Users manual

Version 2.0

STOKER PLANTS

M20i-CS • M40i-CS • M80i-CS

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Instructions for TWIN HEAT stoker plants type M20i-CS M40i-CS & M80i-CS

Year:

No.:

Series:

TWIN HEAT stoker plants type M20, M40i & M80i have been tested and approved according to DS/EN303-5 by "Danish Technological Institute"

(The test institution for smaller bio heating appliances)

Wood pellets with app. 8% moisture

Wood chips with app. 25% moisture

Grains with app. 15% moisture

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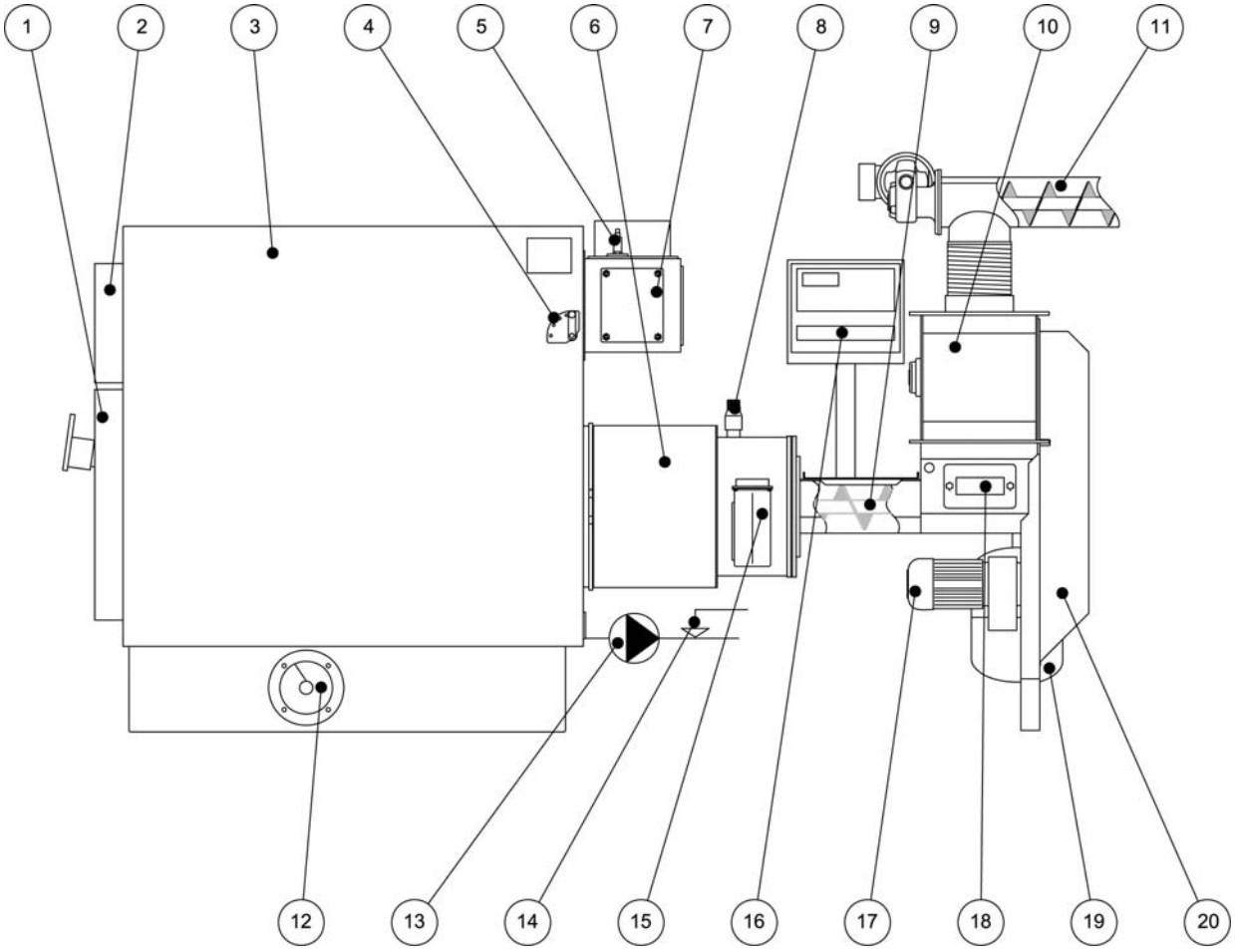
Plant drawing



1. Boiler door with inspection glass/draft flaps, depending on model
2. Cleaning door (flue tubes cooling down the flue gasses)
3. Boiler
4. Bypass (flue temperature damper)
5. Lambda probe (oxygen sensor)
6. Burner tube
7. Plate to access flue box
8. Safety valve – 2,5 bar
9. Stoker auger
10. Rotary valve
11. Auger from extern fuel silo (is not included from Twin Heat)
12. Ash exhale (extra accessories)
13. Circulation pump for burner tube
14. Water pressure sensitive switch (only by M80-CS in DK)
15. Combustion fan
16. Control panel
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19. Pressure tank for sprinkler
20. Chain box

Section 1- How to use a M-CS stoker plant

1.1 The display in the controller

How to read / interpret various parameters, which can be read in the display.

Visible menu lines
Not visible menu lines

The not visible menu lines can be found by pressing ⇓

Cursor →

Pellets Running 67%	← *Fuel type chosen – Mode – Boiler load in % - Errors*
▶Temperature: 67,8 °C	← *Actual boiler temperature*
O2 Auto : 9,6 %	← *Actual oxygen-% (O2%)*
O2 Wanted : 9,3 %	← *Oxygen-% which the control aims to meet.*
Stoker puls : 1,2 S	← *Latest stoker pulse in seconds*
Settings	⇒ ***To settings***

Examples:

Change boiler temperature:

Press ⇓ to `setting`
Press ⇒ to choose `setting`
The cursor is placed by `Temp setpoint` the chosen temperature is shown. (e.g. `70°C`)
Press ⇒ (notice that the cursor change appearance to ⇕)

Now the temperature can be adjusted between 70-90°C by ⇓⇑.
Confirm the chosen temperature by pressing ⇒
Leave the menu by pressing ⇐

Change type of fuel:

Press ⇓ to `setting`
Press ⇒ to choose `setting`
Press ⇓ to `Fuel type`
The cursor is placed by `Fuel type` the chosen fuel type is shown. (e.g. `Pellets`)
Press ⇒ (notice that the cursor change appearance to ⇕)

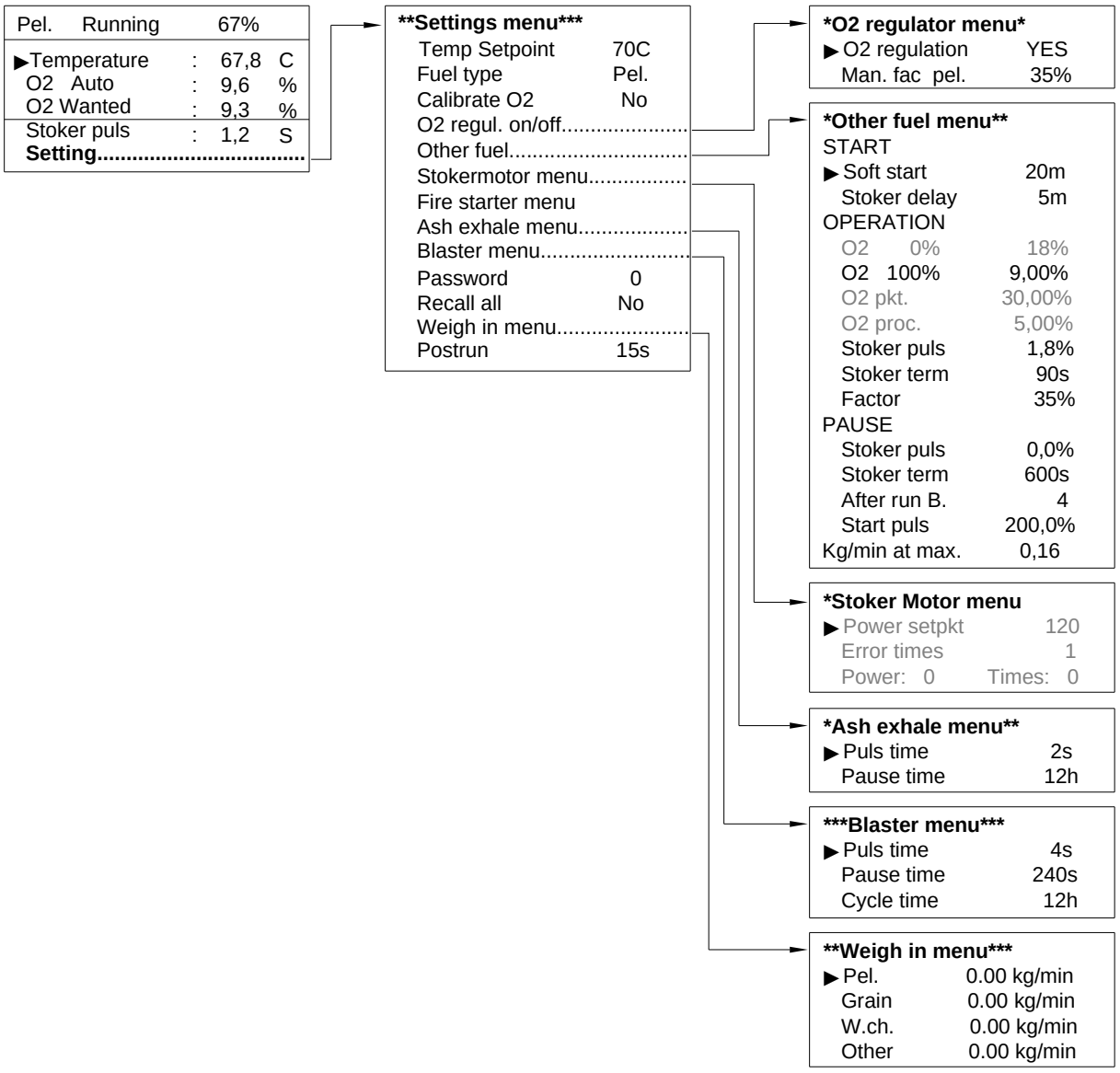
Now the type of fuel can be changed by ⇑ ⇓
Confirm the chosen fuel type by pressing ⇒
Leave the menu by pressing ⇐

Errors are cancelled by pressing »START«
See section 3 regarding how to spot errors

1.2 Menu structure

The various adjustment possibilities are looked up in searching by means of the arrows at the front of the control panel

If you want to leave the menu without making any changes, press ⇐
Errors are cancelled by pressing »START«



1.3 Adjustment of temperature

The temperature (boiler temperature) can be adjusted between 70 – 90°C
The temperature is from factory pre-set to 70°C.

Some situations – such as an under-dimensioned radiator system or hot water tank might make it desirable to adjust the boiler temperature higher than 70 º C

The cursor must be placed by the line `Setting`

Press ⇒ : The adjusted temperature is shown . (e.g. `70°C`)
Press ⇒ : The temperature can be adjusted by pressing ⇑⇓.
Confirm new setting by pressing ⇒
Leave the menu by pressing ⇐

The water returning to the boiler must always be at **least 60°C**
If the above is not respected the corrosion of the steel in the boiler will increase and the life expectations will be reduced

1.4 How to chose fuel type

In the `settings menu` under `fuel type` you can chose between 4 programs
There are 3 fixed programs for respectively **Wood pellets, Grains or Wood chips**. The programs are adapted to the individual type of fuel.

