



EOS P 396

Installation Conditions



Operating instructions





EOS P 396

Laser-sintering system for plastics

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Important basic information

Important basic information

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Legal notes ■

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.

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

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

Structure of the Operating instructions ■

The EOS P 396 Operating instructions comprise the following manuals:

- Installation Conditions
- Operation
- Troubleshooting, Maintenance and Spare parts
- Software reference
- Accessories and Options.

Other reference documents ■

Machine folder

The Machine folder holds the declaration of conformity, data sheets, inspection and acceptance logs, the wiring diagram for the machine, as well as documentation for bought-in parts and is also a loose-leaf collection for information which you receive from EOS from time to time.



This manual describes the system components for the EOS P 396 laser sintering system without IPCM.

If you use components of the IPCM, also note the additional *Operating instructions* for the IPCM.

Conventions used in this manual

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 P 396.
- **Accessories**
is used to refer to the standard accessories, optional accessories or peripherals.
- **IPCM**
is used to refer to the Integrated Process Chain Management IPCM P or IPCM P plus.
- **PSW**
is used to refer to the process software necessary for the operation of the machine.
- **PPP**
is used to refer to *Part Property Profiles*, defined part properties for laser sintered parts that can be obtained with a standardised combination of machine, material and *PPP parameter sets*.

Pictograms



Hazard

Indicates the possibility of very serious injury or fatality, and the possibility of considerable damage to property.



Warning

Indicates the possibility of minor injury, the possibility of damage to the machine or its accessories and of possible problems related to the parts quality.

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Notice

Draws your attention to information that you should note.

Training

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



Risk of injury and damage!

The machine must not be operated by the customer without prior training by EOS.

Hotline

Telephone	+49 (0)89 / 893 36-151
Fax	+49 (0)89 / 893 36-196
Address	EOS GmbH - Electro Optical Systems Robert-Stirling-Ring 1 D-82152 Krailling / München
E-mail	servicehotline@eos.info
Homepage	www.eos.info

When calling the EOS-hotline, ensure you have all the relevant information to hand, including

- Machine type
- Machine serial number
- Software version number
 - Process software (PSW)
 - EOSTATE.

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Scope of delivery, dimensions and weights

Scope of delivery ■

Standard ■

- Basic machine, switching cabinet, control terminal
- Exchangeable frame with building platform
- Blade module II (blue)
- Software
 - Windows Embedded 7
 - *Process software (PSW)*
 - *EOSTATE Basic*
- Parameter set *PA 2200 Balance*
- Protective equipment
 - *Polimask 230* face mask with particle filter (filter category P3)
 - Goggles
 - *Nitra Tex* disposable protective gloves, unpowdered
 - Kevlar gloves with arm protection
- Tools for cleaning the laser window
 - Optics cleaning paper
 - Optics cleaning fluid (5 % dodecyl sodium sulphate solution)
- Operating instructions.

Part Property Management modules ■

- Depending on the configuration of the basic machine, the following *Part Property Management* modules are part of the scope of delivery:
- *Original EOS parameter sets*
 - *PPP parameter sets*
 - *Exposure editor*
 - *Initial values for parameters.*

Hardware modules ■

- Depending on the configuration of the basic machine, the following system modules are part of the scope of delivery:
- Blade module I (green)
 - Blade module III (red).

Accessories and Options ■

Software ■

- *Offline PSW*
- *EOS RP-Tools*
- *Magics RP*
- *EOSPACE*
- *EOSTATE*. Modules.

System ■

- Cooling system (air-water / water-water)
- Unpacking and sieving station P 1 / P 3
- Lifting truck
- Unpacking stand P 3
- Exchangeable frame (additional)
- Shot-peening cabinet.

Dimensions and weights

Packaged delivery

- Basic machine
 - Pallet dimensions (W x D x H): 1430 x 1430 x 2,270 mm
Crate dimensions (W x D x H): 1530 x 1530 x 2,320 mm
 - Pallet weight: approx. 1,100 kg
Crate weight: approx. 1,355 kg.
- Control terminal, switching cabinet, Exchangeable frame with building platform (2 off)
 - Pallet dimensions (W x D x H): 2080 x 880 x 2,320 mm
Crate dimensions (W x D x H): 2180 x 980 x 2420 mm
 - Pallet weight: approx. 480 kg
Crate weight: approx. 710 kg.
- Cooling system
 - Dimensions (W x D x H): 570 x 720 x 900 mm
 - Weight: approx. 110 kg.
- Unpacking and sieving station P 1 / P 3
 - Crate with pallet dimensions (W x D x H): 1842 x 961 x 1796 mm
 - Weight: approx. 330 kg.
- Lifting truck
 - Dimensions (W x D x H): 650 x 950 x 1,550 mm
 - Weight: approx. 40 kg.
- Unpacking stand
 - Dimensions (W x D x H): 1250 x 700 x 1,000 mm
 - Weight: approx. 100 kg.
- Shot-peening cabinet
 - Dimensions (W x D x H): 1400 x 1400 x 2,100 mm
 - Weight: approx. 320 kg.



- Depending on the region to which the delivery is made, the scope of delivery is supplied on pallets or in crates.
- The basic machine and the Shot-peening cabinet are delivered as individual packages. All other parts of the scope of delivery are either supplied as individual packages or combined into one or more packages.

Operational status ■

- Basic machine with exchangeable frame inserted
 - Dimensions (W x D x H): 1230 x 1270 x 2,100 mm
 - Weight: approx. 1060 kg (without plastic powder filling)
 - Weight of plastic powder filling:
 - max. 70 kg in the powder supply bins
 - max. 24 kg in the collector bins
 - max. 55 kg in the exchangeable frame.
- Switching cabinet
 - Dimensions (W x D x H): 610 x 790 x 2,100 mm
 - Weight: approx. 340 kg.
- Control terminal
 - Dimensions (W x D x H): 950 x 700 x 1,550 mm
 - Weight: approx. 43 kg.
- Exchangeable frame with building platform
 - Dimensions (W x D x H): 395 x 420 x 680 mm
 - Weight: approx. 10 kg.
- Cooling system
 - Dimensions (W x D x H): 405 x 600 x 850 mm
 - Weight: approx. 70 kg (without cooling water filling)
 - Weight cooling water filling: approx. 10 kg.
- Unpacking and sieving station P 1 / P 3
 - Dimensions (W x D x H): 1502 x 813 x 1376 mm
 - Dimensions with dust protection cover (Option)
(W x D x H): 1502 x 813 x 1623 mm
 - Weight (without exchangeable frame): approx. 210 kg
 - Weight exchangeable frame FORMIGA P 1
(filled with parts, plastic powder): max. 20 kg
 - Weight exchangeable frame EOSINT / EOS P 3
(filled with parts, plastic powder): max. 65 kg
 - Configuration I: Weight recycled powder bin
(filled with plastic powder): max. 25 kg.
- Lifting truck
 - Dimensions (W x D x H): 565 x 835 x 1,450 mm
 - Weight: approx. 34 kg.

