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INSTALLATION AND OPERATING INSTRUCTION MANUAL

ZANTINGH FLUEGASCONDENSER ZRC 0.5 - 12.0



ZANTINGH



YOU CAN COUNT ON OUR EXPERTISE

Dear Customer,

We would like to thank you for purchasing our product.

We provide this manual to ensure the distribution of all important information for your safety, optimal profit and product lifetime.

Please read the instructions carefully before installing or operating the product.

The safety and operating instructions in this manual must be followed to ensure that installation, commissioning, operation and maintenance are safe and in accordance to (local) standards and regulations.

Our technical department can provide additional information and support.

If you have any questions, please contact us.

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1. INTRODUCTION



IMPORTANT read this first!

The instructions are an integral part of the product. The instructions contain important information on the commissioning, usage and operation of the product. Please read the instructions carefully.

The guarantee becomes null and void if the mounting instructions are not followed. Zantingh B.V. cannot be held liable for these damages.

Store this manual carefully near the equipment!

A certified heating or electrical installer should instal the product, in accordance with the applicable (local) standards and regulations.

In Europe the applicable requirements are specified in:

- NEN 1010: electrical installations for low-voltage.
- NEN 1078: requirements for gas installations ≤ 500 mbar.
- NEN 2078: requirements for industrial gas installations.
- NEN 3028: requirements for fuel combustion installations.
- As well as possible local regulations.

Changes to the system may only be implemented conform instructions after receiving confirmation in writing from Zantingh.



REMARK:

Restrict authorization to trained personnel only. Please contact your Zantingh representative or local service department in case of doubt.

2. DANGERS, WARNINGS AND NOTES OF CAUTION

NOTE: The information included in this section is dedicated to both user and personnel charged with installation and/or maintenance

Always make sure that a copy of this manual is available in the boiler room.



In case of fire or any other emergency:

When accessible close the gas valve (A1) of the gas train and switch off the main switch on the burner panel.

When there's a fire in the boiler room you need to switch off the electric power using the "fire switch" mounted on the wall outside the boiler room.

Before you start

- The flue gas condenser is suitable for recovering heat from the flue gasses of gas fired warm water, hot water, or steam boilers. The equipment is to be installed between the boiler and the flue (chimney).
- The equipment must be installed by qualified personnel following the manufacturer's instructions, in compliance with the regulations in force.
- Qualified personnel means those having technical knowledge in the field of civil or industrial heating systems, electrical systems and are preferably employed by service centers authorized by the manufacturer.
- The installer must ensure that the equipment is compatible with the associated appliance and the capacity of the venting system. The installation must be in compliance with the requirements of this manual and the regulations in force.
- Improper installation may cause injury to people and animals or damage to property, for which the manufacturer cannot be held liable.
- Remove all packaging material and inspect the equipment for integrity. In case of any doubt, do not use the equipment, but contact the supplier instead. The packaging materials (wooden crate, nails, fastening devices, plastic bags, foamed polystyrene, etc.), should not be left within the reach of children, as they may prove harmful.
- The equipment should be used exclusively for which it was designed. Any other use shall be considered as improper and therefore dangerous.
- Only equipment designed according to the regulations in force should be used.
- Failure to comply with the above instructions is likely to impair the equipment's safety.



Precautions if you smell gas:

1. Immediately open doors and windows to create an air flow to purge the room
2. Close the gas valves
3. Do not operate electric switches, the telephone, or any other item likely to generate sparks
4. Contact qualified personnel

Instructions regarding operation and maintenance

- The equipment shall be operated and serviced by qualified personnel only and in compliance with the regulations in force.
- Make sure that the equipment has been firmly secured to the boiler.
- After installing the equipment, the associated burner system has to be re-commissioned, due to altered back pressure. Installation and commissioning shall only be done by qualified personnel.
- To ensure equipment efficiency and proper operation, it is essential that maintenance operations are performed by qualified personnel at regular intervals, following the manufacturer's instructions.
- Before any cleaning or servicing operation, disconnect the system from the power mains by turning the master switch on the burner switch panel to OFF, and cut off the fuel supply by closing the hand gas valve A1 in the gas train of the burner.
- Observe caution with hot components. They become hot during operation and will remain hot for some time after the system has stopped.
- In case of breakdown and/or defective operation, shut off the system from fuel and electrics. Make no attempt to repair the equipment or take any other action. Contact qualified personnel instead.
- Equipment shall be repaired exclusively by a servicing center, duly authorized by the manufacturer, with original spare parts and accessories.
- When a decision is made to discontinue the use of the equipment, those parts likely to constitute sources of danger shall be made harmless.
- In case the equipment is to be sold or transferred to another user, or in case the original user should move and leave the unit behind, make sure that these instructions accompany the equipment at all times so that they can be consulted by the new owner and/or the installer.



LIABILITY:

The manufacturer shall not be held liable, by agreement or otherwise, for damages resulting from improper installation, use and failure to comply with the instructions supplied by the manufacturer. The occurrence of any of the following circumstances may cause explosions, polluting gases (example: carbon monoxide CO), burns, serious harm to people, animals and things:

- Failure to comply with one of the instructions in this chapter.
- Incorrect handling, installation, adjustment or maintenance.
- Incorrect use of the equipment or incorrect use of its parts or optional supply.

