

TR-C SERIES

GAS OR LPG 3 PASS STAINLESS STEEL
CONDENSING HOT WATER BOILER



INSTALLATION, OPERATING & MAINTENANCE MANUAL

MODELS 175 - 230 - 290 - 350 - 465 - 625 - 810 - 1000 - 1250



HIGH EFFICIENCY BOILER-PLANT

ATLANTIC 2000 - boilerplant sales ACM ATLANTIC - commissioning and maintenance ATLANTIC 4422 – spares

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***Gas fuel
TR C type condensing
central heating boiler
installation, operating and
maintenance procedure***



ENSURE THAT THE BOILER PERSONNEL READ
THESE OPERATING-MAINTENANCE INSTRUCTIONS
!

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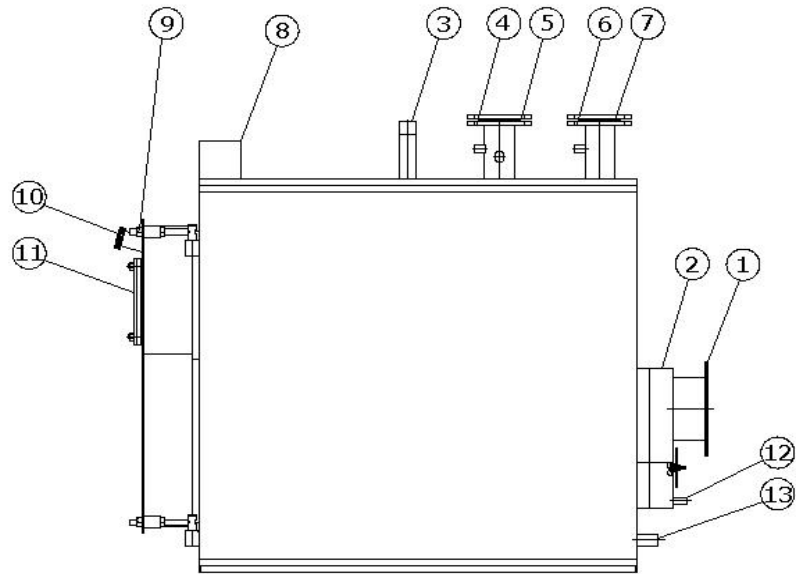
- TRC type condensing hot water boilers have triple pass. The heat is transferred into water by radiation in the combustion chamber where the 1st passage takes place, and by convection and conduction in the smoke pipes where the 2nd and the 3rd passages take place.
- With the wet back design, the heat transfer surfaces provide maximum benefit.
- Efficiency reaches up to 106% as a result of the heat gained by condensing the water vapor in the chimney gas.
- The condensation is achieved by gas delaying turbulators, by increasing the speed of the smoke and gases in the flame pipes and thus keeping convection at optimal level and ensuring the low level temperature of the smoke gas.
- Liquid and gas fuelled condensation hot water boilers, which provide high efficiency with these features, lower operational costs by quickly getting into the steady state.

STANDARDS APPLIED TO MANUFACTURING AND TESTING

BOILERS BETWEEN TR C 175 – TR C 1250

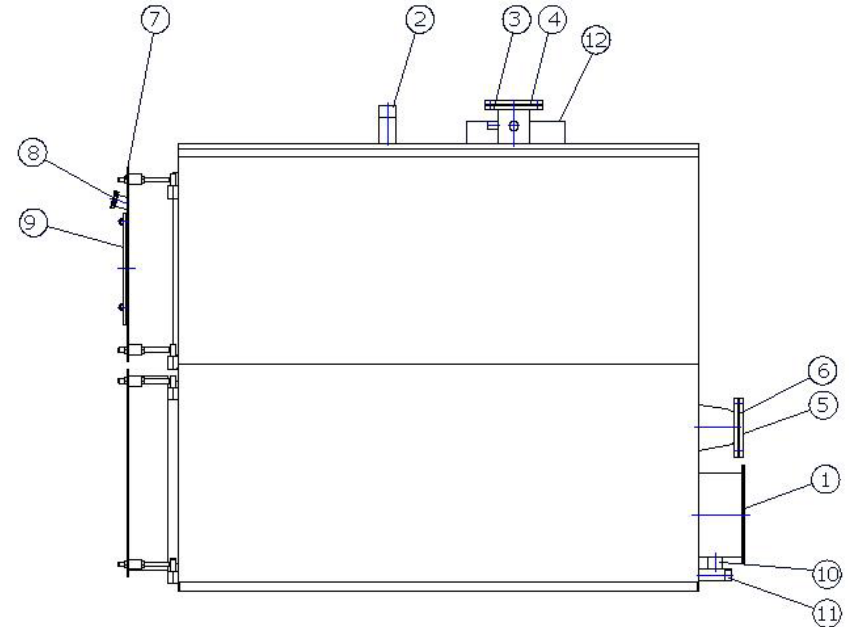
TS EN 303-1
 TS EN 303-3
 TS EN 304

INTRODUCTION



TR C 175-350

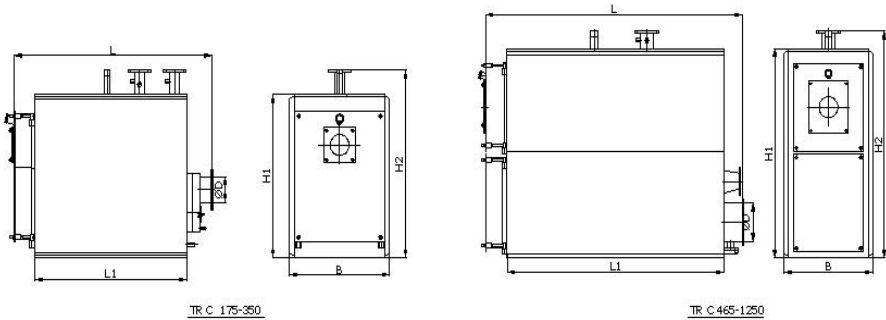
1. Chimney duct
2. Smoke chest
3. Safety Connection
4. Input to the system
5. Counter Flange
6. Return from the System
7. Sealant
8. Control Panel (CP) (Optional)
9. Door connection elements
10. Observation mechanism
11. Burner adapter flange
12. Condensation water discharge sleeve
13. Boiler filling discharge sleeve



TR C 465-1250

1. Chimney duct
2. Safety Connection
3. Input to the System
4. Counter Flange
5. Return from the system
6. Sealant
7. Door connection elements
8. Observation mechanism
9. Burner adapter flange
10. Condensation water discharge sleeve
11. Boiler filling-discharge sleeve
12. Control panel (CP) (Optional)

BOILER DIMENSIONS




BOILER TYPE	TR C 175	TR C 230	TR C 290	TR C 350	TR C 465	TR C 625	TR C 810	TR C 1000	TR C 1250
Capacity (kW)	175	230	290	350	465	625	810	1000	1250
L (mm)	1690	1790	1940	2095	2215	2240	2640	2465	2865
L1 (mm)	1300	1400	1550	1700	1802	1801	2200	2000	2400
B (mm)	875	875	900	900	830	930	1010	1010	1010
H1 (mm)	1250	1250	1300	1300	1595	1738	1738	1922	1922
H2 (mm)	1413	1413	1465	1465	1710	1850	1850	2037	2037
ØD (mm)	200	200	250	250	300	300	300	400	400
Water Outlet Nozzle	DN 80	DN 80	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125	DN 150
Water Inlet Nozzle	DN 80	DN 80	DN 100	DN 100	DN 100	DN 100	DN 125	DN 125	DN 150
Safety Connection	DN 40	DN 40	DN 50	DN 50	DN 50	DN 50	DN 65	DN 65	DN 80
Water Volume (lt.)	490	520	580	620	520	540	720	810	960

BOILER OPERATING PERSONNEL

Boiler operating personnel (boiler operator) should be knowledgeable about general boiler failures and their reparation, as well as the tasks and working principles of all measurement, adjustment, control and safety devices on the system.

