



Gas and Liquid Fuel Steel Boiler



**3 Pass CGS3 Series
116-3.489 kW Low Temperature Boiler**



LEADER IN STEEL BODY BOILERS

Gas and Liquid Fuel **3 PASS CGS3 SERIES** Steel Boiler



STATE OF THE ART TECHNOLOGY

All manufacturing processes, methods and materials comply with the relevant European and national norms. Boilers are manufactured using cutting edge automation technologies such as CNC punch, CNC plasma, NC welding robots and NC bending.

HIGH EFFICIENCY

High volume combustion chamber and maximized heat transfer surfaces ensure efficiency and maximized energy transfer to water.

Efficiency is maximized while gas and water side boiler resistance and boiler stand-by losses are minimized. As the burner flame travels through the combustion chamber following a shorter route, quicker and with lower heat, the CGS3 series boilers have lower nitrogen oxide emissions compared to 2 pass boilers.

No environmentally hazardous materials (such as asbestos) were used in production of the boiler.

BURNER COMPATIBLE OPERATION

No need for long nozzle, high pressure burners. A highly efficient, stable, smooth and silent combustion is achieved through the use of burners in accordance with EN 676 and EN 267 standards.

AESTHETICALLY APPEALING DESIGN

The outer protection plates are double shielded against corrosion and ambient conditions:

1. Both surfaces are coated with a special organic protective primer coating.
2. The front side is coated with an appealing protective topcoat.

Note: Types 1.000 - 3.000 the outer shield is in the form of metal sheets wrapped around the cylindrical body.

LONG SERVICE LIFE

Long service life thanks to design and calculations in accordance with European directives (EN 12953), certified materials, balanced design in the thermal expansion areas and approved automated source methods.





Single Block Steel Boiler Body

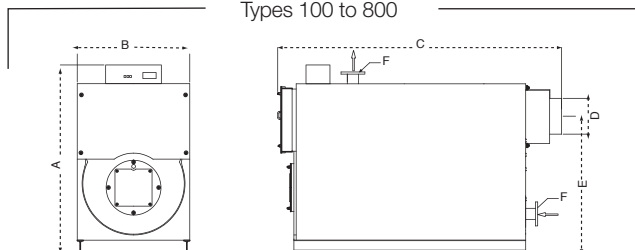
The boiler has a completely welded, flame flue type, single block steel body. Possible thermal stresses are balanced thanks to homogeneous heat transfer the thermal stresses are balanced. It has a long service life.

CGS3
100-800

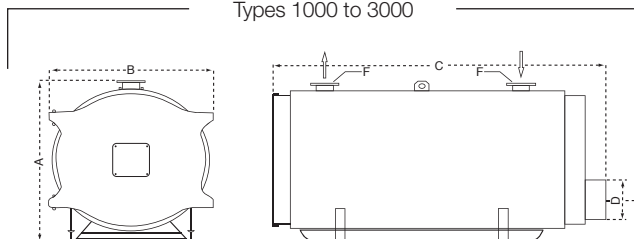
CGS3
1000-3000



Types 100 to 800



Types 1000 to 3000



		CGS3 100	CGS3 125	CGS3 150	CGS3 200	CGS3 250	CGS3 300	CGS3 350	CGS3 400	CGS3 450	CGS3 500
Rated thermal power*	kcal/h x 1000	100	125	150	200	250	300	350	400	450	500
	kW	116	145	174	233	291	349	407	465	523	582
Rated thermal load	kcal/h x 1000	108	135	162	216	270	324	378	431	485	539
	kW	125	157	188	251	314	376	439	502	565	627
Efficiency**	%	92.7									
Maximum operating pressure***	bar	3									
Maximum operating temperature	°C	90									
Flue gas side resistance	Pa	5	5	10	27	32	31	35	29	22	50
	mbar	0.5	0.5	1.0	2.7	3.2	3.1	3.5	2.9	2.2	5.0
Recommended flow rate	m ³ /h	5	5	8	10	13	15	18	20	23	25
Water side resistance (at the recommended flow rate)	mbar	5	5	6	6	7	7	8	8	8	10
	mSS	0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.10
Water output to the network	inches	NW50	NW50	NW65	NW65	NW65	NW80	NW80	NW80	NW80	NW100
Water input from the network	inches	NW50	NW50	NW65	NW65	NW65	NW80	NW80	NW80	NW80	NW100
Safety output connection	inches	1"	1"	1 W"	1/1"	1/1"	1/1"	1/1"	1/1"	2"	2"
Safety input connection	inches	1"	1"	1 V	1/1"	1/1"	1/1"	1/1"	1/1"	2"	2"
Boiler weight (w/o water)	Kg	390	450	500	650	805	880	950	1108	1185	1350
Boiler water volume	Lt	250	280	375	440	460	525	600	700	740	800

FLUE GAS VALUES¹

Flue gas temperature	Full load	°C	185								
	Partial load	°C	130								
Flue gas flow rate	Full load	gr/sec	47	60	71	95	117	141	165	188	235
	Full load	m ³ /h	188	237	284	378	471	566	660	753	942
	Partial load	gr/sec	28	35	42	57	71	85	99	113	141
	Partial load	m ³ /h	113	142	170	227	283	340	396	452	565
Flue gas required delivery pressure	Pa, mbar		0								

