

# Installation and Operating Instructions

ThermoSphere Slimline Electric Flow Boiler with Pump

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## 1. General

These instructions contain basic information about the design and operation of ThermoSphere Slimline Electric Flow Boilers (TSEFB) and define the rules for operation. Indicated is the sequence of installation and connection, and the technique of tuning. Possible problems and recommended solutions are also given. Before installing the TSEFB and its introduction into service, carefully read this manual, as proper installation, configuration and maintenance of the TSEFB will ensure its safe and reliable operation for a long period. TSEFB is not intended for use by persons (particularly young children) with disabilities or lack of experience and knowledge, except if in the immediate presence of the supervisory staff or the person responsible for their safety, the necessary instructions for using the device have been given. Authorized personnel must supervise young children to prevent them from playing with the device. Adhere to the requirements of these instructions and store it for later use.

1.1 TSEFB is intended for heating the heat carrier (treated water) in the space heating system with forced circulation of heat carrier. The rated pressure of heat carrier (water) in the system must be no more than 0.2 MPa (2 bar). The minimum gauge pressure before the circulation pump (backwater) must be 0.01 MPa (0.1 bar). TSEFB have been manufactured for use in residential and other areas of this type for regions with moderate and cold climates.

1.2 TSEFB is recommended to operate in the premises with the following working values of climatic factors:

Atmospheric pressure 84 ... 107 kPa (630 ... 800 mm Hg)

Temperature 10 °C - 35 °C (the limiting values - 5 °C - 40 °C);

Relative humidity 60% at 20 °C.

The indoor air must be free of dust, as well as aggressive and flammable gas and vapour.

1.3 In the operation of the TSEFB, one must regularly watch its operation.

Avoid installation of TSEFB at sites without people who control the condition and operation of the equipment.

1.4 TSEFB is manufactured in accordance with the requirements of TU 28.2-31402141-001-2001.

1.5 An example of designation of the wall mounted electric water heater: TSEFB-P4.5,

where TSEFB-P is the symbol, 4.5 = nominal power in kW.

## 2. Specifications

2.1 Main technical data on TSEFB shown in Table 1, and a circuit diagram - in Figure 3. 4.

2.2 TSEFB heats the heat carrier for the heating system using tubular heating elements (THE).

2.3 TSEFB design provides adjustment of heat carrier heating temperature within the allowable range and its automatic support with a deviation bandwidth ranging from 4 °C to 8 °C.

2.4 In terms of the protection against electric shock, TSEFB belong to class 1. Degree of Protection - IP22.

Table 1 - Main Technical Parameters

| Indicator  | Meaning               |                      |                   |              |             |                |             |  |
|--|-----------------------|----------------------|-------------------|--------------|-------------|----------------|-------------|--|
| Power Consumption  | Electrical            |                      |                   |              |             |                |             |  |
| Rated Supply Voltage (V)   | 230/400               |                      |                   |              |             | 400            |             |  |
| Mains Current Frequency (Hz)   | 50                    |                      |                   |              |             |                |             |  |
| Nominal Power Consumption (KW)   | 4.5                   | 6                    | 9                 | 12           | 15          | 18             | 24          |  |
| 1st level  | 1.5/ 1.5              | 2/2                  | 3                 | 4            | 5           | 9              | 12          |  |
| 2nd level  | 3/1.5                 | 4/2                  | 3                 | 4            | 5           | 9              | 12          |  |
| 3rd level  | -/1.5                 | -/2                  | 3                 | 4            | 5           | -              | -           |  |
| Heater Type  | THE                   |                      |                   |              |             |                |             |  |
| Efficiency (%)   | 95                    |                      |                   |              |             |                |             |  |
| Heat Carrier Maximum Temperature (°C)  | 80                    |                      |                   |              |             |                |             |  |
| Nominal Pressure MPa (bar)   | 0.2 (2)               |                      |                   |              |             |                |             |  |
| Tank Nominal Capacity (L)  | 2.0                   |                      |                   |              |             |                |             |  |
| Connection Pipes (inch)  | G $\frac{3}{4}$       |                      |                   |              |             |                |             |  |
| Circulation Pump   | WILO                  |                      |                   |              |             |                |             |  |
| Max weight (KG)  | 14                    |                      |                   |              |             | 22             |             |  |
| Overall Dimensions (mm)<br>Height x Length x Depth   | 755 x 215 x 150       |                      |                   |              |             | 755 x 355 x150 |             |  |
| Copper Wire Cord Sectional Area (mm <sup>2</sup> )   | 2x4/3x1.5 +<br>+1x1.5 | 2x6/3x2.5+<br>+1x2.5 | 3x2.5 +<br>+1x2.5 | 3x4 +<br>1x4 | 3x4+<br>1x4 | 3x6+1x4        | 3x6+1x<br>4 |  |
| Opening Line Circuit Breaker, Two/Four-Pole, In, A<br>(intercontact air gap must be at least 3 mm for each pole) | 25/10                 | 32/13                | 20                | 25           | 32          | 40             | 50          |  |

