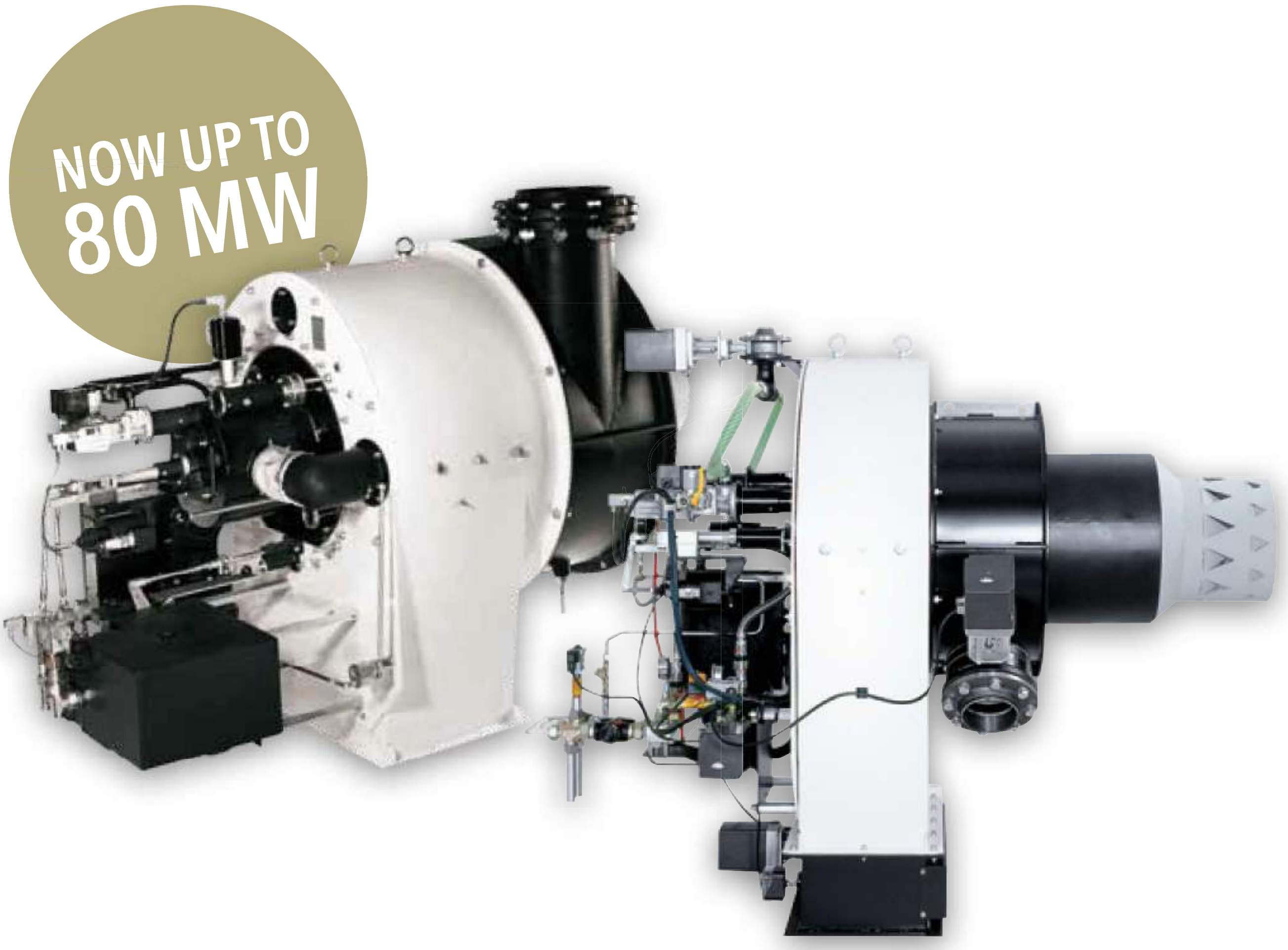
elco

EK-DUO • RPD

DUOBLOCK BURNERS
250 - 80000 kW



Industrial burners as part of a comprehensive solution

On track to success with ELCO

Wherever large-scale power generation is needed, ELCO has a proven track record of being a partner you can depend on. Whether it involves the provision of a heating system for a major property development, thermal process engineering in industry, the production of process steam, or the use of special fuels, we will design, construct and install a tailor-made total solution in accordance with your specific requirements.

Competent advice

In the construction of large thermal installations: the road to success is mapped out from the very beginning. Competent advice is therefore of crucial importance. With over 80 years of experience as well as our own research and development, we have the know-how that you need to see your project come to fruition: from conceptual design, planning, project development and project management to commissioning and the provision of continuos service support for the installation throughout its entire life cycle.

First-class products

ELCO industry burners enjoy a first-class reputation. This is built on many years of experience from a wide variety of applications and methodical research and development. Whether the demands stems from extreme environmental conditions, such as those experienced on an oil rig in the Caspian Sea, to keeping pollutant emissions in a Swiss production facility to a minimum, renowned boiler and system manufacturers trust in our products and opt for the tailor-made engineering solutions of ELCO.

Comprehensive system competency

Our know-how spans the whole range of burner peripheral equipment. In addition to combustion engineering, wecover every aspect of measurement and control engineering for efficient, safe and permanently fault-free operation of your heating installation. Everything from one source and perfectly matched.