DIMENSIONS

A	mm	1145	1155	1185	1250	1310	1340	1500	1520	1600	1600
B	mm	725	725	725	785	800	800	880	915	915	1000
C	mm	1420	1520	1670	1780	1820	1890	1990	2120	2190	2345
D	mm	150	150	150	200	200	250	250	250	250	300
E	mm	755	755	785	830	860	90	1060	1060	1060	1127
F	mm	NW50	NW50	NW65	NW65	NW65	NW80	NW80	NW80	NW80	NW100
Combustion chamber diameter	mm	400	400	400	450	480	480	530	550	550	590
Combustion chamber length	mm	950	1050	1200	1300	1350	1420	1450	1580	1660	1740

* These values are for 80 - 60°C regime. Capacity increases about 1.5 - 2% at 70 - 50°C regime and 5 - 6% at 60 - 40°C regime. Contact ACTS for detailed calculations.

** These efficiency values are for natural gas. When liquid fuel is used, these values will be decreasing about 2-5%. Detailed information can be found in our operation manual.

*** Higher working pressure boilers can be produced according to special requirements.

¹ This values apply for 10% CO₂ in natural gas. Calculated at boiler water temperature of 75°C and burning air temperature of 20°C. Partial load is equal to 30% of rated power. Any changes in the partial load are calculated separately.
Note: Flue draft should be between -0,1 mbar and 0 mbar.



Unparalleled insulation and gas tightness

High temperature resistance (1371°C),
High strength (62 kg/cm²)
Low density (1.28 kg/dm³),
Low thermal conductivity (0.33 kCal/hr (C/M)



Minimum feed losses

Boiler radiation and stand-by losses are kept at minimum thanks to aluminium foil, glass wool insulation.

Perfect circulation and maximum heat transfer

Perfect natural circulation and maximum heat transfer thanks to the balanced distribution of large water galleries within the boiler.



Easy installation, simple maintenance and safe operation

Easy installation, maintenance and reliability thanks to specially designed hinge system which can open in two directions. Independently adjustable sealing on the 4 edges. To protect from possible sealing damage, the cover is automatically pulled forward while loosening the hinge side.

		CGS3 600	CGS3 700	CGS3 800	CGS3 1000	CGS3 1250	CGS3 1500	CGS3 1750	CGS3 2000	CGS3 2500	CGS3 3000	
Rated thermal power*	kcal/h x 1000	600	700	800	1000	1250	1500	1750	2000	2500	3000	
	kW	698	814	930	1163	1454	1745	2035	2326	2908	3489	
Rated thermal load	kcal/h x 1000	647	755	863	1079	1348	1618	1888	2157	2697	3236	
	kW	753	878	1004	1255	1568	1882	2196	2509	3137	3764	
Efficiency**	%											
Maximum operating pressure***	bar											
Maximum operating temperature	°C											
Flue gas side resistance	Pa	50	54	55	56	59	59	61	62	67	70	
	mbar	5.0	5.4	5.5	5.6	5.9	5.9	6.1	6.2	6.7	7.0	
Recommended flow rate	m3/h	30	35	40	50	63	75	88	100	125	150	
Water side resistance (at the recommended flow rate)	mbar	12	14	18	20	21	23	24	27	30	35	
	mSS	0.12	0.14	0.18	0.20	0.21	0.23	0.24	0.27	0.30	0.35	
Water output to the network	inches	NW100	NW100	NW100	NW125	NW125	NW150	NW150	NW150	NW200	NW200	
Water input from the network	inches	NW100	NW100	NW100	NW125	NW125	NW150	NW150	NW150	NW200	NW200	
Safety output connection	inches	2"	2"	2"	2"	2 1/2"	2 1/2"	3"	3"	NW80	NW80	
Safety input connection	inches	2"	2"	2"	2"	2 1/2"	2 1/2"	3"	3"	NW80	NW80	
Boiler weight (w/o water)	Kg	1550	1700	1890	2450	2750	3380	3750	4180	5150	5900	
Boiler water volume	Lt	920	980	1290	1617	1748	2121	2321	2811	3544	4492	
FLUE GAS VALUES¹												
Flue gas temperature	Full load	°C										
	Partial load	°C										
Flue gas flow rate	Full load	gr/sec	282	330	376	465	582	698	814	930	1163	1395
	Full load	m³/h	1130	1317	1505	1862	2327	2792	3257	3722	4652	5582
	Partial load	gr/sec	170	198	226	280	349	418	488	558	698	838
	Partial load	m³/h	678	790	903	1117	1396	1675	1954	2233	2791	3349
Flue gas required delivery pressure	Pa, mbar											
DIMENSIONS												
A	mm	1710	1770	1795	1710	1710	1820	1820	1930	2120	2240	
B	mm	1050	1050	1090	1540	1590	1690	1690	1750	1930	2050	
C	mm	2455	2555	2685	2870	3030	3350	3590	3740	4030	4120	
D	mm	300	350	350	400	400	450	450	500	600	600	
E	mm	1234	1256	1350	440	465	465	465	490	500	590	
F	mm	NW100	NW100	NW100	NW125	NW125	NW150	NW150	NW150	NW200	NW200	
Yanma odası çapı	mm	620	630	660	720	770	820	850	870	980	1000	
Yanma odası uzunluğu	mm	1805	1905	2005	2225	2395	2600	2850	3000	3245	3330	

* These values are for 80 - 60°C regime. Capacity increases about 1.5 - 2% at 70 - 50°C regime and 5 - 6% at 60 - 40°C regime. Contact ACTS for detailed calculations.