### 3. Configuration

3.1 Configuration is presented in Table 2.

Table 2

| Name                          | Quantity |
|-------------------------------|----------|
| Electric Water Heater (TSEFB) | 1        |
| Operating Instructions        | 1        |
| Packing                       | 1        |

3.2 Cables and other supporting materials required for installation and external connection are not supplied.

### 4. Safety

4.1 This TSEFB model takes into account the international level of protection from the dangers caused by the electrical, mechanical, thermal effects, possible ignition or radiation during normal operating conditions according to the instructions.

4.2 It is forbidden to carry out maintenance and repair of TSEFB connected to the power supply circuit. In accordance with the installation rules, the circuit breaker (see Table 1) must be installed in the fixed wiring, which is guaranteed to provide a single action off all poles from the mains.

4.3 Before energising TSEFB, check it for any damage that threaten lives and health, and also check the integrity of the grounding conductor and reliability of its contact with the ground terminal. Check the serviceability of the mains and its voltage.

4.4 Attention! Do not turn on TSEFB if not filled with water, closed valves (no water circulation) and in the case of possible freezing of water in the heating system and TSEFB. Do not use water from the heating system for food and household needs.

4.5 To avoid violations of the strength and integrity of the heating system and TSEFB with a possible increase of the internal pressure, it is imperative to install the pressure-limiting safety valve to the heating system in a convenient place for the user when installing TSEFB (included in the package). If the feed water pressure is above 3.0 bar, the feeding line must have a reducer.

4.6 It is strictly forbidden to establish isolation valves between TSEFB and the security group (expansion tank, safety valve, air valve, etc.).

4.7 Do not leave operating TSEFB unattended for a long time.

4.8 **Attention!** To prevent accidents, all work on the installation, connection, repair and maintenance of TSEFB must perform only qualified professionals who have the competence and authority for their conduct.

### 5. Design and Operation Principle

5.1 TSEFB consists of individual nodes placed in steel parallelepiped housing (see Figure 2). The housing perceives stress, which occurs during operation and transportation.

5.2 TSEFB basic elements: a tank - steel rectangular container, thermally insulated on the outer surface with steel pipes (threaded) for connecting the heat carrier to the tank and draining it into the heating system with installed THE; power light, temperature controller; drainage system; heating switches; a thermomanometer, a circulation pump. The tank has a biased-off thermostwitch limiting heating temperature in the anomalous mode. After sufficient cooling, heating switches automatically. For assembly work and visual inspection, remove the front cover. To audit or replacement parts using the drainage system coolant is drained from the boiler.