The boiler operator should have an official document (boiler operator certificate) verifying his expertise on the above mentioned issues.



**MAKE SURE THAT THE BOILER PERSONNEL
POSSESS BOILER OPERATOR CERTIFICATE !**

TRANSPORTATION AND TEMPORARY STORAGE:

- The boiler should be transported using the lifting and transportation points by detaching the top isolator sheet and appropriate equipment.
- For horizontal movement; where it is not possible to utilize a winch, horizontal displacement is possible through controlled sliding on pipes.
- The boiler should be protected against mechanical blows and collisions during loading, transportation and unloading.
- It must be protected against damages resulting from moisture and external mechanical factors that may arise during temporary storage before transportation and installation.



**USE THE BOILER COMPLYING WITH WARNINGS AND
RECOMMENDATIONS IN THIS INSTRUCTIONS.**

BOILER INSTALLATION

- Install the boiler in the boiler room at the installation site on a foundation elevated from the floor.
- Make the boiler mechanical connections as per the installation circuit diagram.
- Boiler installation site should comply with the related standards and procedures. It must have a door opening to the outside, a fresh air inlet duct at floor level and a polluted air discharge chimney duct at ceiling level (apart from the boiler chimney). The door and the window frames must be of non-flammable material.
- Boiler room should be equipped with fire extinguisher and fire cabinet.
- The burner, and the boiler control panel connections should be performed by eligible technical personnel in compliance with the burner user manual and vendor installation diagram.
- The boiler must be used with the boiler control panel. (We also recommend a thermometer to be placed on the ½" sleeve located on the boiler return pipe.)
A hydrometer (open expansion) or manometer (closed expansion) should be placed on the boiler outlet pipe or collector.
- The boiler may be used in an open or closed expansion system. In case it is used in a closed expansion system; a closed expansion tank suitable for the total boiler and central heating water volume should be used at building static water level pressure and with adjusted gas side pressure. The closed expansion tank should be connected to the expansion nozzle directly on the boiler or to the boiler main outlet or return pipe provided that there is no stop gate valve. A pressure relief valve with opening pressure of 1,05 bars over the boiler operating pressure should be used.
- More than one boiler should not be connected to the same chimney.
- The boiler must be provided with a chimney and smoke channel in compliance with the regulations and standards of the authorized institutions regarding the smoke gas debit used.
- Our boiler is designed for 50-30°C and we advise it to be operated with condensation for maximum efficiency.

- Condensation water output no 12 on pages 7 and 8 must be connected to the closest output via a steel or plastic pipe.
- Counter flanges of installation outlet and installation return nozzles and counter flange of smoke channel outlet supplied with the boiler should be used for the installation of boiler to the plant.

In order to prevent battery corrosion, the boiler must be grounded with,

- a) 0.5m², 2mm thick copper sheet,
- b) 0.5m², 3mm thick hot dip galvanized sheet
- c) Massive copper bar electrodes

EXPANSION TANK AND SAFETY PIPES

It is essential for the water not to be in direct contact with the air and the temperature not to rise above 100°C in open expansion hot water heating system. There should be outflow and return safety pipes between the boiler and the expansion container fully and independently, without any valves interrupting it in order to ensure the contact of water with the air and to ensure that this connection is not cut off by mistake or due to negligence. The safety valves should be installed without narrowing and continually rising towards the expansion container.

Access to the outflow safety pipe and the expansion tank can be either from top or bottom. However the return safety pipe must be connected from the bottom. The diameters for both pipes based on tank capacity can be obtained from the table below. The safety pipes should never be smaller than 1".

Safety Pipe Diameters		
DIAMETER	Boiler capacity (kcal/h)	
	Outflow pipe	Return pipe
25 - 1"	50.000	100.000
32 - 1 1/4"	130.000	209.000
40 - 1 1/2"	280.000	630.000
50 - 2"	550.000	1.230.000
60 - 2 1/2"	900.000	2.000.000
70	1400.000	3.000.000
80	1900.000	4.200.000
90	2500.000	5.600.000
100	3200.000	7.200.000

Their diameters can be calculated by the following formula.

$$d_f = 15 + 1,5 \cdot (Q_k / 1000)^{1/2} \quad [\text{mm}]$$

$$d_g = 15 + (Q_k / 1000)^{1/2} \quad [\text{mm}]$$

Monitor = 1/2"

It is strongly recommended to place a circulation connection and tap between the outflow safety pipe and expansion tank.

No hardware such as valve or check valve that clog the circulation should be placed on the safety valves.

The volume of the expansion tank is calculated based on the expansion as a result of the temperature rise of the water in the entire system from 10°C to t_m °C. The expansion tank volume in systems with normal hot water of 50/30°C

can be taken as $V_i = 0,06 \cdot V_s$ (liter).

(V_s , is the total water amount in the system in liters)

$$V_s = W \cdot Q_k \quad (\text{liter})$$

Q_k = Boiler thermal power (kW)

W = Specific water amount;

When convector is used : 5.20 lt/kW

When panel radiator is used: 8.33 lt/kW

When cast radiator is used : 12.00 lt/kW

With heating from flooring : 18.50 lt/kw

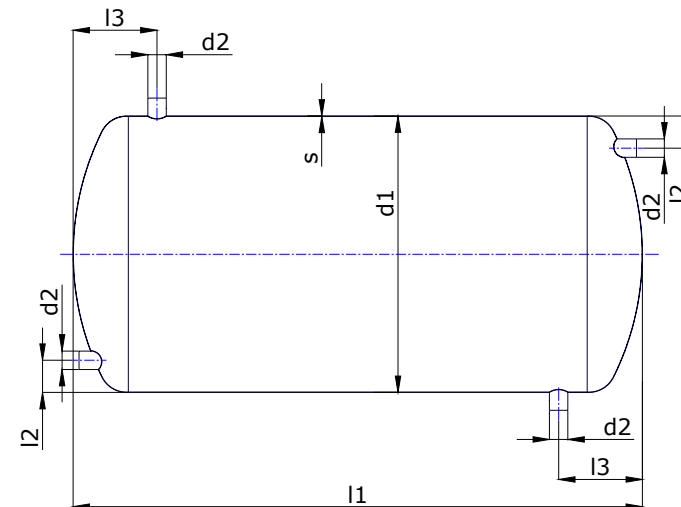
The empirical capacity of the expansion tank can be calculated roughly as follows.

$$V_i = 0,002 \cdot Q_k \quad (\text{liter})$$

Note: The volumes obtained are the useful volume of the tank, and the volume of the tank will be taken as 25% above than this volume.

