Honeywell

krom schroder

Low NO_X self-recuperative burner ECOMAX® LE for direct heating systems

TECHNICAL INFORMATION

- For direct heating
- Economical, energy-saving operation by virtue of internal air preheating up to 850°C (1562°F)
- Uniform distribution of temperature by means of a high burner impulse
- Highly efficient with a ceramic burled tube recuperator or a cast steel ribbed tube recuperator
- Low polluting level in Low NO_X mode at furnace temperatures from 850°C (1562°F) thanks to flameless combustion
- Safe flame control in Flame mode thanks to flame rod or UV sensor (optional) and reliable electrical ignition
- Maintenance-friendly thanks to modular design
- Length increments enable individual adjustment either to new systems or when modernizing existing systems

EAC

EN
Edition 05.23
03251654

Contents

1 Application

ECOMAX LE..M

The self-recuperative burners ECOMAX LE are used for heating furnace systems in ON/OFF intermittent mode. The hot flue gases are fed through the ceramic or metallic heat exchanger integrated in the burner, heating the additional supply of cold combustion air flowing in the opposite direction. The maximum achievable air preheat temperature is approx. 850°C (1562°F), depending on the application.

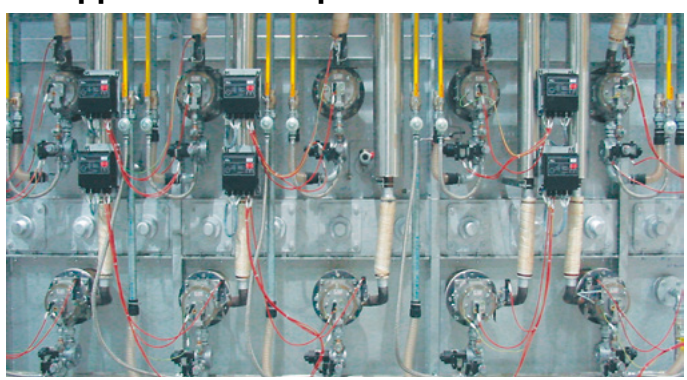
The burners are ignited by the spark electrode and heat up the furnace in traditional Flame mode. To reduce NO_X emissions, the burner can be switched to Low NO_X mode with flameless combustion from a furnace temperature of > 850°C (1562°F).

Low NO_X mode is only possible in conjunction with (ON/OFF) cyclic control. In order to switch to Low NO_X mode, a special burner control unit BCU 465..D2 is required.

1.1 Direct heating

In conjunction with an eductor EJEK to extract the flue gases, the burner ECOMAX is used to save energy in a direct heating system without the need for long hot air lines which require insulation. Applications include heat treatment furnaces in the steel and iron industry and in the non-ferrous metal industry.

1.2 Application examples



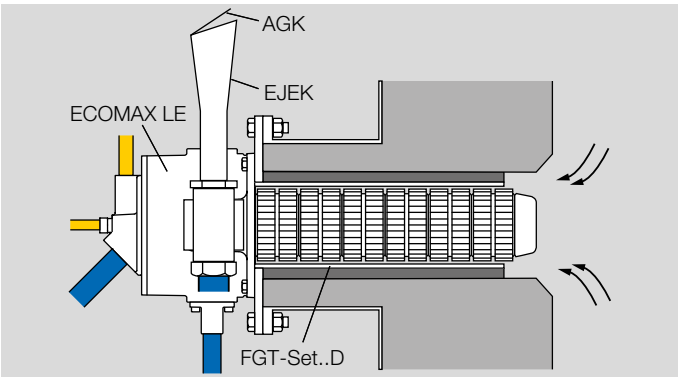
Roller hearth furnace

Bogie hearth furnace

Tailored blank furnace

1.3 ECOMAX for direct heating systems

For direct heating, the burner ECOMAX is combined with a flue gas guide tube FGT set..D to guide the flue gases in the furnace lining and a flue gas eductor EJEK.



The eductor EJEK generates a negative pressure by forcing air through a centrally positioned nozzle and thus draws the flue gases out of the furnace chamber through the burner's heat exchanger. The motive air flow is adjusted on the basis of the negative pressure measured on the pressure tap between the burner and the motive air nozzle. A flue gas valve AGK, which closes due to its own weight, at the eductor minimizes the backflow of hot flue gas from the furnace into the burner or infiltrated air being sucked into the furnace when the burner is switched off.

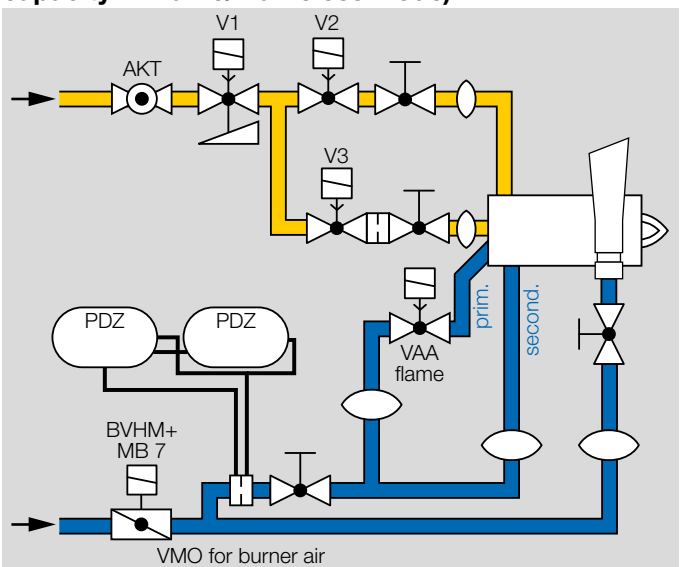
1.4 No pneumatic ratio control system

Slow opening gas valves and quick opening air control valves are to be used to ensure a safe burner start for radiant tube heating.

If no pneumatic ratio control system is used, the gas and air pressure in the supply lines must be controlled and monitored. Fluctuations in the supply pressure affect the burner capacity and the air index (lambda).

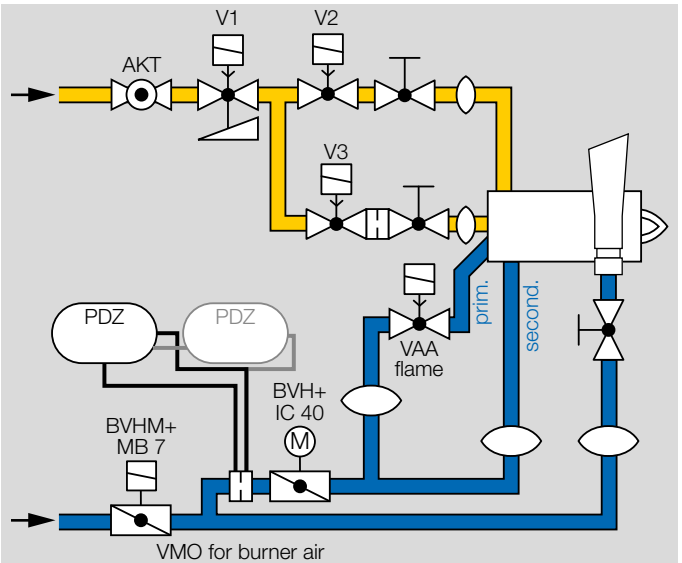
A system design with an air flow monitor is recommended to monitor the pre-purge and to act as a low air pressure protection device (pursuant to EN 746-2 and ISO 13577-2).

Control with 2 solenoid valves for air VAA (jump in capacity in Flame/Flameless mode)



The primary air valve is closed in Flameless mode. This results in a reduction of the air flow rate and the adjustable capacity. The rated capacity of the burner specifies the capacity in Flameless mode. The capacity in Flame mode is higher.

