AUTOMATED WOODWASTE COMBUSTION UNIT
Types:  AZSD-180
        AZSD-250
        AZSD-500
        AZSD-1000

OPERATION

MANUAL

EDITION I/USA

Valid with the order ................../.............

Date ..................... Signature ..................
CONTENTS

CONTENTS .................................................................................................................................................. 2

1. GENERAL INFORMATION .................................................................................................................. 3

2. TECHNICAL DATA ............................................................................................................................... 4

3. STRUCTURE AND OPERATION OF BASIC ELEMENTS OF AZSD ....................................................... 5

   3.1. FUEL TANK .................................................................................................................................. 5
   3.2. WORM CONVEYOR (FIG.1.1.) ...................................................................................................... 5
   3.3. PRE-FURNACE (FIG.1.2.) .............................................................................................................. 5
   3.4. BLOW FAN (FIG.1.5.) .................................................................................................................... 6
   3.5. THERMOSTATIC VALVE AND ANTI-FIRE SENSOR ........................................................................ 6
   3.6. CONVEYOR DRIVE (FIG.1.6) ......................................................................................................... 6
   3.7. AUTOMATED CONTROL SYSTEM ................................................................................................. 6
   3.8. ROTARY FEEDER: ......................................................................................................................... 6
   3.9. GENERAL DESCRIPTION OF AZSD OPERATION (FIG.1, FIG.1A, FIG.1B,1C) ................................. 6

4. ASSEMBLY OF THE AZSD, CONNECTION TO THE BOILER, START-UP ............................................... 7

   4.1. GENERAL INFORMATION ABOUT CONDITIONS OF CONNECTION OF THE AZSD TO THE BOILER ... 7
   4.2. ASSEMBLY OF THE AZSD - FIG.1, FIG.1A, FIG.1B, FIG.1C ........................................................ 7
   4.3. CONNECTION OF THE AZSD TO THE BOILER ............................................................................. 7
   4.4. ASSEMBLY OF THE ELECTRIC SYSTEM ....................................................................................... 7
   4.5. START-UP AND OPERATION OF THE AZSD .................................................................................. 8
   4.6. FUEL COMPLETION ...................................................................................................................... 9

5. INDUSTRIAL SAFETY & ANTI-FIRE RULES ....................................................................................... 9

   5.1. DESCRIPTION AND EVALUATION OF RESIDUAL RISK .......................................................... 10
       5.1.1. Description of residual risk .................................................................................................. 10
       5.1.2. Evaluation of the residual risk .............................................................................................. 10
   5.2. LIST OF WARNING AND INFORMATION SIGNS FOR THE AZSD ............................................. 10

6. INDEX OF QUICK-WEARING PARTS ................................................................................................. 12

7. STANDARD EQUIPMENT .................................................................................................................... 12

8. TYPICAL DEFECTS AND THEIR REMOVAL ..................................................................................... 13

9. LUBRICATION MANUAL ................................................................................................................... 15

10. CURRENT MAINTENANCE, REPAIR AND OVERHAUL ...................................................................... 15

11. INSTALLATION OF THE ANTI-FIRE SYSTEM ................................................................................ 17

   CONTROLLER SE-4/E – OPERATION MANUAL .................................................................................... 32

COMPLAINT FORM ................................................................................................................................. 37

WARRANTY CONDITIONS ...................................................................................................................... 38

CONFORMITY DECLARATION .................................................................................................................. 39
1. GENERAL INFORMATION.

The Automated Woodwaste Combustion unit AZSD is a modern device applicable for burning of comminuted woodwaste with granulation of max. 30 mm and humidity of 30÷60%.(1)

The AZSD can be coupled with properly chosen or adopted boiler and applied for heating of groups of houses, agricultural or forest farms, glasshouses, foil tunnels, workshops etc.

CAUTION!

Taking into consideration a few years lasting co-operation with users, the manufacturer of AZSDs recommends using of boilers with an energetic certificate only.

Application of exhaust/water heat exchangers allows low-cost and versatile use of an AZSD for heating or for technological purposes.

An AZSD should be operated as described in present manual; improper operation makes the warranty void.

Caution!

All data contained in present manual are based on newest manufacturer’s information. Nevertheless, the HAMECH has the right for introduction of changes to the described AZSD version (which have no influence on operation conditions) resulting from development and of design and manufacturing technology.

Present manual should be helpful to enable acquaintance with the device and full evaluation of its operation parameters. We recommend reading the manual carefully before first use.

(1) The term „humidity” means the relation of the weight of water contained in wood to the total weight of humid wood (so-called relative humidity). It is calculated according to following formula.

\[
W_W = \frac{G_W - G_O}{G_W} \cdot 100\%
\]

- \(W_W\) – wood humidity in relation to humid wood
- \(G_W\) – weight of humid wood;
- \(G_O\) – weight of absolutely dry wood
## 2. TECHNICAL DATA

<table>
<thead>
<tr>
<th>Type</th>
<th>AZSD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal thermal power</strong></td>
<td><strong>AZSD</strong></td>
</tr>
<tr>
<td>kW</td>
<td>180  250  500  1000</td>
</tr>
<tr>
<td>kcal/h</td>
<td>154000  215000  430000  860000</td>
</tr>
<tr>
<td><strong>Coupled boiler</strong></td>
<td>Water boiler of similar heating power</td>
</tr>
<tr>
<td><strong>Fuel</strong></td>
<td>sawdust, bark, refuse of granulation up to 30 mm, humidity 30÷60%*, without mineral inclusions</td>
</tr>
<tr>
<td><strong>Fuel consumption (at nominal power)</strong></td>
<td><strong>AZSD</strong></td>
</tr>
<tr>
<td>kg/h max.</td>
<td>77,5  108  217  430</td>
</tr>
<tr>
<td>mp/day</td>
<td>7,4  10,3  20,8  41,2</td>
</tr>
<tr>
<td><strong>Tank capacity</strong></td>
<td>m³  2,3  2,3  2,3  4,4</td>
</tr>
<tr>
<td><strong>Fuel consumption</strong></td>
<td>kW  1,7  1,7  1,9  ~4,2</td>
</tr>
<tr>
<td><strong>Power supply voltage</strong></td>
<td>V  400/230</td>
</tr>
<tr>
<td><strong>Average heated habitable surface</strong></td>
<td>m²  1150  ~ 1600  ~ 3200  ~ 6400</td>
</tr>
<tr>
<td><strong>Efficiency ratio (with boiler)</strong></td>
<td>%  ok. 80</td>
</tr>
<tr>
<td><strong>Heating surface of coupled boiler</strong></td>
<td>m²  16÷22  32÷36  50÷56  100÷120</td>
</tr>
<tr>
<td><strong>Outlet gas temperature</strong></td>
<td>°C  ca. 1000°C before exchanger</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ca. 200°C after exchanger</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>(kg)  ~1250  ~2300  ~3500  ~7000</td>
</tr>
</tbody>
</table>

* If the fuel is of other humidity (eg. too dry), sprinkle it with water or mix with humid one. Burning of excessive dry fuel causes quick wear of lining, grate and feeder. Furthermore, the Manufacturer does not agree for burning of comminuted wood if the dust content is greater than 5%. Non-observance of above-mentioned principles may cause quick wear of the device and emission of harmful combustion products for what the Manufacturer takes no responsibility.