If you chose to use another kind of fuel than the above mentioned, you have the possibility to chose `Other` under `fuel type`. When `Other` has been chosen, parameters for this fuel must be adjusted. *(See section 1.6 Setting)*

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `Fuel type`
The chosen fuel type is shown. (e.g. `Pellets`)
Press ⇒ Now the type of fuel can be changed by pressing ⇑ ⇓
Confirm the new setting with ⇒
Leave the menu by pressing ⇐

PLEASE NOTE:

Requirements when heating with grains: High flue gas temperature min. 180°C
High boiler output min. 50%
High boiler temperature min. 80°C

1.5 O2 regulation ore manual operation

Manual operation can be an advantage, if the fuel used is of bad quality or if e.g. the lambda probe goes defect

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `O2 regul. On/off`
Press ⇒ to choose `O2 regulator menu`
Press ⇒ : Now you can choose YES or `NO` by pressing ⇑ ⇓ .
(YES = O2 regulation `NO` = Manuel operation)
Confirm your choice by pressing ⇒
Leave the menu by pressing ⇐

Hereafter the `Man. Fac.` (the amount of fuel) has to be adjusted (0 – 100 %) according to the fuel chosen : pellets, grains, wood chips or other.
(See next section)

1.5.1 Adjustment of Man. Fac. (amount of fuel by manual operation)

In the O2 regulator menu under Man. Fac. You can adjust the desired amount of fuel, when using "manuel operation"

Manuel operation can be a good choice, if you use inferior fuel or if e.g. the lambda probe might be defect.

A high value = low O2 = fat combustion, where the flames have reddish / black tips
A low value = high O2 = meagre combustion where the flames have yellow / blue tips

When the boiler is running, you will read O2 MAN instead of O2 Auto in the display. The measured O2 value is shown, but not used by the controller.

If the boiler is set to Manuel operation when set to the fuel type Other please be aware, that the Man. Fac. value is a percentage of the stoker pulse, this means that if the stoker pulse is increased the adjusted fuel amount will increase also

The real feeding time is calculated as : Stoker pulse x boiler load x Man. Fac.

Example
Stoker pulse adjusted : 1,8 sec.
Man. Fac. adjusted: 70% Reel feeding = 1,8 × 0,7 × 0,65 = ***0,8 second***
Actual boiler load = 65%

The cursor must be placed by the line Setting

Press ⇒ to choose setting
Press ⇓ to O2 regul. On/off
Press ⇒ to choose O2 regulator menu
Press ⇓ to Man. Fac.
Press ⇒ Now the amount of fuel can be adjusted between 0-100% by ⇑ ⇓
Confirm the new setting with ⇒
Leave the menu by pressing ⇐

1.6 Adjustment of the fuel program "Other"

In the Settings menu under Other fuel you can adjust the relevant parameters for the fuel program Other.

Before you begin to make a program for the alternative fuel type, you must understand the importance of the 8 parameters to adjust
(see section 1.12 Parameter list)

The cursor must be placed by the line Setting

Press ⇒ to choose setting
Press ⇓ to Other fuel
Press ⇒ to choose Other fuel menu

The parameters are adjusted by pressing ⇒ at the current parameter, here after the value can be set by pressing ⇑ ⇓
Confirm the new setting with ⇒
Leave the menu by pressing ⇐

1.6.1 Start parameters

Under `Start` you can adjust 2 parameters for the start up of the boiler.

`Soft start:` Defines the period for the boiler to reach 100% load, when starting up a cold boiler.
`Stoker delay:` Defines the period where the auger is not running, when starting up a cold boiler.

1.6.2 Operation (running) parameters

Under `Operation` you can adjust 2 parameters for the running of the boiler.

O2 means Oxygen and indicates the air surplus measured in the flue.
Good fuels of dried wood, such as pellets and the like can be combusted by a small surplus of air (6 – 9 %) whereas less good fuel with higher water content or the like needs a higher surplus of air.

`O2 100%:` Defines the oxygen % (surplus air), which the controller aims for by 100 % boiler load.

`Stoker term`: Defines the pause time between each running period.

1.6.3 Pause

Under `Pause` you can adjust 4 parameters for the pause of the boiler

`Stoker pulse`: Defines the running time for the auger per period
`Stoker term`: Defines the pause time between each running period.
`After run blower`: Decides how long time the fan runs after each stoker pulse.
`Start puls`: Decides the time(fuel amount) the auger is running first time after pause

1.7 Calibration of lambda probe

If the lambda probe over time becomes less precise, it has to be calibrated.
In normal atmospheric air the oxygen content is always app. 21 % (O_2). This can be used as point of reference for the measurement of the oxygen content. The lambda probe should be calibrated if the oxygen content in air deviates more than ± 2% from 21%. This can only be established, when the probe is exposed to **absolutely clean atmospheric air**

Dismount the lambda probe by removing the two bolts holding the square plate which the lambda probe is mounted in. Lift up the plate with lambda probe and place it on top of the boiler.

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `Calibrate O2`
Press ⇒ : Now you can change `No` to YES by pressing ⇑.
Confirm the change with ⇒

Now the lambda probe is calibrated (adjusted)

1.8 Reset all

If you want to reset all parameters to factory settings, chose YES.
Remember to re-calibrate the lambda probe as described above

1.9 Ash exhale menu (only for plants provided with automatic ash exhale)

In the `Settings menu` under `Ash exhale menu` you can adjust 2 parameters for the automatic ash exhale.

`Pulse time`: Defines the maximum running time for the ash-auger per period
The time is set from factory to **2 seconds.**
`Pause time`: Defines the pause time between each running period.
The time is set from factory to **12 hours.**

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `Ash exhale menu`
Press ⇒ to choose `Ash exhale menu`

The parameters are adjusted by pressing ⇒ at the current parameter, here after the value can be set by pressing ⇑ ⇓
Confirm the new setting with ⇒
Leave the menu by pressing ⇐

1.10 Blaster menu (only for plants provided with automatic heat exchanger cleaning system)

In the `Settings menu` under `Blaster menu` you can adjust 3 parameters for the automatic cleaning system.

`Pulse time`: Defines how long each blaster-valve is open, when activated.
The time is set from factory to **4 seconds.**
`Pause time`: Defines the time between each blaster-valve is active, when activated.
The time is set from factory to **240 seconds.**
`Cycle time:` Defines how often the system is activated.
The time is set from factory to **12 hours**

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `Blaster menu.`
Press ⇒ to choose `Blaster`

The parameters are adjusted by pressing ⇒ at the current parameter, here after the values can set by pressing ⇑ ⇓
Confirm the new setting with ⇒
Leave the menu by pressing ⇐

1.11 Post run

In the `Settings menu` you can adjust the `Post run` for the stoker auger.

When boiler takes fuel in, both the stoker auger and the auger from the extern silo starts up at the same time. When the auger from extern silo stops, the stoker auger continues to run (post run) so that the stoker is emptied for fuel.
The time is set from factory to **15 seconds.**

1.12 Parameter list

This list shows the settings from the factory.

	Wood pellets App. 7% moist			**Grain** Max. 15% moist			**Wood chips** Max. 25% moist		
	M20iCS	**M40iCS**	**M80iCS**	**M20iCS**	**M40iCS**	**M80iCS**	**M20iCS**	**M40iCS**	**M80iCS**
Start									
Soft start [min]	15	15	15	30	30	30	15	15	15
Stoker delay [min]	5	5	5	20	20	20	15	15	15
Running									
O2 100% [%]	8	8	8	9	9	9	9	9	9
O2 pkt.	30	30	30	30	30	30	30	30	30
O2 proc.	5	5	5	5	5	5	5	5	5
*Stoker pulse [%]	-	-	-	-	-	-	-	-	-
Stoker term [sec]	90	90	90	90	90	90	90	90	90
Post run [sec]	15	15	15	15	15	15	15	15	15
Pause									
Stoker pulse [sec]	0	0	0	0	0	0			
Stoker term [sec]	600	600	600	600	600	600	600	600	600
After run blower	4	4	4	4	4	4	4	4	4
Start pulse [%]	200	200	200	200	200	200	200	200	200
Blaster									
Pulse time [sec]	4								
Pause time [sec]	240								
Cycle time [hours]	12								
Ash exhale									
Pulse time [sec]	2								
Pause time [hours]	12								

*The stoker pulse depends on the amount of fuel from the auger from extern silo.

Section 2- Start up and normal use

2.1 Weighing of fuel

Before the boiler can be started up, the amount which the auger gives for 1 minute must be weighed and keyed into the control unit. The mount must lie within the area listed in the table below. If you try to enter an amount which lies outside the area listed in the table, the control unit will write “Error in weight”.

Permissible fuel amount for auger

Boiler type	Auger Kg/min
M20i-CS	0,8 – 11,5
M40i-CS	1,4 - 19
M80i-CS	2,2 - 32

How to do:
Dismount the flexible hose between auger and the rotating valve. Hold a bag below the auger, press start and hold it for 1 minute. Weigh the bag with fuel. Now the fuel amount per minute is known. Key in the amount in kg in the control unit

Press ⇓ to `setting`
Press ⇒ to choose `setting`
Press ⇓ to `weigh in menu`
Press ⇒ to choose `weigh in menu`
Choose fuel type with ⇑ ⇓
Press ⇒ (cursor change appearance to ⬍)
Press ⇑ ⇓ to key in fuel amount
Press ⇒ to confirm and save

2.1.1 Calibration of lambda probe

The lambda probe must be calibrated before starting up the boiler for the first time. This can only be done when the probe is exposed to absolutely clean atmospheric air. (no fluegas/smoke) It is important that the power to the boiler has been switched on for min. 10 minutes before calibrating, because the probe needs to heat up.
When the lambda probe is calibrated the reading “O2 Auto” in the control panel should show app. 20,9%.

If the boiler already is started (the fire is lightened) the lambda probe must be dismounted as described below.

Dismount the lambda probe by removing the two bolts holding the square plate which the lambda probe is mounted in. Lift up the plate with lambda probe and place it on top of the boiler.

The cursor must be placed by the line `Setting`

Press ⇒ to choose `setting`
Press ⇓ to `Calibrate O2`
Press ⇒ : Now you can change `No` to YES by pressing ⇑.
Confirm the change with ⇒

2.2 Taking fuel forward to the burner tube

If the boiler is new or if the silo/auger has been totally emptied, fuel must be taken forward to the burner tube, by the auger.
Press »Start« and hold it (the auger is running), then press »Stop«.

Check the amount added into the burner tube through the boiler door

The burner tube must be app. ¼ filled up. See to that the fuel is equally distributed in the lower part of burner tube.

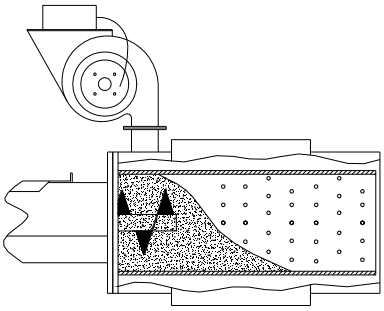


Fig. 2- burner tube M20

2.3 Lightning the fire

When the fuel is lead to the combustion room according to section 2.2, you must light the fire by using e.g. sawdust or pellets soaked in kerosene or the like. By soaked sawdust you add 2 to 3 handful and mix it with the fuel in the burner tube, now light it by using a newspaper or the like. Close door to combustion room and wait for 1 minute for the fire to catch, then press »Start«. The display will show the word `Soft start`

PLEASE NOTE, THAT FLAMES MIGHT REACH OUT OF BOILER IN THIS PFASE

- **ALWAYS USE GLOVES WHEN LIGHTING THE BOILER**
- **NEVER USE GASOLINE OR THE LIKE IN THIS PROCESS**

2.4 Soft start mode

The function of the “soft start” is to limit the boiler load when starting up a cold boiler.
The boiler runs in “soft start” mode for a period of 15 minutes.