Control using butterfly valve BVHM and solenoid actuator MB 7 (constant or variable capacity in Flame/Flameless mode)



The jump in capacity can be compensated if the system is controlled using the IC 40. When the primary air valve is switched off, the BVH is opened more widely so as to compensate the reduction in capacity in Flameless mode.

The capacities for Flame mode and Flameless mode can be set independently of each other if the system is controlled with IC 40 and two pressure switches using the total air orifice.

1 pressure switch: constant capacity,
2 pressure switches: variable capacity

2 Certification

Declaration of Incorporation pursuant to the Machinery Directive

The products ECOMAX LE comply with the requirements of EN 746-2 and the Machinery Directive 2006/42/EC. This is confirmed by the manufacturer's Declaration of Incorporation.

2.1 Eurasian Customs Union

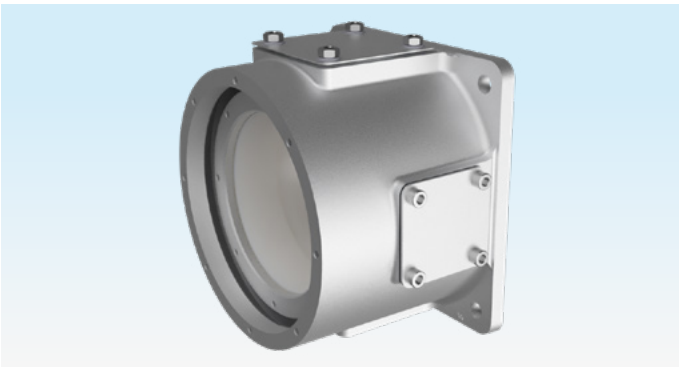
EAC

The products ECOMAX LE meet the technical specifications of the Eurasian Customs Union.

3 Mechanical construction

The burner ECOMAX LE is composed of four modules: burner body, recuperator, air guide tube and gas insert. The modular design facilitates adapting the burners to the respective application or integrating them into an existing furnace system. Maintenance and repair times are reduced, and existing furnace installations can easily be converted.

3.1 Burner body

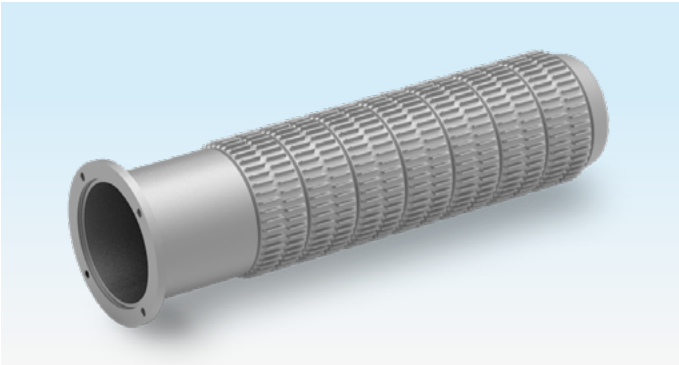


The burner body is made of cast aluminium, which means it has a low weight. The housing has a double-wall design. The combustion air is fed into the burner via the outer annular void. This cools the burner body and reduces emissions. On the flue gas side, there is a shaped part made of vacuum-formed fibres inserted in the housing to act as internal insulation.

3.2 Recuperator

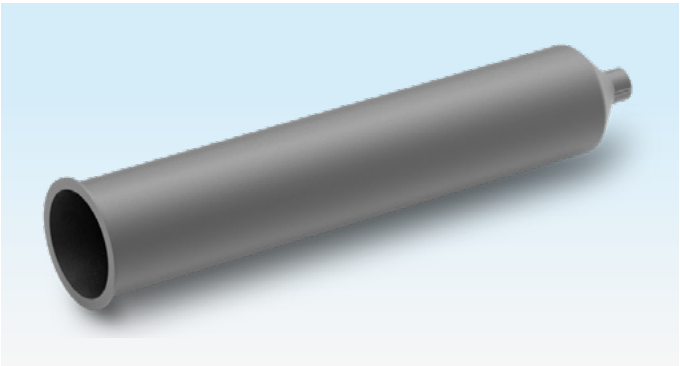
The burner ECOMAX LE is available with a metallic ribbed tube recuperator or a ceramic burled tube recuperator.

3.2.1 Metallic recuperator



The ribs on the cast steel ribbed tube recuperator create a large surface area, allowing it to achieve high efficiency levels even at low temperatures.

3.3 Air guide tube



Burners ECOMAX LE are equipped with a ceramic air guide tube that also serves as the combustion chamber.

3.4 Gas insert

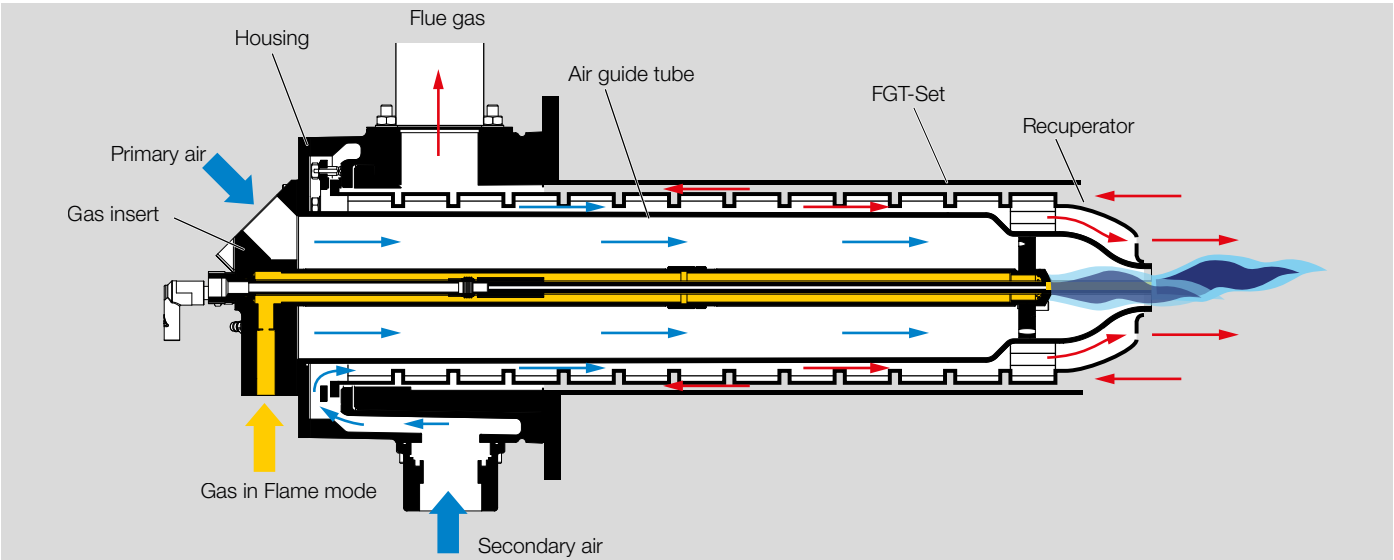
The gas insert consists of the gas flange, the gas connector with burner head and the spark electrode (also serves as monitoring electrode).
An integrated measuring orifice in the gas insert makes it possible to carry out a simple measurement of the gas flow rate in Flame mode. The orifice is designed to suit the gas type.

The gas insert has two purge air connections which purge the electrode and the “Flameless” gas lance.

A certain proportion of primary air will be permanently set on the gas insert using the primary air screw and spacer washers depending on the capacity in Flameless mode.

4 Function

Flame mode



The self-recuperative burner ECOMAX LE uses the heat from the flue gases to preheat the combustion air. The heat exchanger (recuperator) required for this is part of the burner.

After entering the gap between the air guide tube and the recuperator, the secondary air flows towards the burner nozzle. Some of this air is fed via the primary air connection into the inside of the burner, where it is combusted in the first combustion stage.

