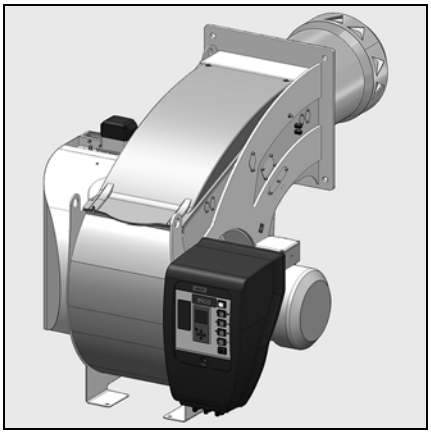
EKEVO 6/N6 L-E / L-EF3
EKEVO 7/N7 L-E / L-EF3
EKEVO 8/N8 L-E / L-EF3
EKEVO 9/N9 L-E / L-EUF



Original Operating Instructions
For authorised specialist engineers
Fuel-oil burner

de 4200 1089 7500
fr 4200 1089 7600
it 4200 1089 7700
nl 4200 1089 7800

EKEVO 6, EKEVO 7 L-E	4200 1054 2800	N6/N7 L-EF3	4200 1044 9701
EKEVO 8, EKEVO 9 L-E	4200 1073 7400	N8/N9 L-E	4200 1052 0100
EKEVO 6, EKEVO 7 L-EF3	4200 1073 8000	N8/N9 L-EF3	4200 1052 7300
EKEVO 8, EKEVO 9 L-EUF	4200 1073 7800	N9 L-EUF	4200 1052 7100
N6/N7 L-E	4200 1045 0401		

EKEVO 6, EKEVO 7 L-E	4200 1089 9000	N6/N7 L-EF3	4200 1095 6800
EKEVO 8, EKEVO 9 L-E	4200 1089 9100	N8/N9 L-E	4200 1095 6700
EKEVO 6, EKEVO 7 L-EF3	4200 1089 9200	N8/N9 L-EF3	4200 1095 6900
EKEVO 9 L-EUF	4200 1089 9300	N9 L-EUF	4200 1095 7000
N6/N7 L-E	4200 1095 6600		

EKEVO 6, EKEVO 7 L-E	4201 1023 4800	N6/N7 L-E	14 064 890
EKEVO 8, EKEVO 9 L-E	4201 1023 5000	N6/N7 L-EF3	14 064 901
EKEVO 6,7,8,9 L-EF3	4201 1023 4900	N8/N9 L-E	14 071 787
EKEVO 9 L-EUF	4201 1023 5200	N8/N9 L-EF3, N9 L-EUF	14 071 798

04/2019 - Art. Nr. 4200 1089 7900A

General information

Contents

Important information

Important information
Burners EKEVO 6/N6-EKEVO 9/N9 L-E/ L-EF3/L-EUF are designed for the combustion of light fuel oil. The design and function of the burners comply with EN 267. They are designed for use with systems that are approved for the use of burners in accordance with EN 267. To use the burner with heat generators in conformity with Pressure Equipment Directive 97/23/EU, special burner components are required (not supplied with standard equipment). Before using the burner with equipment of this type, the equipment characteristics must be checked. Burners that comply with Pressure Equipment Directive 97/23/EU come with a declaration of conformity to this effect and are labelled on the identification plate. Any other type of application requires the approval of ELCO. The burner may only be used in accordance with the instructions set out in this documentation and the relevant technical data. If not used properly, it could cause damage to property and the environment and personal injury. Furthermore, the burner could lose its certification of CE compliance. Installation, commissioning and maintenance must only be carried out by authorised specialists and, during these operations, all applicable directives and regulations must be complied with.

Burner description
Burners EKEVO 6/N6-EKEVO 9/N9 L-E/ L-EF3/L-EUF are electronically modulating, fully automatic monoblock burners. The special design of the burner head provides highly efficient, low-polluting combustion. According to tests as defined by EN267, the values produced comply with emissions class 2 for EKEVO 6/N6-EKEVO 9/N9 L-E or emissions class 3 for EKEVO 6/N6-EKEVO 9/N9 L-EF3, L-EUF. Emissions rates may differ, depending on combustion chamber dimensions, combustion chamber load and the firing system (three-pass boilers, boilers with reverse firing). For specifying warranty values, the conditions for the measuring equipment, tolerances and humidity must be observed.

Scope of delivery
The burner is supplied in one packaging unit:
- Burner with:
  - integrated switch cabinet
  - flange seal and securing screws
  - operating instructions, circuit diagram and spare parts list
- Burner head

Before commissioning, a check must be carried out to ensure that the product delivered fully complies with the scope of delivery.

The following standards should be observed in order to ensure safe, environmentally sound and energy-efficient operation:

EN 226
Connection of atomising oil and gas burners with fan to the heat generator

EN 60335-1, -2-102
Safety of electrical equipment for domestic use

DIN EN 60204-1
Safety of machinery. Electrical equipment of machines

DIN EN 50156-1
Electrical equipment for firing systems

Installation location
The burner must not be operated in rooms with aggressive vapours (e.g. hair spray, tetrachlorethylene, carbon tetrachloride), high levels of dust or high air humidity (e.g. laundry rooms). The limitations of use set out in the technical data must be observed.
Adequate provision must be made for the supply of combustion air. Given standard conditions, the combustion air requirement may be calculated as follows:
Vl [Nm³/h] = QF [kW] *1.25 [Nm³/(h*kW)]

We can accept no warranty for loss, damage or injury caused by any of the following reasons:
- inappropriate use.
- incorrect installation and/or repair on the part of the buyer or any third party, including the fitting of non-original parts.

Final delivery and instructions for use
The firing system fitter must supply the operator of the system with operating and maintenance instructions on or before final delivery. These instructions should be displayed in a prominent location at the point of installation of the heat generator. They should include the address and telephone number of the nearest customer service centre.

Notes for the operator
The system should be inspected by a specialist at least once a year. It is advisable to take out a maintenance contract to guarantee regular servicing.

Please note:
When in operation, the burner produces an electromagnetic field. In certain circumstances, this field could affect medical implants (e.g. pacemakers). Before working with the machine, anyone who has a medical implant should consult their doctor and the manufacturer of the medical implant in order to reduce the risk of serious or fatal injury.

Transport \ packaging \ storage

Safety measures
The burner and accessories must be transported and stored using suitable lifting equipment, means of transport and tools. The safety instructions must be complied with.

Transportation
Depending on the size and weight of packaging, burners and accessories must be transported manually or with the use of suitable aids. The transport instructions on the packaging must be complied with. The burner must be properly secured for transport. If measures to secure the burner have not been taken at the factory, suitable measures to secure it during transportation must be taken.

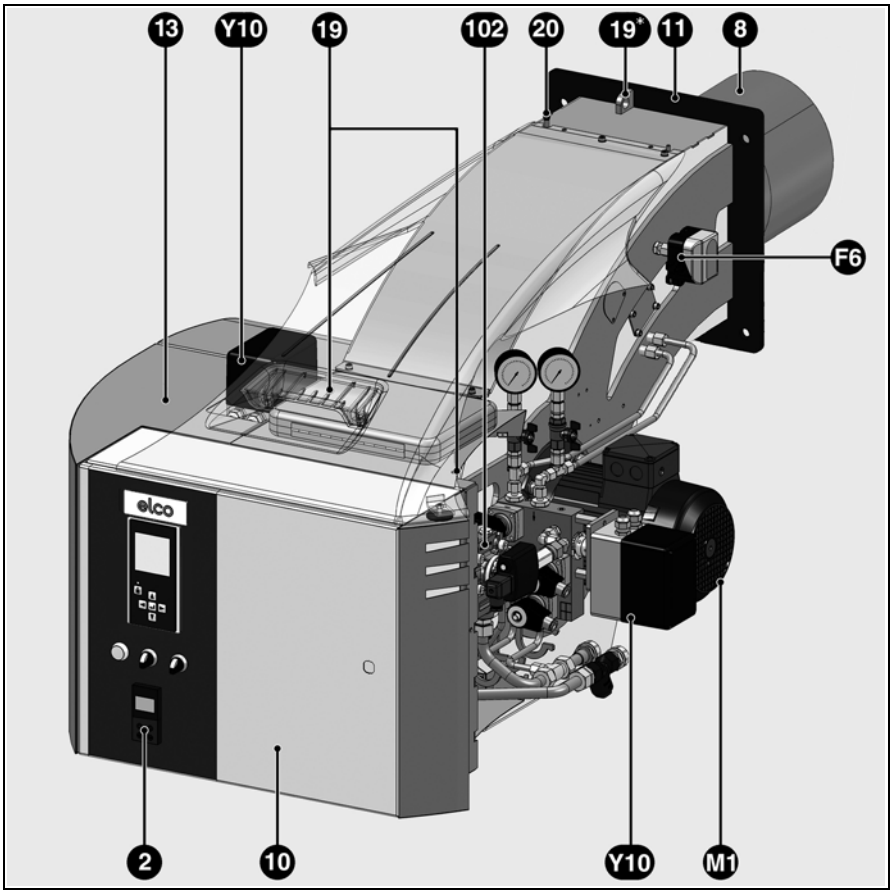
Packaging
The burner and accessories are packed on a wooden pallet and shrink-wrapped. When unpacking the product, suitable lifting equipment and tools must be used to remove the screw connections and clamping devices between the burner and the packaging. Appropriate protective clothing must be worn (gloves, work safety shoes).

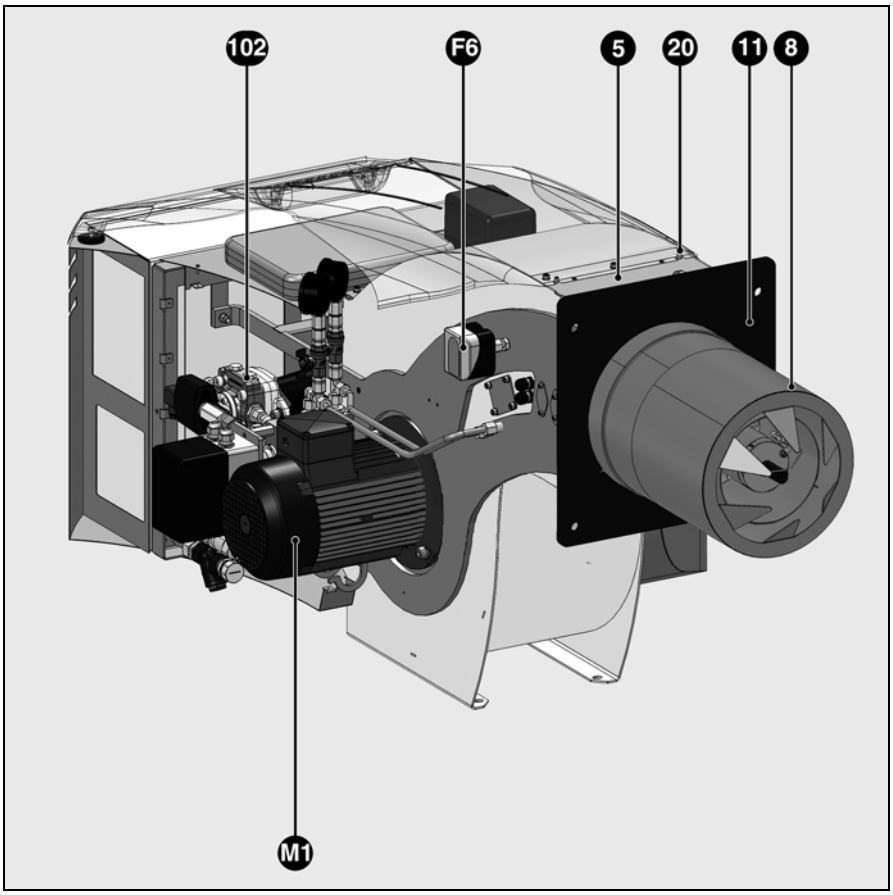
Storage
In order to protect the burner from environmental influences, it must be placed in a dry, locked room when stored temporarily. For the maximum storage temperatures, please refer to the technical data sheet.

Disposal

Local and currently applicable legislation must always be observed.