Should the combustion not have been correctly stated, when the boiler goes into the mode “Running” the result can be un-combusted fuel being pushed through the burner tube into the combustion room. **Hence you must check the stoker app. 1 hour after start**. Normally this can be done in looking at the chimney. If you do not see visible smoke then the combustion should be OK. If you however see a thick, white smoke, this is a sign, that the fire has been partly choked in the burner tube by too much fresh fuel being pushed in. Normally the combustion room too will be filled with white smoke.
If this is the case, you should carefully and slowly open the door to the combustion room (the white smoke might start burning under certain conditions). Leave the door slightly open for – say - ½ hour to allow the chimney to evacuate the smoke from the combustion room.
(see also section 3.2 Low temp / section 3.4 high O2.)

2.5 Running mode

Running mode means, that the controller constantly adjusts the boiler load in the area 20 to 100 % depending on the actual heat demand. The controller will constantly aim after the temperature chosen, e.g. 70 ºC.

Large heat demand = High boiler load
Small heat demand = Low boiler load (ore pause mode)

An example of the control by the controlling unit:

1. The boiler runs stable and maintains the desired boiler temperature, say 70 ºC and the load is shown as 45% on the display.

2. Now you use hot water for dish washing, bath or the like.

3. The controller will note, that the boiler temperature drops to under 70 ºC, as the water in the boiler is cooled due to the hot water used.

4. The display will tell, that the load increases, as falling boiler temperature is noted. The boiler has to work “harder” to maintain the boiler temperature.

The LOAD data in the display is showing how hard the boiler ”works”

2.6 Pause mode

If the heat demand is relatively small and the controller has reduced the load down < 20%, the boiler goes into “Pause”. During the pause the fan is started every 10 min. and runs a little, to keep the glows in the burner tube alive.

The boiler will go into running mode when the boiler temperature has fallen some few degrees under the adjusted temperature.

Should the boiler run in pause mode for a longer period and only start a few times a day – say in summer – the flue temperature is very low, which can cause condensation of moisture in the chimney, causing soot and corrosion in the chimney. To minimise or perhaps avoid this, you should open the bypass damper totally to avoid cooling the flue too much.
(see section 2.8, bypass)

2.7 Stop

Manuel stop. : Press »STOP« and the boiler will stop.
Automatic stop. : The boiler stops automatically by errors or the like.

ERRORS : Are cancelled by pressing »START«
See section 3 regarding how to spot errors

If you want to stop the boiler for a longer period **then you MUST empty the burner tube from glows to avoid a burn-back into the stoker**
The risk of burn-back is varying from one fuel to the next. Wood chips are more likely to cause back-burn than grains or pellets. The glows might due out by the selves, but you cannot be sure, this happens

If the boiler is stopped e.g. during summer, then please open the combustion room door to prevent moisture from condensing in boiler or chimney.

2.8 Bypass (flue temperature damper)

The very effective flue cooling in the boiler means that the flue is only 170 – 180 ºC by 100% load, when leaving the flue outlet. The flue temperature is closely connected to the boiler output, means lower load = lower flue temp.

The handle in the rear of the boiler (the bypass) is used to adapt the flue temperature in relation to boiler output. By fully opened damper only a part of the flue is passing the flue tubes. By fully closed damper the flue is cooled to maximum (see fig 3)

If the boiler load is less than 40 – 50 %, as is the case in large parts of the year, you should open the bypass to increase flue temperature so that the flue does not condense on its way up through the chimney.

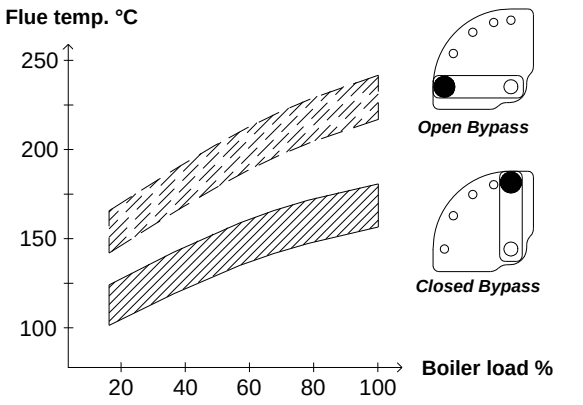


Fig. 3- Approx. flue temperature compared to boiler load

If in doubt about how to place the damper, please consult your installer
(see section 2.6, pause)

Section 3- Troubleshooting

Possible errors will appear in the upper line in the display.

Low temp. (start)
▶Temperature : 33,8 °C
O2 Auto : 20,9 %
O2 wanted : 8,0 %

← **When the problem has been solved the message can be annulled by pressuring »START«**

Before restarting the boiler after any errors, please check, if the sprinkler has sprinkled water into the auger channel (slow moving auger, fuel is wet)
If this is the case, use the auger to transport the wet fuel into the combustion room and remove it from here (Remove fuel manually from the burner tube)

After removing the fuel please check that the sprinkler valve is closing tight again – See section 3.9 sprinkler

3.1 Error: Hot boiler

The boiler temperature has exceeded 95 ºC and the over temperature thermostat has stopped the boiler.
The produced amount of heat could not be used in the heating system.

Causes:

- There is no real need for heat (typical for the summer).
- There might be an air pocket in the system, no water circulation.
- The circulation pump does not function.

When the boiler temperature has fallen below 80 – 85 ºC and the error has been corrected, reset over temp. thermostat and restart the boiler.
Reset the over temp. thermostat by removing the black hood in the rear of the boiler and gently press a match or the like into the hole. Put black hood in place again.

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.2 Low temp.

The boiler stopped because the boiler temperature has fallen more then 15ºC below the adjusted value.
Had the boiler temperature been set on 70 ºC an error would be announced, when the temperature has been under 55 ºC for more than 10 minutes.

Causes:

- No more fuel in the extern silo
- The auger from the extern silo is not running
- The fire has extinguished in the burner tube
- The boiler is not installed with a 3 ways mixing valve, as described in the installation manual

PLEASE NOTE: “Low temp.” is first active, when the boiler temperature has reached over 15 ºC under the set temperature, e. g. when 55 ºC has been reached by a setting of 70 ºC.

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.3 Stoker stop (only boilers with electrical supply - 3 phase 400V)

The controller is keeping track on the power consumption used by the auger.
If the auger uses more power than calculated, it is because it has jammed, ore moving too slow. The load on the auger is too high.

Causes:

- The auger is jammed by a stone or the like.
- Heavy coating in the burner tube. (see section 4.3 Maintenance of burner)
- The sprinkler has sprayed water in (see section 3.9 Sprinkler)

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.3.1 Error: Freq. conv. (only boilers with electrical supply - single phase 230V)

The frequency converter supplying the stoker motor has gone in error mode. Open the electrical box placed on the side of the rotating valve and read the error code in the display of the inverter.

Error codes:
F0001: Over current*
F0002: Over voltage
F0003: Under voltage
F0004: Inverter over temperature

Errors are cancelled by pressing FN
See further troubleshooting in separate supplied manual for frequency converter, found in the electrical box.

*If the auger uses more power than calculated, it is because it has jammed, ore moving too slow. The load on the auger is too high.

Causes:

- The auger is jammed by a stone or the like.
- Heavy coating in the burner tube. (see section 4.3 Maintenance of burner)
- The sprinkler has sprayed water in (see section 3.9 Sprinkler)

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.4 High O2

The boiler stopped because the O2% has been over 16% for more than 10 minutes while the boiler output has been over 80%

Causes:

- No more fuel in the fuel store
- The auger from the extern silo is not running
- The fire has extinguished in the burner tube
- There is leaking false air into the boiler

NOTE: High O2 is only active when the boiler is in running mode

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.5 Lambda offs.

If the error “Lambda offs.” appears when calibrating the lambda probe, it is because the measured O2% deviates more than ± 4% from 21% which is the amount of oxygen (O2) in clean air. The lambda probe can only be calibrated in the area from 17 – 25%.
Try the function “Reset all” before calibrating.

Causes:

- The probe is not exposed to absolutely clean atmospheric air
- The probe has to be cleaned (use a wire brush gently)
- The probe is defect

3.6 Error: Waterpress (only by M80 installed in DK)

If the boiler is installed with a pressure sensitive switch, the error will come if the boiler-pressure is below the setting at the pressure sensitive switch.

3.7 Error: Thermo (only by plant with Twinheat Quatro silo)

The micro switch placed on top of Quatro silo auger has activated. The lid on top of auger has been forced open due to compressed fuel in the auger. Open lid and clean out compressed fuel. If necessary also clean out fuel from hose between auger and rotating valve.

Remember to cut the power to the auger before opening the lid. De activate motor protection relay for auger in electrical box for Quatro silo.

If you still see glows in the burner tube, press »START« and the boiler will restart as described in Section 2.4, soft start. In case the fire should be extinguished, the fire must be started again as described in section 2.2 “Taking fuel forward to the burner tube.”

3.8 Power cut

In case of power cut, the boiler will automatically restart, though depending upon length of the power cut.
Should the boiler temperature have dropped more than 15ºC during power cut, the boiler will not restart, but display the error “Low temp.”, see section 3.2 Low temp.

3.9 Sprinkler system

Should the fuel back-burn into the auger channel and the temperature exceed 95 ºC the sprinkler might start and spray water under pressure down into the auger channel and put the fire out. (The boiler will continue as normal, if possible.)

Causes:

- The rotating valve has a leaky.
- Too much draft in chimney (Draft stabiliser might be installed into chimney)

If the sprinkler system has been activated you must check that the sprinkler valve is closing tight again. Dismount the hose on the sprinkler valve and check whether it drips.

Please contact your installer, should you continuously have burn-back problems

Section 4- Maintenance

Regular maintenance of the plant is essential for effective problem free use of the plant and also for the life expectation. The following is recommended.

4.1 Maintenance intervals

The following intervals should be seen as guidelines, as they are very much depending on the fuel type used and the conditions of use for this plant

Daily (check)
- Does the plant run as expected
- Check and if necessary remove slag from the burner tube (this might mainly be necessary when heating by grains)

Weekly maintenance
- Check that the water level is OK, see manometer
- Check that the water returning to boiler is at least 60 ºC (65°C by grains and chips)
- Clean the heat exchanger using the brush
- Empty the combustion room for ashes

Monthly maintenance
- The heat exchanger / flue boxes should be totally cleaned out for ashes, bypass channel and valve must be cleaned.
- Check that the gasket in the doors to the combustion room are OK
- Clean the side walls in the combustion room
- Check and clean the burner tube for slag (in the area close to the auger)
- Check and clean the perforations in the side of the burner tube
- If a draft stabiliser is fitted, check it for “free” movement and clean it if necessary.

Yearly maintenance
- Check that the flue pipes from boiler to chimney are not blocked
- Check the safety valve on the burner tube.
- Combustion fan should be cleaned at air in grill and the fan wheel.
- The bolts holding the burner tube and auger together should be fastened.
- Check the sprinkler valve and check afterwards, that it is tight
- Dismount aluminium block for sprinkler system and clean it for any accumulated fuel
- Dismount air-inlet and clean oblong hole beneath.
- The chain at the rear of the stoker should be oiled and tightened to 15º on the scale.
- The bearings at the rear of the stoker should be greased by means of a grease pump.
- Check the rubber in the rotating valve for wear.

Important!

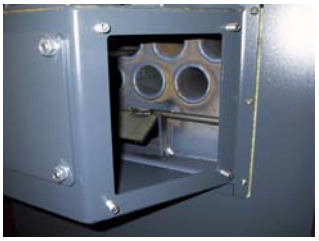
Always remember to cut the power to the control box during any form of maintenance or repair work

4.2 Maintenance of boiler

The combustion room should be cleaned when an app. 2 mm thick layer is seen, as this layer insulates and prevents the water from getting full use of heat produced.
The combustion room and the flue tubes are cleaned through the doors in the front of the boiler.
Clean the tubes by pulling brush forth and back in each tube.
Loose sod and ashes are pushed into the flue box at the rear side of the boiler.

