



Gas and Liquid Fuel Steel Boiler



**2-Pass CGS2 series
116-930 kW Low Temperature Boiler**



LEADER IN STEEL BODY BOILERS

Gas and Liquid Fuel **2 PASS CGS2 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 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. CGS2 series boilers have optimized combustion chambers which enable them to achieve nitrous oxide levels in accordance with the European directives. No environmentally hazardous materials (such as asbestos) were used in production of the boiler.

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. 5 years warranty.

AESTHETICALLY APPEALING DESIGN

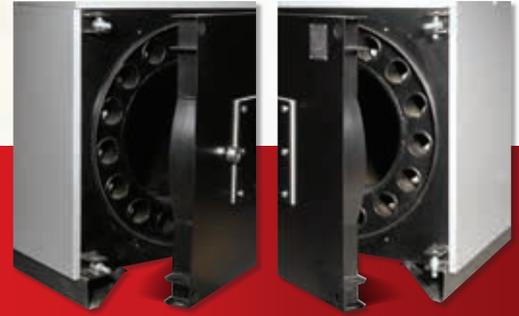
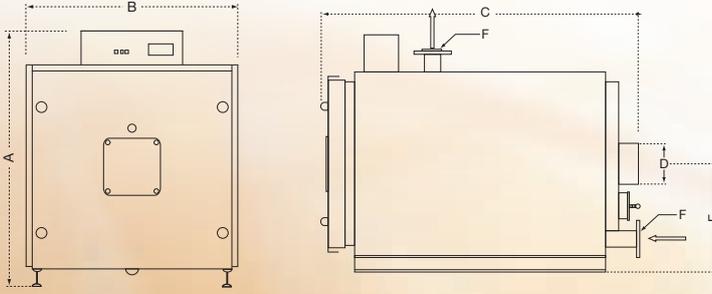
The outer protection plates are double shielded against corrosion and ambient conditions:

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

COMPATIBLE WITH THE BURNER 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.





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.

		CGS2-100	CGS2-125	CGS2-150	CGS2-200	CGS2-250	CGS2-300	
Rated thermal power*	kcal/h x 1000	100	125	150	200	250	300	
	kW	116	145	174	233	291	349	
Rated thermal load	kcal/h x 1000	108	135	162	216	270	324	
	kW	125	157	188	251	314	376	
Efficiency**	%	92.7						
Maximum operating pressure***	bar	3						
Maximum operating temperature	°C	90						
Flue gas side resistance	Pa	5	6	6	11	10	7	
	mbar	0.5	0.6	0.6	1.1	1.0	0.7	
Recommended flow rate	m ³ /h	5	7	8	10	12	15	
Water side resistance (at the recommended flow rate)	mbar	6	10	10	12	14	14	
	mSS	0.06	0.10	0.10	0.12	0.14	0.14	
Water output to the network	inches	NW50	NW50	NW65	NW65	NW65	NW65	
Water input from the network	inches	NW50	NW50	NW65	NW65	NW65	NW65	
Safety output connection	inches	1"	1"	1 W "	1 %"	1 %"	1 %"	
Safety input connection	inches	1"	1"	1 W "	1 %"	1 %"	1 %"	
Boiler weight (w/o water)	Kg	352	407	447	552	712	790	
Boiler water volume	Lt	141	151	139	234	293	347	
FLUE GAS VALUES¹								
Flue gas temperature	Full load	°C	190					
	Partial load	°C	120					
Flue gas flow rate	Full load	gr/sec	47	60	71	95	117	141
	Full load	mVhour	188	237	284	378	471	566
	Partial load	gr/sec	28	35	42	57	71	85
	Partial load	mVhour	113	142	170	227	283	340
Flue gas required delivery pressure	Pa, mbar	0						
DIMENSIONS								
A	mm	1030	1030	1030	1155	1155	1260	
B	mm	820	820	820	945	945	1050	
C	mm	1350	1370	1370	1590	1590	1810	
D	mm	200	200	200	200	200	250	
E	mm	460	460	460	525	525	575	
F	mm	NW50	NW50	NW65	NW65	NW65	NW65	
Combustion chamber diameter	mm	400	450	450	473	500	530	
Combustion chamber length	mm	880	900	900	1050	1100	1280	

* 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 These values are given according to 10% CO₂. 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.