3. TECHNICAL SPECIFICATION

The unit is to be operated under following design conditions:

Flue gas temperature	:	$\leq 240^{\circ}\text{C}$
Flue gas back pressure	:	$\leq 600 \text{ Pa} / \leq 6 \text{ mbar}$
Water temperature	:	$\leq 90^{\circ}\text{C}$
Water pressure	:	3 or 6 bar (flanges are PN10) *
Water flow	:	see data sheet on page 9

* Each condenser has been tested on water proving at 1,5 times the design pressure.



NOTE:

The ZRC condenser data sheet and condenser sizes table can be found in the annex.

4. PRODUCT DESCRIPTION

4.1 Application

A flue gas condenser is used for recovering energy from flue gasses of gas fired boilers (warm water, hot water or steam boilers). The available felt heat and even the latent heat that is released during condensation will be exchanged with return water temperatures lower than 58 °C. The condenser can be placed behind gas fired overpressure boilers with a maximum capacity of approx. 20 MW and a maximum flue gas temperature of 240 °C.

On the water side, the condenser can be connected to a closed system with a maximum water temperature of 90°C and a maximum operating pressure of 3 bar. The design can be adapted to a working pressure of 6 bar and a minimal water flow at customer's demand. Each condenser has been tested by the manufacturer for water proofing at 1,5 times the design pressure.

A minimum quantity of water must always circulate through the exchanger to prevent damage as a result of overheating. Check the type plate on the condenser for maximum pressure and minimal flow.

The Zantingh flue gas condenser has an integrated and manually operated flue gas valve and bypass channel as standard, which means that the heat exchanger can be closed during emergencies. You can then, for example, burn oil temporarily or the boiler can continue being operational when the water flow over the exchange block is too low.

4.2 System components

(Refer to figure 1 on page 10)

The flue gas condenser is shipped with the following parts *(please check before installation)*:

Assembled to the condenser:

- 2 stainless steel water connections with aluminium flanges (3)
- 2 flue gas thermometers (4)
- 2 water thermometers (12)
- 1 deaerator (5)
- 1 pressure relief valve, mounted on the water side (6)
- 1 pressure switch to protect against high flue gas back pressure (8)
- 1 end switch (9)
- 1 terminal box (11)
- 1 protection thermostat for maximum temperature, i.e. fail-safe thermostat (13)
- 1 counter flange (can also be welded to the boiler)

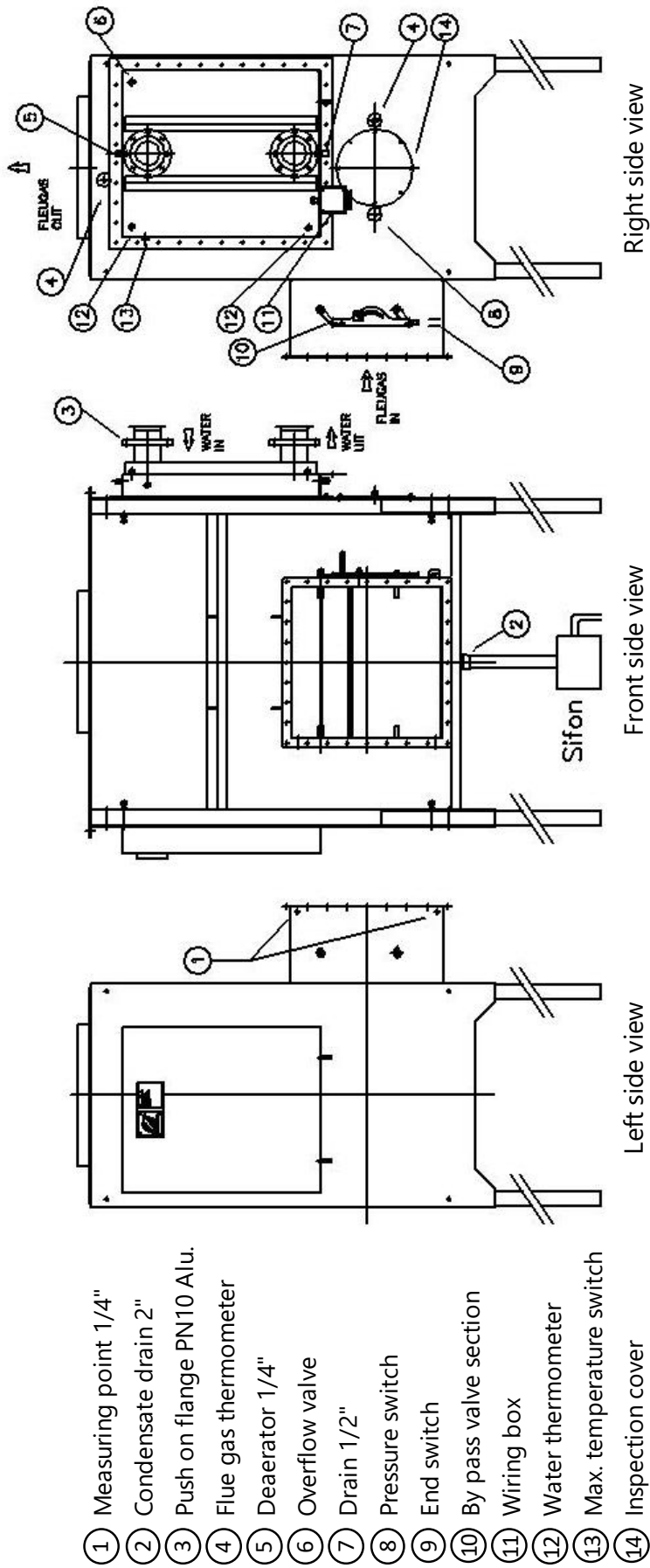


figure 1 ZRC condenser and parts

Separately delivered:

- 1 cartridge silicone paste 315 ml
- 4 galvanized adjustable supporting legs
- 1 set fixing bolts (for supporting legs)
- 1 set bolts (for boiler side flanges)

Component description:

Measuring point (1)

The condenser is equipped with two connections for a flue gas pressure measuring device.

