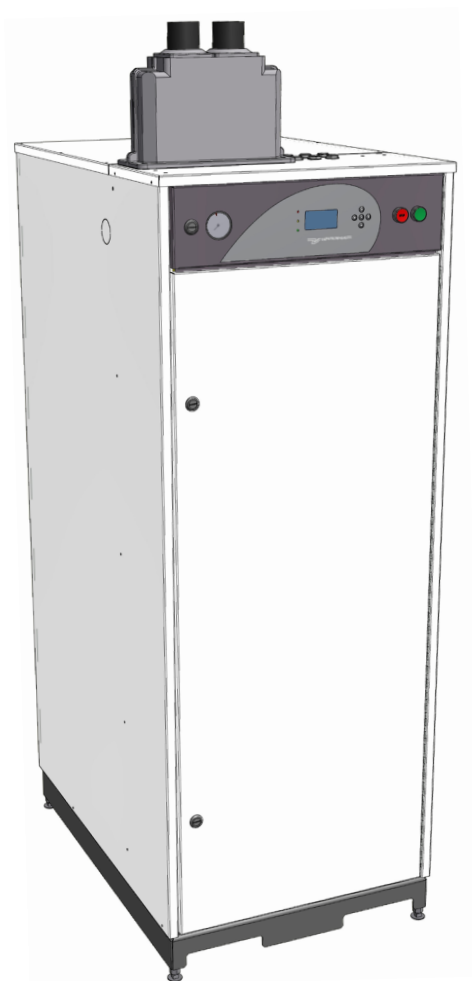


***Installation and maintenance***  
***EP TL series***  
***7 and 15-stage electric boilers***  
***31 - 300 kW***



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Accelerate delay		Over temperature			
Ext. pwr limit		Water level			

# Notes

**To be completed when the boiler is installed!**

7-stage, EP	<input type="checkbox"/> 31	<input type="checkbox"/> 42	<input type="checkbox"/> 52	<input type="checkbox"/> 63	<input type="checkbox"/> 70	<input type="checkbox"/> 84	<input type="checkbox"/> 98	<input type="checkbox"/> 119			
item no.	5631	5632	5633	5634	5635	5636	5637	5638			
15-stage,	<input type="checkbox"/> 67	<input type="checkbox"/> 90	<input type="checkbox"/> 99	<input type="checkbox"/> 112	<input type="checkbox"/> 135	<input type="checkbox"/> 150	<input type="checkbox"/> 180	<input type="checkbox"/> 225	<input type="checkbox"/> 255	<input type="checkbox"/> 270	<input type="checkbox"/> 300
EP item no.	5639	5640	5641	5642	5643	5644	5645	5646	5647	5648	5649

Serial number ..... Date of installation .....

Plumber .....

Tel .....

Electrician .....

Tel .....

Other, .....

## Settings

Installed power	.....	kW	Number of stages	.....		
Load switch	<input type="checkbox"/> yes <input type="checkbox"/> no		Main fuse	.....	A	
Primary transformer	.....	(xxxx/5)	Current limit	.....	A	Margin ..... A
External temperature setpoint	<input type="checkbox"/> no	<input type="checkbox"/> 0 - 10 V	<input type="checkbox"/> 0 - 5 V	<input type="checkbox"/> 4 - 20 mA		
External stage limit	<input type="checkbox"/> no	<input type="checkbox"/> 0 - 10 V	<input type="checkbox"/> 0 - 5 V	<input type="checkbox"/> 4 - 20 mA		
	Max. limit	.....	°C	Min. limit	.....	°C

## UTK - heating curve

P1	$T_{\text{outside}} = 20$	°C	P7	$T_{\text{outside}} = -10$	°C
P2	$T_{\text{outside}} = 15$	°C	P8	$T_{\text{outside}} = -15$	°C
P3	$T_{\text{outside}} = 10$	°C	P9	$T_{\text{outside}} = -20$	°C
P4	$T_{\text{outside}} = 5$	°C	P10	$T_{\text{outside}} = -25$	°C
P5	$T_{\text{outside}} = \pm 0$	°C	P11	$T_{\text{outside}} = -30$	°C
P6	$T_{\text{outside}} = -5$	°C	Temperature adjustment		°C


# Safety and handling


- Read these instructions carefully before installation and operation!  
Keep the instructions in the boiler!
- Check that the boiler has not been damaged during transport. Report any transport damage to the carrier.
- Check that the delivery is complete.
- All installation must be performed by an authorised person in accordance with the existing regulations.
- Risk of electric shock. Never leave the boiler door open!
- Never disable the safety equipment!
- The boiler must never be switched off electrically unless the heating system is full and the boiler vented.
- Correct installation in combination with correct adjustment and continuous service will produce high operational reliability and good heating economy.
- The boiler must not be modified, changed or converted in any way.
- Only authorised persons may work on the boiler.
- Disconnect the boiler from the power supply and lock the switches before service/repairs.
- Never carry out maintenance work/service on


pressure-bearing parts when they are pressurised.

- The boiler may not be used by children or people with physical or mental impairments. Nor by children/people who lack knowledge of the boiler. Children may not play with the boiler or connected accessories.
- Always contact your installation engineer for service.
- The type and production number of the boiler must always be specified when contacting Värmebaronen. See the boiler's rating plate.
- Värmebaronen AB reserves the right to change the specification, in accordance with its policy of continuous improvement and development, without prior notice.
- Subject to amendments and printing and proof-reading errors.  
Images and figures may deviate from the actual product.

The following icons are used in these instructions to indicate important information:

 **Information that is important for optimum operation.**

 **Tells you what you should or should not do to avoid personal injury.**

 **Tells you what you should or should not do to avoid a component, the boiler, a process or the environment being damaged or destroyed.**

 **Electrical hazard!**

## Operation

Electric boilers for heating systems or industrial processes; the series comprises 19 boilers with outputs from 31 to 300 kW.

The boilers are operated using 7 or 15 power stages and can be restricted to a single power stage.

When the boiler is used with a heat pump, it is an advantage to have many stages as the boiler can switch in at low output in support.

In a process, it may be more suitable to have fewer stages so that the boiler immediately connects higher output.

The boilers' standard control range is 20-95°C.

**The electric boiler is CE marked as a unit and is classified as pressure equipment according to Directive 2014/68/EU, Article 4(3).**

**The electric boiler can be supplied with factory-fitted safety equipment, reviewed by an accredited body according to EN 12828.**

**Final examination, under national laws, verifying that the electric boiler has the necessary safety equipment must be carried out by an accredited body when assessing the monitoring interval for the electric boiler.**

**The factory-fitted safety equipment contains safety valve(s), high-pressure switch and automatic vent valves.**

**Double circulation pumps and flow guards are not required. The boiler can cope with zero flow from a safety perspective.**

**A steam-collecting vessel is not required. The safety valves are fitted directly on the boiler's safety pipe.**

### With or without outdoor temperature compensation

The boilers are supplied with control to maintain a constant boiler temperature. An outdoor temperature compensator is available as an option for variable supply line temperature.

### Temperature control in secondary circuit

When used with, for example, a heat exchanger, the temperature in the secondary circuit can control the boiler. This is an option.

### Series connection for greater power

If more power is needed, two boilers can be controlled in series. This is an option.

### Cooling fan

The boiler may be fitted with cooling fan(s) with air filters for

use in areas with high temperatures or a dusty atmosphere.

### Safety

The boilers have a load-break switch that is acted on via shunt release by the boiler's temperature relay or by external safety equipment.

### Operational reliability

The boilers are fitted with float switches and earth fault measurement, which provides an early indication of any faults in the immersion heaters, so that faults can rapidly be dealt with, without unplanned stoppages.

### Pump maintenance operation

Connection for a circulation pump with a pump maintenance operation function.

### External stage and power control

Connection for external blocking, 0 - 5 V, 0 - 10 V and 4 -20 mA control of power.

### External temperature setpoint

Connection for external setpoint in the form of 0 - 5 V, 0 - 10 V and 4 - 20 mA signal.

### Output signal for present power and temperature

0 - 10 V signals for the number of power stages connected and boiler temperature.

### Load guard

Protects the main fuses; secondary transformers are supplied with the boiler.

### Alarm indication

Alarms are indicated on the boiler's control panel. Connection for external indication of a buzzer alarm, alternating potential-free relay output.

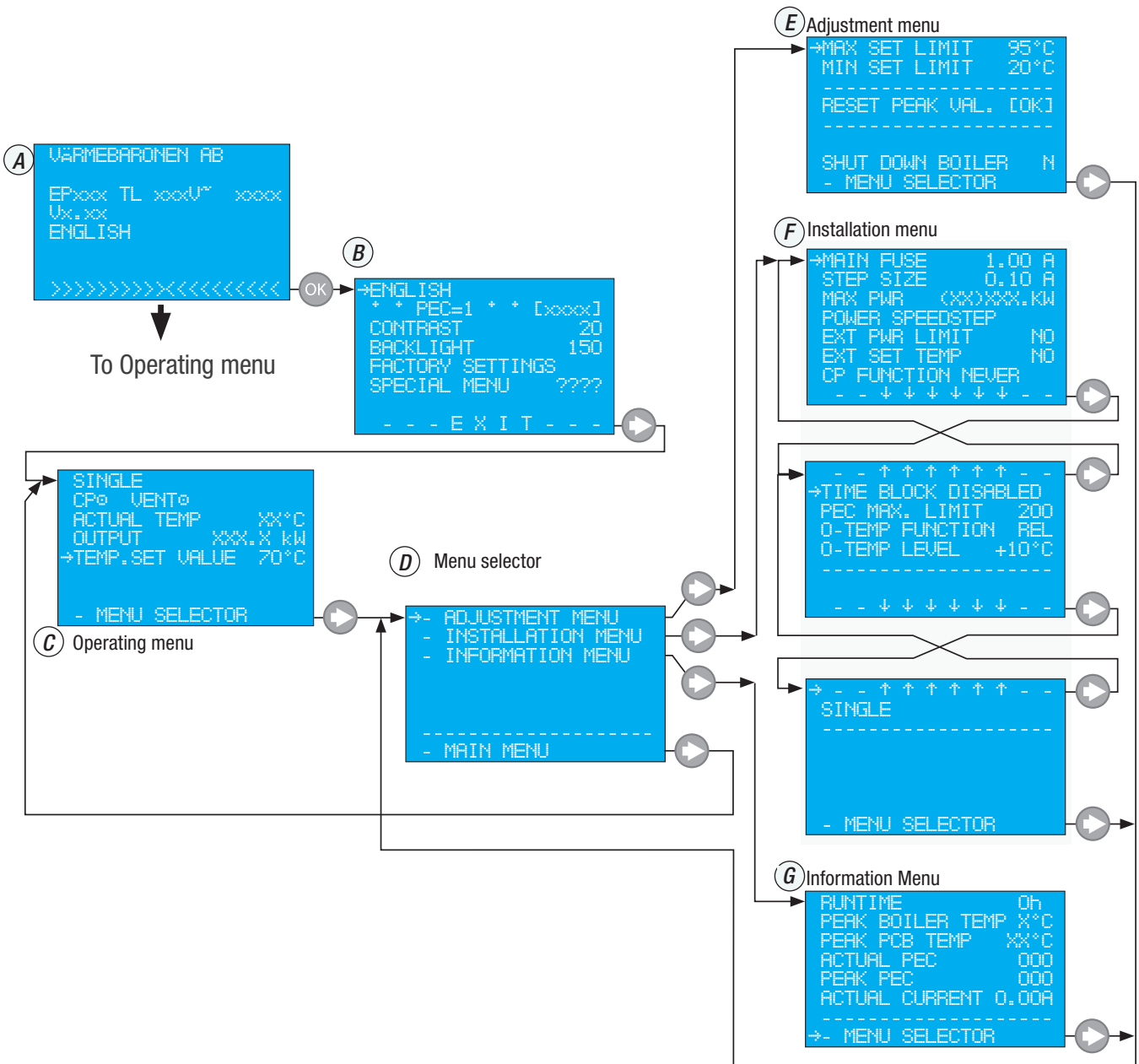
### Aluminium and copper

To facilitate installation, the boilers are fitted with terminals that make it possible to connect both aluminium and copper cables. No splicing from aluminium is required.

### Stainless steel immersion heaters

The immersion heaters are made of stainless steel.

# The menu, standard



Change the content with / .

Leave the line with .

## Menu options

When the power is switched on for the boiler's electronics, window A is displayed.

If is pressed when the arrows in the bottom line move in towards the centre, window B will be displayed. If is not affected, Operating menu C is opened, which displays the boiler temperature, connected power and temperature set point.

An index arrow to the left on the line indicates that it contains information that can be changed.

/ moves the index arrow between the lines.

selects the current line.

A screen with the Menu selector, D is opened by moving to the bottom line with and pressing there.

From this you can access the adjustment menu, installation menu and information menu, or return to the operating menu.

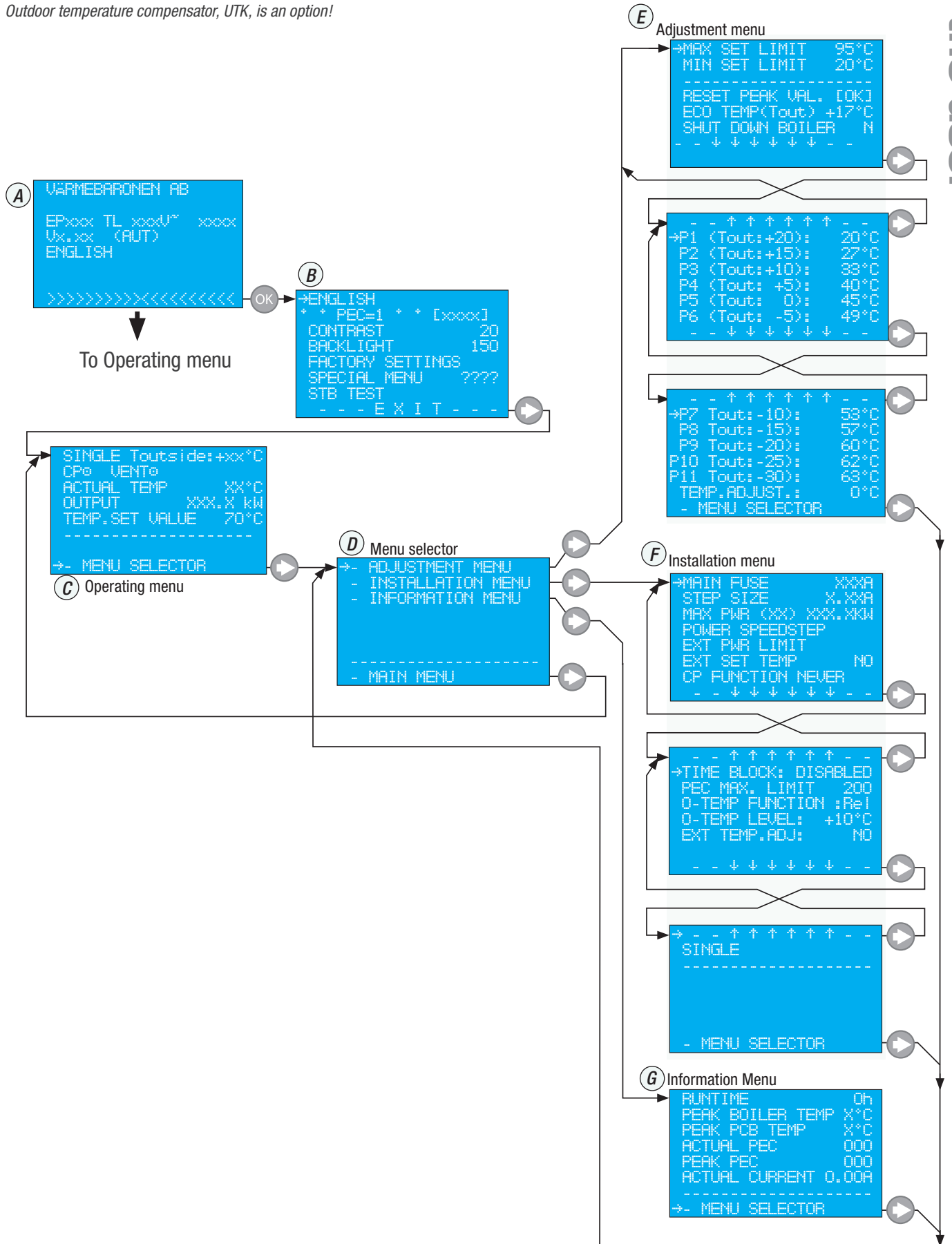
The procedure is the same function in the other menus.