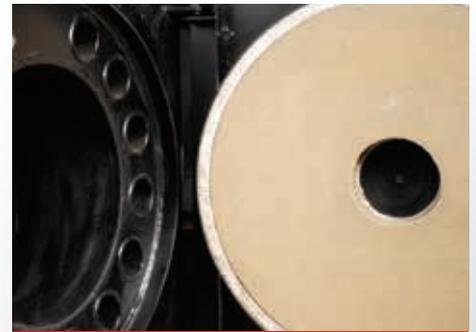
Excellent natural circulation and maximum heat transfer

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



Minimum feed losses

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



Perfect isolation and sealing

Front cover thermal insulation and gas tightness peak;
High temperature resistance 1371°C,
High strength 62 kg / cm²
Low density 1.28 kg / dm³
Low thermal conductivity 0.33 kcal/h (C/M)

		CGS2-350	CGS2-400	CGS2-450	CGS2-500	CGS2-600	CGS2-700	CGS2-800	
Rated thermal power*	kcal/h x 1000	350	400	450	500	600	700	800	
	kW	407	465	523	582	698	814	930	
Rated thermal load		378	431	485	539	647	755	863	
	kW	439	502	565	627	753	878	1004	
Efficiency**	%	92.7							
Maximum operating pressure***	bar	3							
Maximum operating temperature	°C	90							
Flue gas side resistance	Pa	5	6	6	13	16	22	29	
	mbar	0.5	0.6	0.6	1.3	1.6	2.2	2.9	
Recommended flow rate	m ³ /h	18	20	23	25	30	35	40	
Water side resistance (at the recommended flow rate)	mbar	15	15	15	16	16	18	20	
	mS	0.15	0.15	0.15	0.16	0.16	0.18	0.20	
Water output to the network	inches	NW80	NW80	NW80	NW100	NW100	NW100	NW100	
Water input from the network	inches	NW80	NW80	NW80	NW100	NW100	NW100	NW100	
Safety output connection	inches	1 1/2"	1 1/2"	1 1/2"	2"	2"	In the 2.	2"	
Safety input connection	inches	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"	
Boiler weight (w/o water)	Kg	990	1125	1250	1350	1485	1755	2025	
Boiler water volume	Lt	394	608	630	652	691	794	1012	
FLUE GAS VALUES¹									
Flue gas temperature	Full load	°C	190						
	Partial load	°C	120						
Flue gas flow rate	Full load	gr/sec	165	188	212	235	282	330	376
	Full load	mVhour	660	753	847	942	1130	1317	1505
	Partial load	gr/sec	99	113	127	141	170	198	226
	Partial load	mVhour	396	452	508	565	678	790	903
Flue gas required delivery pressure	Pa, mbar	0							
DIMENSIONS									
A	mm	1260	1375	1375	1465	1465	1600	1600	
B	mm	1050	1140	1140	1235	1235	1370	1370	
C	mm	1840	2080	2080	2080	2080	2290	2290	
D	mm	250	250	250	300	350	350	350	
E	mm	575	645	645	690	690	755	755	
F	mm	NW80	NW80	NW80	NW100	NW100	NW100	NW100	
Combustion chamber diameter	mm	600	600	600	630	670	750	750	
Combustion chamber length	mm	1300	1500	1500	1500	1500	1700	1700	

* 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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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 system.

ECOPANEL (7/21 and 12/31)

It saves up to **20%** per year from fuel and up to **35%** when used with three-way motorized valves.

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 microprocessor developed to provide the most efficient, economical, optimum time to operate, maintain, extend life, comfort and economy together. Ecopanel 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

Ekopanel constantly monitors the outside air temperature. It calculates the "reduced outside air temperature", taking into account the heat storage of the building walls and even the spread of the atmosphere. It runs the boiler according to this temperature. It does not waste much fuel.

Economy under all Circumstances

"It also saves fuel at night with "Economy Temperature". When the outside temperature exceeds the selected value by automatic summer / winter operation selection, it avoids unnecessary heating by operating the boiler in summer mode.

Scheduled Heating

The operating hours and temperatures of the boiler can be set daily or weekly.

Optimum Switch On/Off

Taking into account the weekly running schedule and the set room temperature, it calculates the number of activation and the running time of the boiler. It controls the operation of the boiler according to this.

It doesn't operate the boiler unnecessarily.