** fuel of 32% humidity and n.c.v. 11510 kg/kJ.
3. OPERATION AND OPERATION OF BASIC ELEMENTS OF AZSD.

The Automated Woodwaste Combustion Unit AZSD (Fig.1; fig.1A, fig.1B, fig.1C) consists of the following units:
1. Fuel tank
2. Worm conveyors
3. Pre-furnace (retort)
4. Blow fan
5. Thermostatic valve and anti-fire sensor
6. Water tank
7. Conveyor’s drive
8. Controller
9. Rotational feeder
10. Platform

3.1. Fuel tank

The tank has cylindrical shape. The tank has in its lower portion a rectangular pipe welded-in; the pipe is a part of worm conveyor cover. A movable shield is mounted on a pivot with bearings in tank’s bottom. The shield helps to prevent fuel stopping. Each tank should be covered during operation to avoid gas flow and backfire.

3.2. Worm conveyor (fig.1.1.)

The conveyor consists of a cover (1) and a worm (2). The housing is made in the form of a rectangular pipe.

3.3. Pre-furnace (fig.1.2.)

The pre-furnace consists of a metallic outer housing (1) and a ceramic, heat-resistant chamber (2). The housing consists of a two-layer coat; between layers there are air channels for airflow adjustment and cooling of an outer coat. The pyrolithic chamber is a thermal incubator, made of heat-resistant brick, joint with a mortar based on “Gőrkai” cement and “Boss” filler. In the lower portion of the chamber there is a grate (3) applied for fuel gazification and its partial combustion. The pre-furnace should be closed tight during operation. Brackets with threaded openings are welded to the housing’s bottom to enable (after screwing of screws (4)) pre-furnace’s level adjustment. Inside the chamber there is a feeder flap mounted with screws on a tube. All elements are made of creep-resistant steel. The swing-mounted flap protects the pre-furnace chamber from excess fuel. If from any reason excess fuel will be fed to the chamber, it will cause pressure on the lower side of the flap. The feeder’s flap will rise, causing (fig. 1.3) tube’s (5) rotation; at the tube’s end there is a lever (6). The lever pushes the arm of an end switch (7); the switch cuts-off power supply to the engine of the conveyor’s drive.

Caution!

Activation of feeder’s flap is an “emergency” situation and requires crew intervention. Such situation occurs in case of improper fire making or time adjustment (work and pause between programs: normal or auxiliary combustion).

Movement of the feeder’s flap in opposite direction (after reduction of fuel quantity in the chamber) is realized through the weight (8) mounted on the opposite lever’s end. Gate valves are used to adjust the best airflow needed for combustion process (fig. 1.4).

Caution!

During making fire the gate valves should be closed. After the pre-furnace reaches its full effectiveness (auxiliary phase), close upper valves located in the flue.
3.4. Blow fan (fig.1.5).
The fan is connected to inlet stubs with pipes.

3.5. Thermostatic valve and anti-fire sensor
The sensor of the thermostatic valve should be fastened on the housing of the worm conveyor, in the distance of a dozen or so centimeters from the pre-furnace. The valve is activated through temperature rise or backfire to the fuel tank. Quick activation causes water supply and fire extinguishing. The sensor should be mounted on clean surface. (see p. 11).

3.6. Conveyor drive (fig.1.6).
Consists of an engine (1) and a gear (2).
Power is transmitted to the worm's shaft through a clutch. The clutch is simultaneously a kind of safety device and must not be replaced by any other device connecting engine and gear. Power output drives the shaft, which should be coupled with conveyor's worm tip.

3.7. Automated control system.
The combustion control program depends on many variables; before all on humidity of woodwaste, heat demand and boiler type. Proper adjustment is possible after getting some experience during the first operational period.

3.8. Rotary feeder:
The AZSD is fitted additionally with a rotary feeder. The feeder's task is to transport the fuel uniformly from the upper to the lower worm conveyor.
The rotational feeder should also stop the backfire to the fuel tank (if from any reason the anti-fire system will be not activated).

3.9. General description of AZSD operation (fig.1, fig.1A, fig.1B,1C).
The fuel contained in the tank (1) is supplied with the worm conveyor (2) to the pre-furnace (retort, 3), where the fuel is gazificated and partially burnt. To ensure proper gazification, the chamber is supplied with air with the blow fan (4).
The conveyor (2) is driven with a reduction gear (7). The operation of the entire device is controlled with a controller (8), which works according to a set programme. The programme is set by controllers of main and auxiliary combustion and also the water temperature controller at the boiler's outlet, where two temperature sensors for adjusted and maximum (95°C) temperatures are installed.
The AZSD is equipped additionally with the water anti-fire system. Its structure and operation is shown on fig. 1; fig. 1A, fig.1B,fig.1C i fig. 1.7.
The reliability and life of the device depends on good knowledge of the structure, operation rules, proper maintenance and observance of rules contained in present manual.
Taking into consideration that woodwaste contains certain quantity of silica and sometimes other mineral impurities as e.g. sand, gravel, concrete or stone (when stored on the ground or in a concrete bunker), the chamber (especially inner walls and grate) could be covered with silicate deposits. This effect is very harmful and can reduce combustion effectiveness, but can be avoided by use of pure wastewood (free of mineral impurities).
Visible symptoms of silicate deposit are: decrease of effectiveness ratio (lower temperature at the boiler) and black smoke at funnel's outlet (during proper combustion only light, white cloud is visible).
With regard to a. m. effects, the chamber must be cleaned (silicate and carbon deposits must be removed). Cleaning frequency depends on fuel purity. The cleaner is the fuel, the scarcer is the cleaning. The cleaning frequency should be set depending on fuel type.

CAUTION!
Pre-furnace chambers should be cleaned in such a way, that the chamber lining would not be damaged. However, if any damage occurs, repair it with fire-resistant material (normal fire resistance 1370°C)(173sP)
If the fuel is mineral-free, the chamber will be always clean and small quantity of ash (ca. 1% of burnt fuel) falls into the ashtray. For ash removal use a cover in lower pre-furnace's portion. In the...
case when chamber cleaning is necessary, slide off the flat part of the grate through a window. Then clean the chamber’s interior by dropping impurities into the ashtray. The ashtray should be emptied with a ash rake.

