

# **Electric steam generator NDD 18**



**Original operating instructions** 



Title Original operating instructions Electric

**Product** steam generator NDD 18

Publisher Dino Maschinenbau GmbH

Leerkämpe 6d D-28259 Bremen

Tel.: + 49 (0)421-58 00 44 Fax: + 49 (0)421-58 00 46 E-mail: info@dino-bremen.de Web: www.dino-bremen.de

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Suggestions and hints

... for this documentation, please contact the address given above.

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# 1 Product information

In this chapter you will find information about the machine:

- Characteristics (page 5)
- Machine type plate (page 6)
- Technical data (page 7)
- Scope of delivery (page 7)
- EC Declarations (page 8)

## 1.1 Identification data

Here you will find the characteristics of the machine described here.

Characteristics of electric steam generators

Type of machinery

Electric steam generators



# 1.2 Machine type plate

The machine type plate is mounted on the control panel.



Sample of the machine type plate

#### Information about the type plate

Title	Value	Explanation
Туре	NDD 18	Describes the machine type.
No.	2.001.XXX	This is the machine number
Year of construction	XX-XXXX	Specifies the month and year of construction of the machine.
Operating pressure	3.0 bar	This is the operating pressure with which the machine works.
Test pressure	5.5 bar	This is the pressure with which the system was tested.
Water content	10 Ltr	This is the maximum water content for the pressure vessel.
Voltage	400/50 V/Hz	Describes the electrical chip values.
Performance	18/32 kW/A	Describes the electrical readings.
Steam	24 kg/h	Specifies the maximum amount of steam in kg/h.



## 1.3 Technical data

#### Technical data

Technical data		
Dimensions		
Length	630 mm	
Width	500 mm	
Height	700 mm	
Weight	50 kg	
Electrics		
Operating voltage	400 V — 50 Hz — 3ph — PE	
Heating capacity	18 kW	
Total connection	18.5 kW	
Hedging	26 A (This must be secured on site)	
Current power supply line	3 x 35 A	
Minimum cross-section	4 x 6 mm <sup>2</sup>	
Performance		
Steam power	24 kg/h	
Heat output	15 710 kcal	
Maximum operating pressure	300 kPa	
Number of heating elements	4 x 4.5 kW	
Installation sizes		
Steam line	1/2 ¬	
Water entrance	1/2 ¬	
Sludge valve	1/2 ¬	
Safety valve	1/2 ¬	
Noise emission during operation	60 dB	

# 1.4 Scope of delivery

The machine is delivered in fully assembled segments.

#### 1.4.1 Plans

In the delivery documents you will find the following plans:

- Schematic
- Construction drawing of the pressure vessel



#### 1.5 EC Declarations

Here you can find the EC Declaration under the Machinery Directive.

## EC — Declaration of Conformity according to EC Machinery Directive 2006/42/EC of 17 May 2006, Manufactu Dino Maschinenbau GmbH rer\*: Leerkämpe 6 D 28259 Bremen Tel.: + 49 (0) 421 580 044 We hereby declare that the machinery described below complies with the essential health and safety requirements of the EC Directive 2006/42/EC in its design and design and in the version we place on the market. In the event of a change of the machine which has not been agreed with us, this declaration ceases to be valid. Name of the Dino electric steam generator Machinery: Machine type: CD 72 K Boiler No. 1.001.784 It declares compliance with other guidelines and provisions applicable to this product: Pressure Equipment Directive 97/23/EC Low Voltage Directive 2006/95/EC EMC Directive 2004/108/EC Harmonised standards applied, in particular: DIN EN ISO 12100:2010 DIN EN 60204-1 (VDE 0113-1) The following national standards, directives and specifications are also used: BGVR A - D TRD 801 AD 2000 VDE 0100-1

\*: also documentation representative

Manufacturer Signature
Function of signatory

Date:

Model of the EC Declaration under the Machinery Directive

As soon as the machine is substantially modified, this explanation expires. A new conformity procedure under the EU Machinery Directive is then required.

05.12.2012

Technical management



Here you can find the EC Declaration under the Pressure Equipment Directive:

Certificate		
	est of a group 1 — class I/II e steam generator, as indicated	
Dino Maschinenbau G	mbH, Bremen	
Type boiler No. Year		
construction		
Water content		
Betr. overpressure		
97/23 EC of 29.05.2002 and is in	ements of the pressure equip a grouped state a water press on subjected to no complaints	sure test with
plate on the appliance) DGRL 97/23 EC Annex	proof form for the Trade Insporthe class 1/2 electric steam II/Diagr. 5. The enclosed boil red by TÜV-Norddeutschland	m boiler according to ler construction drawing
Please keep this certific competent labour inspe	ate carefully and present it at ctorate.	t the request of the
Dino Maschinenbau Gr	bH	
Signature factory		 Bremen, date
orginature factory		Diemen, date

Model of the EC Declaration under the Pressure Equipment Directive



## 2 Notes for the reader

In this chapter you will find information on how to use the operating instructions:

- Validity (page 10)
- Illustrations (page 10)
- Abbreviations used (page 10)
- Highlighting in the text (page 11)

## 2.1 Validity

This product is a machine within the meaning of the Machinery Directive. In accordance with the industry's usual language use, this operating manual speaks of machine.

This original operating manual contains information and rules of conduct for the safe operation of the machine. Read the original operating instructions carefully before operating. Keep the original operating instructions for everyone at hand.

In order to operate the machine effectively, the original operating manual provides you with information on the following topics:

- · Transporting, setting up and commissioning machinery
- · Working with the machine
- Machine maintenance and maintenance
- · Detect and fix faults

This operating manual applies to:

- · the operator:
- all persons admitted to work on or with the machine

#### 2.2 Illustrations

The pictures in this original operating manual show the machine in a partially simplified presentation.

#### 2.3 Abbreviations used

The following abbreviations are used in the operating instructions:

Abbreviations

VE water

full salted water



## 2.4 Highlighting in the text

Important information with symbols or special spelling is highlighted in this manual. The following examples show the most important highlights.

#### 2.4.1 Safety note

Safety note: Special note for an information section.