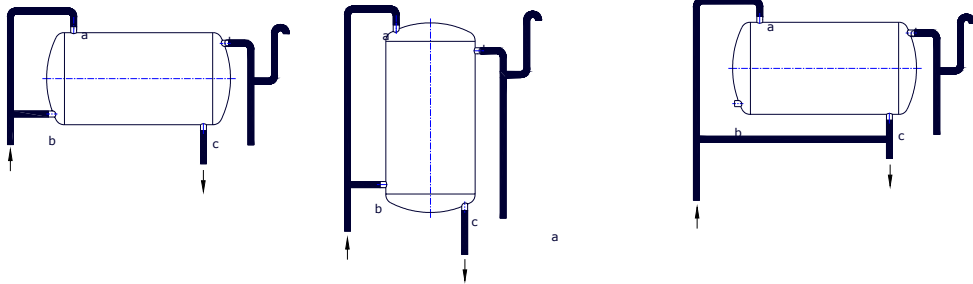
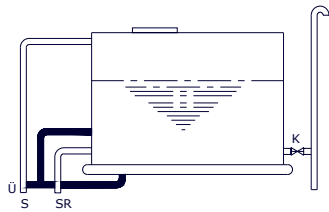
The expansion tanka should conform to TS 713.

(DIN 4806 should be referred to for the matters that are not addressed by TS 713.)

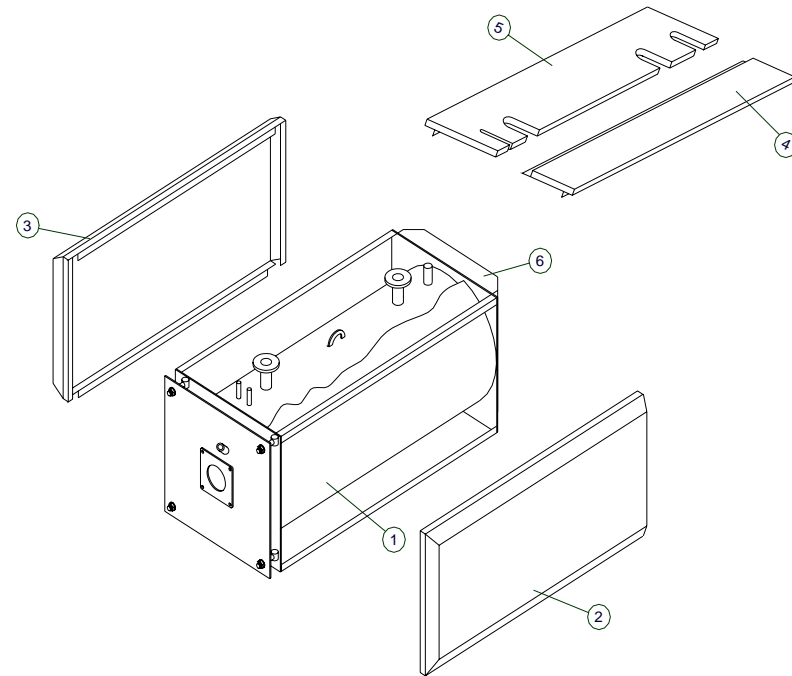


Volume (liters)	d1 (mm)	d2	l1 (mm)	l2 (mm)	l3 (mm)	s (mm)	Weight (kg)
30	300	R 1"	500	50	100	3	14
50	350	R 1"	580	50	105	3	19
75	400	R 1 1/4"	670	50	115	3	25
100	400	R 1 1/4"	870	60	115	3	31
125	500	R 1 1/4"	710	60	130	3	34
150	500	R 1 1/4"	850	60	130	3	40
200	500	R 1 1/2"	1110	60	140	3	49
250	500	R 1 1/2"	1350	60	140	3	57
300	600	R 1 1/2"	1180	60	150	3	63
400	650	R 2"	1310	70	170	3	77
500	700	R 2"	1420	70	180	3	89
600	700	R 2 1/2"	1660	80	190	3	103
800	800	R 2 1/2"	1700	80	200	4	158
1000	800	R 2 1/2"	2125	80	200	4	190

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INSULATED CARTRIDGE INSTALLATION



- Attach the side insulation cartridges numbered 2 and 3 to the boiler. Make sure that they appropriately fitted into the slots on the skirts of the side cartridge.
- Attach the No.4 upper insulation cartridge onto the bottom slot and fit it in completely.
- Upon attaching the No.4 cartridge, attach No.5 upper insulation cartridge the same way.

BURNER SELECTION AND INSTALLATION

To achieve efficient combustion, the burner to be attached to the boiler should be selected in compliance with forming an appropriate flame for the combustion chamber defined in the boiler technical specifications section.

During the installation of the burner, care should be shown to match burner nozzle axis with combustion chamber axis.

To prevent entry of excess air into the combustion chamber from outside, the burner installation should be performed carefully to prevent leakage.

The gas fuel used for operating should comply with burner manufacturer recommendations.

It should be calculated as; Burner firing power = Boiler capacity/Boiler yield. Choose an appropriate burner with this capacity that meets the boiler counter pressure. When ordering a boiler, inform the related sales personnel about the burner selected, to ensure that the boiler door and connection flange is designed in compliance with the burner.

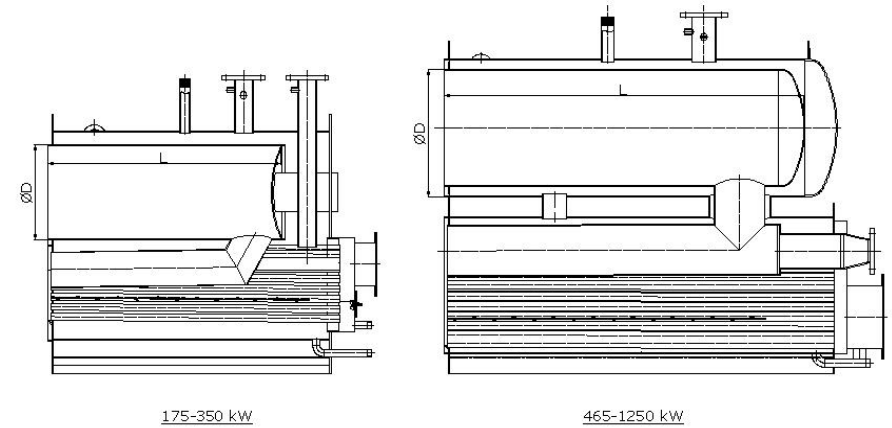
Use a burner with an appropriate barrel length in your boiler.

The burner barrel tip must enter the burning chamber for a minimum of 30mm.

Burner operation and safety system must conform to the boiler control panel.

Our boiler can be used with single increment, double increment or modular burner.

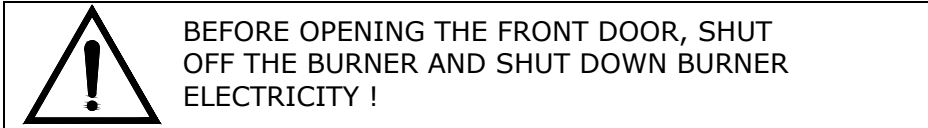
COMBUSTION CHAMBER DIMENSIONS



	BOILER TYPE								
	TR C 175	TR C 230	TR C 290	TR C 350	TR C 465	TR C 625	TR C 810	TR C 1000	TR C 1250
Combustion Chamber Length (L)	1095	1195	1335	1486	1689	1699	2099	1921	2326
Combustion Chamber Diameter (D)	450	450	500	500	554	604	604	704	704

FUEL SELECTION AND STORAGE:

- Appropriate gas fuel complying with the characteristics indicated in the burner user manual or burner vendor catalogues should be obtained.
- Fuel transfer lines and gas path armature set should conform to current technical specifications, regulations and standards.

