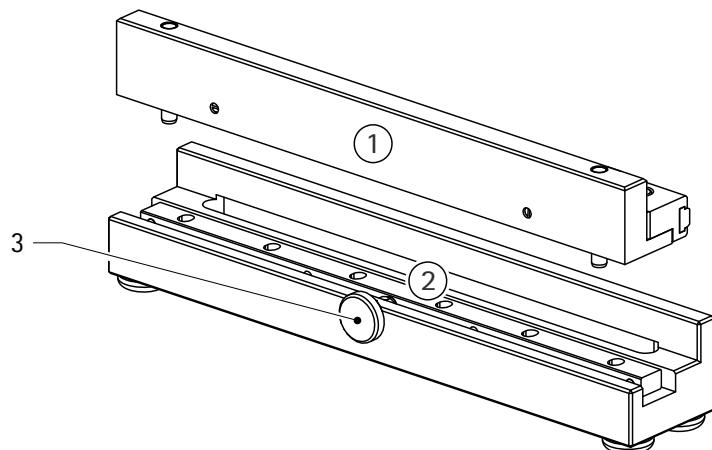


#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

1. Remove recoater cassette  
☞ [8.4.1.1 Removing recoater cassette](#).
2. Remove scraper lip from recoater cassette.
3. Clean up recoater cassette and recoater module using the Wet separator.
4. Cut new scraper lip to a length of 260 mm.
5. Fit scraper lip in the recoater cassette.
6. Fit recoater cassette in the adjustment aid:  
Press in clamping pin against the adjustment aid, insert the recoater cassette in the adjustment aid to the stop and release clamping pin.

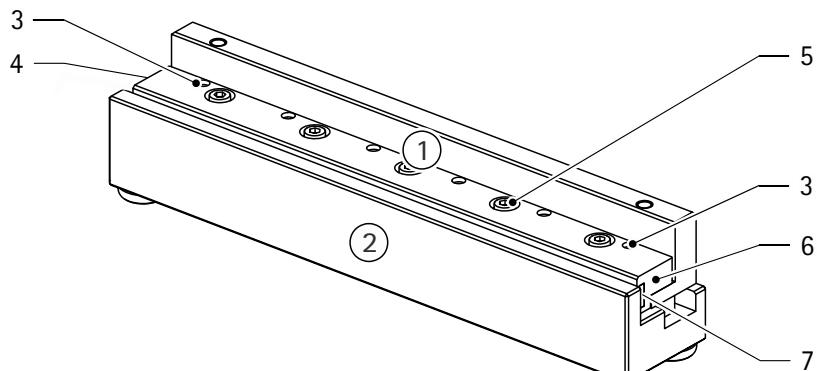


1 Recoater cassette

2 Adjustment aid

3 Recoater cassette clamping pin

- 7.** Fix recoater cassette to the adjustment aid:  
Fit outer fastening bolts to the recoater cassette and tighten hand-tight.



1	Recoater cassette	5	Fastening bolts Clamping strip (5x)
2	Adjustment aid	6	Clamping strip, right side
3	Outer fastening bolt Recoater cassette	7	Scraper lip
4	Clamping strip, left side		

- 8.** Undo clamping strip fastening bolts until the clamping strip can be moved and the scraper lip is pressed against the adjustment aid.  
**9.** Tighten fastening bolts at the rear end of the scraper lip to a torque of 8 Nm starting in order.  
**10.** Undo outer recoater cassette fastening bolts on the adjustment aid and unscrew.  
**11.** Press in clamping pin against the adjusting aid and remove recoater cassette from the adjustment aid.  
**12.** Fit recoater cassette  
☞ *8.4.1.2 Fitting recoater cassette.*

# Maintenance

EOS M 290

## 8.4.5 Replacing brush recoater (brush recoater)

If there is scoring in the bed of powder in the direction of travel of the recoater, the brushes for the brush recoater must be replaced.