**CAUTION!**
After cleaning close the door tight.

4. ASSEMBLY OF THE AZSD, CONNECTION TO THE BOILER, START-UP

4.1. General information about conditions of connection of the AZSD to the boiler.
The choice of a boiler depends on its thermal power. The thermal power should be similar to this of the AZSD. Differences of no more than 10% are permissible.
The gas/steam mixture from the pre-furnace should be transferred through the connector to the boiler’s combustion chamber, where it is burnt out.
The exhaust gas system (flue, smoke channels and funnel) must be made according to rules given in the manual of the boiler coupled with AZSD.
When both devices are properly matched, the effectiveness of the set is highest.
All adaptation works realizes the user on its cost but with observance of following conditions:
   a) place of connection between an AZSD and a boiler must be tighten with e.g. fire-resistant rope and chamotte clay.
   b) an AZSD should be connected to a boiler straight (max. distance between the AZSD and the boiler should not be greater than 0,4 m). Permissible deflection angle – 20°. Any greater deflection may cause incorrect working conditions, for which the manufacturer takes no responsibility.
The energetic set boiler – AZSD must work in a closed room with temperature higher than 0°C. Boiler and AZSD must not be placed in such way, that the gas would flow from the pre-furnace to the boiler downwards.

4.2. Assembly of the AZSD - fig.1, fig.1A, fig.1B, fig.1C.
An AZSD is delivered partially disassembled. One part make the fuel tank and the conveyor, another – the pre-furnace.
Before both parts will be joint, remove transportation elements and level both parts to prepare them for coupling together.
The connection must be tight – use a sealing putty.

4.3. Connection of the AZSD to the boiler.
Connect the assembled AZSD to a boiler.
All connections must be stress-free. After connection mount the frame and the controller (8) on the conveyor’s housing (as shown on fig. 1 and 1A) and the anti-fire sensor together with the thermostatic valve (5). On the woodwaste tank install the water tank (6) and connect all parts as shown on figures 1, 1A, 1B and 1.7. Wiring must be connected as shown on the wiring diagram enclosed to the controller manual.
Install temperature sensors for adjusted and max. temperatures (95°C) on the boiler. Both sensors should contact with clean collector’s surface. Fasten the sensor with a band in two places and insulate well.

**CAUTION!**
Prior to filling the tank with fuel, make sure, that on the tank’s bottom there are not any object, which could be transferred to the worm and block it causing damage. Check the conveyor’s rotational direction.

4.4. Assembly of the electric system.
The controller and electric devices should work with voltage of 230/115 V, 60 Hz and be earthen according to the system used by the user.
All connections are user – made according to the wiring diagram enclosed to the controller manual; it is recommended to employ for this task an experienced, certified electrician.
It is recommended to make power supply for the controller with a four- or five-conductor cable of no less than 1.5 mm² Cu, considering voltage drop. Protect cable and devices with proper fuses. Protection an power supply cable are provided by the user. After all connections are made, check engine’s rotation direction and proper working of other adjustment and control devices.

4.5 Start-up and operation of the AZSD.

CAUTION!

A. During first start-up of the AZSD coupled with a boiler and during each next one (especially after a longer standstill) be especially careful. The operator performing start-up should wear heat-resistant gloves (hand protection) and a mask (face protection).

B. Use only fuel of humidity not greater than 60%. The device works reliably in wide range of humidity (30÷60%), but under condition, that the process is continuous, the pre-furnace’s interior is properly warmed and the controlling program is adjusted properly to ensure uniformity of gazification and combustion. During the auxiliary combustion program, adjustment is very important – the end switch in the case of excess fuel will break the pyrolytic process and cause the necessity of making fire again with dry fuel.

C. Before first operational use of the AZSD with full load, it is indispensable to dry-up the pre-furnace’s lining by burning dry fuel (150 hrs) fed by the worm conveyor from the fuel tank. Use the program similar to the auxiliary one. 150 hrs lasting drying-up means a few cycles of the type “make fire – and – slowly cool down”. In the course of 7 days make 6-8 cycles. After such preliminary drying-up fire the device with dry fuel and start operation with a fuel of 30÷60% humidity. The drying of lining can be of other type, according to user’s invention, but the lining must not be overheated to avoid breaks and damages.

1. Check the oil level in the gearbox and proceed as described in p. 9.
2. Pour the grease to the bearing of the rotational shield as described in p. 9.
3. Set the boiler temperature sensor’s handwheel for minimum (left outer position).
4. Switch on power supply on the controller’s panel. The switching on is signaled with a lamp.
5. Check the direction of engine’s rotation (must conform to an arrow on the engine’s fan housing) and operation of the end switch.
6. Switch off power supply on the controller’s panel.
7. If the direction of engine rotation is proper and the worm and the movable shield in tank bottom match properly, the tank can be filled with fuel. First fuel portion should be dry, of humidity not greater than 30% to ensure proper warming of the chamber and good pyrolytic process conditions. Cover the tank tight.
8. Check the boiler condition (leakage is not permitted), fill it with water and deaerate heating system.
9. Fill the anti-fire tank with water and cover it.
10. Open the pre-furnace cover.
11. Check the position of the flap in the pre-furnace chamber (45° from the vertical position in the boiler’s direction) and close the pre-furnace cover.
12. Set the MMA temperature sensor’s handwheel to 5 (fig. 1.7).
13. Set the fan aperture at 1/2-2/3 of full opening.
14. Open the secondary air gates at the flue.

CAUTION!

The periods given below are only approximate values and depend on kind and humidity of fuel and funnel thrust.

1. Set work cycle (“work time”) to 3÷5 seconds and “pause time” to 10÷15 seconds.
2. Set auxiliary cycle to 5 seconds (“work time”) and “pause time” to 100 seconds.
3. Once again switch on the power supply on the controller’s panel. The worm conveyor will start to transport fuel to the pre-furnace chamber. Switch off the controller when the fuel appears in the chamber.
4. Make small fire of dry wood on the grate. As an incendiary use comminuted spruce wood or small pieces of pine wood. When the fire on the grate burns and the chamber is warm, switch on the sawdust feeding.
CAUTION!

Do not use inflammable materials like petrol, kerosene, their derivatives or similar materials for making fire – this may cause burns or explosion.

5. Turn right the chamber temperature adjustment wheel to the point of the required boiler outlet temperature (ca. 75% of the adjustment range).

6. Together with increase of the chamber temperature (heat cumulating) change work cycle adjustment: “work time” to 25÷30 seconds and “pause time” to 5÷7 seconds.

7. Continue making fire. Patience and attention recommended. Check the continuity of fuel supply. The total time for adaptation of the pre-furnace for efficient pyrolithic process takes 6÷12 hrs. Proper pyrolithic (gazification) process results in continuous flame of uniform, intensive color and quick temperature increase at boiler’s outlet up to required value. When the required temperature is reached the auxiliary program starts. During this phase the blow fan is stopped and the fuel is fed in the quantity of 1/3÷1/5 of normal consumption. The gate valves at the flue should be closed.

8. Increase the boiler’s set temperature. When the conditions in the chamber will be proper for good pyrolithic process (continuous flame of uniform color), normal fuel (of 30÷60% humidity) can be fed, under condition, that the control program settings will be changed (work and pause times). In the first phase decrease the “work time” to 15÷20 seconds and increase the “pause time” to 8÷10 seconds.

