

Aarbergerweg 9  
Rijsenhout  
P.O. Box 255  
1430 AG Aalsmeer (NL)  
Tel. +31 (0)297 219 100  
Fax +31 (0)297 219 199  
www.zantingh.com



# INSTALLATION AND OPERATING INSTRUCTION MANUAL

## ZANTINGH FLUEGASCONDENSER ZRC 0.5 - 12.0



ABN AMRO 49.42.46.294  
BIC ABNANL2A  
IBAN NL17ABNA0494246294  
KvK. A'dam 34041535  
BTW nr. NL0015.13.138.B.01



## **IMPORTANT Read this first!**

This manual is an integral part of the product, it includes instructions for installation, commissioning and operation.

Read instructions attentively! Manufacturers responsibility and warranty shall not apply if installation, commissioning, operation or maintenance is not in accordance to the regulations of this manual.

Store this manual carefully!

<b>Content :</b>	<b>Page</b>
<b>1. PREFACE</b>	<b>3</b>
<b>2. TECHNICAL DATA</b>	<b>3</b>
<b>3. REGULATIONS</b>	<b>3</b>
<b>4. PACKAGE-CONTENT</b>	<b>4</b>
<b>5. APPLICATION</b>	<b>5</b>
<b>6. INSTALLATION</b>	<b>6</b>
6.1 GENERAL	6
6.2 TRANSPORT AND INSTALLATION	6
6.3 INSTALLATION PLAN	7
<b>7. CONDENSER- ACCESSORIES</b>	<b>10</b>
7.1 DIFFERENTIAL PRESSURE SWITCH (HD-ECO) (8)	10
7.2 PRESSURE-RELIEF VALVE (6)	10
7.3 CONDENSATE-DRAIN	11
7.4 MAXIMUM THERMOSTAT (13)	11
7.5 VALVE SECTION (10)	11
<b>8. COMMISSIONING</b>	<b>12</b>
<b>9. INSTRUCTIONS FOR USE</b>	<b>13</b>
9.1 WATERCONDITIONS	13
<b>10. MAINTENANCE INSTRUCTIONS</b>	<b>14</b>
10.1 FLUEGAS RELATED:	14
10.2 WATERCIRCUIT	14
<b>11. WHAT IF UNIT IS IN FAULT</b>	<b>15</b>
11.1 REMARKS:	16
<b>12. WARRANTY CONDITIONS</b>	<b>17</b>

## 1. PREFACE

Dear Customer,

We would like to thank you for your confidence in our organisation and product.

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

We recommend you read this manual and instructions carefully before installing the fluegascondensor.

In order to meet these objectives, installation, commissioning, operation and maintenance shall be carried-out in accordance to the instructions of this manual and local regulations. The safety and operating instructions must be followed.

Additional information and support can be provided by our technical department.

If you have any questions, please contact us.

Phone +31297 219 100 or info@zantingh.com

## 2. TECHNICAL DATA

The fluegascondensor is applicable for reclaiming heat from fluegasses of gasfired forced-draft boilers. (warmwater-, hotwater- or steamboilers).

The unit is to be installed between boiler and stack and -operated under following design-conditions:

- Fluegastemperature :  $\leq 240^{\circ}\text{C}$
- Fluegas backpressure :  $\leq 600 \text{ Pa} / \leq 6 \text{ mbar}$
- Watertemperature :  $\leq 90^{\circ}\text{C}$
- Waterpressure : 3 / 6 bar(o)
- Waterflow : see specifications per type/size or specifications Zantingh.

Each condenser has been factory-tested on water leaking at 1,5x working pressure.

## 3. REGULATIONS



### **IMPORTANT:**

The installer shall ensure the heatreclaimer by design is compatible with the associated appliance and its venting system and the installation is in compliance with the requirements of this manual and the local regulations.

As result of the altered backpressure, the burner shall be re-commissioned during first start-up. Installation and commissioning only by holders of a certificate for the purpose.

## 4. PACKAGE-CONTENT

The fluegascondensor is shipped with following parts:  
(please check before installation).