Outstanding service

As an ELCO customer, you can depend on your installation to perform reliably. Our guarantee is backed up by a service that sets standards in the industry.

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Duoblock range
The basic concept

Benefits of a separately installed fan

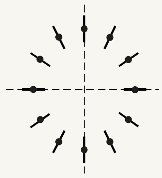
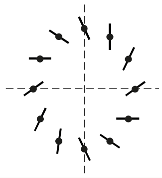
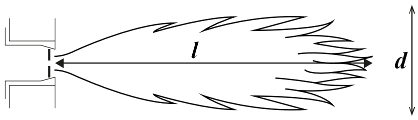
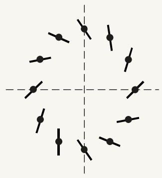
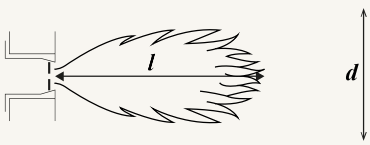
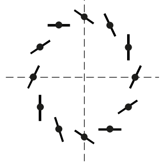
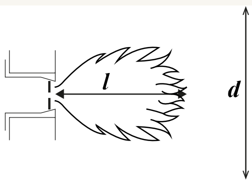
In contrast to monoblock burners, duoblock burners are made up of two units, or blocks, as the name implies: The burner head with the air inlet, and the separately-installed fan. The two units are connected via an air duct. The separate installation of the fan offers several benefits:

- 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.

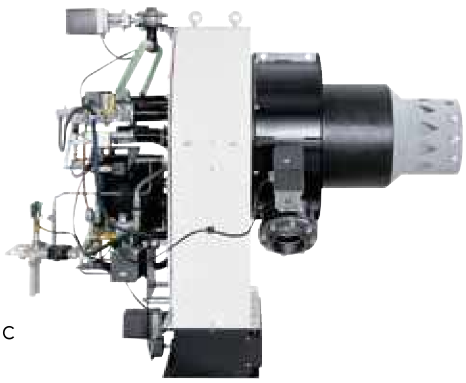
Setting the flame configuration

The air housings in the RPD duoblock burners are each fitted with adjustable air deflector plates, which can be used to swirl the combustion air flowing in from the sides. The flame configuration can hereby be directly influenced according to the geometry of the combustion chamber.

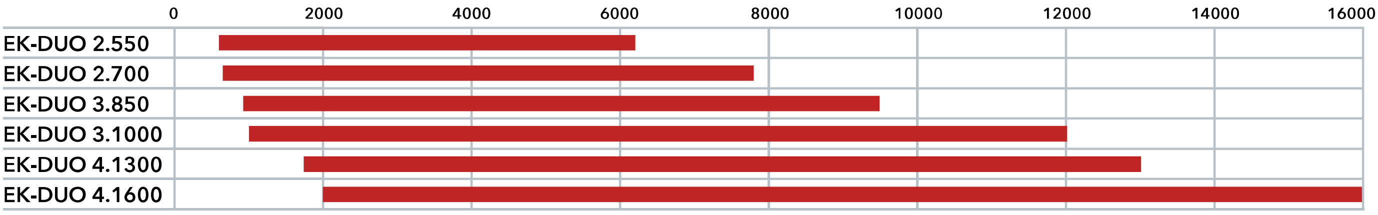
Flame geometry

Setting	Angle of twist (°)	Pressure loss (mbar)		
Position 1 (normal)	0-20		30	
Position 2	20-30		38	
Position 3	30-40		45	
Position 4	40-70		55	

Duoblock burners
EK-DUO



The EK-DUO models are high-performance burners offering well-engineered duoblock technology at an affordable price. The separate fan installation of the burner allows to overcome high combustion chamber resistance.
These burners are predominantly used to burn standard fuels, i.e. domestic light oil and natural gas, and used in shell boilers, water tube boilers and thermal oil boilers.
They reach a high control range of up to 1:8 with gas, 1:3 with oil, 1:5 with pressure atomisation and up to 1:5 with steam atomisation. For Low NOx requirements, the tried-and-tested Diamond burner head for gas burners or the Free Flame burner head for oil or dual fuel burner can be used.
The fuel-air mixture is adjusted solely using a modern electronic compound controller.