Watch the process carefully and do not allow the chamber to cool down, what results in stopping the pyrolithic process.

Proper adjustment of “work time”, “pause time” and primary air flow – throttle – fan valve gates, allows the process to run without disturbance.

CAUTION!

The version AZSD-1000 is fitted with secondary air fans working continuously, with no regard which program – main or auxiliary – is already realized. They can be switched off with switches located nearby the fans.

4.6. Fuel completion.

The fuel in the tank should be completed periodically.

The fuel can be loaded:

- manually (at low heat consumption)
- mechanically

Manual loading is ineffective (and not recommended) regarding the tank’s height.

Manual loading can be used only if the device is located in a deep basement. The difference between levels can be used to make so-called gravity pouring.

Mechanical completion can be realized by use of any type of conveyor; worm conveyors are the best ones. The fuel is transferred to the conveyor and then to the tank. It is recommended to sieve the fuel through a 3 mm screen.

Caution!

If the fuel loading is not automated do not empty the tank completely. If the tank would be completely emptied and the cover open, such situation may cause so-called reverse thrust and ignition of fuel remains in the tank.

Close the tank after each fuel completion.

5. INDUSTRIAL SAFETY & ANTI-FIRE RULES.

- Read carefully the present manual before the assembly, start-up and operation of the device. For request the buyer can be also trained by manufacturer’s service personnel.
- Take special precautions during first start-up of the AZSD coupled with a boiler and during each next one (especially after a longer standstill).
- The operator performing start-up should wear heat-resistant gloves (hand protection) and a mask (face protection).
- Any modifications of wiring and control system are prohibited.
- Do not open the pre-furnace’s cover – risk of burns.
• Be especially aware during opening / closing of the pre-furnace cover. The cover should be opened only when the furnace is cold. Do not pass under the opened cover, because there is a risk of lining fall-down. Turn the lifting wheel until the cover will be lifted over the sealing on its entire circumference, then turn the cover aside. Non-observance of this procedure may cause damage of the seal. In the same way, set the cover during closing exactly above the combustion chamber and then let it down carefully.

• Be sure, that the end switch at the furnace and temperature controller at the boiler work properly. Malfunction of these devices may cause stopping of gazification process in the pre-furnace or boiler damage.

• The device's earthing must be proved and certified. The terms of earthing reliability measurement should be as prescribed in the anti-fire regulations.

• All connections should be tight – emission of carbon monoxide or smoke is inadmissible.

• The room, where the AZSD is located should be dry, well illuminated and ventilated with natural airflow. Round about the device wooden grate or rubber insulation carpets should be laid. In the boiler room with natural (gravity) airflow funnel application of mechanical, force ventilation is prohibited.

• The device should be operated only with efficient automated anti-fire system (tank filled with water, reliable sensor and thermostatic valve).

• The boiler room must fulfill regulations described in the Polish Standard PN/B-02411. Heating. Build-in solid fuel boiler rooms. Requirements.

• In the AZSD’s room there must be an industrial safety and anti-fire instruction elaborated by the user; the instruction must mention all dangers possible during device’s operation.

5.1. Description and evaluation of residual risk

5.1.1. Description of residual risk

Although the MACHINERY WORKS „HAMECH” in Hajnówka take responsibility for design and structure of the device with regard to its safety, certain risk level during operation of the AZSD cannot be avoided.

Usually, the residual risk results from improper behavior of an AZSD operator.

The greatest risk appears during execution of following prohibited actions:

- presence of unauthorized persons in the vicinity of the device during its operation,
- during manipulation in the area of drive units during operation
- operation with opened covers
- cleaning of ash chamber without protection clothes

When presenting the residual risk the AZSD is treated as a device, which until the moment of its start-up is designed and manufactured according to the state-of-art.

5.1.2. Evaluation of the residual risk

If following recommendations are observed:

- careful acquaintance with the manual
- execution of all repairs of the electric system by an authorized electrician,
- inspection of the earthing system after repair of the electric system prior to operation,
- no unauthorized persons in the vicinity of operating machine,
- operation, maintenance and repair of the device only by properly trained personnel, who are acquainted with the manual,
- use of personal protection means: tight clothing, protection gloves, face protection etc.

the residual risk can be eliminated during operation of the AZSD without risk to people and environment.

5.2. List of warning and information signs for the AZSD.

The signs are permanently put onto the housing of the device; their location is shown on the fig.1. In the case of destruction / damage new signs can be delivered by the ZM HAMECH; together with the order give the description of the sign as in the Table 6 below.
<table>
<thead>
<tr>
<th>No.</th>
<th>Sign</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td><img src="image1.png" alt="Type plate" /></td>
<td>Type plate</td>
</tr>
<tr>
<td>2.</td>
<td><img src="image2.png" alt="Plate HAMECH" /></td>
<td>Plate HAMECH</td>
</tr>
<tr>
<td>3.</td>
<td><img src="image3.png" alt="Black letters, orange background" /></td>
<td>Plate AZSD</td>
</tr>
<tr>
<td>4.</td>
<td><img src="image4.png" alt="White sign, blue background" /></td>
<td>Prior to operation read the manual.</td>
</tr>
<tr>
<td>5.</td>
<td><img src="image5.png" alt="Black letters, yellow background" /></td>
<td>Sticker on the tank. Caution! Opened cover may cause fire.</td>
</tr>
<tr>
<td>6.</td>
<td><img src="image6.png" alt="Black symbols, yellow background" /></td>
<td>Plate „Risk of explosion”</td>
</tr>
<tr>
<td>7.</td>
<td><img src="image7.png" alt="White sign, blue background" /></td>
<td>Face protection</td>
</tr>
<tr>
<td>8.</td>
<td><img src="image8.png" alt="White sign, blue background" /></td>
<td>Hand protection</td>
</tr>
</tbody>
</table>
6. INDEX OF QUICK-WEARING PARTS

<table>
<thead>
<tr>
<th>No.</th>
<th>Unit Part</th>
<th>Drawing No.</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Drive unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clutch-safety device</td>
<td>ZS-01.14.00.00</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pre-furnace (retort)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Feeding channel section</td>
<td>ZS20-04.16.00.00</td>
<td>1</td>
<td>Stal H 25 T</td>
</tr>
<tr>
<td>3</td>
<td>Tube for AZSD-180, 250</td>
<td>ZS20-04.17.00.00</td>
<td>1</td>
<td>Stal H25 T</td>
</tr>
<tr>
<td></td>
<td>for AZSD-500</td>
<td>ZS50.01.08.00.00</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Heat-resistant screw</td>
<td>ZS11-01.08.00.00</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Heat-resistant nut</td>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

CAUTION!
The grate is not subject of warranty. The manufacturer, dealers or service dept can replace the grate for user’s cost.