Condensate drain (2)

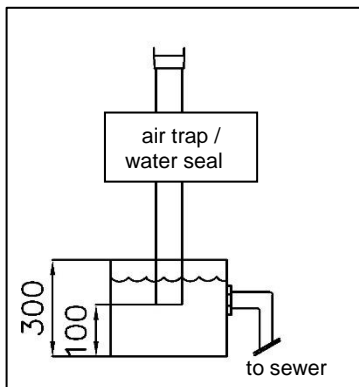


figure 2 Siphon

A Zantingh condenser can produce up to 19 liter of condensate per hour for each 100 kW boiler capacity. Make sure that the drain is not obstructed. The condensate should be discharged immediately as it can be polluting for the condenser, shortening its life span and efficiency as a result.

A siphon is installed to prevent sewer gas and flue gasses to flow into the boiler room.

Push-on flange (3)

The flanges for water sided connection (supply and return) are of a push on type. This flange connection is suitable for a water pressure up to PN10.

Flue gas thermometer (4)

The flue gas thermometer indicates the current flue gas temperature.

Deaerator (5)

It is advised that the condenser shall be bled of air regularly to increase efficiency and prevent pollution.

Pressure relief valve (6)

The condenser is protected against water sided over pressure by means of a pressure relief valve.



IMPORTANT:

The discharge of the pressure relief valve shall be connected to a vertical pipe with a diameter identical to the connection, that ends at a maximum of 10 cm above the ground to prevent risk of injury to people.

Drain (7)

In order to empty the system of water, a water drain is installed.

Pressure switch (8)



figure 3 Pressure switch

The pressure switch is mounted on the inlet side of the flue gas condenser (between condenser and boiler) by means of a copper tube. The upright position prevents condensate flowing to the pressure switch and blocking or polluting it.

A pressure switch is used to monitor changes in the condenser's back pressure, as the back pressure influences the combustion. A too high back pressure results in poor combustion. The burner will give an error message and will be locked out.

The condenser back pressure should not exceed the nominal value (full load) by 2 mbar.

Valve section (10) and end switch (9)

By means of to the integrated flue gas bypass valve section, the cooling section can be shut off when, for example, oil firing is necessary or during temporary low heat demand (low flow in the condenser circuit).

The valve position has to be secured and monitored by means of an end switch (9) which causes the electric supply to the oil valves to interrupt, if the valve is not in full bypass position



IMPORTANT

Make sure that, even in bypass mode, there's always a minimal water flow over the condenser cooling section.

For steam boilers the integrated flue gas valve is often controlled by a servomotor. When the water temperature gets too high, the flue gasses will be bypassed to prevent damage to the condenser.

Wiring box (11)

(Safety) devices can be wired to the condenser terminal box.

Water thermometer (12)

To measure the water temperature

Maximum thermostat (13)

In order to prevent hazardous steam formation, the water circuit is secured by a maximum thermostat. At a too high temperature the thermostat causes the burner to lockout. The system has to be manually reset after a lockout.

Setting maximum thermostat in **closed heating systems**:

- pressurized installation: 95°C
- open installation: 95°C

The setpoint value of the maximum thermostat has to be defined in consultation with the installer and end user, as it depends on the application / sort of network (steel tubes or PVC) the condenser is connected to.

Setting maximum thermostat in heating systems for **drinking or swimming water**:

- if chloride content is 50 up to 250 mg / litre water:
 - pressurized installation : 40°C
 - open installation : 40°C
- if chloride content is **less than** 50 mg / litre water:
 - pressurized installation : 80°C
 - open installation : 80°C

Inspection cover (14)

To inspect the condition of the condenser (pollution-corrosion) in the inside, an inspection cover has been installed.

5. INSTALLATION



IMPORTANT:

Before connecting the condenser to the boiler, make sure there are no loose items or animals/pets in the condenser.

The area around the condenser shall be frost free at all times (also when the condenser is stocked or not in use).

The condenser shall be accessible from all sides for inspection, service and maintenance. The minimum space required is 0,5 meter.

5.1 Transport and preparations

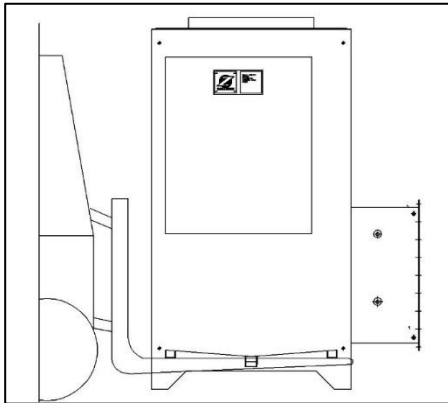


figure 4 Lifting the condenser

Only lift the device with a forklift or by using hoisting belts (sling hitches) around and underneath the equipment.