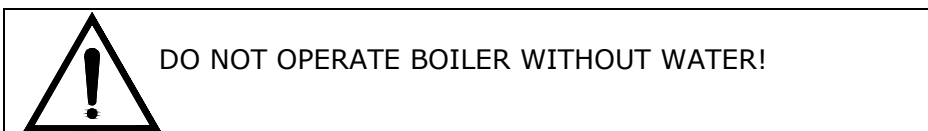


FILLING THE SYSTEM WITH WATER

The boiler should be filled with water before operation. The boiler should not be operated before it is filled with water.

To fill the boiler with water, the main distribution and collection pipes, the boiler feeding pipes, installation column valves should be opened fully, water should be let in from the filling/discharge tap and it should be filled slowly until water starts coming from the monitor pipe of the Expansion Tank. In closed expansion systems, during water filling from boiler filling/discharge tap, the air discharge tube valves and mechanical purgers should be opened and then closed when it is observed that the incoming water does not have bubbles. When the air tube at the top most level of the installation or at the roof is completely filled with water, filling will be completed.

The circulation pump should not be operated during the filling process. The expansion tank connections should conform to the installation circuit diagram.



PREPARATION OF BOILER FOR OPERATION

The boiler room must be designed to meet the combustion air requirements of the boiler.

The boilers should be completely cleaned from internal and external dust, soot, etc.

The smoke channel, smoke pipe and chimney cleaning doors should be checked and leakages should be prevented.

The conformance of the provided gas pressure to the relevant burner and boiler, the sealings and the functional operation of the control system should be checked.

The fuel combustion system should be reviewed with respect to the system's working principles and each element should be controlled for proper operation.

Boiler safety devices (manometer, hydrometer, safety valve, thermostat, visual and sound warning system etc.) should be reviewed to ensure proper operation.

SAFETY RULES

- Use the boiler only for hot water production for the closed circuit heating system.
- Use the boiler complying with warnings and recommendations in this procedure.
- Have the heating system installed by authorized personnel.
- Have the boiler electrical connections made by authorized personnel.
- Do not operate boiler without water.
- When opening the front door and the front smoke chest door , shut off the burner and shut down burner electricity.
- Make sure the boiler personnel are certified boiler operators.

- Make sure that water conforming to EN 12953-10 is used in the boiler. (See page 38.)
- Boiler water temperature is designed for 50-30°C. Install a safety system to prevent water outlet temperature from exceeding 100°C.
- Perform the inspection and maintenance activities of the boiler thoroughly.
- The boiler chimney should be built in compliance with chimney building rules. Airbrick and briquette should not be used in boiler chimneys. The fuel used must conform to the standards and regulations in effect.
- The conformance of the chimney gas emission values to the national and international standards and regulations in effect must be ensured and checked.
- In closed expansion systems, the expansion tank gas pressure should be checked to be equal to that of the building static water height and the operation of the safety valve should be tested at opening pressure.
- Have the initial operation of the burner performed by authorized service of related burner company. The burner capacity adjustment should be made as per the label capacity of the boiler and the boiler efficiency value stated by the manufacturer firm for the boiler. A burner adjustment above the boiler label value should not be allowed.
- If abnormal noises are heard from the boiler or the installation, the burner should be stopped immediately and the fuel inlet should be closed. The investigation and repair of the malfunction should then be made.
- If leakages are observed on the burner fuel attachments and transfer lines, the burner should be immediately stopped and line valves should be closed. If natural gas or LPG is used, use a leakage detector device in the boiler room and an automatic fuel cut-off system on the main inle

- If LPG is used, when icing and dew is observed on the fuel pipes due to the liquidizing of residual gas in fuel pipes from the previous night especially on cold days, the burner should absolutely not be used. The LPG should be carefully discharged from the drain tap. (Liquidizing may also form at normal times due to gasification level control or line regulator problem.)
- In cold climate regions, measures should be taken to prevent the installation water temperature from falling to freezing temperature. Circulation pump should be operated continuously at workplaces that are closed at night and during weekends. If heating is to be stopped for a long period of time, the boiler and system water should be discharged. Antifreeze should not be used. (Antifreeze causes corrosion and a decrease in water thermal capacity.)
- If the burner malfunctions, burner computer reset button should not be pressed more than two times. If the burner still does not work, the related authorized service should be called.
- The minimum distance between boiler hot surfaces and structural elements and electrical installation elements should be 50 cm.
- We recommend installation of sensors that will detect gas leakages, fires and earthquakes that may occur around boiler and in boiler room and a safety system that will cut off the gas automatically from the building inlet in the above cases.
- The drainage of water that will be produced as a result of condensation in the rear smoke box area should be connected to the nearest outlet by means of a corrosion-resistant pipe with at least 2% slope.
- A flush system should be provided on the boiler condensation water outlet line in order to prevent the chimney from sucking air. Flush should be easy to remove, cleaned once a week and its cross section clearance should be checked.

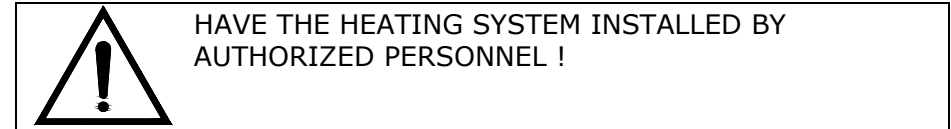
PUTTING BOILER IN OPERATION

- Before the gas fuel condensation heater boiler is operated, the existence of the following conditions should be checked:

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- The boiler thermostats should be adjusted to the appropriate value.
- It should be made sure that the heating system is filled with water.
- It should be ensured that all the valves are open by filling the system with water (except the emergency circulation pump and the by-pass valve). Air should be discharged from the air valves and purgers in the system. Circulation pump should not be operated during air discharge.
- Circulation pump should be started.
- The burner should be started from the switch on burner power panel.
- When the boiler is in steady state (1-1.5 hours after the burner has started), burner optimum air fuel adjustment should be made using the chimney gas analysis device.
- Fuel cut-off valves are opened and the burner is started.
- Hourly fuel quantity is calculated with the formula of $B=Q_k/(H_o*v)$.
 B : Fuel quantity per hour [kg/h],[Nm³/h]
 Q_k : Boiler output [kcal/h]
 H_o : Fuel top thermal value [kcal/kg],[kcal/Nm³]
 v : Boiler yield must be obtained from table on page 9.
- The type of fuel (Natural gas, LPG) and gas consumption according to line pressure must be checked from the relevant gauge.
- If the boiler water is overheated, the circulation pump should be controlled. (It may be turning in reverse due to misplaced connectors.) If that does not bring a solution, the burner should be stopped and the installation should be checked.
- Open the boiler door carefully.

- Protect the front door and the front smoke chest fire cement surface from collusion with hard objects (skewer, brush arm, turbulence makers, etc.).
- During the initial firing of the boiler after manufacturing, run it at a 25-30% capacity setting for about 2 hours to let the moisture in the cover fire cement be disposed of in a healthy manner.