6.A. Index of bearings:
- reduction gear ZS 6208 2Z, 6305, 6203, 6205 2RS
- fuel tank: AZSD-180, 250 and AZSD-500 - 32208
- feeder’s drive: bearing + housing FG 56206s

6.B. The device is powered with Skf-80 engines, 1440 rpm, rated at:
- AZSD-180, 250: 1 pc – 0.55 kW, 1 pc 0.75 kW
- AZSD-500: 1 pc 0.55 kW
- AZSD-1000: 2 pcs – 0.75 kW

6.C. For power transmission in the rotational feeder applied is a roller chain 19,05x11.68x12.07.

7. STANDARD EQUIPMENT

<table>
<thead>
<tr>
<th>No.</th>
<th>Unit or part</th>
<th>Quantity</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Set of quick-wearing parts as described in p. 6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Ash rake</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Operation manual</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
### 8. TYPICAL DEFECTS AND THEIR REMOVAL

<table>
<thead>
<tr>
<th>No.</th>
<th>Defect</th>
<th>Cause</th>
<th>Removal</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td><strong>Fuel tank</strong></td>
<td>Fuel stops</td>
<td>- movable shield does not rotate</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>- break or damage; the aerator is bent</td>
<td>- one shield tooth bent or broken. Remove the shield, weld new tooth in the place of the previous one</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- too humid fuel (freezes to walls in winter)</td>
<td>- weld new aerator or repair the damaged one (upper aerator wall should be distanced max. 10 mm from the tank wall)</td>
</tr>
<tr>
<td></td>
<td><strong>Worm conveyor</strong></td>
<td>Does not rotate</td>
<td>- no power supply to the motor</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>- clutch/safety device damaged</td>
<td>- find out the cause: blown fuse, damaged thermal safety device or controller – replace or repair damaged part</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- reduction gear damaged</td>
<td>- screw off the motor and replace the clutch</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- connection</td>
<td>- repair the gear (replace damaged tooth wheel)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- worm/reduction gear shaft damaged</td>
<td>- remove the gear from the motor and repair the connection (protect the screw against falling down from the reduction gear shaft)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- motor burnt</td>
<td>- repair or replace the motor</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- end switch pressed or damaged</td>
<td>- unlock or replace the motor.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- wiring damaged</td>
<td>- unlock (release) the switch lever or replace the switch.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- motor overload</td>
<td>- replace damaged cables.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- remove cause of overload and check operation of the thermal safety device.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- extinguish and cool down the chamber, clean the outlet and check fuel flow through the channel</td>
</tr>
<tr>
<td>2.</td>
<td>No fuel feeding</td>
<td>- no fuel in the tank</td>
<td>- complete the fuel</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- worm damaged feather</td>
<td>- remove the worm – repair feather</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- worm tip broken or damaged</td>
<td>- remove the worm, repair damaged tip</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- outlet clogged</td>
<td>- extinguish and cool down the chamber, clean the outlet and check fuel flow through the channel</td>
</tr>
<tr>
<td>III</td>
<td><strong>Reduction gear</strong></td>
<td>Overheated</td>
<td>- drive overload</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td>- oil level too low</td>
<td>- unlock the worm (clean the channel and the outlet)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- bearings damaged</td>
<td>- complete the oil (Hipol 15) to the level of the overflow plug (total capacity 1.7 l)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- tooothed wheel damaged</td>
<td>- find out, which bearing is damaged and replace it</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- improper oil</td>
<td>- replace damaged wheel (worn wheels replace pairwise)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- worn oil</td>
<td>- pour proper oil</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- remove worn oil, rinse the gearbox and pour new oil</td>
</tr>
<tr>
<td>2.</td>
<td>Too loud operation</td>
<td>- bearing damaged</td>
<td>- replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- tooothed wheel damaged</td>
<td>- replace</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- lack of oil or level too low</td>
<td>- complete or pour new oil</td>
</tr>
<tr>
<td>IV</td>
<td><strong>Pre-furnace</strong></td>
<td>Quick growing up of the coal deposit on the grate and chamber walls; flue channel throttled</td>
<td>- improper combustion process - too many impurities in the fuel - improper fuel</td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td>- adjust the process with controllers for optimum values</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- remove fuel and replace with pure one</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- do not burn coal, coke, plastic etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- remove coal deposits, clean the pre-furnace chamber (do not damage the lining)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>
|   | 2. The lining worn too quick | -improper preliminary heating of the chamber
-lining damaged mechanically (e.g. during cleanup)
-improper fuel |
|   |   | -repair the lining or make the new one with heat-resistant bricks laid on the mortar made of fire-resistant cement and “Boss” type filler |
| V | The whole AZSD unit |   |
| 1. Smoke sensed | -untight flange connections
-untight cover or cover seal damaged
-lining damaged
-untight fuel tank cover
-improper thrust in the funnel.
-untight flue and smoke channels. |
|   | -repair the connections using new seals (tighten well with screws). Tighten boiler inlet with fire-resistant mortar
-lay down the cover and fasten the butterfly nut.
-Replace the fire-resistant seal if necessary
-repair or make a new one of materials as in p. IV. 2.
-Close the tank with clamps. Replace the seal if necessary
-Clean up the funnel or flues, heighten the funnel or apply forced airflow
-seal up boiler flue and smoke channels |
| 2. Improper woodwaste gazification process in the chamber | -chamber temperature too low (should amount to 850-1000°C)
-fuel too humid (more than 60%)
-the end switch switches off conveyor’s drive too soon
-fuel humidified from untight anti-fire tank valve |
|   | -improper process of making fire. Making fire should be conducted so as chamber lining had light color. For this purpose burn dry fuel (humidity lower than 30%) during 6÷12 hrs. Continuously adjust times: pause and feeding - if the fuel quantity is too low, adjust the feeding time
-mix the fuel with portion of dry one
-excess fuel flap in the chamber improperly adjusted. Cool down the chamber and position the flap 45° from vertical in the gas exhaust direction
-chamber air inlet throttled. Rise the gate with the butterfly nut
-check valve tightness. Replace untight valve. To make sure, that there is no leakage, prove the water level continuously |
| 3. Boiler does not reach the set temperature | -improper combustion process in the pre-furnace chamber
-temperature set to lower value than required
-too great funnel thrust
-excess of secondary air.
-damaged temperature sensor switches combustion process to auxiliary cycle too soon
-damaged controller – controls combustion process improperly (puts out of order, switches auxiliary cycle) |
|   | -see p. V. 2
-set the sensor to higher value.
-decrease the thrust using flap mounted in the funnel flue.
-throttle back flaps for secondary air adjustment.
-replace the sensor.
-adjust the sensor (certified service personnel only) or replace it |
| 4. Damp emission in the boiler (water boils) | -adjustable temperature sensor does not work
-maximum temperature sensor does not work |
|   | -check if the sensor is fastened properly
-check the contact with the pipe
-check sensor’s electrical connection, repair if necessary, replace sensor if damaged
-check the controller’s answer for sensor signal (through a measurement bridge) |
5. The program set is not realized properly
- power supply fading
- controller damaged
- adjust programs: main and auxiliary on the control panel
- repair or replace the controller