Displayed as follows:

- - - E X I T - - - To the operating menu with
- - ↑ ↑ ↑ ↑ ↑ ↑ - - To the previous window with
- - ↓ ↓ ↓ ↓ ↓ ↓ - - To the next window with
- MENU SELECTOR To the menu selector with

# Menus - with outdoor temperature compensation (UTK)

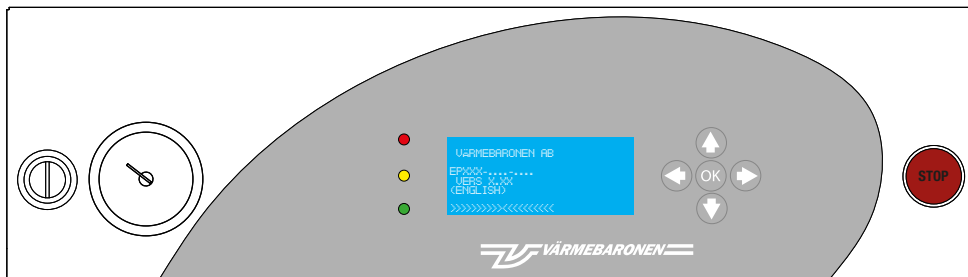
Outdoor temperature compensator, UTK, is an option!



for the user

# Operation and maintenance

## Control panel



### red indicator

Off: normal.

Flashing: serious fault.

The display shows the cause when  is pressed.

### yellow indicator

Off: normal.

Flashing: warning.

The display shows the cause when  is pressed.

### green indicator

On: normal.


Flashing: something is preventing power increase/decrease.

The display shows the cause when  is pressed.




Breaks the power supply to the boiler by tripping the boiler's load-break switch.

The voltage to the control circuit is not broken!

 moves the index arrow upwards, between the lines containing parameters that can be changed.


Set/change the content with the UP/DOWN arrow.

Parameters with a large setting range have a fast move function when the button has been pressed for a while.


 moves the index arrow downwards between the lines containing parameters that can be changed.

Set/change the content with the UP/DOWN arrow.

Parameters with a large setting range have a fast move function when the button has been pressed for a while.

 Press the RIGHT arrow to select the highlighted line. Set/change the content with the UP/DOWN arrow.

 -

 Confirms a change and jumps back to the current menu. Changes made take immediate effect when you press OK.

### Display

Shows status, alarms, etc. The display returns to the Operating menu a minute after any button has been pressed.

### Manometer

Shows the water pressure in the boiler/heating system.





# Operating menu, Adjustment menu

## Operating menu

```
SINGLE Toutside xx°C
CP⊕ VENT⊕
ACTUAL TEMP xx°C
OUTPUT 000.0 kW
→TEMP SET VALUE 70°C

- MENU SELECTOR
```

SINGLE

“SINGLE”, information, changes with series operation, option.

CP⊕ VENT⊕

CP⊕ : pump in operation.

CP : flashing, pump paused.

See 'CP function' in the installation menu.

VENT⊕ : cooling fan in operation.

VENT : cooling fan paused.

ACTUAL TEMP 50°C

Information, current boiler temperature.

OUTPUT 000.0 kW

Information, current connected power.

→TEMP SET VALUE 70°C

Setting, desired boiler temperature, 20 - 95°C, setpoint. The setting range is affected by max. and min. limits.

## Adjustment menu

```
→MAX SET LIMIT 95°C
→MIN SET LIMIT 20°C
-----
RESET PEAK VAL. [OK]
-----
SHUT DOWN BOILER? N
- MENU SELECTOR
```

→MAX SET LIMIT 95°C

→MIN SET LIMIT 20°C

Max. and min. limits of the range for setting the boiler's temperature setpoint.

Max-limit: 55 - 105°C.

Min. limit: 20 - 50°C.

RESET PEAK VAL. [OK]

Resetting all the high values in the information menu.

SHUT DOWN BOILER N

Set boiler to standby mode (switched off).

# Adjustment menu - with outdoor temperature compensation (UTK)

## Adjustment menu - boiler with UTK - Window one

```

->MAX SET LIMIT 95°C
->MIN SET LIMIT 20°C
-----
RESET PEAK VAL. [OK]
ECO TEMP(Tout) +17°C
SHUT DOWN BOILER N
- - ↓ ↓ ↓ ↓ ↓ ↓ - -
    
```

```

->MAX SET LIMIT 95°C
    
```

```

->MIN SET LIMIT 20°C
    
```

Setting range for temperature setpoint.

Max limitation: 50 - 105°C.

Min. limit: 20 - 45°C.

```

RESET PEAK VAL.? [OK]
    
```

Resetting values in the information menu.

```

ECO TEMP(Tout) +17°C
    
```

Lowest temperature at which no heating is required. All boiler power disconnected; circulation pump stops.

Alternative `->CP FUNCTION ECO` in the Installation menu must be selected for the ECO-function to be active and for temperature setting to be carried out

```

SHUT DOWN BOILER? N
    
```

Set boiler in standby position (switched off).

## Window two

Setpoint at outdoor temperature:

```

- - ↑ ↑ ↑ ↑ ↑ ↑ - -
20°C -> P1 (Tout: +20): 20°C
15°C -> P2 (Tout: +15): 27°C
10°C -> P3 (Tout: +10): 33°C
5°C -> P4 (Tout: +5): 40°C
0°C -> P5 (Tout: 0): 45°C
-5°C -> P6 (Tout: -5): 49°C
- - ↓ ↓ ↓ ↓ ↓ ↓ - -
    
```

## Window three

Setpoint at outdoor temperature:

```

- - ↑ ↑ ↑ ↑ ↑ ↑ - -
-10°C -> P7 Tout: -10): 53°C
-15°C -> P8 Tout: -15): 57°C
-20°C -> P9 Tout: -20): 60°C
-25°C -> P10 Tout: -25): 62°C
-30°C -> P11 Tout: -30): 63°C
TEMP.ADJUST.: 0°C
- MENU SELECTOR
    
```

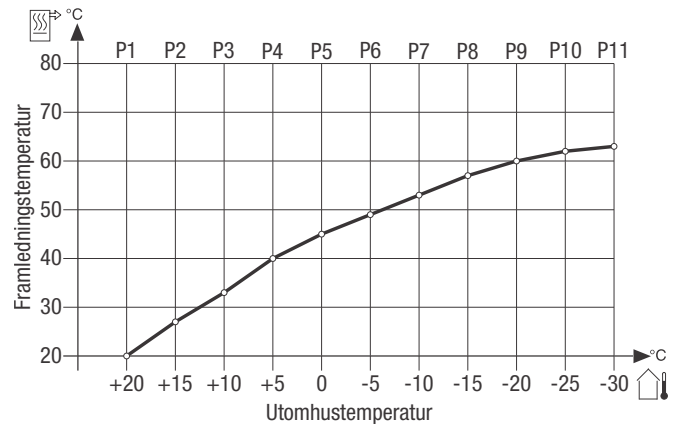
```

->TEMP. ADJUSTMENT 0°C
    
```

Alternative temperature, against normal temperature, ± adjustment of setpoint, parallel displacement.

The change is affected by a contact function connected to terminal block J2, see point 32 "Control circuit".

## Heating curve



Each setpoint, P1 - P11, is adjustable over the range 20 - 80°C

# Installation menu

## Window one

```

→MAIN FUSE      1.00 A
STEP SIZE      0.10 A
MAX PWR (XX)  XX.XkW
POWER SPEEDSTEP
EXT PWR LIM    →CURRENT LIMIT X.XxA
EXT SET TEMP   CURRENT MARGIN X.XxA
CP FUNCTION    MAX PWR (15) XX.XkW
              POWER SPEEDSTEP
              EXT PWR LIMIT    NO
              EXT SET TEMP    NO
              CP FUNCTION     NEVER
              - - ↓ ↓ ↓ ↓ ↓ ↓ - -
  
```

The two upper lines of the window vary with the load guard's measurement method.

### Load guard with secondary measurement EP 70 - 300

```

→CURRENT LIMIT X.XxA
→CURRENT MARGIN X.XxA
  
```

Setting values are calculated, for example:

- Main fuse: 160 A
- Current transformer: 200/5 (custom xx:5A)
- Boiler, EP 90: 6 kW/stage/8, 7 A. See "Technical data".

### Current transformer conversion ratio

$$\frac{200}{5} = 40$$

### Current limit

$$\frac{\text{size of main fuse}}{\text{Current transformer conversion ratio}} = \frac{160 \text{ A}}{40} = 4$$

### Margin

$$\frac{\text{size of power stage in Amps}}{\text{Current transformer conversion ratio}} = \frac{8.7\text{A}}{40} = 0.22$$

### Load guard with direct measurement EP 31 - 63

```

→MAIN FUSE XXXA
  
```

Main fuse: size of the fuse to be protected  
50 - 63 - 80 - 100 - 125 - 160 - 200A

```

→STEP SIZE X.XkW
  
```

Stage size: defined in the boiler model; cannot be changed.

7-stage boiler →MAX PWR (7) XX.XkW

15-stage boiler →MAX PWR (15) XX.XkW

Number of power stages the boiler is to work with. The selected number of stages is displayed in brackets. See stage size in Technical data.

```

→ POWER SPEEDSTEP
  
```

Quick power ramping in connection with checks and acceleration of the delay when it is active. If the delay is active, the display shows. →ACCELERATE DELAY

Release the button and press it again if you want quick increase/decrease.

```

→EXT PWR LIMIT NO
  
```

Stage limit with external signal, 0-100% of selected power, "Max. POWER".

- NO: internal limit.
- 0-5V: limit with 0 - 5 V.
- 0-10V: limit with 0 - 10 V or potential-free blocking.
- 4-20mA: limit with 4 - 20 mA.

```

→EXT SET TEMP NO
  
```

Temperature setpoint via external signal.

- NO: internal setpoint.
- 0-5V: nominal value with 0 - 5 V (0-170° C).
- 0-10V: nominal value with 0 - 10 V (0-170° C).
- 4-20mA: setpoint with 4-20 mA (0 - 170°C).

```

→CP FUNCTION NEVER
  
```

Operating method for circulation pump supplied with power by the boiler:

- NEVER: no pump operation/pump switched off
- AUTO: The pump starts before power is connected and stops one minute after all power has stepped out. If the pump is not in operation, it is run once daily. In the event of over temperature, the pump starts and is in operation until the over temperature situation ends, even if all power is disconnected.

ALWAYS: Pump always in operation.

ECO: Only with UTK, option.  
Pump stop with maintenance operation, when the outdoor temperature meets the set temperature according to →ECO TEMP(Tout) 17°C in the Adjustment menu

# Installation menu

## Window two

```

- - ↑↑↑↑↑↑↑ - -
→TIME BLOCK DISABLED
PEC M ---- ↑↑↑↑↑↑↑ ----
0-TEMP →TIME BLOCK DISABLED
0-TEMP PEC MAX. LIMIT 200
----- 0-TEMP FUNCTION Rel
--- ↓ 0-TEMP LEVEL +10°C
      EXT. TEMP ADJ NO
- - ↓↓ ↓↓ ↓↓ ↓↓ ↓↓ - -

```

```
→TIME BLOCK ENABLED
```

Limits power connection after a power cut which has lasted longer than three minutes. See 'Delayed power connection' under 'Operation and maintenance', options:

Switched off: no function.

Activated: delayed power connection.

```
→PEC MAX. LIMIT 200
```

Limit value, 0 - 500 quality factor, for PEC function alarm.

```
→0-TEMP FUNCTION Rel
```

```
→0-TEMP LEVEL +10°C
```

Over temperature function:

Rel: over temperature, 5 - 15°C, relative to setpoint.

Abs: absolute value for over temperature , 105 - 106°C

Temperature level for the over temperature function, range:

5 - 15°C when relative to setpoint is selected.

35 - 105°C for absolute temperature.

```
with UTK →EXT. TEMP ADJ NO
```

Will the function be used with closing or open contact, alternative:

No = function is not used

J2 = 0 open contact

J2 = C closed closed

See TEMP ADJUSTMENT in the adjustment menu - with outdoor temperature compensation, OTC

## Window three

```

- - ↑↑↑↑↑↑↑ - -
SINGLE
-----
- MENU SELECTOR

```

```
SINGLE
```

Information, changes with series operation, option.

## Information on the menu

```
RUNTIME          0 h
PEAK BOILER TEMP XX°C
PEAK PCB-TEMP   XX°C
ACTUAL PEC      000
PEAK PEC        000
ACTUAL CURRENT  XX.XA
-----
->- MENU SELECTOR
```

```
RUNTIME          0 h
```

The time in hours for which the electronics were powered.

```
PEAK BOILER TEMP XX°C
```

The highest boiler temperature since the electronics were last switched on.

```
PEAK PCB-TEMP   XX°C
```

The highest temperature of the relay circuit board since the electronics were last switched on.

```
ACTUAL PEC      000
```

```
PEAK PEC        000
```

Result of leakage current measurement. The value, 1 - 500, is a quality factor, i.e. the lower the value the better.

```
ACTUAL CURRENT  XX.XA
```

Requires the load guard current transformer to be installed. The displayed current is the highest loaded phase. Shown current value is what the secondary transformer, 1 - 5 A, measures. The actual current value is obtained by multiplying the read off value by the primary transformer's conversion ratio.