Control Panels Difference Table

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

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. (*)



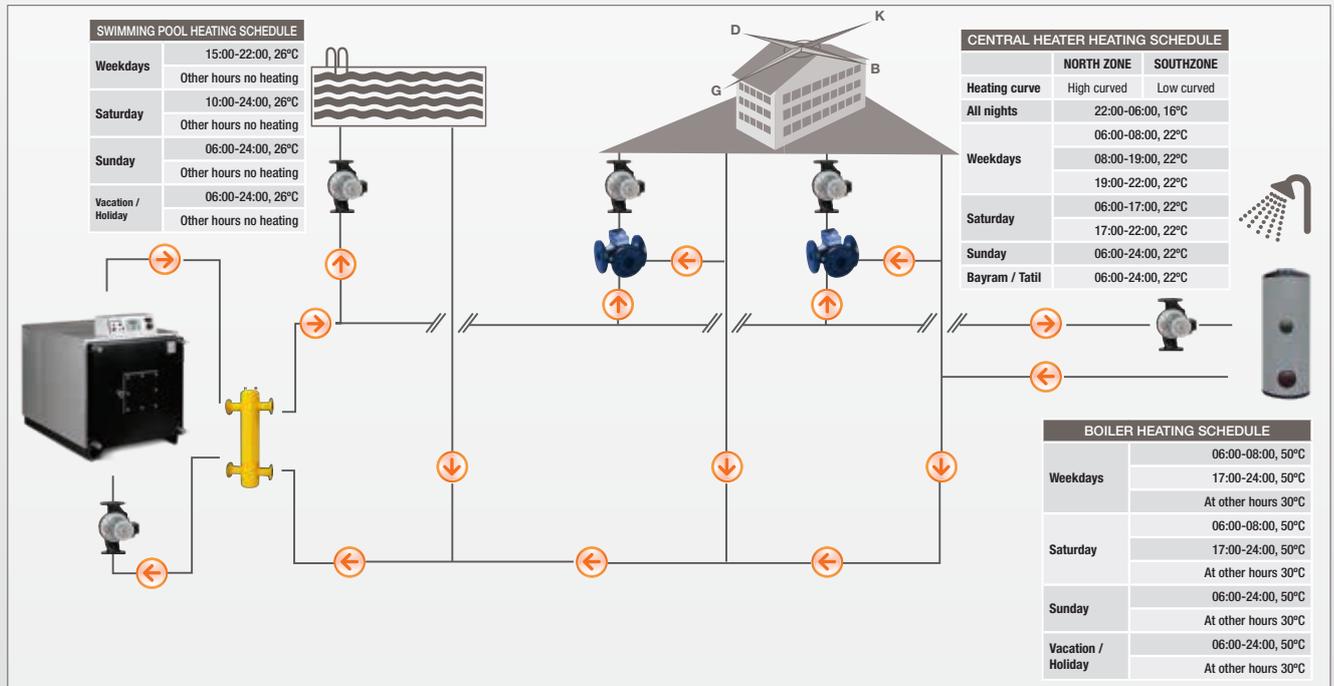
ECOPANEL

7 Day Timer-According to Heating Schedule

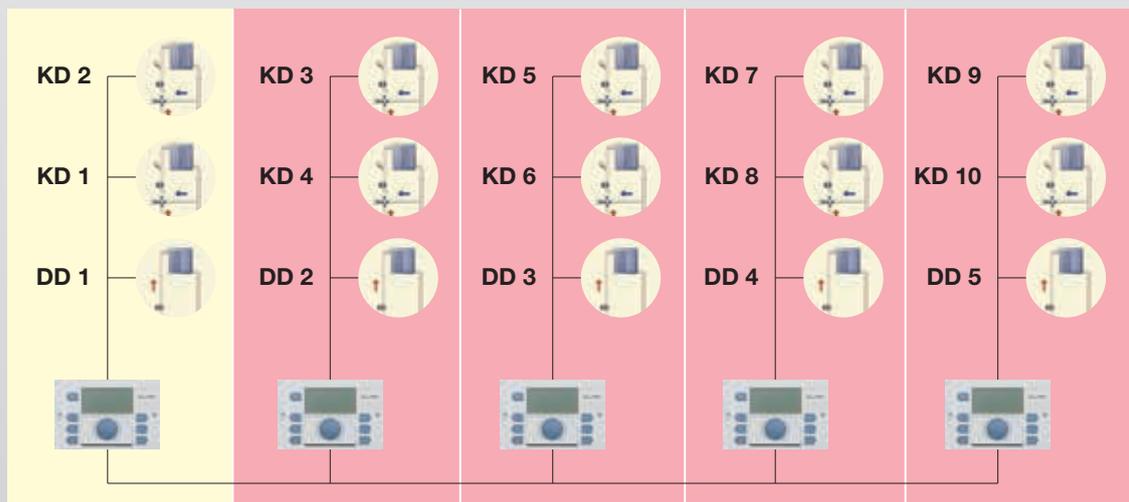
15 Different Spaces

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.