The secondary air exits at high speed through the secondary air holes in the recuperator head so that it can be combusted in the second combustion stage. This process means that fewer pollutant emissions are produced. The hot flue gases, flowing in the opposite direction, leave the combustion chamber on the outside of the recuperator. Heat is exchanged between the hot flue gases and the cold combustion air through the recuperator wall.

Influence of furnace temperature

The pressure losses from the combustion air and flue gas in the recuperator rise with the furnace temperature. As the furnace temperature increases (at constant air supply pressure), the air mass flow (= standard air flow rate) drops while the gas flow rate remains almost unaffected. A system design without a pneumatic ratio control system does not compensate for any temperature-dependent pressure

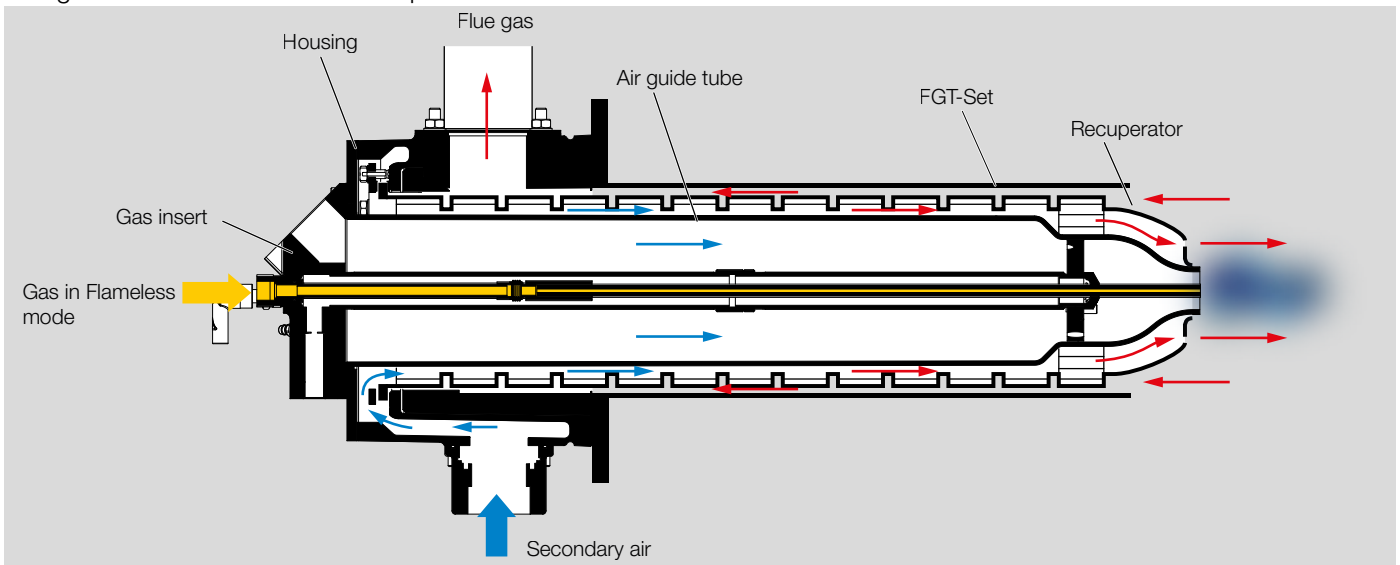
losses in the burner. The air index lambda is reduced as the furnace temperature increases.

Ignition and flame control

The burner is directly ignited.

The ignition and flame control takes place with a combined spark electrode/flame rod (single-electrode operation). Alternatively, UV control is also possible using a UV sensor.

Flameless mode (furnace temperature > 850°C)



When the system is switched to Flameless mode, the primary air valve is switched off so that no more primary air can flow through the primary air connection of the gas flange into the air guide tube. Depending on the burner capacity and air supply pressure, a small proportion of the secondary air will flow through the air guide tube via an internal bypass hole. The secondary air will continue to flow in the gap between the recuperator and air guide tube to the recuperator head, where it is fed into the combustion chamber through the holes in the recuperator head. The gas for Flameless mode is supplied via the central gas lance. The gas/air mixture diluted with flue gas reacts flamelessly in the SICAFLEX flame tube. In Flameless mode, the burner is no longer monitored by the flame rod, but by the high temperature input of the BCU. The positioning of the thermocouple required for this purpose must be representative of the furnace temperature near the burner.

If the furnace temperature falls below 850°C, the burner is switched back to Flame mode.

Switching from Flame mode to Flameless mode results in a reduction in the combustion air volume. The gas volume in Flameless mode must be tailored to this reduced combustion air volume.

5 Selection

5.1 Capacity data

As far as the capacity data are concerned, it should be noted that the capacities in kW and the energy densities in kWh/m³ relate to the lower heating value LHV (H_i, H_u). Capacities quoted in BTU/h and energy densities in BTU/ft³ relate to the higher heating value HHV (H_s, H_o).

Units	Relative to
kW	Lower heating value LHV
kWh/m³	Lower heating value LHV
BTU/h	Higher heating value HHV
BTU/ft³	Higher heating value HHV

5.2 Burner type

Selection is dependent on the type of heating and the furnace temperature. Details for selection, see page 15 (6.1 Heat design).

Burner	Max. flue gas temperature at recuperator inlet	
	°C	°F
ECOMAX LE..M	1150	2100

5.3 Burner size

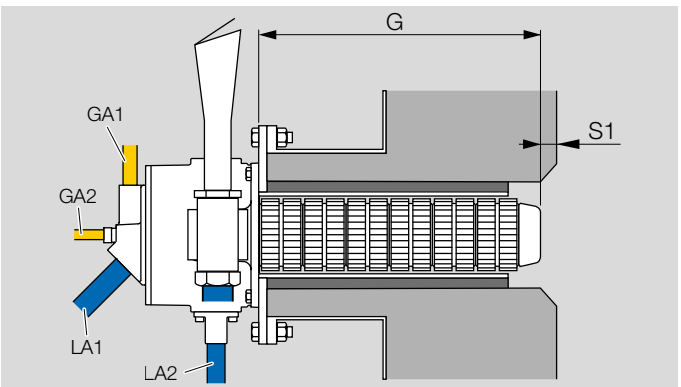
Burner size	Rated capacity in Flameless mode[1)]	
	kW	10^3 BTU/h
ECOMAX LE 1	36	136
ECOMAX LE 2	60	227
ECOMAX LE 3	100	378

1) For operation with natural gas.

If the burners are used at geodetic altitudes of over 500 m above MSL, the possible capacity will be lower as a result of the reduced density of gas and air. Guide value 5% per 1000 m above MSL, details available on request.

5.4 Burner length

The recuperator length **G** and the furnace geometry should be coordinated so that the burner is flush with the inside edge of the furnace lining (**S1** = 0 ± 20 mm).



5.5 Burner head

5.5.1 Use

Burner ECOMAX LE has a burner head for Flame mode and a central gas lance for Flameless mode (Low NO_X mode).