Minimum required tools and equipment:

Hoisting unit / forklift
Drilling machine
Screw-driver / headbox wrench 13 mm
Measuring rule
Spirit / water level
Aluminium tape
Safety glasses
Gloves

Extra tools:

Welding machine
Flex / grinder machine

Remarks:

- Before beginning the installation, read this manual attentively. When in doubt ask our technical team.
- Keep area clean to prevent accidents.
- Apply nothing but tested and certified hoist- and electrical equipment.

5.2 Installation steps

1. Mount the counter flange for the condenser flue gas inlet required by welding it to the flue gas outlet of the boiler, if this is not already done by the boiler manufacturer.
2. Position the condenser at 0,5 meters from the flange by means of a forklift or pallet truck. Make sure that the hoisting equipment is suitable for the condenser weight.
3. Apply two lines (5-8mm) of the heat resistant silicone paste on the gasket of the flue gas flange, one along the inner contour and one along the outer contour. Align the condenser with the counter flange and fasten with the supplied bolts. Remove the surplus of silicone paste.

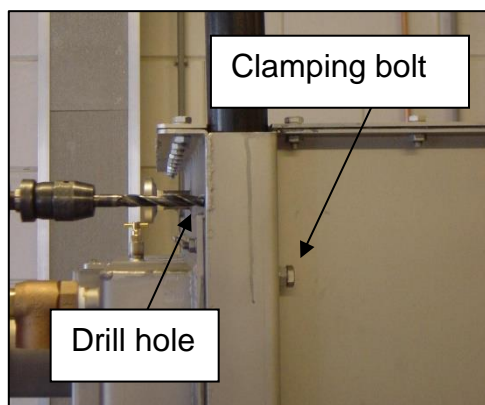


figure 5 Leveling the condenser

4. Extend the support legs to the floor. Temporarily fix the support legs by using the required clamping bolts (figure 6) and adjust until the condenser is in level position.

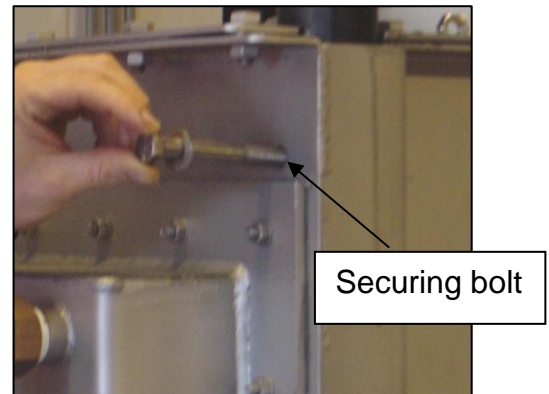
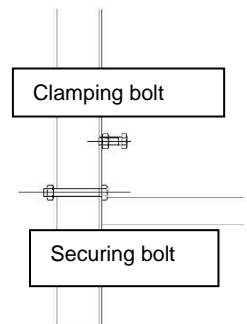


figure 6 Fixing supporting legs

5. When the position is final, drill 8 mm holes through the condenser construction and legs (figure 6) and fix with the securing bolts (figure 7). When the condenser is warm (at first operation) tighten again all bolts with a torque wrench at 21 Nm, see §5.1.



6. Remove the forklift and other hoisting equipment. The steps above should result in an absolute tension free connection of the flu gas inlet. Secure support legs to floor by means of angle steel (not provided) if necessary
7. Position the flue on the inner side of the rim / flange on the upper side of the condenser (make sure that a possible CO₂ connection points in the right direction) and seal the space between the rim and the flue with silicone paste. Cover with aluminum tape to ensure gas tightness.

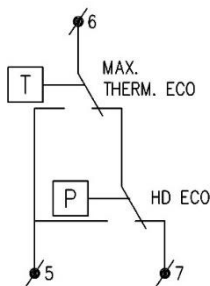


IMPORTANT:

The maximum allowed total weight of the complete chimney including guy wires and other options is 150 kg.

8. Install a roof through, rain cap (roof hood) and a guy clamp. Connect the guy wires to the roof construction. The height should be in accordance with local regulations.
9. Make the water connections by connecting the supply and return flanges (PN10) of the condenser water circuit, considering the right flow direction (water inlet is the upper flange). All connections should enable removal of the condenser (flange connections, no welding!). The position of the water pipes should enable sideways removal of the cooling section. It is very important that all connections to the condenser are tension free. The use of compensators is highly recommended. When the condenser is warm (after first operation) tighten again all bolts with a torque wrench at 21 Nm, also see §5.1.
10. Connect the condensate drain to the water seal (siphon, see figure 4) by means of a stainless steel or galvanized pipe. **Do not use PVC. Do not use a discharge pipe smaller than 2"**. Connect the water seal to the drain/sewer.
11. Connect the safety devices (maximal thermostat, differential pressure switch, end switch on bypass valve) as shown in figure 8.

Max. thermostat & pressure switch (HD)



End switch on bypass valve

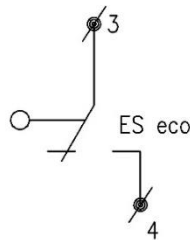


figure 7 Connecting the safety devices electrically

12. The condenser is protected against over pressure by means of a pressure relief valve, see figure 9. The discharge has to be connected to a vertical pipe with identical diameter until a minimum of 10 cm above the ground, to prevent risk of injury (hot steam) to people.