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Note: Flue draft should be between -0,1 mbar and 0 mbar.

Boiler Control Panels



STANDARD PANEL

1



Boiler Water Sensor



Safety Sensor

The standard panel package includes the boiler sensor and the safety sensor. The desired water temperature value is set in the boiler thermostat. The burner starts and stops according to the temperature value from the boiler water sensor. When the temperature rises excessively, the safety sensor turns off the entire .

ECOPANEL (7/21 and 12/31)

Up to **20%** savings, up to **35%** savings with threeway motor valve.

2



External Air Sensor



Boiler Water Sensor



Safety Sensor

Ecopanel package includes, an outside air sensor, a boiler water sensor and a safety sensor. The desired room temperature is set at the ecopanel. Ecopanel decides the water temperature to be sent to the plant according to the outside air temperature and operates the burner accordingly.

Full Comfortable and Safe Operation with Ecopanel

Ecopanel is a cutting-edge technology microprocessor to operate the heating system in the most efficient and economical manner, optimize operation time, increase service life and provide comfort & economy in one device. It continuously monitors the outside temperature all day long. It provides uninterrupted comfort by operating the boiler to provide the required comfort temperature.

Condensation Safety

In order to prevent the water vapour inside the flue gas from condensing and therefore undermining the service life of the boiler, the ekopanel will stop the circulation pumps temporarily when the burner starts/stops. Boiler temperature dramatically increases. The critical area is free from condensation.

High and Low Temperature Safety

Ecopanel turns the boiler on and prevent the piping and boiler water from freezing when the temperature of the boiler water drops below the freezing point. It stops the boiler when the temperature is too high. It stops the boiler when the temperature is too high.

Lime and Deposits Safety

If the boiler does not operate for a long time, Ecopanel runs the circulation pump and the valve motors at intervals to prevent the sumps from blocking the pump, the valves and the boiler.

Fuel Savings

Ecopanel constantly monitors the outside air temperature. It calculates the "reduced outside air temperature", taking into consideration many factors such as the heat stored in the building walls and the ambient radiation. The boiler operation depends on this temperature. It saves fuel.

Economy under all Circumstances

It saves fuel at night time thanks to "Economy Temperature". When outdoor temperature exceeds a certain limit, automatic summer-winter operation switches the boiler to summer mode to prevent unnecessary heating.

Scheduled Heating

The operating hours of the boiler can be scheduled daily or weekly.

Optimum Switch On/Off

It calculates the start count and running time of the boiler taking into consideration the weekly operation schedule and the set room temperature. It controls the operation of the boiler using these values. Prevent unnecessary operation.

Operating the Modulated Burner:

Ekopanel 12/31 can operate the modulated burner. The variable output relay is used to command the burner modulation with mixer cycle relays.

Therefore; If the modulated burner is to be operated, the number of mix cycles that can be controlled falls from 2 to 1. (*)

Control Panels Difference Table

	Burner 1. Stage	Burner 2. Stage	Direct Circuit	Mixing Circuit 1	Boiler Pump	Mixing Circuit 2	Variable Output 1	Variable Output 2	Modulated Burner
Standard Panel	√	√	-	-	-	-	-	-	-
Ecopanel 7/21	√	√	√	√	√	-	-	-	-
Ecopanel 12/31	√	√	√	√	√	√*	√	√*	√*