Scope of delivery, dimensions and weights

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- Unpacking stand
 - Dimensions (W x D x H): 1190 x 620 x max. 1500 mm
 - Weight: approx. 70 kg (without exchangeable frame, used powder bin)
 - Weight exchangeable frame incl. filling: max. 65 kg
 - Weight used powder bin incl. filling: max. 34 kg.
- Shot-peening cabinet
 - Dimensions (W x D x H): 1260 x 1230 x 1990 mm
 - Weight: approx. 275 kg (without shot-peening medium filling)
 - Weight of shot-peening medium filling: approx. 25 kg.

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Scope of delivery, dimensions and weights

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On-site requirements

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On-site requirements

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Delivery, installation, ■ commissioning

Delivery, storage ■

The machine, the accessories and materials are delivered on the agreed date by a freight hauler in one or more packages.

For the storage of the scope of delivery until the agreed commissioning dated, the customer is to provide a weather-proof storage area that meets the specified ambient conditions, see *Place where the machine is to be installed*.

The customer unloads the scope of delivery and stores it until the date agreed for commissioning protected from the weather as per the specified ambient conditions, see *Unloading, transport, Place where the machine is to be installed*.

The customer checks the delivery for condition and completeness.

Obvious damage must be noted immediately on the shipping paperwork, documented and reported in writing to EOS.

Hidden damage must be documented and reported in writing to EOS immediately, at the latest within 5 days of delivery.

Unpacking, installation ■



Risk of injury and damage!

- **Incorrect unpacking of the machine and the accessories can cause serious injuries and extensive damage.**
- **The machine and the accessories must be unpacked correctly.**

The EOS service personnel arrive on the date agreed for commissioning and support the customer during unpacking of the scope of delivery.

The customer immediately installs the machine and the accessories in the planned location under the instruction of the EOS service personnel.

The EOS service personnel assemble the machine and the accessories, if necessary with the support of the customer.

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Commissioning ■



Risk of injury and damage!

- **Incorrect commissioning of the machine can cause serious injuries and extensive damage.**
- **The machine is only allowed to be commissioned by EOS service personnel.**

The EOS service personnel place the machine and the accessories in operation.



For the commissioning of the machine, provide 50 kg of the plastic powder type that is to be used for commissioning.

Unloading, transport ■

For a smooth process on unloading the machine and the accessories, as well as on transporting to the storage area of place where the machine is to be installed, the following requirements must be met:

- A forklift truck and a lifting truck with a carrying capacity suitable for the goods to be transported and adequate fork length must be available, see section 2, *Dimensions and weights*.
- There must be no unevenness or steps along the route taken by the lifting truck.
- The transport route must be kept clear.
- The transport route to the place the machine is to be installed must be of adequate dimensions for the scope of delivery, see section 2, *Dimensions and weights*.
- Door openings must be at least 5 cm wider and higher than the units to be transported, including the equipment used to transport the units.
- The weight of the transported goods combined with the weight of the equipment used to transport the goods must not exceed the maximum floor loading capacity, see *Floor loading capacity*.

Moving ■



Risk of injury and damage!

The machine is only permitted to be moved by EOS service personnel.



If you want to move your machine to a different production facility, please do the following:

- Inform us of your intentions and discuss terms and conditions, as well as dates with us.
- Prepare the new place where the machine is to be installed in accordance with this manual.

Place where the machine is to be installed ■

The machine is only allowed to be installed and operated in a closed room.

Floor characteristics ■

The floor in the room where the machine is installed must have the following characteristics:

- It must be hard, flat, and level. Unevenness of the area for the machine $\leq 5 \text{ mm/m}^2$.
- Free of interfering vibration.
If heavy machines such as presses or punches are to be operated in adjacent rooms, the machine must not be subjected to vibration.
- There must be no unevenness or steps along the route taken by the Lifting truck.

The floor covering in the room the machine is to be installed must have the following characteristics:

- The surface must be such that spilt plastic powder cannot be trapped.
- The surface must be easy to clean.

On-site requirements

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- The surface must be suitable for wet cleaning so that no plastic powder dust is produced during cleaning.
- The surface must be anti-slip.
- The floor covering must be resistant to solvents.
- The floor covering must be electrically conductive or have anti-static properties.
- It must be possible to pass over the floor covering with the Lifting truck.



Risk of slipping!

If you spill plastic powder on the floor, there is an extreme risk of slipping due to the spherical plastic powder grains.

Use a suitable floor covering in the working area, e. g. an industrial carpet or a rubber or plastic grid.

Floor loading capacity ■



Risk of collapse!

The floor of the room where the machine is installed can collapse if the floor loading capacity is not adequate for all the scope of delivery.

Ensure that the floor has adequate loading capacity. Here pay attention to the weight

- Of the machine in operational status incl. plastic powder filling
- Of accessories
- Of people
- Of other equipment in the immediate vicinity of the machine.

The machine stands on three levelling elements (115 x 115 mm).

Floor loading capacity

- Machine: $\geq 75 \text{ N/cm}^2$
- Unpacking stand: $\geq 158 \text{ N/cm}^2$.

Ambient conditions ■



Risk of injury and damage!

It is imperative that you observe the following ambient conditions so that the machine, accessories and all safety devices always function correctly and consistent production quality is assured.

Machine ■

Operational status:

- Permissible room temperatures:
 - 15 - 20 °C at 50 - 80 % relative atmospheric humidity
 - > 20 - 25 °C at 40 - 60 % relative atmospheric humidity
 - > 25 - 30 °C at 30 - 45 % relative atmospheric humidity.
- Noise emission (noise pressure level emissions): < 70 dB(A)
- Waste heat (incl. Cooling system): approx. 5 kW, max. 12 kW.

Not in operational status, machine not filled with plastic powder:

- Permissible room temperature: -25 - 55 °C
- Permissible relative atmospheric humidity: 20 - 80 %, non-condensing.

Other ambient conditions:

- The machine is only allowed to be installed and operated in a closed room.
- No single-sided local heating or cooling of the machine, e. g. by a radiator, air-conditioner, solar irradiation or a draught.
- There must be no visible formation of condensation on the laser cooling circuit.
- EMC
 - No devices that emit high-frequency radiation are allowed to be operated close to the machine.
 - No interference producing electrical installations are to be present in the room where the machine is installed.



The machine is an ISM device of class A, group 1 in accordance with EN 55011.

Accessories and Options ■

Nitrogen supply ■

The nitrogen generator is built into the machine.

Operational status:

- Permissible room temperature and permissible relative atmospheric humidity, see *machine, operational status*.
- Permissible temperature of the compressed air supplied:
≤ 10 °C above ambient air temperature.