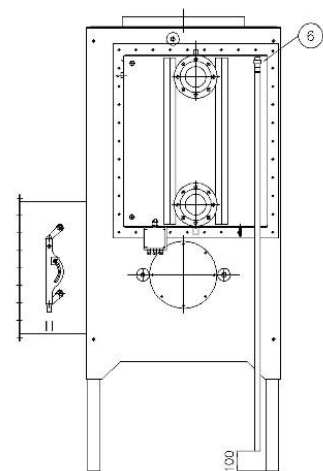


figure 8 Location of pressure relief valve

6. OPERATION

6.1 First start-up



IMPORTANT:

Installing a condenser behind a boiler changes the back pressure of the total installation, which has an effect on the combustion and the settings of safety devices. For this reason, the burner may only be put into operation by qualified and authorized personnel.

1. Before starting the burner, the condenser and water circuit must be filled with water and bled until all air is out of the system. Fill the air trap (figure 4) with water until it flows into the sewer to prevent flue gasses from flowing into the boiler room.
2. Make sure that pumps are working and provide at least the **minimum required water flow** as specified for the corresponding type/size of the condenser (also for steam boilers). A nominal water flow ensures optimal heat recovery. Increasing to **maximum water flow** can increase the efficiency but always make sure that it is never exceeded, as it can cause damage to the equipment.
3. Set and test the safety devices (maximal thermostat, pressure switch and bypass valve end switch). When not working properly this can cause extreme damage to the equipment, but also severely influence the combustion, which can lead to hazardous situations.
4. To prevent pollution by corrosion chips from the boiler, the condenser should be bypassed (oil firing mode) at first startup. Move the bypass valve in the bypass position, see figure 11. The valve position is monitored and secured by an end switch (position 9, figure 1). The electrical supply to the oil valves is interrupted when the bypass valve is not in full bypass position.

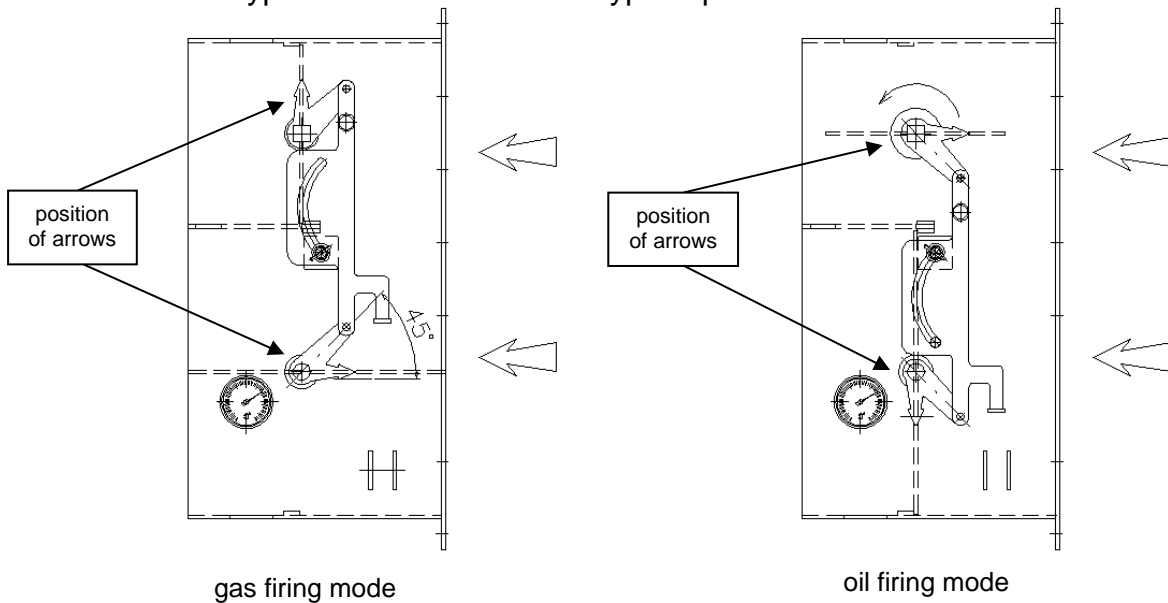


figure 9 Bypass valve positions

**IMPORTANT:**

Never put the condenser to operation when the water flow is too poor or the water level is too low. **This is also applicable when the bypass valve is in bypass position.** Safety devices (max. thermostat, pressure switch and end switch on the bypass valve) are electrically connected to and monitored by the burner management system, see figure 7 on page 14. When exceeding their set values, they have to cause the burner to lockout. Non proper connection or testing can lead to hazardous situation.

After a lockout the system has to be reset manually at the burner switch panel.

5. First run burner for 10 minutes without condenser to remove any corrosion chips from boiler.
6. Switch off burner and put the bypass valve in gas firing position, see figure 10. Now run the installation again and have the combustion adjusted conform the (altered) back pressure of the total installation. **This step must only be performed by qualified personnel, a Zantingh engineer or a by Zantingh authorized engineer.** The combustion test results and the settings of safety devices from the commissioning procedure shall be registered in the burner file and stored on site in the burner panel for safety information and inspection.

**IMPORTANT:**

Complete the installation procedure in chapter 4 by tightening all 8.8 bolts with a torque wrench at 21 Nm.

Attention: condenser and boiler parts may have hot surfaces!

6.2 Operation instructions

A Zantingh flue gas condenser is designed for energy recovery from gas fired boilers. If for some reason the burner has to operate on oil temporary (in case of emergency), the cooling section of the condenser must be bypassed (oil firing mode) by means of the bypass valve. This bypass valve generally is operated manually.