Explanation of the note.

The point identifies measures to take account of the reference.

#### 2.4.2 Warnings



#### **WARNING**

#### Warning of serious injuries.

Failure to comply with the warning may result in serious damage to health.

The arrow indicates a precautionary measure that you need to take to avert the hazard.



#### Warning of injuries.

Non-compliance with the warning may result in mild and moderate damage to health. The arrow indicates a precautionary measure that you need to take to avert the hazard.

#### 2.4.3 Instructions for action

Perform the following steps: = Start of an action manual.

- First step in a sequence of actions.
   Required settings ...... Setting values
- 2. Second step in a sequence of actions.

The result of this action step.

✓ The action is completed, the goal is achieved.



#### 2.4.4 Action sequence

Sub-objective of the first set of actions

Perform the following steps: = Start of the first action guide.

1. First step in the first sequence of action. First alternative instruction to the action step. Second alternative instruction to the action step.

Last alternative instruction to the action step.

2. Second step in the first sequence of action.

Important note on this step of action.

The sub-objective of the first set of actions is achieved.

Sub-objective of the second set of actions

Perform the following steps: = Start of the second action guide.

The only step in the second sequence of action.

? Problem. An expected error occurred. Cause of the error. Error rectification measure.

The sub-objective of the second set of actions has been achieved.

The sequence of actions is completed, the goal of the action sequence is reached.

#### 2.4.5 Tip

Further, useful information.





# 3 Security

In this chapter you will find information for the safe operation of the machine:

- Safety instructions (page 13)
- Obligations of the operator (page 15)
- Qualification of staff (page 16)
- Safety devices (page 18)
- Residual risk (page 20)
- First Aid Instructions (page 20)

## 3.1 Safety Instructions

In the following sections you will find basic safety instructions.

#### 3.1.1 Operational safety

The machine is operationally safe. It was built according to the current state of science and technology.

Nevertheless, the machinery may present risks if:

- the machinery is not used as intended;
- · the machine is improperly used,
- · the machinery is operated under unacceptable conditions.

The following instructions apply to anyone working on or with the machine:

- All work on the machine shall be carried out in accordance with the provisions laid down for this purpose.
- · All protective covers must be mounted.
- · Changes in movements or malfunctions must be reported immediately.

#### 3.1.2 Prohibited operating conditions

Under unacceptable operating conditions, operational safety cannot be guaranteed. Therefore, unlawful operating conditions must in any case be avoided.

The machinery shall not be operated under the following conditions:

- Safety devices do not work or have been removed.
- Malfunctions were detected.
- · Damage was detected.
- · Maintenance intervals have been exceeded.
- · Cycle times and print settings have not been changed.



#### 3.1.3 Information on the operation

Safety-conscious and predictive behaviour of personnel avoids dangerous situations during operation.

Note the following points when dealing with the machine:

- The machine may only be installed and installed by qualified personnel.
- The machine may only be operated by qualified personnel.
- Faults may only be eliminated when the machine is switched off in a "safe off" condition. Turn off the machine and secure the machine against restarting.
- Safety devices shall not be modified, dismantled, circumvented or taken out of service.
- Structural modifications to the machine are not permitted.
- · Workspaces must not be changed.
- Areas of work must always be free. Items must not be placed in work areas.
- Any change to the machine must be reported immediately to the responsible person.

#### 3.1.4 Information on environmental protection

Safety-conscious and forward-looking behaviour of staff avoids harmful effects on the environment.

The following principles apply to environmentally conscious action:

- Substances that are hazardous to the environment shall not enter the soil or sewerage system.
- Provisions on the prevention, disposal and recovery of waste must be complied with.
- Substances harmful to the environment shall be stored in suitable containers.
- Containers containing substances hazardous to the environment shall be clearly labelled.

#### 3.1.5 Supplementary provisions

In addition to this guidance, the proper operation of the machine is regulated by laws and regulations.

The following additional requirements shall apply to the operation of the machinery:

 Regulations on the operation of machinery (including laws and regulations not expressly mentioned here),

- Accident prevention rules;
- Intra-corporate rules;
- Hints on the machine.



## 3.2 Obligations of the operator

In the following sections you will find information on the obligations of the machine operator.

#### 3.2.1 Plan and control security measures

The operator's duty of care is to plan and control the implementation of security measures.

#### 3.2.2 Minimise risk of injury

To minimise the risk of injury, the following principles apply:

- If employees work alone, the operator must ensure safe personal monitoring.
- · Work on the machine may only be carried out by qualified personnel.
- Staff must be authorised by the operator for the respective activity.
- Staff must have familiarised themselves with all safety equipment before the start of the work.
- Staff must have familiarised themselves with the controls before the start of work.
- Order and cleanliness must prevail on the machine, in its surroundings and in the workplaces.
- Personnel must wear the protective equipment required for this machine. The necessary protective equipment is specified in the factory regulations.
- During the operation, qualified first responders shall be ready to take the necessary first-aid measures if necessary.
- Procedures, competences and responsibilities in the field of machinery must be clearly defined. The behaviour of incidents must be clear to everyone. Staff shall be instructed on a regular basis.
- Warning signs and indications on the machine must be complete and easily legible. Therefore, regularly clean and replace warning signs and warnings.

 Staff shall wear the required protective equipment during maintenance and cleaning work. The necessary protective equipment is specified in the factory specification. For some work, additional personal protective equipment is to be worn.



#### 3.2.3 Operating machine without fault

The following principles shall apply to trouble-free operation:

- Keep the operating instructions complete, easily readable and ready for everyone at the site of the machine.
- The machine shall be used exclusively as intended.
- The machine shall be operated only in perfect and functional condition.
- · Before starting work, the safe condition of the machine shall be checked.
- The functioning of machinery and safety devices shall be checked regularly.

TIP

Carry out regular checks. This allows you to ensure that these Measures are actually being followed.

#### 3.3 Qualification of staff

In this section you will find information on how to train the staff working on the machine.

All work on the machine requires special knowledge and skills of the person.

Anyone working on the machine must fulfil the following conditions:

- Personally suitable for the respective activity.
- · Sufficiently qualified for the particular job.
- Trained in the handling of the machine.
- Familiar with the safety devices and their functioning.