Cooling system ■

Operational status:

- Permissible room temperature: 5 - 40 °C
- Noise emission (noise pressure level emissions): < 70 dB(A)
- Air-water Cooling system:
 - Fan performance: 1,200 m³/h
 - Waste heat: max. 2.8 kW.

Storage and transport:

- Permissible room temperature (Cooling system drained): -25 °C up to 70 °C
- Permissible relative atmospheric humidity: 20 - 95 %, non-condensing.



- **Ensure that the cooling air can flow freely. The minimum distance at the side to adjacent equipment / walls must be 0.3 m, the minimum spacing to the rear of the Cooling system must be 0.8 m.**
- **Do not place the Cooling system near the heating.**
- **Place the Cooling system at the same height as the machine.**
- **Air-water Cooling system:**
Ensure that the heat dissipated by the Cooling system is drawn off, or place the Cooling system in a separate, well ventilated room.

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On-site requirements

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Unpacking and sieving station P 1 / P 3

In the ATEX version the Unpacking and sieving station P 1 / P 3 is approved for operation in ATEX zone 22, category II 3D. The area inside the machine corresponds to category II 2D. All other measures for safe operation must be taken by the operating organisation as per directive 1999/92/EC.



The ambient conditions for the Unpacking and sieving station P 1 / P 3 are the same as the ambient conditions for the machine, see *Ambient conditions, Machine*.

Operating state:

Noise emission (noise pressure level emissions): 71 dB(A)

On moving up and down the building platform carrier the seal on the carrier produces a noise due to air flowing out.

On conveying using the powder pump, the waste air from the powder pump produces a noise that escapes via a silencer. The conveying is in operation for maximum 20 minutes during unpacking. The operator can interrupt and continue the conveying at any time.

Unpacking stand



The ambient conditions for the Unpacking stand are the same as the ambient conditions for the machine, see *Ambient conditions, Machine*.

Plastic powder

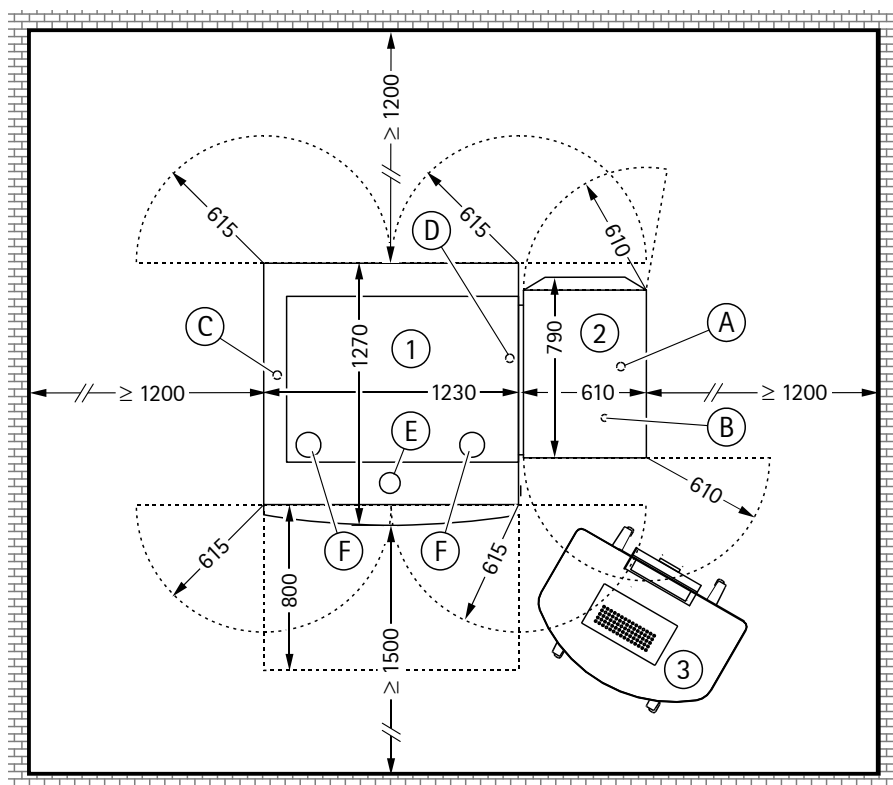
Storage:

- Permissible room temperature: 20 - 25 °C
- Permissible relative atmospheric humidity: approx. 40 - 60 %.

Space requirements ■

Installation plans ■

Machine ■

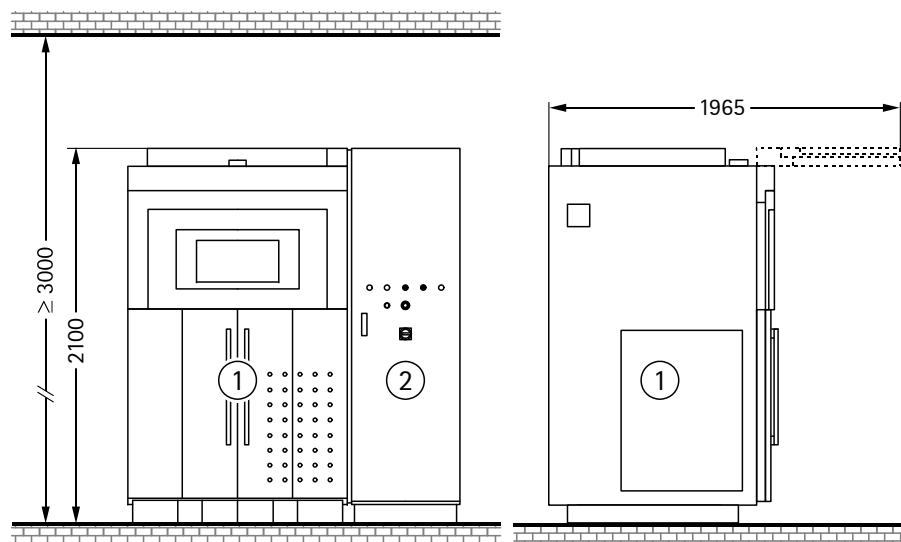


Dimensions in [mm]

- | | |
|---------------------|---|
| 1 Basic machine | A Power connection
(900 mm above floor) |
| 2 Switching cabinet | B Network connection
(750 mm above floor) |
| 3 Control terminal | C Compressed air connection
(800 mm above floor) |
| | D Cooling water connection
(1,950 mm above floor) |
| | E Extraction connection
(2,100 mm above floor) |
| | F Powder supply bin filling
(2,100 mm above floor) |