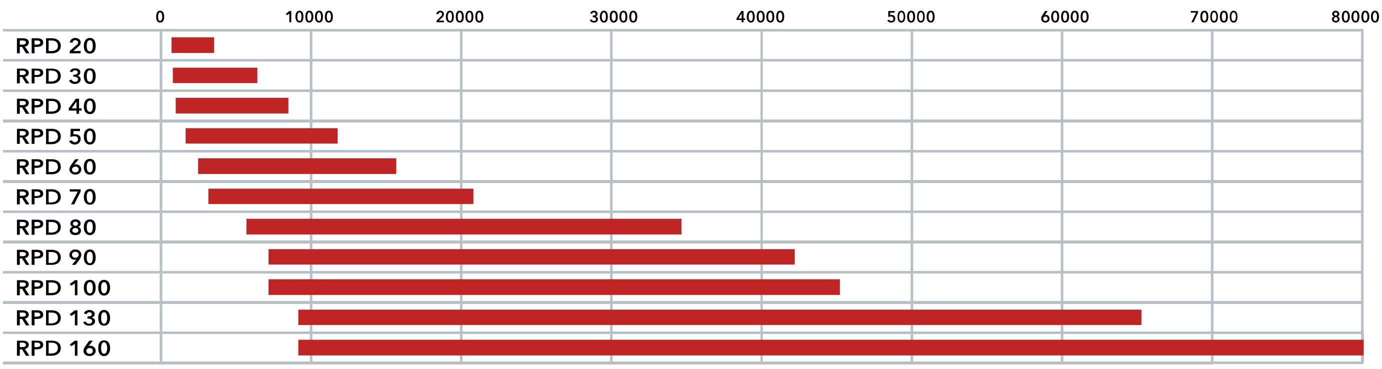


Duoblock burners
RPD

RPD burners are suitable for almost any firing-related task. In addition to the torsion apparatus integrated in the air housing for the secondary air, they also have a separate adjustment option for the primary air, and therefore offer many adjustment possibilities for influencing flame geometry and atomisation. Thanks to its flexible and modular design RPD burners are used anywhere where complex tasks and high technical requirements demand customised heating installation solutions.
Typical areas of use include:

- burners for multiple gases and/or multiple liquid fuels;
- use of fuels with low calorific values;
- thermal disposal of gas or liquid substances;
- thermal neutralisation of exhaust air;
- pilot or auxiliary burners in waste incineration plants.

Burner control regulation may be designed in accordance with the task and is, where possible, implemented via digital combustion manager as well as an electronic compound for a precise fuel-air ratio. For simpler tasks, mechanical compound systems are also available.
Pre-heated combustion air can also be used in order to achieve greater energy-saving potential.



ELCO operations and Systems

EDP and RGC Systems

Burners for multiple gases and exhaust air:
processes and applications

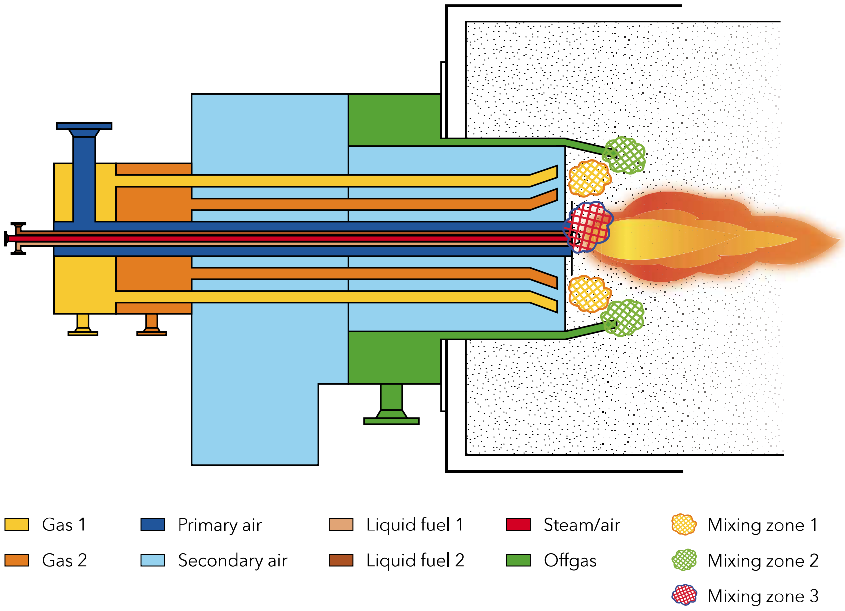
Modern disposal solutions with ELCO burner technologies

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

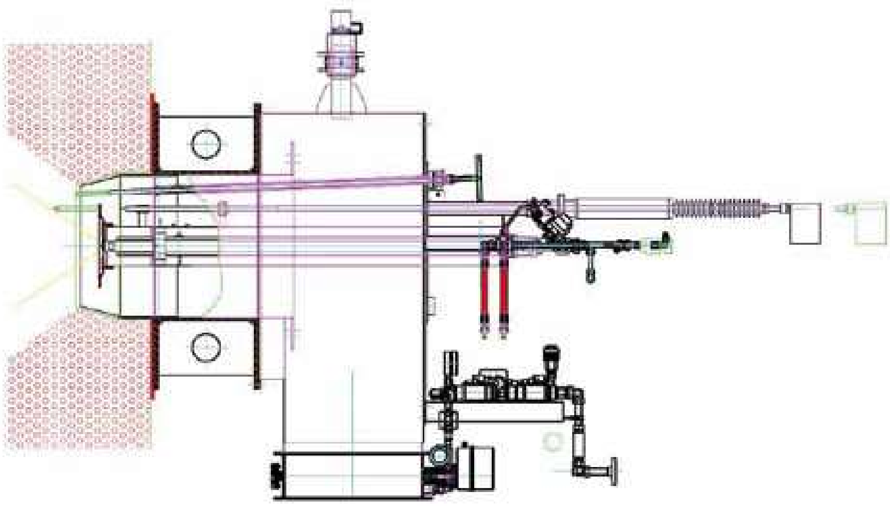
In the picture it is shown a burner that channels contaminated N_2 gas via a double-jacketed head directly into the combustion process, disposing of it thermally.
At the same time, the hydrogen gas that is formed during the production process is used to generate heat. Hydrogen, coal gas or heavy oil (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 operations and Systems