### Single condensor (with 1 watercircuit):

#### Assembled:

- 2 flanges (waterconnections) (3)
- 2 fluegasthermometers (4)
- 1 de-aerator (5)
- 1 pressure relief-valve (6)
- 1 pressure-switch (with tube) (8)
- 1 limit switch (9)
- 1 junctionbox(11)
- 2 waterthermometers (12)
- 1 maximum thermostat (13)
- 1 counterflange (fluegasconnection)

#### Separate:

- 1 cartridge silicone paste 315 ml
- 4 pc galvanised supports (2" pipe, length  $\geq$  2 meter)
- 1 set fixingbolts (support)
- 1 set bolts (fluegasflanges)

### Combi-condenser (with 2 watercircuits) :

#### Assembled:

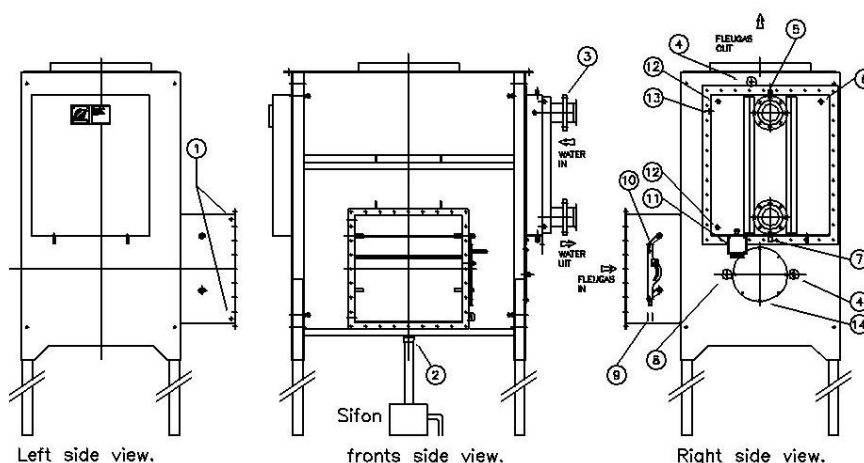
- 4 flanges (waterconnections) (3)
- 2 fluegasthermometers (4)
- 2 de-aerator (5)
- 2 pressure relief-valve (6)
- 1 pressure-switch (with tube) (8)
- 1 limit switch (9)
- 1 junctionbox(11)
- 4 waterthermometers (12)
- 2 maximum thermostat (13)
- 1 counterflange (fluegasconnection)

#### Separate:

- 1 cartridge silicone paste 315 ml
- 4 pc galvanised supports (2" pipe, length  $\geq$  2 meter)
- 1 set fixingbolts (support)
- 1 set bolts (fluegasflanges)

Material: Stainless steel 304

- ① Measuring point 1/4"
- ② Condensate drain 2"
- ③ Push on flange ND16 Alu.
- ④ Fleugas thermometer
- ⑤ De-aerator 1/4"
- ⑥ Overflow valve
- ⑦ Drain 1/2"
- ⑧ Pressure switch
- ⑨ Limit switch
- ⑩ Valve section lever
- ⑪ Wiring box
- ⑫ Water thermometer
- ⑬ Max. temprature safety
- ⑭ Inspection cover



## 5. APPLICATION

A Zantingh Total Eco, installed between a gasfired forced-draftboiler and stack, will reduce the stack-loss to an absolute minimum.

If the temperature of the systemwater entering the condenser is lower than 58°C, even the condensation-energy will be reclaimed. (up to the difference between GROSS and NETT Calorific Value of the supplied gas).

Type ZRC 0.5 up to ZRC 12.0; matches with boilercapacity (output) from 580 up to 13.950 kW.

Due to the integrated fluegas- divertervalvesection and bypass, the cooling-section can be shut-off for oilfiring or temporary low heat-demand in condensorcircuit.

The compact construction enables installation even in narrow situations.

The telescopic supports and counterflange create simple installationconditions.