N6/N7/N8/N9
Burner description

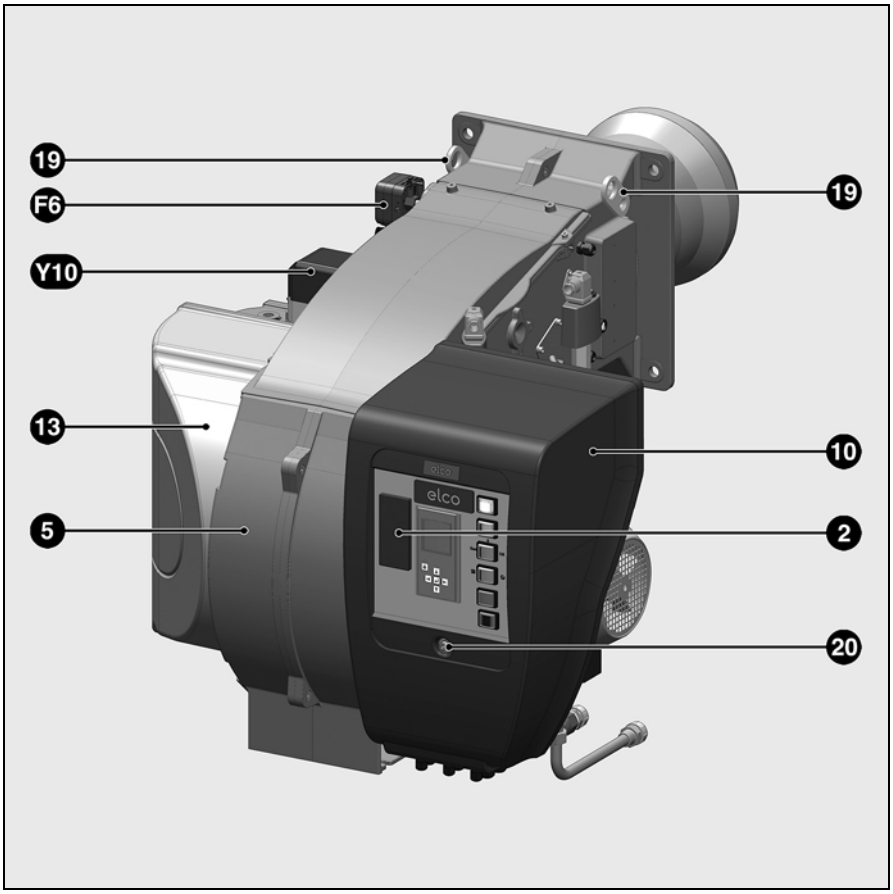


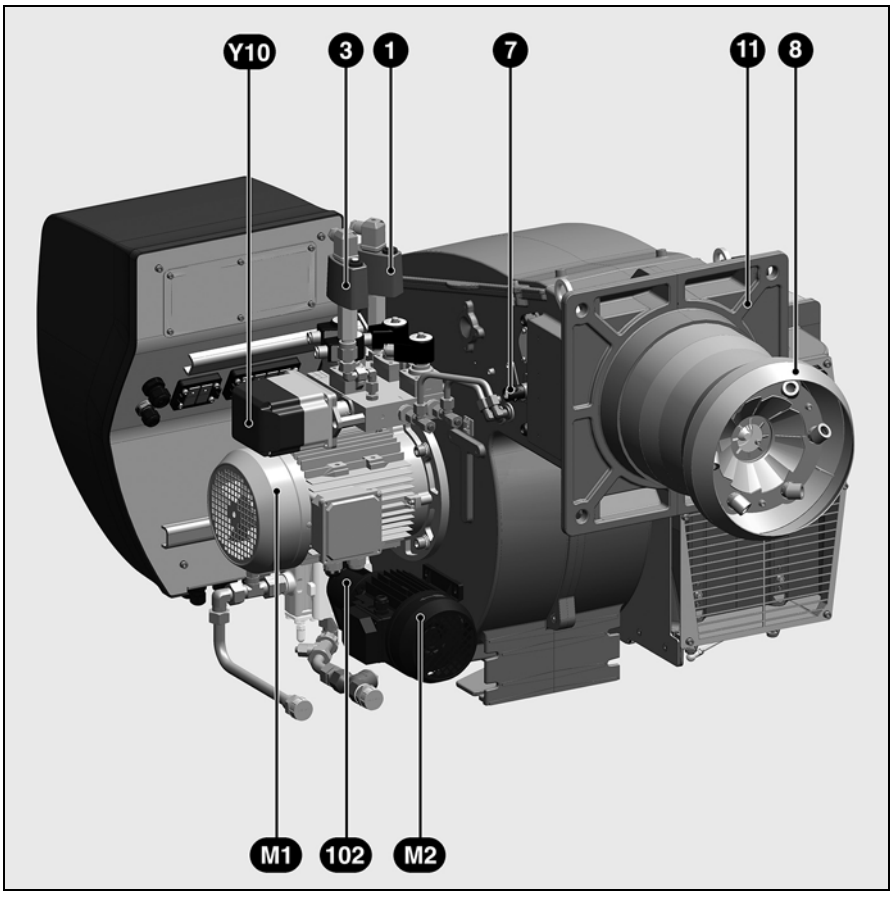


2 Power controller (option)
5 Casing
8 Burner tube
10 Integrated switch cabinet
11 Burner flange
13 Air box
19 Lifting rings (underneath the metal cover for the N8 burner)
20 Connection cooling sight glass
F6 Air pressure switch
M1 Electric motor
Y10 Actuator for air and fuel-oil flow regulator
102 Pump

Note:
The construction principle for N6-N9 L-E, L-EF3 and L-EUF burners is largely identical. To provide an example, only the scenario with burner N6 L-EF3 is shown on this page.

EKEVO 6/EKEVO 7/EKEVO 8/EKEVO 9
Burner description



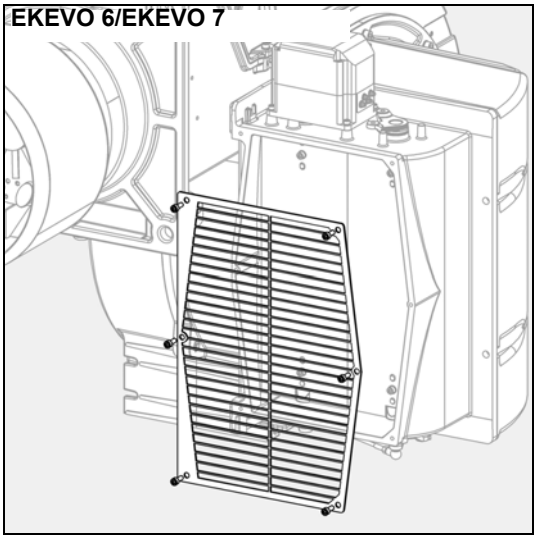


1 Fuel-oil pressure switch (supply)
2 Power controller (option)
3 Fuel-oil pressure switch (return)
5 Casing
7 Flame monitor
8 Burner tube
10 Integrated switch cabinet
11 Burner flange
13 Air box
19 Hoisting eyes
20 Fastening screw for the switch cabinet cover
F6 Air pressure switch
M1 Electric motor
M2 Fuel oil pump motor
Y10 Actuator for air and gas flaps, oil flow regulator
102 Pump

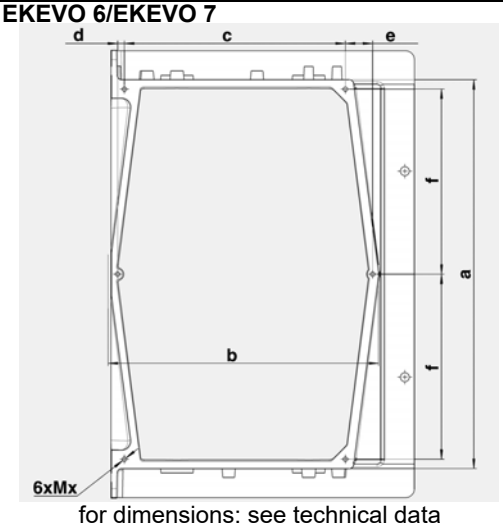
Note:
The construction principle for EKEVO 6 - EKEVO 9 L-E burners is largely identical. To provide an example, only the scenario with burner EKEVO 6 L-E is shown on this page.

EKEVO 6/EKEVO 7/EKEVO 8/EKEVO 9
Air duct connection
Rotating air box

EKEVO 6/EKEVO 7

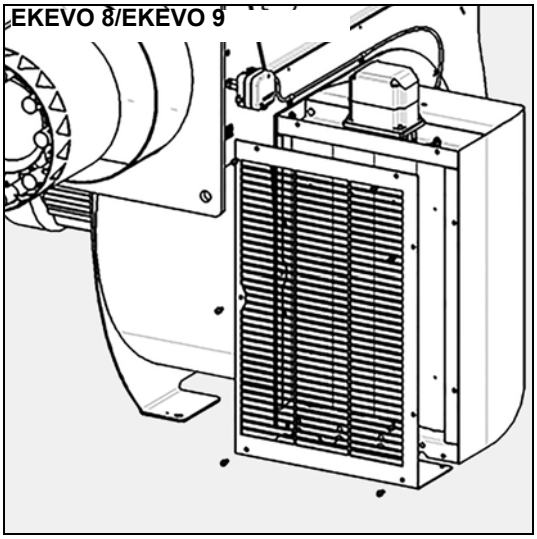


EKEVO 6/EKEVO 7

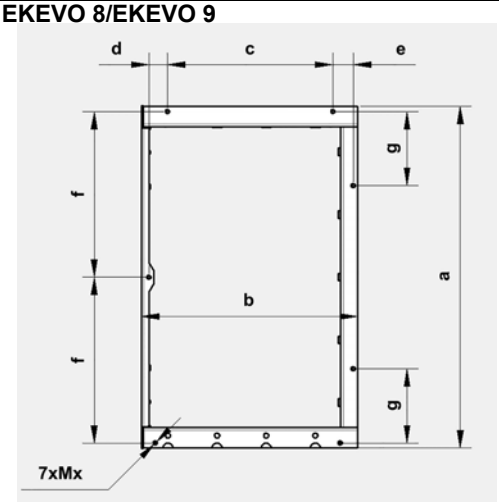


for dimensions: see technical data

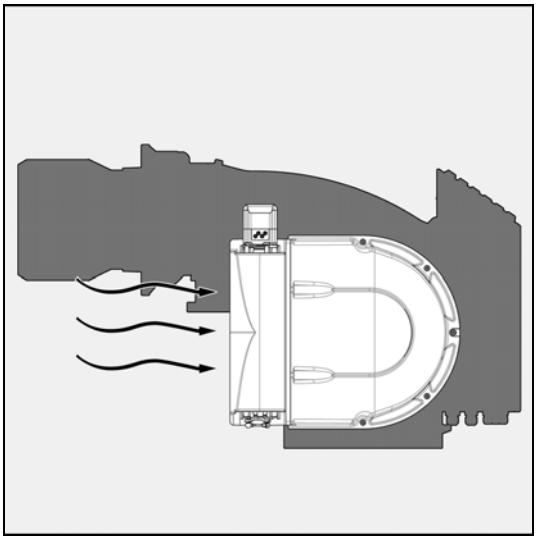
EKEVO 8/EKEVO 9

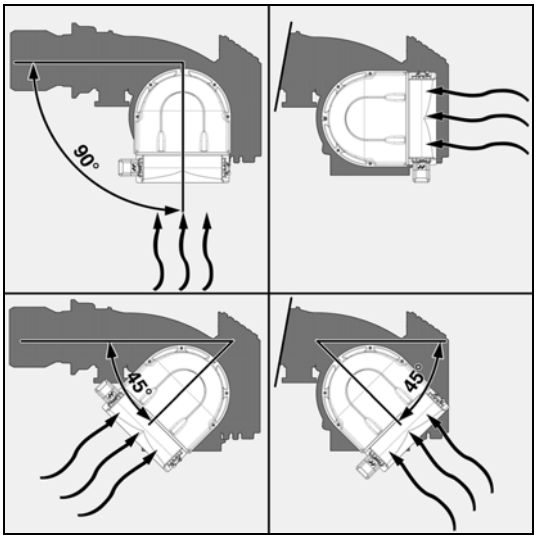


EKEVO 8/EKEVO 9



for dimensions: see technical data





* Rotation procedure of air box: see chapter «Servicing»

General information regarding burner installation

Tightening torques
During installation, commissioning and maintenance, the following torques for screw connections must be observed.

Recommended tightening torques Standard unions								
M4	**M5**	**M6**	**M8**	**M10**	**M12**	**M16**	**M20**	
2	6	10	25	48	85	210	415	Nm

N.B.:
In general, the correct tightening torques have been applied when the unions are tightened hand-tight using a screwdriver (ISO 272) or angled Allen key.

Tightening torques of electrical connections for bolts on terminal boards				
M4	**M5**	**M6**	**M10**	
1.2	2	3	10	Nm

Note:
Check the tightness of electrical connections before using the burner. Make sure to observe the tightening torques listed above!

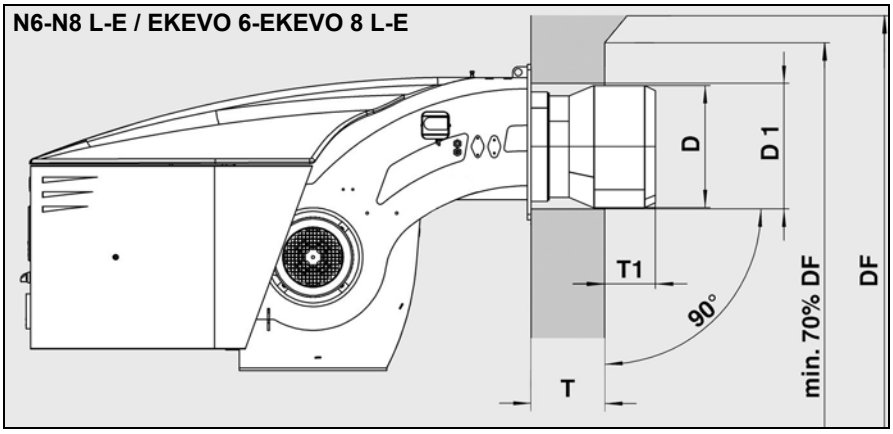
WARNING:
Electrical shock hazard!
There is a risk of coming into contact with live parts! This could lead to fatal electrical shock!
The motor must be switched off via an omnipolar cut-off switch and protected against accidental reconnection.

Tightening torques for root connector for fan impeller			
SM16 (Ø28) No.: 1615	**SM20 (Ø38 and 42) No.: 2012**	**SM25 (Ø42 and 48) No.: 2517**	**Bushing**
20	30	50	Nm

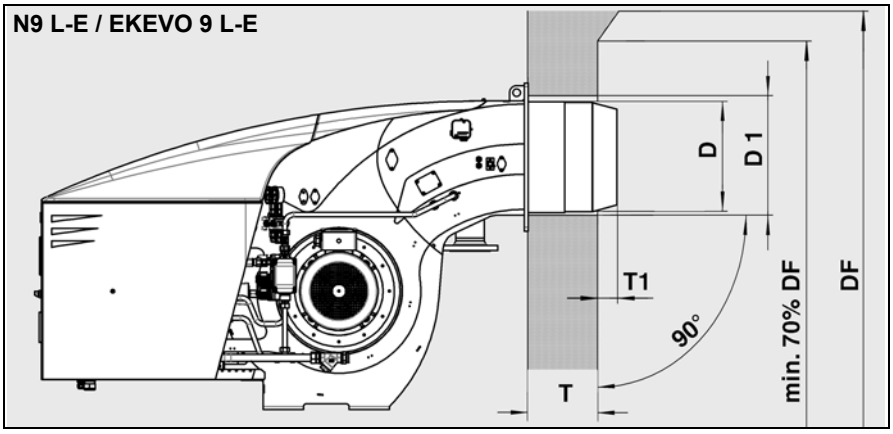
N.B.:
For more information regarding installation/dismantling of the fan impeller, please refer to the relevant chapter in the operating instructions.

Boiler lining for L-E, L-EF3 und L-EUF burner

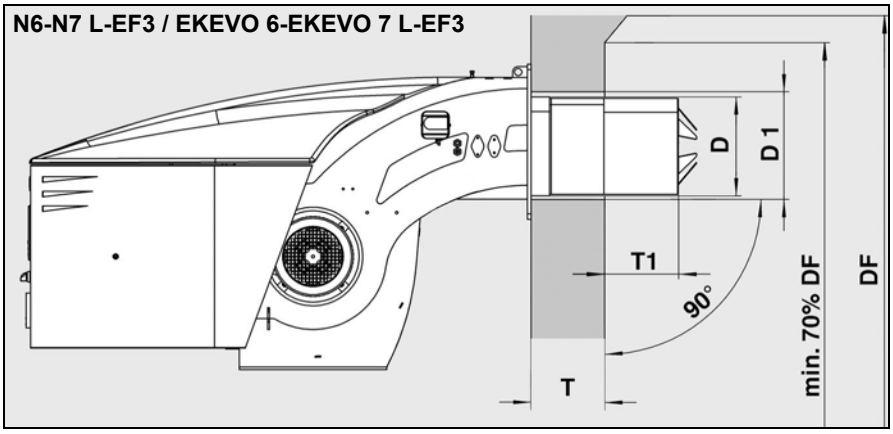
N6-N8 L-E / EKEVO 6-EKEVO 8 L-E



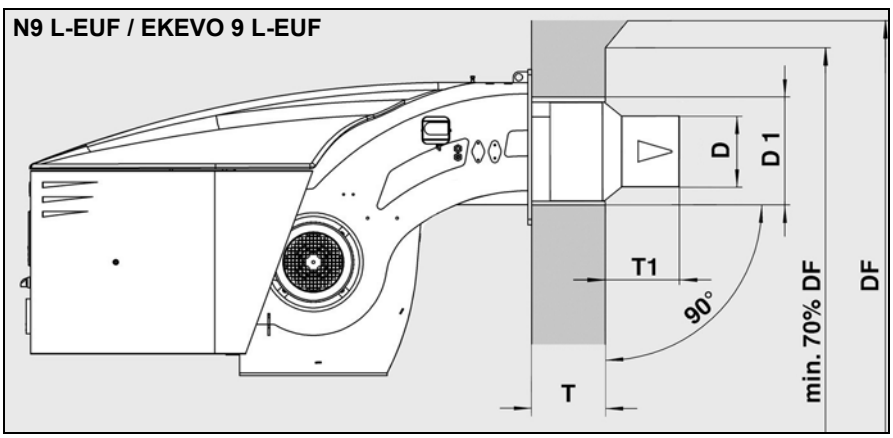
N9 L-E / EKEVO 9 L-E



N6-N7 L-EF3 / EKEVO 6-EKEVO 7 L-EF3



N9 L-EUF / EKEVO 9 L-EUF



Boiler lining
The burner lining must be installed at a right angle to the burner tube. Possible trimming work (bevelling, rounding) as required for reverse boilers, for example, should done at a diameter not below 70% of the combustion chamber diameter. The space between the flame tube of the burner and the boiler lining should be lined with heat resistant material, such as Cerafelt.

