EK-DUO • RPD

DUOBLOCK BURNERS
250 - 80000 kW

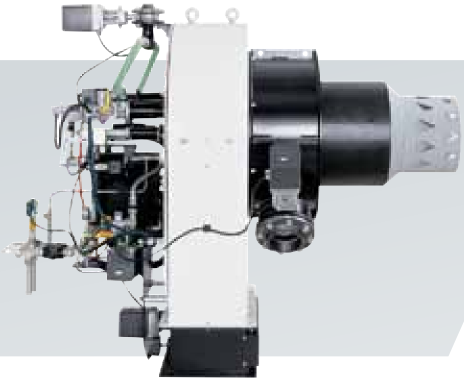
NOW UP TO
80 MW

DUOBLOCK RANGE

Industrial burners as part of a comprehensive solution

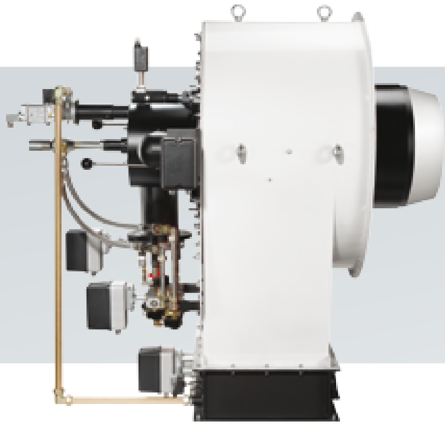
EK-DUO

DUOBLOCK BURNERS
FROM 600 TO 16000 kW
GAS, LIGHT OIL AND DUAL FUEL



RPD

DUOBLOCK BURNERS
FROM 500 TO 80000 kW
GAS, LIGHT OIL, HEAVY OIL AND DUAL FUEL



Benefits of a separately installed fan

In contrast to monoblock burners, duoblock burners are made up of two units, or blocks, as the name implies: The burner head with the air inlet, and the separately-installed fan. The two units are connected via an air duct. The separate installation of the fan offers several benefits:

- the fan can be installed in a separate room to the boiler, for instance in the cellar: this results in considerably lower noise levels in the boiler room When the fan is installed in the same room, a fan enclosure can be used to achieve optimum sound absorption, without inhibiting access to the burner;
- less space required in front of the boiler/combustion chamber;
- individual fan layout with optimum adaptation of the fan characteristic curve to suit the pressure ratio of the heat generator. This guarantees pulsation-free and stable burner behaviour, even on heat generators with high resistance on the exhaust side;
- combustion air can be preheated to increase installation efficiency;
- lower weight loading on the boiler front;
- more direct access to the burner head.

ELCO TECHNOLOGIES AND SYSTEMS

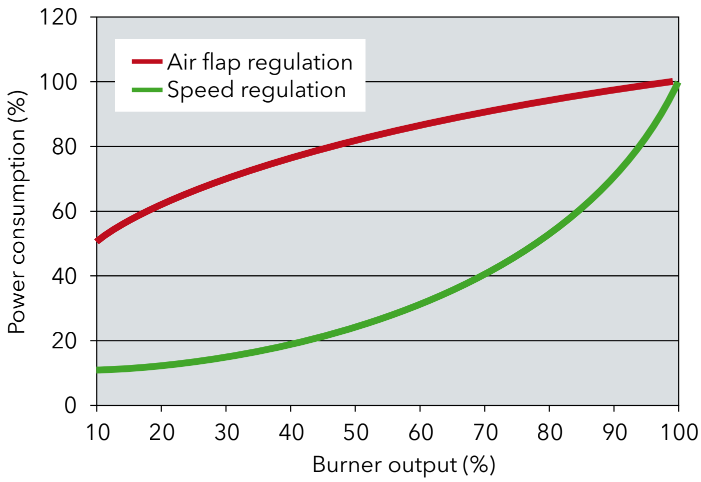
VARIATRON

Speed regulation: noise reduction and energy saving

Conventionally, the air in modulating burners is regulated by an air flap. In the partial load range, a large amount of the air pressure generated by the ventilator goes to waste.
With speed regulation, the speed of the combustion-air fan is varied continuously depending on the burner output required. Full speed is reached only at maximum burner output. In the predominant partial load range, the lower speed translates into significant reductions in power consumption and noise emissions.

Savings on electrical energy

A speed regulator makes it possible to conserve valuable electrical energy.
The diagram compares the power consumption of a burner ventilator with speed regulation with a burner ventilator with air-flap control. In the medium output range, a saving of around 70% is achieved, decreasing at full and low load. Therefore, the total savings over an operating year depends fundamentally on the load of the heating installation. For installations that are predominantly operated close to nominal output –mainly in the process engineering industry– the achievable saving is likely to be relatively small. The majority of plants, however, make great demands on the modulation range. Often, maximum burner output is demanded for only a few hours a year.
For the most part, these are outnumbered by the hours of operation under reduced load in which power consumption is significantly reduced by speed regulation technology. Energy savings of 40/50% have been proven in a real-world environment in plants with a conventional heat-demand pattern.

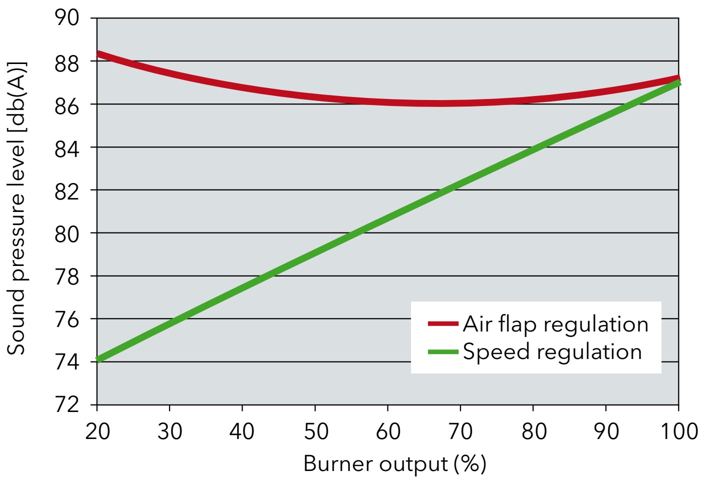


Pre purging inhabit mode

If one combustion chamber contains multiple burners, you can choose whether the burner should be started with or without preliminary air, depending on whether or not a burner is already in operation.