The valve position must always be monitored by an end switch. If the bypass valve is not in full bypass position, the oil valves in the oil supply line to the burner remain closed.

Flue gas conditions

The cooling section consists of aluminium finned stainless steel tubes. In order to prevent damage and wear, the temperature of the flue gasses shall not exceed 240 °C and the boiler shall not exceed the specified condenser capacity.

The flue gasses have to be free of polluting substances like Sulphur, chlorides and halogen. These substances lead to severe damage to the condenser materials. Solid particles in the flue gasses can lead to blockage of the aluminium fins and obstruction of the flue gas flow, with a changing back pressure and a poor combustion (dangerous situation) as a result.

Water conditions

Use (fresh) tap water to fill up a **closed heating system**. The quality of the water should be neutral, meaning:

- pH: ≥ 7
- Cl: < 200 ppm
- NH₃: none

Do not use spring or used water, as it can contain inadmissible amounts of minerals or other polluting substances. The water shall be free of oxygen (O₂) as it results in corrosion inside the condenser.

The quality of the water in an **open heating system** (feed water, drinking water or swimming water) should be as follows:

- pH: $>5 < 11$
- Cl: < 250 ppm if T_{max} 40°C or < 50 ppm if T_{max} 80°C.
- Hardness: follows from the lime content in the water. Chlorides can concentrate in lime deposition.
Limits: T max 40°C => 40 French degrees or 22 German degrees
T max 80°C => 1 French degree or 0.5 German degrees (softened water).

If the quality of the water in the heating system cannot be guaranteed, the water has to be treated before flowing through the condenser.

6.3 Switch from gas to oil and back

From gas to oil:

1. Before switching from gas to oil firing, set the burner load switch to "LOW" and wait until the burner flame is low. Now set the main switch on the burner panel to "OFF".
2. Check that the boiler temperature setpoint is not below 70°C to prevent oil condensation.
3. Close shut off valve A1 on the gas train.
4. Set the flue gas inlet valve of the condenser on bypass.
5. Check that every valve to the oil pump is open and whether the oil pump is filled with oil. The complete system has to be filled with oil without any air. If this is not the case it may cause major defects. The oil pump is not a self-suction pump.
6. Set the selector switch from "GAS" to "OIL".
7. Set the burner load switch to "AUTO" and switch the burner on.

From oil to gas:

1. Set the main switch on the burner control panel to "OFF".
2. Close all oil valves in the oil line.
3. Set the selector switch from "OIL" to "GAS".
4. Switch the load switch to the required setting.
5. Set the flue gas inlet valve of the condenser to standard operation.
6. Open shut off valve A1 on the gas train.
7. Set the main switch on the burner control panel to "ON".

7. MAINTENANCE

Never perform any maintenance or any other activity on the system without adequate knowledge and understanding of the system. When performing any activity on the system, **always switch off the main switch and make sure that it cannot be switched on!**

To assure the safe and proper operation, it is recommended that the system be inspected and serviced at least once a year.

Maintenance work to the burner system should be carried out by a qualified service engineer, including a full combustion report.

Yearly maintenance optimizes the efficiency of the condenser and prevents pollution and hazardous situations.



IMPORTANT:

First set the main switch on the burner panel to “OFF” before performing any maintenance work. Lock the switch to ensure nobody can set the main switch to “ON” while performing maintenance. **Never work on the system if the control panel is live (energized).**

When switching off the main burner control panel switch also switch off the power of any connected CO₂ dosing unit control panel.

Condenser and boiler parts may have hot surfaces!

Remarks:

- The equipment is supplied according to the applicable (safety) standards and regulations. However, it is the responsibility of the user to continually warrant the safety by making sure that the system is maintained according to the regulations in force and the professions of this manual.
- To ensure the good operation of the heating system, the boiler room has to be kept clean. It may not be used for storage purposes. The parts which may need maintenance work need to be accessible at all times.
- Keep the air supply grille and air extraction openings free and clean. Inadequate air ventilation can lead to hazardous situations.
- The boiler room has to be illuminated using mounted electrical lighting, to make sure that all parts of the system can be properly maintained even without daylight.
- Any water leaks have to be repaired immediately.
- If you have any doubts concerning the control or operation of the system, please contact your (burner) technician or supplier.

7.1 Cleaning the condenser

Flue gas side:

The inside of the condenser has to be cleaned once or twice a year, depending on the degree of pollution on the inside of the condenser. Remove corrosion chips and dust (from the boiler) via the inspection hatch.

If the fins of the tubes are blocked, polluted with dust or soot:

1. Clean the fins with detergent (soap) and leave it to soak.
2. Rinse with warm water or gently use a high-pressure cleaner. To prevent deformation of the fins, test the cleaner at a distance first.

To clean the pressure difference switch:

3. Disconnect the copper tube from the bypass valve section.
4. Check the tube and connection to the pressure switch for dirt and remove it.
Do not change settings.

Water circuit:

The system must be bled regularly to make sure it doesn't contain air. Air (oxygen) in the water circuit increases the risk of corrosion inside the condenser.

The water conditions have to be checked regularly to ensure that the quality meets the specifications, see water conditions in paragraph 5.2.

Register the temperature difference between the water supply and return in the condenser circuit. An increased temperature difference may indicate decreasing flow, which may be dangerous to the condenser, if the water flow gets too low.

7.2 Service term

In optimal operating conditions, the condenser can last up to 20 years. Upon expiry of the service term, it is necessary to carry out a technical diagnosis and, if necessary, an overall repair/revision of the system.