- Familiar with this operating manual, specifically with safety instructions and with the sections relevant to the activity.
- · Familiar with basic regulations on occupational safety and accident prevention.

In principle, all persons must have one of the following minimum qualifications:

- Trained as a specialist in order to carry out independent work on the machine.
- Sufficient instruction to carry out work on the machine under the supervision and guidance of a trained professional.



This operating manual distinguishes between the following user groups:

#### User groups

Staff	Qualification
Operators	Appropriate training in the areas of:  Operating procedures of the machine Operating procedures
	<ul> <li>Knowledge in the fields of:</li> <li>Competences and responsibilities in the field of activity</li> <li>Behaviour in case of incidents</li> </ul>
Maintenance staff	In-depth knowledge in the areas of:  Mechanical engineering  Electrical engineering  Gas and water technology
	Authorisation for the activities (according to safety engineering standards):  Start-up of equipment Earthing equipment Marking of devices
	In-depth knowledge of the structure and functioning of the machine

The following activities may only be carried out by staff with specific knowledge:

#### Activities and knowledge

Activities and knowledge		
Activity	Qualification	
Working on the piping	Special knowledge and experience in the installation of pipework.	
Working on electrified facilities	Electrician or Instruction, the work may be carried out under the direction and supervision of an electrician in accordance with the electrotechnical rules.	
Working on mechanical facilities	Industrial mechanics or Instruction, the work may only be carried out under the direction and supervision of an industrial mechanic in accordance with the recognised rules of technology.	



## 3.4 Safety devices

In the following sections you will find information about the safety equipment.

#### 3.4.1 Overview

The machine is equipped with safety devices at danger points. Familiarise yourself with all safety devices, thereby preventing or minimising damage to and/or machine failures in the event of an emergency.

Without properly adjusted safety devices, persons on the machine may suffer life-threatening injuries. The safety devices shall not be modified, dismantled or taken out of service. All security devices must be freely accessible at all times.

#### 3.4.2 Fixed safety devices

Fixed safety devices secure dangerous areas on the machine. They have no influence on the movements of the machine.

The fixed safety devices prevent or impede direct access to rotating or moving parts of the machine. They may only be removed for maintenance or repair work and shall be reassembled before recommissioning.

The fixed safety devices of this machine include the protective fittings on the machine frame.

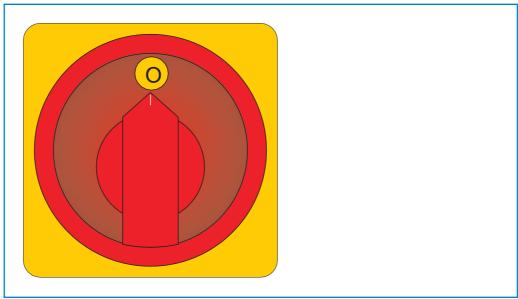


Protective covers on the machine frame



#### 3.4.3 Emergency equipment

The emergency-out equipment secures dangerous areas. When the emergency stop function is triggered, the machine is switched off safely. The machine can be switched off safely via this main switch on the control panel.



Main switch on the control box

## 3.4.4 Warning signs on the machine

Warning signs and other information on the machine must always be easy to read. Unreadable safety markings and other information on the machine shall be immediately renewed:

Dangerous places on the machine are marked by warning signs according to DIN 4844 and BGV A8 (VBG 125).

#### Overview of warning signs

Warning sign	Importance
	Warning: Hot surfaces
4	Warning: Parts under electrical voltage



#### 3.5 Residual risk

The safety devices of the machine effectively protect the personnel from injury.

However, for some activities, residence in hazardous areas is not avoidable. Residual risks cannot be completely excluded there. The wearing of personal protective equipment as well as safety-conscious and forward-looking behaviour of the personnel avoids dangerous situations.

#### Residual hazards on the machine and measures

Danger	Cause	Action
Electrical hazard   Electric shock	During maintenance or malfunction, contact with voltage-leading parts may occur.	The electrical connections of the machinery may only be carried out by approved electricians.
Risk of scaling	At leaks, there may be contact with hot water or steam.	The installation of the machine may only be carried out by approved specialists. Leaks must be removed immediately.
Danger from hot piping	The piping on the machine becomes very hot during operation.	The installation of the machine may only be carried out by approved specialists. Leaks must be removed immediately. The pipelines shall be either insulated or protected against contact.

#### 3.6 First Aid Instructions

In this section you will find special first aid measures if something has happened.

You need to make an emergency call think of the following points:

- What happened?
- Where did it happen?
- · Who's reporting?
- How many injuries?
- Waiting for questions!

TIP

Get involved with the emergency call system and the rescue equipment at your location familiar, e.g.: What's the emergency number? Where's the next phone? Where's the next fire detector? Where can I find a fire extinguisher? Where can I find the next first aid case?

Attend a first aid course to help immediately in case of emergencies.

*.* 



# 4 Transport, installation and connection

In this chapter you will find information about transport, installation and connection of the machine:

- Transporting machine (page 21)
- Unpacking machine (page 23)
- Set up the machine (page 23)
- Connecting machine (page 24)
- First commissioning (page 27)

## 4.1 Transporting machine

In the following sections you will find information about the transport of the machine.

#### 4.1.1 Applicable principles

Safety-conscious and forward-looking behaviour of personnel avoids dangerous situations during transport.

Transport shall be governed by the following principles:

- Transports may only be carried out by qualified personnel.
- Access must be blocked for unauthorised persons. Where appropriate, signs shall be set up to draw attention to the transport.
- Moving parts shall be properly secured.
- Suitable, impeccable load-mounting devices and anchoring devices shall always be used for transport.
- During transport, the weight of the machine parts and the position of the heavy point shall be taken into account.

Prepare the machine for transport as follows:

 If the machine was in operation before transport, put the machine out of operation as described in "Steam production" > "Long-term decommissioning" (page 40).