GEM System

Electronic burner control:
high safety and low costs

Digital combustion management, communication concept

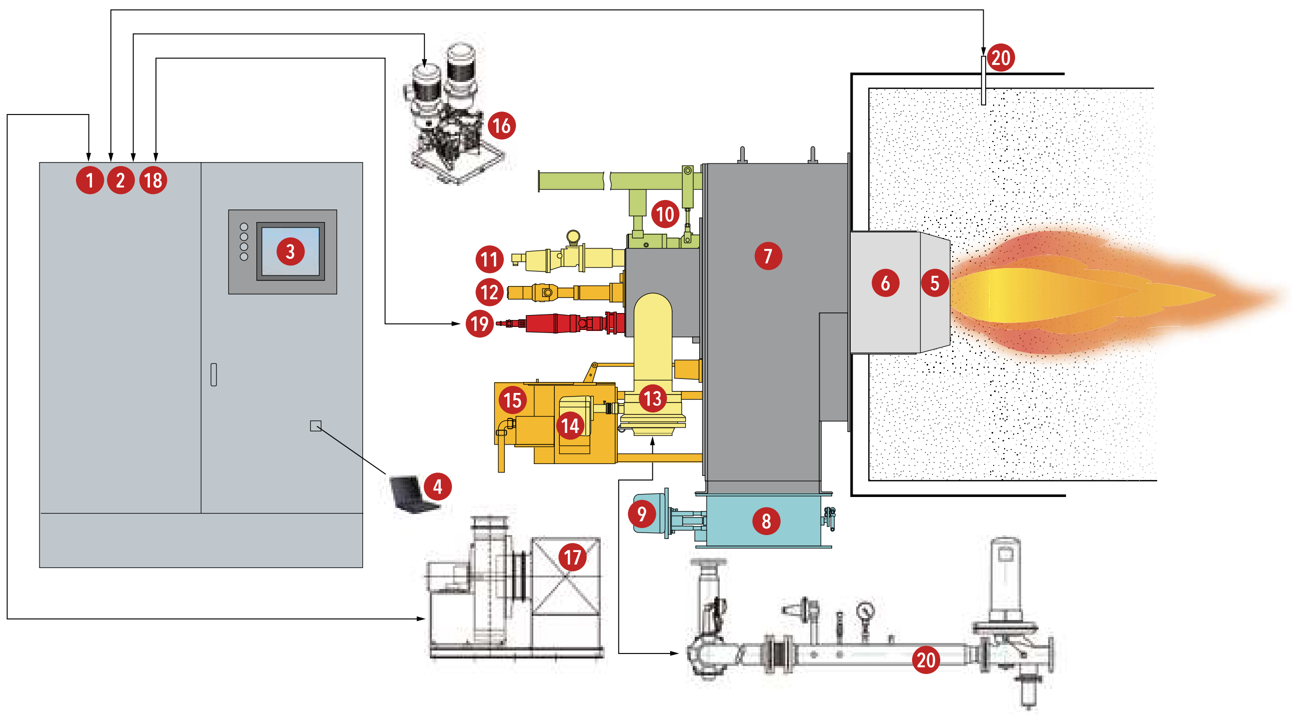
The use of digital technologies in burner control systems helps to reduce running costs, improve reliability of operation and lower pollutant emissions. The digital combustion managers used on ELCO burners are responsible not only for burner control (formerly the task of the traditional automatic combustion 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.



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 operations 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

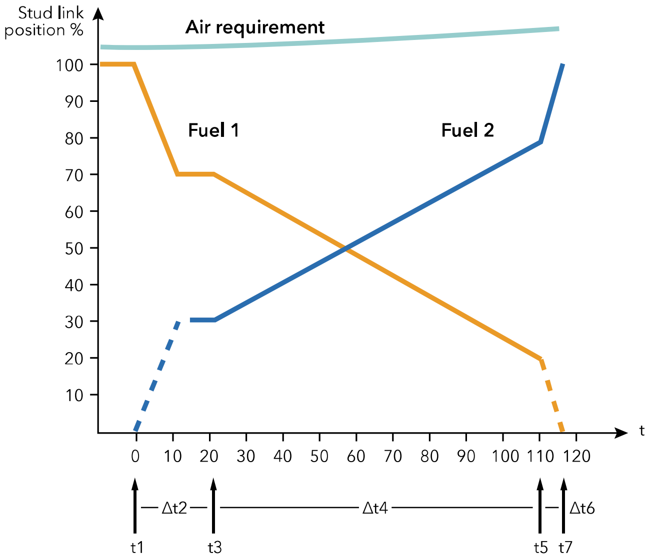
For burner commissioning and adjustments, the combustion manager is connected to a user-friendly or practice-oriented display and operating unit or to a PC. Menu-driven procedures guide the user safely and conveniently through the operating and commissioning process.