Reduced noise emissions

Where airflow is regulated by an air flap, not only does the air pressure generated by the ventilator go to waste, but this process and the subsequent collapse of pressure are, more particularly, accompanied by a certain amount of noise. The graphic shows the sound level curve for a burner with speed regulation and for a burner without. This real example demonstrates that, at approximately 50% burner output, a sound level reduction of around 7 dB(A) is achieved. To put this into context, the human ear perceives a 10 dB(A) increase in the sound level as being twice as loud.



ELCO TECHNOLOGIES AND SYSTEMS

GEM SYSTEM

Electronic burner control: high safety and low costs

Digital combustion management, communication concept

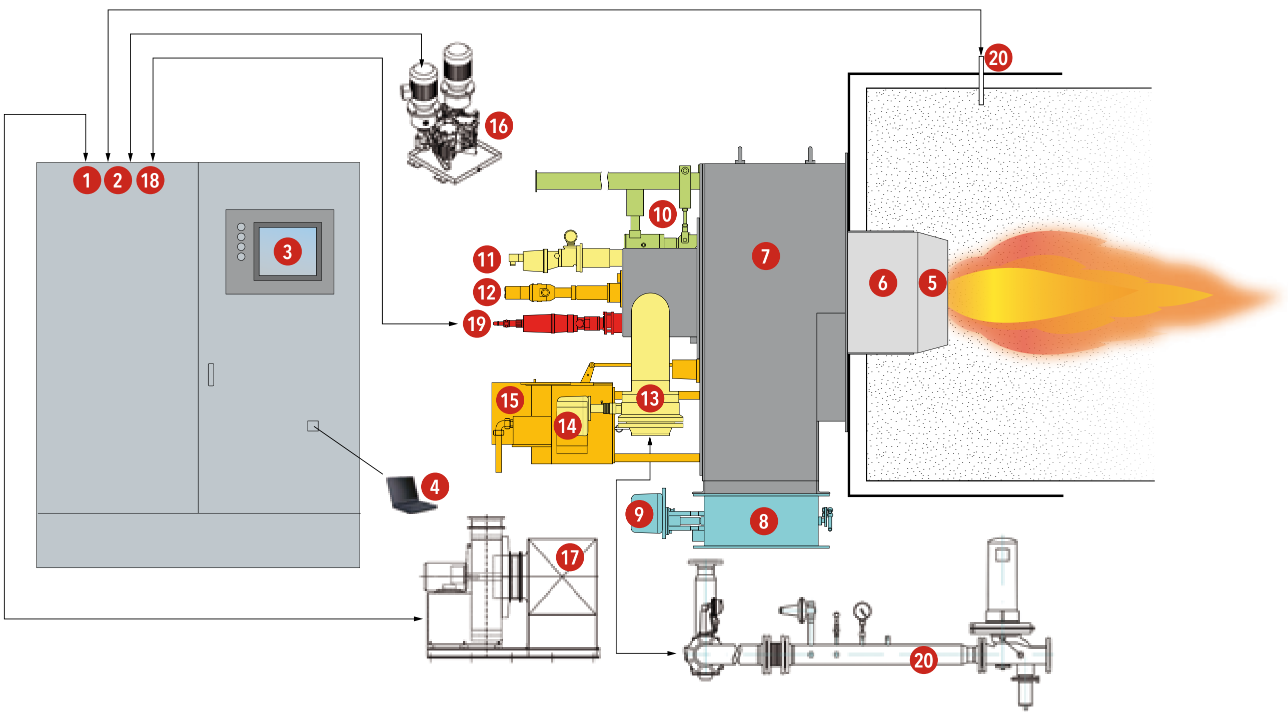
The use of digital technologies in burner control systems helps to reduce running costs, improve reliability of operation and lower pollutant emissions. The digital combustion managers used on ELCO burners are responsible not only for burner control (formerly the task of the traditional automatic combustion control unit) but also for fuel/air regulation (formerly the task of the mechanical compound controller). Data stored electronically has replaced the mechanical characteristic curve and helps to achieve an unprecedented level of precision in air/fuel ratio regulation across the burner's entire control range – a prerequisite for efficient as well as energy and cost-saving operation. Communication with central management systems is possible via the established bus protocol.

Price advantage through integrated safety

Safety chains, sensors and monitoring signals are arranged directly on the combustion manager, and servomotors, valves and frequency converters are controlled directly. This greatly reduces the costs associated with additional relays and wiring and keeps potential fault sources to a minimum. Integrated safety concepts, such as the automation of gas-valve leak monitoring, lower component costs and improve the operational reliability of the overall system. Other combustion-related functions that were previously fulfilled by separate devices may be integrated:

- burner output regulator
- operating hours counter
- start-up counter
- fault alert management
- speed regulation of the combustion-air fan
- O_2/CO regulation
- interface with control technology

Naturally, our combustion managers fulfil all relevant standards and regulations and are approved for intermittent and continuous operation.



Legenda
1 – SPS
2 – Combustion manager
3 – Display and operating unit
4 – Laptop
5 – Blast tube
6 – Burner tube
7 – Burner body
8 – Secondary air connection
9 – Servomotor
10 – Extension equipment
11 – Ignition burner
12 – Nozzle rod assembly
13 – Gas flap
14 – Servomotor for gas flap
15 – Oil regulation
16 – Pump unit
17 – Blower
18 – O_2/CO regulator module
19 – Flame monitor
20 – Gas regulation section
21 – O_2/CO probe

ELCO TECHNOLOGIES AND SYSTEMS

GEM SYSTEM

Electronic burner control: high flexibility for precise and efficient processes

Flexible operating modes with electronic compound

For more complex tasks, digital firing managers offer various options. Depending on requirements, separate units are used here for digital burner control and electronic fuel-air regulation.

Sliding fuel switchover

If, for process-related reasons, the burner output may not be reduced during a fuel switch, the sliding fuel change can be used. During the switchover phase, the flow of the first fuel is reduced continuously and the second increased at the same rate until the change is complete. The sum of the two fuels during the switchover always amounts to the required burner output.

Mixed firing

If combustible residues and waste products are formed during production, it stands to reason that these should be disposed of in an environmentally-friendly, energy-saving and cost-effective manner in an existing heating installation. Usually, however, these waste fuels form in variable and insufficient quantities, so that it is only possible to use parallel multi fuel firing to form a main fuel. This kind of mix firing should be performed with an electronic compound controller, without laborious quantity measurements, in a fail-safe and tried-and-tested manner.