Act during transport in accordance with the following instructions:

- Comply with accident prevention regulations and local regulations.
- · No stay of persons under suspended loads.
- · Use hoists only in a prescribed manner.
- Lifting equipment shall be designed and approved for the weight of the parts of the machinery.
- Use hoists only in perfect condition.
- Transport machine parts carefully. Not on sensitive parts (to lift, push or support.

TIP

Share the dimensions of each system to the forwarder in good time components with.



#### 4.1.2 Requirements for lifting equipment

The machine is delivered on a pallet. To lift the machine you need a low-floor pallet truck or a crane.

There are four adjustable feet on the floor of the machine. Between these feet, the machine can be lifted and transported with a low-floor pallet truck. For this purpose, the machine can be lifted sideways.

The main focus of this machine is in the front area (switchbox).

In the case of a crane transport without a pallet, suitable conveyor belts must be attached to the machine frame.



Permissible positions of transport belts



## 4.2 Unpacking machine

Before setting up the machine, remove any existing transport packages, transport fuses and transport aids.

Then check the machine as follows:

- · Are there any damage caused by transport?
- Is the delivery complete? Compare the delivered parts with the details on the shipping document.

If the machine has been damaged during transport or if the delivery is incomplete, please inform the manufacturer.

Dispose of the packaging material in accordance with the applicable regulations.

## 4.3 Set up a machine

In the following sections you will find information on how to set up the machine.

#### 4.3.1 Requirements for the environment

The environment shall meet the following requirements:

#### Requirements for the environment

Permissible ambient temperatures during operation	frost-free up to 40 °C
Permissible ambient temperatures during storage and transport	frost-free up to 40 °C
Permissible relative humidity	up to a maximum of 80 %

#### 4.3.2 Requirements for the substrate

The substrate shall meet the following requirements:

- level, horizontal and solid surface
- designed according to the country-specific specification for concrete (for Germany: WUB-BN25)

#### 4.3.3 Conditions

Requirements for setting up the machine:

Familiarise yourself with the establishment plan, if it is available.

- Around the machine you need to plan an area that is always free of objects and easy to walk at any time, see chapter "Machine Overview"
  - > "Maintenance areas" (page 36).
- A floor drain must be present.

  Alternatively, the machine shall be placed in a protective tray. This then ensures drip water and leakage protection.



#### 4.3.4 Set up and align machine

#### Required:

Low-floor pallet trucks

- Forklift trucks
- Crane

Perform the following steps:

Set up all machine parts according to the hall plan.

✓ The machine is positioned and aligned.

## 4.4 Connecting machine

Once the machine is properly aligned, you can start the installation.

#### Condition:

You need standard tools.

- \* The power supply shall be switched off and secured against reactivation.
- Water connections shall be secured against accidental opening.

# Cable platforms

Perform the following steps:

- 1. Install suitable cable platforms or use suitable cable channels between the machine and the on-site power connection.
- 2. Find out about the minimum bending radius of cables and hoses.

It's done.

#### Electric

s

#### The machine is operated with 3-phase alternating current.

There is a risk of life due to electric current.

Only trained and authorised electrical technicians may carry out the electrical installation.



#### **WARNING**

If you turn off the machine, always secure it against unjoined restart.

Perform the following steps:

- 1. Lay all the necessary cables.
- Make all the necessary connections.
- 3. Earth the machine.

It's done.



# Water connection

#### Perform the following steps:

- 1. Lay all the necessary pipelines.
  - Pay attention to the specific requirements for the feed water, see Ka- pitel "Machinery overview" > "Requirements for feed water" (page 34).
- 2. Unscrew the tank lid from the feed water tank.

You can now see through the control opening the position of the float in the food water tank.

- 3. Screw the water supply pipe to the feed water connection.
  - ! When assembling,make sure that the float is vertical in the feed water tank.
- 4. Screw the tank lid back to the feed water tank.
- 5. Check the connection for tightness.

It's done.

## Steam connection

#### Perform the following steps:

Lay all the necessary pipelines.
 Mounting vertically upwards. . . . 1.5 m
 Following downhill . . . . . . . 5°

2. Assemble the steam line to the steam line connection.

Check the connection for tightness.

It's done.

# Safety valve at the vapour connection

#### Perform the following steps:

- 1. Lay all the necessary pipelines.
  - When laying the pipes,make sure that you do not reduce the cross-section of the pipeline and discharge the outlet outwards over the roof.
- 2. Assemble the pipe to the safety valve.
- 3. Check the connection for tightness.

It's done.







#### Perform the following steps:

- 1. Lay all the necessary pipelines.
  - I The overflow, draining and sludge pipes must not be merged.

    The water-steam mixture can penetrate into the feed water tank via the overflow.
- 2. Install the pipe to the sludge connection of the steam boiler.

- Pay attention to the specific requirements, see chapter "Machinery inspection" > "Sewage sewer requirements at sludge connection" (Page 35).
- 3. Check the connection for tightness.

It's done.

Machine is connected.



## 4.5 First entry into service

In the following sections you will find information on the first commissioning of the machine.

#### 4.5.1 Notes

At first commissioning, the machine is adapted to the production process. Pay attention to possible malfunctions. Therefore, the machine should only be introduced gradually to the production process.

A commissioning protocol shall be kept at the time of first commissioning. You will find the start-up protocol in the chapter "Maintenance and repair" > "Protocoll commissioning" (page 53).

Safety note: Risk of injury during operation!

There is a risk of injury during operation of the machine. Pay attention to the following points:

- Read the section "Security" > "Security Instructions" (page 13) before performing the work.
- Do not put the machine into operation until all the covers, intervention protections and safety devices are installed.
- Before commissioning, activate all safety devices. See the section "Security" >
   "Security" (page 18).
- After commissioning, check that all safety devices work freely.
- · If you turn off the machine, always secure it against unjoined restart.

When first commissioning, pay attention to the following points:

- · Is the machine positioned correctly?
- Is the machine properly connected?
- Is the machine free of tools and material?



## 5 Machine overview

In this chapter you will find information on the use of the machine:

- Intended use (page 29)
- Function description (page 29)
- Parts of the machine (page 30)
- Areas (page 35)

## 5.1 Intended use

The machine is exclusively intended to produce hot steam from suitable water.