Standby 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 standby 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 operations and Systems

GEM System

O_2/CO regulation:
forever optimum

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

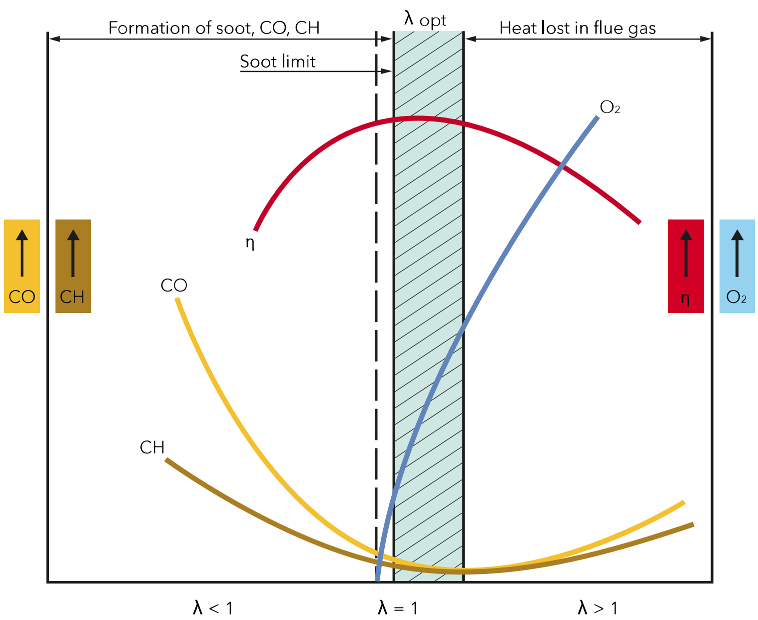
Variations in air density alone –caused by temporary or seasonal weather changes– can have an effect on the O_2/CO value of more than 1%. Every service engineer will therefore adjust the O_2/CO value to such a level that, even in the worst conditions, emissions of CO, C_xH_y and soot remain within acceptable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

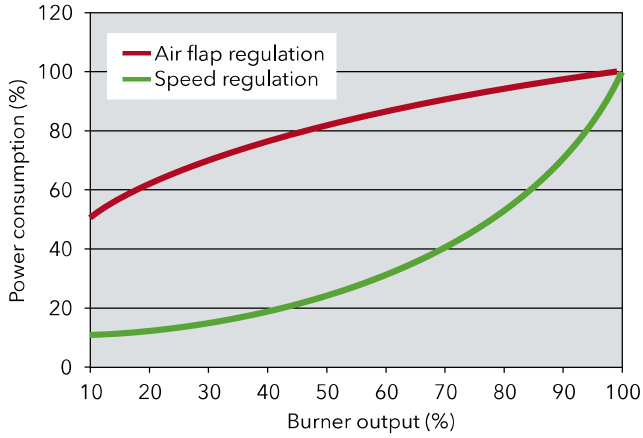
Variatron

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.

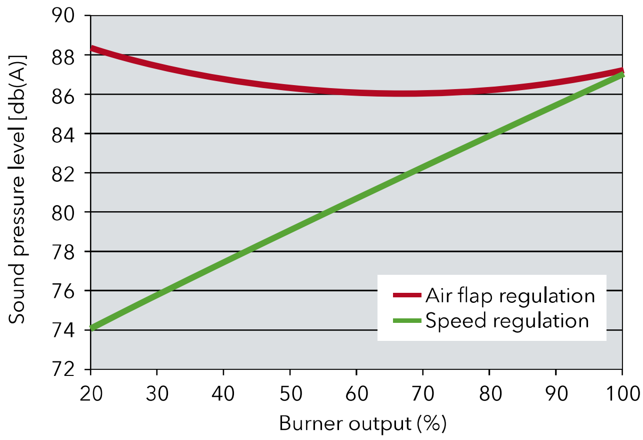


Pre purging inhabit mode

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 operations and Systems

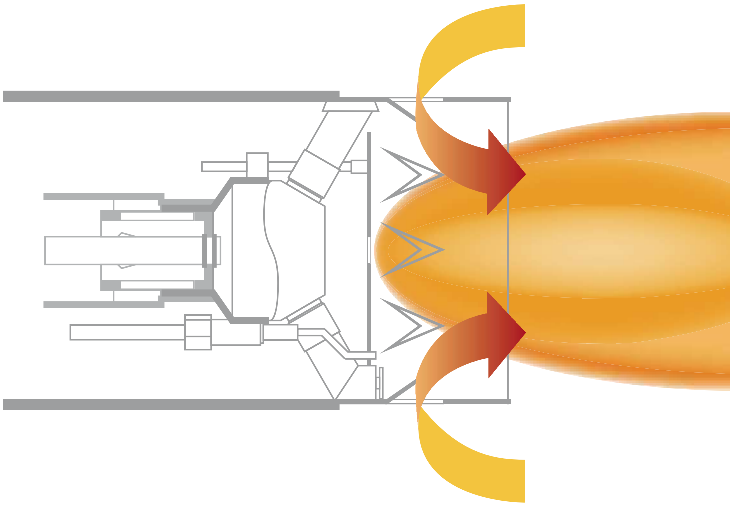
Diamond Head

Diamond Head technology:
low emissions and reliable operation

Today, across almost the whole of Europe, national legislation places restrictions on the emission of environmental pollutants. Under particular scrutiny are nitric oxides, which are held to be the cause of acid rain and are subject to very strict limits.

Nitric oxides form at high combustion temperatures. Thus, a cooling of the flame temperature through recirculation of already cooled flue gases has proven to be an especially effective measure for reducing emissions.