User-friendly operation

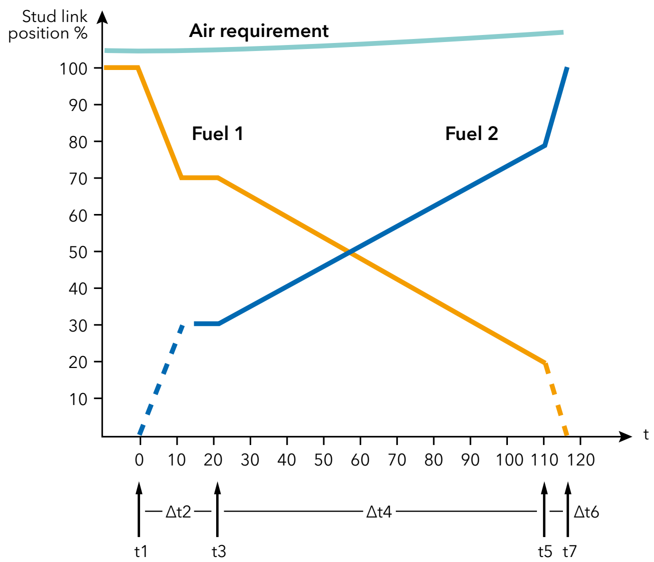
For burner commissioning and adjustments, the combustion manager is connected to a user-friendly or practice-oriented display and operating unit or to a PC. Menu-driven procedures guide the user safely and conveniently through the operating and commissioning process.

Stand-by mode

In the case of firing systems that frequently start and stop for process-related reasons, it may be logical not to shut down the burner completely, but to leave the ignition burner activated during breaks. This stand-by mode enables firing to start up immediately. Losses due to cooling are prevented.

Freely-programmable burner controller

In addition to the options described, ELCO also offers the burner control design as a freely-programmable system. The compound can be broken down electronically and the ratio controlled.



Time	*Process*
t1:	*change of fuel signal*
Δt2:	*reduction of gas output by the light oil basic load*
t3:	*release of light oil valves*
Δt4:	*sliding process for fuel flaps against one another in connection. Gas switches to the gas basic load, oil switches to the required output minus gas basic load*
t5:	*gas valve shutdown*
Δt6:	*oil simulates the missing output*
t7:	*change completed*

ELCO TECHNOLOGIES AND SYSTEMS

GEM SYSTEM

O_2/CO regulation: costantly working with optimum performance

O_2/CO regulation for optimum combustion

The efficiency of a heating installation is, to a large degree, contingent on the burner working with the optimum fuel/air ratio (λ).
If the burner is supplied with too little air (λ<1), the proportion of flue gas made up of unburnt fuel particles in the form of CO, C_xH_y and soot increases sharply. Not only are these unburnt fuel particles harmful to the environment, they also contain latent heat, which is carried away from the combustion process.
If the burner is supplied with too much air (λ>1), the proportion of unburnt fuel particles similarly increases. More notably, however, the surplus air in the heating installation is heated and leaves the plant through the chimney at an elevated temperature, literally blowing away the operator's valuable energy reserves. For this reason, the goal of any burner calibration should be to set the air-to-fuel ratio no higher than is necessary. Nevertheless, a margin of safety has to be maintained because a number of disturbance variables have a bearing on the fuel/air mixture control process. These include:

Air:
- temperature
- pressure
- humidity

Fuel:
- calorific value
- viscosity
- pressure

Contamination:
- burner
- boiler

Mechanics:
- hysteresis of the actuators

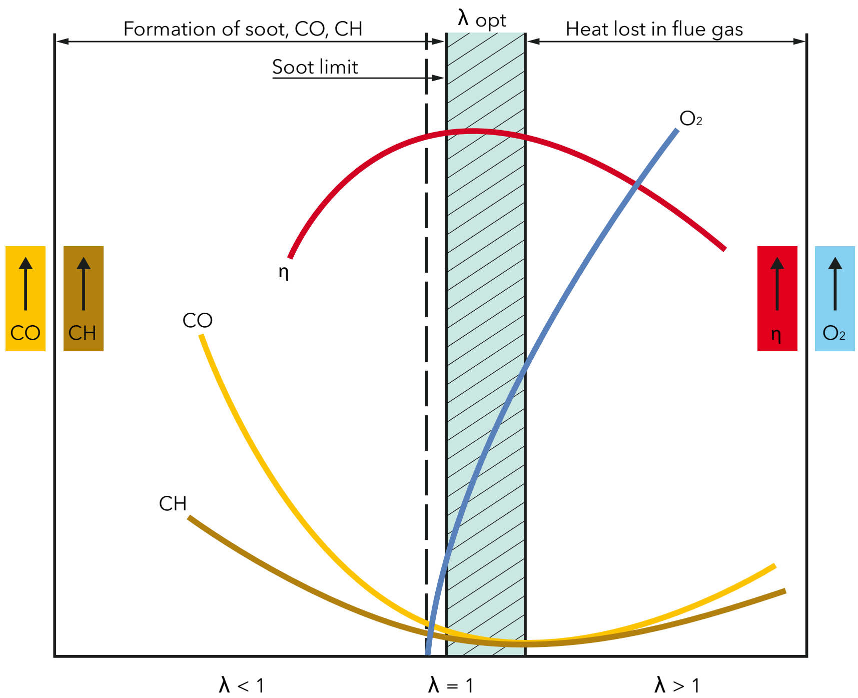
Variations in air density alone –caused by temporary or seasonal weather changes– can have an effect on the O_2/CO value of more than 1%. Every service engineer will therefore adjust the O_2/CO value to such a level that, even in the worst conditions, emissions of CO, C_xH_y and soot remain within acceptable limits.

The solution is provided by an O_2/CO regulator, which measures the air surplus continuously and corrects the ratio to the stored setpoint value for each operating point.

How an O_2/CO regulator pays for itself

The period in which investment in an O_2/CO regulator pays for itself fundamentally depends on a range of system-specific factors. However, based on theoretical calculations and on comparison measurements carried out on completed installations, a potential saving of 1,0% to 1,5% of annual fuel costs can be considered realistic.