Use	Burner head code letter
Low NO_X mode	F

5.5.2 Gas type

Gas type	Code letter	Heating value range		Density ρ	
		kWh/m³(n)	BTU/scf	kg/m	lb/scf
Natural gas L and H quality	B	8–12	810–1215	0.7–0.9	0.041–0.053

5.6 Type of heating

Type of heating	Code letter	Explanation
Radiant tube heating	/R-	Burner head, optimized for radiant tube heating

5.7 Selection table

Option	ECOMAX LE
Size	1, 2, 3
Recuperator	M
Recuperator length in mm	545, 595, 645, 695
Use	-F
Gas type	B
Type of heating	/D-
Burner head identifier	(1-99)
Construction stage	A-, B-…
Special version	Z

Order example

ECOMAX LE 3M545-FB/D-(1)A-

5.7.1 Type code

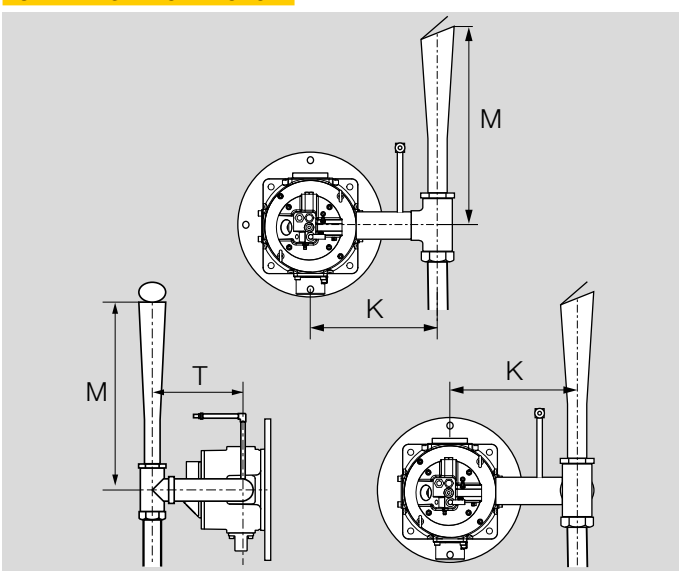
ECOMAX LE	Self recuperative burner
1, 2, 3	Burner size
C	With ceramic burled tube recuperator made of SiSiC
M	With cast steel ribbed tube recuperator
545–695	Recuperator length [mm]
-F	For flameless mode
B	Natural gas
/D-	For direct heating with eductor
(1-99)	Burner head identifier
A-, B-,...	Construction stage
Z	Special version

5.8 Selection table for flue gas eductor EJEK

Description	Code	EJEK LE 2	EJEK LE 3	Condition
Flue gas eductor	**EJEK LE**	•	•	
Size	**1–3**	2	3	Size 1 on request
Axis spacing K in mm	**-K258–292**	-K258	-K292	Special dimensions on request
Installation height M in mm	**-M540–625**	-M540	-M620	
Distance T in mm	**-T50–500**			on request
Eductor angle: x° towards the furnace	**-F5–15**	-F5–15	-F5–15	
Eductor angle: x° away from the furnace	**-R5–15**	-R5–15	-R5–15	
High temperature version	**-HT**	-HT	-HT	HT version for ECOMAX LE..C
Construction stage	**-A**	-A	-A	

Order example

EJEK LE 3-K292-M620-A



6 Project planning information

6.1 Heat design

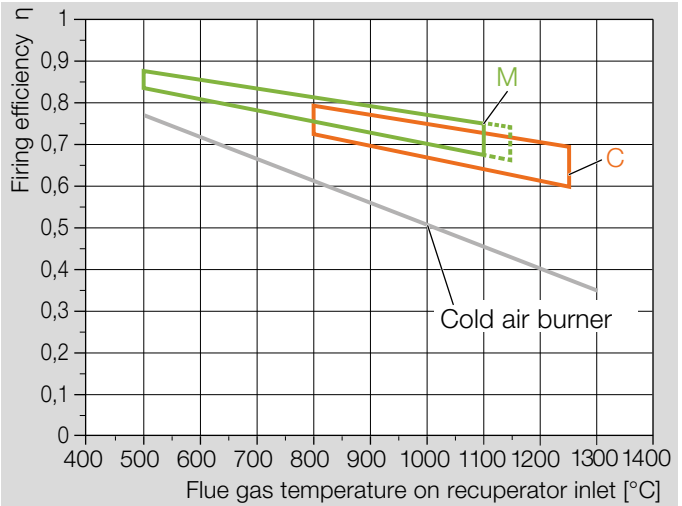
The selection of the burner type depends on the furnace chamber temperature.

Burner	Recommended range of application		Max. flue gas temperature at recuperator inlet	
	[°C]	[°F]	[°C]	[°F]
ECOMAX..M	up to 1100	up to 2012	1150	2102

The burners ECOMAX..M (sizes 1 to 3) can be used for furnace chamber temperatures up to the maximum application temperature if it can be ensured that the burner head will not overheat, for example due to opposite burners or non-representative temperature measurements, see also page 18 (6.4.4 Furnace chamber temperature measurement).

Selection of the burner size is dependent on the net heat output. From this, the required burner capacity is calculated using the firing efficiency value.

$$\frac{\text{Net heat output [kW]}}{\text{Firing efficiency } \eta} = \text{Burner capacity [kW]}$$



A detailed heat design is available on request.

6.2 Flue gas guide tube FGT set

The flue gases are routed out of the furnace in the flue gas pipe through the recuperator in the furnace lining. The FGT set must be ordered separately and is not supplied in the burner package, see page 28 (7.4 Flue gas guide tube FGT set).

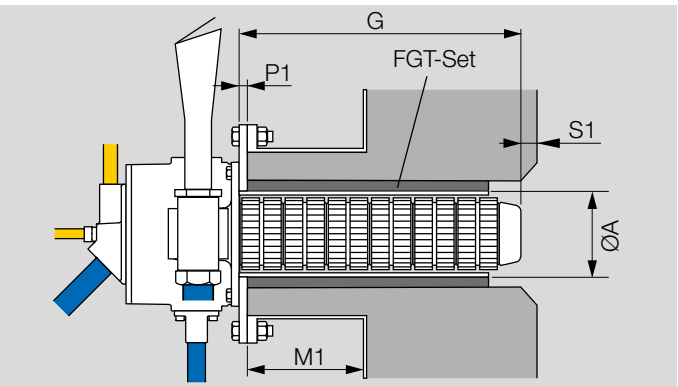
The flange thickness **P1** of the flue gas guide tube is 15 mm. Design the length of the furnace extension **M1** so that the front edge of the recuperator is flush with the inside edge of the furnace lining (**S1** = 0 ± 20 mm).

Do not stress the flue gas guide tube with forces from the furnace lining.

The FGT must be wrapped in a ceramic fibre blanket during installation so that the hot furnace atmosphere cannot

come into contact with the furnace wall or furnace extension. The installation opening in the furnace wall must be greater than the outside diameter **A** of the FGT.

Depending on the furnace lining and the type of expected movements in the furnace wall, the annular void must be at least 25 mm. Use a larger annular void if necessary. Select a fibre blanket thickness which is twice the size of the annular void and compress it to 50%.

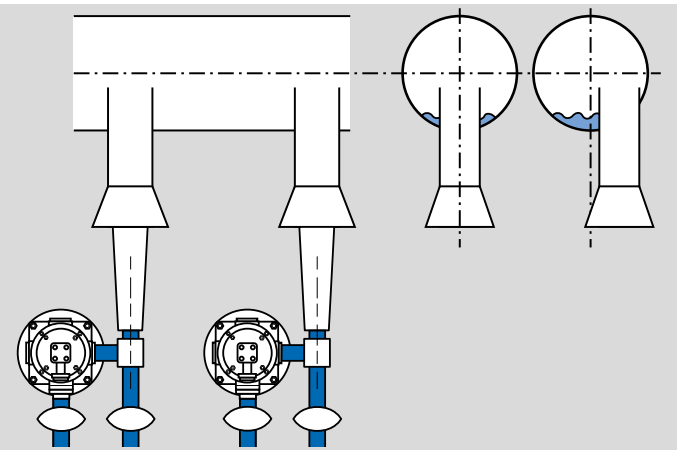


Burner	FGT outside diameter ØA in mm
ECOMAX LE 1M	133
ECOMAX LE 2M	156
ECOMAX LE 3M	193