5.3 The TSEFB principle of operation is as follows. Cold water is pumped through the lower tube in the tank, where it is heated by the THE and enters the heating system through the top outlet pipe. The thermostat, the handle of which is located on the front panel, sets the supply water temperature. The desired temperature is maintained automatically with a deviation within the band (4 - 8) °C. Electricity consumption economy mode is selected using the "Heating" key and the thermostat handle.

## 6. Preparing for Operation and Operation Order

6.1 TSEFB wall installation, connection to the heating system and testing should be performed by qualified personnel in compliance with the requirements of the project and all the installation and operation rules. Before connecting TSEFB, thoroughly rinse away any dirt from the heating system.

### **ATTENTION!**

**Protective connection to Earth required.**

**Check all wiring connections including factory connections before switching on.**

**Water must be treated with the correct concentration of inhibitor.**

**Failure to follow these instructions will void the product warranty.**

Forced circulation of water through TSEFB provides a circulation pump.

The heating system (see Figure 1) must have the pressure relief valve ( $P_{max} = 1.5 P_{nom} = 3 \text{ bar}$ ).

**ATTENTION! Lack of pressure relief valve and damage during installation can lead to failure of the boiler under abnormal operating conditions.**

6.2 Remove the front panel by unscrewing the mounting screws, place TSEFB on the wall vertically in the prepared place and outline two metal mounting anchor bolts (mounting holes shown in Fig. 2).

Pushing TSEFB aside, drill in the wall 8 mm holes per marking to a depth of at least 35 mm, put into the holes anchor bolts and secure them by spreading out the metal collet (tightening the nut).

Before final installation, check the load bearing capacity of bolts and wall (taking into account the weight of TSEFB with water). Set TSEFB on anchor bolts and secure with lock nuts M6 through spring washers.

Connect TSEFB to the heating system, connect the power cable with the grounding conductor in accordance with the marking (F, N, PE/A, B, C, PE). Conduct an external inspection of parts to identify and resolve problems.

6.3 After verifying that the heat carrier is in the heating system and the integrity of the system, turn TSEFB on in the following order: Set the thermostat handle to the position that corresponds to the maximum temperature (turn fully clockwise), check voltage and turn on the opening line circuit breaker supplying power to TSEFB (the housing network lamp lights up) and consistently (at intervals of 3-5 s) push key of heating mode switches: 1, 2, 3. This enables THE, and the water warms up. Check the heating and circulation of the carrier.

6.4 The flow temperature on the thermometer is set by a handle of thermo-controller and corresponding heating stage key. Subsequent operation of TSEFB is in automatic mode, and the desired temperature is maintained constant with possible deviations within the band (4 - 8) °C.

6.5 To turn TSEFB off, it is necessary to turn the thermostat knob counter-clockwise until it stops (position corresponding to  $t_{min}$ ), disable "Heating" keys and in (3 - 5) min the automatic circuit breaker in the fixed wiring.

## 7. Maintenance

7.1 Prior to commissioning, as well as two hours after the start and periodically, at least once a month, you need to check the reliability of fastening of wires, cables, tightening of threaded connections. If necessary, tighten connections, avoiding damage that affect the subsequent use of TSEFB.

7.2 A company that performs installation and maintenance of TSEFB must be experienced, trained or licensed to perform this work.

7.3 Servicing TSEFB is allowed to persons who have studied the operating principle, structure, mode of operation, and have been instructed in safety and got admission to perform this type of work.

7.4 For the operation of apparatus and components of a heated system without damage due to deposits of scale and sludge or corrosion of metal, the circulating water and feed water used should be suitably treated. Indicators of water quality must meet the following requirements: the total hardness less than 20 uEg/kg, the contents of mechanical impurities and suspended particles in the water are not allowed. Ways to treat water, which guarantees the fulfilment of these requirements must be selected by the owner or specialised organization (project or maintenance).

7.5 Periodically check the operation of the safety valve, i.e., check water drain at least 1 time in 6 months.

## 8. Storage

8.1 Before operating, TSEFB must be placed indoors in packaged form. Room temperature 5 °C - 40 °C, relative humidity 60% at 20 °C. The indoor air should not have aggressive and flammable vapours and gases.