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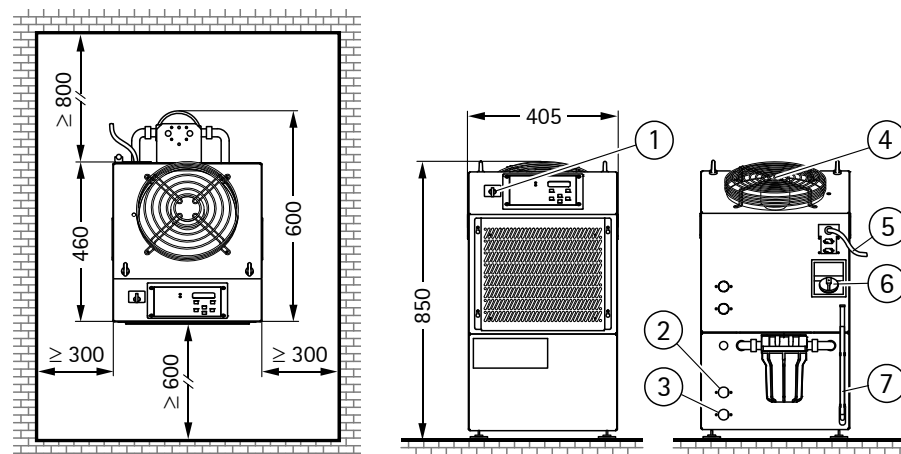


Dimensions in [mm]

1 Basic machine

2 Switching cabinet

Cooling system (air-water) ■



Dimensions in [mm]

1 MAIN SWITCH

2 Cooling water feed to the laser cooling circuit (blue)

3 Cooling water return from the laser cooling circuit (red)

4 Fan

5 Power connection

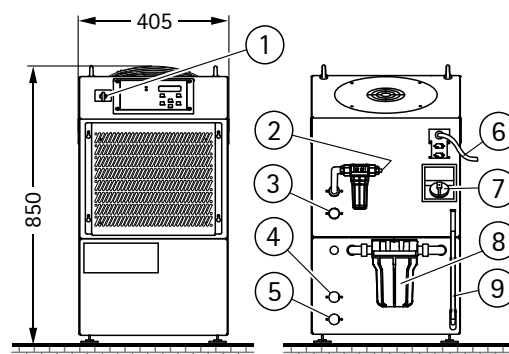
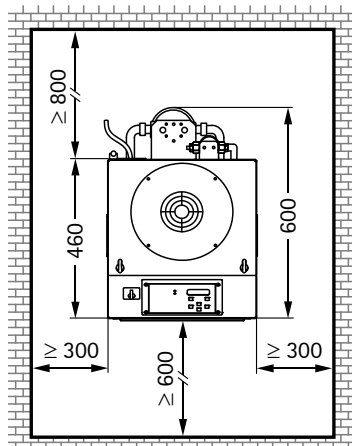
6 Tank filler

7 Hose level gauge / draining

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Cooling system (water-water) ■



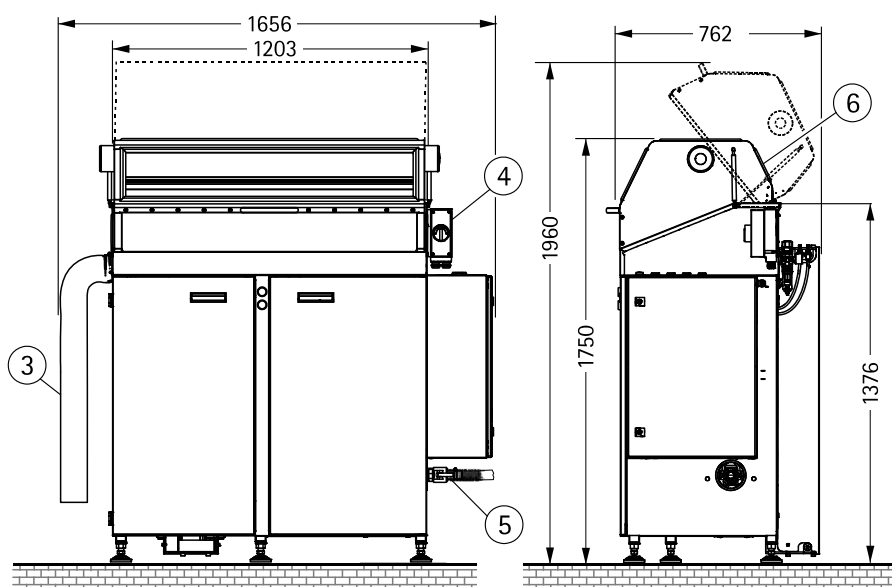
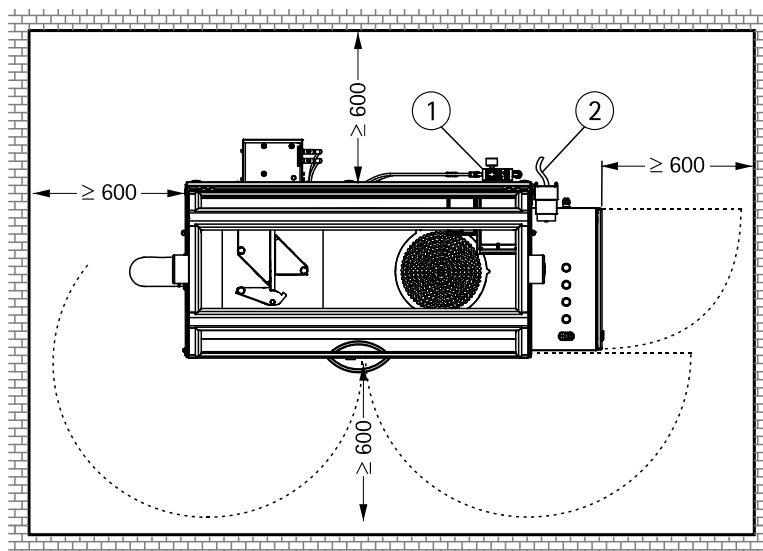
Dimensions in [mm]

- | | |
|--|---|
| 1 MAIN SWITCH | 5 Cooling water return from the laser cooling circuit (red) |
| 2 Feed cooling water from the internal circuit in the building | 6 Power connection |
| 3 Return cooling water to the internal circuit in the building (red) | 7 Tank filler |
| 4 Cooling water feed to the laser cooling circuit (blue) | 8 Hose level gauge / draining |
| | 9 |

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Unpacking and sieving station ■ P 1 / P 3