This space must not be lined with brickwork

D = see dimensioned drawing
D1 = see dimensioned drawing
DF = combustion chamber diameter
T1:

	T1
EKEVO/N 6/7 L-E	> 70 - 200mm
EKEVO/N 6/7 L-EF3	> 150 - 300mm
EKEVO/N 8.5800 L-E	210-350
EKEVO/N 8.7100 L-E	230-370
EKEVO/N 9.8700 L-E	2-150
EKEVO/N 9.10400 L-E	2-150
EKEVO/N 9.8700 L-EUF	280-430
EKEVO/N 9.10400 L-EUF	295-445

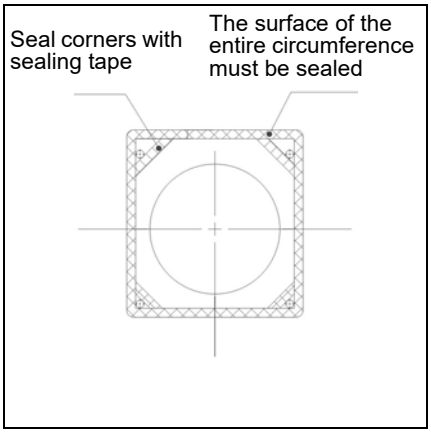
T = standard muffle depth (option: extensions: see technical data)

Please note for reverse flow boilers:
For reverse flow boilers, dimension T1 is only a recommended value. Depending on the type of boiler, the combustion head must project at least beyond the reversal gap by the dimension below.

EKEVO/N 6/7 L-E	- 50 mm
EKEVO/N 6/7 L-EF3	- 120 mm
EKEVO/N 8 L-E	- 120 mm
EKEVO/N 9 L-E	- 50 mm
EKEVO/N 8/9 L-EF3	- 120 mm

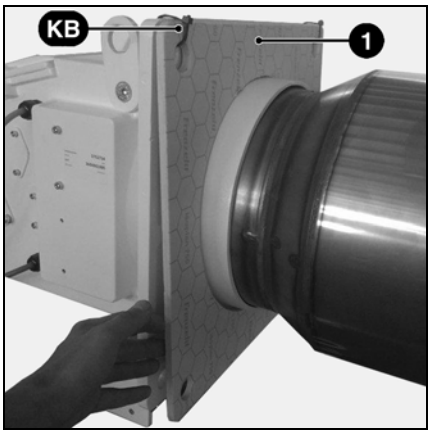
Note
The L-EUF burners must not be installed on reverse flow boilers!

Burner installation

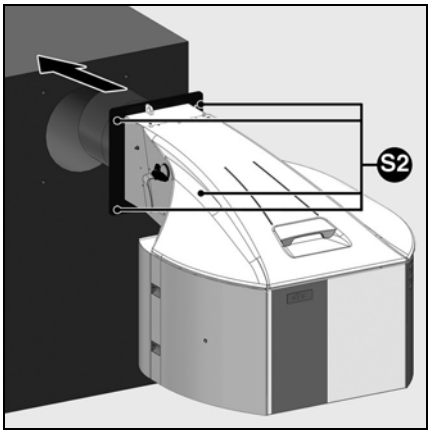


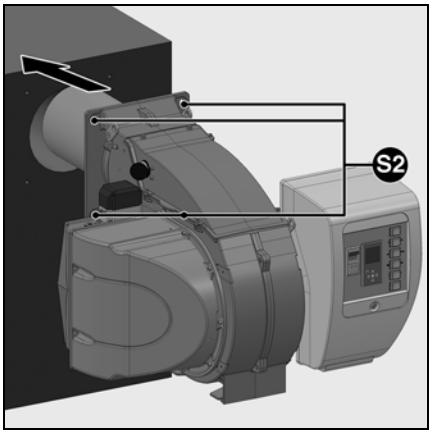
Burner flange seal (option 1)
The sealing tape in the accessories kit must be affixed to the burner as shown in the drawing below. The sealing tape should be affixed without gaps in order to prevent exhaust from escaping during burner operation.

Please note:
Depending on the fibre diameter, the mineral fibre sealing thermocord may cause reversible mechanical irritation to the eyes and skin. In the event of high dust concentrations, risk of mechanical irritation to upper respiratory tract. When working with the sealing thermocord, the operator should wear loose-fitting, long-sleeved clothing. In the event of high fibre dust concentrations, the operator should wear an FFP1 mask and well-sealed protective goggles (also when carrying out overhead work).



Burner flange seal (option 2)
- Check whether the gasket **1** is fitted and in the correct position.
- Remove **KB** fixing clamps prior to installation.



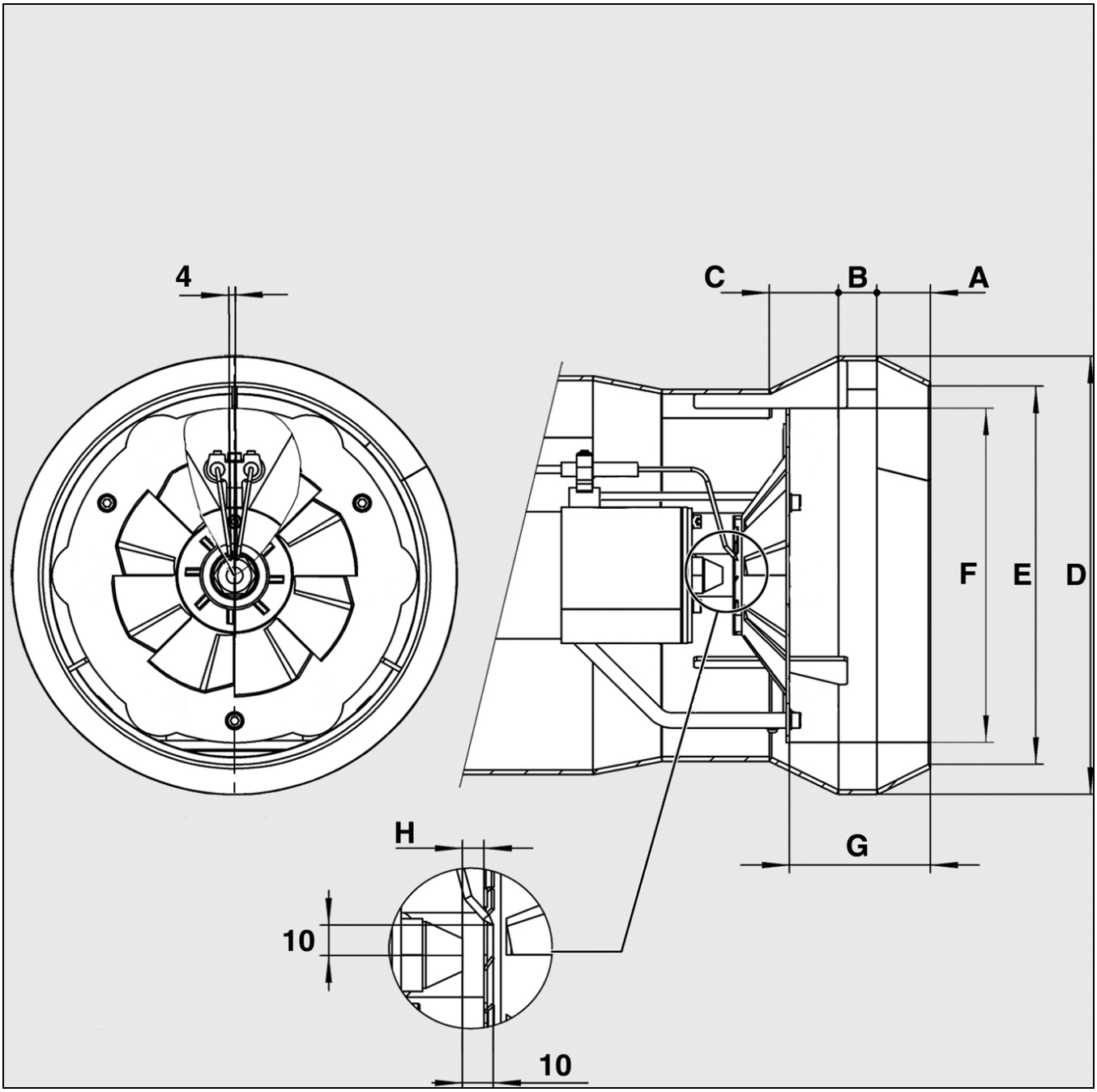


Burner installation
- Attach boiler front gasket to the burner (see section entitled Burner front gasket)
- Lift burner using hoisting eyes **19** (see page 4 N6/7/8/9, see page 5 EKEVO 6/7/8/9) and fasten to the boiler.*
- Tighten the 4 fastening screws **S2** (check the tightening torques).

* Alternatively a forklift truck may be used for fixing it if the burner is fixed to the transport pallet supplied with it. Provision must be made for adequate transportation safety. Suitable transportation materials must be used if necessary (lashing straps).

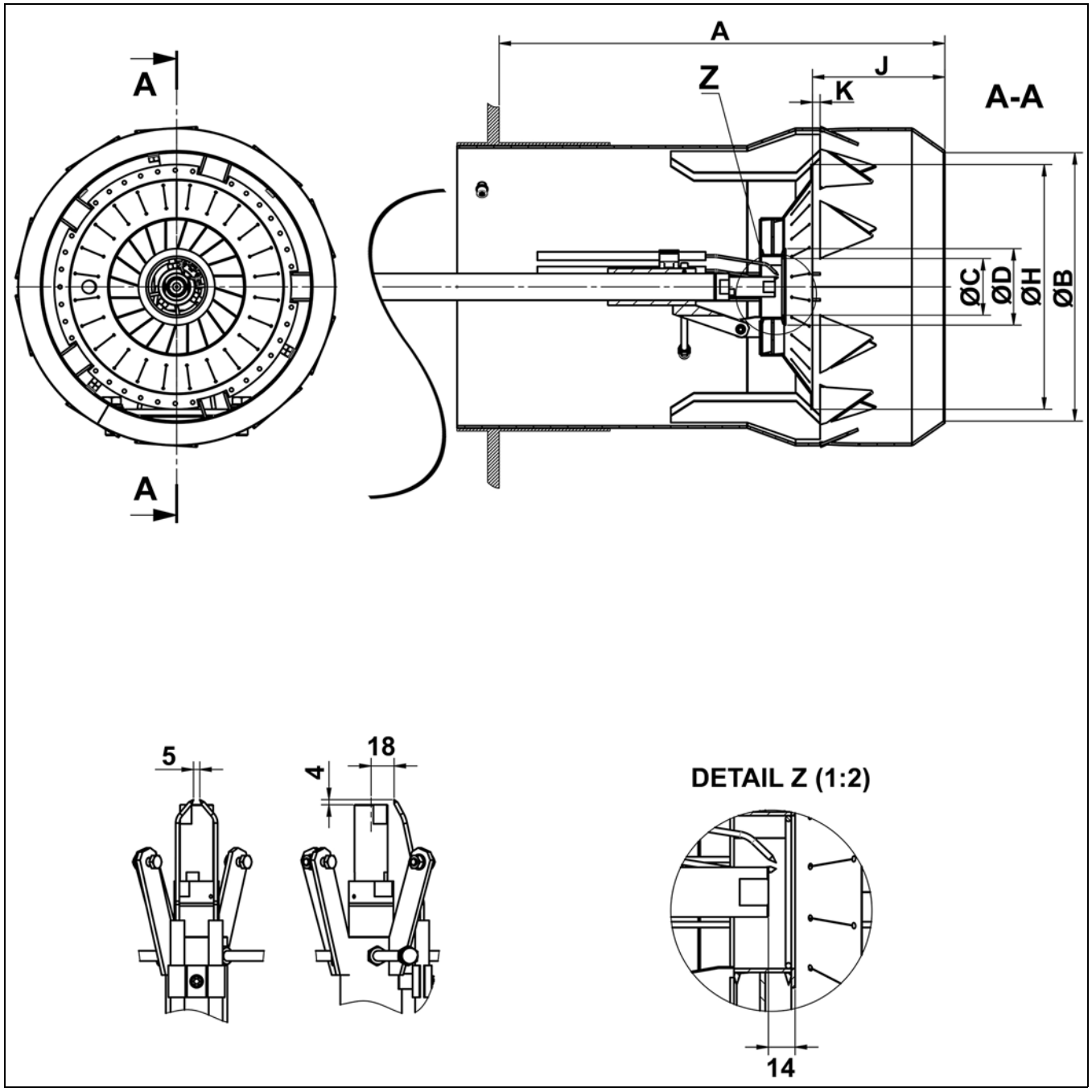
The leaktightness of the connection between the burner and the boiler must be tested during operation. It must be ensured that exhaust cannot escape in harmful quantities. Poorly sealed burner boiler connections may result in combustion problems.