8.2 Keep unwrapped TSEFB at repair stations only for the period of repair.

8.3 TSEFBs must be transported in closed vehicles (cars, containers, wagons, and the like).

8.4 Ambient temperature during transportation: from minus 10 to plus 50 °C, relative humidity 60% at 20 °C.

8.5 Packaging and apparatus after use shall be delivered to wastepaper and scrap metal stations.

## 9 Possible Malfunctions and Remedies

Table 3

| Name of malfunction  | Probable cause   | Remedy  | Note   |
|--|--|---|--|
| At power on, network indicator light is not lit                    | 1) No power supply.<br>2) Faulty lamp.   | Check the presence of voltage.<br>Replace the faulty component.           | Replacement and validation performed by a specialist   |
| When enabled keys 1, 2 and 3, TSEFB does not reach the rated power | 1) Low power supply.<br>2) Faulty THE.<br>3) Open circuit.   | Check power supply.<br>Replace THE.<br>Reactivate the circuit.            |  |
| Low carrier temperature in the heating system devices              | 1) TSEFB thermal power is insufficient to compensate for high losses of heat from the premises.<br>2) There is no circulation of heat carrier. | Align TSEFB thermal power and heating system<br><br>Check the circulation | Technical and economic assessment carried out by a specialist<br><br>Validation performed by a specialist. |

## 10 Certificate of Acceptance and Selling

Electric Water Heater TSEFB- \_\_\_\_\_

Serial number \_\_\_\_\_

Passed acceptance tests, meets the requirements

TU 28.2-31402141-001-2001 and found serviceable.

Date of Manufacture \_\_\_\_\_ Date of Sale \_\_\_\_\_

Controller \_\_\_\_\_ Signature \_\_\_\_\_

QCD Stamp Stamp

Price

## 11 Manufacturer's Warranty

This product is protected by a 2 year manufacturers guarantee against material or manufacturing defects when installed in line with the instructions. ThermoSphere warranty covers replacement parts or product only. See ThermoSphere warranty terms and conditions for full details.