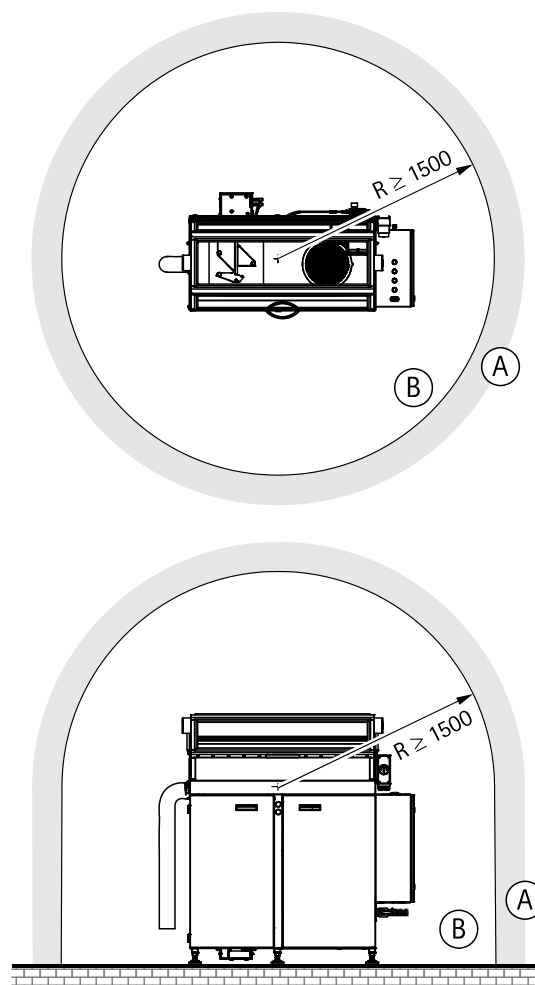
Dimensions in [mm]

- | | |
|------------------------------|--------------------------------------|
| 1 Compressed air connection | 4 MAIN SWITCH |
| 2 Power connection | 5 Powder discharge return connection |
| 3 Powder hose waste portions | 6 Dust protection cover (optional) |

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➤ Area for electrical connection

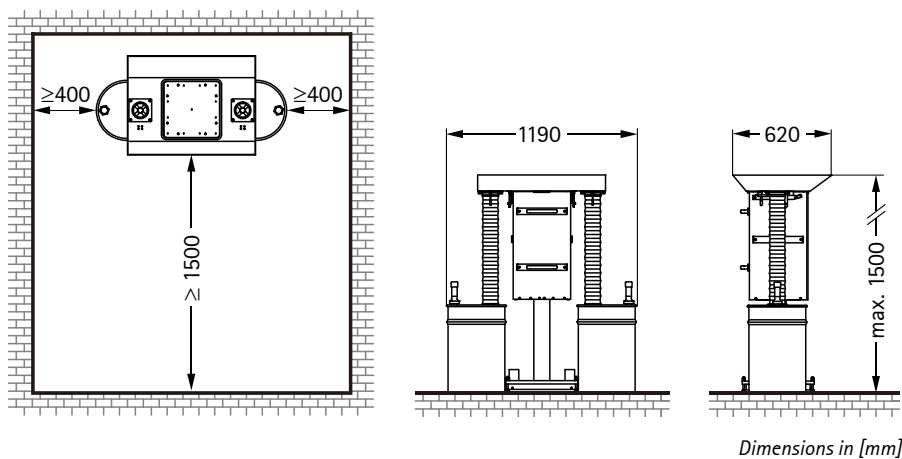


Dimensions in [mm]

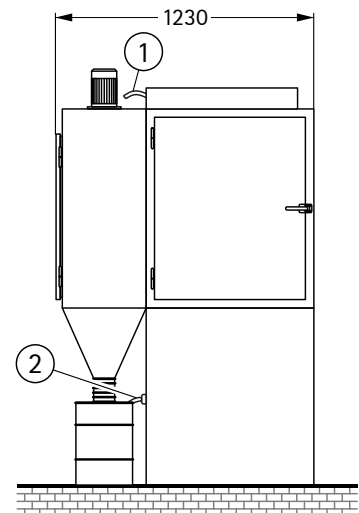
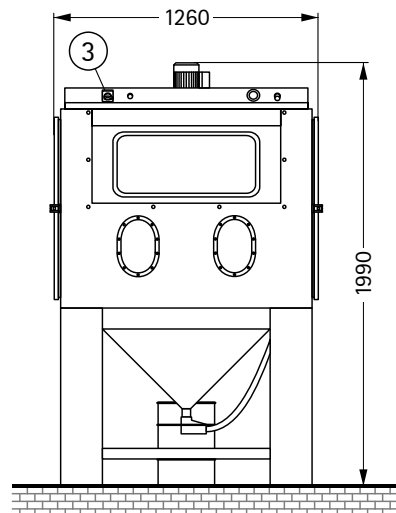
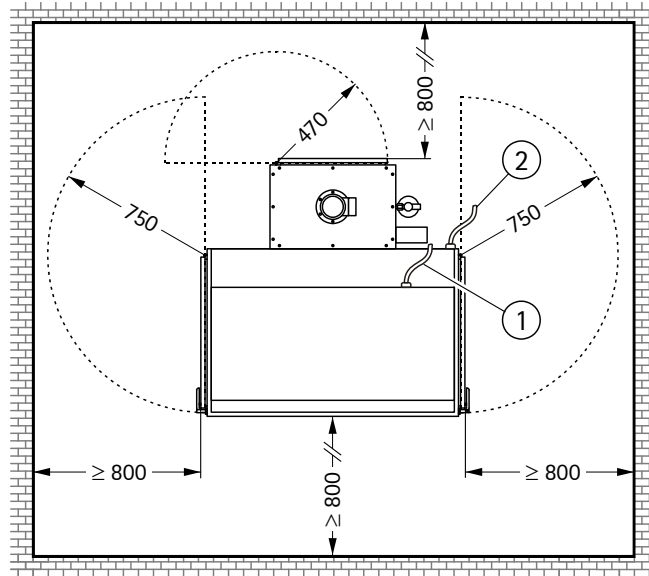
A Permissible area for electrical connections

B Permissible area for explosion-protected electrical connections

Unpacking stand ■



Shot-peening cabinet ■



Dimensions in [mm]

- 1 Power connection
- 2 Compressed air connection

- 3 MAIN SWITCH

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On-site requirements

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Minimum space requirements ■



- When determining the minimum space requirements take into account the installation plans for the accessories.
- Include in your planning a work surface of at least 2 m² for handling the parts after processing.
- The areas in front of the machine and the Unpacking stand must remain free for manoeuvring the Lifting truck and the powder bins.
- Include sufficient space for further powder bins in the plans.
- For the second exchangeable frame plan a surface of (W x D) 900 x 600 mm.
- Take into account adequate space for accessories, e. g., computer for data preparation, etc.

Accessibility ■

When the doors on the machine are open or on the accessories, there must still be enough space

- To use the Lifting truck
- To perform servicing work.

The machine must be easily accessible from all sides.



Risk of fatality!

Blocked escape routes and safety areas that are not respected can result in a potentially lethal trap in an emergency.

Observe requirements for escape routes and safety areas as per local regulations.

Connections ■



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

The supply lines from the connections in the building will be laid by the EOS service personnel.

The connections in the building should be positioned as close as possible to the connections on the machine.

The connections in the building must be designed such that the supply lines to the machine and to the accessories can be run, protected against mechanical damage, across the floor.