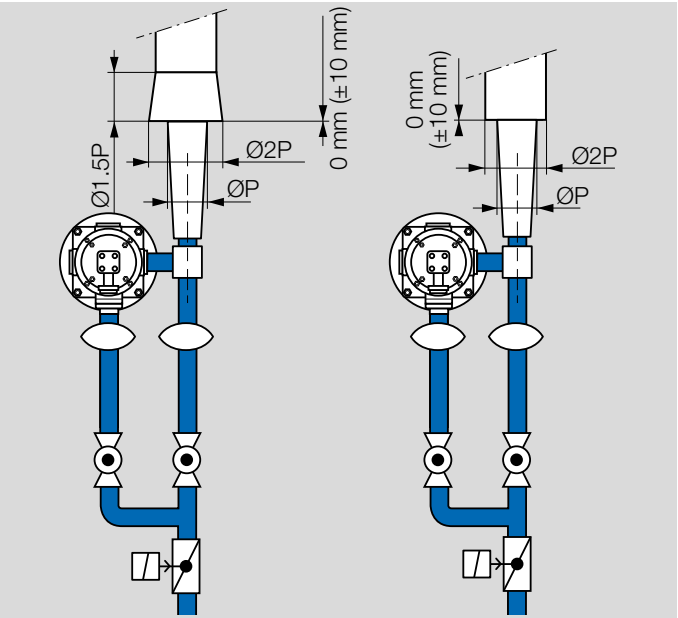
6.3 Flue gas system on the furnace

A flue gas system must be fitted on the furnace as a means of guiding the flue gas to the chimney. In the flue gas system, there should be a low negative pressure thanks to the draught of the chimney or an exhaust fan.

The flue gas system on the furnace should be fitted flush with the eductor (± 10 mm). The diameter of the flue gas pipe on the furnace should be twice the eductor diameter **P**. If the diameter is too small, there is the danger of hot flue gases creeping through the burner when it is switched off, even if it is equipped with an EJEK..AGK with a flue gas valve.



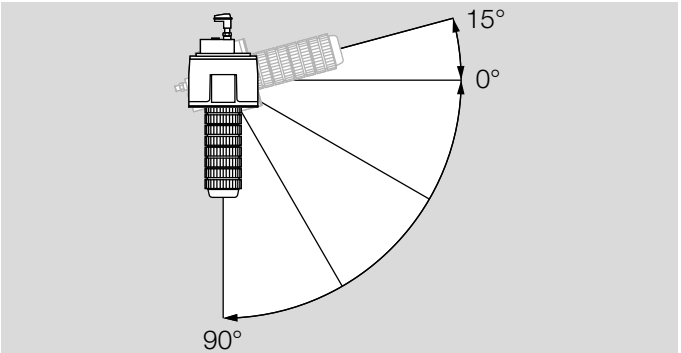
The spur lines from the flue gas manifold on the furnace to the various burners should be designed so that condensate cannot drip backwards into the burner.



		ØP [mm]
ECOMAX LE 1	EJEK 1	on request
ECOMAX LE 2	EJEK 2(A)	83
ECOMAX LE 3	EJEK 3(A)	98

6.4 Installation

6.4.1 Installation position



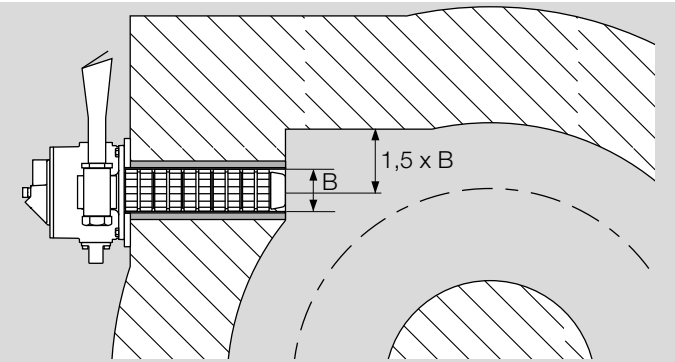
The burner ECOMAX may be installed as required between an angle of 0° (horizontal) and 90° (vertical from top to bottom). The ECOMAX may be angled upwards from the horizontal at a maximum angle of 15°.

Installation position of eductor EJEK: vertical, maximum angle 10°.

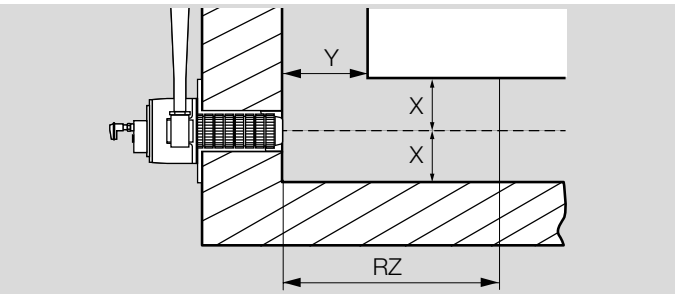
If the burner is installed at an angle of more than 10° to the vertical or horizontal, a special version of the flue gas eductor EJEK is required, which is available on request.

6.4.2 Tangential or angled burner installation

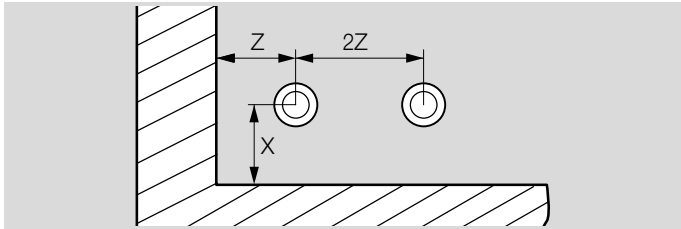
For a tangential or angled burner installation, make a recess in the furnace lining to allow the flue gas to be extracted smoothly. Take into account the very high outlet velocity of the burner when selecting the furnace lining for this area. In addition, the reflective radiation from the furnace wall onto the burner must be considered.



6.4.3 Clearances



Plan for adequate clearances to the charge and the interior furnace wall to ensure complete combustion and avoid local overheating. The high level of air preheating achieved by the ECOMAX also means that the flame has a higher temperature.



The minimum side clearance between two burners or between a burner and the furnace side wall is calculated using the geometric dimensions of the burner with eductor.

It should also be noted that burners positioned opposite each other may cause the recuperator heads to overheat.

Flame mode

Burner	Reaction zone RZ [mm]	Distance [mm]	
		X	Z
ECOMAX LE 1	700	155	270
ECOMAX LE 2	900	200	285
ECOMAX LE 3	1200	250	300

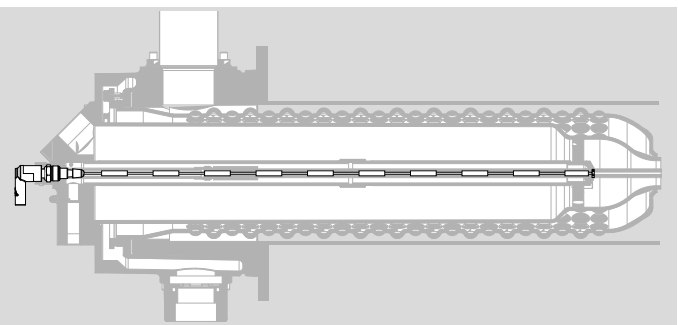
6.4.4 Furnace chamber temperature measurement

The furnace chamber temperature measurement must be representative for the flue gas temperature around the extraction system on the burner. If the measurement is not representative, there is a danger that the recuperator head will overheat.

6.4.5 Heat guard

During operation, the burner body and flue gas connector can reach surface temperatures of over 80°C. The burner and flue gas connector must not be insulated as otherwise the material will overheat. We recommend that warning signs and a contact guard be fitted, for example made of perforated sheet metal.

6.5 Flame control



Burners ECOMAX LE are equipped with a combined spark electrode/flame rod (single-electrode operation). The electrode is not in use in Flameless mode. It is purged via the purge air connection in the gas flange.

UV control is only required for gases with < 5% CH compounds; for example for natural gas and hydrogen mixtures which contain > 95% H_2 and for LCV gases such as blast furnace gas or converter gas.