Any other or further use shall be deemed to be non-determined.

TIF

The manufacturer shall not be liable for damage caused by non-intentional Use of the machine is created.

## 5.2 Functional description

The water is passed through the water solenoid valve and the check valves into the pressure vessel. There, the water is heated and evaporated with electric heating elements. The generated steam is fed to the consumer via a steam shut-off valve.

The heating elements of the pressure vessel are automatically switched off when the preset pressure of 300 kPa is reached. After a pressure drop, they are automatically switched on again. The respective heating power can be regulated with multi-stage versions of the steam generator by means of light pressure switches on the control box.



## 5.3 Parts of the machine

In this chapter you will find information about the parts of the machine.

#### 5.3.1 Overview



Front view

#### Legend

No.	Title	Function
1	Control box	See section "Control box" (page 32).
2	Manometer	Indicates the pressure in the steam boiler of the machine.



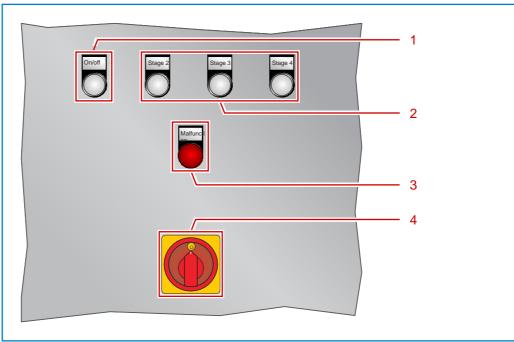


#### Legend

Legend			
No.	Title	Function	
1	Safety valve	In case of overpressure, the safety valve is opened and the steam is blown off.	
2	Steam pipe connection with Shut-off tap.	The steam line is connected to the steam line and the steam produced in the boiler is discharged. The steam outlet can be closed via the shut-off valve.	
3	Sludge connection with ball valve	Used for emptying the steam boiler. Via the sludge connection, the water-steam mixture is discharged from the steam boiler and discharged into a waste duct. With the ball valve, the sludge connection can be opened or closed. The pipes of the sewer must meet specific requirements, see section "Requirements of the sewer at the sludge connection" (page 35). The sewer shall not be connected to other sewers. Otherwise, there is a risk of steam leaking at the drains of sinks or similar sinks.  In principle, you must obtain the appropriate permit for the connection to an urban water connection (city works/waterworks). This also applies if the pipelines are already suitable for construction. If no approval is granted, you can use a mixed water cooler for cooling Dino Maschinenbau GmbH.	



## 5.3.2 Control box



Control box

#### Legend

Lege	iiu			
No	Title	Type	Position	Function
1	On/off	Luminous pressure switches	pressed	Launch the feed water pump and pump the feed water into the steam boiler. Starts steam generation: Stage 1-18 kW
2	Levels 2,3 and 4  are optional and not for all installations available.  Stage 2   Level 3   Level 4	Luminous pressure switch	pressed	Increases the electrical power of the Steam generators.
3	Malfunction	Light detecto rs	from	There is no fault on the machine.
			lights up	A fault occurred on the machine, see chapter "Steam production" > "Disruptions during production" (page 42).
4	Main switch	Circuit breaker	One/OFF	Switches on or <b>off</b> the electrical power supply of the machine.  The main switch can be connected with a padlock against unwillingly restarting.
0	Steam	Luminous <b>pressure</b> – <b>pressed</b> switch		Open the vapour valve as long as the release is from the distance.



#### 5.3.3 Requirements for food water

#### Suitable water:

- Drinking water treated with the DINO-SOFT water softening system
- Drinking water with a maximum total hardness of 4° dH
- For steam generators in stainless steel version, VE-water may be used
- For steam generators of types NDD and steam boy, a water pressure of at least 3.5 bar is required for trouble-free operation.

#### Unsuitable water:

Drinking water with a total hardness exceeding 4° dH

- Drinking water with chemical additives (hydrazine, sodium sulphide, etc.)
- · Fully softened water (0-grassy).
- Fully salted water (VE water) may only be used in stainless steel steam generators.
- Well water
- Domestic water
- · Process water from a production plant



#### 5.3.4 Requirements of the sewer at the sludge connection

Safety note: Get your permission!

The water-steam mixture is very hot. Under pressure, this can cause damage to the sewer. Therefore, the water-steam mixture must not be directly passed through into plastic sewers. Steel or clay sewers may be used.

If the sewer is not heat-resistant, the water temperature must be sufficiently lowered by adding cold water into a sludge mixing water cooler.

In principle, you must obtain the appropriate permit for the connection to an urban water connection (city works/waterworks). This also applies if the pipelines are already suitable for construction.

TIP

You will receive a suitable sludge mixing water cooler as an accessory from DINO Maschinenbau GmbH

## 5.4 Areas

In the following sections you will find information about the machine's work, hazard and maintenance areas.

#### 5.4.1 Areas of work

The working areas must be kept free for the operator. Do not place objects around the machine in an area of at least 80 cm.

#### 5.4.2 Hazard areas

The mechanical danger points on this machine are secured by structural and technical measures. Nevertheless, some machine parts become very hot. You must not touch these machine parts.

#### 5.4.3 Maintenance areas

Maintenance areas must be kept free for maintenance personnel. Keep an area of 80 cm around the machine free and do not set any counters.

After connecting all cables, all protective covers still have to be, see "Safety" > "Fixed safety devices" (page 18) can be removed from the machine.



# 6 Steam production

In this chapter you will find information about production with the machine:

- Production with the machine (page 37)
- Daily commissioning (page 37)
- Turn on machine and start production (page 38)
- Controls during production (page 39)
- Decommissioning (page 40)
- Malfunctions during production (page 42)

#### 6.1 Production with the machine

Production with the machine is fully automatic. The operator shall continuously monitor the operation.

Pay particular attention to the following possible malfunctions:

- Is the line system tight?
- · Do the valves switch correctly?
- Do unusual noises occur?

If you notice a malfunction, stop the machine immediately. Eliminate the cause of the malfunction, as well as you are authorised to do so. Otherwise, you immediately inform your supervisor. Do not continue to produce until you are sure that the machine works flawlessly.