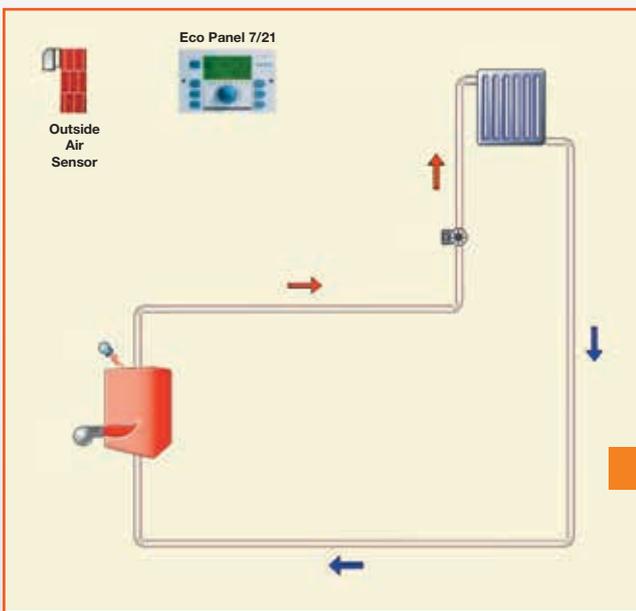
Maximum System Architecture



KD: Mixing Circuit, DD: Direct Circuit



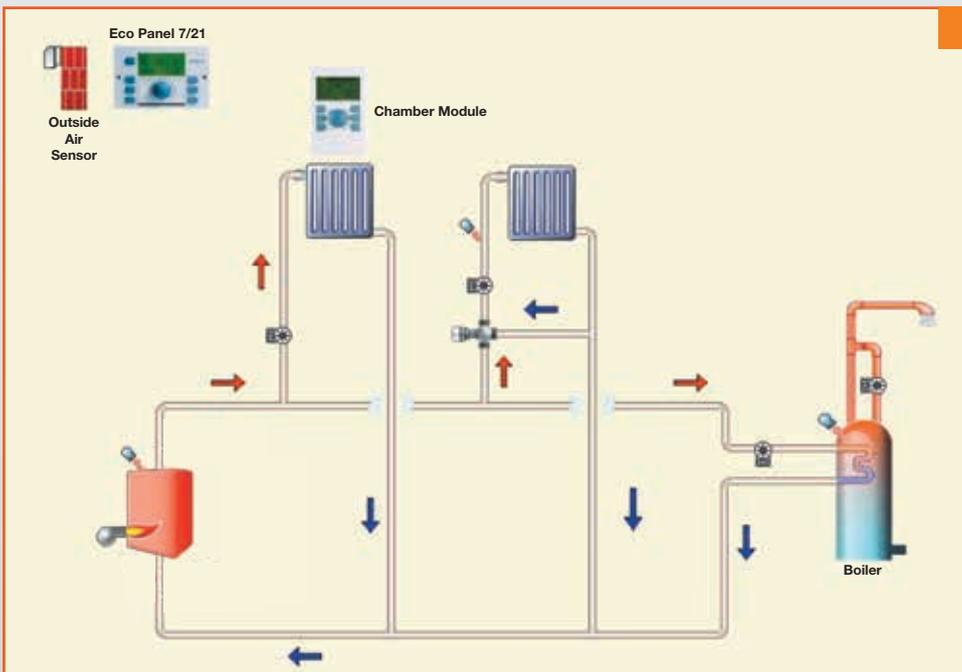
Examples of Heating System that can be applied with ECOPANEL