**Figure 1** - Recommended schematic diagram of the heating system

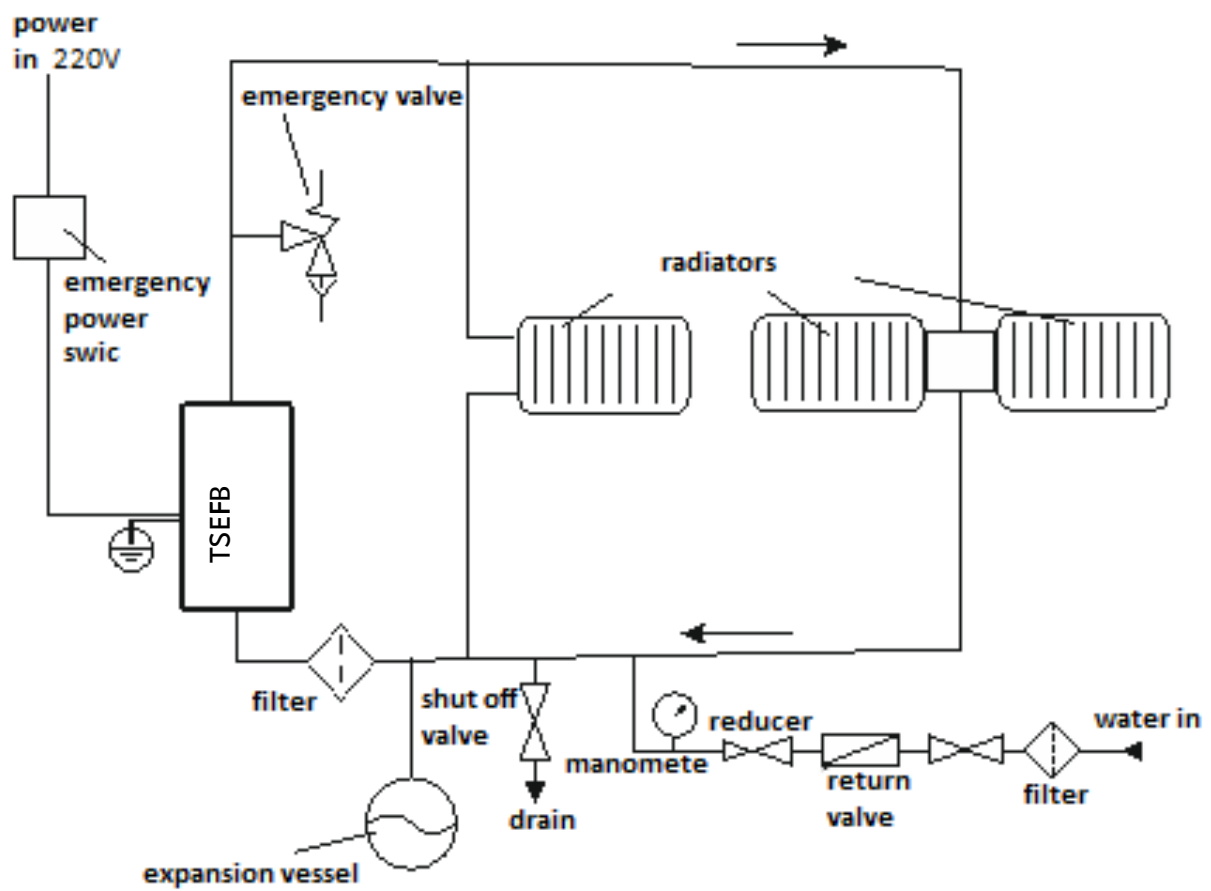
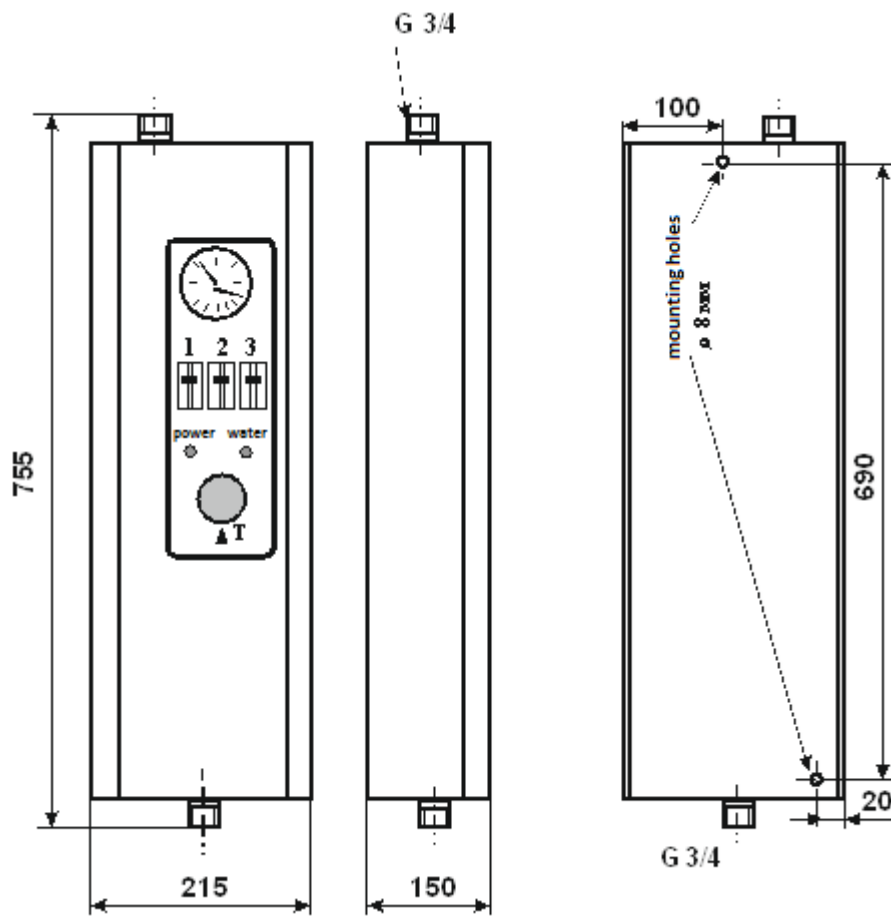
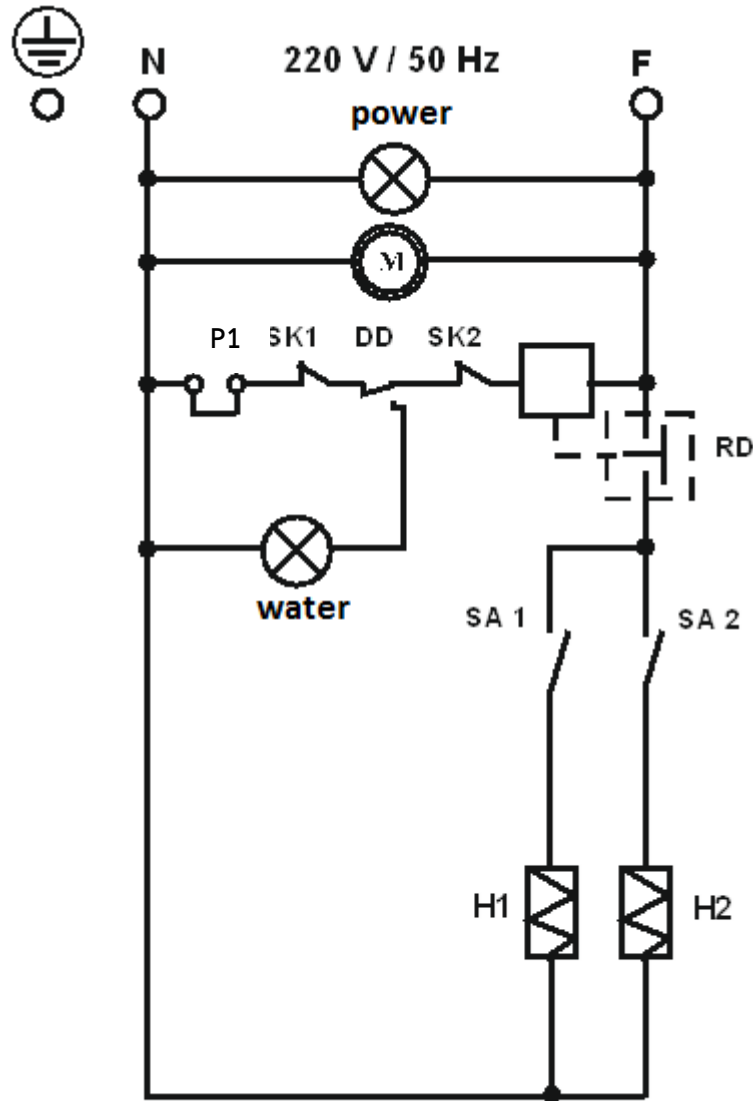


Figure 2 – TSEFB Dimensions



**Figure 4** - Circuit Diagram 230V Single Phase



- MP1 Contactor RD 25 40
- H1 THE heater
- H2 THE heater
- SK1 Thermal switch biased-off contact (thermal protection)
- SK2 Thermostat contact
- SA1 Heating switch 1
- SA2 Heating switch 2
- P1 Jumper (Remove jumper when connecting to a Thermostat)



Figure 4 - Circuit Diagram 400V Three Phase