## 6.2 Daily commissioning

Before starting the machine, you need to make sure that you can answer the following questions with "yes":

- Are all safety devices, as intended by the manufacturer, assembled and functioning properly?
- Is the working area free of materials and objects that are not necessary for production?
- Are only authorised persons present in the work area of the machine?
- Can no one be hurt by starting the machine?

Do I know how to act in case of incidents?



## 6.3 Turn on machine and start production

Condition:

The shut-off valve at the steam line connection is closed.

•The ball valve for the sludge connection is closed.

#### Perform the following steps:

- 1. Open the on-site feed water valve before the feed water connection.
- 2. Rotate the < MAIN SWITCH> on the control panel in position I ON. The machine is powered by power.
- Press the light pressure switch (ON/OFF) on the control box.
   The water solenoid valve is opened and water flows from the pipe into the steam boiler.

When the minimum water level is reached, steam production starts. When the maximum water level is reached in the steam boiler, the Water supply stopped automatically.

- 4. Press the luminous pressure switches (2), (3) and (4).
   ! This action step shall be carried out OPTIONAL.
   Check on the pressure gauge if the target pressure in the steam boiler is reached.
- Check on the pressure gauge if the target pressure in the steam boiler is reached.
   Target pressure
   300 kPa
- **6.** Open the shut-off valve at the steam line connection.

The machine is operational.

The steam can be removed.

The pressure in the boiler falls below 200 kPa?
The steam pick-up is too big. With constantly open water solenoid valve and constantly tightened heater, too much steam is removed!
Connect the shut-off valve to the steam pipe connection
Wait until the pressure in the boiler has risen to 300 kPa.
Open the shut-off valve at the steam line connection.





## 6.4 Controls during production

During the production of the water vapour, inspections must be carried out at regular intervals on the machine. In this chapter you will find information on the controls to be carried out during the steam production of the machine.

#### 6.4.1 Control of the "interference" indicator

During operation, check the light detector fault on the control panel of the machine. If the light detector lights up, there is a malfunction on the machine, see chapter "Disruptions during production" (page 42).



# 6.5 Decommissioning

In the following sections you will find information on the decommissioning of the machine.

#### 6.5.1 Turn off the machine

At the end of the day, turn off the machine.

Perform the following steps:

- 1. Connect the shut-off valve to the steam pipe connection.
- 2. Turn off the light pressure switches (2), (3) and (4) on the control panel.
  - This action step can only be performed if you have OPTIONAL heating power I'm sorry, sir.
- 3. Press the light pressure switch (ON/OFF) on the control box.
- **4.** Rotate the < MAIN SWITCH on the control panel in position **o off**. The machine is tension-free.
- 5. Open the ball valve at the sludge connection.



## 6.5.2 Long-term decommissioning

Long-term decommissioning means that you take the machine out of service for a longer period of time or move it to another location.

#### Condition:

Prepare a log during decommissioning.

- Keep this log together with the machine's documentation file.
- The machine is switched on and produces steam.

# Emptying machine

Perform the following steps:

- 1. Connect the shut-off valve to the steam pipe connection.
- 2. Turn off the light pressure switches (2), (3) and (4) on the control panel.
  - This action step can only be performed if you have OPTIONAL heating power I'm sorry, sir.
- Press the light pressure switch ON/OFF on the control box.
- **4.** Rotate the < MAIN SWITCH> on the control panel in position **0 OFF**. The machine is tension-free.
- 5. Stop the water supply on the built-in shut-off valve.



- 6. Open the ball valve at the sludge connection.
- 7. Connect the shut-off valve to the steam pipe connection.

The machine is emptied.

Fill in antifreeze

Perform the following steps:

Carry out appropriate antifreeze measures, see chapter "Maintenance and repair" > "Insert antifreeze" (page 52).

The antifreeze is filled in.

Disconnecting machine from the supply lines

Perform the following steps:

Remove all piping from the machine.

Machine is separated from the supply lines.

Machine conserfour Perform the following steps:

- 1. Dry the machine carefully.
- 2. Pack the machine so that it is protected from moisture and dust.

Machine is conserved.

Long-term decommissioning has been completed.

TIP

In addition, please note the following instructions on how to store the machine in case of non—

use.

#### 6.5.3 Storage in case of non-use

Store the machine under the following conditions if the machine is to be taken out of service for a long time:

- Store machine parts standing on the feet in order to avoid distortion of the components
- · closed, well-ventilated room
- Ambient temperatures between 5 °C and 40 °C
- avoid large temperature fluctuations
- · low humidity

#### 6.5.4 Disposal

This section provides information on the disposal of the machine.

The machine may only be completely disassembled by the specialist personnel of DINO Maschinenbau GmbH.

Disconnecting





In the case of disposal, the following principles shall apply:

- Equipment must not be disposed of via household waste.
- Collect and, if necessary, clean parts of the machine separately as metal scrap and electronic scrap
- Dispose of cleaned metal parts as scrap metal
- Dispose of cleaned cables as electronic scrap

# 6.6 Malfunctions during production

Safety: in an accident

Only trained persons may eliminate disturbances. In the event of a malfunction, please follow the following safety instructions:

- Check if there is any damage to the machine.
- Use the trouble list to check whether you can fix the fault independently.
- Inform yourself about the malfunction with your supervisor.

In this chapter you will find measures that need to be carried out during an incident.



## 6.6.1 Troubleshooting table

In this section you will find possible causes of malfunction of the machine

#### Faults on the machine and measures

Malfunction	Cause	Action
The performance is not achieved.	Steam shut-off valve not fully opened.	Open the vapor shut-off valve.
	Heating element failed.	Change the heating element, See chapter "Maintenance and repair" > "Replace heating elements" (page 50).
	Boiler's calcified.	Descaling boilers, see chapter "Maintenance and repair" > "Decaling steam boilers" (page 48).
Light detector does not lapse.	Overheating of the steamer.	See section "Remedie overheating malfunction" (page 44).