HEATING SYSTEM ADJUSTMENTS:

The boiler circulation pump should be checked for proper selection and adjustment.

a- Pump flow should be calculated with the formula below:

Q_p : Pump flow rate.

$Q_p: Q_k/[C_p*(t_g-t_d)]$: [lt/h].

Q_k : Boiler output [kcal/h]

C_p : Specific heat of water [1 kcal/(kg.°C)]

is taken as $t_g-t_d=20$ °C (in 50/30 °C system)

b- Pump pressure;

H_p : [Mss] Should be greater than the calculated critical circuit pressure of the building.

The pump selection should be approved by the (Mech. Eng.) responsible for the building project and the technical application. Where a project and calculations do not exist or are not available, regulations can be made by placing thermometers, one each, on the boiler outflow and return lines, a manometer to the circulation pump exit and by adjustments with the help of the related pump curve, through the circulation pump valves so that the water temperature difference between outflow and return lines is 20°C. In the case of big pump selection, the outflow-return temperature difference will stay below 20° C and boiler outflow temperature may not rise, and in the case of small pump selection, the outflow return temperature difference will be over 20° C and the high and remote radiators may not function efficiently enough.

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The water level and pressure should be controlled by the hydrometer or manometer in the heating system every morning. If it is below the normal value, water should be added while the boiler is cool. If it is a closed expansion system, the closed expansion tank gas pressure should be controlled to be equal to the static water height of the building. This control should be done on the expansion tank manometer if it is present, if not, it should be done from the gas side valve with a manometer.

If the pressure is excessive, it should be discharged from the related valve, if it is insufficient, nitrogen gas should be added by the expansion tank authorized service.

If water comes out from the valve during the check instead of gas or air, this means the tank diaphragm is torn and it should be changed by contacting an authorized service.

DISCHARGE OF BOILER WATER

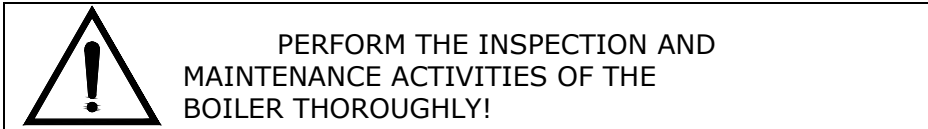
- After a season's utilization, the boilers should be cleared of gasket remains, mud and residue in the heating system.
- The blind flanges at the lowest level of the main distribution and collection reservoir and boiler filling-discharge tap are opened, and the system and boiler water is rapidly flushed out.
- After cleaning operation, the system should be filled with water (as described in the article **filling the system with water**).
- The boiler water should not be discharged at any time except pre-operation cleaning and water should not be added to the boiler except for the purpose of compensating any depletion in the expansion tank.

TAKING BOILER OUT OF OPERATION

The taking of boiler out of operation should be as follows:

- The burner is stopped and boiler surfaces are cooled.
- The electrical feeding of the burner should be turned off using the circuit breaker or the switch and the boiler door should be opened.
- The fire smoke gas surfaces of the boiler should be checked and cleaned if dirty.
- The cleaned surfaces should be checked under strong light to detect damages like leakages, oozing, cracks, etc. If such damages exist, the authorized services are notified and the necessary repairs are done.
- The liquid fuel between the burner and the main fuel tank should be discharged and the fuel system should be cleaned with kerosene.
- Active lime should be sprinkled into the combustion chamber, smoke pipes and smoke channels.

-
- The chimney cleaning flap should be brought to fully open position. It should be closed down after the chimney cleaning.
 - The damaged heat insulators should be repaired.
 - The burner maintenance should be done as per manufacturer recommendations.
 - During non-operational period, the boiler room temperature should be kept at min. +5° C.
 - The boiler and system water should not be discharged if it is not a necessity. Corrosion formation should be prevented. In long term idle states and at end of the heating season, appropriate chemical protective additive should be added to system water, to prevent negative effects of the oxygen in water on the metal surfaces.



INSPECTION AND MAINTENANCE OF BOILER

Boiler maintenance and malfunction interventions should be performed by Erensan Authorized Service Personnel.

Maintenance and malfunction interventions on the Burner on the boiler should be performed by the Authorized Service Personnel of manufacturer/importer.

1. General Maintenance

Heating system boilers should be subjected to general maintenance at least once a year. The following points should be checked during general maintenance.

- The operation of boiler armatures (thermostat, thermometer, hydrometer/manometer) should be observed continuously and in case of malfunction the required controls should be done and if needed, they should be changed. Heat transfer should be improved by filling the thermometer cartridges with thin lubricant.
- All connections in the system should be controlled for proper insulation, leakages and oozing should be repaired and if needed, the valve gaskets should be reinforced.
- The boiler front big door and the front and rear smoke chest insulation elements should be checked continuously; if leakage exists, the tightening elements and nuts should be tightened in balance; if leakage is not stopped, gasket/sealant should be changed or our authorized services should be contacted. Grease the bolt screws and nuts of tightening elements.
- Combustion chamber, smoke pipe and smoke chest cleaning should take place at least once every 60 days. The turbulators should be taken out and all pipes should be cleaned with a suitable mop. Turbulators should be reinstalled in place after cleaning. For full boiler efficiency, all turbulators should be installed.
- Boiler condensation water output should be checked frequently, and it should be ensured that there is no leakage or obstruction.
- At the end of season, the boiler should be cleaned fully, as in periodical cleaning.

- The boiler and system water should not be discharged if it is not a necessity. At end of season, appropriate chemical protective additive should be added to system water, to prevent negative effects of the oxygen and similar corrosive elements in water on the metal surfaces.
- Temperature gages are compared to a calibrated thermometer.
- Safety elements, outlet and return safety pipes and safety valves are checked for proper operation.
- The controls described in article on taking boiler out of operation, are performed.

2. Hydrostatic Test

Boiler parts such as the smoke pipe, nozzle, mirror should pass a hydrostatic test under an authorized mechanical engineer's supervision, when replaced or every 5 years for control purposes.

For boilers up to 1250kW


- Close all outlets and inlets with blind flanges except one outlet/return pipe left open.
- Let water into the boiler from the filling/discharge tap until water comes from the vent left open.
- Also plug the open vent with a blind flange.
- Pressure the boiler to 1.3 times the design pressure. Wait 20 minutes and then check for drop in pressure, leakage, oozing and permanent form changes.

GENERAL BOILER MALFUNCTIONS

Malfunction Symptom	Reason	Solution
No firing	<ul style="list-style-type: none"> • Burner malfunction 	<ul style="list-style-type: none"> • Follow burner manufacturer recommendations.
Dark black smoke from chimney	<ul style="list-style-type: none"> • Air excess coefficient is low • Circuit voltage low • Increase in the gas pressure or decrease in the temperature 	<ul style="list-style-type: none"> • Check the fresh air entering the boiler room or burner air setting. • Voltage drop will cause motor rotation to drop and result with a low fuel-air mixture. • Have the pressure and the temperature checked.
Drumming noise in boiler water compartment	<ul style="list-style-type: none"> • Air in system. • Wiring and installation error 	<ul style="list-style-type: none"> • Discharge the air. • Check the connections according to the system installation circuit diagram.
Overheating in boiler water	<ul style="list-style-type: none"> • Circulation pump malfunction. • Thermostat malfunction 	<ul style="list-style-type: none"> • Check circulation pump for reverse turning. • Check boiler thermometer for proper operation.