Alternatively the supply lines can also be connected to the top of the switching cabinet.



Risk of fire and explosion!

The plastic powders used are flammable and can form a potentially explosive atmosphere in combination with air.

There are not allowed to be any unprotected electrical or pneumatic connections in areas with potentially explosive atmospheres containing dust.



Hazardous electrical voltage!

Risk of electric shock on direct and indirect contact with live parts.

- The electrical connections to the machine and the accessories, as well as the laying of the mains cable are only allowed to be performed by an electrician.
- Lay all electrical cables and all hoses such that they are protected against damage, e. g., due to chafing, kinking, crushing, abrasion, etc..



If necessary seek specialist advice on compliance with the specifications for the connections.

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On-site requirements

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Mains power supply ■



The components for the machine and the accessories must be connected to 400 V TN-C-S three-phase mains supply and protected with fuses.

If this connection condition cannot be met at the place the machine is installed, this type of three-phase mains supply must be provided using an appropriate transformer solution.



If you want to install an uninterruptible power supply (UPS), contact the EOS-hotline.

Power connections ■

Machine ■

Specification:

- Connection: CEE socket 400 V / 32 A
- Voltage: 400 V 3~/N/PE
- Voltage fluctuations: +6 % to -10 %
- Frequency: 50 / 60 Hz
- Rated short circuit current: 5 kA
- Nominal power: 10 kW
- Power consumption (typical, during building): approx. 2.4 kW
- Current consumption: max. 16,0 A
- Mains fuse protection: 3 x 32 A (characteristic C)
- Length of mains cable (scope of delivery): 6 m.

On-site requirements

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Cooling system ■ Specification:

- Connection: CEE socket 230 V / 400 V / 16 A
- Voltage: 230 V 1~/N/PE
- Voltage fluctuations: +10 % to -10 %
- Frequency: 50 / 60 Hz
- Current consumption:
 - max. 8.5 A at 50 Hz
 - max. 9.5 A at 60 Hz
- Power consumption (typical, during building): approx. 1.4 kW
- Mains fuse protection: 1 x 12 A (characteristic C)
- Length of mains cable (scope of delivery): 5 m.

Unpacking and processing station P 1 / P 3 ■ Specification:

- Connection: As per local requirements
- Voltage:
 - 200 V - 240 V 3~/PE
 - 380 V - 415 V 3~/N/PE
- Frequency:
 - 50 Hz / 60 Hz
- Voltage fluctuations: +6 % to -10 %
- Nominal power: approx. 0.2 kW
- Mains fuse protection: 3 x 1 A - 3 x 16 A.

Specification (ATEX version):

- Connection: CEE socket 400 V / 16 A



If the connection for the Unpacking and processing station is in zone 22, the socket must be suitable for operation in zone 22.

- Voltage: 400 V 3~/N/PE
- Frequency: 50 Hz
- Voltage fluctuations: +6 % to -10 %
- Nominal power: approx. 0.2 kW
- Mains fuse protection: 3 x 1 A - 3 x 16 A.

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On-site requirements

EOS P 396

Shot-peening cabinet ■



Ensure that on this mains connection only the Shot-peening cabinet is connected.

Specification:

- Connection: earthed socket 230 V
- Voltage: 230 V 1~/N/PE
- Voltage fluctuations: +6 % to -10 %
- Frequency: 50 Hz
- Current consumption: max. 2.6 A
- Nominal power: max. 0.6 kW
- Mains fuse protection: 1 x 10 A
- Length of mains cable (scope of delivery): 3 m.

Service ■



Two dedicated mains connections must be provided for servicing work. Ensure that no equipment is connected to these mains connections.

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On-site requirements

EOS P 396

Compressed air connection

Machine

Specification:

- Compressed air consumption: approx. 10 m³/h at 7 bar
- Nominal pressure: 7 bar
- Minimum pressure: 6 bar
- Maximum pressure: 10 bar
- Compressed air temperature: max. 10 °C above temperature of the ambient air
- Quality of the compressed air in accordance with ISO 8573:
 - Solids: Class 1 (particle size ≤ 0.1 µm, particle density ≤ 0.1 mg/m³)
 - Water content: Class 4 (pressure dew point ≤ 3 °C)
 - Oil content: Class 1 (oil concentration ≤ 0.01 mg/m³)



The compressed air must not contain any liquid water.

- Length of compressed air hose (scope of delivery): 3.5 m.

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On-site requirements

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Unpacking and sieving station ■ P 1 / P 3

Specification:

- Operating pressure: 6 bar
- Minimum pressure: 6 bar
- Maximum pressure: 10 bar
- Compressed air temperature: max. 10 °C above temperature of the ambient air
- Quality of the compressed air in accordance with ISO 8573:
 - Solids: Class 1
(particle size $\leq 0.1 \mu\text{m}$, particle density $\leq 0.1 \text{ mg/m}^3$)
 - Water content: Class 4 (pressure dew point $\leq 3 \text{ }^\circ\text{C}$)
 - Oil content: Class 1 (oil concentration $\leq 0.01 \text{ mg/m}^3$)



The compressed air must not contain any liquid water.

- Length of compressed air hose (scope of delivery): 3.5 m.
- Hose inside diameter: 8 - 13 mm.



Provide a hose of adequate length and a hose clip of appropriate size for the Unpacking and sieving station P 1 / P 3 compressed air connection.

Shot-peening cabinet ■

Specification:

- Compressed air consumption: approx. 0.6 - 1.0 m³/min at 6 bar
- Nominal pressure: 5 - 6 bar
- Quality of the compressed air: clean, dry
- Hose inside diameter: 13 mm.



Provide EOS service personnel with a compressed air hose of adequate length for the installation of the Shot-peening cabinet.

Nitrogen connection ■ (option)

Specification:

- Nitrogen consumption: approx. 1.2 m³/h
- Nominal pressure: 7 bar
- Minimum pressure: 6 bar
- Maximum pressure: 10 bar
- Nitrogen temperature: max. 10 °C below temperature of the ambient air
- Quality of the nitrogen: 2.5 or higher

Cooling water connection ■

Laser cooling circuit ■

Specification:

- Feed temperature: 20 – 22 °C
- Change in the feed temperature: ≤ 0.1 °C/min
- Water pressure: < 400 kPa (4.8 bar)
- Flow rate: ≥ 7 l/min at a pressure of 400 kPa (4 bar)
- Thermal load: ≤ 1.4 kW
- Cooling water:
 - Distilled or de-ionised water (to be provided by the operating organisation)
 - Amount: approx. 10 l
 - Corrosion protection: addition of 10 g/l Varidos Lasercool GLS (corresponds to approx. 1 vol. %).
- Material for all components carrying water: stainless steel or plastic.
- Length of cooling water hoses (scope of delivery): 5 m each.