Cleaning the tubes

Flue box is cleaned by dismounting the two plates on side of it. Also clean the rectangular bypass channel, behind the damper.
You should never attempt to clean a boiler, which has just been fired by hand (logs), as the heat exchanger can be covered by tar. Please wait until the stoker has “burned” the tar off again.



Flue box with dismounted plates

As a guideline please control the flue temperature thermometer. If the flue temperature has increased some 30 – 40 ºC over the temperature in a newly cleaned boiler, you should clean the combustion room walls. The temperature should be read at the same load %, as it increased with boiler load.

In case the plant is stopped for a longer period, e. g. over summer, it should be totally cleaned out for ashes. It is important to leave the combustion room door slightly open to prevent condensation and corrosion.

4.3 Maintenance of burner tube

The cleaning of the holes is made by pressing a pointed object like a nail into the holes. The holes are placed with the same internal distance round the burner tube and depending on the size of burner tube in one or more rows. Sizes of the holes M20=Ø5mm. M40/M80=6mm

If the holes are blocked, there will only be an incomplete combustion of the fuel.
(see fig. 4)

The auger must be able to deliver the fuel into the burner tube. Heavy coating can block the fuel and finally cause a stop.

The burner tube must be cleaned if a heavy coating is noted. It is very important, that the holes, which let combustion air into the burner tube are not blocked.

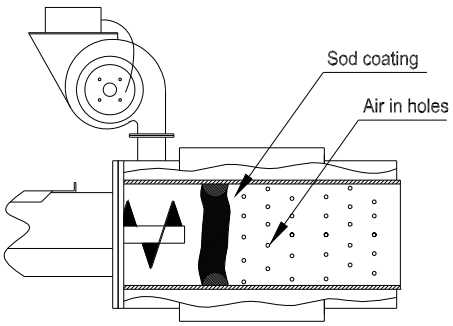


Fig. 4 - Maintenance of burner tube

4.4 Maintenance of stoker

The red cover at the rear of the stoker is removed. The chain must be greased by oil of grease. The chain must be tightened to 15 º (shown on the tightening devise). Both chain wheels are tightened

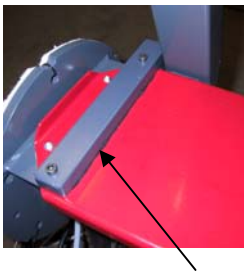
The bearing behind the bigger chain wheel is greased by a grease pump

Chain tightener

The sprinkler valve is controlled by unscrewing the hose, where after the red hut under the valve is activated. It is very important to secure that the valve is tight after the test, as you otherwise will have water dripping into the fuel. Should the valve not be tight, you must open it and clean the contact surface and assemble it again.

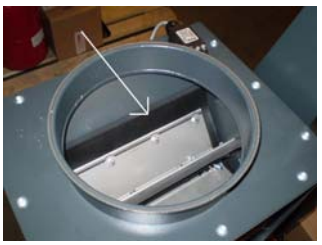
Sprinkler valve without hose

The air-inlet on top of the stoker is cleaned by un-screwing the air-inlet and clean the oblong hole beneath the air-inlet, in the red plate.



Air-inlet

The rubber in the rotating valve must be controlled visual. In case of any signs of tear and wear it must be exchanged. The rubber can be controlled by unscrewing the big hose connecting the transport auger to the valve.



Rotating valve

Section 5- Combined - or manual heating

5.1 Combined heating

What is combined heating?
If you decide to use logs in addition to the stoker heating, you can add some few logs onto the grid placed in the combustion room. The amount to be added is very much depending on the boiler output (the actual heating need)

When can one use combined heating ?
You should be aware, that this heating combination can only be used, when the following parameters are adhered to :
There must be a demand for heating (boiler output), which actually can consume the heat output produced from both the stoker and from the combined heating.. At the same time the heat output – as read on the display – be at least 50 % to achieve that sufficient air from the fan is supplied to sustain both the stoker and the combined combustion. If the heating demand is not that big, the load percentage of the boiler will fall, which will reduce the amount of combustion air further. The result will be a bad and incomplete combustion in particular of the logs, leading to sot and tar on the heating surfaces.

What to do, and how much wood can be added ?
Both draft valves must be totally closed and tight. The chain to the lover valve must be loose. If one or both valves are just a little bit opened, false air will enter into the boiler and influence the oxygen sensor (Lambda probe), which controls the fuel input. The lambda probe will measure a higher air surplus (meagre flue mix) and will send signal to increase the amount of fuel to be added through the burner tube. In worst case some fuel will be not manage to ignite before entering into the boiler and the result will be an incomplete combustion, leading to sot and tar on the heating surfaces

You should maximum fill the combustion room to 50 % with logs, holding some 10 cm free in front of the burner tube. The logs must be dry and split – **add only 2 – 4 logs** in the beginning, until you are accustomed to this kind of heating. As the flues from this way of heating are not as clean as by stoker heating, you must aim at a higher flue temperature to reduce the risk of flue gasses condensing in the boiler, the flue outlet and chimney, leading to sot and tar on the heating surfaces and else where. Please adjust the handle on the bypass at the rear of the boiler be in fully opened position when lighting the fire and the following 10 to 20 minutes. Here after you can lower the flue temperature to 150 ºC to 180 ºC in moving the bypass handle 1 to 2 holes up, depending on draft and heat output. The sawing in going below 150 ºC is minimal and is often tightly connected to sot and tar problems.

You should only use combined heating, when the load is indicated over 50 % in the display, as there then is a lot more activity in the combustion room, leading to a quick and effective combustion of the logs.

If you add too much logs to the boiler, the stoker will gradually go down towards pause mode. In this stage next to no air is added from the combustion fan, hence the combustion will be "choked" and cause a mess in the boiler.

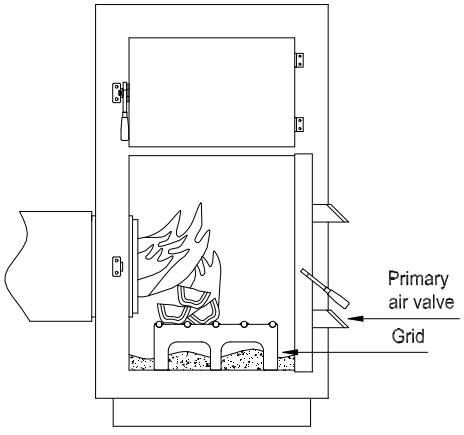


Fig. 6- Combined heating

5.2 *Manual heating*

The power to the plant MUST be on, **e.g. the light in the controller must be on**, as the lambda probe is heated to 600 ºC to be able to keep it clean from tar and sot.

If you still see burning fuel or embers in the burner tube you must empty it back to the stoker auger to avoid any back glow into the auger channel. Then make a “lid” of glass wool or the like at the end of the burner tube to prevent the radiant heat from the manual heating from entering into the auger channel, where it might release the sprinkler. (You can leave the fuel store full of fuel).

1. If it’s not feasible to light the fire on a good, burned out layer of ashes , please use the grid included. The grid should be removed, when a app. 10 cm layer of ashes has been built up. Alternatively you can remove the grid and place 3 – 5 shovel full of dry sand or dry, old ashes on the floor of the combustion room. This will act as insulating material towards the cold base of the boiler.

2. Fill the boiler app half with dry and split wood (max moisture content 15 – 20 %). See to, that you keep an app. 10 cm opening as shown on fig. 7 between the two stacks of wood.

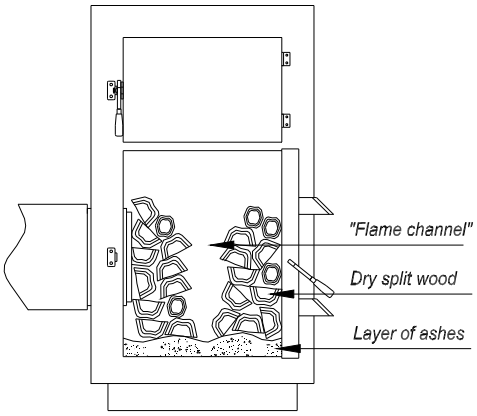


Fig. 7- Manual heating

3. Adjust the primary air valve (the lower air intake) by means of the adjustable arm of the draft regulator to app. 7 – 8. By a cold boiler the opening should be some 5 – 7 cm.

4. The secondary air valve (the upper air intake) is only opened some 2 – 4 mm by means of the adjustment screw – must maybe be totally closed the fist 10 – 30 minutes, depending on the chimney draft. Often this valve is left too much open, resulting in the air in is cooling the flue gasses and the boiler, which hinders that remaining combustible gasses are burnt of, as the gas mix gets too cold.

5 If a draft stabiliser is installed in the flue pipes, it must be closed and locked.

6. The BYPASS handle at the rear of the Variant boiler must be totally opened (lower position) This reduces the air resistance and increases the draft conditions, as now the majority of cold flue gasses are taken past the flue gas cooler and thereby reducing the risk of condensation.

7. Now we have reached: Igniting the fire
Place some 3 – 5 hand full of sawdust in the front of the flame channel and ignite it.. You can of course also use the old fashion method with curled newspaper and small twigs. In igniting the fire in the flame channel, you secure a quick heat development and a controlled release of combustible gasses which results in a high flame temperature. After a short while the walls in the flame channel will be red hot and slowly releasing even more combustible gasses due to the radiant heat from the parallel, vertical walls of the flame channel. In placing the wood as shown, we secure, that the flames are kept as long a time as possible in the high temperature zone with controlled and turbulent primary air. This yields a high degree of heat output before the flame finally gives its radiant heat off to the heat exchanger of the boiler on its way to the chimney.

7a As the remains from the manual combustion are not as clean as those from stoker heating you ought to strive for a rather high flue temperature. This is done by using the bypass handle on the rear of the boiler. At the same time you also reduces the development of tar and sot. The flue temperature should be 150 □6C to 180 ºC, depending on the chimney conditions. (in the ignition phase even higher). The handle should in the beginning be in the upper position. When the combustion is well under ways the handle may eventually be moved down to hole 2 – 3.

8. It is of no importance, that the flame channel will disappear after some time, because now the gas development is reduced and partly replaced by short flamed glow warm from the burning of the charcoal.

9. Let the glowing base burn almost totally down before adding the next batch of logs. You should puss the embers to the front of the combustion room before you add the new logs, which should be placed as described above, creating a new flame channel. The glowing embers will normally start the next combustion, when they are placed close to the primary air inlet.

10. If possible you should add small amounts of logs every 2 – 3 hours. This means, that you need not wait until the previous load has been burned down to charcoal remains, but you can add fuel to well glowing layer of short flamed charcoal, whereby a swift rebuilding of new flames and a good combustion of flue gasses is secured.

You are sure to get a boiler and its heat exchanger filled with tar, if you use: wood with a high moisture content in an overfilled combustion room, without having a accumulating tank, combined with a too low chimney draft and / or next to no heating demand.

We see that much too often, unfortunately!

Section 6- Various types of fuel

6.1 Wood pellets

Wood pellets are made by pressing fine grinded wood through a matrices under high pressure adding steam. Pellets are produced in diameters between 3 and 25 mm. If they are over 25 mm, they are called briquettes. The pellets are cooled down and put through sieves to remove dust.
According to (*Danish*) notice no 638 regarding biomass you can only use clean wood such as sawdust, chips and grinding dust. Any added binding material may not change the character of the wood pellets from being biomass combustible. The basic material may contain maximum 1 % glue of approved types, but neither paint, plastic, metal, impregnating material or the like. Pellets containing such material are defined as waste and should NOT be used in any furnaces

How do I get good wood pellets?

The supplier must be able to issue a declaration, stating that the pellets are made of clean wood without any prohibited additives. Further the following should be checked.