The Total Eco Compact may be constructed for one- or two watercircuits; The Combi-type is advised when the heat demand of the available condensorcircuit is less than the recovery-potential of the condenser.

The fluegas-inletconnection is square, the counterflange may be welded to the fluegasconnection-box of the boiler. The fluegas-outlet-connection is circular, adapted for direct connection to an aluminum flue-tube.

The cooling-section is removable and used vertically to enable external cleaning in case of severe soot-contamination and permanent in-proces-cleaning by the condensation.

### **High-grade materials.**

In order to combine high performance and a profitable lifetime in a compact condenserconstruction, Zantingh applies only high-grade materials.

The encasing of the removable cooling section is fully made of stainless-steel.

The cooling section itself consists of stainless tubes, welded to a stainless-steel collector. In order to obtain high performance, the tubes are provided with aluminum fins. The aluminum fins create intense contact between the fluegas and a huge cooling surface in respect to the volume of the cooling section.

The construction ensures intense counterflow heat exchange between the fluegas and the water in order to obtain an optimal heatreclaim.

## 6. INSTALLATION

### 6.1 General



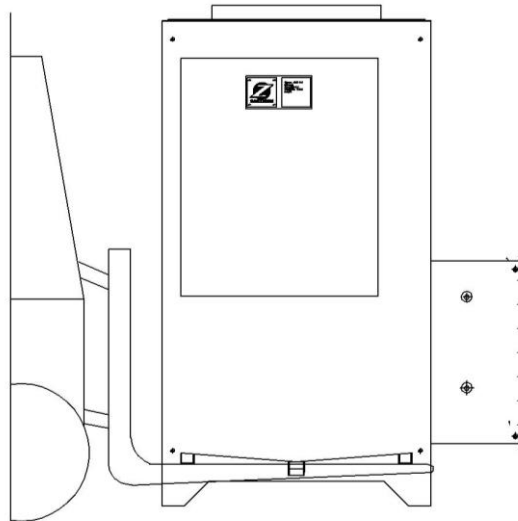
#### **IMPORTANT:**

Just before connecting the condenser to the boiler, make sure there are no tools, parts or animals (pet's) left in the condenser.  
The condenser shall be all-side accessible for inspection, service and maintenance.  
Minimum space 0,5 meter (+ extension for cooling-section)  
The clearance to combustible material shall be 0,5 meter  
The area around the condenser shall be frost-free at all time, even if not connected.

### 6.2 Transport and installation



For installation and transport, unit shall only be lifted by means of a forklift as shown, or hoisting belts, placed at same spot as forklift.



#### **Required tools and equipment:**

Hoisting-unit / forklift. (mind dead-weight)  
Welding-transformer Drilling-machine  
Slitting disc  
Air-level.  
Screw-driver /headbox-wrench 13 mm.  
Measuring rule.  
Aluminium tape.  
Safety-glasses  
Gloves

### 6.3 Installation-plan

1. Read- and consult the manual on your toolbox, if in doubt ask our technical team.
2. Keep area clean to prevent accidents.
3. Apply nothing but tested and certified hoist- and electrical equipment.
4. Assemble fluegas-counterflange to fluegas-outlet of the boiler. (welding)
5. Move condenser up to 0,5 m from the flange by means of a forklift or pallet-truck. Make sure equipment can and may hoist the condensermass.
6. Create two ridges (5-8mm) of the heatresistant silicone paste on the gasket-face of the fluegasflange, one along the inner edge/contour and one along the outer edge/contour.
7. Align and move condenser up to the counterflange and fasten with 8mm bolts. Remove surplus of silicone paste.
8. Extent support-pipes to the floor, tighten clampnuts (fig. 1) and level condenser. If position is final, drill holes 8 mm (fig 1) and fix the correct position with the securing bolts.(fig 2).