### ⚠ WARNING

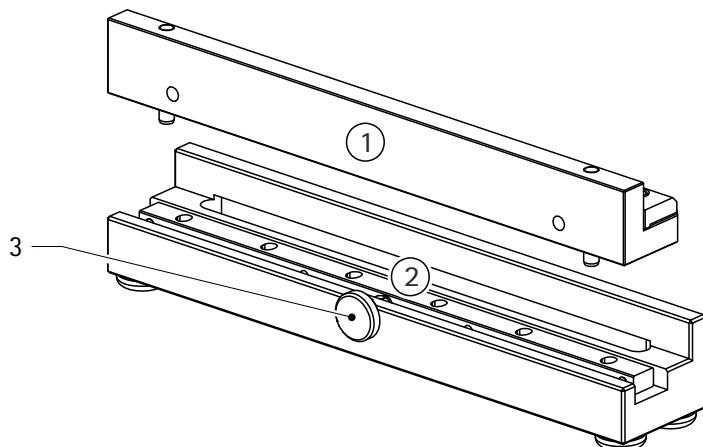


#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

1. Remove recoater cassette  
☞ [8.4.1.1 Removing recoater cassette](#).
2. Clean up brushes, recoater cassette and recoater module using the Wet separator.
3. Fit recoater cassette in the adjustment aid:  
Press in clamping pin against the adjustment aid, insert the recoater cassette in the adjustment aid to the stop and release clamping pin.

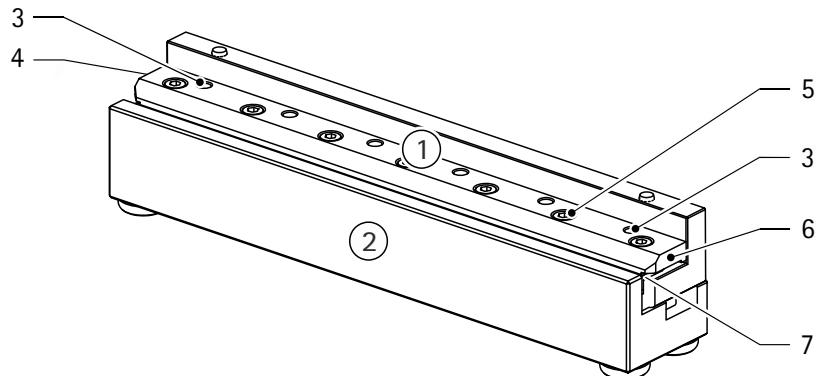


1 Recoater cassette

2 Adjustment aid

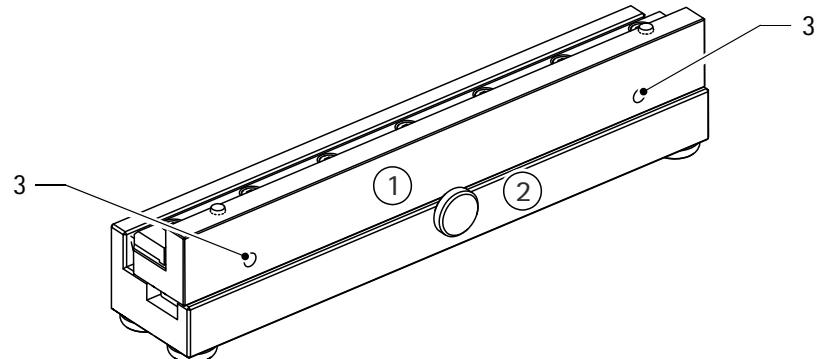
3 Recoater cassette clamping pin

4. Fix recoater cassette in the adjustment aid:  
Fit outer fastening bolts to the recoater cassette and tighten hand-tight.



- |                             |                              |
|-----------------------------|------------------------------|
| 1 Recoater cassette         | 5 Fastening bolts            |
| 2 Adjustment aid            | Clamping strip (7x)          |
| 3 Outer fastening bolt      | 5 Clamping strip, right side |
| Recoater cassette           | 7 Brushes                    |
| 4 Clamping strip, left side |                              |

5. Undo fastening bolts for the clamping strip and unscrew.
6. Remove clamping strip.
7. Remove brushes.
8. If necessary, unscrew pressure pins approx. 5 mm so that the new brushes can be inserted without stress.



- |                     |                |
|---------------------|----------------|
| 1 Recoater cassette | 3 Pressure pin |
| 2 Adjustment aid    |                |



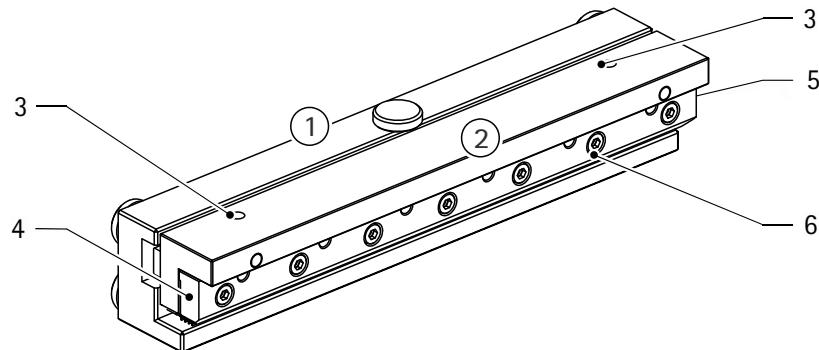
The pressure pins do not have any function if the recoater cassette is used as a brush recoater.