6. Backfire goes to the fuel tank
- fuel is not fed (worm conveyor does not work)
- no fuel or fuel stopped
- find out the cause and remove it
- shake the fuel or complete it

7. Continuous backfire to the fuel tank
- conveyor damaged
- no power supply for the longer time
- sensor and anti-fire valve damaged
- no water in the tank
- find out the cause and remove it
- if the anti-fire sensor does not work, empty the fuel tank and extinguish fire in the conveyor’s housing with water
- replace the sensor and the valve
- pour water to the tank

9. LUBRICATION MANUAL

AZSD-180, 250, 500 fig.2

Lubrication points:
- the bearing in the movable shield mounted in the tank bottom; grease 2-3 times for a season
- connection reduction gear – feeder, grease every 10 days
- chain gear drive bearings, grease every month
- cover rotation sleeve, grease once a season

Elements of the worm gear (toothed wheels) require oil bath.
- oil type – Hipol 15
- oil capacity – 1,7 l, number of gears - 2
- replacement frequency – each 1000 hrs, first after 1000 hrs
- oil level – up to the overflow plug

AZSD-1000 fig.2A

Lubrication points:
- connection reduction gear – feeder, grease every 10 days
- chain gear drive bearings, grease every month
- fuel scoop drive pivot (inside the tank)

Elements of the worm gear (tooth wheel) require oil bath
- oil type – Hipol 15
- number of gears – 2, total oil capacity – 3,5 l
- replacement frequency – each 1000 hrs, first after 1000 hrs

CAUTION:
The worm gear is delivered after running-in and filled with oil protecting from corrosion. The buyer should check the oil level (and complete up to the overflow plug, if necessary) before first use.

10. CURRENT MAINTENANCE, REPAIR AND OVERHAUL
The AZSD is an energetic device for long-term operation. Device’s long life is possible only through observance of rules given in present manual and execution of inspections, repairs and overhauls as described below.
**Current inspections and maintenance**

- Because the device is fed with fuel in the form of small, granulated woodwaste, there is a risk of dust deposition on various parts of the device.
- The blow fan rotor is the part mostly exposed to the dust, thus stop the fan once a week and clean rotor blades.
- Polluted rotor works unequally (vibrates and makes noise) what may cause its damage; simultaneously fan efficiency drops thus combustion process is improper, regarding to the lack of indispensable air.
- During current maintenance do not forget to grease the movable shield bearing and complete the oil in the gearbox.
- During combustion process rest of the fuel (impurities + ash) will fall to the ashtray, thus clean up the ashtray once a day or more frequent depending to the used fuel.
- Additionally, during current inspection (which should take place every day) check if the set parameters are realized, wiring – not damaged (sparkling etc.), sensors and end switch work properly.
- It is indispensable to ensure that all connections are tight to avoid carbon oxide emission and fire propagation.
- Once a week check if the sensor with anti-fire valve works properly, check the water flow in the worm housing (e.g. with pressurized air). The water level should be at the upper edge of the tank and should be checked daily (replenish the water immediately).
- Once a week check the valve and thermostat; the way of making it is described in p. 11.

**Repairs**

Repairs are performed only if necessary. If during inspection any defect or damage will be found, repair or replace damaged part or unit.

**Overhaul**

Overhaul is a planned activity of the maintenance crew. It is recommended to conduct each type of the overhaul in following cycle:

- **P** – periodical inspection every 200 hrs
- **B** – current overhaul every 600 hrs
- **S** – medium overhaul every 6000 hrs
- **K** – general overhaul every 30000 hrs

- During periodical inspection check chamber and burner linings, condition of the furnace – mounted flap and its arm.
- Additionally, clean up deposits in the chamber.
- Check the drive gear, worm and movable shield in the fuel tank.
- During current overhaul perform all works resulting from periodical inspections, e.g. repair lining defects, adjust the worm or movable shield teeth, replace safety flap in the furnace.
- Medium overhaul should comprise, besides of all works as for the of current overhaul, replacement of bearings in the drive gear.
- General overhaul comprises such works as: exchange of chamber lining, channels’ sealing cover, regeneration or replacement of the worm, replacement of bearings in the drive gear, replacement of gear teeth if necessary.

**CAUTION:**

1. Each time the scope of works should be settled with regard to wear of parts or units.
2. All works (inspections, repairs and overhaul of boiler and controller) should be performed as described in appropriate manuals.
11. INSTALLATION OF THE ANTI-FIRE SYSTEM

Installation of the anti-fire system with a valve and a MMA thermostat (made in Sweden)

The valve with thermostat should be fastened to the connector of distribution pipes. Supply pipe should be screwed to the valve, then a hose put onto it (detail A on the fig. 1.7).

The range of set temperatures is as follows:

1 – 50°C
2 – 53°C
3 – 56°C
4 – 59°C
5 – 62°C
6 – 64°C
7 – 66°C
8 – 68°C
9 – 70°C

To set the temperature just turn the handwheel to one of a.m. numbers

To check the valve and the thermostat:
- empty the tank
- remove the valve from the anti-fire system
- set the handwheel to 1
- put the thermostat tip (sensor) into hot water (previously boiled)
- check the air flow in the valve blowing the air through it

The valve is efficient if the air flows free through it.

Check also the valve at various settings.
If at any of settings the valve is clogged (no air flow), replace it.

CAUTION!
Remove plastic cover before sensor will be fastened to the worm conveyor housing.
Fig. 1 AZSD-250 – general view
(location of warning & information stickers is also shown)

a-sign No.1, b-sign No.2, c-sign No.3, d-sign No.4, e-sign No.5, f-sign No.6, g-sign No.7, h-sign No.8, i-sign No.9, k-sign No.10

Description of signs is given on pp. 11 and 12
Fig. 1A AZSD-500 – general view
(location of warning & information stickers is also shown)
a-sign No.1, b-sign No.2, c-sign No.3, d-sign No.4, e-sign No.5, f-sign No.6, g-sign No.7, h-sign No.8, i-sign No.9, k-sign No.10, Description of signs is given on pp. 11 and 12
Fig. 1B AZSD-1000 – general view

(location of warning & information stickers is also shown)


a-sign No.1, b-sign No.2, c-sign No.3, d-sign No.4, e-sign No.5, f-sign No.6, g-sign No.7, h-sign No.8, i-sign No.9, k-sign No.10, Description of signs is given on pp. 11 and 12
Fig. 1C. AZSD-180 – general view
(location of warning & information stickers is also shown)
a-sign No.1, b-sign No.2, c-sign No.3, d-sign No.4, e-sign No.5, f-sign No.6, g-sign No.7, h-sign No.8, i-sign No.9, k-sign No.10
Description of signs is given on pp. 11 and 12
Fig. 1.1 Worm conveyor

Fig. 1.2. Pre-furnace

a - grate, b - fuel excess flap, c - secondary air, d - primary air, e - fuel feed worm
Fig. 1.3. Excess fuel control in the pre-furnace chamber