Relationship between pollutant emissions and the efficiency of a heating installation:



ELCO TECHNOLOGIES AND SYSTEMS

EDP SYSTEM

Burners for multiple gases and exhaust air: processes and applications

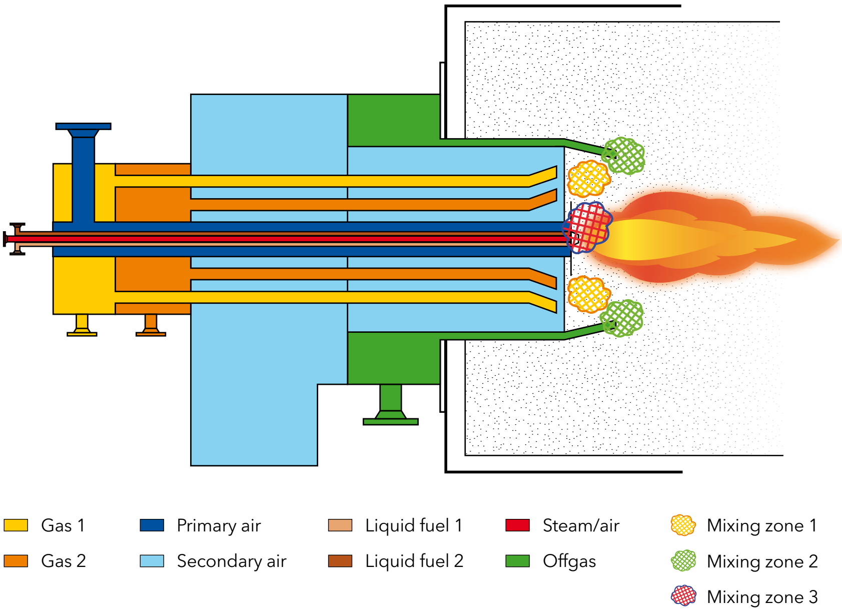
Modern disposal solutions with ELCO burner technologies

In different production processes, some of the exhaust air formed contains liquid or gas residues. Modern waste incineration processes make it possible to dispose of these pollutants in an environmentally-friendly and cost-effective manner. With the duoblock series, ELCO is offering technical solutions for optimum implementation of these disposal concepts.

Thermal disposal

In the picture it is shown a burner that channels contaminated N_2 gas via a double-jacketed head directly into the combustion process, disposing of it thermally.
At the same time, the hydrogen gas that is formed during the production process is used to generate heat. Hydrogen, coal gas or heavy oil (HFO) is used as the primary fuel. Furthermore, a liquid residue (glycol/water mixture) is also burnt.

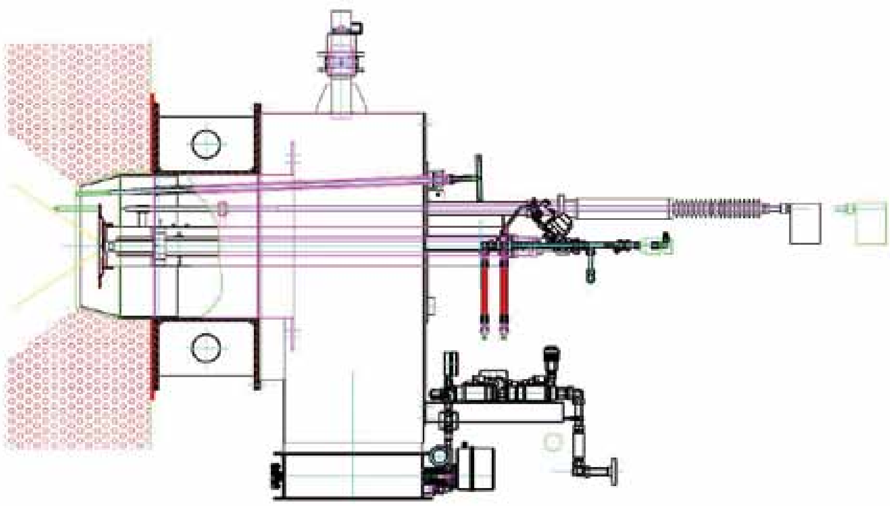
Individual installation concepts are planned and implemented to suit the requirements of our customers.



Ignition and auxiliary firing for large boilers and process installations:

cold or hot-air applications, liquid and/or gas-forming fuels.

Illustration:
Pilot and auxiliary burners for a waste vessel, cold-air design, heating oil fuel, with compressed-air atomisation and high-voltage igniters with pneumatic feed apparatus.



Functions:

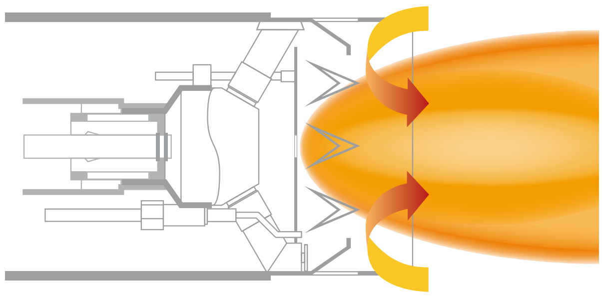
- controlled boiler start-up of approximately 4 hours for the purpose of warming up the entire system to >850°C;
- ignition of the waste fire once the waste has been introdued via the waste hopper; the radiant heat of the ignition burners ignites the waste; the burner remains in operation until the waste fire is able to maintain the combustion process of its own accord;
- auxiliary firing during the waste operation if the boiler room temperature falls below the permissible level.

ELCO COMBUSTION TECHNOLOGIES

DIAMOND HEAD

Low emissions and reliable operation

The Diamond Head is a combustion technology suitable for modern gas, light oil and dual fuel burners, with the aim of reducing the emissions of nitrogen oxides.
The principle is based on the internal recirculation of the combustion flue gases. These are partially drawn into the base of the flame via triangular openings positioned at the end of the combustion head.
The position and geometry of the gas injectors are such that a significant quantity of combustion flue gas is drawn in and rapidly mixed with air and gas at the root of the flame.

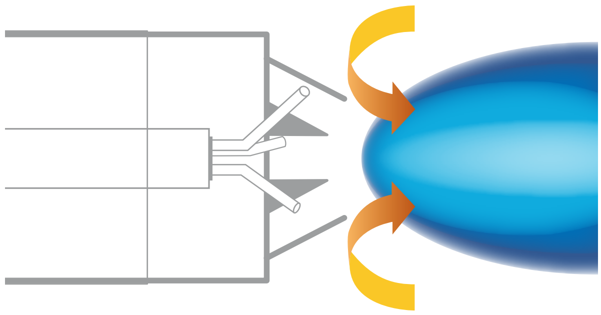


This mixture crosses the main reaction area, slowing the combustion and lowering the main flame temperature.
The result of this staging combustion is a significant reduction in the formation of thermal nitrogen oxides.
The advantage of this internal recirculation technique is an automatic adjustment to the quantity of recycled combustion flue gases: the volume of the flame is always as low as possible, which has a very minor effect on the nominal power of the generator, unlike external recirculation systems.