- The pellets must smell as fresh wood.
- The smell coming through the combustion must be as from clean wood.
- The colour must be as wood without any traces of paint or the like.
- The specific weight must be OK.
- There should not be any kind of additives in the pellets.
- The amount of saw dust and the like should be very low.

How to control these preconditions?

Smell
Put a few handfuls of pellets into a plastic bag and smell the content. If the pellets smells from wood, they are OK. But remember, that some pellets are made of beech or oak which smells different than pine. The smell alone cannot define a good pellet.

Smell during combustion.
The smell from the flues must be as from wood combustion. If the flues smells differently, you should carefully check the pellets.

The colour
The pellets must be homogeneous and have a wood like colour. The colour can vary depending on the kind of wood used or if smaller amounts of finely grinded bark is mixed into the pellets (this is permissible). The exterior must be dark brown (caused by the heat during production). No particles, not looking like wood, should be visible, as this indicates pollution from paint, plastic, carpet or similar items.

The specific weight
The specific weight for wood pellets depends partly on how hard they were pressed, partly on moisture content (typically round 6 – 8 %) Due to the amount of air between pellets the specific weight is round 0,6 to 0,7 kg pr litre. But if you put a good pellet into a glass of water it should sink like a stone (due to the compression of the material.

Additives
If the pellets are produced without any binding materials, they will easily dissolve in water, when immersed. Try to put a few pellets into a glass of water. If they dissolve within a few minutes, the risk of unwanted binding material and the like is very low.

Dust
The content of dust between the pellets should be very low, as dust can be a real problem. It prevents the pellets from moving freely and ads to the risk of building bridges in the fuel store or in the auger. Good, clean pellets easily runs down into the auger, where as dust often remains in the lower part of a silo or the fuel store.
The dust originates from the production process, from the transport or from being blown into a silo. The pellets are considered to be OK, if the amount of dust is below 8 % at delivery. As dust is not homogeneous distributed between the pellets, it may be hard to check this figure, but you should use your best judgement to distinguish between “good pellets” and “not good pellets”.

6.2 Wood chips

In general Wood chips is a good fuel, but the size of the chips and the water content is of immense importance. The best wood chip is made from hardwood, which has been dried for 2 – 3 years
The chips should be maximum 2 x 2 x 1 cm, but some few parts may be larger. If the chips in general is too rough (too many large parts) you will increase the rubbing off on the auger and auger channel considerable, as the auger has to squeeze the material through the channel.
In other words: relatively rough chips increases the wear and reduces the life expectation of the equipment.

If you compare wood pellets with app. 6 % water content against wood chips of fresh hardwood (with app 50 % water content) you half the heating value - only due to the increased water content. Therefore always aim at so low a water content as possible – **and always below 30 %**

Wood chips from coniferous tree has app. the same heating value as hardwood, but has typically a higher bark content and often also contains sand, which burns into slag. At the same time you will often see more long, thin pieces of branches in such chips, which further complicates the handling of such chips – **and once again always below 30 % water content**

Wood chips has a tendency to building bridges in the fuel store, hence it is recommendable to connect the stirrer.

Should the water content in the chips used be above 30 – 35 %, you might have to set the controller to “Manual operation” (see section 1.5, O2 regulation ore manual operation)

6.3 Machine / industrial chips

Machine chips are made from waste wood from furniture production or the like. The size of such chips vary from 2 – 3 cm up to 8 – 10 cm, and the thickness round 2- 10 mm. Only very seldom would you see bark in this kind of chips. The water content will be round 10 % and they have a high heating value.
Machine chips have a tendency to create bridges in the fuel store, hence it is often an advantage to connect the stirrer.

6.4 Grains

If you are heating by burning grains (e.g. rye, wheat or barley), the water content of the fuel should always be under 15-16%.

One cannot for sure say, that one sort of grains is better than another, as the heating value depends on the year the grain was grown (much rain / little rain and more) and of the type of soil, on which it was grown.
Further you should anticipate, that grains has a tendency to create slag in the burner tube, e.g. the ashes gets so hot, that they create slag in the lower part of the burner tube.
This can be remedied by adding 1 – 2 kg of feed chalk (calcium carbonate) on top of the grains in a filled fuel store. The grains and the chalk will by it self be mixed. Further the risk of slag can be reduced by mixing 33 % wood pellets into the grains

Should there be a layer of slag in the burner tube it must manually be removed by using a fire hook.

PLEASE NOTE:

Requirements when heating with grains: High flue gas temperature min. 180°C
High boiler output min. 50%
High boiler temperature min. 80°C

6.5 Light fuel types in general

A few advises regarding heating by means of light combustibles such as wood shavings and the like (less than 150 kg / m^3)
The draft in the chimney should never exceed 15Pa (1,5 mm water coulomb) measured in the flue outlet of the boiler. If the draft is too large, the light combustibles will incinerate in the auger channel between the burner tube and the store, which will release the automatic sprinkler system. In most such cases you have to retrofit a draft diverted in the flue pipe.

The stirrer must be fitted with all the stirrer wings (which are in the accessories box included) If the stirrer wing are not fitted, the light fuel will build bridges over the auger (the stoker auger cannot get a hold in the fuel.) In some cases you even have to install additional stirrer wings.
If the fuel builds a bridge over the auger and hence not let to combustion, the controller will announce the error “Low temp.” ore “High O2”

Section 7- Technical information

7.1 M20i / Variant A2

		Approved fuel		
		Pellets	Grains	Wood chips
Class	-	3		3
Water content in fuel	%	App 7	App 15	App 25
Nominal output	kW	29	23	23
Minimum output	kW	7,9	5,1	5,8
output sphere	kW	7,9 – 29	5,1 – 23	5,8 – 23
Capacity of fuel store	litre			
Combustion period by full fuel store	hours			
Efficiency by nominal output	%	88	87	87
Efficiency by minimum output	%	89	82	84
Flue temperature by nominal output	°C	178	151	156
Flue temperature by minimum output	°C	87	77	68
Flue gas amount by nominal output	kg/h	64	64	62
Flue gas amount by minimum output	kg/h	23	21	23
Minimum temperature of water returning (lowest acceptable)	°C	60	65	65

Draft necessary:	12 Pa
Diameter of flue outlet:	Ø 155 mm
Heating area in boiler:	3,5 m²
Combustion box volume in boiler:	190 litre
Amount of water in boiler:	170 litre
Water resistance by temp. difference =10°C	12,7 mbar
Water resistance by temp. difference =20°C	3,4 mbar
Adjustment span for boiler thermostat:	70 – 90°C
Effect consumption by nominal output, to gear motor and fan and more.:	App. 110 W

7.2 M40i / Variant A4

		Approved fuel		
		Pellets	Grains	Wood chips
Class	-	3	-	3
Water content in fuel	%	App 7	App 15	App 25
Nominal output	kW	48	37	37
Minimum output	kW	13,5	10,4	11,2
output sphere	kW	13,5-48	10,4-37	11,2-37
Capacity of fuel store	litre			
Combustion period by full fuel store	hours			
Efficiency by nominal output	%	90	88,5	88,9
Efficiency by minimum output	%	89,1	86,2	88,9
Flue temperature by nominal output	°C	164	148	157
Flue temperature by minimum output	°C	88	78	86
Flue gas amount by nominal output	kg/h	94,7	86,1	102,8
Flue gas amount by minimum output	kg/h	44,4	36,3	44,6
Minimum temperature of water returning (lowest acceptable)	°C	60	65	65

Draft necessary:	15 Pa
Diameter of flue outlet:	Ø 187 mm
Heating area in boiler:	5,6 m²
Combustion box volume in boiler:	290 litre
Amount of water in boiler:	300 litre
Water resistance by temp. difference =10°C	55 mbar
Water resistance by temp. difference =20°C	13 mbar
Adjustment span for boiler thermostat:	70 – 90°C
Effect consumption by nominal output, to gear motor and fan and more.:	App. 110 W

7.3 M80i / Variant A8

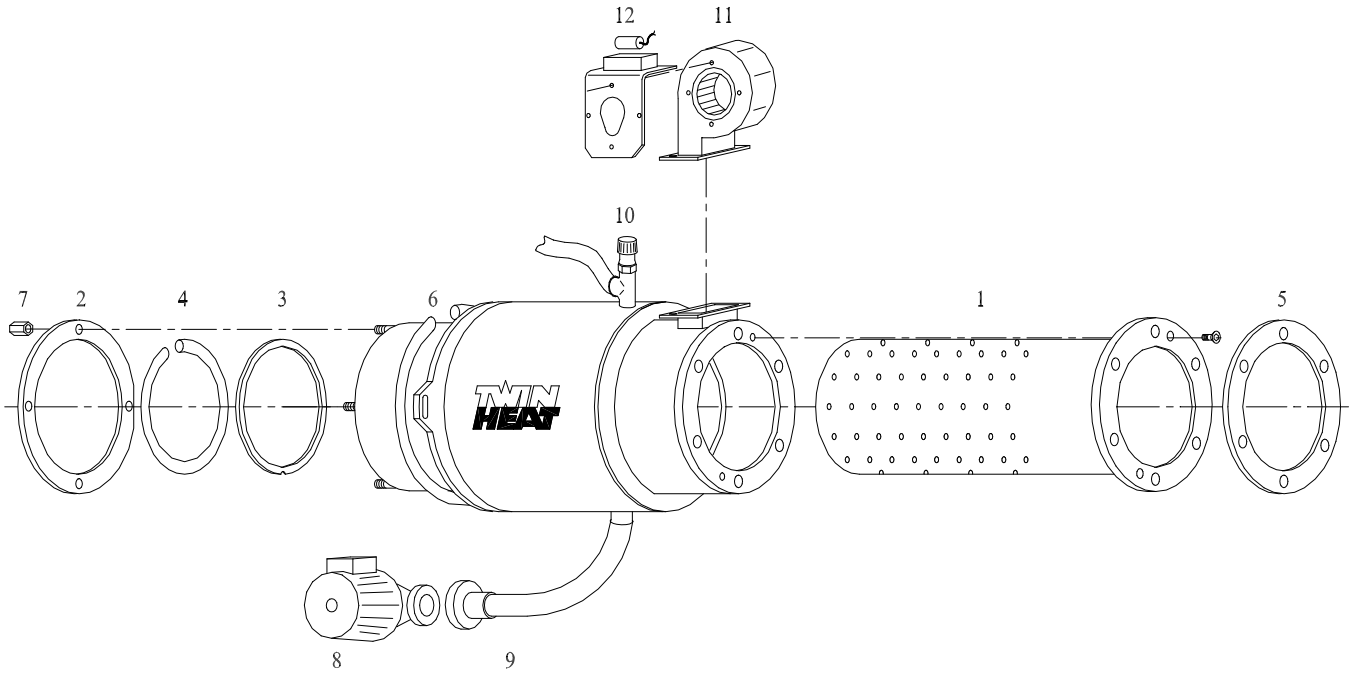
		Approved fuel		
		Pellets	Grains	Wood chips
Class	-	3		3
Water content in fuel	%	App 7	App 15	App 25
Nominal output	kW	80	65	65
Minimum output	kW	22	22	21
output sphere	kW	22-80	22-65	21-65
Capacity of fuel store	litre			
Combustion period by full fuel store	hours			
Efficiency by nominal output	%	89,6	90,2	88,7
Efficiency by minimum output	%	85,9	85,1	88,2
Flue temperature by nominal output	°C	147	138	146
Flue temperature by minimum output	°C	89	88	88
Flue gas amount by nominal output	kg/h	159	177	171
Flue gas amount by minimum output	kg/h	74	85	80
Minimum temperature of water returning (lowest acceptable)	°C	60	65	65