The status is considered to be at its limit if it is technically impossible to continue using it due to noncompliance with safety requirements or a decrease in performance. The owner makes the decision whether to revise and continue using the equipment, or replacing and disposing of it, based on the actual status of the equipment and repair costs.

7.3 Seasonal stop

It is not necessary to perform any actions on the condenser in case of a seasonal stop. To stop the burner in the seasonal stop, proceed as follows:

1. Turn the burner main switch to "OFF".
2. Disconnect the main power supply.
3. Close the fuel/gas valve A1 of the supply line.

7.4 Disposal



IMPORTANT:

The use of the equipment for other purposes after the expiry of the terms of use is strictly prohibited.

In case of disposal, follow the instructions according to the laws in force in your country about the "Disposal of materials".

8. FAILURE REPORT

The condenser has a signal light on the burner control panel. If a lockout is caused by a condenser error, the corresponding signal light will be on. Reset the system by pressing the reset button on the switch panel door. Please contact your local installer or Zanting service department when an error occurs that cannot be resolved.

8.1 Troubleshooting



WARNING:

First of all, switch off and secure the burner main switch!
Watch out for hot parts and spraying hot water in case of leaks!

Fault indication:	Probable cause:	Suggestion:
Maximum water temperature *	Circulation pump is not working	Reset pump thermal lock out / check switch positions and pump operation.
	Water circuit obstructed	Check valves
	Local circuit bypass open	Close circuit bypass
	Thermostat setting too low	Adapt setting to acceptable value (consult installer) max. 95°C!
	Thermostat defect	Replace thermostat (failsafe type)
	Broken wire or poor connection	Check circuit rewire / reconnect
Maximum back pressure*	Bypass valve section obstructed (both closed)	Check / recover valve positions
	Condenser polluted	Run bypass mode or clean cooling section
	Pressure switch defect	Compare actual pressure and settings. If setting > actual value, replace switch. (settings shall be as commissioned!)
	Broken wire or poor connection	Check circuit Rewire / reconnect
	Pressure difference switch setting too low	Check setting, value shall be in accordance to value in commissioning report. Settings may only be changed by authorized personnel!
	Condensate drain obstructed	Check inspection opening. Clean condenser and drain connections including siphon / water seal.
Oil firing blocked	Bypass valve position not correct	Change bypass valve position
	End switch not activated / defect	Check diverter valve position or replace end switch.
	Broken wire or poor connection	Check circuit Rewire / reconnect
Condensate siphon overflow	Sewer connection obstructed	Clean connection and condenser

* Any error is likely visible by means of a control light on the control panel of the burner system.

9. WARRANTY CONDITIONS

Zantingh B.V. guarantees this Zantingh product for the installer under the following conditions. The installer guarantees this product to the user under the same conditions which are provided below.

1. The period of guarantee is valid as from the day of delivery on location. The guarantee has a fixed period of 12 months, based on the agreed sales price.
2. A recognized installer should install the system according to the applicable general and local standards and regulations based on the assembly and operation instructions provided by Zantingh.
3. The system may not be moved from the original location.
4. The guarantee becomes null and void if and when:
 - Defects of the system are not reported in writing to the installer and/or Zantingh B.V. immediately after having been discovered or these could reasonably be expected to have been discovered.
 - Defects are caused by errors, improper use or neglect by the installer and/or the user who has placed the order or his/her legal successor or caused by external causes.
 - During the period of guarantee a third party is requested to or implements changes to the system or when the user has done so without prior written consent by the authorized installer and/or Zantingh B.V.
 - During the period of guarantee the expert inspections and/or maintenance work are periodically not performed even though the equipment requires it.
 - Corrosion has been caused by polluted flue gas, to be determined by Zantingh B.V.
 - If after research is carried out, one or more of the above conditions were not taken into account and are the reason for any guarantee claim, the costs for the required research by Zantingh B.V. or third parties will be charged to the user.
5. The initial request based on the guarantee obligations described in this article should be submitted in writing to the installer within five working days after the error or defect has been observed or could reasonably have been observed.
6. The stipulations included in our general guarantee, sales and payment conditions, issued by the ORGALIME S 2012 "General conditions for the supply of mechanical, electrical and electronic products" are also applicable. Zantingh B.V. will not be liable for any consequential damage to the Zantingh system other than a defect covered by the guarantee as described above. Moreover, Zantingh B.V. will not be liable for any damage to income and/or loss of profit to the user of any nature whatsoever.
7. Any costs incurred by assembly or disassembly, travelling or accommodation expenses, constructional costs and such required to execute the terms of the guarantee are excluded from the terms of the guarantee.

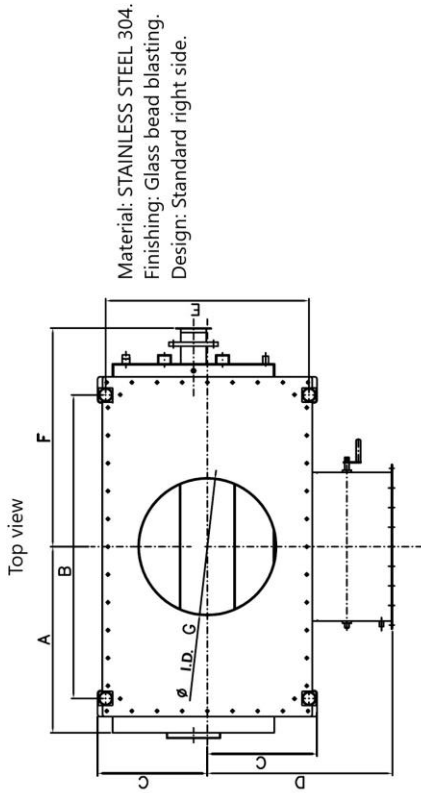
Any dispute between Zantingh B.V. and the buyer regarding a claim based on the guarantee will be resolved by an expert and independent authority if so desired. The parties agree to abide by the binding decision of said authority.