The Diamond burner head has been specially designed with this principle in mind. At the chevron openings, flue gases are drawn out of the combustion chamber and into the mixing zone of the burner head where they are mixed homogeneously with the fuel and combustion air. The result is a uniform flame pattern with no temperature peaks and the lowest of nitric oxide emission values, compliant with limits anywhere in Europe.

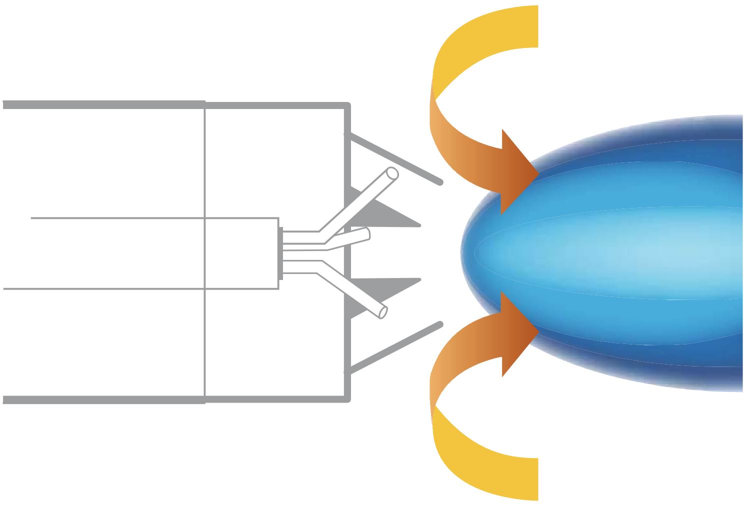


Free Flame

Free Flame technology:
the pinnacle of low-polluting burner engineering

The greatest challenge in the development of a low-polluting burner is how to achieve compliance with emission limits during light oil operation. This is because the light oil has to be mixed homogeneously with the combustion air and the recirculated flue gas – and, for this to be possible, it must have evaporated as completely as possible before it has even been delivered to the flame.

The Free Flame burner head provides an excellent solution to this problem. Atomised light oil is sprayed from the nozzle, evaporated in the evaporation and premixing zone and intensively mixed with the air and flue gas. Only then it is ignited. As a result, the flame burns homogeneously and without the temperature peaks that are conducive to the formation of nitric oxide. It does so forward of the burner head and not, unlike conventional burners, directly at the burner outlet. The flame is stabilised across the entire output range by a precisely defined swirl flow and, if necessary, by a pilot burner.



EK-DUO
Technical data

Range and type
EK-DUO 2, 3, 4

Size
Max power (kW)

Fuel
G = Natural gas
GL = Dual fuel (gas/light oil)
L = Light oil

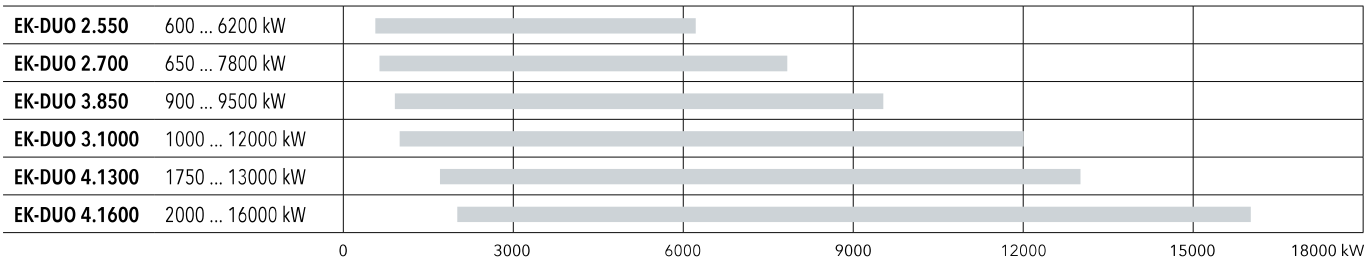
Combustion type
- = Standard
U = Low NOx gas - Diamond Head
U2 = Low NOx gas - Diamond Head
UF = Low NOx light oil - Free Flame