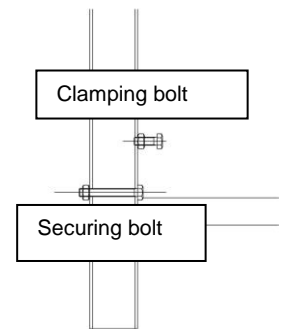
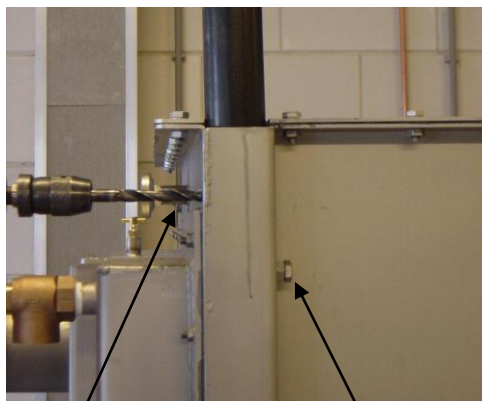


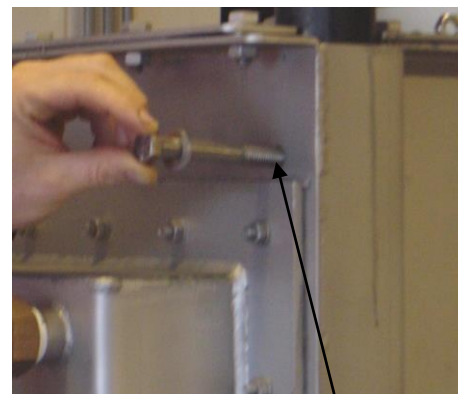
figure 1



Drill hole

Clamping bolt

figure 2



Securing bolt

9. Release forklift or other hoisting equipment.
10. Alignment shoot result in tension free connection of the fluegas-inlet. If necessary, secure support-pipes to floor by means of angle-steel (not provided).

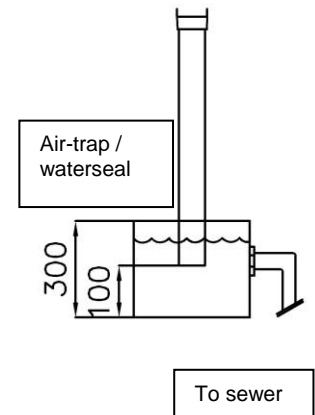
11. Position flue-tube into connecting rim on top of the condenser. Make sure lateral connections (CO2-unit) point in correct direction. Seal space between ridge and fluetube with silicone paste and cover with aluminum tape.
12. Fluetube-top shall reach up to at least 2 m over rooftop and the level in accordance to local regulations.



**IMPORTANT:**

Total effective weight-load on top of the condenser by means of the flue-tube and guy-wires shall not exceed 150 kg.

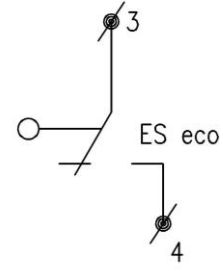
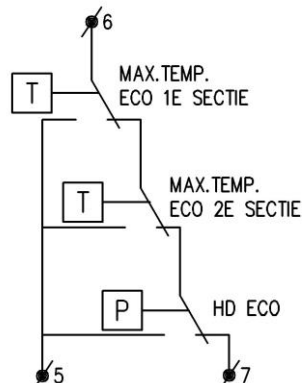
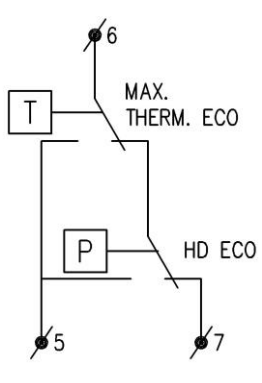
13. Install flue-tube lead-through, rain-rim, and guy-clamp. Connect guy-wires or guy-bars to roofconstruction.
14. Connect supply and return of the condenser-circuit to the corresponding flanges (waterinlet = upper-flange). Connections shall enable removal of the cooling section. Support and alignment of the connected piping shall prevent any tension to the condensorconnections, we recommend the use of compensators.
15. Fill the watercircuit and bleed the system to remove all air.
16. Connect condensate-drain to the air-trap/water-seal by means of a stainless- or galvanized tube. Drain shall be 2" all the way and straight-down, do not reduce to smaller diameter, do not apply PVC.  
Connect water-seal to local drain/sewer.  
Before start-up fill air-trap with water until it flows into the sewer to prevent any fluegas-flow into the boilerroom.
17. Connect- adjust-, and test safety devices (max. thermostat, backpressureswitch, oilimitswitch position on divertervalsection and bypass) as shown below.