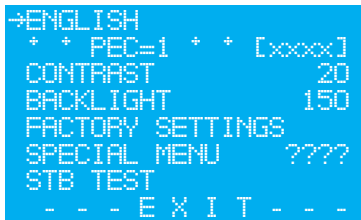
# General menu

This menu is only available on start after the electronics have been without power.

Press **OK** when this screen is shown, while the arrows in the bottom row disappear towards the centre.



This window will then be displayed:



Language selection.



PEC = 0

PEC = 1 PEC function active.

PEC = 0 PEC function disabled.

See “HIGH EARTH CURRENT, PEC!” Under “Alarm - warning - information”.

The function is not reactivated automatically after a power cut.

(XXXX)

Information to manufacturer.



Adjusting window contrast.



Adjustment of the backlighting of the window.



Reset to factory setting.

YES = OK

NO = OTHER BUTTON



Manufacturer settings.



Only boiler with OTC function. Used to control the boiler's thermostats.

# Operation and maintenance

## Power connection

The boiler uses binary power increase. By connecting and disconnecting the three or four power groups, seven or fifteen stages are obtained. Only fifteen-stage boilers have power group four.

## Restart after power cut

The boiler restarts automatically after a power cut.

## Delayed power connection

See **→DELAY** **CLOSED** in the Installation menu.

Power connection can be time restricted after a power cut longer than three minutes. When the delay is active, the green indicator on the control panel flashes. Information may be shown in the display. The delay can be temporarily disabled. See the Installation menu.

When the boiler is restarted after a power cut, if necessary 1/3 of the power is connected immediately, 1/3 after 20 minutes and the remainder 40 minutes after the power has returned.

## Quick increase/reduction

For quick increase/reduction, see the Installation menu. Increase/reduction can be limited by temperature, load guard or the permitted number of power stages.

## Load guard

The load guard protects the main fuses against overload by reducing the boiler's power. When the overload ceases, the power is reconnected.

## PEC function

The boiler has earth fault measurement, PEC, which indicates any fault in the immersion heaters at an early stage. This function can be used to remedy any fault without unplanned stoppages.

The break value for the PEC function can be set.

## Safety valves

To maintain the safety function, the heating system's safety valves must be operated regularly.



**Control voltage is not broken by the load-break switch! External voltage may occur.**

## Over temperature protection

To supplement the thermostats, the control electronics has over-temperature protection. The aim of this is to prevent the thermostats from being tripped where possible. The protection disconnects all power in the event of a temporary temperature increase that may occur as a result of reduced flow following a pump stoppage, for example.

## Maintenance



**After 500 hours of operation, the cable connections must be tightened with a torque wrench.**

Check the power cables' connections every 2 years.

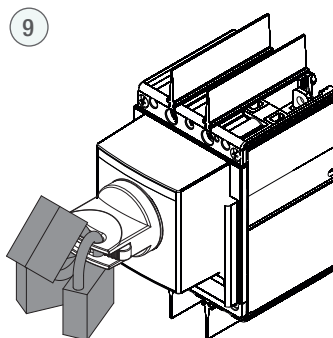
## Cooling fan

The fan is equipped with a dirt filter, which must be inspected regularly to prevent clogging. The interval depends on the environment the boiler is installed in, but at least once a year. Contaminated filters may lead to downtime.

## Draining



**Always cut the power to the boiler and lock the switch before draining the water!**



*The switch version varies with the boiler model*

## Venting - water pressure

Regularly check that the water pressure is correct. Air may be left in the system for a while after installation, for which reason it should be vented a few more times.



**The pressure in a heating system varies with the temperature. Do not add water unnecessarily!**




# Operation and maintenance

## Controlling power from heat pumps with binary outputs

If the function is used, "Ext STAGE LIMIT" in the installation menu must be set for 0-10V!

Electric boilers with power from 31 to 119 kW are supplied with a function, that permits a heat pump with three bit binary 230V~ output to control the boiler's power connection. Three bit binary gives seven power combinations, which means that a fifteen stage boiler will increase by two stages at each change.

 **The temperature setpoint of the boiler is set to the highest permitted temperature in the system!**

The electric boiler can be disconnected from the heat pump control by means of a switch; see "Control circuit" point 14, in position

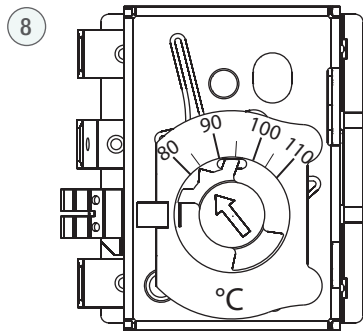
EP: the electric boiler is controlled by its own temperature control.

VP: the electric boiler is controlled by the heat pump.

## Checking thermostats

Stop the flow through the boiler.

Adjust the break temperature to 80°C, on the back of the thermostat.



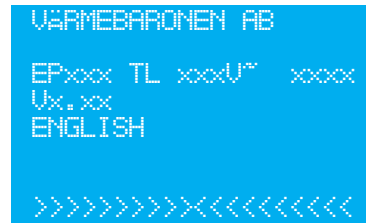
### Standard boiler:


Adjust the boiler temperature setpoint to 90°C.

When the boiler temperature reaches the break temperature, the thermostats should be triggered together with the load break switch.

### Boiler with UTK:

Press the STOP button so that the load break switch trips. Reset the load break switch so that this window is displayed:



Press  when the arrows on the bottom row point towards the middle, so that this window is displayed:



Activate the function by selecting:



This window will then be displayed:



When the boiler temperature reaches the break temperature, the thermostats should be triggered together with the load break switch.

Do not forget to readjust the thermostat break temperature to 105°C when inspection is finished.

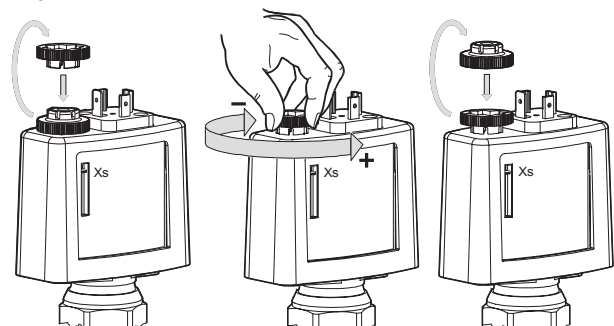
The break temperature must not be set lower than the boiler temperature control's highest temperature!

### Pressure guard(s) - option

High pressure switch: Set so that the trigger pressure is between the boiler's normal operating pressure and the safety valves' opening pressure.

Low pressure guard: Set the trigger pressure slightly below system pressure when the system is not heated.

### Adjustment




# Alarm - warning - information

At the same time as one of the indicators, red, yellow or green, is flashing, the bottom line of the window alternates between:

→ - MENU SELECTOR

and

PRESS OK FOR INFO

When  is held down, the cause of the flashing indicator is shown.

## Red indicator flashing - Alarm

Buzzer alarm via output pt 25 in "Control circuit".  
Requires action and manual reset.

### R1 TEMP SENSOR J1

Cause: Short-circuit, interruption or not connected.  
Pt100 boiler temperature sensor (option) J1, point 31 in "Control circuit!".  
Action: Check, replace.

### R2 TEMP SENSOR J2

Cause: Short-circuit, interruption or not connected.  
Pt100 temperature sensor (option) J2, point 32 in "Control circuit".  
Action: Check, replace.

### R3 TEMP SENSOR J12

Cause: Short-circuit, interruption or not connected.  
Boiler temperature sensor J12, point 27 in "Control circuit".  
Remedy: Check, replace.

### R4 TEMP SENSOR J14\* J9/3

Cause: Short-circuit, interruption or not connected.  
Temperature sensor, J14+J9/3, option, in secondary circuit at secondary control, point 29 in "Control circuit".  
Action: Check, replace.

### R5 TEMP SENSOR J13

Cause: Short-circuit, interruption or not connected.  
Temperature sensor cooling fan, option, J13, point 28 in "Control circuit".

Action: Check, replace.

### R6 TEMP SENSOR J3

Included only in boiler with outdoor temperature compensator.  
Cause: Short-circuit, interruption or not connected.  
Outdoor temperature sensor, J3, point 35 in "Control circuit".  
Action: Check, replace.

### R7 TEMP SENSOR, POWER

Cause: Short-circuit or interruption.  
Temperature sensor on power circuit board.  
Action: Check, replace power circuit board

### R8 TEMP SENSOR, PANEL

Cause: Short-circuit or interruption.  
Temperature sensor on panel circuit board.  
Action: Check, replace panel circuit board

### R9 HIGH PEC

Cause: The PEC value is higher than the break limit set.  
Action: Check Current PEC value in the Operating menu  
Highest PEC value, Information menu  
PEC alarm limit in Installation menu.  
If the current PEC value is higher than the alarm limit when no power is connected, there is no fault in the boiler.  
The alarm limit should then be raised approximately 50 above the highest measured PEC value. The external earth fault should be identified and remedied.  
If the current PEC value is lower than the alarm limit, the fault may be in the boiler. Check:  
- Acknowledge the alarm by cutting the control voltage for 10 seconds.  
- Increase boiler power while reading off the current earth fault value.  
- Check the insulation of each immersion heater in the power group issuing the PEC alarm to find out which immersion heater is faulty.  
- If the boiler works normally when power is connected without tripping a PEC alarm, the earth fault is external.  
If the cause is not due to the boiler, the PEC function may be temporarily deactivated. See "General Menu".

### R10 HIGH TEMP, POWER

Cause: High power circuit board temperature.

## Alarm - warning - information

Action: Check the cause, the permissible ambient temperature is  $\leq 30^{\circ}\text{C}$  or  $40^{\circ}\text{C}$  for boilers with fans (option).  
Make sure the cooling fan air filter is not blocked.

### R11 HIGH TEMP, PANEL

Cause: High temperature of panel circuit board.  
Action: Check the cause. The permissible ambient temperature is  $\leq 30^{\circ}\text{C}$ .  $40^{\circ}\text{C}$  for boilers with fans (option).  
Make sure the cooling fan air filter is not blocked.

### R12 LOW WATER LEVEL, TANK

Cause: Low water level in the boiler  
Action: Check the cause, add water and vent the system.

### R13 SEE MANUAL

Cause: A guard, high, low or temperature, has tripped without the power switch being tripped.  
Action: Check the cause.

### Yellow indicator flashing - warning

Automatic reset once the cause has ceased.

### Y1 PEC

Cause: Increasing PEC values.  
Action: See R9, High earth current, PEC.

### Y2 OVER TEMPERATURE

Cause: The boiler temperature is higher than the boiler temperature value.  
Action: Check that the boiler has sufficient flow and that all necessary valves are open.  
Check the setting for over temperature.

### Y3 WATER LEVEL

Cause: Variations in the signal from the boiler's level sensor.  
Action: Check the cause, add water and vent the system.

### Green indicator flashing - information

Something is preventing power increase/decrease. Automatic reset when the cause has ceased.

### G1 DELAY

Cause: Delayed power connection after restart after power cut.

### G2 LOAD GUARD

Cause: Load guard limits power increase/decrease.

### G3 EXT ANALOGUE PWR LIM.

Cause: The boiler's power increase/decrease is limited by an external setpoint or stage limit.

### G4. MIN/MAX LIMIT

Cause: The boiler temperature is restricted by a min or max limit.

# Alarm - load-break switches and safety guards

*When a guard in the safety circuit is triggered, the display shows which guard(s) have been triggered.*

*The boiler's load-break switches are always triggered when a guard is triggered.*

*An alarm from the boiler buzzes and a red indicator flashes on the boiler panel.*



**Always check the cause of a guard being triggered!**

**If the guards are triggered repeatedly, the cause must be remedied!**

Reset must take place in the order displayed in the window!  
Depending on the cause, the following may be displayed:

```
ACTUAL TEMP    70°C

SWITCH IN 0 POSITION
OR TRIGGERED

PUT SWITCH IN ON
POSITION
```

```
ACTUAL TEMP    70°C

SWITCH @ TEMP. GUARD
ARE TRIPPED

RESET 1. TEMP. GUARD
      2. LOAD-BREAK
```

The following windows can be displayed if the boiler has additional pressure guard(s).

```
ACTUAL TEMP    70°C
SWITCH @ TEMP. GUARD
@ H-PRESSURE GUARD
ARE TRIPPED

RESET 1. TEMP. GUARD
      2. H-PRESSURE
      3. LOAD-BREAK
```

```
ACTUAL TEMP    70°C
SWITCH @ TEMP. GUARD
@ L-PRESSURE GUARD
ARE TRIPPED

RESET 1. TEMP. GUARD
      2. L-PRESSURE
      3. LOAD-BREAK
```

```
ACTUAL TEMP    70°C

SWITCH @
H-PRESSURE GUARD
ARE TRIPPED

RESET 1. H-PRESSURE
      2. LOAD-BREAK
```

```
ACTUAL TEMP    70°C

SWITCH @
L-PRESSURE GUARD
ARE TRIPPED

RESET 1. L-PRESSURE
      2. LOAD-BREAK
```

```
ACTUAL TEMP    70°C
SWITCH
@ H-PRESSURE GUARD
@ L-PRESSURE GUARD
ARE TRIPPED

RESET 1. H-PRESSURE
      2. L-PRESSURE
      3. LOAD BREAK
```

```
ACTUAL TEMP    70°C
SWITCH @ TEMP. GUARD
@ H-PRESSURE GUARD @
L-PRESSURE GUARD
ARE TRIPPED

RESET 1. TEMP. GUARD
      2. L-PRESSURE
      3. H-PRESSURE
```

## Boiler shares safety equipment

In a system in which the boiler shares safety equipment with other boilers in the system and this safety equipment is triggered, only this window can be displayed.

```
ACTUAL TEMP    70°C

SWITCH IN 0 POSITION
OR TRIGGERED

PUT SWITCH IN ON
POSITION
```

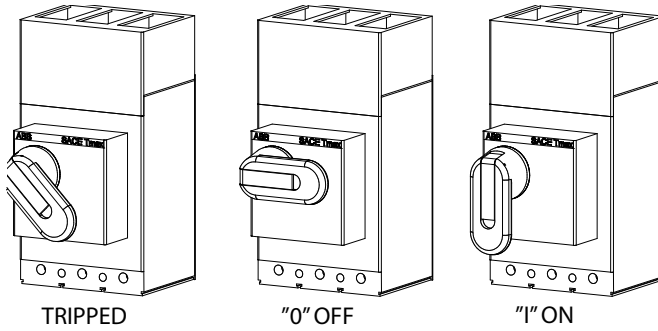
## Alarm - load-break switches and safety guards

### Load-break switch

When a guard trips the load-break switch will moved to "tripped" position. The switch is also tripped by the "STOP" button on the boiler panel.

The switch is reset by turning the knob to "0 off" and then to "I on".