Combustion components N/EKEVO 6/7 L-E adjustment data/check



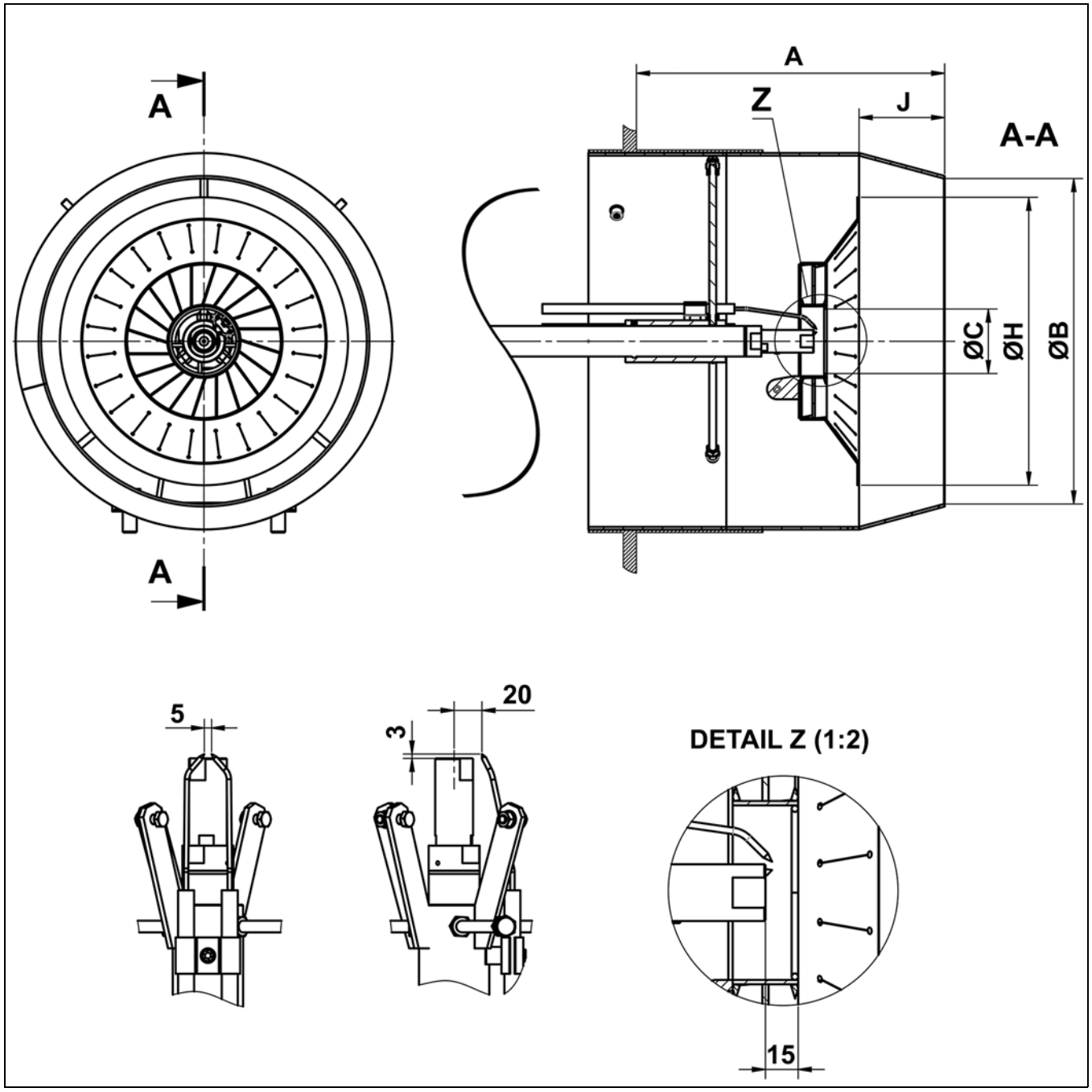
Burner	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	G (mm)		H (mm)
							min.	max.	
N/EKEVO 6.2400	35	25	45	290	250	221	90	69	7
N/EKEVO 6.2900	35	25	45	310	265	221	90	60	7
N/EKEVO 7.3600	30	20	50	340	280	221	47	47	7
N/EKEVO 7.4500	55	40	76	370	310	260	165	95	7

Combustion components N/EKEVO 8 L-E adjustment data/check



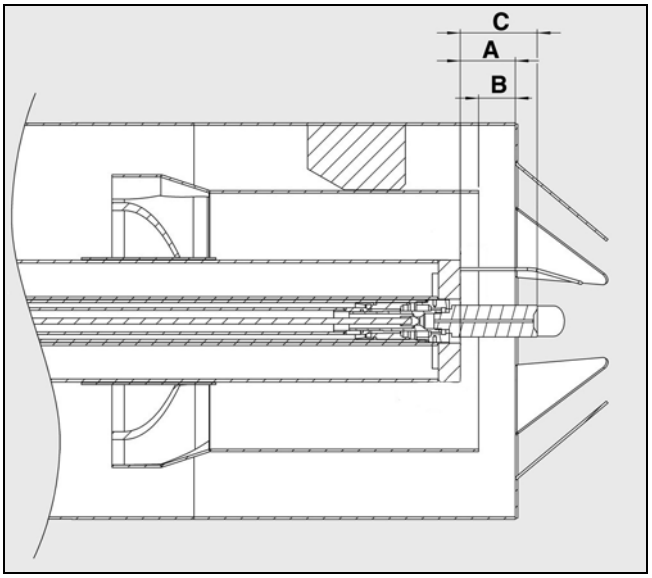
	A			B	C	D	H	J	K
	KN	KM	KL						
EKEVO/N8.5800	562	702	842	320	74	100	320	152	10
EKEVO/N8.7100	583	723	863	351	74	100	320	173	10

Combustion components N/EKEVO 9 L-E adjustment data/check

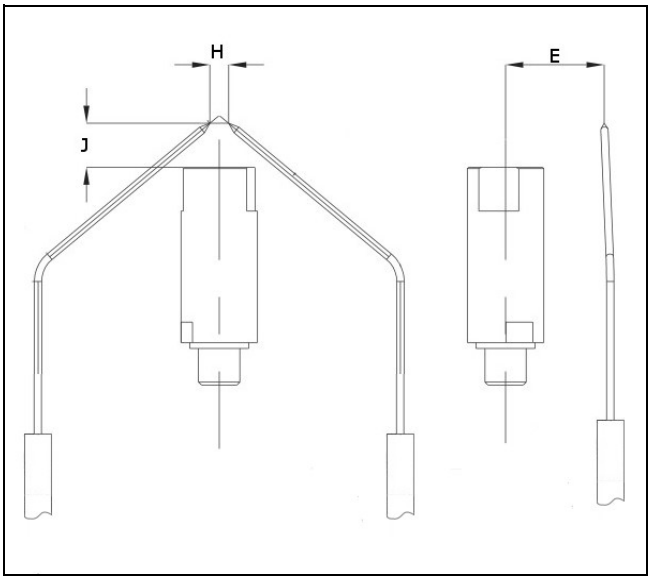


	A			B	C	H	J
	KN	KM	KL				
EKEVO/N9.8700	353	503	653	373	74	330	98
EKEVO/N9.10400					74	300	102

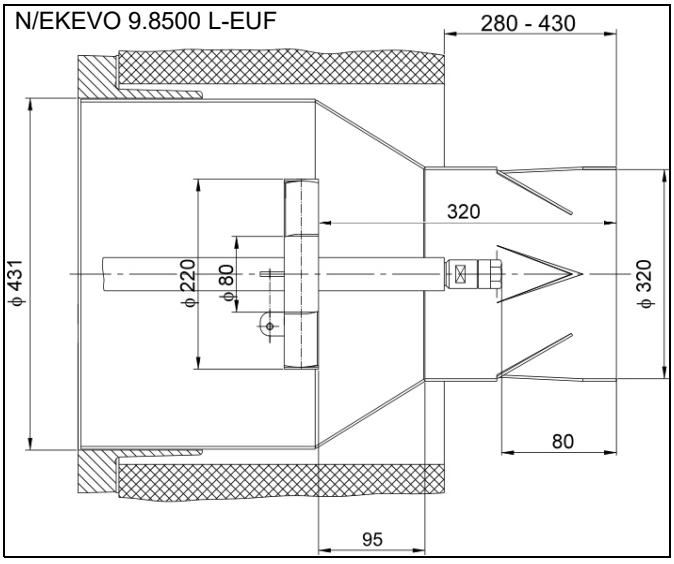
Combustion components N/EKEVO 6 - N/EKEVO 9 L-E/L-EF3/L-EUF adjustment data/check

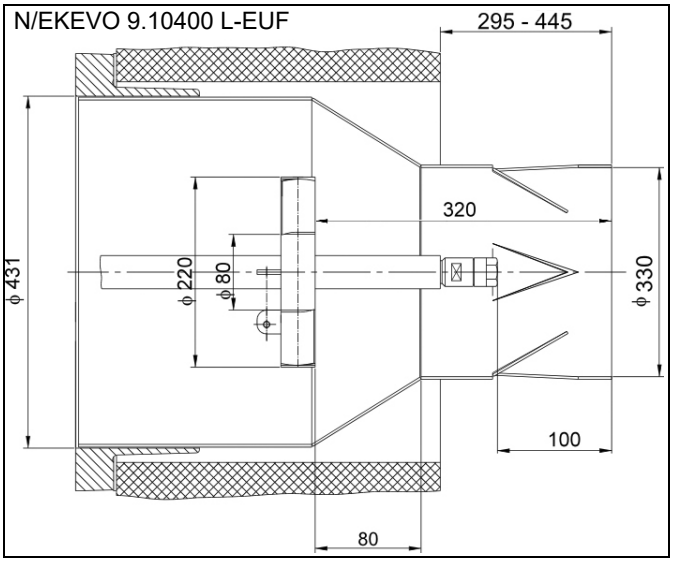


Burner	A	B	C
N/EKEVO 6.2400 L-EF3	30	10	58
N/EKEVO 6.2900 L-EF3	35	40	58
N/EKEVO 7.3600 L-EF3	45	15	85
N/EKEVO 7.4500 L-EF3	45	30	60
N/EKEVO 8.5700 L-EF3	50	40	98
N/EKEVO 9.6500 L-EF3	50	40	98



Burner	E	H	J
N/EKEVO 6.2400 L-EF3	22	6	15-18
N/EKEVO 6.2900 L-EF3	22	6	15-18
N/EKEVO 7.3600 L-EF3	22	6	15-18
N/EKEVO 7.4500 L-EF3	22	6	15-18
N/EKEVO 8.5700 L-EF3	35	5	17
N/EKEVO 9.6500 L-EF3	35	5	17
N/EKEVO 9.8700 L-EUF	22	5	8
N/EKEVO 9.10400 L-EUF	22	5	8



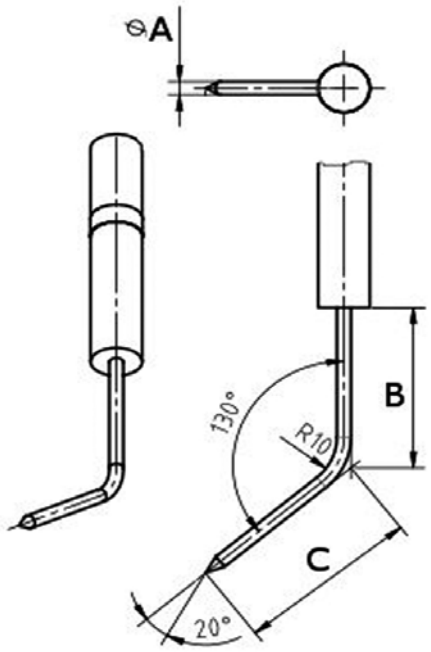


Installation
Combustion components

Ignition electrodes N/EKEVO 6 - N/EKEVO 9 L-E/L-EF3/L-EUF adjustment data/check

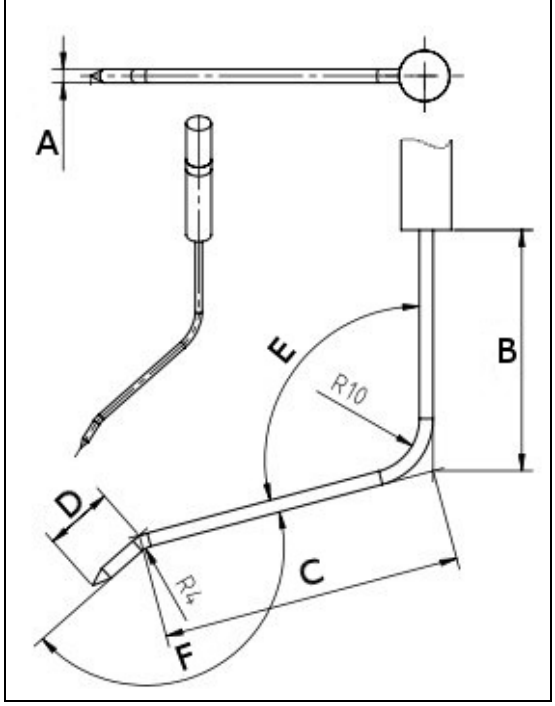
Note:
If there are any ignition or flame detection problems, check the setting and dimensions of the electrodes. If the wear is too great, replace the electrodes.

N/EKEVO 6 - N/EKEVO 9 L-EF3



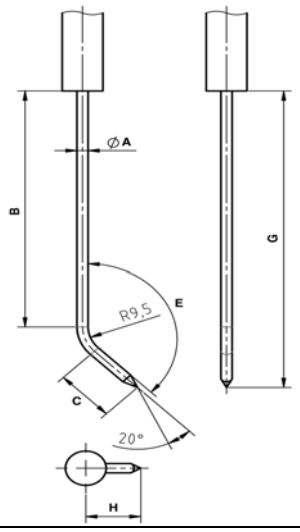
Burner	A [mm]	B [mm]	C [mm]
N/EKEVO 6.2400	2,5... 3	30,6	32,9
N/EKEVO 6.2900	2,5... 3	30,6	32,9
N/EKEVO 7.3600	2,5... 3	49,7	66,8
N/EKEVO 7.4500	2,5... 3	25,7	66,8
N/EKEVO 8.5700	2,5... 3	48,6	71,7
N/EKEVO 9.6500	2,5... 3	48,6	71,7

N/EKEVO 6/7 L-E



Burner	A [mm]	B [mm]	C [mm]	D [mm]	E [°]	F [°]
N/EKEVO 6.2400	2,5... 3	44,2	55	12,5	105	153,5
N/EKEVO 6.2900	2,5... 3	44,2	55	12,5	105	153,5
N/EKEVO 7.3600	2,5... 3	44,2	55	12,5	105	153,5
N/EKEVO 7.4500	2,5... 3	44,2	55	12,5	105	153,5

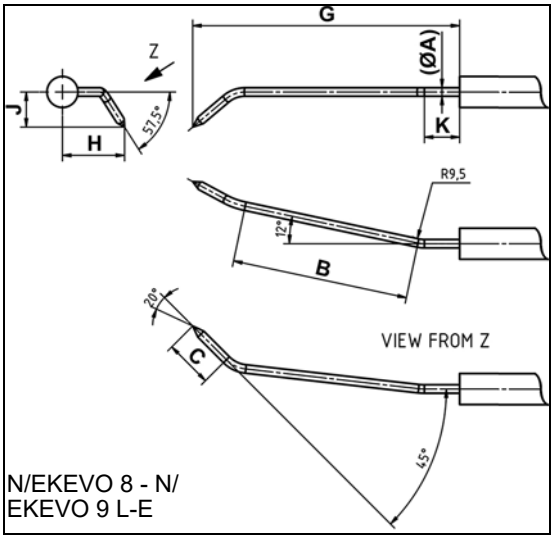
N/EKEVO 9 L-EUF



Burner	Ø A [mm]	B [mm]	C [mm]	E[°]	G [mm]	H [mm]
N/EKEVO 9 L-EUF	2,5... 3	75,4	14	135	93	13