Fig. 1.4. Air control in the pre-furnace

Caution!
Primary air control (under the grate) is realized through adjustment of the slot with a fan shutter (see fig. 1.5.)

a,b - secondary air; c,d-primary air; e,f-secondary air fan (only for AZSD-1000);
Fig. 1.5. Connection blow fan – pre-furnace

a-fan shutter

Fig. 1.6. Worm conveyor drive
Fig. 1.7. Anti-fire system

a – water tank
b – unscrew the screw every 10 days, check the flow
c – prior to installation of the sensor remove the plastic cap
d – sensor
1. Inlet pipe       2. Thermostat MMA
Fig.2. General lubrication plan AZSD-180, 250, 500

- grease LT4S
- oil Hipol 15
Fig. 2A. Lubrication plan AZSD-1000

- grease LT4S

- oil Hipol 15
Fig. 3. Fastening and adjustment of stand feet AZSD-1000

- **a** - locating pin K800AC,
- **b** - nut M12 5,8-B-ZN PN/M82144
- **c** - fastened element (stand foot)
- **d** - foundation (concrete)
<table>
<thead>
<tr>
<th>No.</th>
<th>Part</th>
<th>Qty</th>
<th>Material</th>
<th>Size</th>
<th>Standard No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Upper housing</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Lower housing</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Worm</td>
<td>1</td>
<td>0533-400-0071</td>
<td>for AZSD 180, 250,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0533-400-0072</td>
<td>for AZSD 500, 1000</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Worm wheel</td>
<td>1</td>
<td>0533-400-0067</td>
<td>for AZSD 180, 250</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0533-400-0065</td>
<td>for AZSD 500, 1000</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Shaft + screw-toothed wheel</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Screw-toothed wheel</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Outlet shaft</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Cover I</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Cover II</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Flange connection</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Motor connection</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Driver I</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Driver II</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Clutch</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Space ring</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>Space washer</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.</td>
<td>Electric motor</td>
<td>1</td>
<td>0.55kW n=1440rpm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Bearing</td>
<td>2</td>
<td>6208 2Z</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.</td>
<td>Bearing</td>
<td>2</td>
<td>6305</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20.</td>
<td>Bearing</td>
<td>1</td>
<td>6205 2RS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.</td>
<td>Bearing</td>
<td>1</td>
<td>6203 2RS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.</td>
<td>Sealing ring</td>
<td>1</td>
<td>B25x40x10</td>
<td>PN/M-86960</td>
<td></td>
</tr>
<tr>
<td>23.</td>
<td>Sealing ring</td>
<td>1</td>
<td>B40x62x10</td>
<td>PN/M-86960</td>
<td></td>
</tr>
<tr>
<td>24.</td>
<td>Retainer ring</td>
<td>1</td>
<td>25z</td>
<td>PN/M-85111</td>
<td></td>
</tr>
<tr>
<td>25.</td>
<td>Retainer ring</td>
<td>1</td>
<td>17z</td>
<td>PN/M-85111</td>
<td></td>
</tr>
<tr>
<td>26.</td>
<td>Plug</td>
<td>2</td>
<td>M16x1,5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27.</td>
<td>Prismatic key</td>
<td>1</td>
<td>A8x7x30</td>
<td>PN/M-85005</td>
<td></td>
</tr>
<tr>
<td>28.</td>
<td>Prismatic key</td>
<td>2</td>
<td>A6x6x20</td>
<td>PN/M-85005</td>
<td></td>
</tr>
<tr>
<td>29.</td>
<td>Prismatic key</td>
<td>1</td>
<td>A8x7x40</td>
<td>PN/M-85005</td>
<td></td>
</tr>
<tr>
<td>30.</td>
<td>Screw</td>
<td>12</td>
<td>8.8-B</td>
<td>M8x25</td>
<td>PN/M-82105</td>
</tr>
<tr>
<td>31.</td>
<td>Screw</td>
<td>8</td>
<td>8.8-B</td>
<td>M8x20</td>
<td>PN/M-82105</td>
</tr>
<tr>
<td>32.</td>
<td>Screw</td>
<td>4</td>
<td>8.8-B</td>
<td>M6x20</td>
<td>PN/M-82105</td>
</tr>
</tbody>
</table>
Controller SE-4/E – operation manual

The SE-4/K controller is a device controlling drive units of ovens AZSD-180,250 and 500. Combustion process is controlled in such way so as to keep the required heating medium temperature at coupled boiler. The SE-4/K controller has been installed in a plastic box with transparent, opened doors. All controlling and signalling elements as well as electrical safety devices are place behind the door. Main voltage switch is located on the right-hand side of the box.

Controller operation
Operation of the SE-4/K controller consists in feeding fuel to the pre-furnace and controlling the operation of blow fan for adjustment of burning process. The fuel is given in batches; their volume and frequency is adjusted by setting fuel feeder working time and pause time on the front panel.

Control panel
On the panel located are: the temperature controller and four signaling devices for (from left to right):
- overheat i.e. heating medium has reached the temperature of 95°C
- disconnection of the end switch
- fan operation
- conveyor operation

Controller operation
Operation consists in adjustment of boiler temperature and work/pause times; these times should be estimated experimentally so as during work cycle long, constant flame runs out from the flue. Time settings for auxiliary cycle should ensure feeding of 1/3 – 1/4 of fuel in comparison to work cycle. It is recommended that auxiliary fans work continuously – during both work and auxiliary cycles.

The main control element of the of the SE4/E controller is a microprocessor temperature controller MRT01. It is equipped with a 4-key keyboard and a illuminated alphanumeric display (2 x 16 digits). The most important features of the controller are:
- temperature measurement within the range 0 – 99°C with help of enclosed sensor
- temperature adjustment within the range 20 – 95°C with step 1°C
- hysteresis: 5°C
- feeding time adjustment (for intensive & auxiliary combustion) within the range 1 to 99 s
- pause time adjustment (for intensive & auxiliary combustion) within the range 1 to 250 s

When activated, the controller measures the temperature with help of the sensor and sets the operational mode. Exemplary display view is shown below:

Temp: 40°C  70°C  
Int.b: 5s  9s

In the upper line displayed is the measured and the set temperature. In the lower line displayed is the controller working mode – here “intensive combustion” and times of feeding and pause respectively. When the required temperature is reached the controller switches to auxiliary combustion. Exemplary view is shown below:

Temp: 72°C  70°C  
Aux.B: 2s 120s

All controller operation parameters i.e. required temperature, feeding time, pause time are stored in the permanent EEPROM memory. During the first start-up the controller utilises
factory settings. Change of those parameters is possible by pressing the key „SET” once, what causes entering into the setting mode. Following message is displayed:

Required temp.:  
70°C

The value in the lower line can be increased with the „∧” key or decreased with the „∨” key. Single short pressing of each key causes increase / decrease of the value by 1. Pressing and keeping of the key for more than 2 seconds causes activation of so-called quick mode. Acceptance of set value is realized through single pressing of the „SET” key, what simultaneously causes entering into the mode of setting of the feeding time for intensive combustion.