Single-Condenser

Combi Condensor

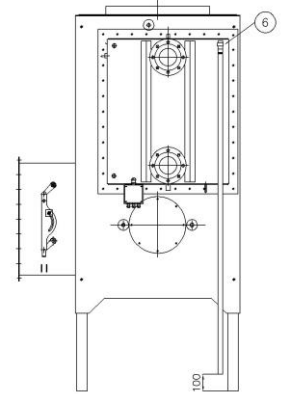
Oillimitswitch on divertervalsection







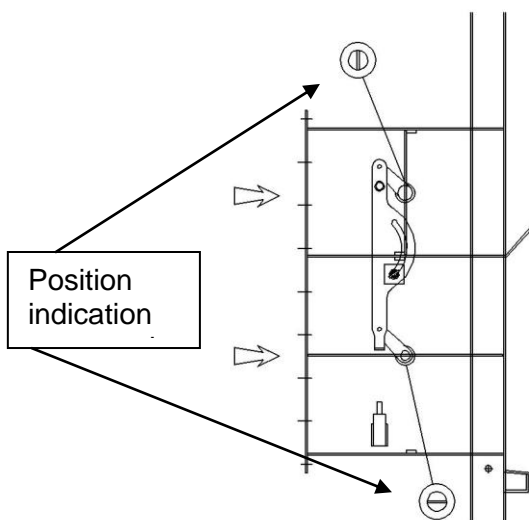
18. The condenser is protected against undue pressure by means of a pressure relief-valve. The discharge shall be connected to a vertical pipe with identical diameter till 10 cm above the floor, in order to prevent personal risk of burning, see figure.
19. Adjust and secure diverter valve in bypass-position (oilfiring-mode), see figure.
20. Run burner for 10 minutes to remove corrosion-chips from boiler.
21. Switch-off burner and put diverter valve in gas-firing position, see figure.



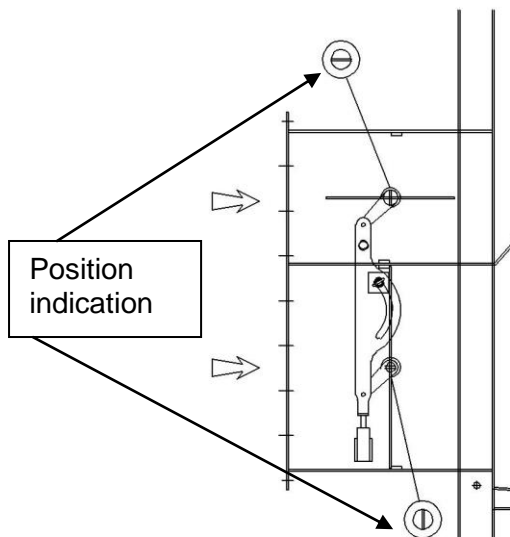
**Attention!:**

Condenser and connections may have hot surfaces !  
Combustion shall be checked and re-adjusted by qualified persons only.

22. Due to altered backpressure conditions, burner may only be put in operation by authorised personnel until re-adjustment of combustion and safeguarding devices is completed. If condenser is warm, tighten all bolts (tighten moment 8.8 bolts, 21 Nm).