9. Fit new brushes.

# Maintenance

## EOS M 290

10. Fit clamping strip to the brushes and loosely fit all fastening bolts.
11. Tip adjustment aid with recoater cassette by 90°.



1 Adjustment aid  
2 Recoater cassette      3 Clamping pin  
4 Clamping strip, left recoater cassette



The brushes must lie in loose contact on the flat surface of the adjustment aid.

12. Tighten fastening bolts to a torque of 8 Nm in sequence starting on the left side of the clamping strip.
13. Undo outer recoater cassette fastening bolts on the adjustment aid and unscrew.
14. Press in clamping pin against the adjusting aid and remove recoater cassette from the adjustment aid.
15. Fit recoater cassette
  - ☞ [8.4.1.2 Fitting recoater cassette](#).

#### 8.4.6 Moving clear recoater

If a backup limit switch in the recoating system is tripped, the recoater stops and an error message appears on the screen. The recoater must be moved clear manually.

##### **WARNING**



##### **Harmful metal powder!**

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ *2.7 Personal protective equipment.*

1. Open process chamber door  
☞ *6.3.2.1 Opening process chamber door.*
2. Manually push recoater approx. 100 mm in the direction of the middle of the building area.
3. Close process chamber door  
☞ *6.3.2.2 Closing process chamber door.*
4. Perform homing with the recoater  
☞ *8.3.1 Performing platform or recoater homing.*



The cause of the tripping of the backup limit switch is not rectified by moving the recoater clear.

Contact EOS support if the fault occurs repeatedly.

# Maintenance

EOS M 290

## 8.4.7 Changing window for the F-Theta module

### ⚠ WARNING



#### Harmful metal powder!

Skin and eye contact with metal powder, as well as inhaling and swallowing metal powder can be harmful to the health.

Wear personal protective equipment during all work in the process chamber  
☞ [2.7 Personal protective equipment](#).

#### 1. Deactivate lens clearing:

- On the *Manual operation* navigation bar, select the *Process conditions* workspace.



#### 2. Deactivate lens clearing:

Touch **Lens clearing** button on the screen.

#### 3. Open process chamber door.

☞ [6.3.2.1 Opening process chamber door](#).

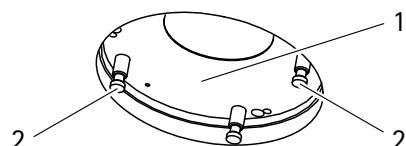
#### 4. Remove any soiling in the process chamber in the immediate vicinity of the window.

### NOTICE

Ensure you do not damage the window.

#### 5. Remove nozzle ring:

Take hold of nozzle ring at the right and left grip, turn and remove downward.



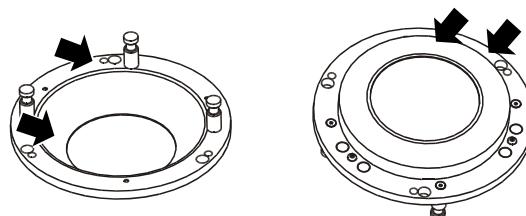
1 Nozzle ring

2 Grip

#### 6. Clean nozzle ring:

Completely remove deposits with alcohol and cellulose.

There must be no foreign bodies left on the contact surface.



7. Undo fastening bolts for the window unit and remove window unit downward.
8. Fit new window unit incl. O-ring.

**NOTICE**

Wear new disposable protective gloves (comparable to EN ISO 374-1, type A) to protect the window.

9. Evenly tighten fastening bolts for the window unit.
10. Fit nozzle ring:
  - Take hold of nozzle ring at grips on left and right so that the third grip is facing the rear.
  - Fit nozzle ring straight and rotate carefully until it can be clearly felt to engage.
11. Close process chamber door
  - ☞ 6.3.2.2 *Closing process chamber door*.
12. Activate lens clearing  
Touch **Lens clearing** button on the screen.



#### 8.4.8 Checking top process chamber lighting

1. Close process chamber door
  - ☞ 6.3.2.2 *Closing process chamber door*.



2. Select *Maintenance* navigation bar.



3. In the *Maintenance* workspace select the *Maintenance* dialog box.



4. Switch on top process chamber lighting and check:  
Set **Light (process chamber top)** ON / OFF selector switch to **ON** by touching the button.  
The process chamber lighting is activated.  
If it is not activated, contact EOS support.