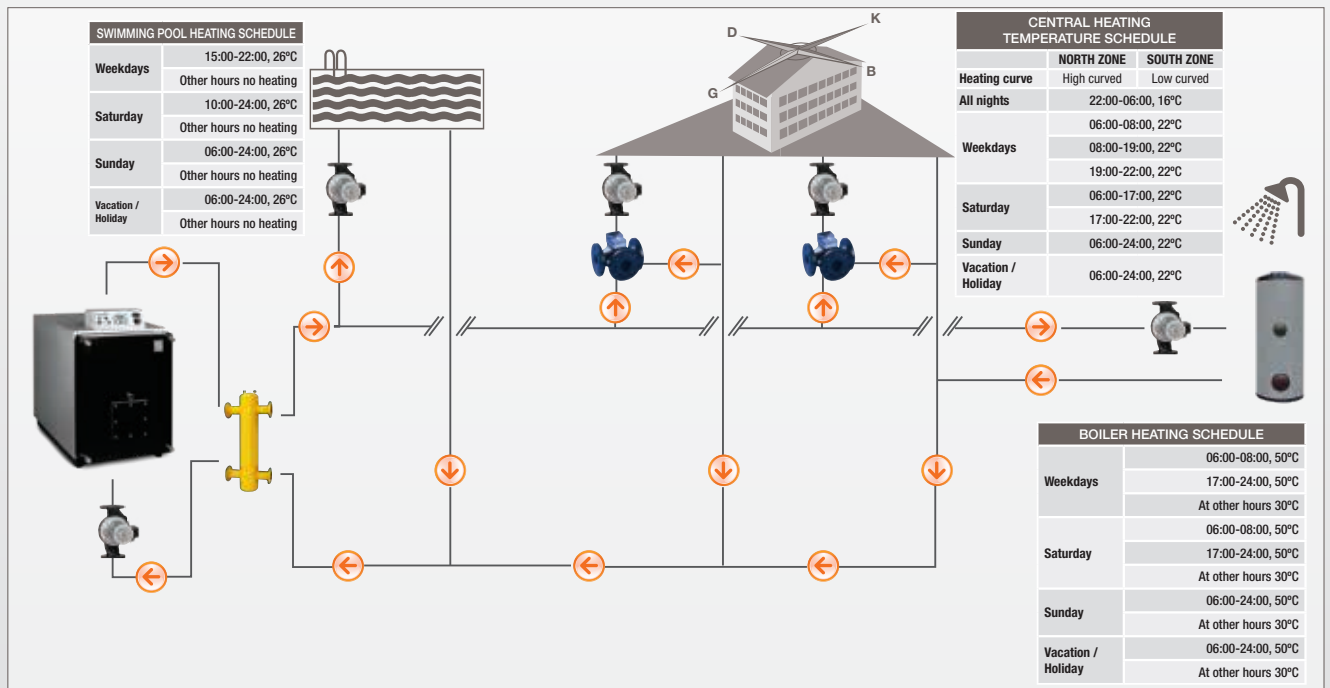
ECOPANEL

7 Day Timer-According to Heating Schedule

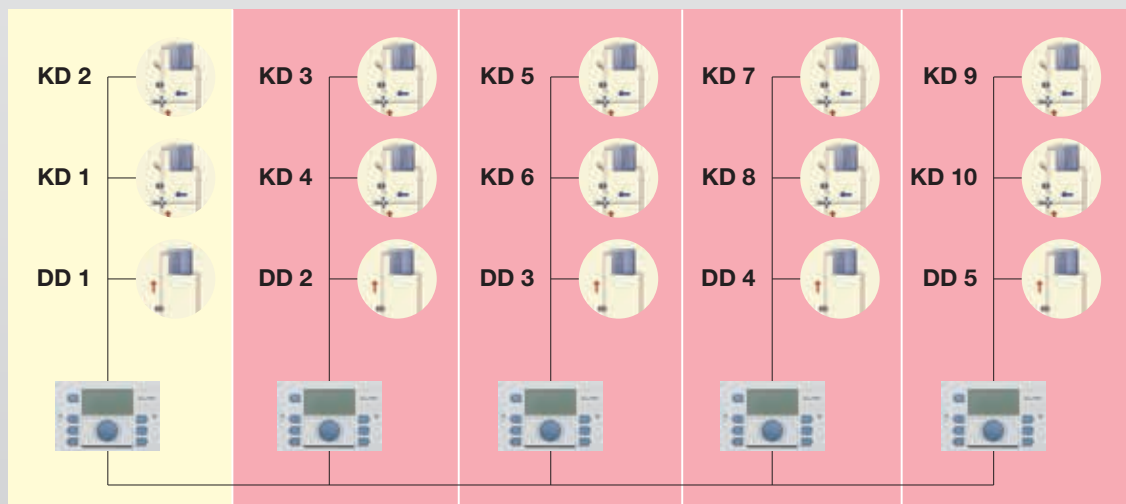
15 Different Spaces

It can heat independently

There may be places in a building where water must be sent at different temperatures at different times. Hotter water may need to be sent to the radiators of the apartments in the north so that the apartments on the north façade can heat up like southern flats. Since the swimming pool is used at different times of the week, it operates with a completely different program from the apartments.