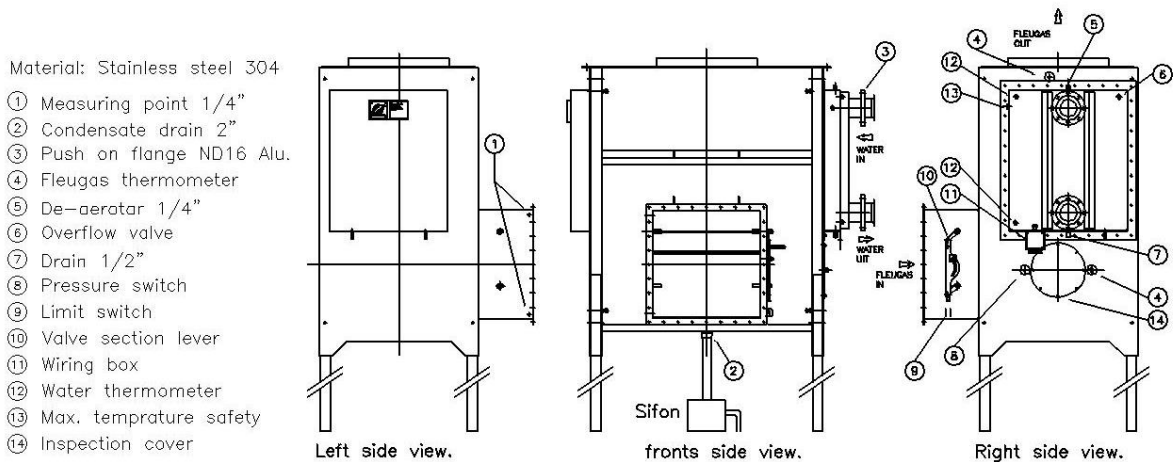
Valve positions Gas-firing mode



Valve positions Oilfiring mode

## 7. CONDENSER- ACCESSORIES

The accessories will be factory-assembled if possible.



### 7.1 Differential pressure switch (HD-eco) (8)

The differential pressure switch is in upright position connected to the condenser-flue-inlet by means of a copper tube. The upright position prevents contamination of the pressureswitch and the connection.

The pressure differential switch safeguards the condenser-backpressure as this influences the combustion and shall be interlocked and set to shut off the supply of fuel to the burner if backpressure exceeds the nominal (full-load) backpressure by 2 mBar or 20 %. Setting only by qualified personnel, setting has to be sealed in order to prevent unauthorized adjustment.

### 7.2 Pressure-relief valve (6)

The condenser is protected against undue pressure by means of a pressure relief-valve.

The (steam-)discharge-capacity shall at least correspond with the capacity of the fluegas cooling down from nominal value to 100°C.

{ 0,05% of matching boilercapacity / ( flue °C – 100 °C ) }

Manufacturers selection: > 7,5% of matching boilercapacity.

### IMPORTANT:

The discharge of the pressure relief-valve shall be connected to a vertical pipe with identical diameter till 10 cm above the floor, in order to prevent personal risk of burning, see figure page 9.

### 7.3 Condensate-drain

In condensating conditions the Zantingh Total Eco may produce up to 21 liter condensate per hour for each 100 kW boiler capacity.

The condensate-flow may not be obstructed as it rinses away contaminating particles on its way-out. The air-trap shall prevent sewer-gas- and fluegasflow into the boilerroom. The waterlevel above the drain-end shall correspond with the backpressure  $+>20$  mm.

### 7.4 Maximum thermostat (13)

In order to prevent hazardous steam-formation each watercircuit shall be safeguarded by means of a maximum thermostat. The thermostat shall shut-off and electrically lock the burner, undo only by mandatory manual reset.



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

- maximum setting: 95°C\*
- lower values may extent protection to user defined purposes which shall be registered and sealed by the installer to prevent unauthorised adjustment.



#### Setting maximum thermostat in **drinking- or swimming-water**:

- maximum setting: if chloride-content is 50 up to 250 mg / liter water: 40°C
- maximum setting: if chloride-content is 50 mg / liter water: 80°C

If burner shall temporary operate on oil, cooling section has to be set in bypass position (oilfiring mode) by means of the diverter-valvesection.

Valve position shall be secured and safeguarded by means of the oil limit switch (9) which shall interrupt the control-voltage of the oil valves if diverter valve is not fully in bypass-position.