Draft necessary:	20 Pa
Diameter of flue outlet:	Ø 215 mm
Heating area in boiler:	9,1m²
Combustion box volume in boiler:	490 litre
Amount of water in boiler:	350 litre
Water resistance by temp. difference =10°C	97 mbar
Water resistance by temp. difference =20°C	27 mbar
Adjustment span for boiler thermostat:	70 – 90°C
Effect consumption by nominal output, to gear motor and fan and more.:	App. 150 W

Section 8- Diagrams

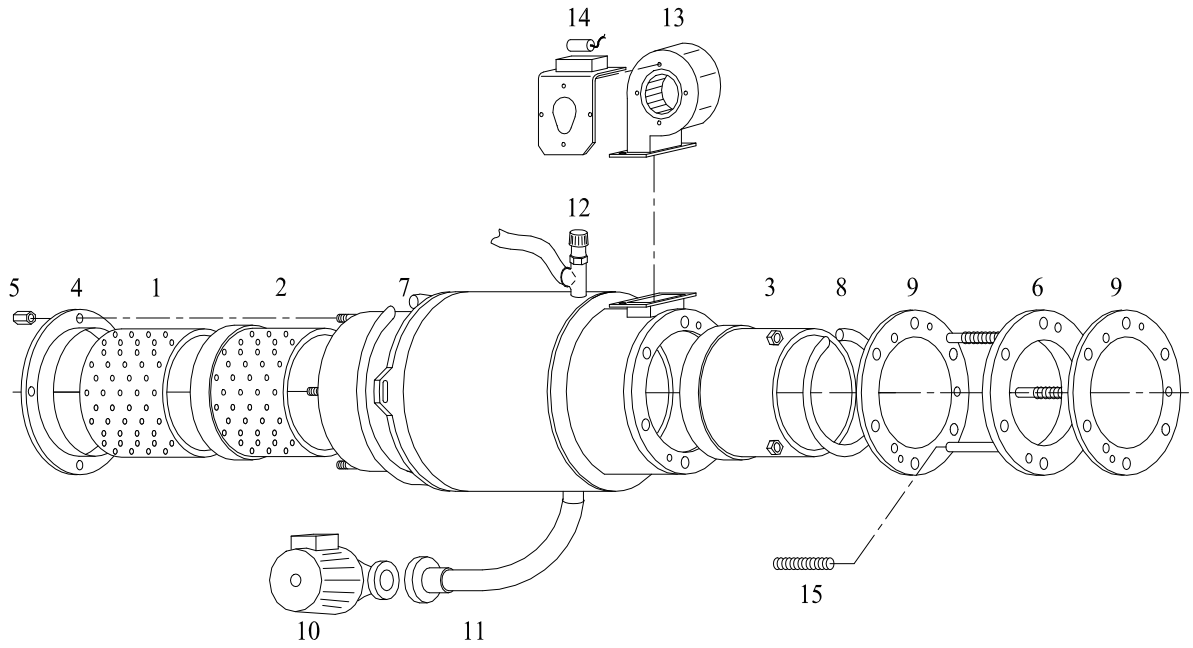
8.1 Parts list burner tube M20

Pos.	Part no.	Pcs.	Description
1	2002010-00	1	Combustion ring
2	2002020-00	1	Front flange
3	2002030-00	1	Washer flange
4	2002040-00	1	Gasket
5	2002051-00	1	Gasket
6	2002060-00	1	Gasket
7	2002070-00	4	Top nut
8	6000750-00	1	Circulation pump - Grundfos
9	6000800-00	2	Hose
10	6000470-00	1	Safety valve
11	4000120-00	1	Fan
12	4000121-00	1	Capacitor



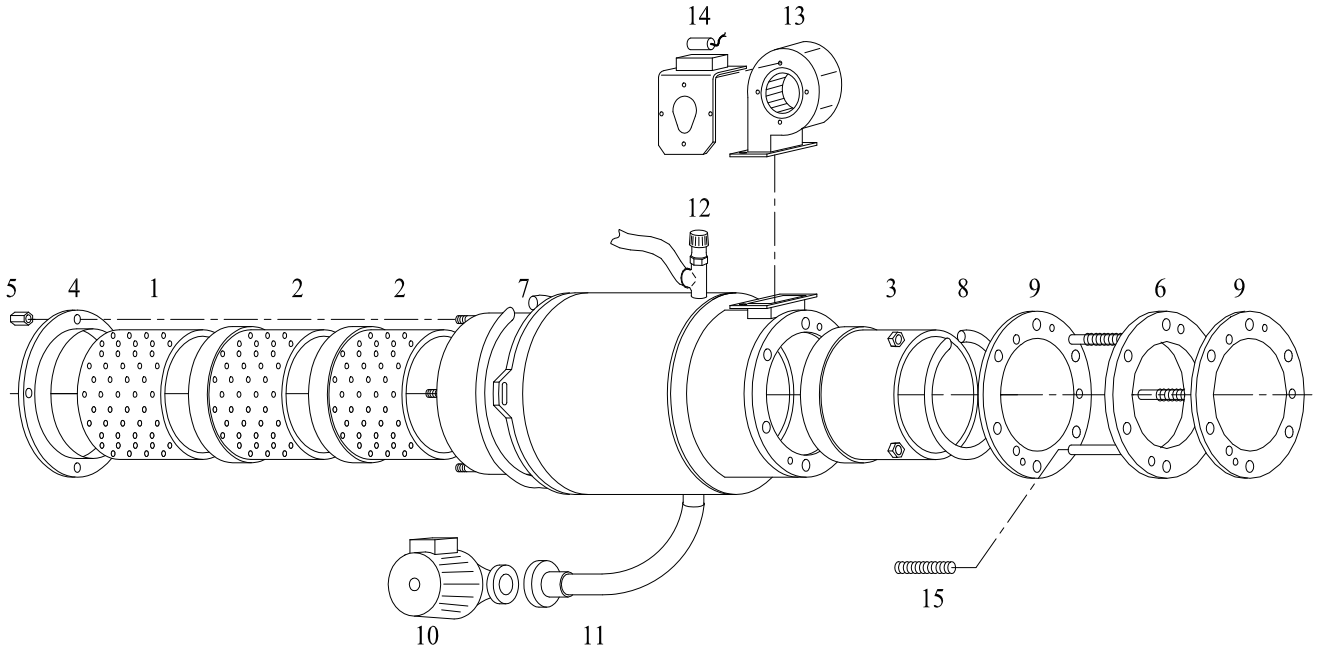
8.2 Parts list burner tube M40

Pos.	Part no.	Pcs.	Description
1	2001041-00	1	Combustion ring with holes
2	2001046-00	1	Combustion ring with holes and assembly ring
3	2001042-00	1	Combustion ring without holes
4	2001040-00	1	Front flange
5	2002075-00	6	Top nut
6	2004031-00	1	Rear flange
7	2004060-00	1	Gasket
8	2001043-00	1	Gasket
9	2004051-00	2	Gasket
10	6000750-00	1	Circulation pump
11	6000800-00	2	Hose
12	6000470-00	1	Safety valve
13	4000120-00	1	Fan
14	4000121-00	1	Capacitor
15	2001030-00	6	Spring



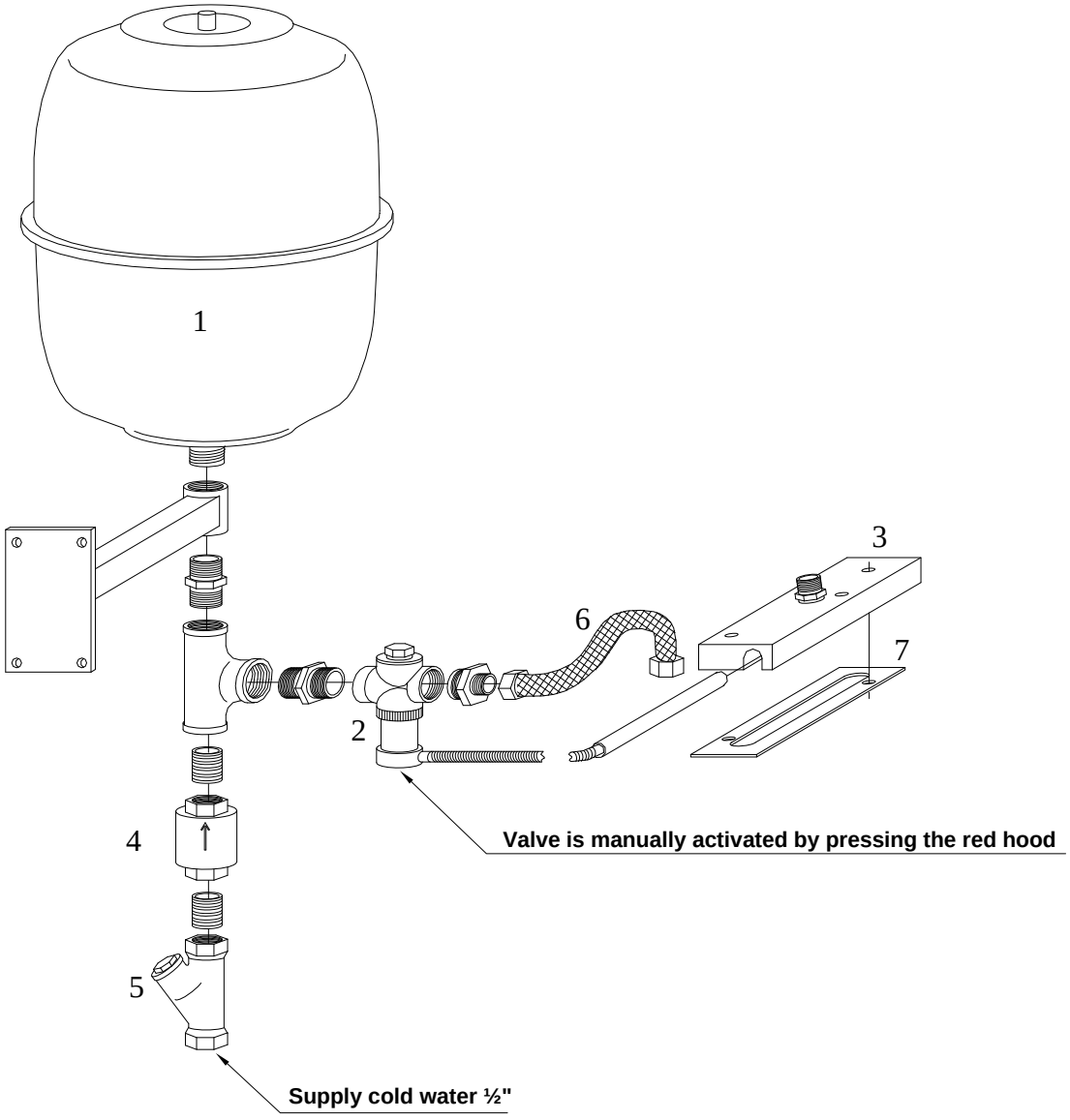
8.3 Parts list burner tube M80

Pos.	Part no.	Pcs.	Description
1	2001084-00	1	Combustion ring with holes
2	2001081-00	2	Combustion ring with holes and assembly ring
3	2001082-00	1	Combustion ring without holes
4	2001080-00	1	Front flange
5	2002075-00	6	Top nut
6	2008031-00	1	Rear flange
7	2008060-00	1	Gasket
8	2001083-00	1	Gasket
9	2008051-00	2	Gasket
10	6000750-00	1	Circulation pump
11	6000810-00	2	Hose
12	6000470-00	1	Safety valve
13	4000140-00	1	Fan
14	4000141-00	1	Capacitor
15	2001030-00	6	Spring



8.4 Parts list sprinkler

Pos.	Parts no.	Pcs.	Description
1	6000435-00	1	Pressure tank 24 lt.
2	6000450-00	1	Sprinkler valve
3	1000362-00	1	Aluminium block
4	6000410-00	1	Contra valve
5	6000460-00	1	Dirt strainer
6	6000820-00	1	Hose, steel armed
7	6100160-00	1	Gasket for aluminium block
8	6208625-00	2	Screws for aluminium block