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

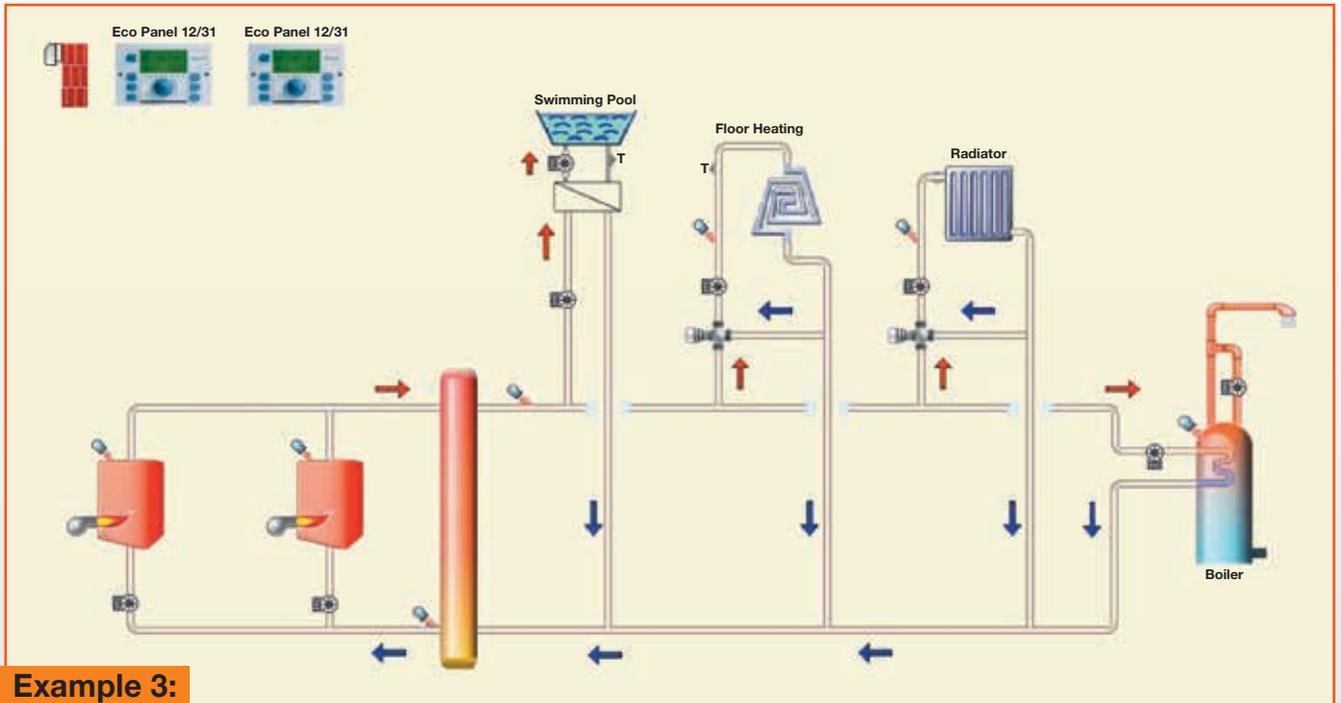
Example 1:

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.