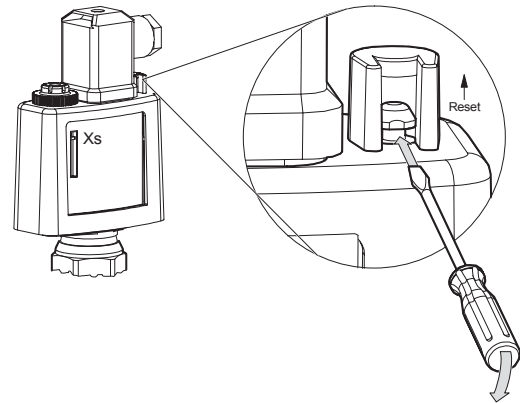
The version of the switch is dependent on the boiler model. The procedure is not always the same!



*The version of the switch is dependent on the model of boiler*

### Pressure guard(s) - option

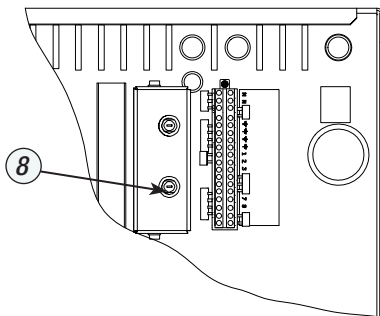
Reset



### Temperature switch

The boiler thermostat trips the boiler if the temperature exceeds 105°C.

Reset by pressing the button on the thermostat when the boiler temperature falls below 80°C.



# General



**Installation must take place according to existing regulations and standards.**

**The boiler is placed standing indoors.**

**The installation site shall be dimensioned for the weight of the water-filled boiler.**

**The boiler can be placed directly on the floor level.**

**The room should have a floor drain.**

**At least 1 metre of free space must be provided in front of the boiler.**

**Ensure there is sufficient ceiling height to allow the immersion heaters to be changed.**

**Adjust the foot bolts so that the boiler is horizontal.**

**Expansion system - The safety pipe, the boiler must be connected to an expansion system.**

**Valves must be fitted between the boiler and the heating system.**

**Pipes must be routed so that it is possible to open the front and remove the roof plate for service.**

**The boiler is not intended for use with oxygenated water.**

**As frost protection, the water in the system may be mixed with maximum 30% glycol.**

**Heating systems can differ between countries due to climate, traditions and national regulations. In cases where the standards violate national regulations, the latter must be followed. Consider national and individual requirements.**

**Electric boiler supplied with safety equipment is reviewed by accredited body in accordance with EN 12828.**

**With factory-fitted safety equipment, the boiler can be installed without expansion tank.**

**Double circulation pumps and flow guards are not required. The boiler can cope with zero flow from a safety perspective.**

**A steam-collecting vessel is not required. The safety valves are fitted directly on the boiler's safety pipe.**

**Final examination, under national laws, that the electric boiler has the necessary safety equipment must be carried out by an accredited body when assessing the monitoring interval for the electric boiler.**

## Water quality

Tap water is usually classified from the point of view of hygiene. Good water classified on this basis is not automatically suitable for a heating system. To avoid problems, the water should be analysed from a technical point of view and any deviations from standard values should be adjusted.

If the volume of the heating system is low, it can be filled with water that was not classified as good system water. When the water is heated, some oxygen and carbonic acid are emitted to the expansion tank or vent valves. The remainder will react with the metals in the system. This corrosion is generally insignificant. It is important for the system to be leak-proof so that the water does not need to be replaced with new water and the water is not oxygenated during

installation.

In practice, it is impossible to protect large systems against leaks and oxygen admission. In such cases, an oxygen-consuming agent can be added so that there is always a slight surplus in the system. These agents often contain corrosion-limiting additives.

## Water quality - in respect of suitable tap water

The alkalinity should exceed 60 mg/l to avoid corrosion.

Contents of carbonic acid over 25 mg/l increase the risk of corrosion.

Sulphate contents over 100 mg/l may accelerate corrosion. If the sulphate content is higher than the alkalinity, there is a risk of copper corrosion.

Hard water causes boiler scale and is not suitable in a heating system. The hardness must be approx. 5 - 6 dH°. Very soft water may cause corrosion damage.

Chloride contents over 100 mg/l make the water aggressive, particular when combined with lime deposits.

Low pH values may cause corrosion damage. The pH value should be 7.5 - 8.5.

The incidence of carbonic acid in combination with low pH and hardness values makes the water aggressive.

The water must not contain sludge or other impurities.

## Flow requirements

The boiler must have a constant, sufficiently high flow to function satisfactorily. The flow must be dimensioned so that it is within specified limits.

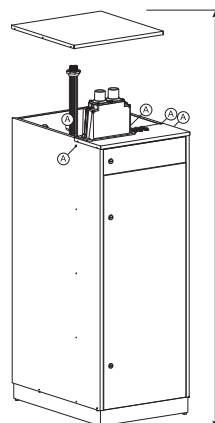
Insufficient water flow can result in the following:

- The difference between the temperature setting and the actual temperature achieved in the boiler increases.
- Irregular control with increased wear on the boiler's contactors, with reduced service life as a result.

Excessive water flow can result in the following:

- Vibrations in the immersion heaters with noise and reduced service life as a result.
- Unnecessary wear on the system's components.

Recommended flow produces a  $\Delta t$  of 10°C at the boiler's maximum power. See Technical data.



**Do not drill into the boiler's cover plates. Swarf can damage the boiler's electrical equipment!**  
**M6 bolts are available for fastening cable trays.**

**Minimum ceiling height, 2370 mm**

**(A) = M6 bolts for fixing cable trays, etc.**

**Pipes, cable ducts, etc. may not be laid on the boiler's rear cover plate.**

# Pipe installation

*The figures shown on this page are system principles. The actual system must be installed according to existing standards. Any additional equipment must be installed as indicated by the manufacturer for its product.*

## Open system

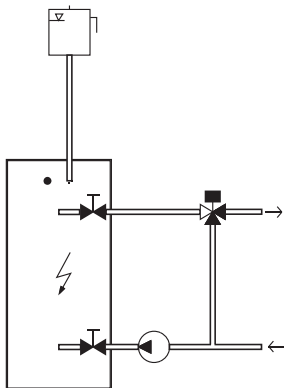
The boiler's safety line must be connected in an uninterrupted, non-closeable incline to an expansion tank, installed at the highest point in the heating system.

Expansion vessels are dimensioned to accommodate changes in water volume due to heating and cooling.

Expansion vessels, safety pipes, aeration and overflow pipes must be installed such that they are protected against freezing.

To avoid oxygenation of the water, the distance between the heating system's highest point and the expansion tank must not be less than 2.5 metres.

Pressure height must exceed the pump's lowest static pressure on the low side.



**!** *To avoid damage in the event of any blockage in the expansion system, the boiler should be fitted with a safety valve.*

**!** *The air vent on the boiler's safety pipe must always be open. Otherwise, air collects in the top of the boiler, which leads to disruption as the float switch is triggered on account of insufficient water level.*

Closed system  $\leq 300$  kW and  $< 105^\circ\text{C}$

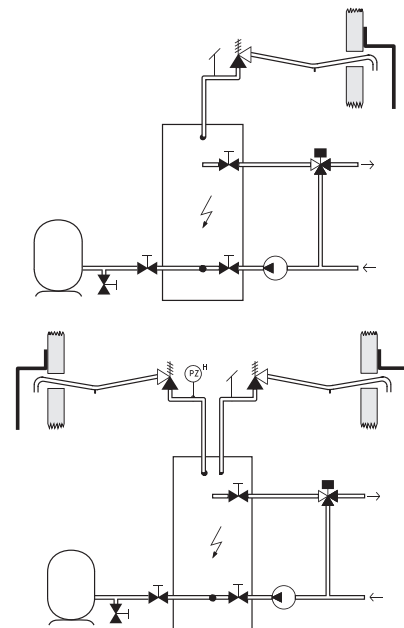
**!** *The opening pressure of the safety valve is determined by the component in the system that tolerates the lowest pressure.*

The boiler:

- can cope with zero flow, from a safety viewpoint
- has a built-in thermostat.
- has a built-in level sensor.
- can be supplied with a factory-installed, optional safety valve, low and/or high pressure switch.

To comply with EN 12828, the installation must have:

- At least one safety valve min DN 15, with sufficient blow-off capacity at the system's operating pressure.
- If the boiler is located at a higher level than users, a float switch or low-pressure guard is required.



Safety valves are fitted with pressure guards and an automatic vent valve on the boiler's safety pipe.

The discharge pipe of the safety valve shall lead to a safe place in accordance with the requirements of SS EN 12828. Normally, this means on the outside of the building or in a flash tank.

The discharge pipe from the safety valve shall be dimensioned so that the blow-off capacity is not impeded.

The discharge pipe must be laid so it cannot freeze, must be cleaned well and must be laid so that water pockets cannot form. DN 10 drainage must be provided if there is a risk of standing water in the safety valve outlet line.

# Electrical installation



**The installation must be carried out according to existing rules and standards under the supervision of a qualified electrician!**

**Cables must be dimensioned according to the Electrical Installation Rules.**

**Cables must be laid so that it is possible to open the front and remove the roof plate for service. For minimum ceiling height, see Technical data.**

**Light-current cables must not be laid in direct connection with power cables as this may give rise to disruption.**



**Do not drill into the boiler's cover plates. Cuttings can damage the boiler's electrical equipment.**

**M6 bolts are available for fixing cable trays.**

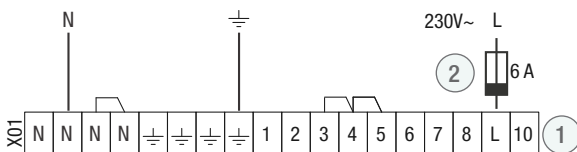
## Output limiting

**See "Max. POWER (7)" or "Max. POWER (15)" in the installation menu.**

## Operating voltage

The control side of the boiler is supplied with 230V~, 6 A fused, as shown in the figure below.

**The boiler must be preceded by an all-pole switch with at least 3 mm breaking distance!**



## Power supply

Connection for PEN 4-core cable.

Connect the earth conductor to the earth terminal block/clamp; tightening torque:

EP 31- 42: 5 Nm

Others: 40 Nm

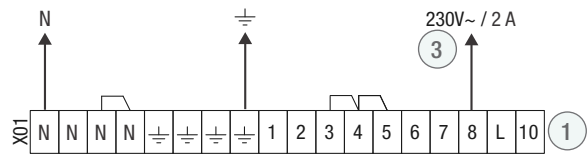
Connect the phase conductors to the terminals on the load breakers; tightening torque: EP 31 - 70: 13.5 Nm

EP 84 - 300: 31 Nm

**Grease the aluminium cable with neutral contact grease.**

**Power supply to external unit**

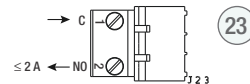
230V~, max load 2 A.



## Circulation pump

**See 'CP function' in the installation menu!**

Potential-free closing contact for control to circulation pump, max. load 230 V~, 2 A.

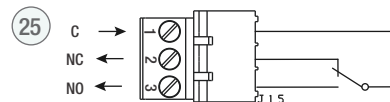


**The circulation pump must be labelled to show that it is controlled by the boiler if the function is used.**

## External alarm indication

Buzzer alarm for external alarm indication of low water level, overheating protection triggered, PEC or safety equipment triggered.

Potential-free alternating contact, max. 230 V~, 2 A.



Terminals 1 - 2, C - NC, closed during operation.

Terminals 1 - 3, C - NO, closed during alarm.



# Electrical installation

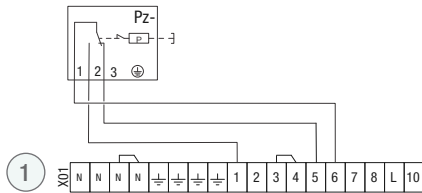
## Pressure guards - Safety equipment

**⚠ External safety equipment must be connected as shown below to ensure the boiler safety system functions as intended.**

Connect any optional pressure guards supplied as shown in the figures below.

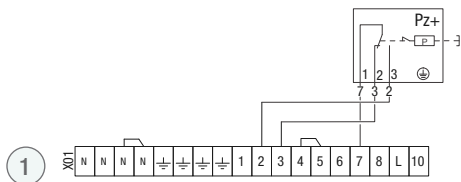
### Low pressure guard

Existing connection between terminals 4 and 5 is removed.



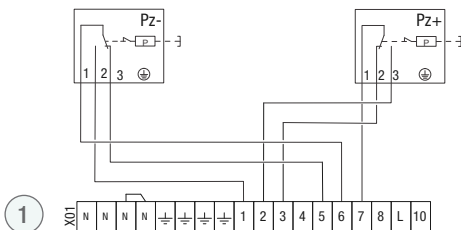
### High pressure guard

Existing connection between terminals 3 and 4 is removed.

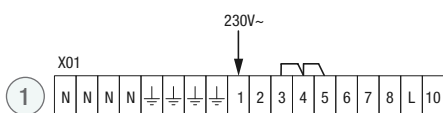


### Low and high pressure guards

Existing connections between terminals 3-4-5 are removed.



Alternatively, if the boiler can share the safety equipment with other boilers in the installation.



The alarm signal, 230 V~, from existing safety equipment, is connected to terminal 1. Please note that the alarm signal must be of the same phase as that used for the boiler's control!

### Load guard

The current transformers need not be connected if the function is not to be used. The guard is not phase-sensitive.

**⚠ The circuit board may be damaged, short circuit the current transformer when switching on/off!**

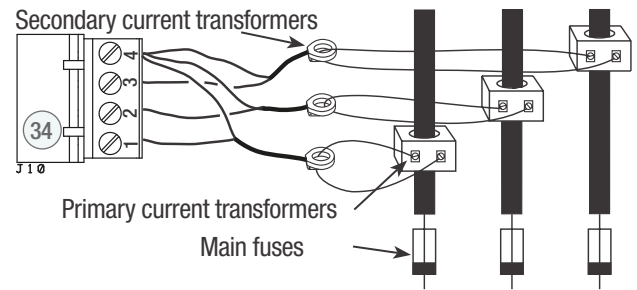
## Secondary measurement EP 67 - 300

**See "CURRENT LIMIT" and "MARGIN" in the Installation menu.**

Measurement is with primary and secondary current transformers. The latter are supplied with the boiler. The system-adapted primary current transformers, xxx/5 A, are supplied by the electrician.

The cable from the primary current transformer must pass through the secondary current transformer once.

Connection to terminal block J10, with a common conductor in terminal J10:4.