UV sensor UVS with an integrated purge air connection is required for UV control, see page 29 (7.6 UV adapter set).

Size	UVS	Order No.
ECOMAX LE 1	With lens	84315203
ECOMAX LE 2	Without lens	84315202
ECOMAX LE 3	Without lens	84315202

6.6 Burner control units and ignition transformers

ECOMAX LE burners are designed for ON/OFF operation. We recommend burner control units BCU 465..D2.

After a safety shut-down, air should always be supplied to purge the radiant tube (parameter 34 of BCU 465..D2).

If the burner ECOMAX LE is used with additional cooling air, the additional cooling air valve can be actuated together with the air valve using the external process control system when the BCU is in standby.

ECOMAX LE burners require an ignition transformer with 7.5 kV high voltage and an output current of 20 mA for ignition. An appropriate ignition transformer is already integrated in burner control units BCU.

For further information on burner control units and ignition transformers, see Technical Information BCU 465.

6.6.1 Configuration of burner control unit

Pre-configured burner control units BCU 4 – on request

6.7 Gas connection

6.7.1 Component selection

A slow opening gas valve must always be used to ensure a safe burner start for radiant tube heating.

The following gas valves and components are recommended for natural gas:

Indirect heating/Gas connection

Gas Flame	Gas Flameless
ECOMAX LE 1	
VAS 115R/LW	
VAS 115R/NW	VAS 115R/NW
GEH 15	GEH 15
	VMO 115R
ECOMAX LE 2	
VAS 115R/LW	
VAS 115R/NW	VAS 115R/NW
VMV 115R	GEH 15
	VMO 115R
ECOMAX LE 3	
VAS 115R/LW	
VAS 115R/NW	VAS 115R/NW
VMV 115R	GEH 15
	VMO 115R

A bellows unit EKO should be installed between the burner and controls to rule out the possibility of force acting on the burner.

6.7.2 Gas pressure

The required gas pressure depends on the burner size, gas type and system design.

The required gas supply pressure must be 10 mbar higher than the fan air pressure (air pressure upstream of air control valve).

6.8 Air connection

6.8.1 Component selection

To be able to set a capacity in Flame mode which is independent of the capacity in Flameless mode, a BVH with actuator IC 40 must be installed in the total air line.

If an air valve VAA is installed in the total air line, the air volume will be reduced in Flameless mode. This will mean that the capacity in Flame mode is higher than in Flameless mode. The following air valves and butterfly valves are recommended:

ECOMAX LE..M

Size	Recuperator	Capacity in Flame/ Flameless mode	Air controls	Flame	Flameless	Flame	Main air valve
3	M	Jump in capacity	1 butterfly valve and 1 primary air valve	125 kW	100 kW	VAA 125R/NW	BVHM 65 + MB 7
3	M	Constant or variable	2 butterfly valves and 1 primary air valve	125 kW	100 kW	BVH 50 + IC 40 + VAA 125	BVHM 65 + MB 7

Details for sizes 1 and 2 on request

6.8.2 Air pressure

The required air pressure depends on the burner size, gas type and system structure.

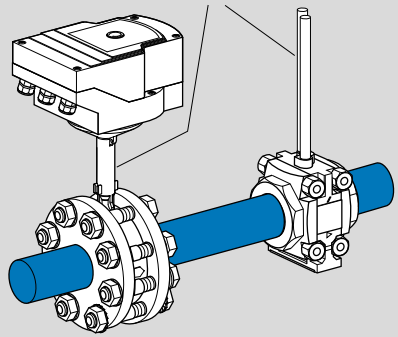
The air supply pressure must be at least 90 mbar.

6.9 Air flow monitoring

A system design with an air flow monitor is recommended to monitor the pre-purge (pursuant to EN 746-2 and ISO 13577-2). It is achieved using a differential pressure switch at the total air orifice combined with a burner control unit BCU. An accessory set to monitor the air flow is available for this purpose, see page 27 (7.1 Air flow monitoring).

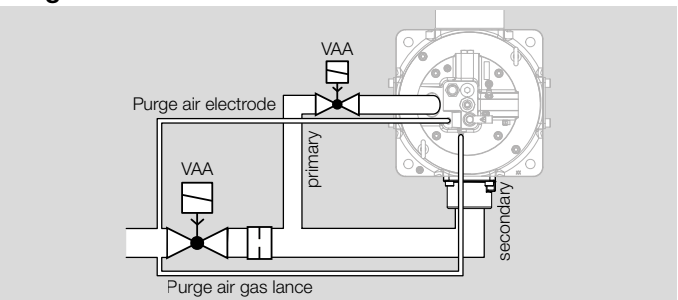
Note for using a butterfly valve:
To avoid the upstream butterfly valve having an excessive influence on the total air measuring orifice, the pressure tap of the measuring orifice must point in the same direction as the rotary axis of the butterfly valve; this is particularly the case if the installation space is tight and there is only a short barrel nipple between the butterfly valve and the orifice.
Good idea: long barrel nipple upstream of the orifice (with a butterfly valve or valve).

The axis and washer must have the same alignment.

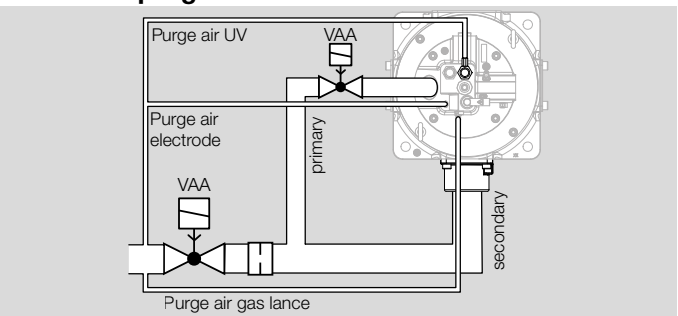


6.10 Purge air and cooling air

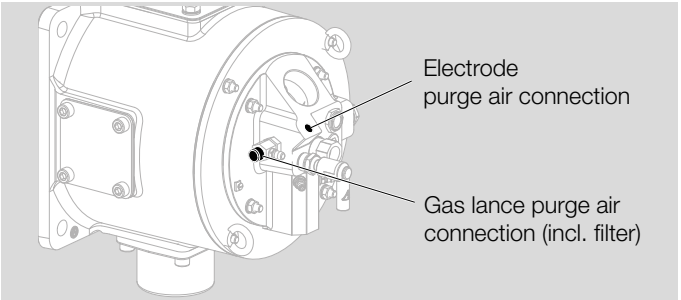
Purge air



UV sensor purge air



The purge air must be connected to the electrode and the "Flameless" gas lance on the burner ECOMAX LE in order to ensure safe ignition and monitoring, and in order to avoid problems caused by condensation and/or overheating. The connected purge air prevents the residual gas in the gas lance cracking by sending a small stream of air through the gas lance at all times.
The required purge air volume is approx. 1–2 m^3/h.



The purge air is connected to the gas flange. The purge air is tapped upstream of the air control valve so that the purge air continues to flow even if the burner is switched off.

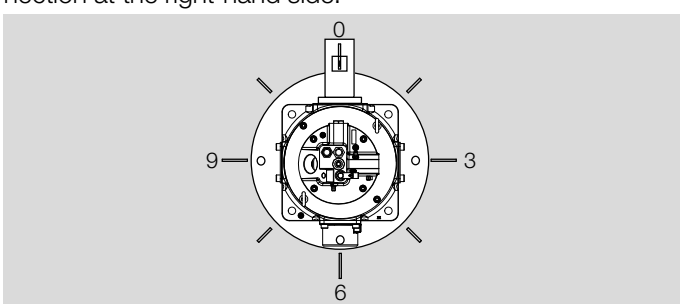
The volume of purge air for the gas lance and electrode is adjusted to the required air supply pressure by the nozzles in the burner. Special nozzles adjusted to the required air supply pressure for the ECOMAX can be used to limit the volume of purge air for the UV sensor (included in the UV sensor set).