# Maintenance

EOS M 290

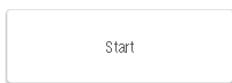
## 8.4.9 Calibrate oxygen sensor

1. Open process chamber door  
☞ 6.3.2.1 *Opening process chamber door.*

2. Select *Maintenance* navigation bar.



3. In the *Maintenance* workspace select the *Calibration* dialog box.



4. Start the calibration of the oxygen sensor:  
Touch **Start calibrating oxygen sensor** button.  
The oxygen sensor is calibrated.  
A message appears on the screen.

---

## Spare parts and consumables



## 9.1 Important information

Contact EOS support for wearing parts / spare parts and consumables that are not listed in the tables below.

## 9.2 Machine

### 9.2.1 Wearing parts

Quantity	Description	Comment	Article no.
1 pc.	Recoater blade, ceramic		300042295
1 pc.	Recoater blade, HSS		2200-4073
1 pc.	Recoater cassette Soft-Recoating		500008663
1 pkt.	Scraper lip silicone for Soft Recoating	10 pcs.	300042390
1 pkt.	Scraper lip NBR for Soft Recoating	10 pcs.	300042392
1 pc.	Recoater cassette Brush recoater		500007626
1 pkt.	Brush strip for Brush recoater	2 pcs.	2200-4366
1 pc.	Window unit for F-Theta module, incl. O-ring seal		5080-0045

### 9.2.2 Consumables

Quantity	Description	Comment	Article no.
1 pkt.	Optics cleaning paper	324 sheets Paper size 4" x 4"	9035-0019
-	Rubbing alcohol, Purity > 99.9 % (e.g. isopropanol)	Please obtain commercially	-

# Spare parts and consumables

EOS M 290

## 9.3 Building process

### 9.3.1 Consumables

#### Metal powder category A

Quantity	Description	Comment	Article no.
	Metal powder EOS CaseHardeningSteel 20MnCrZr		9030-0004
	Metal powder EOS CobaltChrome MP1		9011-0012
	Metal powder EOS Copper Cu		9030-0002
	Metal powder EOS MaragingSteel MS1		9011-0016
	Metal powder EOS NickelAlloy HX		9011-0023
	Metal powder EOS NickelAlloy IN625		9011-0022
	Metal powder EOS NickelAlloy IN718		9011-0020
	Metal powder EOS NickelAlloy IN939		9011-0030
	Metal powder EOS StainlessSteel 17-4PH		9011-0041
	Metal powder EOS StainlessSteel 254		9030-0007
	Metal powder EOS StainlessSteel 316L		9011-0032
	Metal powder EOS StainlessSteel CX		9011-0037
	Metal powder EOS StainlessSteel PH1		9011-0019
	Metal powder EOS ToolSteel 1.2709		9011-0042

## Metal powder category B

Number	Description	Comment	Article no.
	Metal powder EOS Aluminium AlF357		9011-0049
	Metal powder EOS Aluminium AlSi10Mg		9011-0024
	Metal powder EOS Aluminium Al2139-AM		9030-0008
	Metal powder EOS Titanium Ti64		9011-0014 9011-0039
	Metal powder EOS Titanium Ti64 ELI		9011-0017 9011-0040
	Metal powder EOS Titanium Ti64 Grade 5		9011-0045
	Metal powder EOS Titanium Ti64 Grade 23		9011-0046
	Metal powder EOS Titanium TiCP Grade 2		9011-0036
1 pc.	Building platform DirectBase S22		2200-4372
1 pc.	Building platform DirectBase S36		2200-4373
1 pc.	Building platform DirectBase TS36P		2200-4374
1 pc.	Building platform DirectBase AL30		2200-4819

# Spare parts and consumables

EOS M 290

## 9.3.2 Accessories

Quantity	Description	Comment	Article no.
1 pc.	Sieve for dispenser platform with equipotential bonding wire	w = 75 µm	200000321
1 pc.	Sieve for dispenser platform with equipotential bonding wire	w = 80 µm	1212-0312
1 pc.	Dial gauge with bracket		1212-0134
-	Brush, spatula, hand shovel, set of feeler gauges	Please obtain commercially.	-
1 pc.	Inspection mirror	65 x 40 mm	9080-0035



**EOS GmbH – Electro Optical Systems**  
Robert-Stirling-Ring 1  
D-82152 Krailling / München

Telephone: +49 (0)89 / 893 36-0  
Fax: +49 (0)89 / 893 36-285  
Internet: [www.eos.info](http://www.eos.info)  
E-mail: [info@eos.info](mailto:info@eos.info)

Original operating instructions

Machine - EOS M 290  
Article number: **9239-3441**  
Edition: 05.22