Installation
Combustion components

Ignition electrodes N/EKEVO 6 - N/EKEVO 9 L-E/L-EF3/L-EUF adjustment data/check



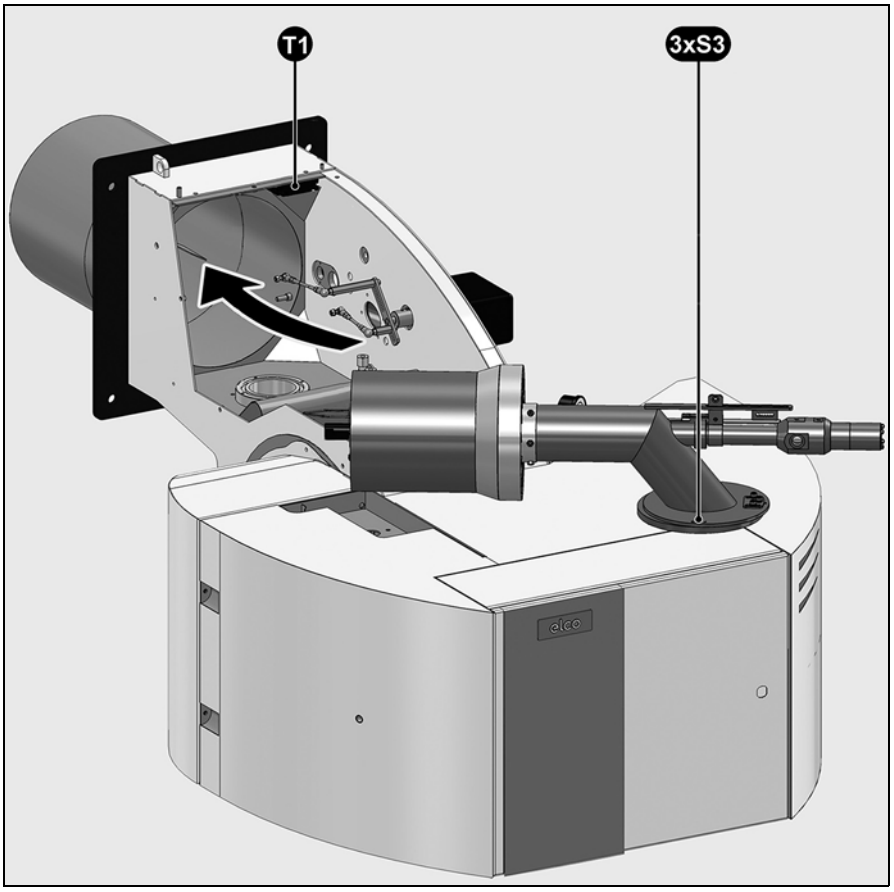
N/EKEVO 8 - N/EKEVO 9 L-E

Burner	Ø A [mm]	B [mm]	C [mm]	G [mm]	H [mm]	J [mm]	K [mm]
N/EKEVO 8 L-E	2,5... 3	62,7	16,9	94,8	22	12,5	12,5
N/EKEVO 9 L-E	2,5... 3	62,7	15,4	93,7	21,5	11,6	12,5

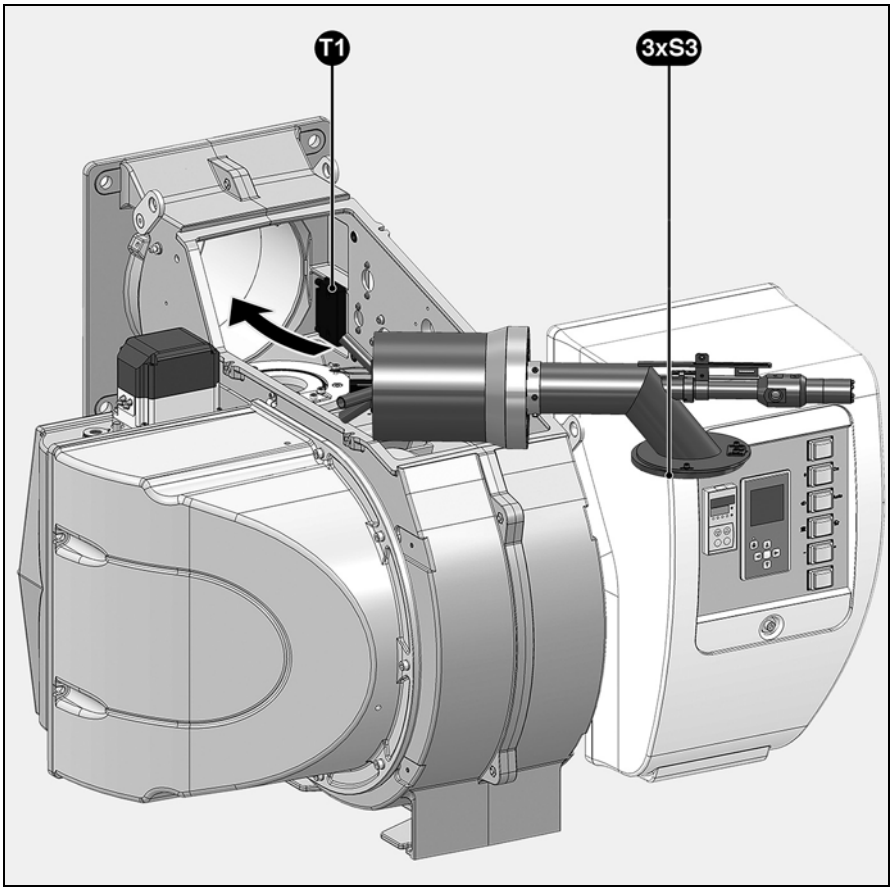
Installation

Installing the combustion components

- Check the settings for the ignition electrode and the combustion components as shown.
- Insert the combustion components into the flame tube, tighten the securing screws **S3**.
- Connect the oil supply (fast-closing couplings). Please note: Check the correct assignment of the supply and return lines.
- Connect the ignition cable to the combustion components.
- Connect the ignition cable to the ignition transformer **T1**.



Note: To provide an example, only the scenario with burner N6 L-EF3 is shown.



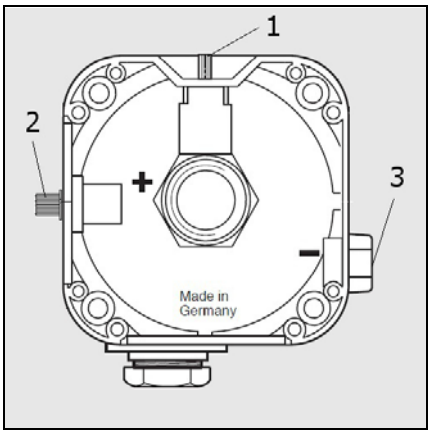
Note: To provide an example, only the scenario with burner EKEVO 6 L-EF3 is shown.

Air pressure switch

Air pressure switch
The air pressure switch is provided for monitoring the pressure of the combustion air fan. Pressure switch LGW... is suitable for switching an electrical circuit or for switching it on or off if the actual pressure values are changing in relation to the setpoint. The pressure switch LGW... can be used as an overpressure, vacuum or differential pressure switch for air and non-aggressive gases but not for gases according to DVGW Worksheet G 260/I.

Certification
The pressure switch has been tested in accordance with EN1854 and is CE/DIN-DVGW-registered. It has been registered in other important gas consumption countries.

N.B.(Gas and air pressure switches)
The pressure switches must be set in accordance with the specifications. Furthermore, each time they are set, a function test must be carried out. Non-compliance could result in personal injury or damage to property!
Once the pressure switches have been set, they must be protected to prevent settings from being altered. For example, this can be done by placing a spot of varnish on at least one of the screws on the equipment's protective cover.



Determining the differential pre-flushing pressure and adjusting the differential pressure switch

Setting for operation without frequency converter
- Burner in the preventilation phase.
- Measure the pressure at the test connection (**2**).
- Measure the vacuum at the test connection (**3**) or directly at the air box (item **4**)
- Add the measured pressures.
- Set the scale to 90% of the calculated value.

Alternative procedure:
- Pre-set pressure switch to maximum value (2.5 mbar)
- Burner at max. power
- Slowly increase the differential pressure setting at the pressure switch until the burner shuts off
- Set 90% of the measured shut-off pressure on the scale

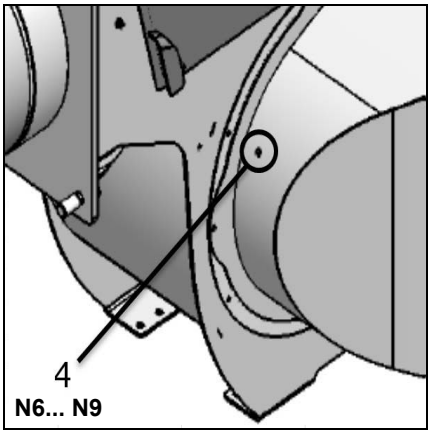
Setting for operation with frequency converter
- Burner with min. calorific power. *
- Measure the pressure at the test connection (**2**).
- Measure the vacuum at the test connection (**3**) or directly at the air box (item **4**)
- Add the measured pressures.
- Set the scale to 90% of the calculated value.

Alternative procedure:
- Pre-set pressure switch to maximum value (2.5 mbar)
- Burner with min. calorific power. *
- Slowly increase the differential pressure setting at the pressure switch until the burner shuts off
- Set 90% of the measured shut-off pressure on the scale

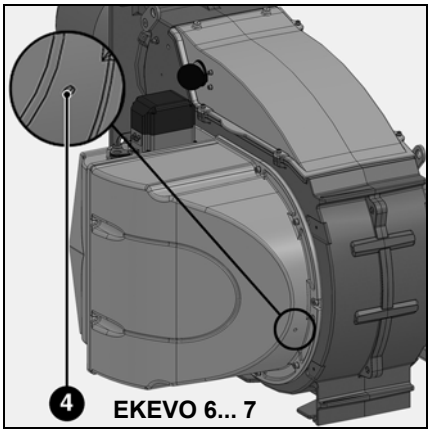
* The basic principle is that for a minimum load the motor frequency is set to the minimum and that the motor frequency setting increases with the increase in the load.

Important note:
After the adjustment procedure, it is necessary to check that the air pressure switch is operating correctly across the entire power range. It may then be necessary to modify the air pressure switch setting, even if the setting and operation are correct. In this case, the switching pressure can be reduced in stages (5% max.). At each stage, it must be ensured that the chosen setting is sufficient.

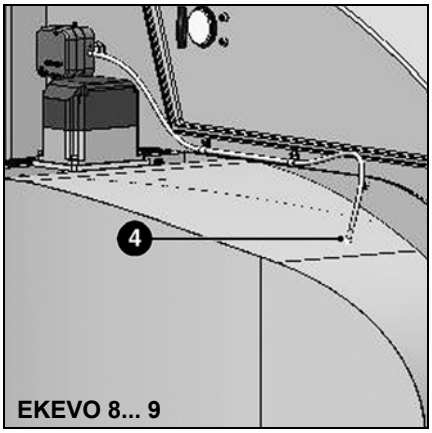
Switch function test
- The switch functions can be tested using the test button (with safety shut-off and locking). If the pressure switch functionality check is required with full load, press button (item **1**). To test the burner in partial or full load, the vacuum line must be detached from the pressure switch measuring point (item **3** or **4**). This removes the vacuum and the required differential pressure is not reached, and the burner goes into fault.