### 7.5 Valve section (10)

Due to the integrated fluegas- diverter valvesection and bypass, the cooling-section can be shut-off for oilfiring or temporary low heat-demand\* in condensor circuit.

For steam boilers the integrated fluegas valve is mostly servo controlled so in case of a high water temperature the fluegasses can be lead through the bypass.

Be aware that always the minimal waterflow have to circulate over the condenser even in bypass situation.

## 8. COMMISSIONING



First of all condenser and watercircuit shall be filled with water and bled until all air is out of the system. Before start-up of the burner, pumps shall be in operation and providing at least minimum flow as specified for the type/size of the condenser (also for steam boilers). The nominal flow ensures optimal heatreclaim in relation to pumpcapacity, max flow may increase heatreclaim but shall not be exceeded as particles in the water may cause wear.

Adjust-, and test safety devices (max. thermostat and backpressureswitch).

In order to prevent contamination by corrosion-chips from the boiler, first start-up shall be done in bypass position (oilfiring mode).

Valve position shall be secured and safeguarded by means of the limitswitch (9) which shall interrupt the control-voltage of the oilvalves if divertervalve is not fully in bypass-position.

Due to altered backpressure conditions, burner may only be put in operation by authorized personnel until re-adjustment of combustion and safeguarding devices is completed.

Safeguarding devices shall be electrically connected to the burner security-circuit and function shall be tested and registered. Each device shall shut-off and electrically lock the burner, undo only by mandatory manual reset.

Immediately upon completion of the commissioning combustiontestresults and setting of safety-devices shall be registered and kept on the premises and in the burnerpanel for safety-information and -inspection.



### **IMPORTANT:**

**If condenser is warm, tighten all bolts (tighten moment 8.8 bolts, 21 Nm)**

### **Attention!:**

Condenser and boilerparts may have hot surfaces!



### **IMPORTANT:**

Condenser may not be operated when watercirculation is poor. The watercircuit connected to the condenser shall be equipped with a low-water fuel cut-off device. (if condenser is not directly connected to boilercircuit with low-water cut-off)

## 9. INSTRUCTIONS FOR USE

The Zantingh fluegascondenser is designed to reclaim energy from gasfired forced-draft boilers. If burner shall temporary operate on oil, cooling section has to be set in bypass position (oilfiring mode) by means of the divertervalvesection.

Valve position shall be secured and is safeguarded by means of a limitswitch which interrupts oilvalves if divertervalve is not fully in bypass-position.

If divertervalve is servo-operated, valveposition may be indicated by means of the groove in the valve-axle.

Fluegasconditions:

The cooling section consists of finned tubes, in order to prevent damage and wear the temperature of the fluegasses may not exceed 240°C and boiler may not exceed the specified boilercapacity.

Fluegas shall be absolutly free of sulphur, chlorides and halogen as these will severely affect the materials.

Solid particles in the fluegas may settle between the fins and obstruct the fluegasflow.

### 9.1 Waterconditions

Closed heating systems shall be filled with pure- or drinkingwater.

(Spring- or ditchwater contain impermissible mineral-contents).

Systemconditions: pH:  $\geq 7$ ; Cl :< 200 ppm; NH<sub>3</sub> : none.

Feed- drinking- or swimwatersysytem conditions:

- pH- value >5 <11.
- Chloride content maximum 250 ppm if Tmax 40°C or 50ppm if Tmax. 80°C.
- Hardness lime-content may scale and cause concentration of chlorides.  
Limits: T max 40°C => 40 france degrees or 22 german degrees  
T max 80°C => maximum 1 france degrees or 0.5 german degrees (softened water).

If system does not meet the specified conditions water shall be treated.

## 10. MAINTENANCE INSTRUCTIONS

### 10.1 Fluegas related:

The condenser inner-side shall be cleaned once or twice a year. (interval depends on found contamination). Remove corrosion-chips and dust (from the boiler) via the inspection- openings

If soot or dust has settled between the fins, rinse with detergent (soap) and give it time to absorb, rinse with warm water or gently use a pressure-sprayer(test spray-pressure and –distance to prevent deformation of the fins.