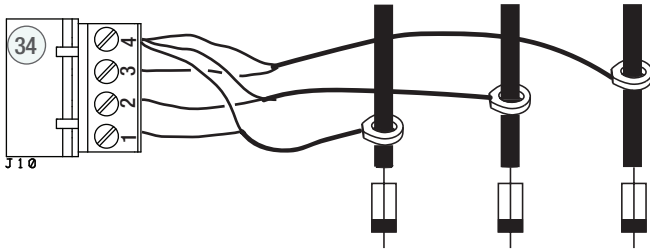
## Direct measurement EP 31 - 63

**See "MAIN FUSE" in the Installation menu!**

Measurement is carried out to a maximum of 200 (A) using the current transformers supplied.

Connection to terminal block J10, with a common conductor in terminal J10:4.

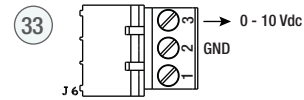
# Electrical installation



## 0 - 10 V output signal of connected power

0-10V, equivalent to 0-100% of installed power.

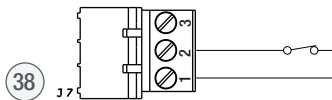
Installed power is the number of stages the boiler is permitted to use.



## External blocking

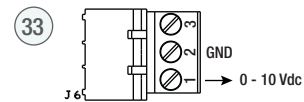
See **“Ext. STAGE LIMIT”** in the Installation menu!

The boiler can be blocked by an external potential-free contact.



## 0 - 10 V output signal of boiler temperature

0- 10V is equivalent to 0-170°C.



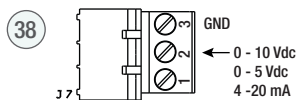
## Outdoor temperature sensor - boiler with OTC

See **Adjustment menu!**

## External stage control — 0 - 10 V, 0 - 5 V or 4 - 20 mA

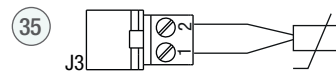
See **“Ext. STAGE LIMIT”** in the Installation menu!

0-100% of installed power. Installed power is the number of stages the boiler is permitted to use.



The temperature sensor is fitted to an outside wall, at half the height of the façade, close to a corner, facing north/north west. The sensor must not be placed where it will be exposed to the morning sun or close to valves, windows or doors.

Connection with at least 0.4 mm<sup>2</sup> cable up to 30 metres. The duct is sealed so as to avoid condensation in the sensor enclosure.



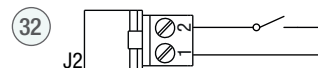
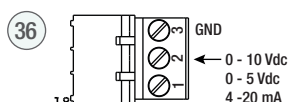
## Alternative heating - boiler with UTK

See **“Ext. TEMP. ADJUST”** in the Installation menu and **“TEMP.ADJUST”** in the Adjustment menu!

The temperature can be changed with the aid of an external potential-free contact function, protective extra low voltage.

## External setpoint — 0 - 10 V, 0 - 5 V or 4 - 20 mA

See **“Ext. TEMP. SETPOINT”** in the installation menu!



# Electrical installation

## Controlling power from the heat pump

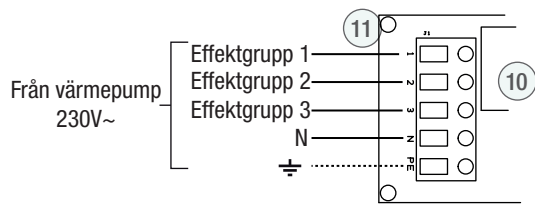
**If the function is used, set "Ext STAGE LIMIT" in the installation menu to 0-10V!**

Electric boilers with power from 31 to 119 kW are supplied with a function that allows a heat pump with three bit binary 230V~ output to control the boiler's power connection.

See "Control circuit" points 10-14. The Circuit board, 10, is connected "Control circuit".

The heat pump is connected according to the figure below.

For installation of the heat pump, refer to the product's installation instructions.



# Control circuit



**Any intervention in the boiler's electrical equipment that requires tools must be carried out under the supervision of a qualified electrician!**

1. Terminal block, control circuit.
2. External control voltage 230V~, to the boiler.
3. Power supply to external unit, 230V~/2A.
4. Connection of pressure guards/safety equipment.
5. STOP button. When pressed, cuts the power supply to the boiler by tripping the load-break switches.
6. Panel circuit board with overlay.
7. Cable strap, with ferrite terminals, connects power and panel circuit board.
8. Thermostat, max temperature relay, STB. One or two depending on boiler model.
9. Load-break switch with auxiliary switch.
10. Circuit board for boiler power control from the heat pump.
11. Connection for 3-bit binary 230V~. "1" is the least significant.
12. Indications, "A - C", display the binary number of stages the heat pump seeks to engage. "A" corresponds to the lowest power group and "C" the largest.
13. Feed, 12VDC, terminals 1 - 2. Output signal, 0-10VDC, terminals 3 - 4.
14. Switch to select whether the boiler is to be controlled by itself "EP" or by the heat pump "VP".
15. Circuit board, power.
16. Sense inputs, indication lights up when:
  - A: the circuit board has power.
  - B: thermostat in operating mode.
  - C: high pressure switch in operating mode.
17. Sense inputs, indication lights up when:
  - A: load break switch in operating mode.
  - B: low pressure guard in operating mode, option.
  - C: -
18. Contactor, K1, power group one.
19. Contactor, K2, power group two.
20. Contactor, K3, power group three.
21. Contactor, K4, power group four on fifteen stage boilers.
22. Contactor, K5, power group four on boilers. Doubled con-
- factor power group four, boilers with power  $\geq 180 \text{ kW}$ .
23. Potential-free relay output for circulation pump. Max. load 230 V~/2 A.
24. Fan(s), option.
25. Potential-free, alternating relay output for buzzer alarm.
26. Outputs for controlling solid state relay, option.
27. Boiler temperature sensor, J12.
28. Temperature sensor, J13, only included in boiler with cooling fan, option.
29. Connection temperature sensor for boiler with secondary control. Also terminals 3 - 4 in terminal block J9, option.
30. Alternative connection of temperature sensor with secondary control, option.
31. Connection Pt100 boiler temperature sensor, high temperature boiler, option.
32. Connection Pt100 temperature sensor, secondary control, high temperature boiler, option. Boiler with outdoor temperature compensation, UTK\*\*. *Connection of contact function for alternative heating.*
33. *Output signal, current power and boiler temperature.*
34. *Connection for the load guard's current transformers.*
35. Connection outdoor temperature sensor, boiler with OTC, option.
36. Connection for external setpoint setting.
37. Level sensor connection.
38. Connection for external stage control.
39. Connection of current transformer for PEC function.
40. Connection for series control of boilers, option.

**Boilers 31 - 119 kW Connected by electrical installer as necessary!**



**The circuit board may be damaged; short circuit the current transformer when switching on/off!**



**The circuit board may be damaged; short circuit the current transformer when switching on/off!**



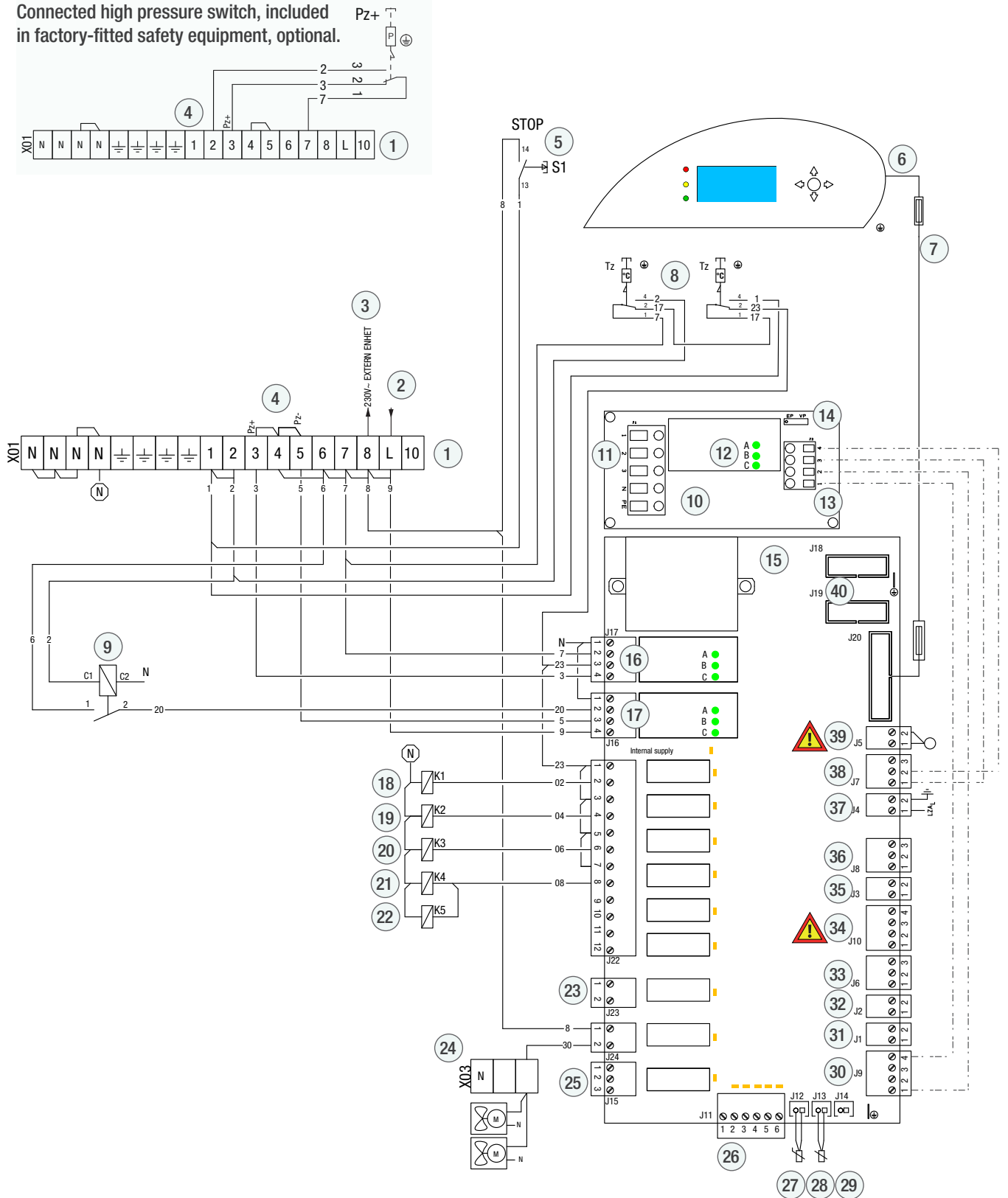
**Control voltage is not broken by the load-break switch!**

**External voltage may exist!**

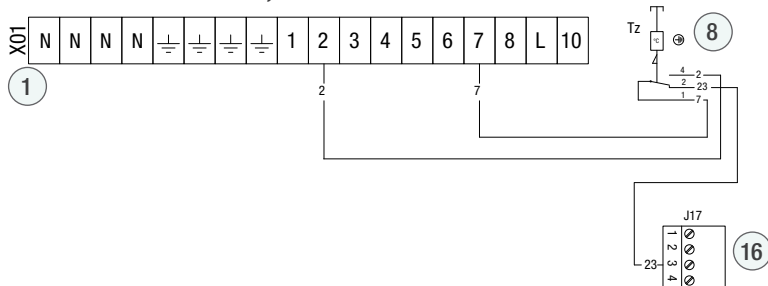
**To break the power supply to the boiler, the load-break switch must be placed in 0 position. Lock the switch!**

# Control circuit

Connected high pressure switch, included in factory-fitted safety equipment, optional.

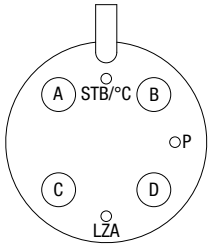
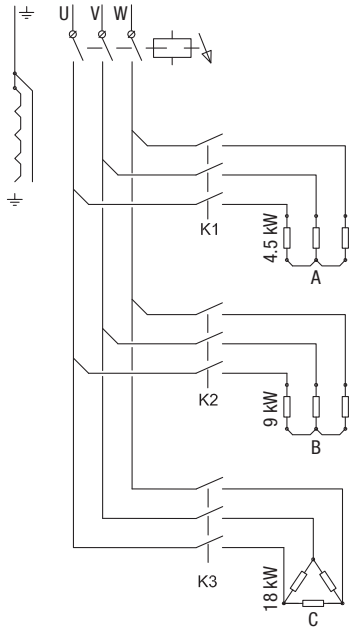


## Boilers with a thermostat, STB



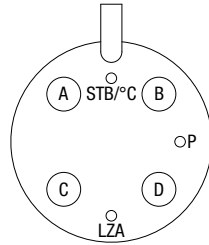
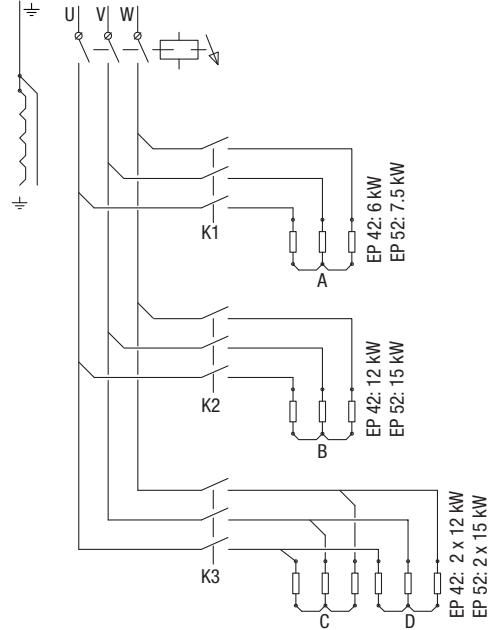
# Electric circuit

EP 31 TL



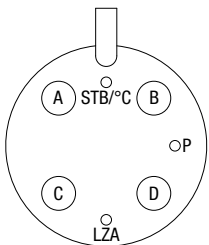
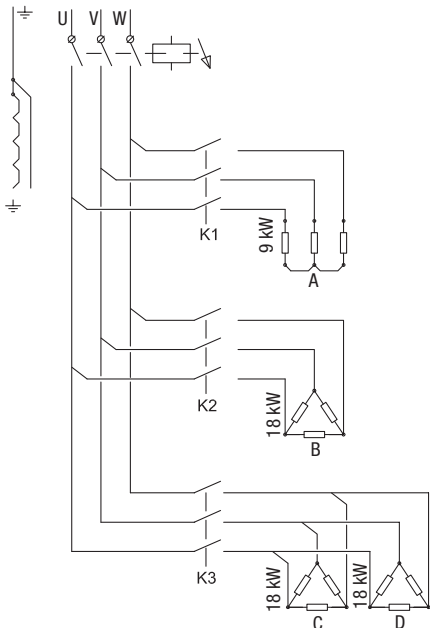
°C: Temperature sensor  
**STB:** Max. temperature thermal  
**P:** Manometer  
**LZA:** Float switch