6.11 Condition on delivery

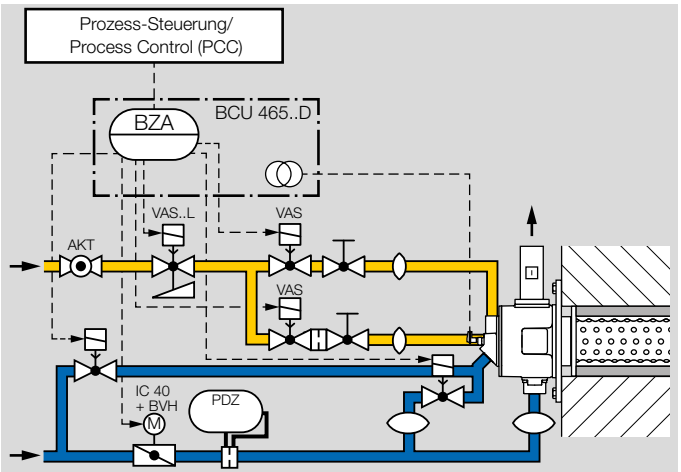
The gas and air connection and the flue gas connection can be aligned to suit the order based on the intended installation on the furnace. The positions of the connections are coded with numbers 0, 3, 6 and 9.

Identifier	Position of the connections
0	top
3	right-hand side
6	bottom
9	left-hand side

The identifiers for the positions of the connections are stated in the sequence flue gas – air – gas. If there is no specification, the burners are supplied as follows:
ECOMAX LE../R for radiant tube heating with a connector position 063, in other words with the flue gas connection at the top, the air connection at the bottom and the gas connection at the right-hand side.



6.12 Increased furnace cooling

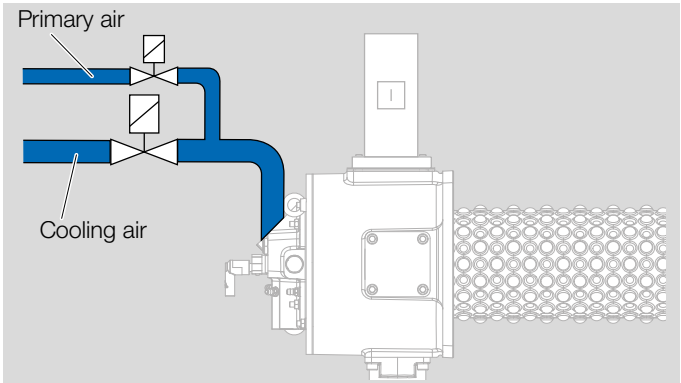


Depending on the process requirements, a two-level cooling system can be implemented.

The “normal” cooling system is activated by actuating the air valve for the burner. An additional cooling air valve can be activated using terminals 85/86/87 on the BCU. The additional cooling air valve is actuated separately by the process control system, see Technical Information BCU 460, 465.

If the BCU is in standby, the additional cooling air valve is activated together with the combustion air valve by the external air valve control.

6.13 Connection for additional furnace cooling



The air volume supplied to the burner in cooling mode can be increased using the primary air connection on the burner. We recommend that the cooling air is only supplied to the burner through the straight section of the tee and through elbows to reduce pressure losses.

The air supplied through the additional air connection flows in the centre of the burner inside the air guide tube. The volume is around twice the normal combustion air.

6.14 Build up of noise

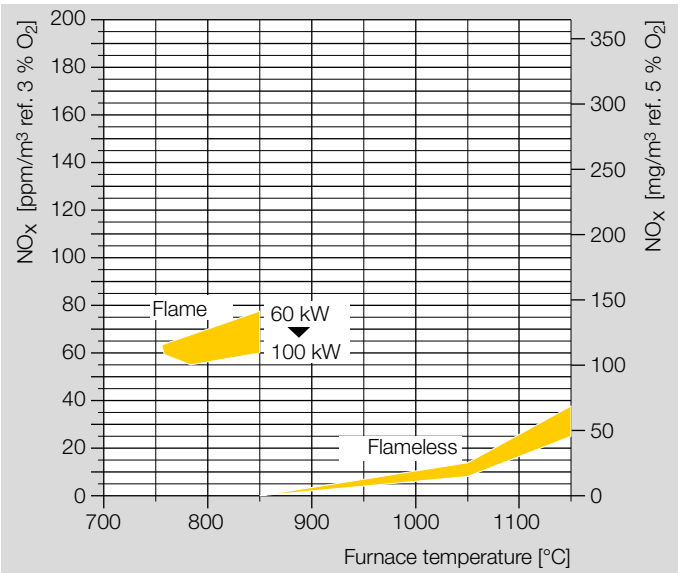
When the burner is installed, the sound pressure level of the individual burner which can be measured outside the furnace is generally between 75 and 85 dB(A). If the burner is controlled without an air valve, the increased capacity in Flame mode will result in a higher sound pressure level.

The measurable value on a furnace system depends on the capacity, excess air, flue gas extraction and flue gas temperature of the individual burners and on the burner layout and ambient influences (sound pressure level on request).

A cold start in the radiant tube may cause pulsation noise. These will disappear, however, after the burner has been operating for 2 to 3 minutes.

6.15 Emissions

The CO and NO_X values depend on the combustion chamber temperature, the size and length of the radiant tube, air preheating, burner type and burner settings (project-related NO_X values available on request).



The diagram shows ECOMAX LE 3C in SER-C 202x2400 as an example.

6.16 Max. flame capacity

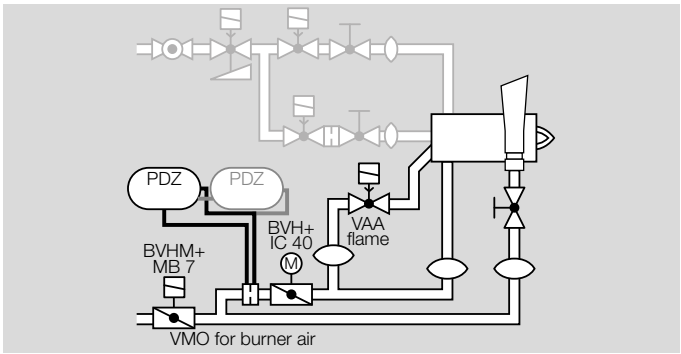
The flame capacity must not exceed a maximum of 125% of the rated capacity in any control types.

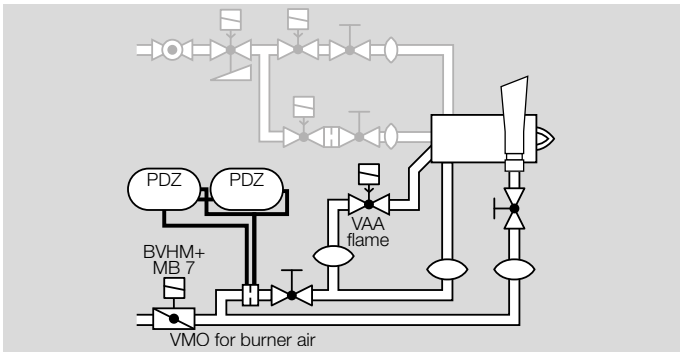
Information about increased flame capacity if an air line allowing a jump in capacity is selected can be provided after you have consulted your technical adviser.

7 Accessories

7.1 Air flow monitoring

Example:





The differential pressure switch to monitor the air flow is used for the automatic monitoring of the air flow on the burner ECOMAX LE in conjunction with the burner control unit BCU 465. The differential pressure switch monitors the air flow during pre-purge and burner operation. If there is no air pressure, the burner is switched off or the burner is not enabled. The pressure switch switching point should be set to approx. 80% of the differential pressure in normal operation.