FREE FLAME

The pinnacle of low-polluting burner engineering

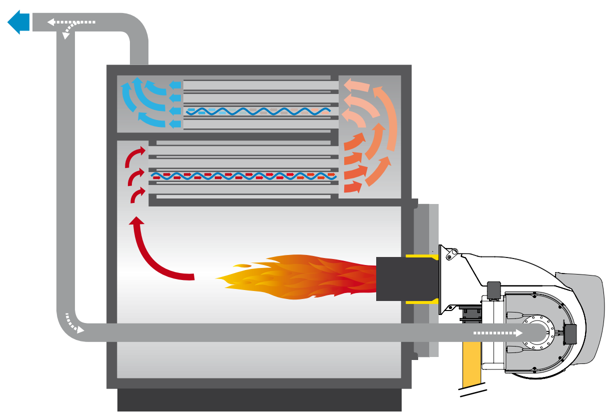
The principle of the Free Flame combustion technology is based on the internal recirculation of the flue gas, combined with high speed flow of the fuel air mixture.
The flame stabilises at the right distance from the combustion head, thus leaving space for the mixture of reagents and flue gas. This phenomenon greatly reduces NOx emissions. The flame seems to float in the furnace, thus giving the system its name: «Free Flame».
The technology is used with both liquid and gas fuels.



FGR SYSTEM

Ultra low NOx solutions to reach emissions of less than 30 mg/kWh

Thanks to its experience and the technologies it has developed over the years, ELCO offers a wide range of products which use the external FGR technology to reduce NOx emissions and satisfy even the most stringent regulations.
The principle of external flue gas recirculation consists in sending a mixture of comburent air and flue gas to the combustion head, thus reducing the NOx emissions. The gases are mixed upline of the combustion process by the burner fan (for monoblock units) or by the external fan (in case of duoblock burners).
This technology enables ELCO to guarantee emissions of less than 30 mg/kWh, a value which is hard to obtain with conventional combustion systems, and offer cutting-edge products which satisfy the requirements of any current regulations.



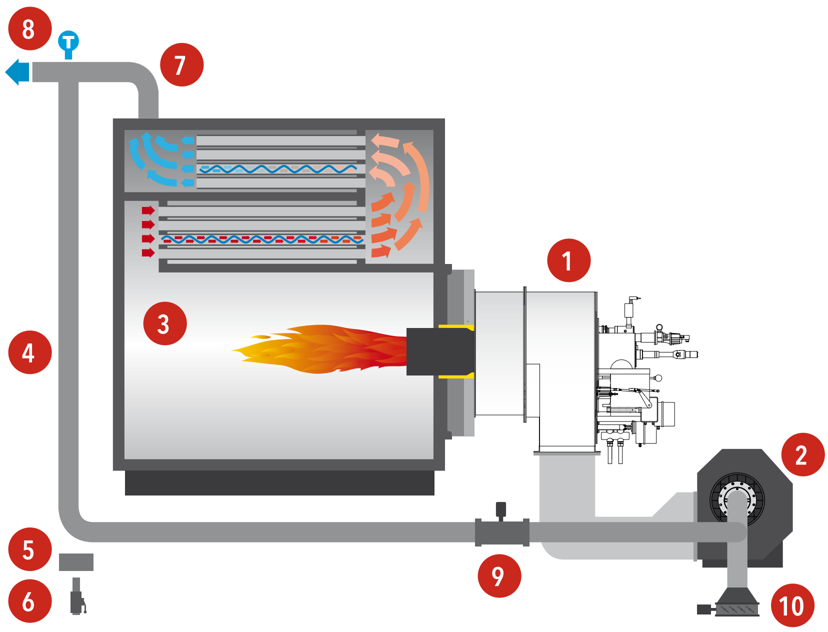
ELCO COMBUSTION TECHNOLOGIES

FGR System on duoblock burners: layout "A"

The FGR system for duoblock burners, since the draught fan is installed far from the burner, needs a different layout from the one of the monoblock burners, so that the flue duct ends upstream of the draught fan. In order to produce the needed suction to get flue from the stack and to mix it with the fresh air, the air damper is fitted upstream of the draught fan and upstream of the flue duct end, too.
The flue duct has to be properly sized in order to minimize the pressure drop.

Legenda

1 – Burner
2 – Draught fan
3 – Furnace
4 – Flue pipeline
5 – Drainage
6 – Drainage valve
7 – Stack
8 – Temperature probe
9 – FGR valve
10 – Air damper

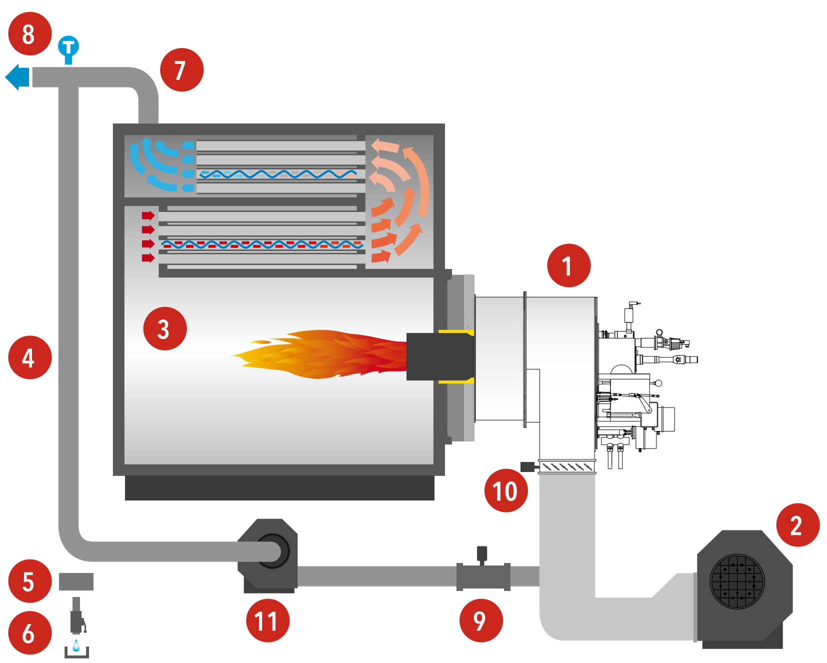


FGR System on duoblock burners: layout "B"

An alternative layout to layout "A" provides a further draught fan dedicated to the flue. It takes the flue from the stack and pushes it into the duct between the burner and the fresh air draught fan. The flue damper is just after the flue fan. The air damper is on burner board and therefore it adjusts the rate of the mixture between the flue and the fresh air.
As for the previous layout, the flue duct has to be properly sized in order to minimize the pressure drop.