If soot-contamination is severe, remove coolingsection for cleaning.

Pressure-difference switch: disconnect coppertube from diverter valve-section and check tube and switchconnection, remove contamination. Do not alter adjustment.

Burner shall be checked once a year including full combustion-report in order to optimize efficiency of the application and prevent soot-contamination or excessive CO-production ( if CO<sub>2</sub> is used for production in greenhouse limit is 20 ppm).

### 10.2 Watercircuit

Bleed system regularly in order to make sure system runs without air.

Check waterconditions regularly to ensure quality meets specifications.

Register temperature-difference between supply and return in condensercircuit, raising temperature-difference may indicate decreasing flow.

## 11. WHAT IF UNIT IS IN FAULT



### IMPORTANT:

**First of all switch-off and secure burner main switch to prevent electrocution and unexpexted burneroperation!**

<b>Fault indication:</b>	<b>Probable cause:</b>	<b>Suggestion:</b>
Maximum watertemperature *	Circulation pump not running	Reset pump thermal lock-out / check switch-positions and pump-operation.
	Watercircuit obstructed	Check valves
	Local circuit-bypass open	Close circuit-bypass
	Thermostat-setting too low	Adapt setting to acceptable value (consult installer) <b>max. 95°C!</b>
	Thermostat defect	Replace thermostat (failsafe type)
	Broken wire or poor connection	Check circuit Rewire / reconnect
Maximum backpressure (HD ECO) *	Divertervalvesection in disorder (both closed)	Check / recover valve positions
	Condenser contaminated	Run bypassmode / clean cooling section
	Pressure-switch defect	Compare actual pressure and setting. If setting > actual value replace switch. (mind! setting 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. Setting may only be altered by authorized personnel as increased backpressure may severely disrupt combustion and cause soot, CO and / or flame-instability.
	Condensate-drain obstructed	Check inspection-opening. Clean condenser and drainconnections including airtrap / waterseal.
Oilfiring blocked	Limit-switch not activated / defect	Check divertervalvepositions and switch activation / switchcircuit.
Condensate airtrap / waterseal overflow	Sewer-connection obstructed	Clean connection.

\* fault probably signalled by indicator-light on burner-switchpaneldoor.

### 11.1 Remarks:

Always consult the installer or Zantingh if you have any doubts regarding the operation and use of the system.

The CO<sub>2</sub> dosing system 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 complete system is installed, commissioning and maintained according to the professions of this manual.

Maintenance work should be carried at least once a year to ensure that the fluegascondensor is functioning correctly and safely. These inspections and maintenance work should be carried out by qualified technicians.

Never work on a system when you do not have the required skills.

Please contact the installer or Zantingh when an error occurs that cannot be resolved.



## 12. 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 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. The device should be installed by a recognized installer according to the applicable general and local standards and regulations and 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 have been discovered.
  - Defects are caused by errors, improper use or neglect by the user and/or installer who has given the order or his/her legal successor or caused by external causes.
  - During the period of guarantee a third party is requested to or make provisions to the system or when the user has done so without prior written consent by the installer and/or Zantingh B.V..
  - During the period of guarantee no expert inspections and/or maintenance work are periodically performed to equipment requiring the same.
  - Corrosion has been caused by polluted flue gas or as a result of flue gasses containing substances other than produced by burning naturel gas with clean combustion-air, to be determined by Zantingh B.V.
  - Corrosion has been caused by a result of impermissible waterconditions.
  - If after research is carried out, one or more of the above conditions have not been 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 2000 “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, traveling or accommodation expenses, constructional costs and such required to execute the terms of the guarantee are excluded.

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.

## Imprint

All rights reserved, including the rights to the translations. Nothing from this issue may be copied, stored in an automatic data file or made public in any way or by any means, be it electronically, mechanically, photocopy or otherwise, without prior written consent from Zantingh B.V. Reprinting, including excerpts, is forbidden. Changes, errors and misprints reserved. These assembly and operation instructions comply with the technical requirements at the time of printing. We reserve the right to make technical and design changes.