For the connection of the laser cooling circuit there are two variants:

- Air-water Cooling system (standard):
The air-water Cooling system dissipates the waste heat to the ambient air via a fan.
- Water-water Cooling system:
The water-water Cooling system is intended to be connected to an internal Cooling system in the building as a secondary circuit.

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On-site requirements

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Do not connect the laser cooling circuit directly to an internal Cooling system in the building. Corrosion and dirt could damage the cooled elements in the machine.

On both Cooling systems the length of the pipes between machine and Cooling system must not exceed 5 m.

**Internal cooling water circuit
in the building** ■



An internal cooling water circuit in the building is required for the usage of a water-water Cooling system.

Specification:

- Water quality:
 - Total hardness < 6 - 15 dH
 - pH value: 7 - 9
 - Filterable substances: < 30 mg/l
 - Chloride content: < 200 mg/l
- Temperature of cooling water in the internal circuit in the building: 5 - 25 °C
- Flow rate: min. 10 l/min.

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On-site requirements

EOS P 396

Extraction of process
products and dusts ■

Machine ■



Risk to health!

Inhaling vapours from the thermal decomposition of plastic powder can cause health problems, see *safety data sheet* for the type of plastic powder used in the *Machine folder*.

- The machine is only allowed to be operated in conjunction with an extraction system.
- The extraction must ensure that the necessary volumetric flow rate is continuously extracted from the machine.
- Extracted waste air is not allowed to be fed back to the working room.

Specification:

- Volumetric flow rate: approx. 10 m³/h
- Diameter of extraction connecting pipe: 100 mm.



Provide EOS service personnel with a waste air hose of adequate length for the installation of the extraction.

Unpacking and sieving station P 1 / P 3



Risk to health!

Skin and eye contact with plastic powder, as well as inhaling and swallowing plastic powder dust

- On open vibration of powder
- On unpacking the parts
- On cleaning the Unpacking and sieving station

can harm the health, see *safety data sheet* for the plastic powder used in the *Machine folder*.

- The Unpacking and sieving station P 1 / P 3 can optionally be equipped with a dust protection cover to which an explosion-proof industrial vacuum cleaner of type B1 or an extraction system in the building can be connected.
- Extracted waste air is not allowed to be fed back to the working room.

Specification:

- Inside diameter of connection for extraction system in the building: 100 mm
- Extraction connection inside diameter (reducer): 38.5 mm (for the connection of the explosion-proof industrial vacuum cleaner of type B1 recommended by EOS).

Vacuum cleaner

Specification:

- Industrial vacuum cleaner of type B1
 - Explosion-proof
 - Noise attenuated
 - Electrostatic conducting vacuum cleaner hose.



If you use a vacuum cleaner different to the explosion-proof industrial vacuum cleaner of type B1 as recommended by EOS, the vacuum cleaner must comply with the above specification.

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On-site requirements

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Network connection for data transfer ■

The process computer for the machine is permanently connected to the customer's network via a data cable laid through an opening in the base of the switching cabinet.

Specification:

- Network *Fast Ethernet*
- Network protocol TCP/IP
- Network connection 100 Base-TX.



Provide a network cable of adequate length for the network connection.

Other requirements ■

Unpacking stand ■



The Unpacking stand must be used in a fixed location so that ejection ram and exchangeable frame can be reliably aligned with each other.

4

Customer safety precautions

4

Customer safety precautions

EOS P 396

Laser radiation ■



Risk of injury and damage!

The machine is operated by EOS service personnel also with the optics chamber open. With the optics chamber open, the machine corresponds to laser safety class 4.

- Observe the safety precautions described in the following.
- Note the locally applicable national regulations. These always have priority over the safety precautions described in the following.

Securing the room where the machine is installed ■



Hazard due to invisible laser radiation!

The irradiation of eyes or the skin by direct or scattered radiation will cause severe burns.

- All access doors to the room must be lockable and equipped with laser warning lamps. When working with the optics chamber open, the laser warning lamps at the access doors must be switched on.
- Affix the following sign to all doors that can be used to access the room where the machine is installed:



Caution – invisible laser radiation of class 4.

- Shield the machine with portable laser safety screens if there are other work areas in the room apart from the machine.
- Only personnel briefed on laser safety are allowed to be present in the laser hazard area.
- Remove flammable or explosive materials from the laser hazard area.

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Customer safety precautions

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Personal protective equipment ■



Hazard due to invisible laser radiation!

Only the EOS service personnel is authorised to open the cover on the optics chamber. When the optics chamber is opened, irradiation of eyes or skin by direct or scattered radiation can cause serious burns.

When the optic chamber is open, provide personnel present in the room where the machine is installed with the following personal protective equipment:

Laser safety glasses of laser safety level LB5 at D 10600 nm in accordance with EN 207. The safety glasses must be appropriately marked for the laser safety level.

EMC ■

Securing the room where the machine is installed ■



Radiated electromagnetic interference!

High-frequency devices such as mobile phones can interfere with the operation of the machine.

Affix the following sign to all doors that can be used to access the room where the machine is installed:



Mobile phones forbidden.

Immunity to interference ■



Radiated electromagnetic interference!

No interference producing electrical installations are to be present in the room where the machine is installed.

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Customer safety precautions

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Risk of fire and explosion ■

Securing rooms where the machine is installed and storage rooms ■



Risk of fire and explosion!
The plastic powders used are flammable.

- All access doors to the room where the machine is installed
- All access doors to the place the powder is stored

Are to be fitted with the following hazard sign:



Fire, naked flames and smoking forbidden.

Fire and explosion prevention ■



Risk of fire and explosion!
The plastic powders used are flammable and can form a potentially explosive atmosphere in combination with air.

- For all tasks related to the machine and the accessories, use only an explosion-proof industrial vacuum cleaner of type B1.
- Avoid dust deposits in the area where the machine, accessories and components are installed. The less dust in the installation area, the lower the risk of fire or explosion.

Fire-fighting ■



Hazardous electrical voltage!

Risk of electric shock when extinguishing fires on the system when it is still live if conductive extinguishing media are used.

- Match the extinguishing medium and the extinguishing equipment to the general conditions on site.
- During fire fighting observe the locally applicable national regulations.
- EOS recommends a CO₂ fire extinguisher for extinguishing fires.



Fire risk!

The plastic powders used are flammable.

- Note the fire fighting measures in the *safety datasheets* for the plastic powder used.
- Match the extinguishing agent and the extinguishing units to the general local conditions.
- During fire fighting observe the locally applicable national regulations.

Chemical hazards ■



Skin and eye contact with plastic powder can harm the health.