Legenda

1 – Burner
2 – Fresh air draught fan
3 – Furnace
4 – Flue pipeline
5 – Drainage
6 – Drainage valve
7 – Stack
8 – Temperature probe
9 – FGR valve
10 – Air damper
11 – FGR draft fan



EK-DUO

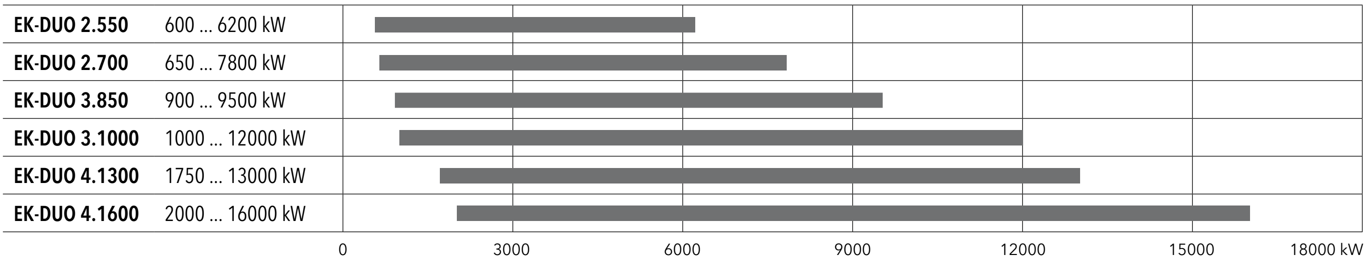
The EK-DUO models are high-performance burners offering well-engineered duoblock technology at an affordable price.
These burners are predominantly used to burn standard fuels, i.e. domestic light oil and natural gas, and are typically used in:

- shell boilers;
- water tube boilers;
- thermal oil boilers.

The separate fan installation of the burner allows to overcome high combustion chamber resistance.

The tried-and-tested Diamond burner head for gas burners or the Free Flame burner head for oil and dual fuel burners grant high performance and low emissions, meeting the most stringent Low NOx requirements. The fuel-air mixture is adjusted solely using a modern electronic compound controller.

Range overview

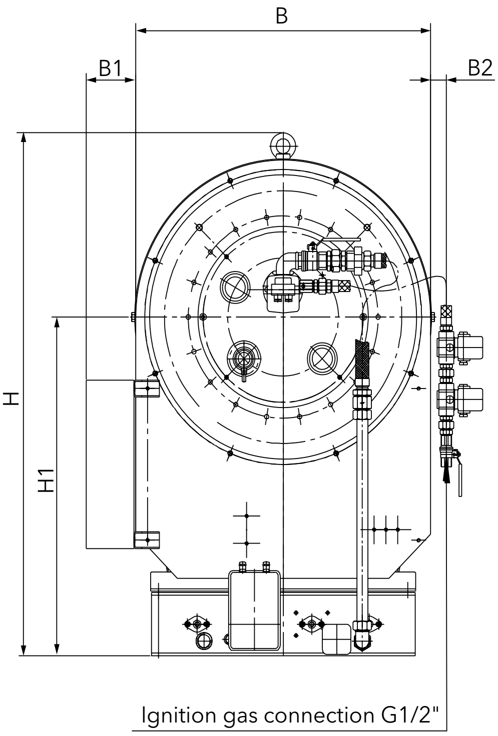


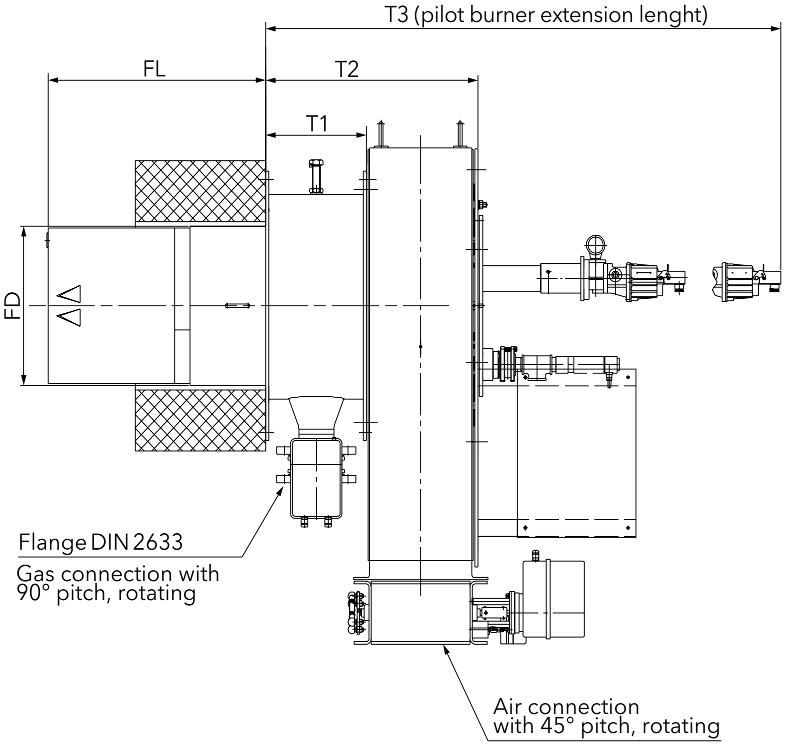
Configurations

Model	Weight (kg)	Fuel			Operation		NOx emissions		
		Gas	Gas/Light oil	Light oil	Mechanical	Electronic	Class 2	Class3	Ultra Low NOx
EK-DUO 2.550	320 ... 400	●	●	●		●		●	●
EK-DUO 2.700	320 ... 400	●	●	●		●		●	●
EK-DUO 3.850	400 ... 470	●	●	●		●		●	●
EK-DUO 3.1000	400 ... 470	●	●	●		●		●	●
EK-DUO 4.1300	400 ... 420	●	●	●		●		●	●
EK-DUO 4.1600	400 ... 420	●	●	●		●		●	●