EK-DUO 3.1000 G - EU2 KN

Operation
R = 2 stage progressive mechanical
E = 2 stage progressive electronic

Combustion head
KN = short
KM = medium
KL = long

RANGE OVERVIEW

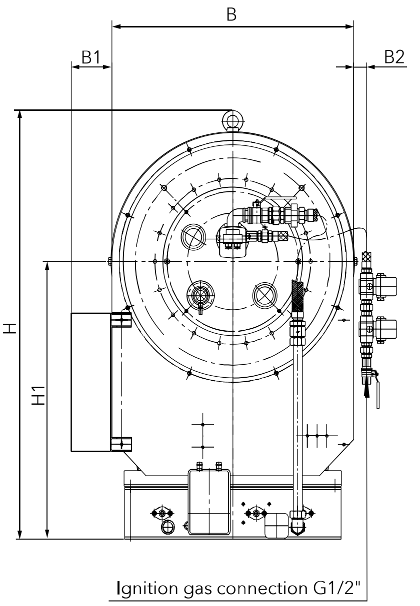


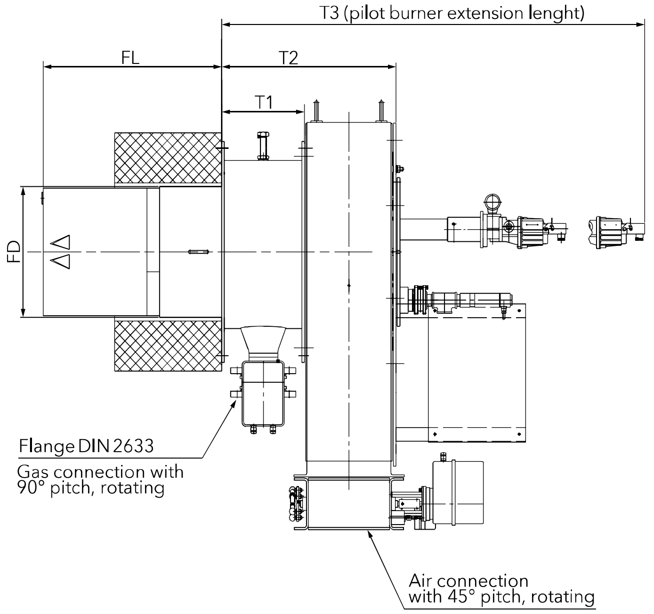
AVAILABLE CONFIGURATIONS

Model	Fuel					Operation		Low NOx		
	Gas	Gas/ Light Oil	Light Oil	Heavy Oil	Gas/ Heavy Oil	Mechanical	Electronic	Gas	Light Oil	Gas/ Light Oil
EK-DUO 2.550	•	•	•				•	•	•	•
EK-DUO 2.700	•	•	•				•	•	•	•
EK-DUO 3.850	•	•	•				•	•	•	•
EK-DUO 3.1000	•	•	•				•	•	•	•
EK-DUO 4.1300	•	•	•				•	•	•	•
EK-DUO 4.1600	•	•	•				•	•	•	•

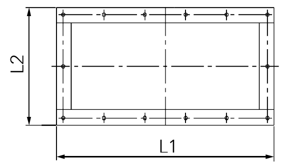
EK-DUO

Overall dimensions

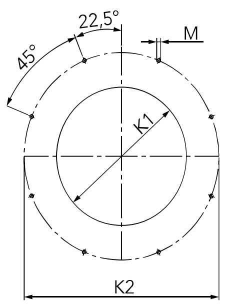




Air connection flange



Details of boiler front plate



Model	Space requirements and dimensions				
	L1	L2	K1	K2	M
EK-DUO 2.550	670	340	400	600	M12
EK-DUO 2.700					
EK-DUO 3.850	827	386	480	690	M12
EK-DUO 3.1000					
EK-DUO 4.1300	840	440	525	725	M20
EK-DUO 4.1600					

Model	Weight* (kg)	Gas connection	Space requirements and dimensions									
			H	H1	B	B1	B2*	T1	T2	T3*	FL*	FD*
EK-DUO 2.550	320 ... 400	DN80	1241	804	750	125	40	255	537	2005 ...2150	320 ...570	378
EK-DUO 2.700	320 ... 400											
EK-DUO 3.850	400 ... 470	DN80	1481	944	950	120	40	290	622	1810 ...2390	350 ...590	441 ...456
EK-DUO 3.1000	400 ... 470											
EK-DUO 4.1300	400 ... 420	DN100	1491	929	1000	122	40	420	802	2600 ...2770	350 ...620	506
EK-DUO 4.1600	400 ... 420											

*: value dependent on design variant

RPD
Technical data

Range and type
RPD 20 ... 100

Fuel
G = Natural gas
F = Liquid gas
GL = Dual fuel (gas/light oil)
L = Light oil
S = Heavy oil
GS = Dual fuel (gas/heavy oil)