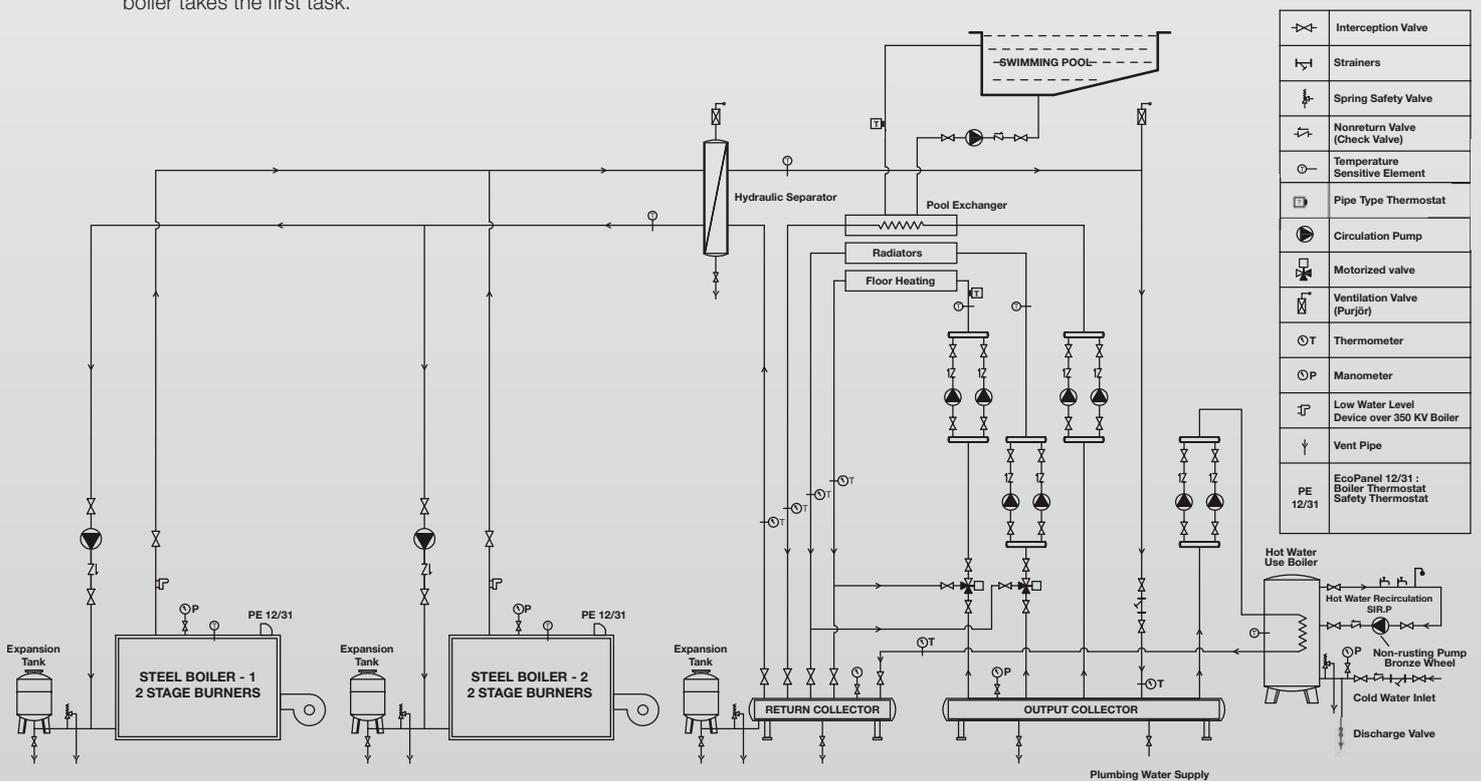
Example 2:

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:

Ecopanel 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. Flame Recycling Combustion Chamber

Large volume combustion chamber. All flammable substances and gases in the combustion gases are re-burned by flammable and combustible gases from the burner, back turbulently from the backside of the boiler combustion chamber, and compared again with the burner flame. Full combustion is provided. Thus, both the harmful waste gas ratio is reduced and the highest available heat energy is obtained.

2. Smoke Pipes and Turbulators

The turbulence of the combustion gases is ensured by the turbulators placed inside the smoke tubes. Thus, heat is transmitted to the boiler water at the highest level. The flue gas temperature is kept at the optimum level by decreasing the desired levels.

3. Boiler Body

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

4. Feet

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

5. Front Cover Insulation *

Isolation with high temperature resistant refractory material. Long life full gas sealing with flexible thick wickets.

6. Boiler Outer Protection Plates

Metallic gray colored, two-coat special protective coating. Aesthetic and modern appearance.

7. Body Insulation

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

8. Lift Gate (Openable Cover)

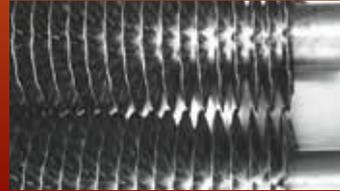
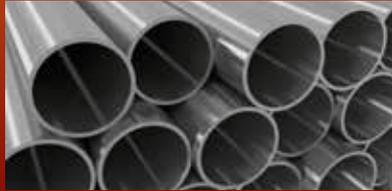
Front cover opening in both directions. Convenient for installation, maintenance and cleaning. Thanks to the special hinge system, adjustable sealing from four independent angles. To protect from possible sealing damage, the cover is automatically pulled forward while loosening the hinge side.

9. 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.

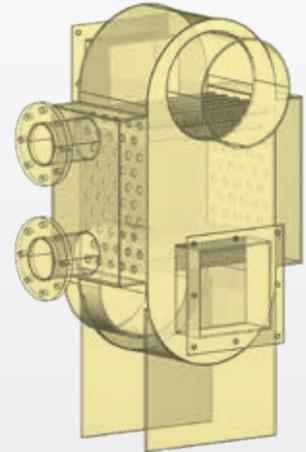
** The burner adaptation plate is without holes. The user must open the necessary holes according to the burner.



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.



ECONOMIZER 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	(1)				
Economizer		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
Flue Gas Temp. (°C)	Boiler Operation Temp. (°C)														
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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