N6... N9



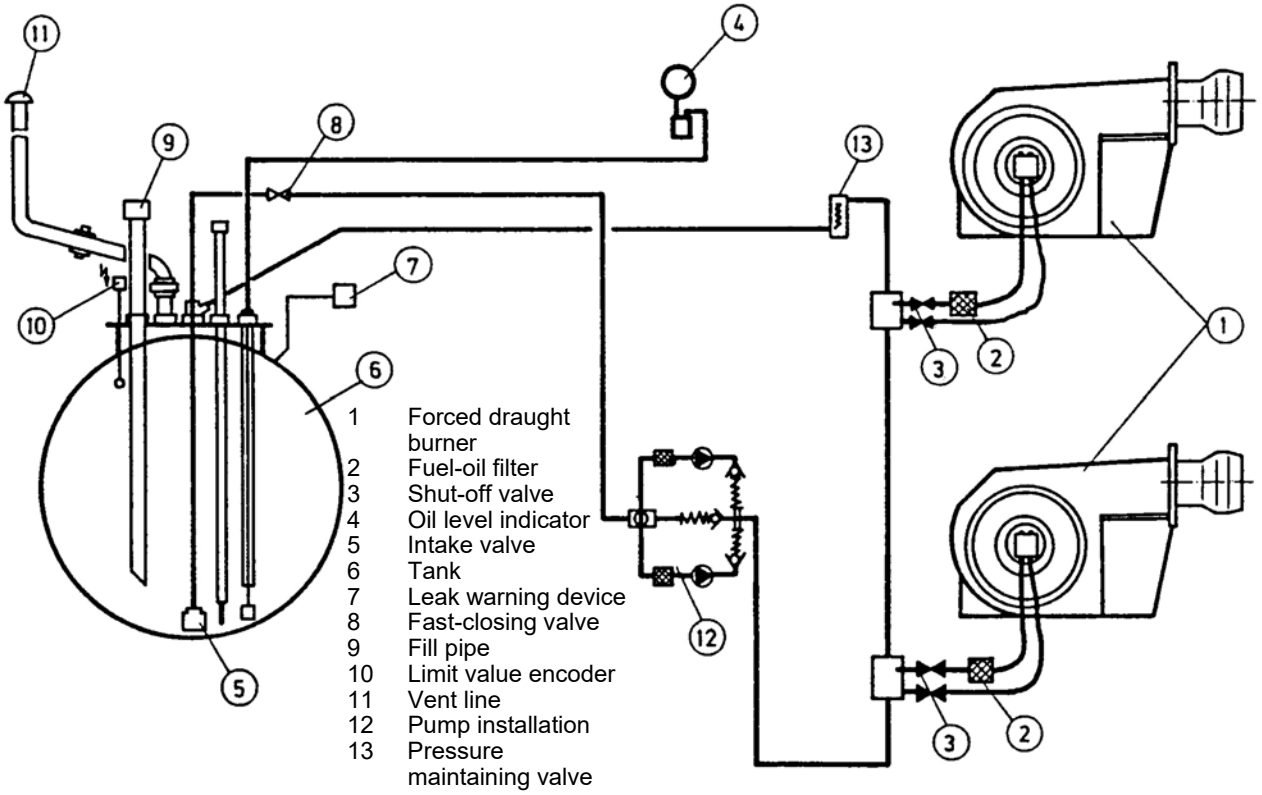
EKEVO 6... 7



EKEVO 8... 9

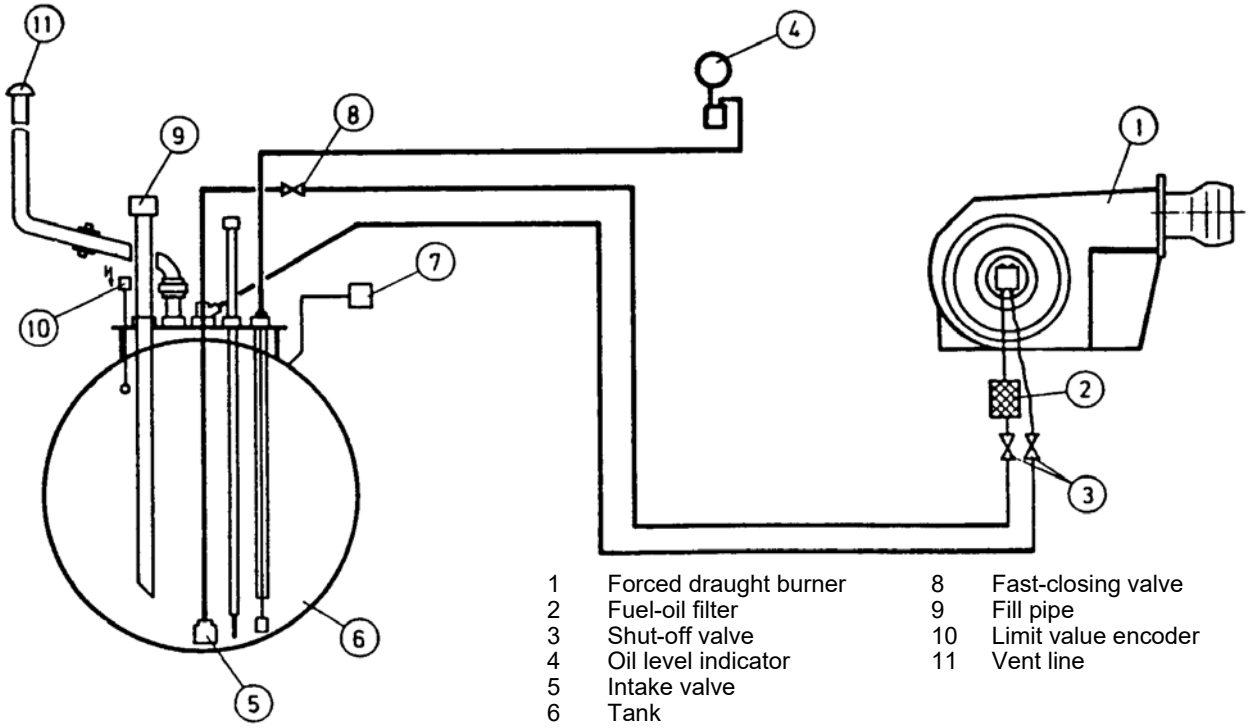
Fuel-oil system diagram

With booster pump



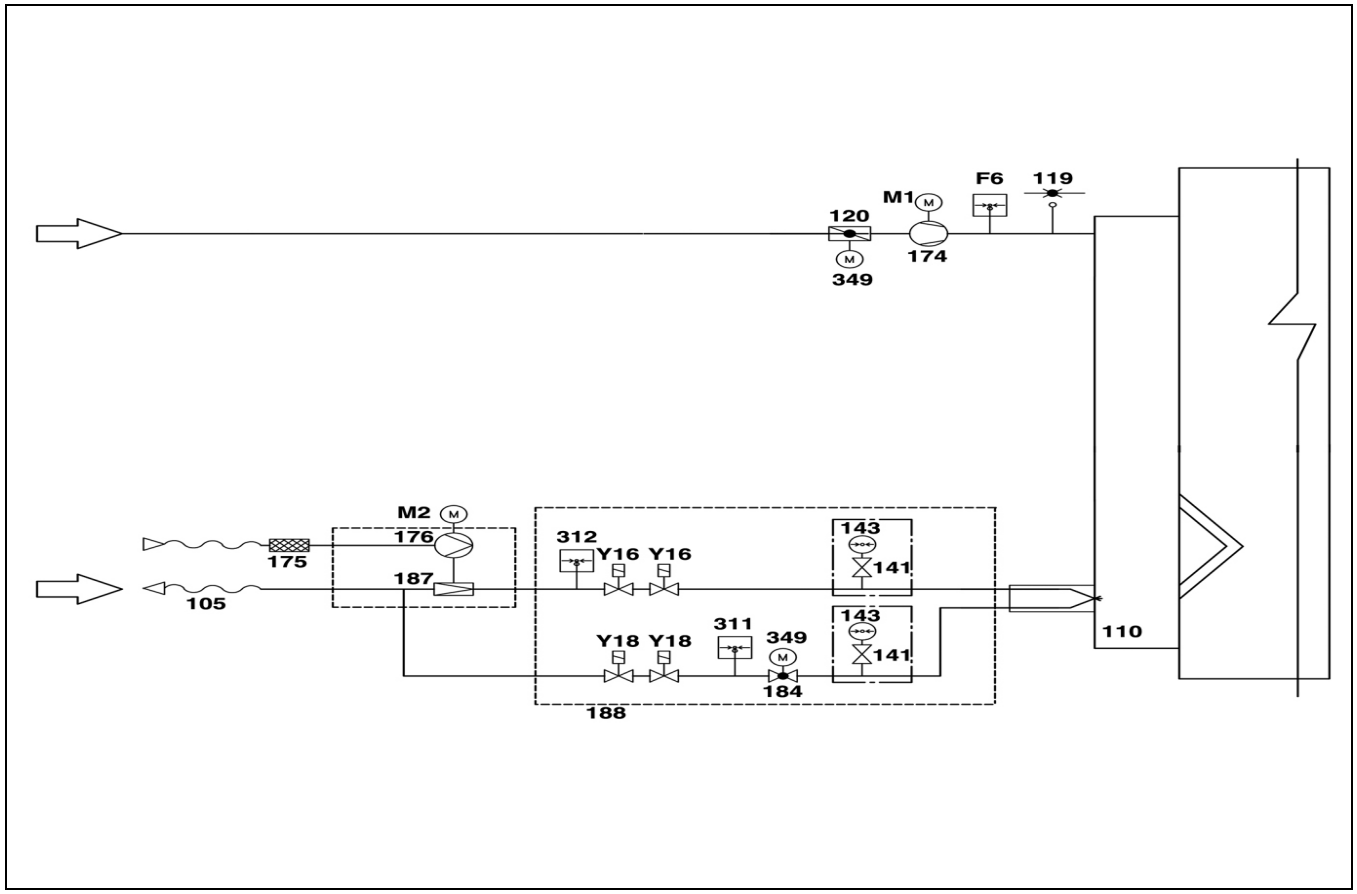
1 Forced draught burner
2 Fuel-oil filter
3 Shut-off valve
4 Oil level indicator
5 Intake valve
6 Tank
7 Leak warning device
8 Fast-closing valve
9 Fill pipe
10 Limit value encoder
11 Vent line
12 Pump installation
13 Pressure maintaining valve

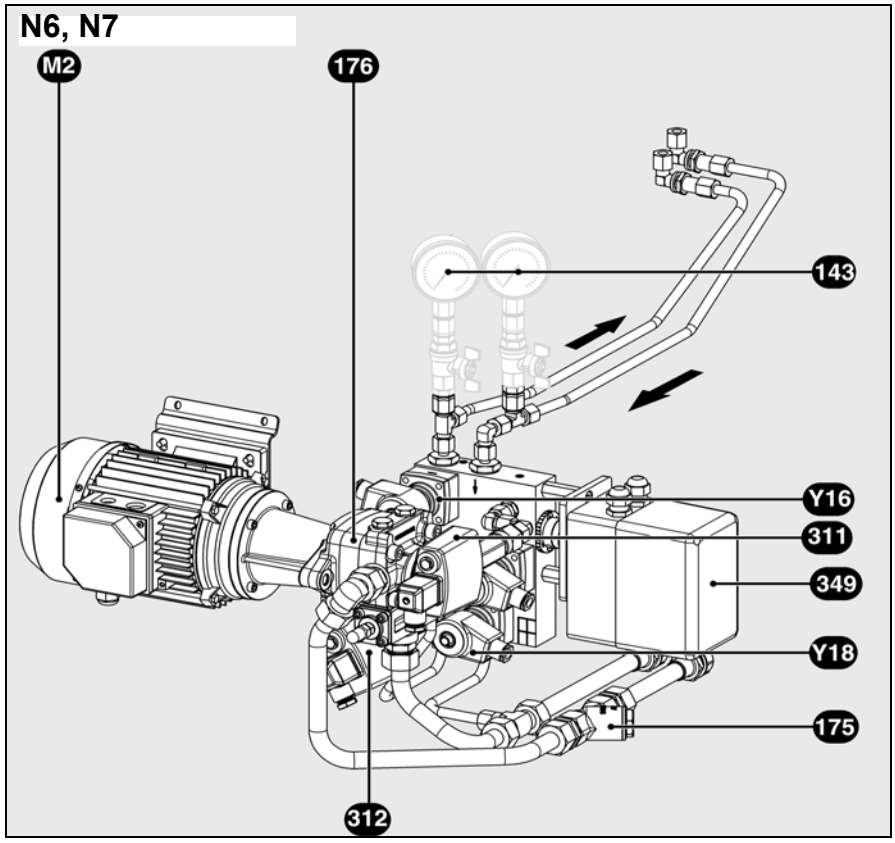
Direct suction



1 Forced draught burner
2 Fuel-oil filter
3 Shut-off valve
4 Oil level indicator
5 Intake valve
6 Tank
7 Leak warning device
8 Fast-closing valve
9 Fill pipe
10 Limit value encoder
11 Vent line

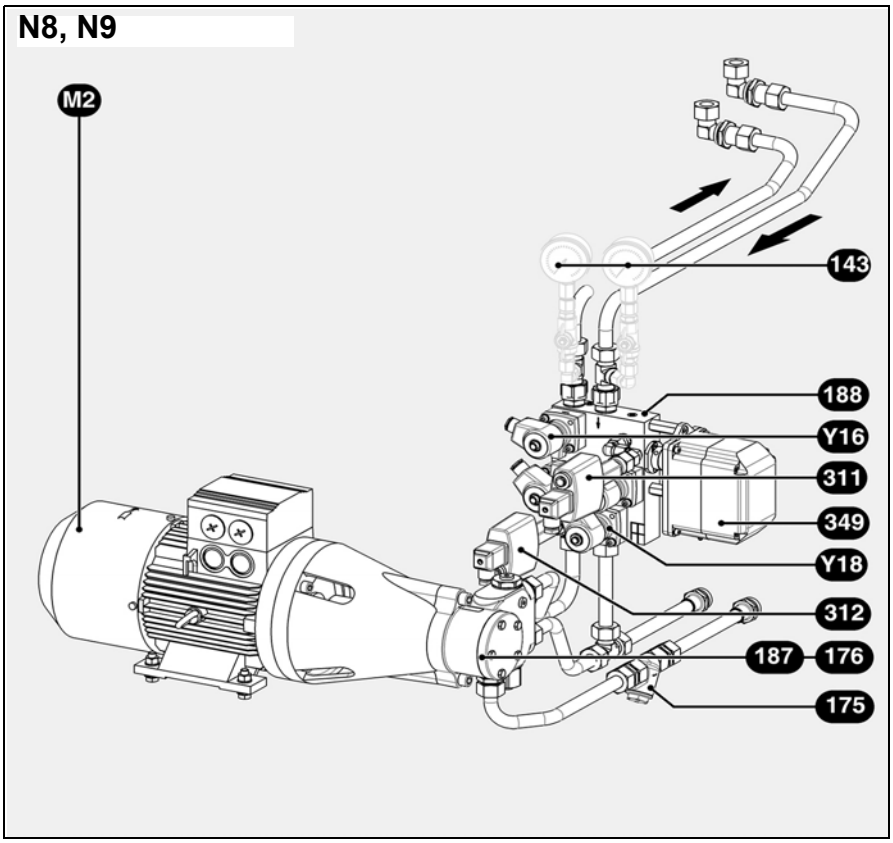
General information regarding the fuel-oil system
Fuel-oil hydraulics diagram

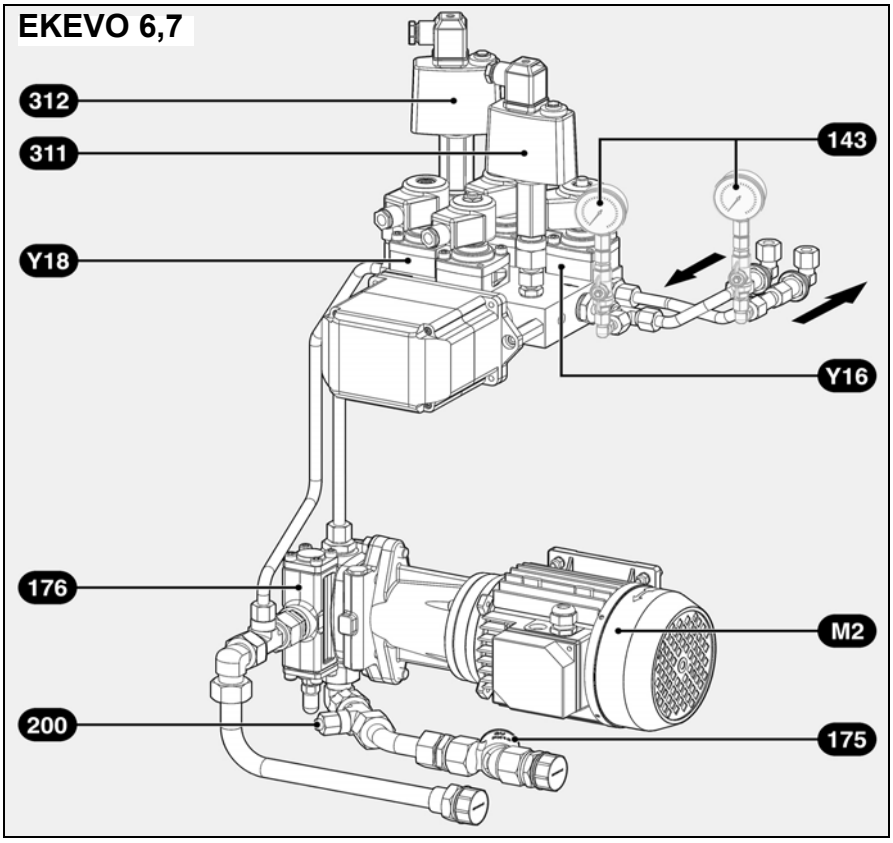




F6 Air pressure switch
M1 Fan motor
119 Pressure tap
120 Air flap
143 Manometer with shut-off valve (141)
174 Ventilator
349 Actuator
T2 Oil ignition transformer
M2 Pump motor
Y16 Fuel-oil safety valve, supply
Y18 Fuel-oil safety valve, return
105 Fuel-oil hose
110 Fuel-oil nozzles
175 Fuel-oil filter
176 Fuel-oil pump
184 Power control valve
187 Pressure regulation valve (integrated in pump)
188 Fuel-oil hydraulic block
311 Fuel-oil pressure switch, return (max.)
312 Fuel-oil pressure switch, supply (min.)
349 Servomotor