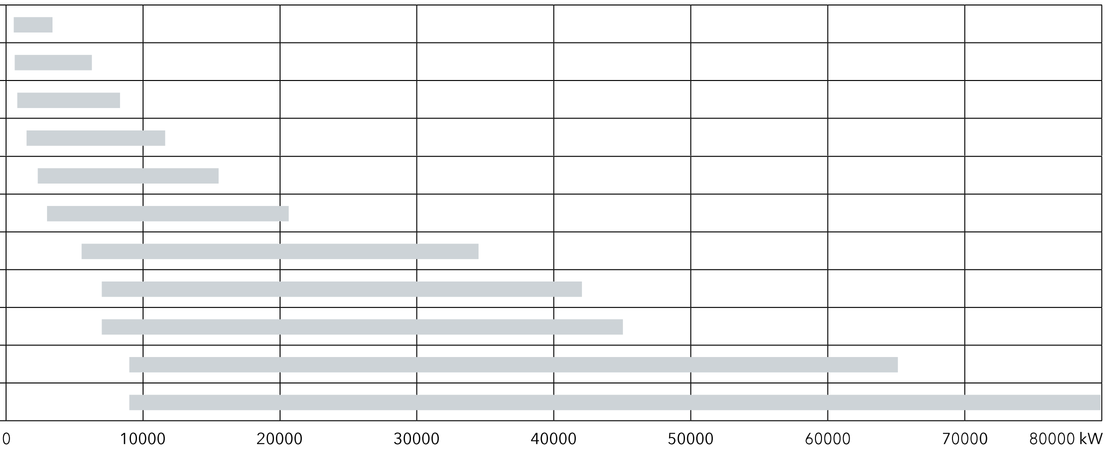
RPD 60 G - E KN

Operation
R = 2 stage progressive mechanical
E = 2 stage progressive electronic

Combustion head
KN = short
KM = medium
KL = long

RANGE OVERVIEW

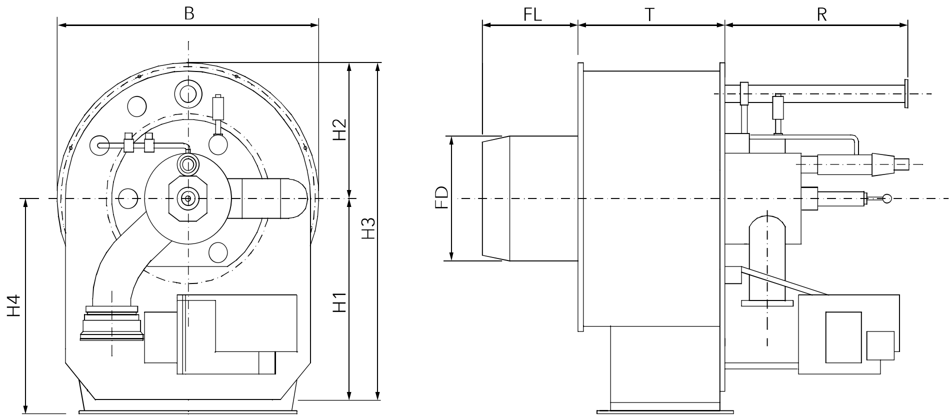
RPD 20	500 ... 3300 kW
RPD 30	670 ... 6215 kW
RPD 40	900 ... 8230 kW
RPD 50	1400 ... 11160 kW
RPD 60	2230 ... 15420 kW
RPD 70	3000 ... 20640 kW
RPD 80	5500 ... 34500 kW
RPD 90	7000 ... 42000 kW
RPD 100	7000 ... 45000 kW
RPD 130	9000 ... 65000 kW
RPD 160	9000 ... 80000 kW



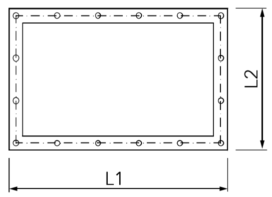
AVAILABLE CONFIGURATIONS

Model	Fuel					Operation	
	Gas	Gas/Light oil	Light oil	Heavy oil	Gas/Heavy oil	Mechanical	Electronic
RPD 20	•	•	•	•	•	•	•
RPD 30	•	•	•	•	•	•	•
RPD 40	•	•	•	•	•	•	•
RPD 50	•	•	•	•	•	•	•
RPD 60	•	•	•	•	•	•	•
RPD 70	•	•	•	•	•	•	•
RPD 80	•	•	•	•	•	•	•
RPD 90	•	•	•	•	•	•	•
RPD 100	•	•	•	•	•	•	•
RPD 130	•	•	•	•	•	•	•
RPD 160	•	•	•	•	•	•	•

RPD
Overall dimensions

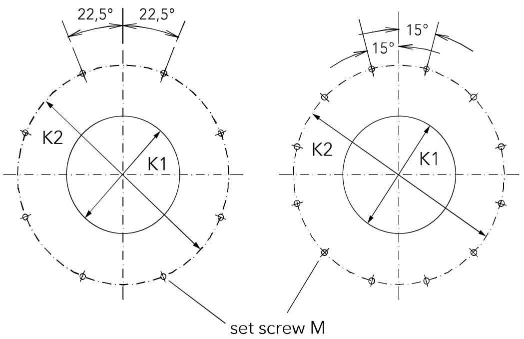


Air connection flange



Details of boiler front plate

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



Model	Space requirements and dimensions				
	L1	L2	K1	K2	M
RPD 20	510	316	270	500	M10
RPD 30	670	410	385	790	M12
RPD 40	670	410	423	790	M12
RPD 50	830	506	470	990	M12
RPD 60	840	560	520	1040	M12
RPD 70	1026	690	640	1200	M12
RPD 80	1192	790	740	1400	M12
RPD 90	1390	832	883	1750	M12
RPD 100	1390	832	935	1750	M12

Model	Weight* (kg)	Gas connection	Space requirements and dimensions								
			H1	H2	H3	H4	B	T	R	FL	FD
RPD 20	300 ... 430	R2″	385	265	650	425	530	325	-	250	260
RPD 30	300 ... 430	R3″	620	373	993	650	830	416	1265	317	371
RPD 40	350 ... 450	R3″	620	373	993	650	830	416	1265	442	409
RPD 50	450 ... 600	R5″	675	475	1150	740	1030	535	1743	370	456
RPD 60	500 ... 640	R5″	700	497	1197	825	1080	622	1760	312	506
RPD 70	700 ... 900	R5″	780	580	1360	900	1240	731	2010	469	626
RPD 80	900 ... 1200	R8″	820	675	1495	1000	1450	860	2320	600	710
RPD 90	1100 ... 1400	R8″	905	850	1755	1100	1800	890	2720	810	870
RPD 100	1150 ... 1450	R8″	905	850	1755	1100	1800	890	2720	810	920

RPD 130	value dependent on design variant
RPD 160	value dependent on design variant

*: value dependent on design variant