8.5 Parts list stoker

Pos.	Parts no.	Pcs.	Description
1	0999002-00	1	Shaft for rotating valve
2	0999003-00	6	Rubber for rotating valve
3	1500102-00	5	Angled plate for rotating valve
4	7000106-00	2	Flange bearing for rotating valve
5	4000260-00	1	Gear motor
6	4000086-00	1	Electrical motor for gear motor
7	7000106-00	1	Flange bearing for auger
8	7000101-00	1	Chain wheel
9	7000107-00	1	Chain for rotating valve
-	7000103-00	2	Chain connection link
10	7000105-00	1	Chain wheel
11	7000098-00	1	Chain for auger
12	7000130-00	1	Chain tightener, external
13	7000140-00	1	Chain tightener, internal
14	7000120-00	1	Bearing for auger
15	7000305-00	2	Chain wheel
16	7000310-00	2	Taperlock bush
17	1500710-00	1	Auger
18	1005350-00	1	Bronze bearing
19	1500752-00	1	Sprinkler plate
20	6100185-00	1	Gasket for sprinkler plate
21	1500790-00	1	Air-inlet
22	1500160-00	1	Bearing pedestal
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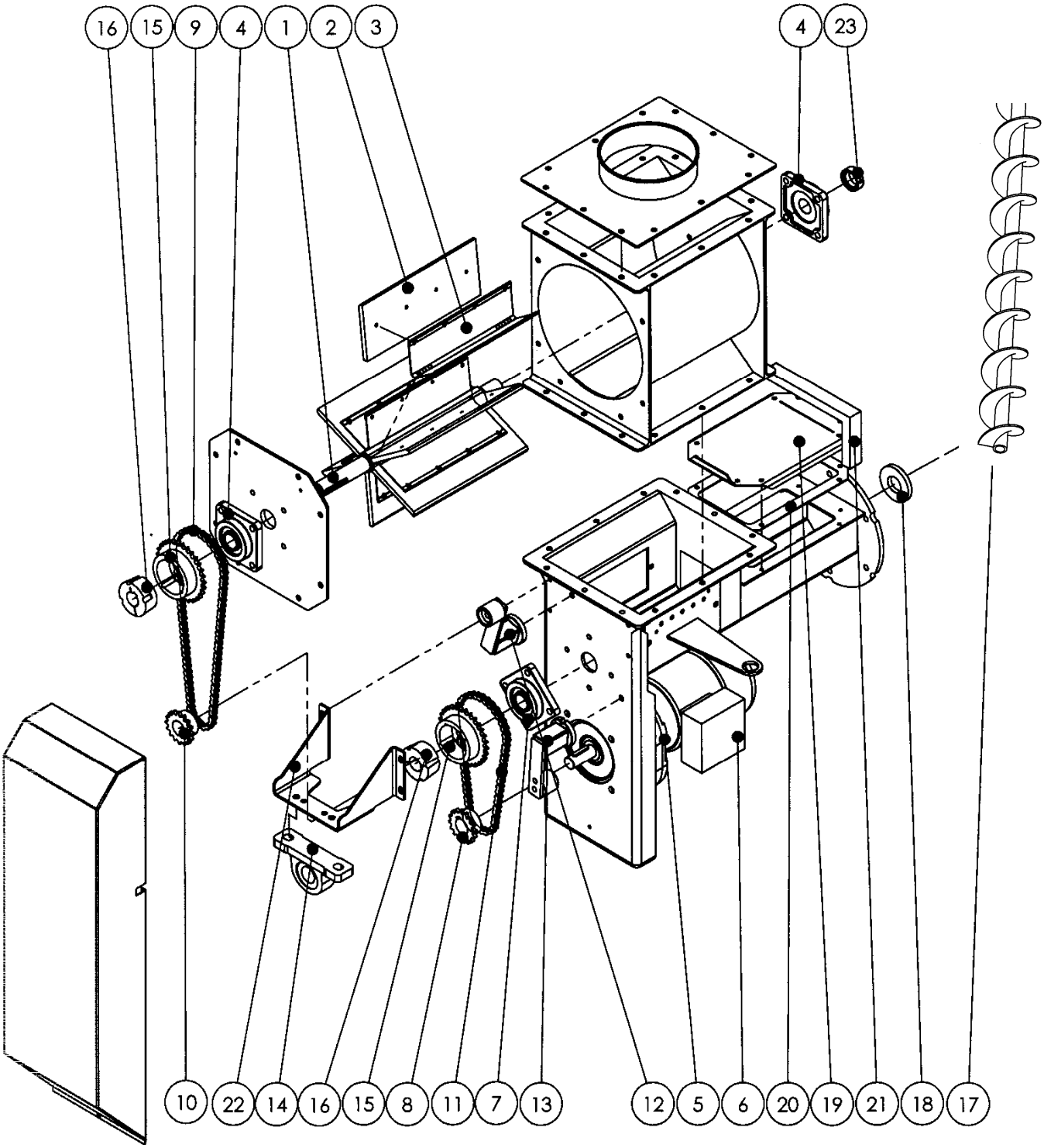
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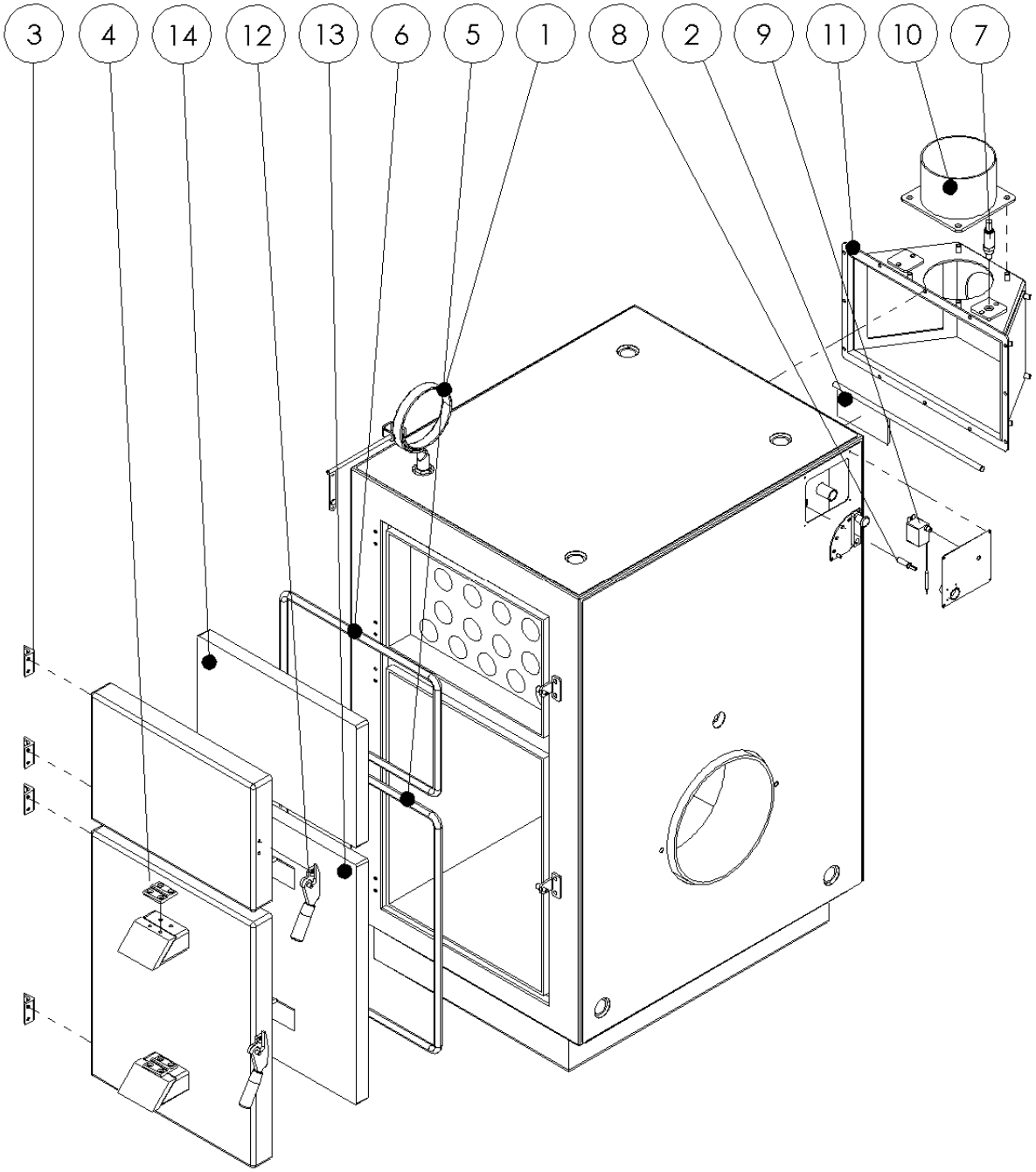
8.6 Parts list Variant boiler