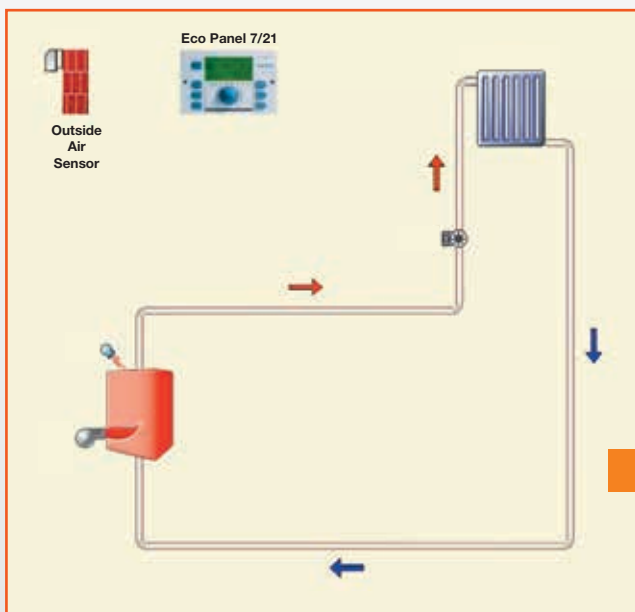
Maximum System Architecture



KD: Mixing Circuit, DD: Direct Circuit



Examples of Heating System that can be applied with ECOPANEL

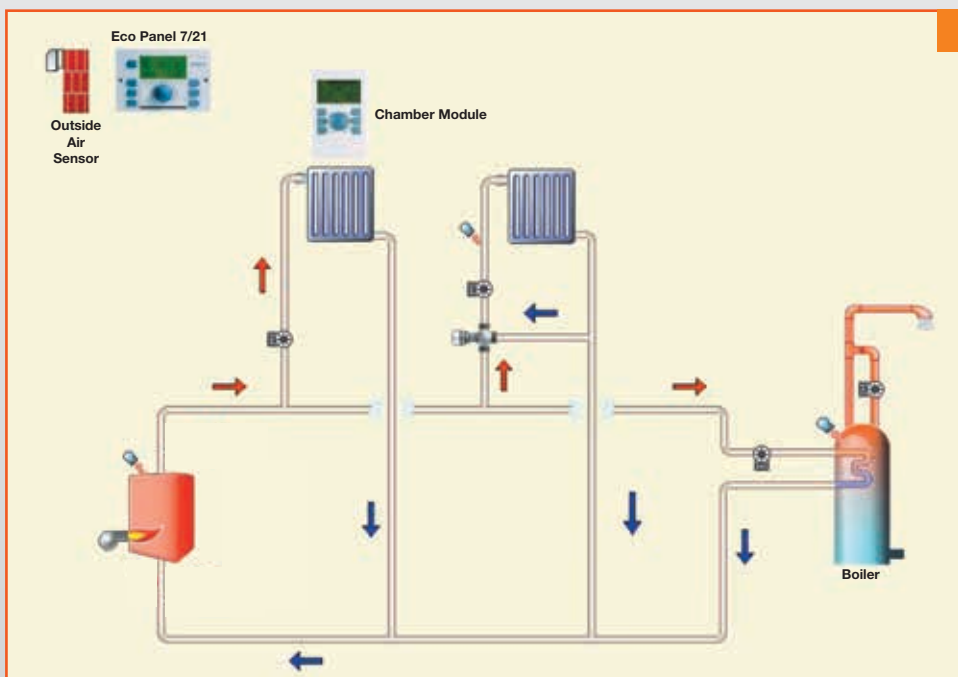


Ekopanel is capable of handling many different heating circuits at the same time. Only three examples are given below.

More extensive examples and mechanical installation diagrams for these examples, the necessary automation equipment and electrical connection diagrams can be found via www.alarko-carrier.com.tr.

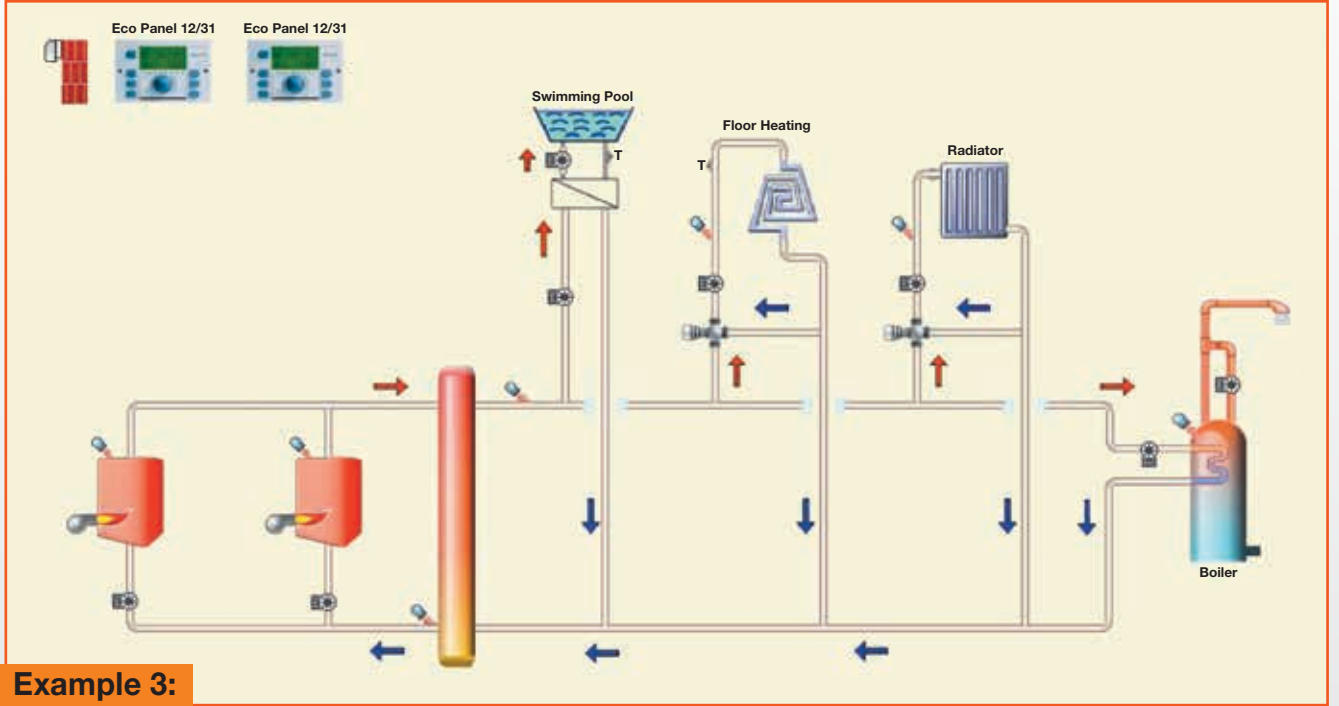
Example 1:

Based on the time schedule and the outside air temperature, Ekopanel calculates to what temperature the boiler water should be in order to achieve the desired ambient temperature. It activates the burner and circuit pump according to this.



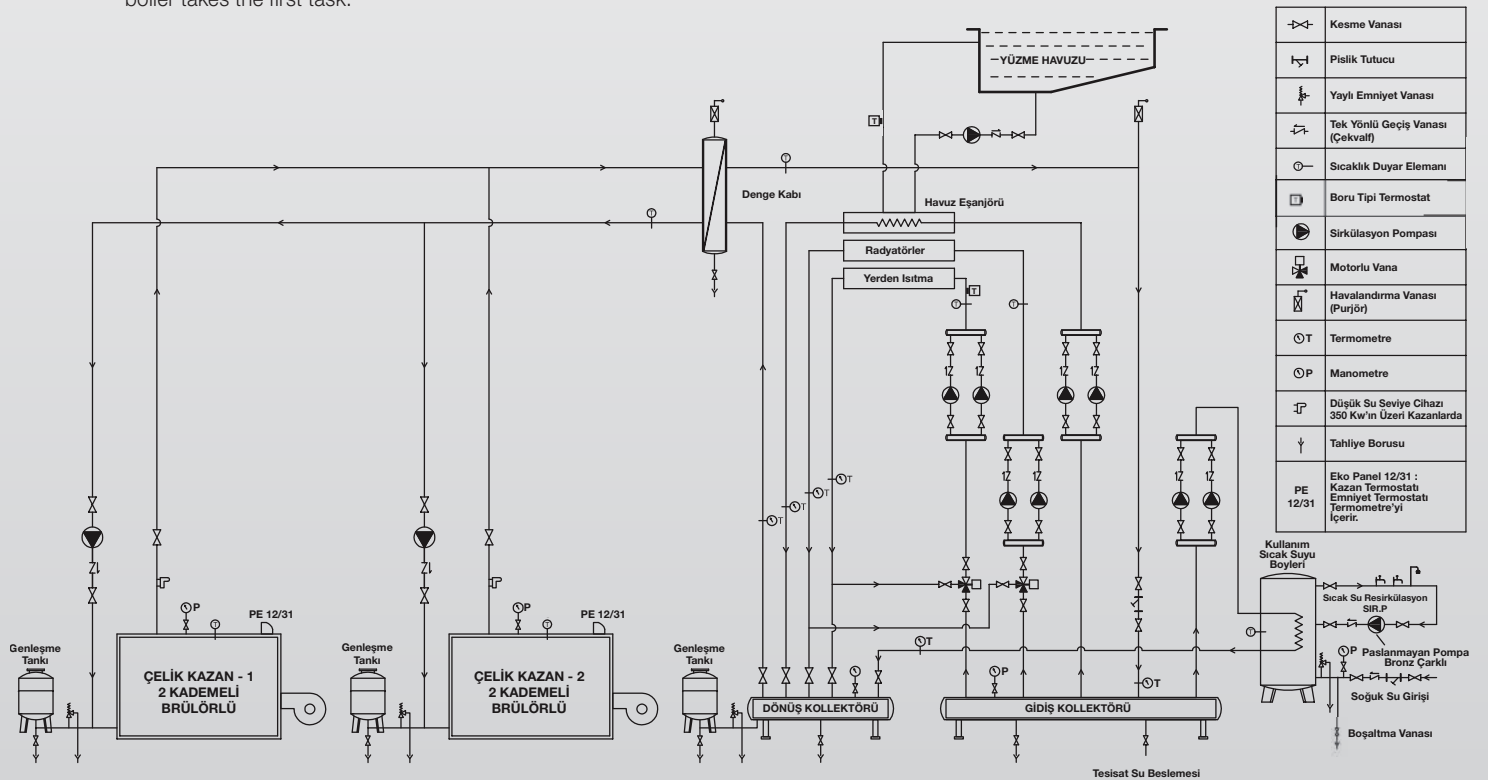
Example 2:

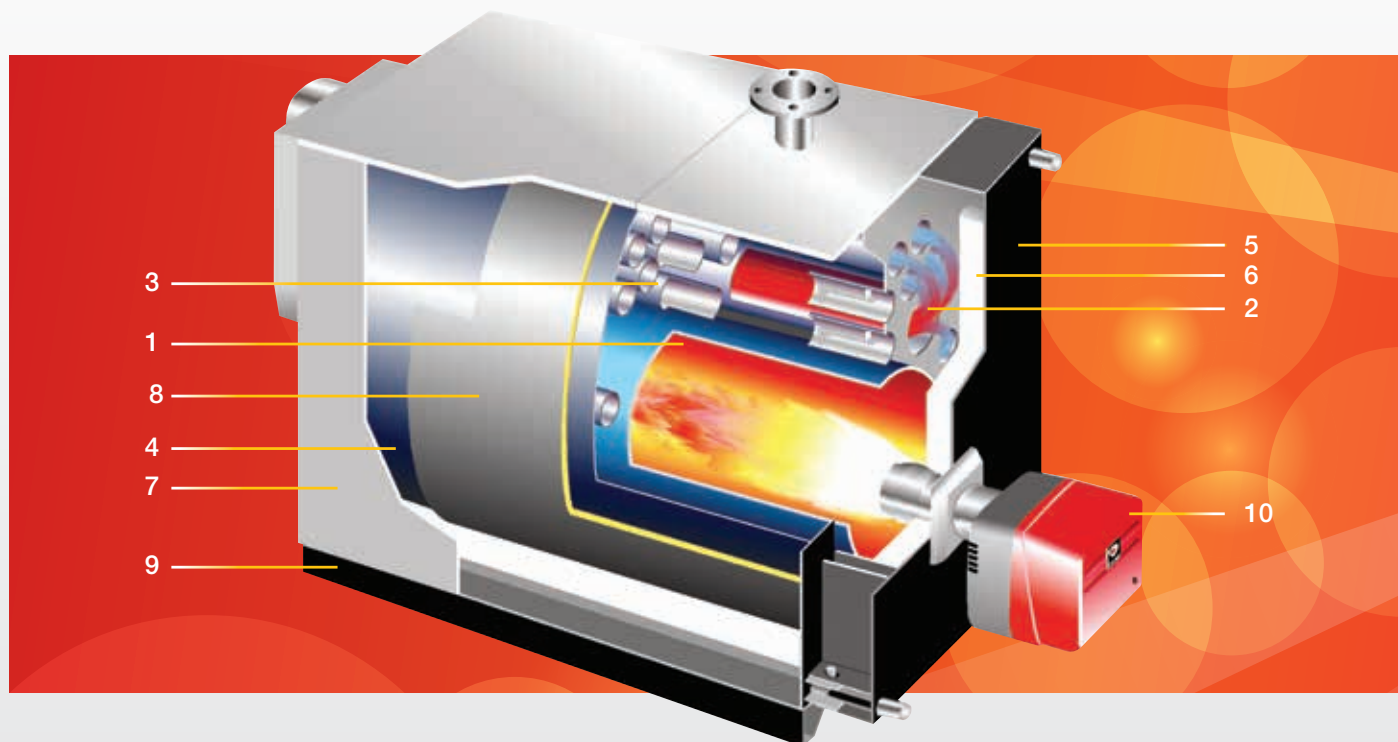
Ekopanel, starts the pumps and the burner depending on the need. It also controls the three-way valve proportionally. If the boiler has cooled, stop the pumps of the other circuits, close the mixing valve and start the boiler pump. It increases the boiler temperature and focuses on heating the boilers as soon as possible. When the boiler is warmed, the pump stops and the heating and mixing circuits continue to operate normally.



Example 3:

Ekopanel burns or stops the boiler burners in sequence at appropriate stages to achieve the desired balance tank temperature. In order to produce the requested hot water, the burner is first ignited in the first stage and, if the temperature does not rise, it is switched to the second stage. If the water temperature has not yet reached the desired level; the second boiler, in turn, is burnt in the first and second stages. Ekopanel calculates the required water temperature and the boiler water temperature to account for which burner the burner burns in the next few steps. The boilers are operated in sequence with an equally aged way. After a certain period of work, the first boiler takes the second task, the second boiler takes the first task.





1. Combustion Chamber

Large volume combustion chamber; flame and combustion gases in the burner fed from the back of the boiler combustion chamber and enter the second pass flues. As the furnace temperature is not too high, lower furnace pressures and combustion gases enable lower NOx levels.

2. Second Pass Flues

They transfer the hot gases formed in the combustion chamber to the boiler front fume box. This is one of the main factors that enable lower NOx emissions.

3. Third Pass Flues and Turbulators

Stainless and cor-ten steel turbulators located inside the flues enable the combustion gases to swivel. Maximum heat transfer to the boiler water. Decrease the temperature of the flue gas to ensure an optimal setting.