EP 42 TL, EP 52 TL



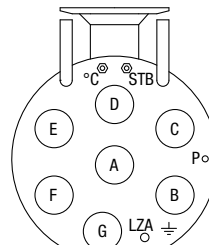
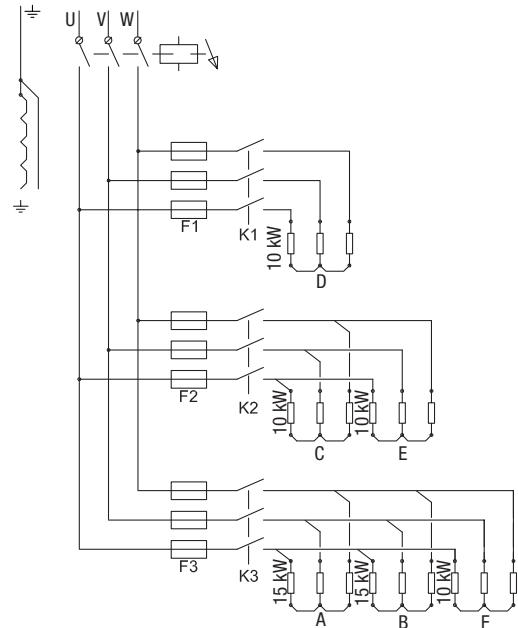
°C: Temperature sensor  
**STB:** Max. temperature thermal  
**P:** Manometer  
**LZA:** Float switch

EP 63 TL



°C: Temperature sensor  
**STB:** Max. temperature thermal  
**P:** Manometer  
**LZA:** Float switch

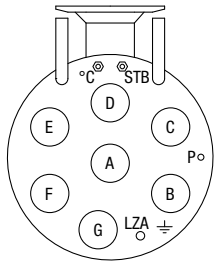
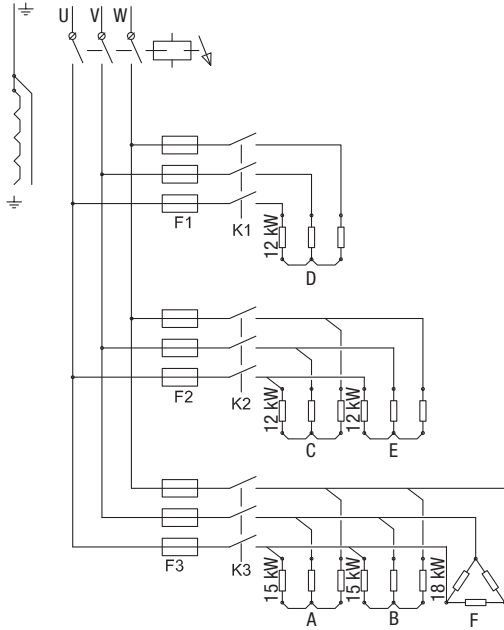
EP 70 TL



°C: Temperature sensor  
**STB:** Max. temperature thermal  
**P:** Manometer  
**LZA:** Float switch

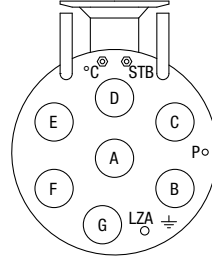
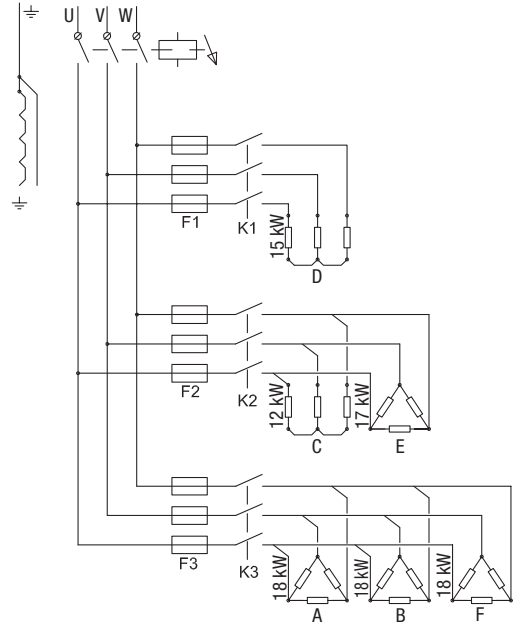
# Electric circuit

## EP 84 TL



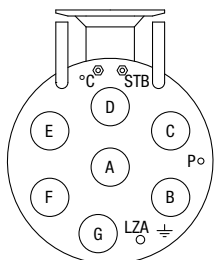
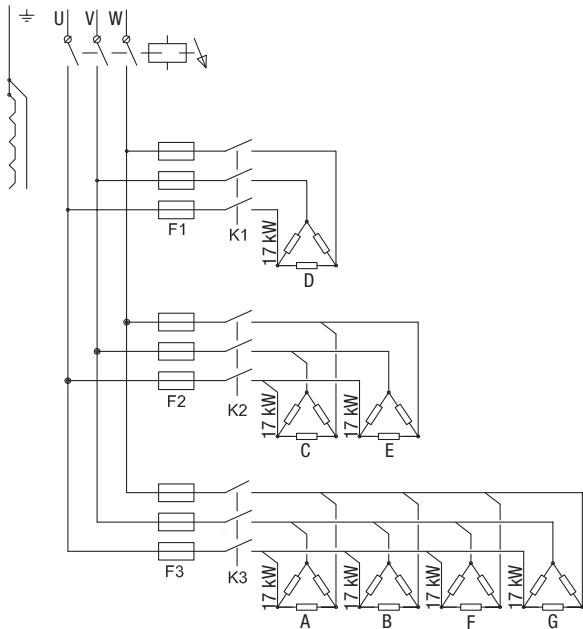
°C: Temperature sensor  
 STB: Max. temperature thermal  
 P: Manometer  
 LZA: Float switch

## EP 98 TL



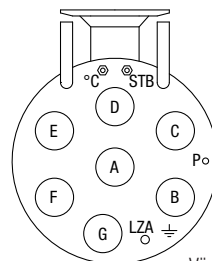
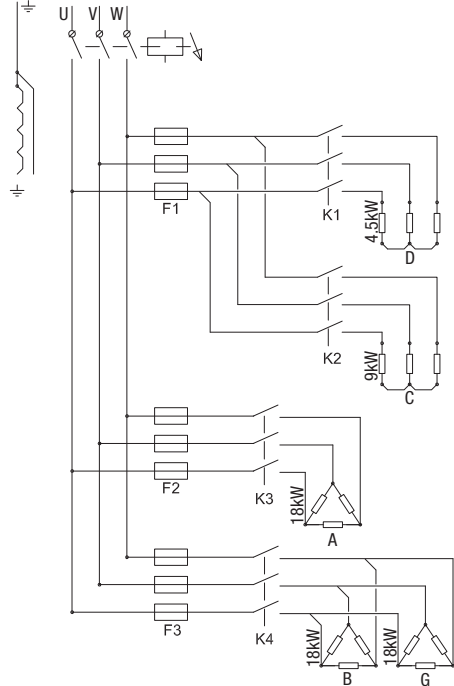
°C: Temperature sensor  
 STB: Max. temperature thermal  
 P: Manometer  
 LZA: Float switch

## EP 119 TL



°C: Temperature sensor  
 STB: Max. temperature thermal  
 P: Manometer  
 LZA: Float switch

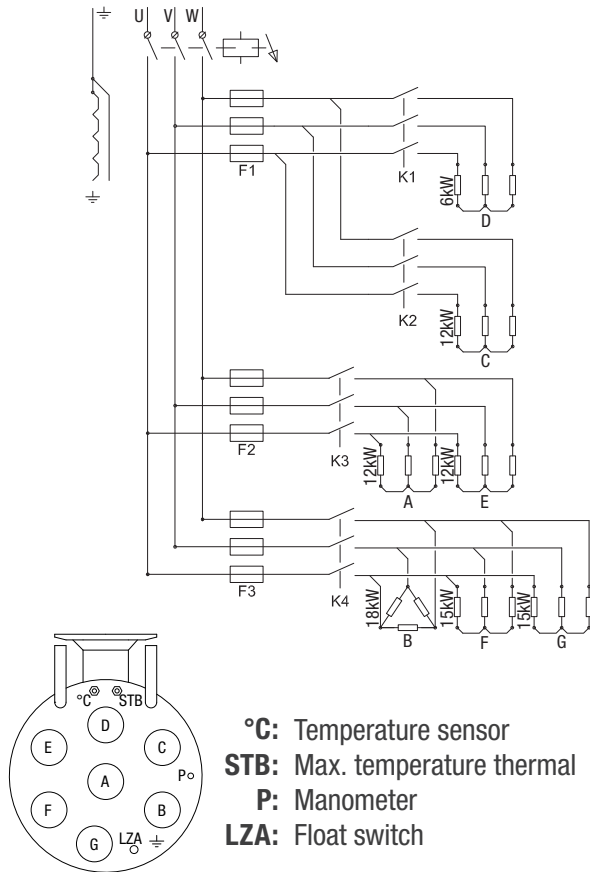
## EP 67 TL



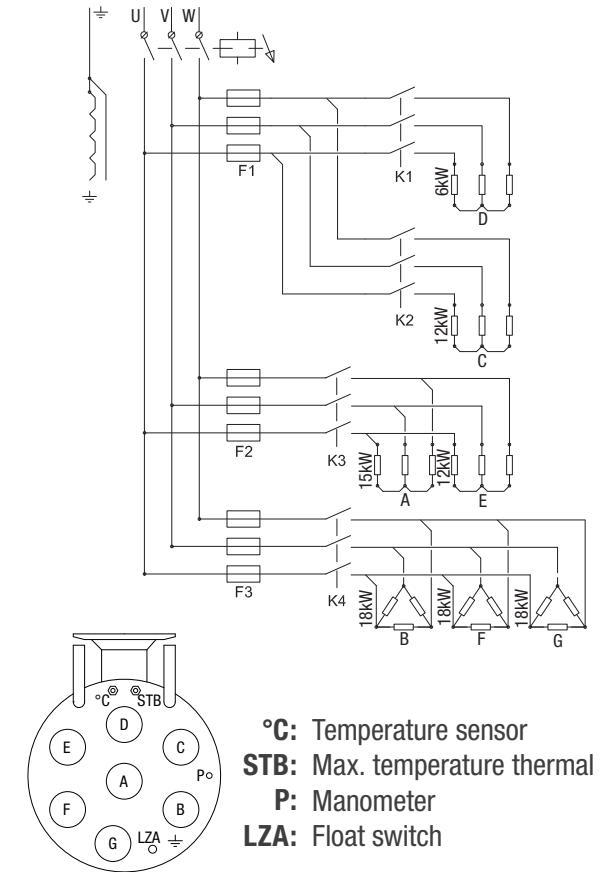
°C: Temperature sensor  
 STB: Max. temperature thermal  
 P: Manometer  
 LZA: Float switch