## 6.6.2 Fix overheating failure

The overheating disorder occurs when there is no water in the system. A thermostat monitors the temperature of the heating element installed at the highest point. At 250 °C, the thermostat switches off the system and the light **detector** (SSOULATION) lights permanently.

Condition:

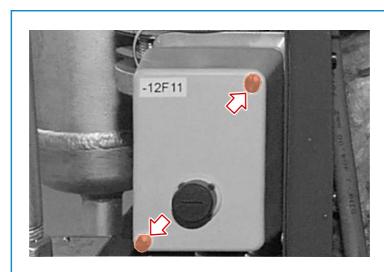
- The main switch is in position o off and secured against an unwanted restart.
- The plant is cooled for at least two hours.

Required:

- Slot screwdriver
- Control cabinet key

Perform the following steps:

1. Use the slot screwdriver to release the two slot screws.





- Remove the housing cover from the thermostat.
   Store the housing cover in a suitable location.
- 3. Press the red anti-interference button on the thermostat.



An overheating malfunction is reset.

- 4. Reset the housing cover of the thermostat.
- 5. Use the slot screwdriver to screw the two slot screws manually.
- Poes the thermostat trigger several times in a row? The plant is either defective or calcified. Inform the maintenance staff about the incident. Decalcify the machine, see chapter "Maintenance and repair" > "Decaling steam boilers" (page 48).
- ✓ It's done.

If you cannot fix the error, then contact DINO Maschinenbau GmbH Telephone and fax numbers:

Telephone: + 49 (0)421-58 00 44

Fax: + 49 (0)421-58 00 46



# 7 Maintenance and repair

In this chapter you will find information on the maintenance and repair of the steamer:

- Notes on maintenance and repair (page 46)
- Maintenance plan (page 47)
- Spare parts (page 54)

## 7.1 Notes on maintenance and repair

This section provides information on the maintenance and repair of the machine.

Safety note: Risk of injury due to unwanted start-up of the system!

There is a risk of injury to persons due to unwanted start-up of the machine. Note the following points when waiting for the machine:

- Turn off the system before the start of maintenance.
- Use warning signs to indicate maintenance or repair work.

Safety-conscious and predictive behaviour of personnel avoids dangerous situations during maintenance and repair work.

The following principles apply to maintenance and repair:

- Maintenance or repair work may only be carried out by qualified personnel.
- The intervals prescribed in the maintenance plan shall be respected.
- The machine shall be decommissioned before maintenance and repair work.
- Access must be blocked for unauthorised persons. Where appropriate, signs shall be set up to draw attention to the maintenance or repair work.
- Climbing on the machine or on feeders is prohibited. Instead, suitable tools shall be used, e.g. fixed ladders with handrails.

The complete machine must be regularly cleaned and checked according to its degree of contamination.

In particular, during maintenance work, attention should also be paid to damaged components and components as well as to loose screws, screw fittings and flange screws. Loose connections must be followed immediately.

Damaged components must be replaced immediately to ensure the proper functioning of the machine.



# 7.2 Maintenance plan

### Safety note:

Perform the described maintenance work after initial commissioning. Note the recommended maintenance intervals.

In this section you will find information about the maintenance services to be carried out on the machine.

Perform the following steps regularly to maintain trouble-free operation of the machine.

#### Maintenance plan — the machine

	plan — the machine		
Who	Machine part	Work steps	Maintenanc e intervall
Operator sonal	Open sludge valve	After turning off the machine, open the ball valve at the sludge connection.	daily
Maintenan ce staff	Machine in general	<ul> <li>Perform the following steps.</li> <li>Drag down all installation connections.</li> <li>Check all installation connections for tightness.</li> <li>Check all electrical connections for fixed seat.</li> <li>Perform a visual inspection of the machine.</li> </ul>	After the first week of operatio n
Maintenan ce staff	Machine in general	<ul> <li>Perform the following steps.</li> <li>Drag down all installation connections.</li> <li>Check all installation connections for tightness.</li> <li>Check all electrical connections for fixed seat.</li> <li>Perform a visual inspection of the machine.</li> <li>Decalcify the machine, see section "Decaling steam boilers" (page 48).</li> </ul>	3-monthly



## 7.3 Maintenance work on the machine

This chapter describes the maintenance work to be carried out on the machine.

## 7.3.1 Descaling steam boilers

Condition:

The machine is switched off, see chapter "Steam production" > " Disable machine" (page 40).

The food water tank is emptied.

Required:

one water vessel with 20 I of water

- 250 g citric acid or lemon powder
- a plastic funnel



#### The citric acid is corrosive!

You may injure yourself when contacting the citric acid. Wear appropriate protective equipment.



# **CAUTION**

Avoid direct contact with citric acid.

Perform the following steps:

- 1. Fill the citric acid or lemon powder in the water vessel.
- 2. Mix citric acid with water.
  - If you use lemon powder, you need to warm the water.
    As a result, the lemon powder dissolves better.
- 3. Close the ball valve at the sludge connection.
- 4. Unscrew the tank lid from the feed water tank.
- 5. Insert the plastic funnel into the opening.
- 6. Fill the citric acid-water mixture from the plastic bucket into the plastic funnel.
- 7. Remove the plastic funnel from the opening.
- 8. Screw the tank lid back to the feed water tank.

The preparations have been carried out.



Build up pressure in the steam boiler

Perform the following steps:

- 1. Rotate the < MAIN SWITCH> on the control panel in position I ON. The machine is powered by power.
- 2. Press the light pressure switch (ON/OFF) on the control box. Steam production starts.

3.	Observe the pressure gauge below the control box.												
	Target pressure 200 kPa				•		•						

4. Press the light pressure switch (ON/OFF) on the control box. The steam generation stops.

- 5. Rotate the (MAIN SWITCH) on the control panel in position 0 OFF.
- 6. Wait an hour.

The pressure in the steam boiler was built up.