For malfunctions listed above, boiler operator personnel intervention is sufficient. For malfunctions apart from these, contact our authorized services.

Malfunction Symptom	Reason	Solution
Boiler output water temperature not rising	<ul style="list-style-type: none"> • High water speed • Inappropriate burner selection for the boiler capacity 	<ul style="list-style-type: none"> • If the circulation pump is set for cycle, the cycle should be reduced, if it has one cycle the valve should be reduced and regulation should be conducted or should be replaced with an appropriate pump. • Get an authorized service to check your burner.
Condensation in the smoke gas	<ul style="list-style-type: none"> • Incorrect thermostat adjustment or malfunctioning thermostat • Incorrect pump selection or inappropriate cycle or regulation 	<ul style="list-style-type: none"> • Adjust or change the thermostat. • Regulation compliant with the pump or cycle change
Dye burn, heat rise, fire cement or turbulence maker deformation on the front door	<ul style="list-style-type: none"> • Incorrect burner selection and high setting 	<ul style="list-style-type: none"> • Burner replacement, repair to appropriate barrel measurement and burner adjustment are necessary.
Chimney gas temperature rising	<ul style="list-style-type: none"> • Operation without or with deficient turbulence maker, incorrect burner setting and selection 	<ul style="list-style-type: none"> • Turbulence maker should be attached or its deficiencies should be completed, the burner setting should be done correctly and appropriate burner should be provided



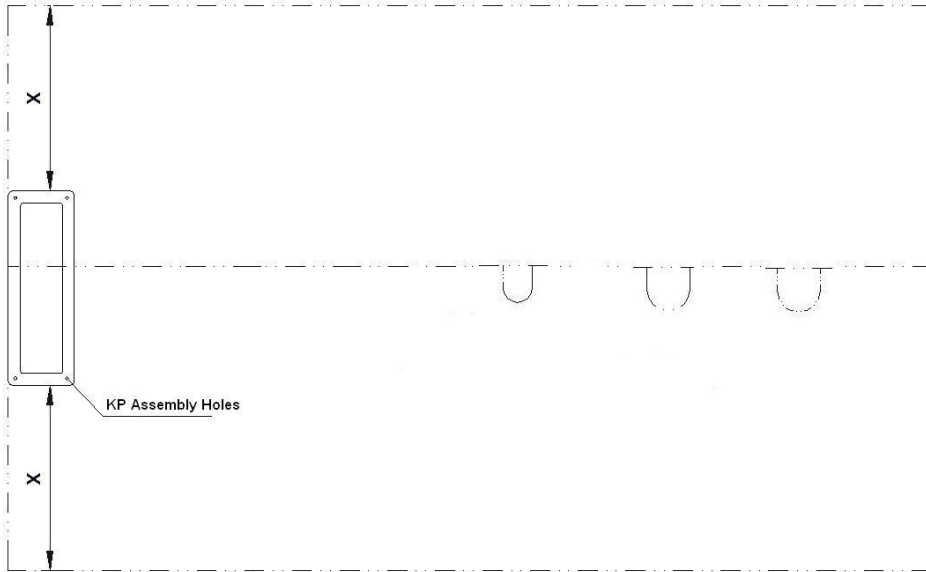
HAVE THE BOILER ELECTRICAL CONNECTIONS MADE BY AUTHORIZED PERSONNEL !

BOILER CONTROL PANEL INSTALLATION INSTRUCTIONS

- Boiler Control Panel (CP) supplied with the boiler has a plastic body mounted on the upper insulation plate. The insulated plate of CP plastic body material withstands external surface temperatures.
- Flax the 2 pieces of 1/2" brass cartridges supplied with the CP and install them on the sleeves on the outlet pipe of the boiler with proper insulation. Stop the empty sleeves with 1/2" blind plugs.
- Disassemble the CP body into two pieces, removing the 4 connection screws. Check that the marked 375x48 mm section at the base is drained. Pass the thermometer and thermostat sensors through this gap and place them (at most 3 each) in the cartridges. Put light machine oil inside the casings and seal the upper part with silicon.

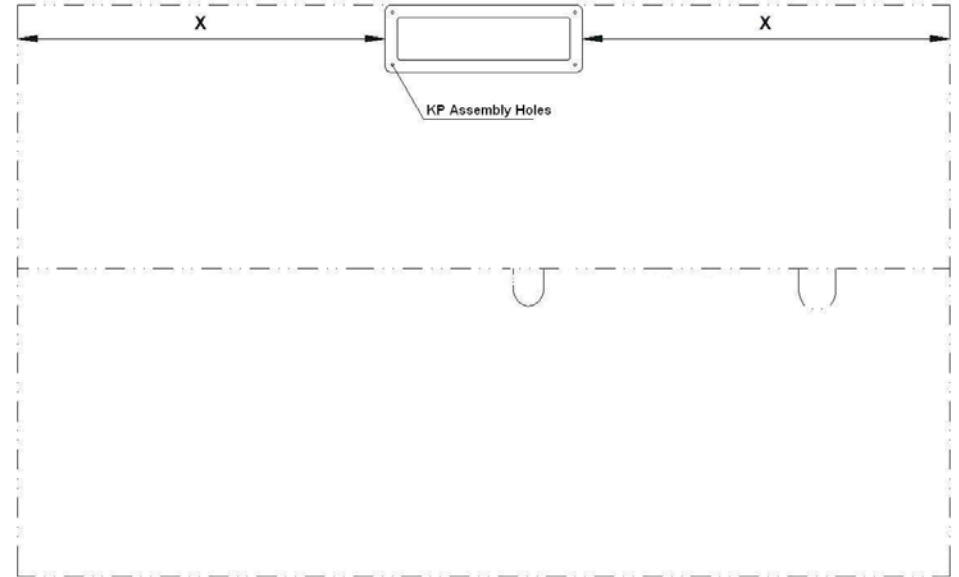
For TR C 175 – TR C 350 Types;

- Drill the CP lower body as below, from the screw points marked on 410 x 65mm axis measures with a 4mm tip, concurrently with the upper insulation sheet.



For TR C 465 – TR C 1250 Types;

- Drill the CP lower body as below, from the screw points marked on 410 x 65mm axis measures with a 4mm tip, concurrently with the upper insulation sheet.

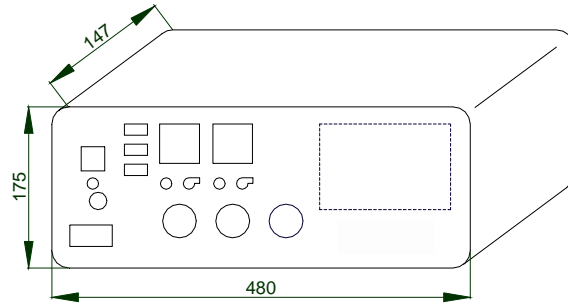


- Make the electrical connection between the CP exit contact and burner contact, complying with the wiring diagram (with the number of connections) with 0.75mm² cable. Open enough positions in the cross sectional area behind the CP for cable pass-through and use bushings.
- Securely screw the CP lower body onto the upper isolator sheet of the boiler with 4 4.2x13mm metal sheet screws.
- Put the upper body of the CP in place and close it by tightening with 4 screws.
- Ask the operating personnel to fill the boiler and system with water. When the boiler and system is filled with water, expansion system is controlled, the circulation pump is seen to be operational, you may power the control panel.
- Make the sequential controls on the CP and declare that the burner may be started by the authorized service technician. Supervise the operation of the burner by the related technician and make the functional controls of the CP elements.