ANNEX

Condenser sizes



ZANTINGH FLUE GAS CONDENSER



Material: STAINLESS STEEL 304.
 Finishing: Glass bead blasting.
 Design: Standard right side.

** Dimensions are in mm

Type:	A	B	C	D	E	F	G	H	I	J	K	L	M1xM2	N1xN2	NW/PN10
ZRC 0.5	480	649	341	579	610	625	310	1294	466	828	820	225	540X540	460X460	50
ZRC 0.75	600	1364	341	579	610	745	310	1294	466	828	820	225	540X540	460X460	50
ZRC 1.0	836	1364	281	519	490	982	360	1394	446	948	740	405	540X540	460X460	65
ZRC 1.5	836	1364	311	549	550	982	360	1514	446	1068	740	525	540X540	460X460	65
ZRC 2.0	836	1364	341	578	609	982	460	1654	516	1138	820	585	640X640	560X560	80
ZRC 2.5	836	1364	401	638	729	982	510	1654	516	1138	820	585	640X640	560X560	80
ZRC 3.0	836	1364	461	798	850	982	610	1714	561	1153	880	585	740X740	660X660	100
ZRC 4.0	836	1364	491	828	909	982	610	1774	561	1213	880	645	740X740	660X660	100
ZRC 5.0	1165	1804	491	908	908	1302	710	1854	626	1228	960	645	870X870	790X790	125
ZRC 6.0	1165	1804	521	938	969	1319	710	1854	626	1228	960	645	870X870	790X790	125
ZRC 7.0	1187	1804	596	1099	1119	1319	760	1934	665	1269	990	680	970X970	890X890	150
ZRC 8.0	1247	1804	656	1159	1239	1373	760	1934	665	1269	990	680	970X970	890X890	150
ZRC 9.0	1412	2195	626	1169	1179	1572	810	2034	715	1319	1090	680	1070X1070	990X990	150
ZRC 10.0	1412	2195	656	1229	1239	1572	810	2034	715	1319	1090	680	1070X1070	990X990	150
ZRC 12.0	1442	2195	740	1319	1479	1572	910	2034	715	1319	1130	600	1070X1070	990X1190	200

Datasheet

DATASHEET ZANTINGH FLUE GAS CONDENSER



ZANTINGH

FLUEGAS CONDENSER TYPE	ZRC 0,5	ZRC 0,75	ZRC 1.0	ZRC 1.5	ZRC 2.0	ZRC 2.5	ZRC 3.0	ZRC 4.0	ZRC 5.0	ZRC 6.0	ZRC 7.0	ZRC 8.0	ZRC 9.0	ZRC 10.0	ZRC 12.0
Net boiler capacity [Mcal/h]	500	750	1.000	1.500	2.000	2.500	3.000	4.000	5.000	6.000	7.000	8.000	9.000	10.000	12.000
Nett boiler capacity [kW]	580	870	1.160	1.745	2.330	2.900	3.490	4.650	5.810	6.975	8.140	9.295	10.465	11.628	13.956
Heated surface [m ²]	48	66	88	132	170	227	284	336	450	491	614	702	790	845	950
Max. fluegas temperature °C	240	240	240	240	240	240	240	240	240	240	240	240	240	240	240
Max. fluegas volume [m ³ /h]	785	1.180	1.575	2.360	3.145	3.935	4.720	6.295	7.865	9.440	11.011	12.584	14.157	15.730	18.880
Max. fluegas backpressure [mbar]	0,5	0,65	1,6	2,7	3,6	3,2	2,9	4,6	4,1	4,9	5,3	5,3	5,3	5,7	6,5
Min. water flow ¹ [m ³ /h]	7,5	7,5	7,5	12	15	20	25	30	30	32	40	45	42	45	nb
Water back pressure at min. flow [mbar]	5	5	14	17	16	18	16	18	18	18	17	18	20	20	nb
Nominal water flow ² [m ³ /h]	15	15	15	23	29	39	49	58	58	63	79	90	85	90	100
Water back pressure at nominal flow [mbar]	15	15	50	60	55	66	57	63	62	64	61	63	72	72	70
Max. water flow ³ [m ³ /h]	30	30	30	45	58	78	100	115	115	125	157	180	170	180	nb
Backpressure at max. flow (mbar).	55	55	185	225	210	245	215	240	225	230	220	230	260	230	nb
Chimney connection Ø mm	310	310	360	360	460	510	610	610	710	710	760	760	810	810	910
Flange connections water in- & outlet [NW PN10]	50	50	65	65	80	80	100	100	125	125	150	150	150	150	200
Overflow valve connection	1/2"	1/2"	1/2"	3/4"	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2 1/2"
Weight fluegas condenser [kg]	400	460	597	668	732	825	918	1003	1430	1510	1750	1920	2065	2210	2500
¹ Based on water speed 0,5 m/s															
² Based on water speed 1 m/s															
³ Based on water speed 2 m/s															

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