# Electric circuit

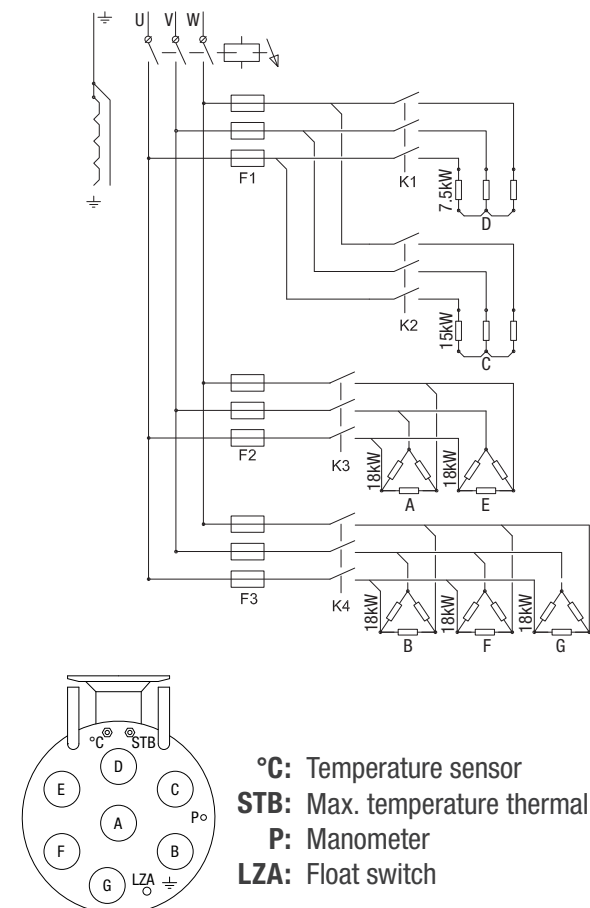
## EP 90 TL



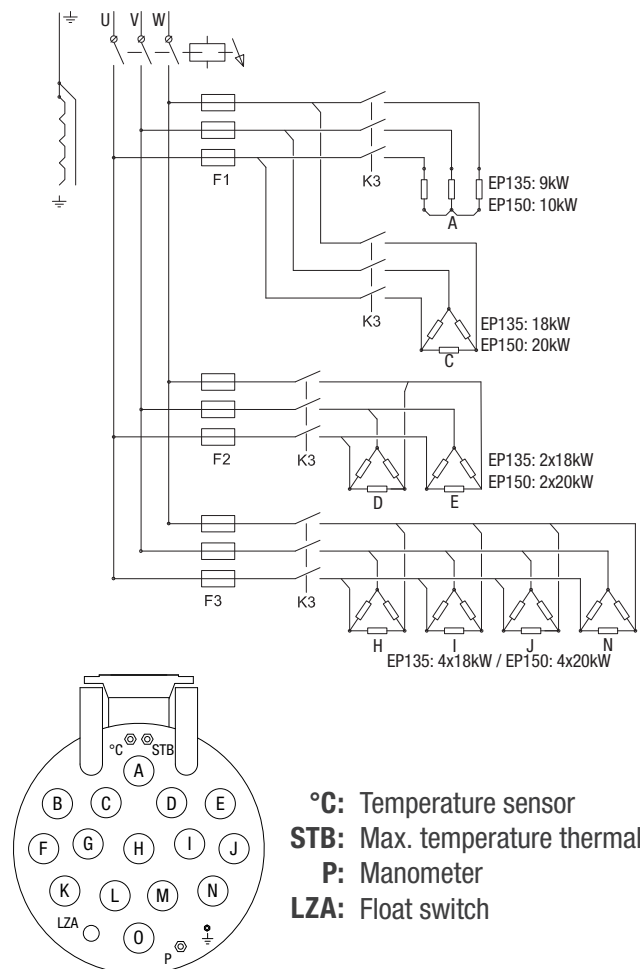
## EP 99 TL



## EP 112 TL



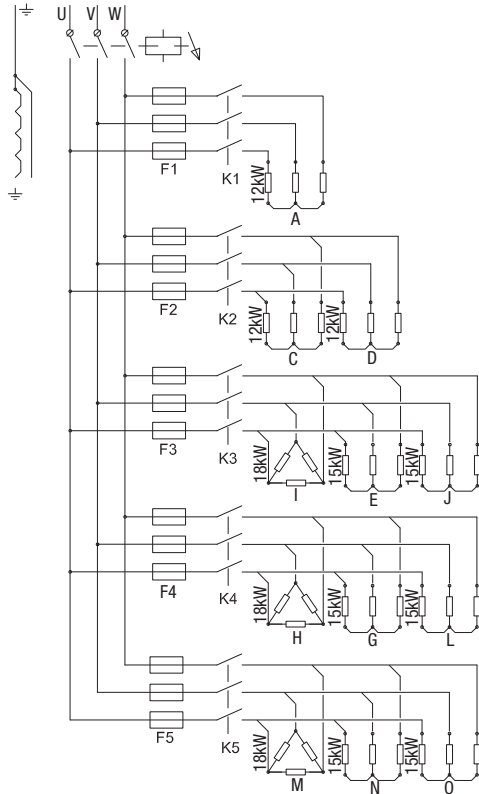
## EP 135 TL, EP 150 TL



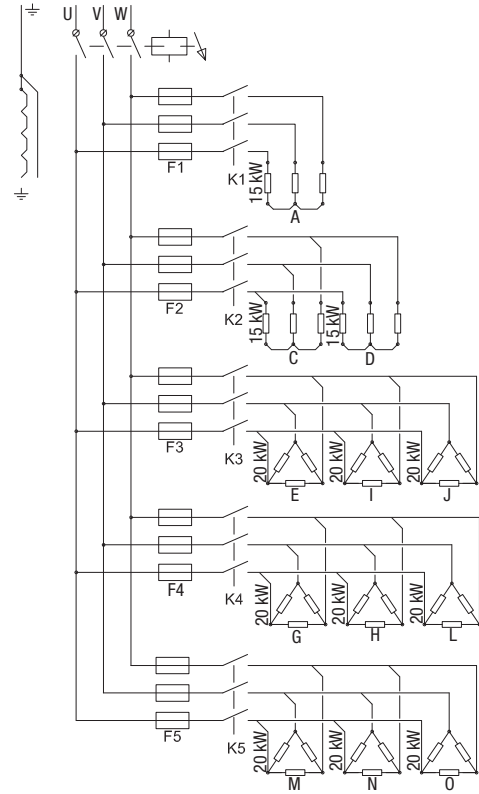


# Electric circuit

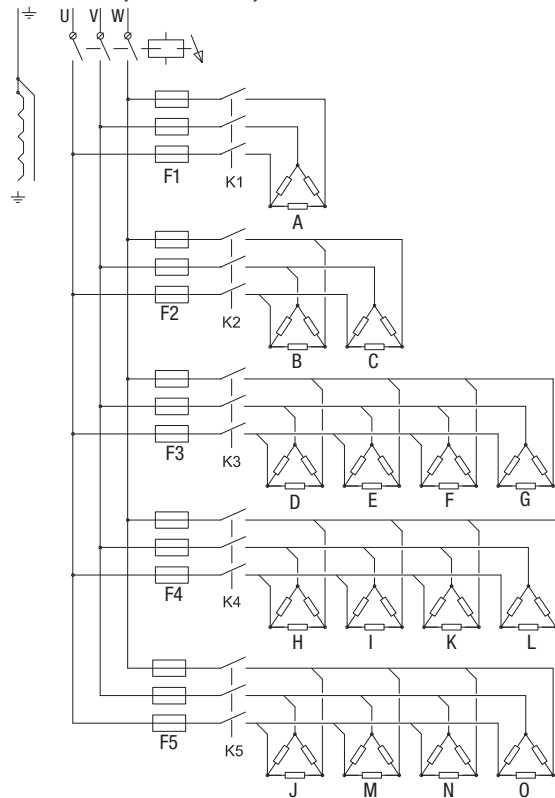
## EP 180 TL



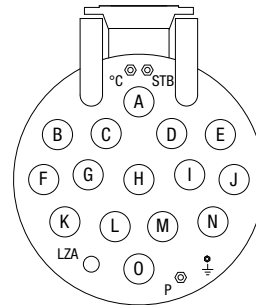
## EP 225 TL



## EP 255 TL, EP 270 TL, EP 300 TL



## EP 180 TL, EP 225 TL, EP 255 TL, EP 270 TL, EP 300 TL



- °C:** Temperature sensor
- STB:** Max. temperature thermal relay
- P:** Manometer
- LZA:** Float switch

EP-	255	270	300	
A - 0	17	18	20	kW

# Data

The electric boiler is CE marked as a unit and is classified as pressure equipment according to Directive 2014/68/EU, Article 4(3).

The electric boiler can be supplied with factory-fitted safety equipment, reviewed by accredited body according to EN 12828.

Factory-fitted safety equipment includes:

- 2 x safety valves.
- 2 x high pressure guards.
- 1 x low pressure guard.
- 1 x automatic vent valve.

With factory-fitted safety equipment, the boiler can be installed without expansion tank according to EN 12828.

From the point of view of safety, the boiler copes with zero flow, i.e. it is designed so that it is not damaged if the forced circulation ceases, for example by a valve being closed or a pump stopping and only self-circulation being present.

The system need not be fitted with dual circulation pumps or flow switches.

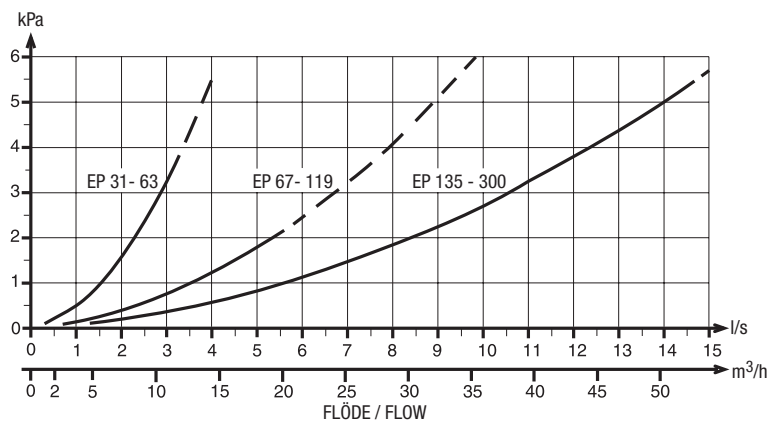
A steam-collecting vessel is not required. The safety valves are fitted directly on the boiler's safety pipe.

Final examination, under national laws, verifying that the electric boiler has the necessary safety equipment must be carried out by an accredited body when assessing the monitoring interval for the electric boiler.

## Shared data

Voltage, power control	400V 3~ 50/60 Hz 230V~, 50/60 Hz	
Voltage tolerance	±10	%
Calculation pressure	0.6 / 6	MPa / bar
Test pressure	0.86 / 8.6	MPa / bar
Design temperature	110	°C
Operating temperature	20 - 95	°C
Ambient temperature	boiler without fan ≤ 30 boiler with fan ≤ 40	°C
Manufactured to	PED 2014/68/EU article 4.3	

## Pressure drop



# Data

## 7 STAGE BOILERS

Model, EP TL	31	42	52	63	70	84	98	119	
Article number	5631	5632	5633	5634	5635	5636	5637	5638	
Output	31.5	42	52.5	63	70	84	98	119	kW
Current	45	61	76	91	101	121	141	172	A
Highest fuse	160						250		A
Power/stage	4.5	6	7.5	9	10	12	*	17	kW
Current/stage	6.5	8.7	10.8	13	14.4	17.3	*	24.5	A
Coupling./Cable flange	Coupling, Ø34 mm				KF 121-60, Ø60 mm				
Cable connection, Al/Cu	35 - 95				120 - 240				mm <sup>2</sup>
Volume	31				60				litre
Connection, flow/return	R 50 int.				DN 80 PN 16				
Safety pipe	R25 ext.				2 x R25 ext.				
Flow requirements, $\Delta t = 10^{\circ}\text{C}$	0.8	1.0	1.2	1.5	1.6	2.0	2.3	2.8	litre/s
min./max.	0.3 / 4	0.4 / 4	0.5 / 4	0.6 +4	0.7 / 10	0.8 / 10	0.9 / 10	1.1 / 10	litre/s
Weight, empty	80				135	140	145		kg
Weight, filled with water	111				195	200	205		kg
Min ceiling height for immersion heater replacement	1720				1825				mm

## 15 STAGE BOILERS

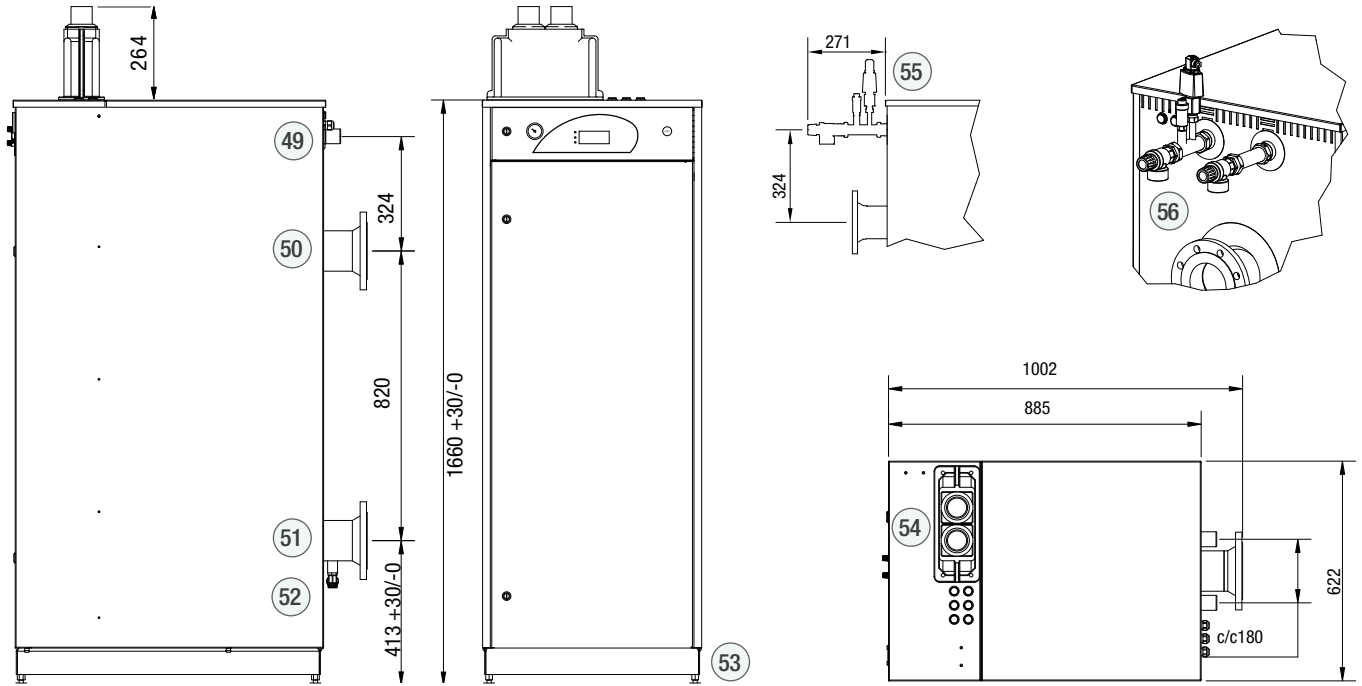
Model, EP TL	67	90	99	112	135	150	180	225	255	270	300	
Article number	5639	5640	5641	5642	5643	5644	5645	5646	5647	5648	5649	
Output	67.5	90	99	112.5	135	150	180	225	255	270	300	kW
Current	97	130	143	162	195	217	260	325	368	390	433	A
Highest fuse	160			250			400		630			A
Power/stage	4.5	6	*	*	9	10	12	15	17	18	20	kW
Current/stage	6.5	8.7	*	*	13	14.4	17.3	21.7	24.5	26	28.9	A
Cable flange	KF 121-60, Ø60 mm						FL 33, 2 x Ø60 mm					
Cable connection, Al/Cu	35 - 95	120 - 240				2 x 95 - 240					mm <sup>2</sup>	
Volume	60					180						litre
Connection, flow/return	DN 80 PN 16					DN 100 PN 16						
Safety pipe	2 x R25 ext.					2 x R32 ext.						
Flow requirements, $\Delta t = 10^{\circ}\text{C}$	1.5	2.1	2.3	2.7	3.2	3.6	4.2	5.0	6.0	6.5	7.0	litre/s
min./max.	0.6/10	0.9/10	0.9/10	1/10	1.3/15	1.5/15	1.7/15	2.1/15	2.4/15	2.6/15	2.8/15	litre/s
Weight, empty	140			230			260		270		275	kg
Weight, filled with water	200			410			440		450		455	kg
Min ceiling height for immersion heater replacement	1825			2185		2375	2185	2375	2185		2375	mm

\* The power groups do not follow binary weighting; use these values when using the load monitor function

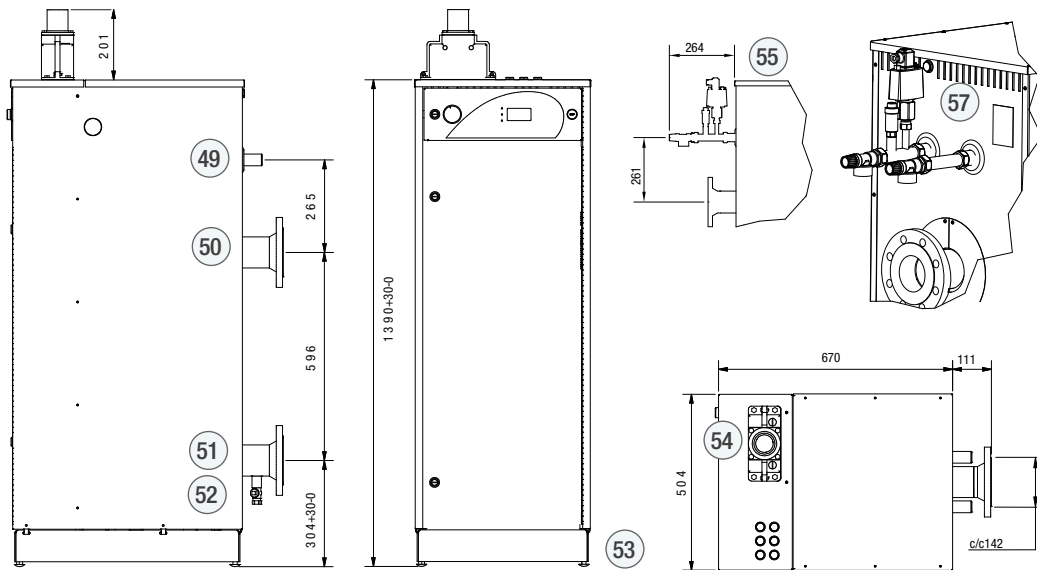
Model, EP TL	98	99	112	
Power/stage	15	9	13.5	kW
Current/stage	21.6	13	19.5	A