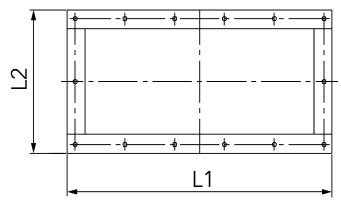
EK-DUO

Overall dimensions

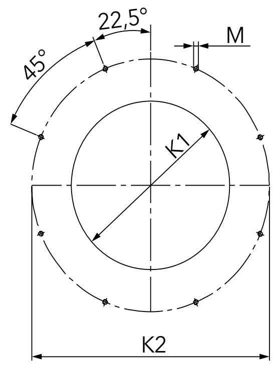




Air connection flange



Details of boiler front plate



Model	Gas connection	H	H1	B	B1	B2*	T1	T2	T3*	FL*	FD*	L1	L2	K1	K2	M
EK-DUO 2.550	DN80	1241	804	750	125	40	255	537	2005 ... 2150	320 ... 570	378	670	340	400	600	M12
EK-DUO 2.700	DN80	1241	804	750	125	40	255	537	2005 ... 2150	320 ... 570	378	670	340	400	600	M12
EK-DUO 3.850	DN80	1481	944	950	120	40	290	622	1810 ... 2390	350 ... 590	441 ... 456	827	386	480	690	M12
EK-DUO 3.1000	DN80	1481	944	950	120	40	290	622	1810 ... 2390	350 ... 590	441 ... 456	827	386	480	690	M12
EK-DUO 4.1300	DN100	1491	929	1000	122	40	420	802	2600 ... 2770	350 ... 620	506	840	440	525	725	M20
EK-DUO 4.1600	DN100	1491	929	1000	122	40	420	802	2600 ... 2770	350 ... 620	506	840	440	525	725	M20

*: values are referred to standard burner versions and may vary in base of the configuration chosen

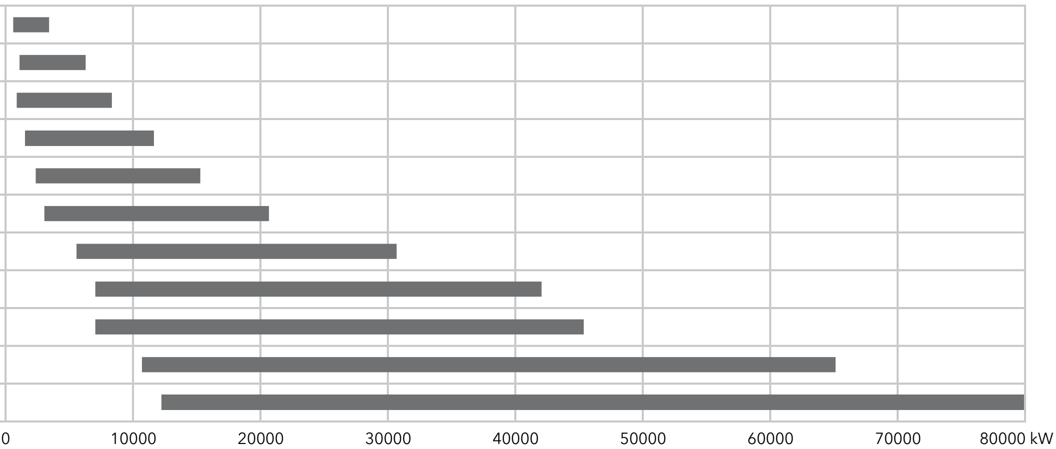
RPD

Thanks to their extreme flexibility, RPD burners are suitable for almost any firing-related task. All RPD models are fitted with adjustable air deflector plates, which can be used to swirl the combustion air. The flame configuration can hereby be directly influenced according to the geometry of the combustion chamber.
The combustion head features optimised internal geometry to reduce head loss and the power demand of the fan motor.
Pre-heated combustion air up to 350°C can also be used in order to achieve greater energy-saving potential.

The flexible and modular design of the RPD range makes this burners suitable to be used in all those cases where complex tasks and high technical requirements demand customised heating installation solutions.
Typical exemples of use include:
- use with multiple gases and/or multiple liquid fuels, simultaneously;
- water tube boilers used in big heating installations and industrial processes with remarkable thermal demand;
- refinery processes and chemical industry applications;
- waste incineration plants.

Range overview

RPD 20	500 ... 3300 kW
RPD 30	1130 ... 6042 kW
RPD 40	910 ... 8230 kW
RPD 50	1400 ... 11160 kW
RPD 60	2232 ... 14511 kW
RPD 70	3000 ... 20470 kW
RPD 80	5500 ... 30350 kW
RPD 90	7000 ... 42000 kW
RPD 100	7000 ... 45000 kW
RPD 130	10800 ... 65000 kW
RPD 160	12500 ... 80000 kW