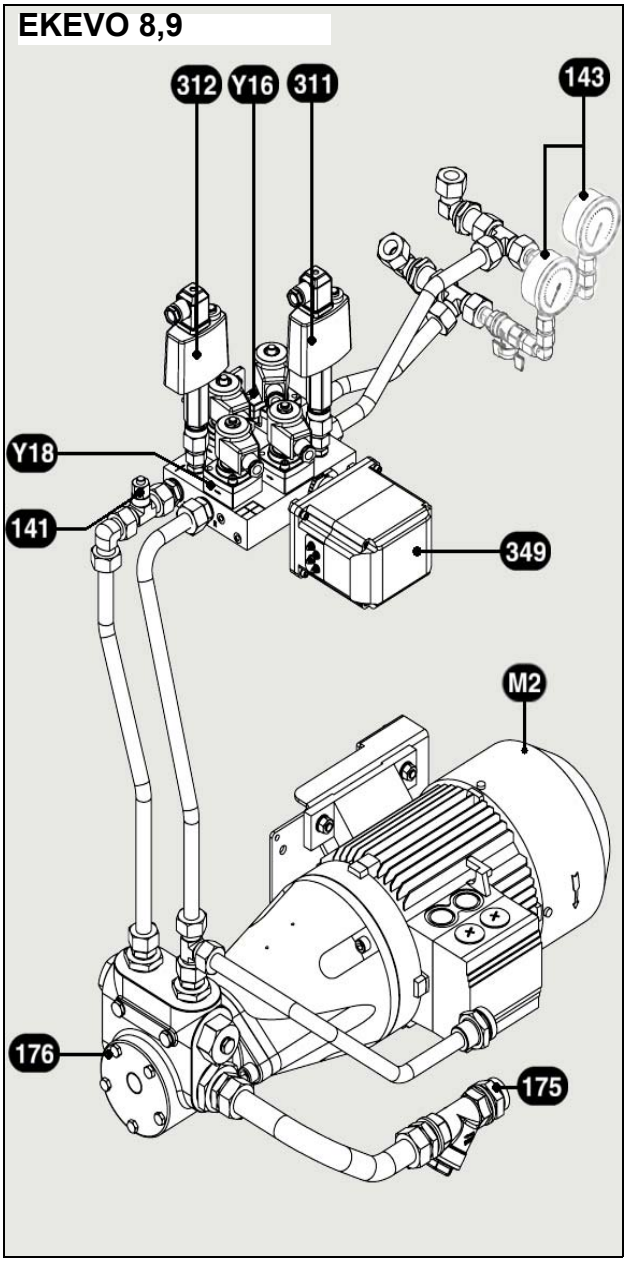
General information regarding the fuel-oil system
Fuel-oil hydraulics diagram





M2 Pump motor
Y16 Fuel-oil safety valve, supply
Y18 Fuel-oil safety valve, return
143 Manometer with shut-off valve (option)
175 Fuel-oil filter
176 Fuel-oil pump
187 Pressure regulation valve (integrated in pump)
188 Fuel-oil hydraulic block
200 Measuring point fuel oil suction pressure
311 Fuel-oil pressure switch, return (max.)
312 Fuel-oil pressure switch, supply (min.)
349 Servomotor

General information regarding the fuel-oil system
Fuel-oil hydraulics diagram



M2 Pump motor
Y16 Fuel-oil safety valve, supply
Y18 Fuel-oil safety valve, return
141 Pump input pressure measuring point
143 Manometer with shut-off valve (141) (option)
175 Fuel-oil filter
176 Fuel-oil pump
311 Fuel-oil pressure switch, return (max.)
312 Fuel-oil pressure switch, supply (min.)
349 Servomotor

Fuel-oil pressure switch

Fuel-oil pressure switch
Fuel-oil pressure switches are used to monitor burners to ensure that they do not exceed or fall below specific fuel-oil pressures. Depending on the burner variant, pressure switches may be specified in the return only or in the return and supply line. The shut-off pressure in question is set depending on the system parameters (boost pressure, fuel-oil nozzle etc.).

Fuel-oil pressure damping
To reduce fluctuations in fuel-oil pressure, a throttle screw (2) or a capillary tube may be screwed into the connection nozzle.

Adjustment of shut-off pressure
To adjust the shut-off pressure, the adjustment button (**1**) can be pulled upward and reinserted the opposite way around.

Setting the fuel-oil pressure switch min.:
The shut-off pressure is the fuel-oil supply pressure at full load, minus approx. 20%.

Setting the fuel-oil pressure switch max. (only for burners with a return nozzle):
The shut-off pressure is the boost pressure with a full load plus approx. 2 to 3 bar. The set shut-off pressure should also take the switching differential into consideration.
When the setting procedure is complete, the setting button must be returned for reasons of safety.
A seal must be applied to the pressure switch to secure the setting (Item 4).

Model	Adjustment range	Switching differential	Application
DSB 158 F.	0-25 bar	1.0 to 7.5 bar	Standard EN 267 supply line and return

Switching differential
The switching differential may be set at the limits of the pressure switch in accordance with the values in the table. To do this, the set screw must be rotated in the adjusting screw (3) for the shut-off point. 1 turn modifies the switching differential by approx. 20% of the total switching differential range.

General information regarding the fuel-oil system

Fuel-oil connection
Hoses are used to make a connection to the fuel-oil tubes or the gate valves. To prevent kinks and therefore any risk of rupture, the hoses must be fed correctly (no tension or distortion). When installing the fuel-oil tubes, care must be taken to ensure that the lines terminate as close to the burner as possible and that they are positioned in such a way that the boiler door and the burner can be swivelled out without obstruction.

Shut-off valve
In the fuel supply feed line, manual shut-off valves must be fitted before the burner (supply line and return). These must be installed in such a way that they are easily accessible. The manual shut-off valves are not included in the scope of delivery.

Gas and air separators
Air or gas In the fuel supply line could cause noise and operational problems. In order to avoid this, a suitable gas air separator must be fitted in the fuel supply line.

Fuel-oil filter
To protect the oil pressure pump and the hydraulic system, a filter must be installed upstream of the pump. A filter with ≤ 250 µm is recommended.

Installation options
- Two-line installation (separate supply line and return line with no delivery pump)
- Ring line system (with delivery pump and gas-air separator)

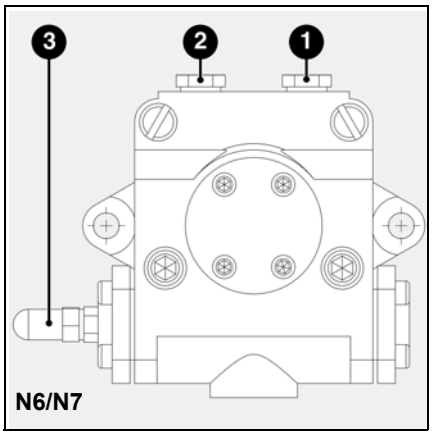
Fuel-oil pressure regulator (supply line)
The supply pressure is regulated by the pressure regulator fitted in the pump and, depending on the burner output and make of nozzle, it is set to 25-30 bar. The pressure regulator is actuated by rotating screw **3**. Before commissioning, the pump must be filled with fuel-oil.

Venting
With the ring line, if any, in operation, open the supply line and return gate valves. Reduce the oil pressure on the pressure regulation valve. Switch on the pump by depressing the contactor. Check whether the direction of rotation is correct, the pump is supplying fuel-oil and the fuel-oil hydraulics system is leak-proof. Vent the pump, e.g. at the pressure gauge connector. When commissioning the burner, the oil pressure must be increased slowly until it reaches the operating value.

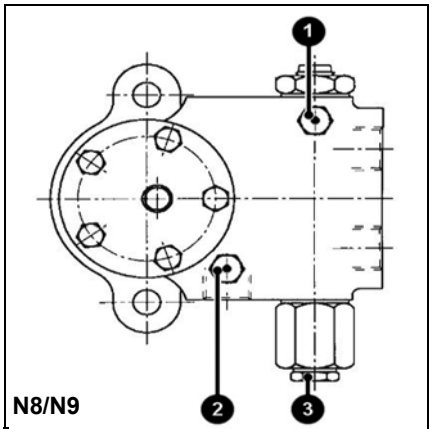
Pressure regulation (fuel-oil intake pressure)
The maximum possible vacuum is 0.2 bar. If the vacuum pressure is greater than this, gas emissions are produced from the fuel-oil and this could cause problems.
In the case of ring line operation, the oil pressure at the pump must not exceed the maximum permissible pressure. For the maximum pressure, please refer to the technical data.

Connecting test devices
Before setting the burner, test pressure gauges must be fitted to determine supply pressure **1** and possibly intake pressure **2**.

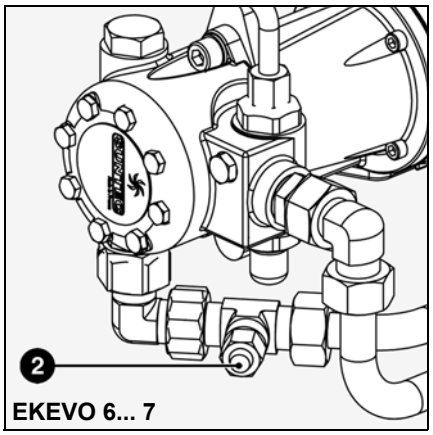
Note:
When commissioning is complete, the pressure gauges must be removed and the connections must be duly sealed. If the pressure gauges are left on the burner, they must all be shut off with shut-off valves.



N6/N7



N8/N9



EKEVO 6... 7

Oil hoses for burner connection				
Burner type	DN	Length [mm]	Connection on both sides	Minimum bending radii R [mm]
N/EKEVO 6	20	1500	R 1/2”	145
N/EKEVO 7-9.8700	20	1500	R 3/4”	145
N/EKEVO 9.10400	25	1500	R 1”	165

Connection to the test point			
Burner	Test point for intake pressure	Test point for pump pressure (at pump)	Test point for pump pressure bef. 1st safety valve (only EKEVO)
N/EKEVO 6-7	G1/4	G1/4	Ø10 pipe connector acc. to DIN EN ISO 8434-1*
N/EKEVO 8-9.8700	G1/8	G1/8	Ø10 pipe connector acc. to DIN EN ISO 8434-1*
N/EKEVO 9.10400	G1/4	G1/4	Ø10 pipe connector acc. to DIN EN ISO 8434-1*

*In order to be able to use the test point, a cutting ring that conforms with DIN EN ISO 8434-1 is required. If the pressure gauge is not left on the burner, a union nut in acc. with DIN EN ISO 8434-1 is also required.

Pump type TA

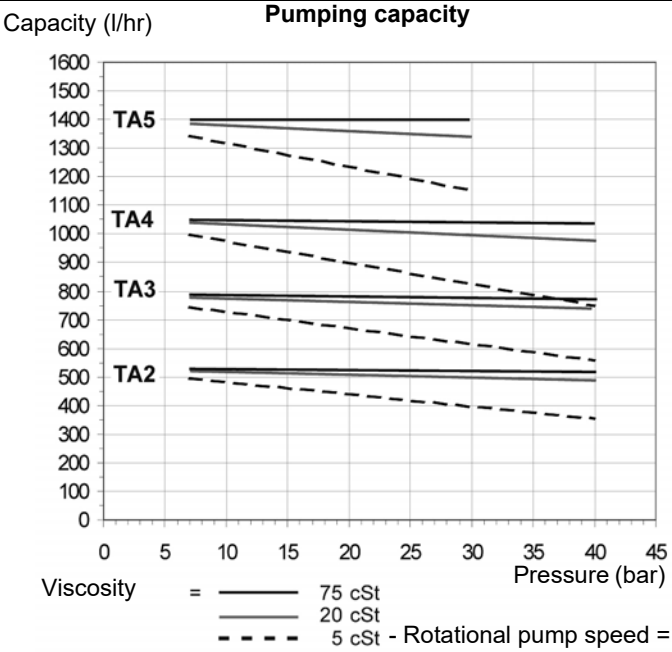
Areas of application
- Domestic oil and heavy-grade oil.
- Two-line system.

Description of functions
The gearbox draws the fuel-oil from the tank and supplies it under pressure to the valve which controls the oil pressure for the nozzle line.
In the case of two-line installations, fuel-oil which exceeds the nozzle capacity flows back to the tank through the valve via the return opening.

Venting
Pump venting is speeded up by opening a pressure connection.

Comment:
All TA pumps supplied are for two-line installation (bypass plug screwed into the vacuum connection).
To convert to single-line operation, the bypass plug must be removed and the return opening must be sealed off with a gasket and metal plug.

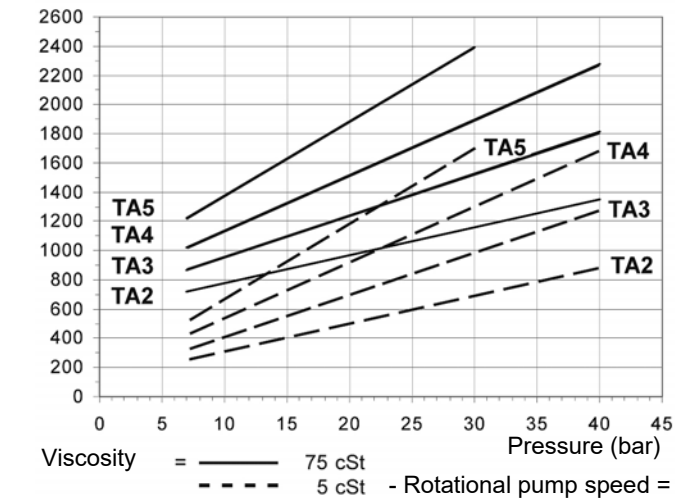
Pumping capacity



- Rotational pump speed = 2850 rpm

The values specified in the curves apply to new pumps (with no evidence of wear)

Pump power requirements



- Rotational pump speed = 2850 rpm

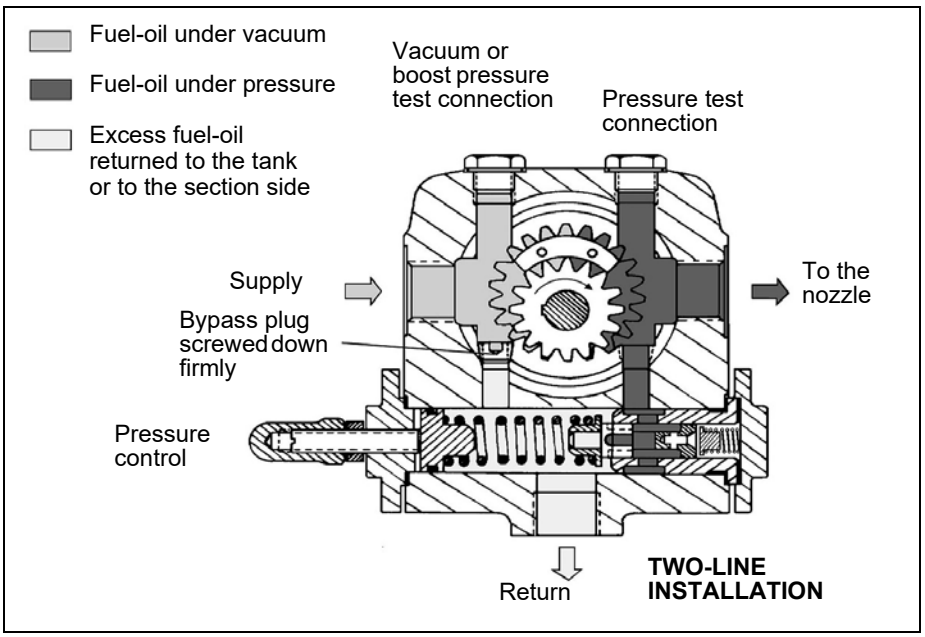
The values specified in the curves apply to new pumps (with no evidence of wear)