# Data

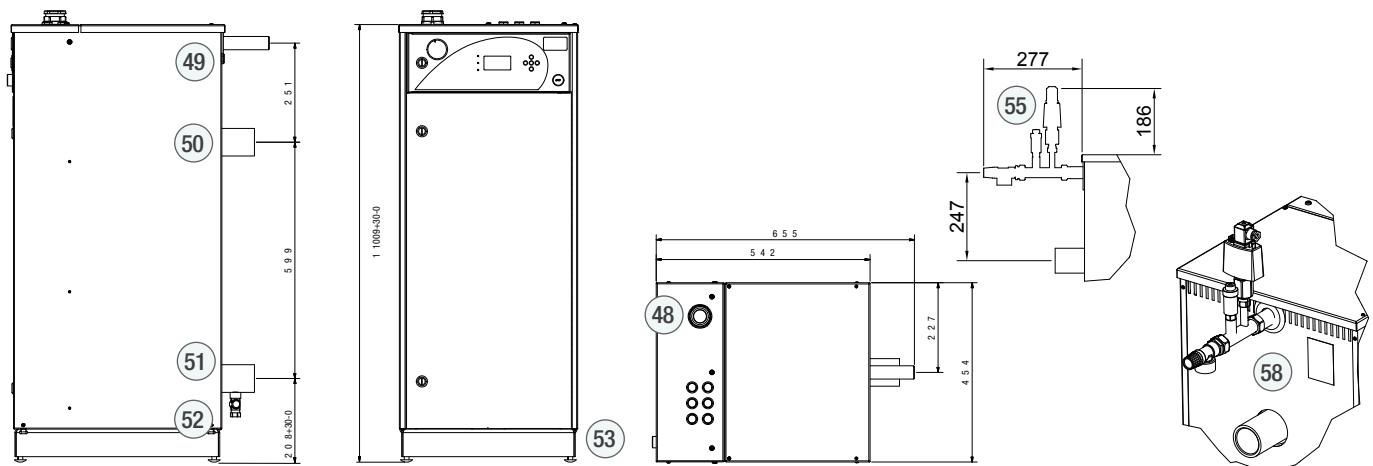
## 15-stage: EP TL -135, -150, -180, -225, -255, -270, -300



## 7-stage EP TL-70, -84, -98, -119. 15-stage: EP -67, -90, -99, -112



## 7-stage EP TL -31, -42, -52, -63



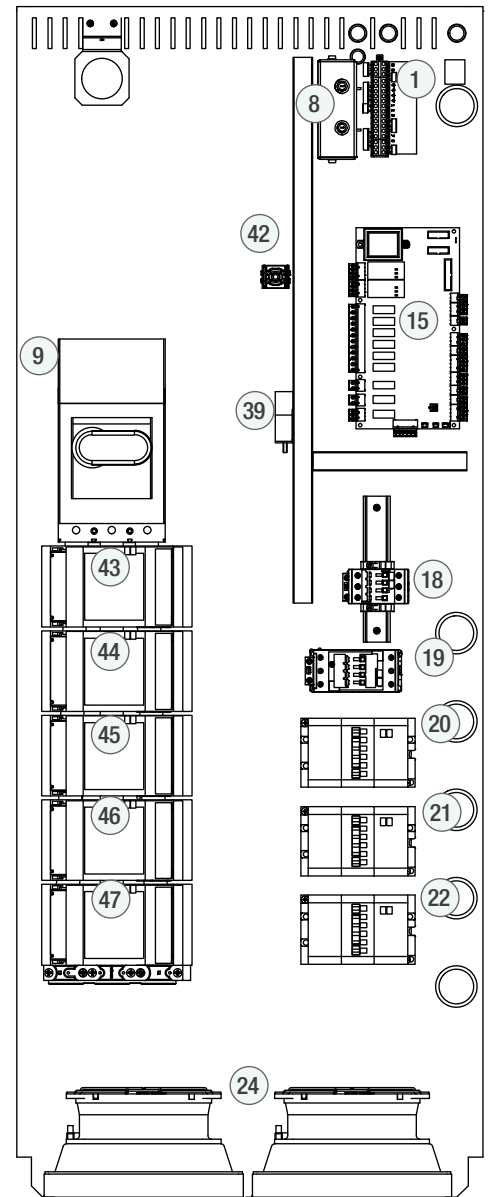
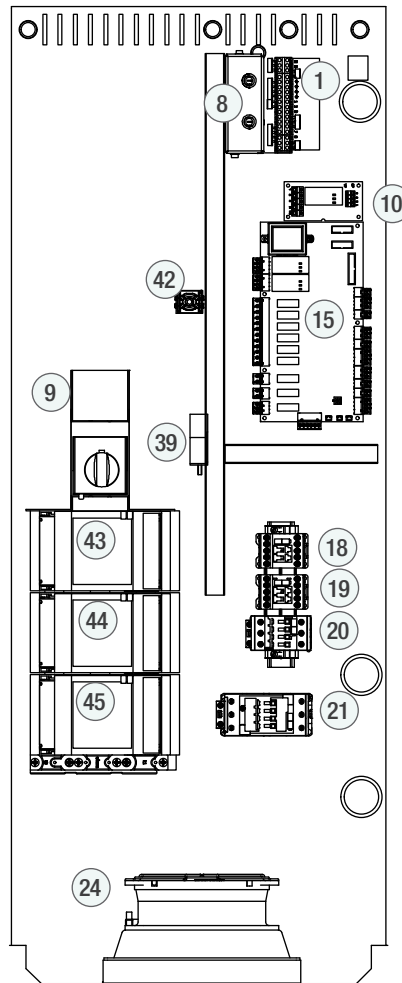
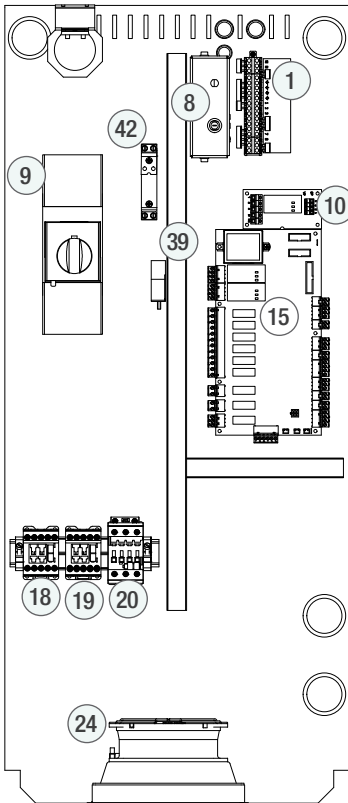
# Data

**Component location** (the images are illustrative, versions vary dependent on boiler model)

**7-stage EP -31, -42, -52, -63**

**7-stage EP -70, -84, -98, -119.**  
**15-stage: EP -67, -90, -99, -112**

**15-stage: EP -135, -150, -180, -225,**  
**-255, -270, -300**



- 1. Terminal block.
- 8. Thermostat(s), max temperature relay.
- 9. Load break switch, connection power supply
- 10. Circuit board for boiler power control from the heat pump, only in EP 31-119.
- 15. Circuit board, power.
- 18. Contactor, K1.
- 19. Contactor, K2.
- 20. Contactor, K3.
- 21. Contactor, K4.
- 22. Contactor, K5.
- 24. Fan(s), option.
- 39. Current transformer for PEC function.
- 42. Connection, PE conductor.
- 43. Fuse F1.
- 44. Fuse F2.
- 45. Fuse F3.
- 46. Fuse F4.
- 47. Fuse F5.
- 48. Cable fitting.
- 49. Safety pipe(s).
- 50. Flow line.
- 51. Return line.
- 52. Draining.
- 53. Adjustable foot bolts.
- 54. Cable flange.
- 55. Dimensions, factory-fitted safety equipment, option.
- 56. Safety equipment EP 135-300, optional twin safety pipes, twin safety valves, high pressure switch and automatic deaerator.
- 57. Safety equipment EP 70-119, optional twin safety pipes, twin safety valves, high pressure switch and automatic deaerator.
- 58. Safety equipment EP 31-63, single safety pipe, safety valve, high pressure switch and automatic deaerator.

# Troubleshooting

## Irregular operation

The electric boiler increases a few stages and is then reduced immediately, etc.

Water flow through the electric boiler too low.

Check that circulation pumps and valves are working.

This is an easy way to get an idea of the level of flow through the boiler:

- Limit the power stages of the boiler so that the power is constant, for example to one power stage.
- Let the boiler's temperature become stable.
- Measure the temperature increase between the flow and return lines of the boiler.
- Calculate the flow through the boiler using the formula below.
- Check against the details in "Data" whether the flow is adequate.

$$q = \frac{P}{\Delta t \times 1,16}$$

$q$  = water flow in m<sup>3</sup>/h. ( m<sup>3</sup>/h x 1000/3600 = litres/second)  
 $P$  = electric boiler's power output in kW  
 $\Delta t$  = temperature difference between the boiler's flow and return line in °C.  
 1.16 = the water's thermal absorption coefficient.

## Tables for temperature sensors

When the resistance of a temperature sensor is measured, it must be disconnected from the circuit board.

For voltage measurement of sensors J12 = Boiler temperature sensor, 27.

J13 = Temperature sensor, 28, boiler with cooling fan, option.

J14 = Temperature sensor, 29, for secondary control, option. Also terminals 3 - 4 in terminal block 30.

if there are measuring points on the circuit board with connections. The voltage of other temperature sensors is measured in their connection to the terminal block.

### Temperature sensors, J12, J13 and J14

°C	kΩ	V	°C	kΩ	V	°C	kΩ	V
5	141.9	4.7	45	24.6	3.6	85	5.9	1.9
10	111.6	4.6	50	20.2	3.3	90	5	1.7
15	88.3	4.5	55	16.7	3.1	95	4.3	1.5
20	70.3	4.4	60	13.9	2.9	100	3.7	1.3
25	56.3	4.3	65	11.6	2.7	105	3.2	1.2
30	45.4	4.1	70	9.7	2.5	110	2.7	1
35	36.8	3.9	75	8.2	2.3			
40	30	3.8	80	6.9	2.0			

### Pt100 temperature sensor, option

°C	Ω	V	°C	Ω	V
5	101.9526	0.4626	85	132.799	0.5862
10	103.9022	0.4706	90	134.7022	0.5936
15	105.849	0.4786	95	136.6026	0.6009
20	107.7928	0.4865	100	138.5	0.6083
25	109.7338	0.4944	105	140.3945	0.6156
30	111.6718	0.5023	110	142.2862	0.6228
35	113.607	0.5101	115	144.1749	0.6300
40	115.5392	0.5179	120	146.0608	0.6372
45	117.4686	0.5256	125	147.9437	0.6444
50	119.3951	0.5333	130	149.8237	0.6515
55	121.3186	0.5410	135	151.7009	0.6586
60	123.2392	0.5486	140	153.5751	0.6656
65	125.157	0.5562	145	155.4464	0.6727
70	127.0718	0.5637	150	157.3149	0.6797
75	128.9838	0.5712	155	159.1804	0.6866
80	130.8928	0.5787	160	161.043	0.6935

### Outside temperature sensor, option

°C	kΩ	V	°C	kΩ	V
-30	47	4.3	5	6.8	2.4
-25	34.7	4.1	10	5.4	2.1
-20	25.9	3.9	15	4.2	1.8
-15	19.5	3.6	20	3.4	1.6
-10	14.8	3.3	25	2.7	1.3
-5	11.4	3.0	30	2.2	1.1
0	8.8	2.7			

Art.nr	EP-TL-	31	42	52	63	70	84	98	119	67	90	99	112	135	150	180	225	255	270	300
<b>Immersion heaters</b>																				
110029	4.5 kW	1								1										
110030	6 kW		1									1								
110031	7.5 kW			1									1							
110032	9 kW	1			1					1				1						
110033	10 kW					4									1					
110034	12 kW		3				3	1			3	2				3				
110035	15 kW			3			2	1			2	1				6	3			
110036	17 kW							1	7									15		
110037	18 kW	1			3		1	3		3	1	3	5	7		3			15	
110038	20 kW														7		9			15

## Contactors

170080									K3					K4					K3, K4, K5	
170081									K3					K4						
170083		K1, K2			K1					K1, K2				K1						
170085		K3			K2			K1, K2			K4			K2		K1, K2				K1
170087				K3					K2			K3							K2	
170088					K3						K3				K3					K2
170089							K3					K4								K3, F4, K5

## Circuit breakers (three in each group)

180060	35 A								F1										F1	
180061	50 A					F2				F2	F1, F2			F1		F2				F1
180062	63 A							F2				F2								
180063	80 A					F3				F2				F2						F2
180064	100 A						F3					F3				F3, F4, F5				
180065	125 A							F3					F3						F3, F4, F5	
180066	160 A								F3					F3						F3, F4, F5
180067	25 A					F1				F1					F1					

## Load-break switch

130065				X						X										
130066								X					X							
130067																X				
130068																				X

## Common components

210314	Circuit board, panel	1
700415	Overlay, panel circuit board	1
210313	Circuit board, power	1
218010	Ferrite clamp	2
700564	Temperature sensor	1
360020	Current transformer, PEC	1
440040	Level sensor	1
360020	Current transformer, load guard	3
120022	Thermostat: EP 31-63	1
	EP 67-300	2
180024	Circuit breaker, 2-pole, 6A	1
130034	STOP button	1
240350	Drain valve	1
380021	Manometer	1
300017 / (493)	O-ring, seal immersion heater (one per immersion heater/ blind plug)	1
245077	Automatic bleed valve (boiler with safety equipment)	1
440196	Pressostat 0 - 6 bar (boiler with safety equipment)	1

## Option

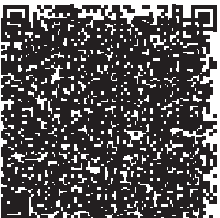
1909	OTC 7/15/30 (temperature compensated, complete)	
210211	Outside temperature sensor for OTC	
4801	Flan kit EP 135-750, one fan, complete	
4802	Flan kit EP 135-750, extra fan, complete	
500030	Fan for 4801 and 4802	1
500031	Filter for 4801 and 4802	1
4805	Fan kit EP 31-119, one fan, complete	
4806	Fan kit EP 31-119, extra fan, complete	
500032	Fan for 4805 and 4806	1
210206	Temperature sensor for 4801,4802, 4805 and 4806	1
4804	Secondary control EP31-750, complete	
210203	Temperature sensor for 4804	1
4803	Series control two boilers EP31-750, complete	

## Safety equipment

Contents: safety valve(s)  
high-pressure switch  
automatic venting valve

Item no.

	EP	31 - 63	70 - 119	135	150	180	225	255	270	300
1.5 bar		4840	4841	4843						
2.5 bar		4844	4845	4846		4847				
3.0 bar		4848	4849	4850			4851			
4.0 bar		4852	4853	4854				4855		
6.0 bar		4856	4857	4858						



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