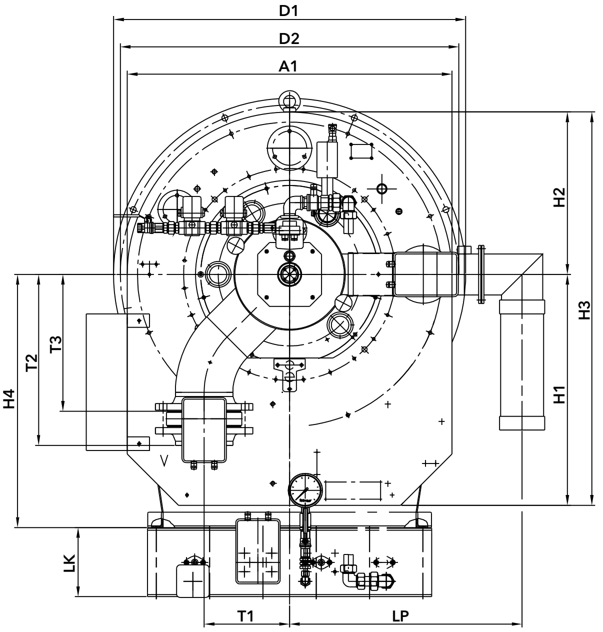


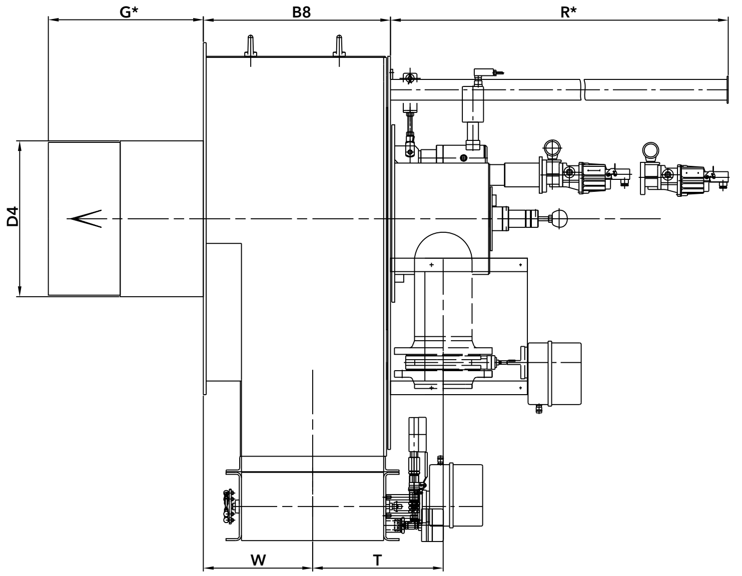
Configurations

	Weight (kg)	Fuel					Operation		NOx emissions		
		Gas	Gas/Light oil	Light oil	Heavy oil	Gas/Heavy oil	Mechanical	Electronic	Class 2	Class3	Ultra L. NOx
RPD 20	370	●	●	●	●	●	●	●	●	●	●
RPD 30	400	●	●	●	●	●	●	●	●	●	●
RPD 40	430	●	●	●	●	●	●	●	●	●	●
RPD 50	550	●	●	●	●	●	●	●	●	●	●
RPD 60	600	●	●	●	●	●	●	●	●	●	●
RPD 70	760	●	●	●	●	●	●	●	●	●	●
RPD 80	1060	●	●	●	●	●	●	●	●	●	●
RPD 90	1200	●	●	●	●	●	●	●	●	●	●
RPD 100	1250	●	●	●	●	●	●	●	●	●	●
RPD 130	2850	●	●	●	●	●	●	●	●	●	●
RPD 160	3080	●	●	●	●	●	●	●	●	●	●

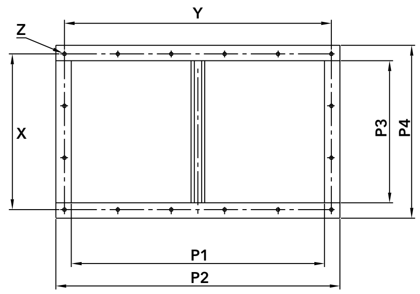
RPD

Overall dimensions

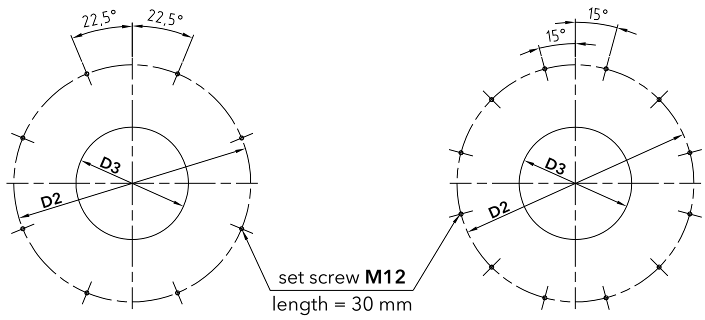




Air connection flange



Details of boiler front plate



RPD 20 - 60 **RPD 70 - 100**

	A1	B8	D1	D2	D3	D4	D7	H1	H2	H3	H4	P1	P2	P3	P4	T	T1	T2	T3	V	W	X	Y	Z	LK	LP
RPD 20	*values dependent on design variant*																									
RPD 30	745	428	830	790	385	371	17,5	620	373	993	650	580	670	320	410	342	192	458	362	DN80	248	4X92	5x126	10	202	594
RPD 40	745	428	830	790	423	409	17,5	620	373	993	650	580	670	320	410	342	192	458	362	DN80	248	4x92	5x126	10	202	594
RPD 50	950	547	1030	990	470	456	17,5	675	475	1150	740	740	830	416	506	382	250	500	400	DN150	319	3x152	5x156	10	202	680
RPD 60	994	634	1080	1040	520	506	18	700	497	1197	825	750	840	470	560	439	270	520	420	DN150	379	4x129	5x160	10	202	704
RPD 70	1160	731	1240	1200	640	626	18	780	580	1360	900	936	1026	600	690	501	365	479	479	DN150	410	5x128	7x140	10	202	841
RPD 80	1350	860	1450	1400	740	710	18	820	675	1495	1000	1102	1192	700	790	561	310	647	547	DN150	489	6x125	9x128	10	202	909
RPD 90	1700	890	1800	1750	883	870	18	905	850	1755	1100	1300	1390	742	832	618	310	743	643	DN150	494	6x132	10x135	10	202	1043
RPD 100	1700	890	1800	1750	935	922	18	905	850	1755	1100	1300	1390	742	832	618	310	743	643	DN150	494	6x132	10x135	10	202	1043
RPD 130	*values dependent on design variant*																									
RPD 160	*values dependent on design variant*																									

*: value G and R are defined based on the coating of the boiler
All values are referred to standard burner versions and may vary in base of the configuration chosen

WORLDWIDE REFERENCES

Beijing, China

Fuel:
Natural gas

Total nominal output:
180 MW

Burners:
4x RPD 100 G-EU

Stavanger, Norway

Location:
District heating plant

Fuel:
Natural gas

Burners:
2x EK-DUO 4.1600 G-E

Tianjin, China

Fuel:
Natural gas

Nominal output:
58 MW

NOx emissions:
Installation with FGR system to reach NOx levels below 30 mg/kWh

Burners:
RPD130 G-EU1 FGR

WORLDWIDE REFERENCES

Stuttgart, Germany

Fuel:
Natural gas / light oil

Burners:
2x EK-DUO 2.700 GL-EUF
1x EK-DUO 2.550 GL-EUF
Low NOx operation for both fuels

Copenhaghen, Denmark

Location:
Incinerator plant

Fuel:
Propane

Total nominal output:
150 MW

Burners:
24x RPD 30 G-E

Saint Petersburg, Russia

Fuel:
Natural gas

Total nominal output:
64 MW

Burners:
4x EK-DUO 4.1600 G-EU2

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