If the capacities in Flame and Flameless mode are set to be constant using the air butterfly valve, only one pressure switch is required. If the Flame and Flameless capacities are variable, two pressure switches are required for low air pressure protection.

Constant capacity

Designation	Order No.
DG 10U-6T2	84447329

Variable capacity/Jump in capacity

Designation	Order No.
DG 10U-6T2	84447329
DG 30U-6T	84447294

7.2 Purge air set

For purging the electrode and the gas lance for Flameless mode using 2 connections on the gas flange.

Designation	Order No.
ES 6RA1000Z	35460037
Hose inside dia. 6/outside dia. 8	22111753
Flat seal for ES 6RA (packaging unit = 10 items)	74928240

7.3 Flue gas eductor EJEK

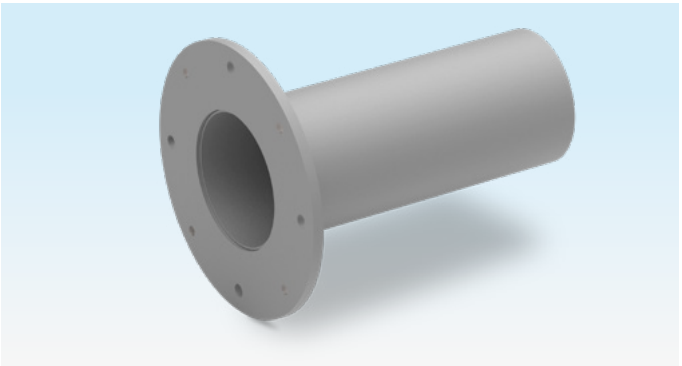
For direct heating

The eductor EJEK generates a negative pressure with a centrally positioned nozzle and thus draws the flue gases out of the furnace chamber through the burner's heat exchanger.

Designation for ECOMAX..M	Order No.
EJEK 1	on request
EJEK 2	on request
EJEK 3	34106479

Special version available on request

7.4 Flue gas guide tube FGT set



When using ECOMAX LE burners for direct heating, a flue gas guide tube FGT set..D is required.

The FGT set..D is available in lengths in various increments, which are suited to different burner lengths.

Scope of delivery: flue gas guide tube FGT with burner gasket, mounting gasket, as well as four threaded bolts, washers and nuts for attaching it to the burner

ECOMAX..M

Flue gas guide tube	Order No.
FGT SET ECO 1M545/D	21800195
FGT SET ECO 2M545/D	21800177
FGT SET ECO 3M545/D	21800694

7.5 Pipework

As an option, the burners can be supplied with ready-installed pipework for gas and air. We recommend that the pipework should be agreed with Technical Sales.

7.6 UV adapter set

An adapter is required to install the UVS 10. The adapter set includes the purge air nozzle.

Designation	Order No.
Adapter set UVS 10 ECO LE 1-3	75459651

8 Technical data

Heating: direct with eductor.

Control type: On/Off (or Low/High/Off for NFPA).

Adjusting range: 60 to 100%.

Flame velocity: approx. 130 to 170 m/s (430 to 560 ft/s).

Flame control: with flame rod (UV control as an option).

Ignition: direct spark ignition.

Storage and transport temperatures: -20 to +40°C (-4 to +104°F).

Burner	Recuperator	Max. flue gas temperature at recuperator inlet
ECOMAX LE..C	Ceramic (SiSiC)	1260°C (2300°F)
ECOMAX LE..M	Metallic	1150°C (2100°F)

Burner	Capacity [kW]	Flame length [mm]*
ECOMAX LE 1	36	300
ECOMAX LE 2	60	400
ECOMAX LE 3	100	450

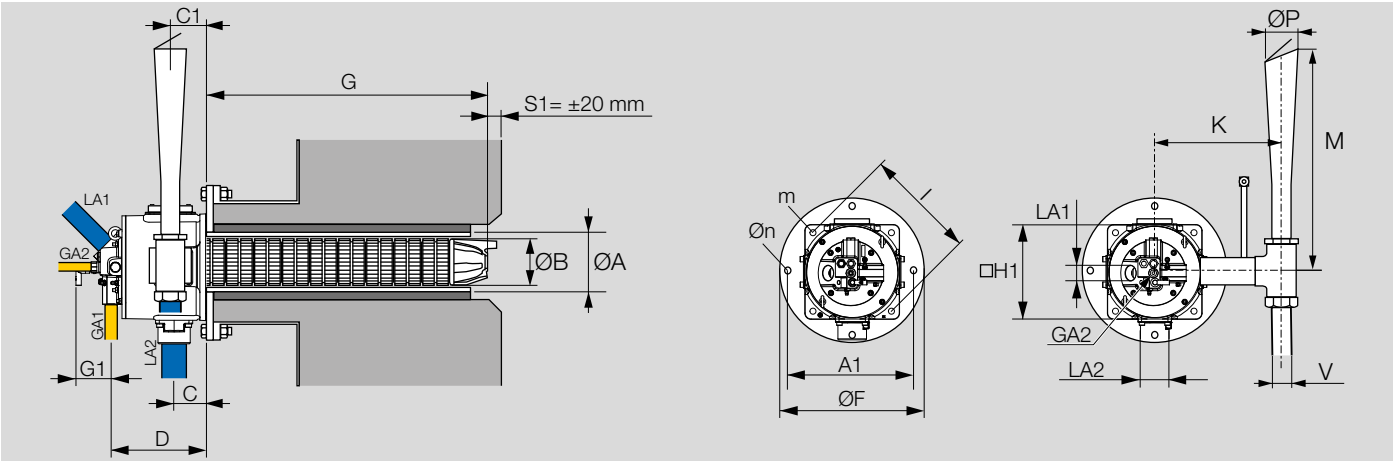
Burner	Capacity [kBTU/h]	Flame length [ft]*
ECOMAX LE 1	136	1
ECOMAX LE 2	227	1.3
ECOMAX LE 3	378	1.5

** Visible range for natural gas operation in the open air, max. connection rating and air index 1.15.*

If the burners are used at geodetic altitudes of over 500 m (1645 ft) above MSL, the possible capacity will be lower as a result of the reduced density of gas and air. Guide value: 5% per 1000 m (3290 ft) above MSL.

8.1 Dimensions

8.1.1 ECOMAX LE..M



Type	ECOMAX LE											
	GA1	LA1	GA2	LA2	B	C	C1	D1	G1	G	H1	Weight
								mm				kg
ECOMAX LE 1M	Rp 1/2	Rp 1 1/2	Rp 1/2	Rp 1 1/2	123	75	75	208	approx. 90	545	236	on request
ECOMAX LE 2M	Rp 1/2	Rp 1 1/2	Rp 1/2	Rp 1 1/2	142	75	75	208	approx. 90	545	236	45
ECOMAX LE 3M	Rp 1/2	Rp 1 1/2	Rp 1/2	Rp 2	178	83	93	250	approx. 90	545	280	62

Type	FGT set						EJEK			
	A	F	A1	n	l	m	V	K	M	P
	mm				mm			mm		
ECOMAX LE 1M	133	330	280	4 x 19	290	4 x M16	on request			
ECOMAX LE 2M	153	330	280	4 x 19	290	4 x M16	R 1 1/2	285	540	83
ECOMAX LE 3M	193	385	325	4 x 19	330	4 x M16	R 2	292	620	98

9 Maintenance cycles

Twice per year, but if the media are highly contaminated, this interval should be reduced.

For more information

The Honeywell Thermal Solutions family of products includes Honeywell Combustion Safety, Eclipse, Exothermics, Hauck, Kromschröder and Maxon. To learn more about our products, visit ThermalSolutions.honeywell.com or contact your Honeywell Sales Engineer.

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ECOMAX LE · Edition 05.23 · EN