- When no adverse situations arise as a result of the functional controls and CP elements are observed to perform their tasks, you can set the CP operational.

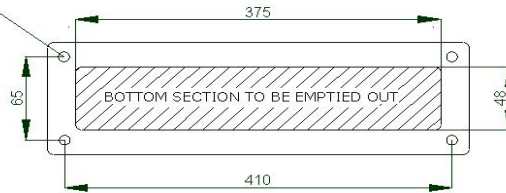
CONTROL PANEL DIMENSIONS

Control panel external dimensions



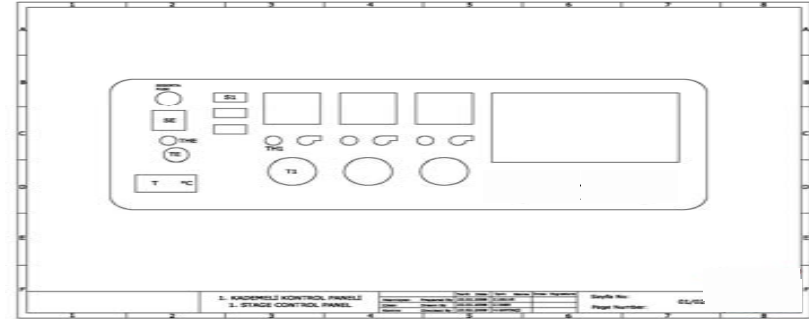
Control panel lower base installation dimensions

SHEET SCREW MOUNTING LOCATION (4.2x13mm)



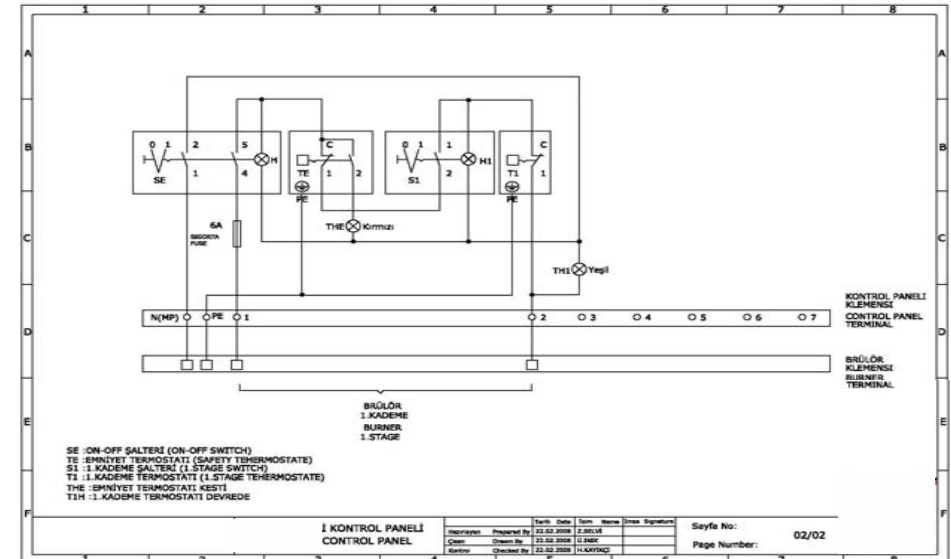
BOILER CONTROL PANEL ELECTRICAL SCHEMA

KP-1 control panel

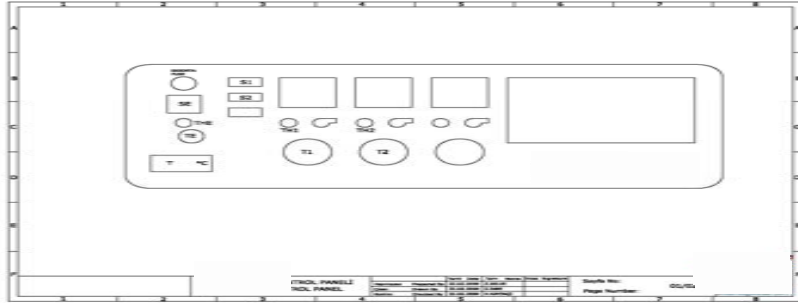


1. Manual on - off switch
2. Fuse (6A)
3. Safety thermostat (With manual reset)
4. Boiler water thermometer
5. Burner ON-OFF switch (1. Level)
6. Thermostat in service signal
7. Limit thermostat

KP-1 ELECTRICAL SCHEMA

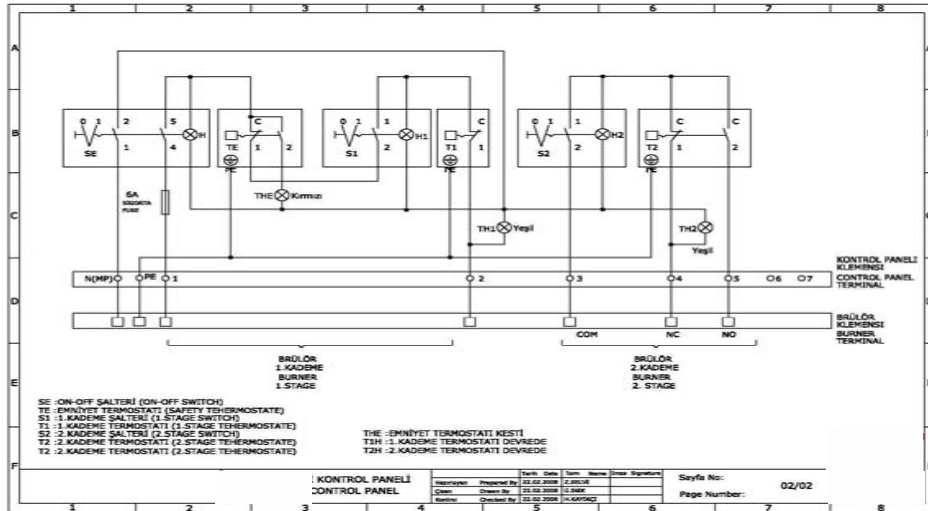


KP-2 control panel



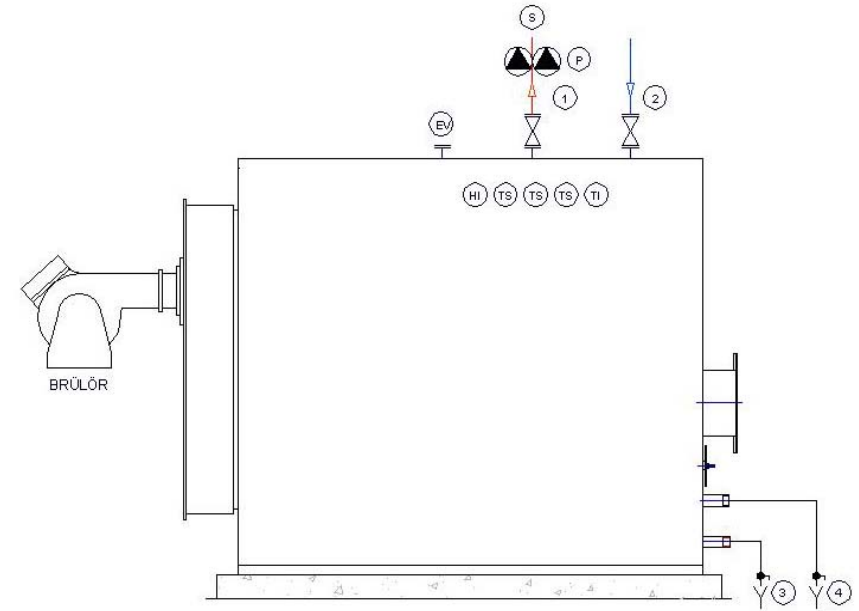
1. Manual on - off switch
2. Fuse (6A)
3. Safety thermostat (With manual reset)
4. Boiler water thermometer
5. Burner ON-OFF switch (1. Level)
6. Burner ON-OFF switch (2. Level)
7. 1st Level in service signal
8. I. Level thermostat
9. 2nd Level in service signal
10. II. Level thermostat