Pos.	Boiler	Parts no.	Pcs.	Description
1	A2/A4/A8	6000700-00	1	Draft regulator
2	A2/A4	3002092-00	1	Bypass valve
2	A8	3008100-00	1	Bypass valve
3	A2	5400110-00	4	Hinges for doors
3	A4/A8	5400120-00	4	Hinges for doors
4	A2/A4/A8	5400110-00	2	Hinges for draft flap
5	A2/A4	3002020-00	1	Glass gasket for boiler door
5	A8	3002080-00	1	Glass gasket for boiler door
6	A2/A4	3003020-00	1	Glass gasket for cleaning door
6	A8	3003080-00	1	Glass gasket for cleaning door
7	A2/A4/A8	4001100-00	1	Oxygen probe (Lambda probe)
8	A2/A4/A8	4001125-00	1	Sensor water temperature
9	A2/A4/A8	4001150-00	1	Overheat thermostat
-	A2/A4/A8	6001010-00	1	Cleaning brush
10	A2	3002230-00	1	Flue spigot
10	A4	3004230-01	1	Flue spigot
10	A8	3008235-01	1	Flue Spigot
11	A2	3002232-00	1	Flue box, complete
11	A4	3004232-00	1	Flue box, complete
11	A8	3008234-00	1	Flue box, complete
12	A2	3002250-00	1	Handle, complete
12	A4/A8	3004250-00	1	Handle, complete
13	A2	6102265-00	1	Insulation for boiler door
13	A4	6104265-00	1	Insulation for boiler door
13	A8	6108265-00	1	Insulation for boiler door
14	A2	6102270-00	1	Insulation for cleaning door
14	A4	6104270-00	1	Insulation for cleaning door
14	A8	6108270-00	1	Insulation for cleaning door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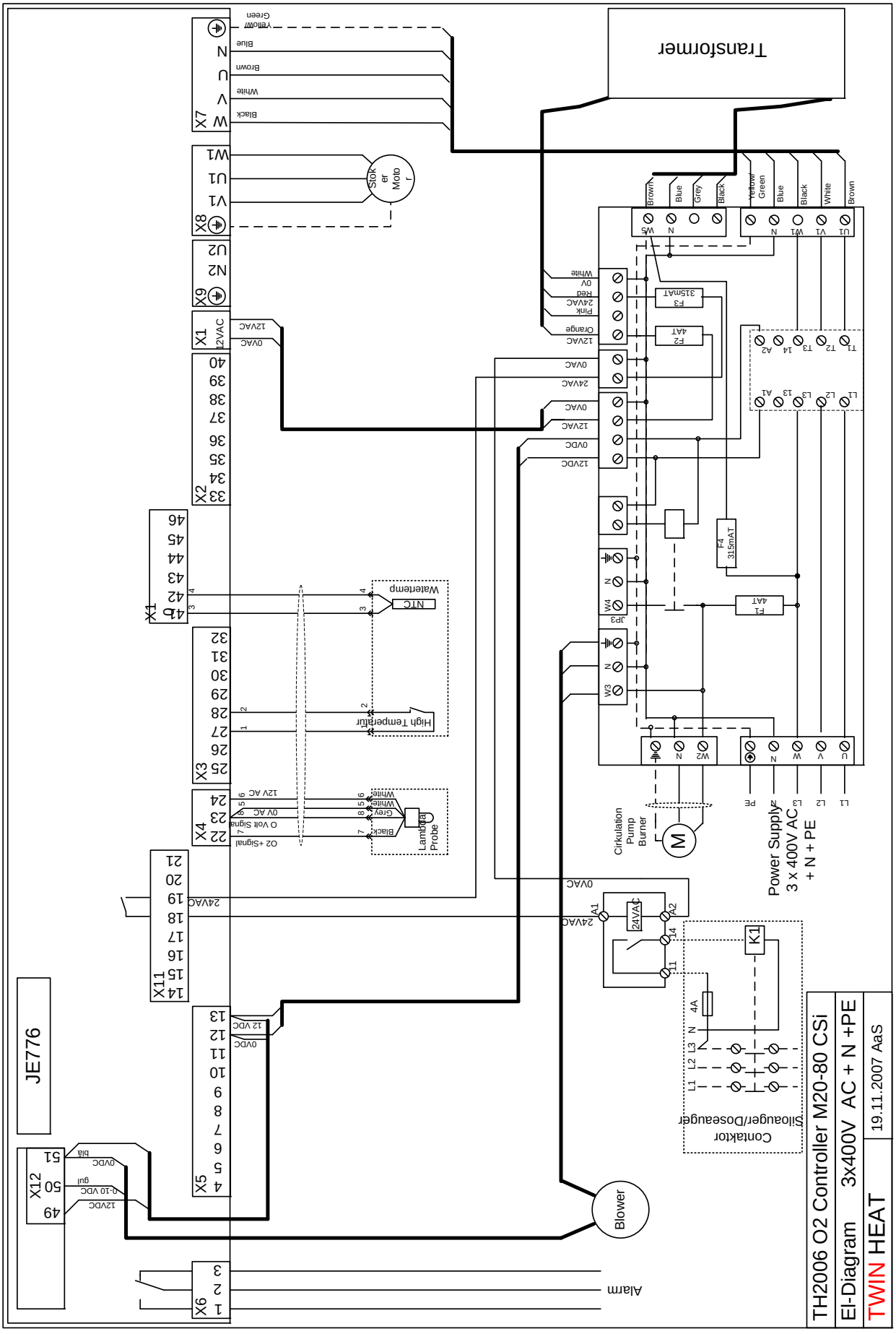
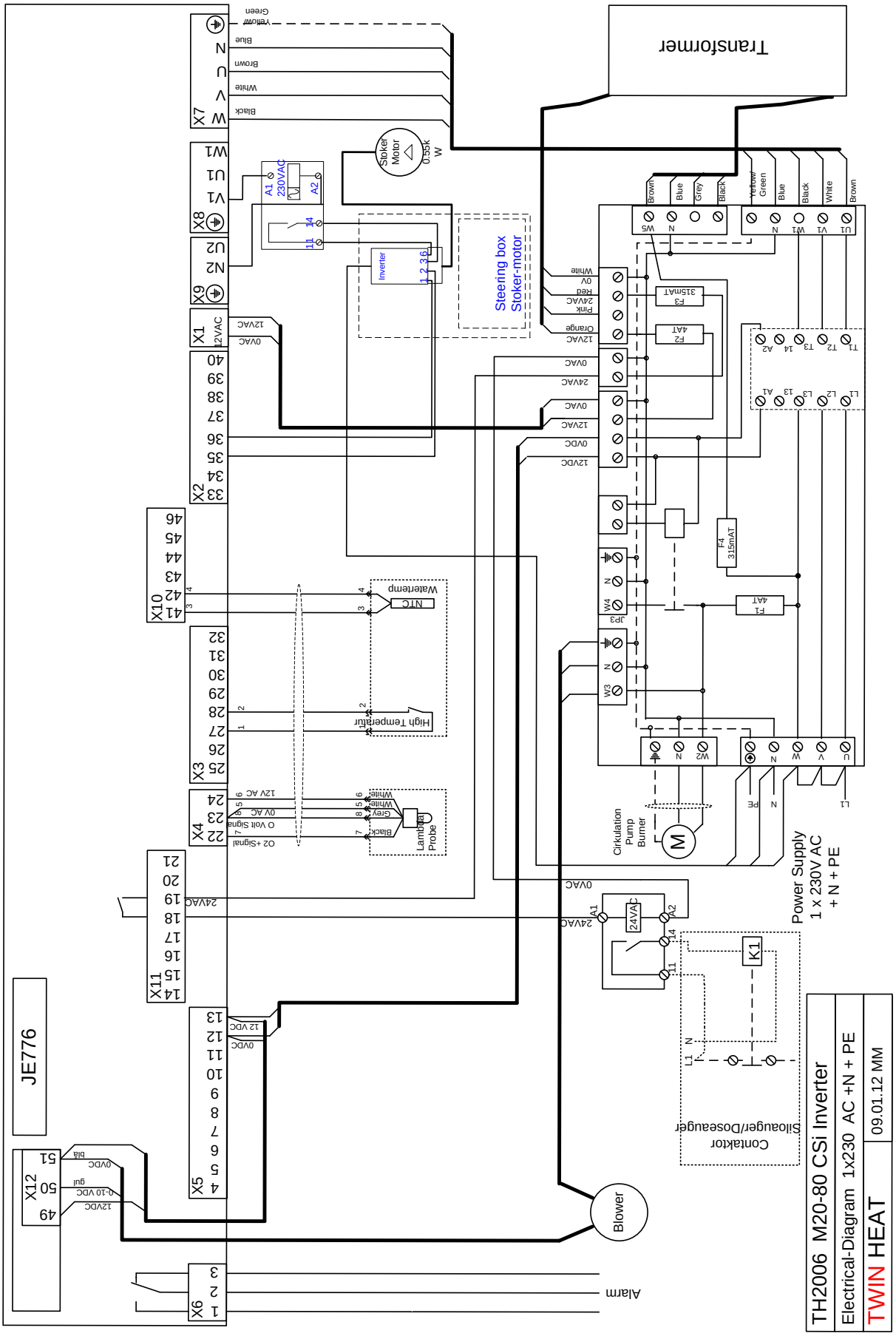
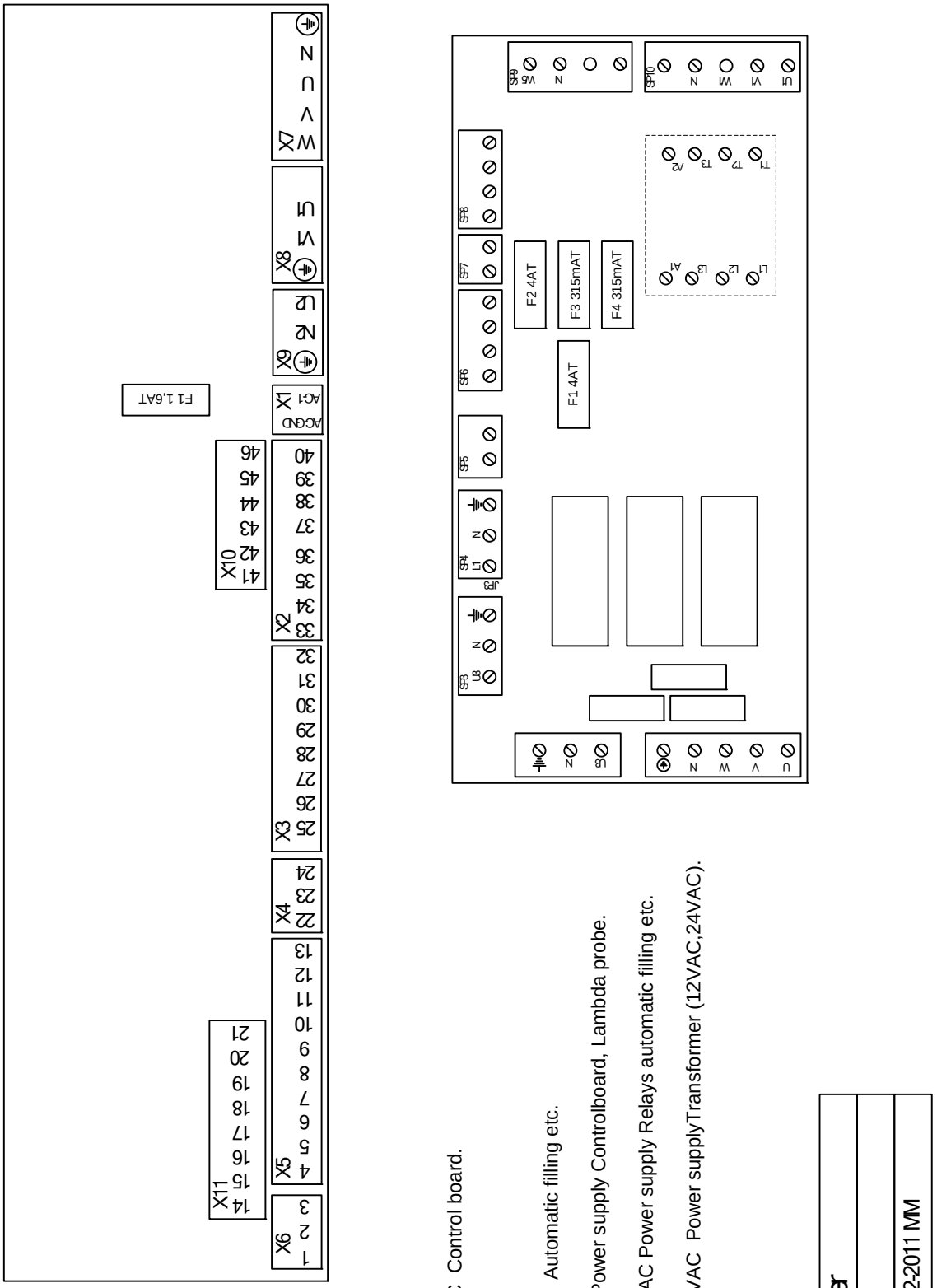
Section 8.7 – Electrical diagram 400V, 3 phase



Section 8.7.1 – Electrical diagram 230V, 1 phase



Section 8.8- The placing of components



Control board:

F1 1,6AT 12VDC Control board.

Power board:

F1 4AT: 230VAC Automatic filling etc.

F2 4AT: 12VAC Power supply Controlboard, Lambda probe.

F3 315mAT: 24VAC Power supply Relays automatic filling etc.

F4 315mAT: 230VAC Power supplyTransformer (12VAC,24VAC).

TH2006 O2 Controller		
Component diagram		
TWINHEAT	09-02-2011 MM	

EC Declaration of Conformity for Machinery

TWIN HEAT®

Norrevangen 7 DK- 9631 Gedsted
Phone +45 98 64 52 22 - Fax +45 98 64 52 44

Herewith declares that

TWIN HEAT Stoker model M20i-CS – M40i-CS – M80i-CS

Is in conformity with the provisions of the Machinery Directive (directive 98/37/EC) and with national implementing legislation

Is in conformity with the provisions of the following other EC directives:
73/23/EEC, 89/336/EC

And furthermore declares that the following harmonized standards have been applied:
EN60 204-1, EN50 081,
DS/EN 292-1, DS/EN 292-2

Gedsted the 1th may 2011

Responsible : Søren Vasegård

Signature

Enclosure 1 – Accessories included

Scraper (only by boilers with stoker in rear)

Cleaning brush Ø50 mm. with handle.

Poker