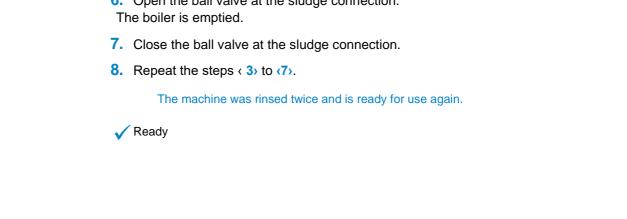
Start rinsing process Perform the following steps:

1. Open the water shut-off valve. The food water tank is filled with food water.

- 2. Rotate the < MAIN SWITCH> on the control panel in position I ON. The machine is powered by power.
- 3. Press the light pressure switch (ON/OFF) on the control box. Steam production starts.
- 4. Observe the pressure gauge below the control box.

500 kPa Target pressure

- 5. Press the light pressure switch (ON/OFF) on the control box. Steam production is stopped.
- 6. Open the ball valve at the sludge connection.





## 7.3.2 Exchange heating elements

Safety note: Please note!

This maintenance work may only be carried out by qualified personnel.

#### Condition:

The machine is switched off and protected against unauthorised restarting, see chapter "Steam production" > "Disable machine" (page 40).

•The steam boiler must be pressureless.

#### Required:

A new sealed with sealing cord and teflon tape and prepared heating element.

- ·a new seal
- ·Screwdriver
- \*Wrench with wrench 60 for heating elements

# Remove heating elements

### Perform the following steps:

- 1. Remove the cover plate.
- 2. Dismantle all electric cables from the heating elements.
- 3. Loosen the screws on the heating elements.
- 4. Remove the old heating element.

The old heating element was removed.



#### Perform the following steps:

- 1. Attach the prepared new heating element.
- 2. Replace the old seal of the heating elements with a new seal.
- 3. Assemble all electric cables to the new heating element.

- 4. Perform a visual inspection of the flange and the new heating element.
  - So you can see if all screws are dense and can't leak steam.
- Assemble the cover plate.

The new heating element was installed.

It's done.



#### 7.3.3 Fill in antifreeze

Condition:

•The machine is switched off, see chapter "Steam production" > "Disable machine" (page 40).

Required:

Antifreeze agents

Make preparations

Perform the following steps:

- Close the ball valve at the sludge connection.
- 2. Unscrew the tank lid from the feed water tank.
- 3. Insert the plastic funnel into the opening.
- 4. Fill the antifreeze in the plastic funnel.
- 5. Remove the plastic funnel from the opening.
- 6. Screw the tank lid back to the feed water tank.

The preparations have been carried out.

Filling pipes with antifreeze

Perform the following steps:

1. Rotate the < MAIN SWITCH> on the control panel in position I ON. The machine is powered by power.

2. Press the light pressure switch **ON/OFF** on the control box. The antifreeze is pumped into the pipelines.

Observe the pressure gauge below the control box.

Target pressure **200 kPa** 

4. Press the light pressure switch (ON/OFF) on the control box.

5. Rotate the (MAIN SWITCH) on the control panel in position o off.

The pipes are filled with antifreeze.

Ready



# 7.4 Commissioning protocol

In this protocol you will find important information that you need to check and work before the first commissioning of the machine.

The commissioning protocol shown here is a sample and applies to several machine variants.

Points E.01 to E.16 only need to be processed for special variants of this machine.

	omer:						
Locat	tion:						
0			L		No	partial	
Annex	tors were present at commissioning:		У	— Date:	. INU	partial	_
	number:				number:		-
	enance interval:			— Name:			_
							_
1	General	OK Not	OK	4	Water drain	OK No	ət
1.1	Device is correctly placed and fastened			4.1	Inner diameter		_
1.2	Strength of the load-bearing structure			4.2	Minimum slope (10 %) observed		_
1.3	Device is correctly aligned			4.3	Right material	_	-
1.4	Covers mounted			4.4	Correctly fastened		-
2	Steam line			5	Electrical installation		_
2.1	Steam pipe mounted correctly			5.1	Conformity of device data	_	-
2.2	Blow-out openings properly mounted			5.2	Correct protection of the lines		-
2.3	Insulation performed correctly			5.3	Direction of rotation checked		-
2.4	Correct insulation material			5.4	Service switch installed		-
2.5	Correct fixing of the steam pipe  Elongation taken into account			5.5	Components correctly connected		_
2.6				5.6	Connection cable fixed		-
3	Water inlet			5.7	Connecting cable loaded	_	_
3.1	Shut-off valve mounted			5.8	Encoding correctly set		_
3.2	Water filter mounted (5μ)  Pressure adhered to			5.9	Leak monitoring available  All terminal connections retracted		-
3.4							_
3.4	Temperature met Sufficient infeed capacity			5.11	All fuse elements retracted  Test run	-	_
3.6	Correct material			5.12	Pressure at steam extraction stable	-	_
3.7	Correctly fastened			5.15	Pressure at steam extraction stable	_	-
3.7	correctly fasteried						-
C-441	gsRules	Evterna	Interna				
Settin	gshales	I	I				
F 01	C	Plant	ls:	F 00	Ti [i-]	Plant	_
E.01	Sensor type  Controller signal (4.30 mA/0.10 V)			E.09	Time [min]	-	_
E.02 E.03	Controller signal (4-20 mA/0-10 V)  Setpoint [%rF]			E.10 E.11	Water conductivity [μs/cm]  Water hardness [μs/cm or O dH]	-	_
E.04	P-band [%]			E.12	Blended water		-
E.05	Intergr. Time [min]			E.13	Small maintenance [100 % h]		-
E.06	Power limitation [%]			E.14	Great maintenance [100 % h]	_	-
E.07	Softstart (no/yes}			E.15	Sludge interval [h]	_	-
E.08	Limitation [%]			E.16	Sludge time [min]	_	_
2.00	Elimeation [76]			2.10	Studge time [mm]		-
Comm	nents:						_
COMM	iciis.						_



# 7.5 Spare parts

Various spare parts are available for this machine. The information on the spare parts received is in a separate documentation. You can find the spare parts list in the supplier documentation of this machine.





### **Dino Maschinenbau GmbH**

Leerkämpe 6d D-28259 Bremen

Tel: + 49 (0)421-58 00 44 Fax:+ 49 (0)421-58 00 46

E-mail: info@dino-bremen.de Web: www.dino-bremen.de