Intens. burning  
Feed: 5s

Change of value of feeding time is realized in the same way as for temperature. Acceptance of set value is realized through single pressing of the „SET” key, what simultaneously causes entering into the mode of setting of pause time for intensive combustion. Exemplary display view is shown below:

Intens. burning  
Break 9s

Similarly as in above examples the value can be changed with „∧” and „∨” keys. After confirmation of the pause time for intensive combustion with „SET” following message appears:

Aux. burning  
Feed 2s

As above the value can be changed with „∧” and „∨” keys. After confirmation with „SET” appears window for setting of the pause time for auxiliary. The message on the display is as follows:

Aux. burning  
Break 120s

After entering the new value and pressing „SET”, the controller enters into operation mode with new parameters set as above by the user.

Application of the „VIEW” key: single pressing of the key while in working mode causes displaying for ca. 2 s of parameters for auxiliary combustion, when the controller is set to intensive combustion and inversely.

If within 10 s the controller does not receive a signal from the sensor, it switches over to so-called emergency mode. This causes that the temperature value of 40°C will be stored into memory and on the base of this temperature the controller working mode will be set. It is worth to mention that the emergency mode is not the normal operation mode of the controller and if activated it is necessary to take steps to eliminate the arisen defect.

Safety devices
Overload of the scraper drive motor or of the fuel conveyor causes breakdown in its operation. Localize the reason, remove it and switch on the safety device of respective motor again.

Overheating of the boiler above 95°C causes stop of the blow fan and fuel feeder. When the temperature drops, the device will resume operation.

Excess fuel inside the furnace will cause activation of the end switch situated on the side wall of the unit, which stops fuel feeding until the excess fuel will be burnt out.
Then the oven will resume normal operation. If the excessive feeding repeats, decrease the quantity of fuel on the digital controller.

**List of spare parts**

<table>
<thead>
<tr>
<th>Part</th>
<th>Cat. No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal sensor for SE-4/E</td>
<td>04-0 ZS20-05.02.00.00/C</td>
</tr>
<tr>
<td>Installation breaker S301C1</td>
<td>1115-310-0018</td>
</tr>
<tr>
<td>Motor breaker GZ1-M10 4-6,3A</td>
<td>1115-230-0009</td>
</tr>
<tr>
<td>Contactor DIL 00M/22-24AC</td>
<td>1115-293-0004</td>
</tr>
<tr>
<td>Transformer TSZZ 25/006/M1 2x12V</td>
<td>1158-141-0005</td>
</tr>
<tr>
<td>End switch LM-10D</td>
<td>1115-291-0032</td>
</tr>
<tr>
<td>Temperature controller.MRT01</td>
<td></td>
</tr>
<tr>
<td>Signaling module</td>
<td></td>
</tr>
</tbody>
</table>

**Installation of the temperature sensor**

During start-up of the AZSD the proper installation of the temperature sensor is the thing of great importance. The sensor should have possibly best contact with the heating element. In the case of the AZSD unit coupled with the KWH boiler the sensor should be installed on the side wall of the water collector of the boiler (see fig. 1S). Prior to installation clean the contact surface thoroughly. Now, unscrew 4 screws and remove the sensor cover and fasten the sensor housing to the boiler collector with two screws. Finally screw the cover to the housing.

![Fig. 1S Fastening of the temperature sensor to the water collector](image-url)

a- temperature sensor, b- screw M4x12
Product: Zespół Spalania Rozdrobnionego Drewna

Type AZSD.................................
Serial.................................
Controller serial & type...........................
Reduction gear motor serial............................
Manufacturing date........................................
Dispatch date........................................
Sale date........................................

........................................
stamp & signature Quality Dept

........................................
point of sale – signature & stamp

COMPLAINT FORM

Mr (Mrs)........................................
Address........................................
Warranty card No........................................
Product type & serial........................................
Purchase date........................................
Start-up date........................................

Short description of the defect........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
........................................
WARRANTY CONDITIONS

1. The manufacturer is obliged to repair for his own cost any physical defect revealed during warranty period.
2. The warranty period lasts 12 months from the sale date.
3. The manufacturer ensures the warranty service term of 14 days from the complaint date.
4. The warranty period will be lengthened by the time of repair, counting from the complaint date to the date of the repair’s finish, if the defect has made the device out of order.
5. The manufacturer takes no responsibility resulted from the warranty in following cases:
   a) mechanical damages arisen after commissioning of the device to the user,
   b) improper assembling, maintenance and operation (not conformable with the operation manual),
   c) repairs conducted by unauthorized personnel without manufacturer’s agreement,
   d) introduction of structure changes without written manufacturer’s agreement,
   e) defects resulted from force majeure
   f) if the buyer has not informed the manufacturer in the 14-days term, that the device is not complete.
6. All adjustment and maintenance works, as well as replacement of parts, which should be performed by the user as described in the manual, are not warranty repairs.
7. Following parts are not the subject of warranty: sawdust feeder, cast iron grate, PVC clutch
8. The warranty card is valid if contains dealer’s sign, stamp and date of sale.
9. A copy of the warranty card can be issued if the buyer submits any document of purchase.
10. If the complaint was groundless all costs bears the buyer.
11. The complaint should contain:
    a) warranty card number
    b) product name, type and serial
    c) sale date
    d) address and place of installation of the product
    e) type of defect and probable cause. Lack of a.m. data causes the complaint void. As the date of complaint acceptance recognized will be date of completion of data
12. Complaint should be submitted in written according to enclosed complaint form. In urgency the complaint may be submitted by phone. User should record the time of the talk and the name of the person, which accepted the complaint. The phone complaint should be confirmed in written a.s.a.p.
13. Any contention not regulated in present warranty card is subject of The Civil Code regulations, Art. 577-581.

Caution!

Be acquainted with the operation manual before operation,
In the case of lack of the warranty card user has no right to repairs for manufacturer’s cost.
CONFORMITY DECLARATION
No. 1/AZSD/04

Product: WOODWASTE COMBUSTION UNIT.
Type: AZSD: -180, -250, -500, -1000

Serial............................ Manufacturing year............................... 

Thereby we responsively declare that the product being the subject of present declaration is conformable with following standards and other normative regulations:

- Directive 98/37/EU /Decree of the Ministry of Economy, Labor and Social Policy dated on 10.04.2003r. for basic requirements for machinery and safety elements (Dz.U.Nr 91, pos. 858 dated on 23.05.2003r.)
  including the standard:

- Directive 73/23/EU/ Decree of the Ministry of Economy, Labor and Social Policy dated on 12.03.2003r. for basic requirements for electrical devices (Dz.U.Nr 49, pos. 414 dated on 24.03.2003r.)
  including the standard:

The present conformity declaration becomes void if the woodwaste combustion unit AZSD will be modified or rebuilt without our consent.

Hajnówka, 21.06.2004r.

........................................}