KP-2 ELECTRICAL SCHEMA

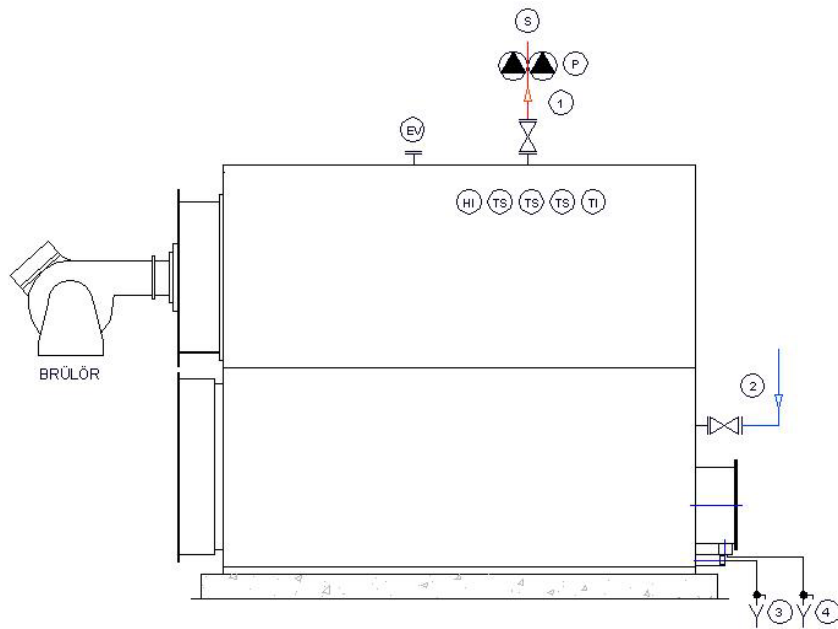


INSTALLATION CIRCUIT DIAGRAM (EXAMPLE)

TR C 175-350



- HI Hydrometer
 TS Thermostat 30-90 °C
 TI Thermometer 0-120 °C
 EV Expansion tank connection vent
 P Pump
 S Input to the system
 1. Input to the system
 2. Return from the system
 3. Boiler Drainage
 4. Condensation Water Drainage



- HI Hydrometer
- TS Thermostate 30-90 °C
- TI Thermometer 0-120 °C
- EV Expansion tank connection vent
- P Pump
- S Input to the system
- 5. Input to the system
- 6. Return from the system
- 7. Boiler Drainage
- 8. Condensation Water Drainage

BOILER FEED WATER AND BOILER WATER CHEMICAL CHARACTERISTICS

The water to be used in Hot Water boilers should conform to the table values indicated below.

The boiler feed water and boiler water should be checked constantly and the chemical conditions required for the water should be ensured in order to operate the boiler efficiently and economically.

HOT WATER BOILERS FEED WATER

Parameters	Unit	Hot water and Red hot water FEED water
Operating Pressure	bar	entire range
	MPa	entire range
Appearance	-	clean, no suspended particles
Conductivity at 25 °C	µS/cm	< 1500
At 25 °C pH value note 1)	-	> 7,0
Total hardness (Ca Mg)	mg/liter (ppm)	< 5 [= 0,5 Fr.H]
Iron (Fe)	mg/liter (ppm)	< 0,2
Copper (Cu)	mg/liter (ppm)	< 0,1
Silicate (SiO ₂)	mg/liter (ppm)	-
Oxygen (O ₂)	mg/liter (ppm)	-
Oil/grease	mg/liter (ppm)	< 1
Organic materials	-	see paragraph5
1) pH value should be kept between the range of 8.7 – 9.2 in copper alloy system.		
2)		
3)		
4) If there is a non-iron material such as Aluminum in the system, low pG and conductivity may be necessary, in all cases protection of the boiler should be a priority.		
5) If phosphate is used for balanced or coordinated phosphatization process, higher PO ₄ concentrations may be acceptable by considering all other values. (also see paragraph 4.)		

HOT WATER BOILERS BOILER WATER

Parameters	Unit	Hot water and Red hot water BOILER water
Operating Pressure	bar	entire range
	MPa	entire range
Appearance	-	clean, lasting, no foam
Conductivity at 25 °C	µS/cm	< 1500
pH value at 25 °C	-	9,0 - 11,5 Note 4)
Acid capacity up to pH 8.2	mmol/liter	< 5
Silicate (SiO ₂)	mg/liter (ppm)	-
Phosphate (PO ₄) ⁵⁾	mg/liter (ppm)	-
Organic materials	-	-
1)		
2)		
3)		
4) If there is a non-iron material such as Aluminum in the system, low pG and conductivity may be necessary, in all cases protection of the boiler should be a priority.		
5) If phosphate is used for balanced or coordinated phosphatization process, higher PO ₄ concentrations may be acceptable by considering all other values. (also see paragraph 4.)		

Ref : prEN 12953-10, Table 5-1, 5-2; 1998

BOILER LIFE SPAN

The Ministry of Trade and Industry has determined the life span of hot water boilers as 10 years. If boilers are utilized in compliance with operating and maintenance instructions, it is possible to go well over the ministry stated life span. Therefore, **make sure that this operating and maintenance procedure is read and fully applied by operating personnel.**

When the boiler has reached unusable state, remove the junk from usage area in compliance with environmental procedures.

WARRANTY TERMS

Warranty period is 2 (two) years starting from the date of delivery of the product.

Boiler and all components thereof are within the warranty scope of our company.

In case the boiler fails within warranty period, the time of repair will be added to the warranty period. Repair time for boiler is 30 business days maximum.

In case the boiler fails due to material and workmanship defects within the warranty period, it will be repaired free of charge.

Situations excluded from warranty scope:

- Malfunctions due to improper use of boiler as per Installation, Operation and Maintenance Instructions,
- Damages and malfunctions due to repairs and modifications performed by persons other than Erensan Authorized Service,
- Damages and malfunctions due to transportation,
- Damages and malfunctions due to storage of boiler under improper conditions or due to physical and chemical external factors,
- Damages and malfunctions due to foreign substances that will penetrate into boiler during installation and operation,
- Malfunctions due to incorrect boiler installation and connections, incorrect capacity and chimney selection and installation overpressure,
- Damages and malfunctions due to under- or overvoltage in electrical equipment, and due to faulty electrical installation.