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

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Hardware and software requirements

Hardware and software requirements

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Hardware

Computer for data preparation and operation of the *Offline-PSW*:

- x86 compatible processor, min. *Pentium 4*, clock frequency ≥ 1 GHz
- Memory RAM ≥ 2 GB
- Free space for EOS software ≥ 150 MB, additional free space for files ≥ 1 GB
- Graphics card *OpenGL*, high colour (32-bit)
- Screen resolution min. 1024 x 768 pixels (XGA)
- DVD drive
- Network interface *Fast Ethernet*
- Network protocol *TCP/IP*
- USB port for CmStick (licence dongle).



The computer can be operated physically separated from the machine.

Software

Operating system:

- *Windows XP* Service Pack 3 (32-bit, 64-bit)
- *Windows 7* (32-bit, 64-bit).

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Hardware and software requirements

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Please return ...

Please return ...

EOS P 396

Procedure ■ On the following pages you will find the two forms

- *Checklist* and
- *Customer confirmation*.

The points in the *checklist* contain the necessary prerequisites for the delivery, storage, installation and commissioning of the machine and accessories.

Only if these prerequisites are met is a smooth, trouble-free process ensured during all the necessary work.

With the *customer confirmation* form you confirm that, at the time of delivery and commissioning of the machine and the accessories, the requirements in the *checklist* will be met.

Please copy the customer confirmation, sign the form and send it together with the order to the following address:

EOS GmbH – Electro Optical Systems
Robert-Stirling-Ring 1

D-82152 Krailling / München

Fax: +49 (0)89 / 893 36-2286

E-mail: installation@eos.info

If you have any questions, the EOS-hotline will be pleased to provide assistance at any time.

Checklist ■

Make sure that the conditions stated in the checklist are met at the time of delivery and commissioning of the machine and the accessories.

You will find detailed descriptions and specifications of these requirements in the individual sections of this manual.

Delivery, storage ■

Unloading, transport ■

- ☐ Forklift truck is available
- ☐ Lifting truck is available
- ☐ Transport routes to the place where the machine is to be installed or storage area are clear
- ☐ Transport routes are of adequate size
- ☐ There is no unevenness or steps along the transport route
- ☐ Floor loading capacity of the transport routes is greater than the total weight of the transport units (scope of delivery + means of transport)
- ☐ Width and height of doorways meet the requirements specified

Storage ■

If the machine and the accessories are stored temporarily until installation and commissioning:

- ☐ Storage area meets the requirements specified

Installation, commissioning ■

Transport ■

If the machine and the accessories have been temporarily stored and must be transported to the place where the machine is to be installed:

- ☐ Forklift truck is available
- ☐ Lifting truck is available
- ☐ Transport routes to the place where the machine is to be installed are clear
- ☐ Transport routes are of adequate size
- ☐ There is no unevenness or steps along the transport route
- ☐ Floor loading capacity of the transport routes is greater than the total weight of the transport units (scope of delivery + means of transport)
- ☐ Width and height of doorways meet the requirements specified

Please return ...

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Place where the machine is to be installed

- ☐ Floor loading capacity and floor characteristics comply with the requirements
- ☐ Space for installing the machine and the accessories is sufficient
- ☐ Accessibility and escape routes have been taken into account
- ☐ Minimum distances between machine, accessories, room walls, etc. are met
- ☐ Space requirements for possible addition of additional accessories have been taken into account.

Ambient conditions

- ☐ Room temperature complies with the specification
- ☐ Relative atmospheric humidity is in the specified range
- ☐ EMC safety is ensured
- ☐ Other ambient conditions are met

Mains power supply

- ☐ Three-phase mains power supply 400 V TN-C-S is available
 - ☐ Other mains power supply is available
- Specification:

Power connections

- Mains connections are available in the immediate vicinity of the machine or the accessories for:
- ☐ Machine
 - ☐ Cooling system
 - ☐ Unpacking and sieving station P 1 / P 3
 - ☐ Shot-peening cabinet
 - ☐ Computer for data preparation and operation of the *Offline-PSW*
 - ☐ Servicing work.

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Compressed air connection ■ Machine

- ☐ Compressed air connection is available in the immediate vicinity of the machine
- ☐ Pressure, temperature and quality of the compressed air comply with the specification.

Unpacking and sieving station P 1 / P 3

- ☐ Compressed air connection is available in the immediate vicinity of the Unpacking and sieving station P 1 / P 3
- ☐ Pressure of the compressed air is in the specified range
- ☐ Quality of compressed air complies with the specification
- ☐ Hose with appropriate inside diameter and of adequate length available with suitable hose clip.

Shot-peening cabinet

- ☐ Compressed air connection is available in the immediate vicinity of the Shot-peening cabinet
- ☐ Pressure and quality of the compressed air comply with the specification.

Laser cooling circuit cooling water connection ■

- ☐ Adequate amount of distilled / deionised water is available
- ☐ Connections are prepared (only for water-water Cooling system).

Extraction ■ Machine

- ☐ Extraction connection complies with the specification
- ☐ Connection for extraction system is prepared
- ☐ Waste air hose of adequate length is available.

Unpacking and sieving station P 1 / P 3

- ☐ Extraction complies with the specification
- ☐ Waste air hose of adequate length is available.

Vacuum cleaner

- ☐ Vacuum cleaner complies with the specification.

Please return ...

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Network connection for data transfer

- ☐ Complies with the specification.

Hardware and software requirements

- ☐ System requirements are met.

Customer safety precautions

- ☐ All access doors to the room where the machine is installed can be locked
- ☐ There are laser warning lamps on all access doors for the room where the machine is installed
- ☐ There are warning signs on all access doors for the room where the machine is installed and storage rooms
- ☐ Locally applicable national regulations in relation to laser safety have been observed
- ☐ Portable laser safety walls are available (optional)
- ☐ Laser safety glasses are available (optional)
- ☐ Explosion-proof industrial vacuum cleaner of type B1 is available
- ☐ Wash basin with eye washing facility is set up (optional)
- ☐ An adequate number of suitable fire extinguishers (extinguishing equipment) is available
- ☐ Explosion protection document (contains zone categorisation) has been prepared by the operating organisation.

Please return ...

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Customer ■ confirmation

Customer address:	
Delivery address: (if different from customer address)	
Address for invoices:	

We herewith confirm that

- This *Installation Conditions* manual has been read
- At the time of the delivery of the machine and the accessories the requirements listed in *Delivery, storage* will be met
- At the time of the commissioning of the machine and the accessories the requirements listed in *Installation, commissioning* will be met
- EOS will be informed at least 14 days before the agreed delivery and commissioning date if the requirements in the *checklist* cannot be met.

If problems should occur on the delivery or commissioning of the machine and the accessories because the requirements specified in this manual are not met or are only partially met, and EOS was not informed of this situation at least 14 days in advance, EOS reserves the right to interrupt the work and to invoice the customer for the resulting costs.

Place:	
Date:	
Company stamp:	
Signature:	

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Translation of the original instructions

Installation Conditions – EOS P 396

Article number: **9241-0011**

Edition: 12.14