4. Boiler Body

The boiler has a completely welded, flame flue type, single block steel body. Possible thermal stresses are balanced thanks to homogeneous heat transfer. It has a long service life.

5. Lift Gate (Openable Cover)

Front cover opening in both directions. Convenient for installation, maintenance and cleaning. Thanks to the special hinge system, adjustable sealing from four independent angles. To protect from possible sealing damage, the cover is automatically pulled forward while loosening the hinge side.

6. Front Cover Insulation*

Insulation with high temperature resistant refractory material. Extended gas tightness life thanks to flexible thick filters.

7. Boiler Outer Protection Plates

Metallic gray colored, two-coat special protective coating. Aesthetically appealing and modern look. Types 1.000 to 3.000 the outer shield is in the form of galvanized plates wrapped around the body.

8. Body Insulation

Boiler stand-by losses are reduced to minimum thanks to perfectly insulated body.

9. Feet

Single piece, robust steel feet that extend throughout the boiler. Easy to slide along piping to move the boiler.

10. Gas/Liquid Burner**

No need for long nozzle, high pressure burners. It is fully compatible with all burners that are standards compliant.

* The closing burner inlet hole is directed to the widest possible barrel diameter. Between the barrel and the refractor the ceramic blanket provided with the boiler should be compressed.

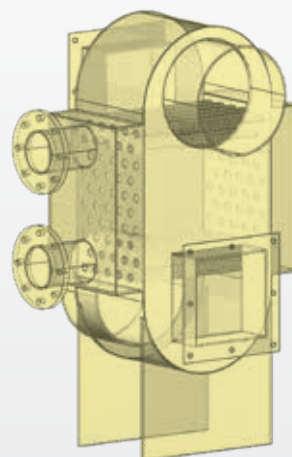
** The burner adaptation plate is without holes. The user must open the necessary holes according to the burner.



ECONOMIZER



Economizer is used to recover the heat at flue gas. There is sensible heat and latent heat in the flue gas. Sensible heat does not change the physical status of the material but changes its temperature. Latent heat changes the physical status of the material but does not change its temperature. Plenty of hydrogen present in natural gas combines with oxygen and generates water during burning. When economizer is operated without condensation, only sensible heat generating because of gas being cooled will be recovered. If it is operated under conditions making the water at gas phase condensate, water releases its latent heat when entering to liquid phase. Therefore, in condensing operation both sensible heat and latent heat is recovered.



ECONIMOZER CAPACITY TABLE

Boiler		CGS 2/3 300	CGS 2/3 350	CGS 2/3 400	CGS 2/3 500	CGS 2/3 600	CGS 2/3 700	CGS 2/3 800	CGS 3 1000	CGS 3 1250	CGS 3 1500	CGS 3 1750	CGS 3 2000	CGS 3 2500	CGS 3 3000
Suggested Burners	2 Stage	ALG 60/2	ALG 60/2	ALG 60/2	ALG 77/2	ALG 94/2	ALG 94/2	ALG 120/2	(1)		(1)				
	Modulating	ALG 60M	ALG 60M	ALG 60M	ALG 77M	ALG 94M	ALG 120M	ALG 120M	ALG 200M	ALG 200M					
Economizer															
Flue Gas Temp. (°C)	Boiler Operation Temp. (°C)	CKE 30	CKE 35	CKE 40	CKE 50	CKE 60	CKE 70	CKE 80	CKE 100	CKE 125	CKE 150	CKE 175	CKE 200	CKE 250	CKE 300
220	80-60	30,000	35,000	40,000	50,000	60,000	70,000	80,000	100,000	125,000	150,000	175,000	200,000	250,000	300,000
	70-50	33,000	38,500	44,000	55,000	66,000	77,000	88,000	110,000	137,000	165,000	192,000	220,000	275,000	330,000
190	70-50	29,000	33,000	38,000	48,000	58,000	67,000	77,000	96,000	120,000	145,000	169,000	193,000	241,000	290,000
	60-40	32,000	37,000	42,000	53,000	64,000	74,000	85,000	106,000	133,000	160,000	186,000	213,000	266,000	320,000
160 (2)	60-40	36,000	41,000	47,000	59,000	72,000	83,000	95,000	119,000	149,000	178,000	209,000	238,000	298,000	358,000
	50-30	42,000	50,000	55,000	69,000	84,000	97,000	112,000	139,000	174,000	208,000	245,000	280,000	349,000	420,000

NOTES * Economizer capacities in the table are given in kcal/h. Values can vary +- 10% due to operation conditions. * In case a burner not recommended is being used, blowing temperature of the burner should be checked against total pressure of boiler end economizer. * In case the boiler is operating in low temperature, required precautions against partial condensation should be taken not to damage the boiler. An exemplary diagram is given below. * In case economizer is being used with liquid fuel boiler, cleaning should be done more frequently than natural gas boiler.

* Flue should conform TS EN 13384-1 standard. (1) You should get in contact with Alarko Carrier. (2) Partial condensation is assumed in this section.



CE

Manufacturer reserves the right to change any product specifications without notice.

 **ALARKO**



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