Pump type TA

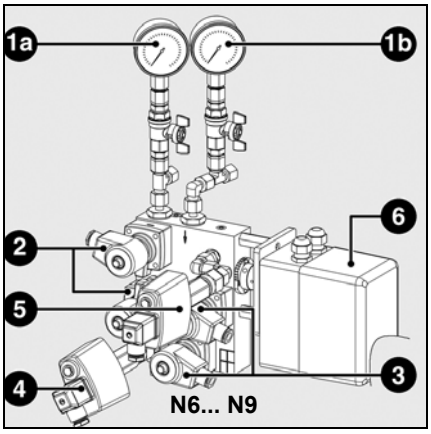
General	
Attachment	Flange attachment
Connections	Cylindrical in acc. with ISO 228/1
Supply line and return	G 1/2
Nozzle outlet	G 1/2
Pressure test connection	G 1/4
Vacuum test connection	G 1/4
Shaft	Ø 12 mm
Bypass-plug	Used in the vacuum connection
	for two-line installation
Weight	45.4 kg (TA2) - 5.7 kg (TA3)
	6 kg (TA4) - 6.4 kg (TA5)

Hydraulic data	
Pressure range	30: 7 - 30 bar
	40: 7 - 40 bar
Pressure setting when delivered	30 bar
Viscosity range	3 - 75 mm²/s (cSt)
(Fuel-oil with a higher viscosity may be used if the fuel-oil is supplied under pressure and is heated in such a way that the viscosity falls below 75 cSt. For use with kerosene, please contact SUNTEC)	
Fuel-oil temperature	0 - 150°C in the pump
Supply pressure	Light oil operation: vacuum 0.45 bar max. in order to avoid air separation
	Heavy-grade oil operation: 5 bar max.
Return pressure	Light oil operation : 5 bar max.
	Heavy-grade oil operation: 5 bar max.
Rotational speed	3600 rpm max.
Torque (at 40 rpm)	0.30 Nm

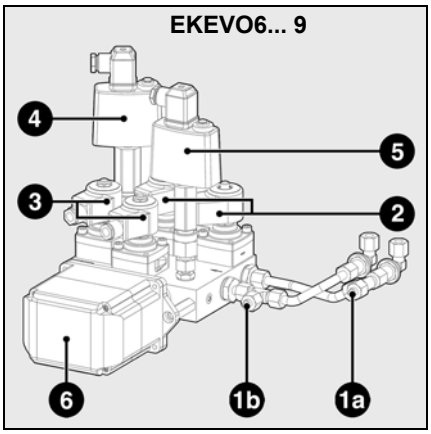
Selecting the heating element	
Heating cartridge	Ø 12 mm
Thread connection	In acc. with EN 50262
Power	80-100 W



Fuel-oil hydraulic block



N6... N9

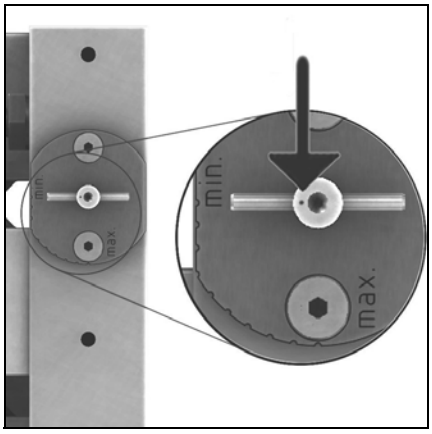


EKEVO6... 9

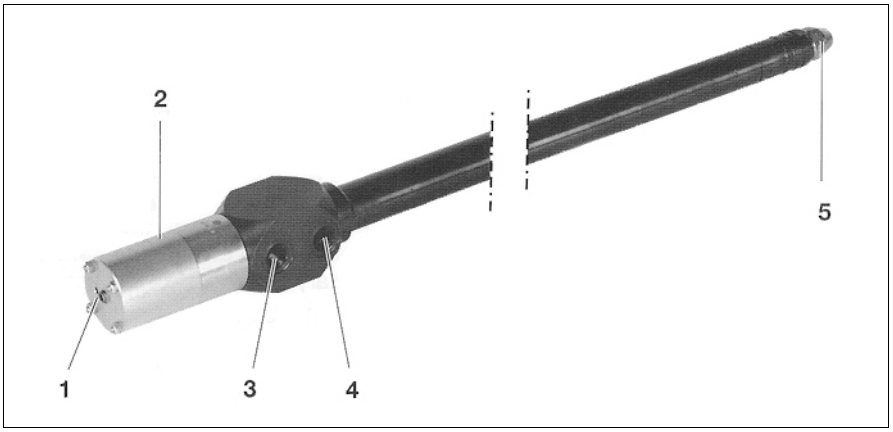
1a Fuel-oil manometer, supply (optional) (not shown)
1b Fuel-oil manometer, return (optional) (not shown)
2 Supply safety valve
3 Return safety valve
4 Fuel-oil pressure switch min. (supply)
5 Fuel-oil pressure switch, max. (return)
6 Oil flow regulator servo motor

The hydraulic block is an integrated component which combines many fuel-oil hydraulic tasks on burners.
It functions as a flow regulator for the oil flow rate. In addition, the safety components (safety shut-off valves and fuel-oil pressure switch) are installed on the compact hydraulic block. The solenoid valves in the supply are servo-assisted, whereas the return valves are controlled directly. The valve coils are electrically switched in series.
This prevents a valve from opening on its own when one of the two coils is faulty. When replacing the solenoid valves during servicing, ensure that the right valve type is fitted the right way round.

When replacing the solenoid valves during servicing, ensure that the right valve type is fitted the right way round. The solenoid valve in the supply line (type 321 F 2523) must be fitted so that the flow direction punched on the valve flange is the same as the flow direction of the oil (from the pump to the nozzle rods). For the solenoid valve in the return, (type 121 F 2523), the arrow punched on the solenoid valve points in the opposite direction to the flow direction of the oil, which is flowing back from the nozzle rods to the pump.
The volumetric flow control valve integrated in the return consists of a bushing, which is pressed into the fuel-oil hydraulic block and secured against twisting, and a control shaft. Thanks to contours which have been worked into the bushing and shaft accordingly, the open passage cross-section for the returning oil is changed by twisting and the quantity of oil return is affected. For adjusting the different fuel-oil nozzle sizes, there are control shafts with different control contour parameters, which makes it possible to achieve outstanding control characteristics and a large control range for every application. The control contour parameter and the rotation direction (with the letter L) are marked using an electrical stylus on the control shaft. If the control shaft is replaced, before refitting, check the control contour parameter and the rotation direction.
The current position of the control shaft can be read from the position display. Starting at "min." (lowest burner load), the control shaft turns clockwise to the "max." marking (full burner load). If the control shaft is removed during servicing, the installation position of the control contour must be noted when refitting the shaft. The position is marked by a punch mark on the front of the shaft. At the lowest load position ("min."), the punch always faces upwards (9 o' clock - see photo).



Return nozzle rod RDN

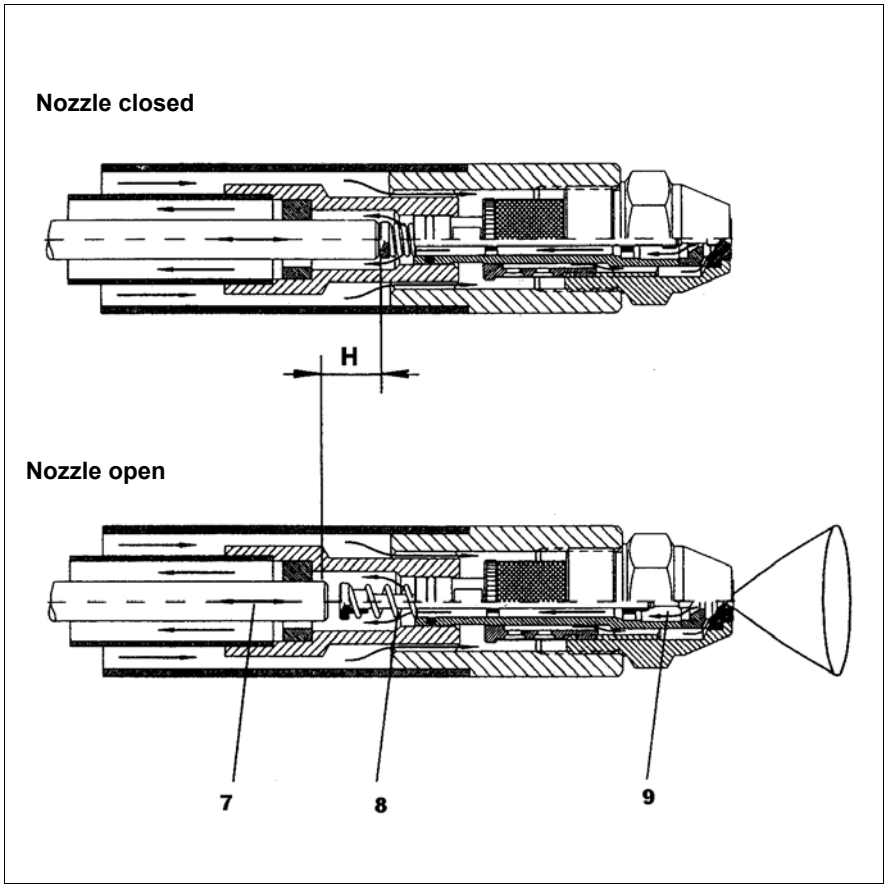


Return nozzle rod RDN

1 Stroke setting (control needle)
2 Hydraulic piston system
3 Fuel-oil connection, return
4 Fuel-oil connection, supply
5 Return nozzle fluidics W-50°

Description
The return nozzle rod RDN is suitable for operation with Fluidics return nozzle type W or Bergonzo CBM type B with 7/8" connection thread. These nozzles are fitted with an integral, spring-loaded shut-off system, in which a stop needle directly closes the nozzle aperture. The stop needle is operated by the control needle, which is connected to the hydraulic piston system of the nozzle rod.
The stroke of the control needle is calculated so that the nozzle with the greatest possible needle stroke in the open needle position still has some play between the spring plate and control needle head. If the pump pressure is too little (< 20 bar) and the control needle is not pressed on fully, one must assume that there are differences in flow, because then the needle position will affect the oil return.

Please note:
The stroke (1) is set at the factory, and must not be adjusted on the system. The stroke (H) is 9 mm, and can only be accurately set on a suitable hydraulic test stand.



Function, nozzle W-50° or CBM/B

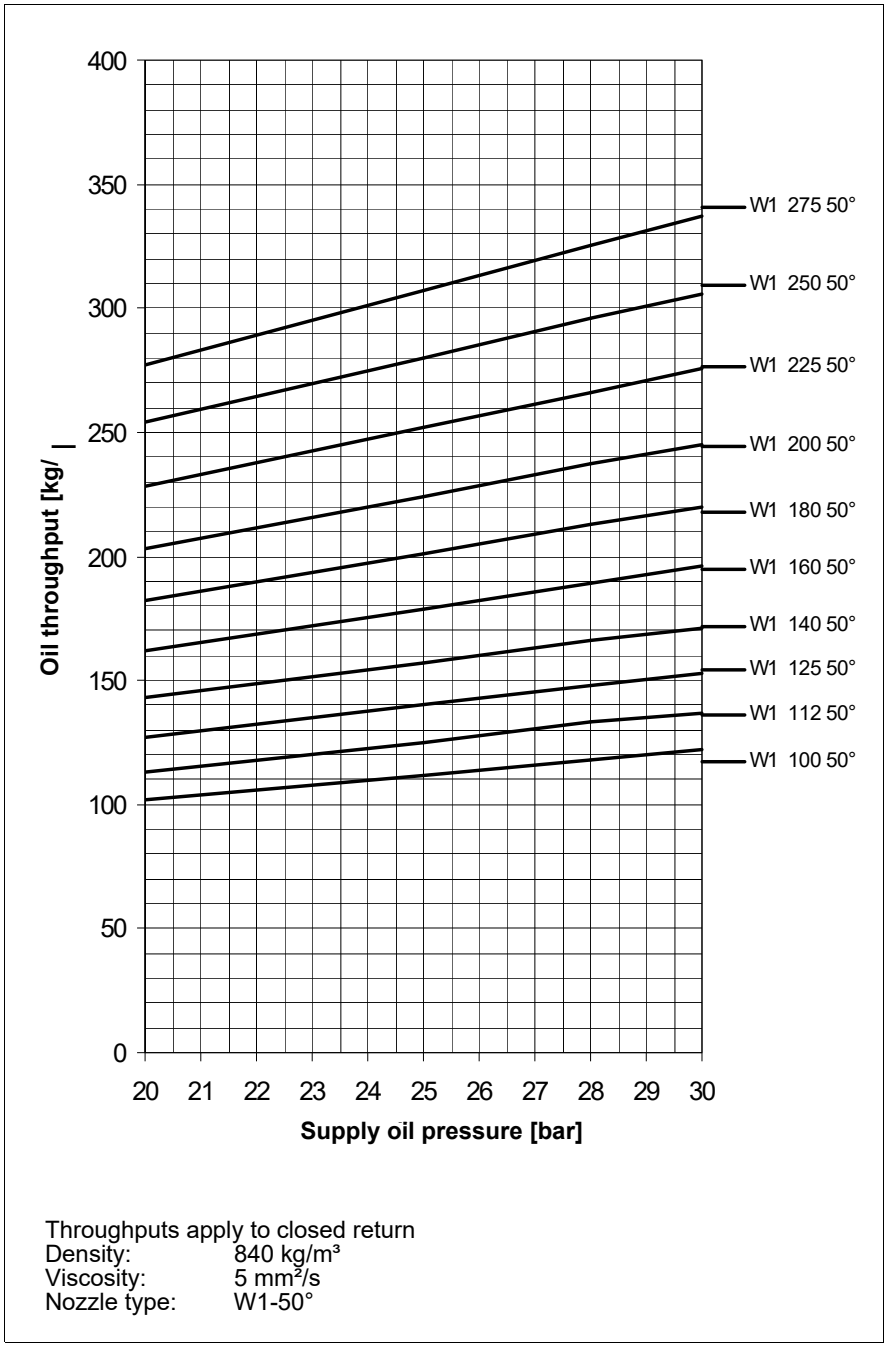
Opening the nozzle
* the piston in the hydraulic system and with it the control needle (7) are pulled back by the supply oil pressure
* the spring (8) in the nozzle opens the stop needle (9)

Closing the nozzle
- the burner stops, the hydraulic piston system is depressurised
- with the spring pressure, the control needle (7) presses on the stop needle of the nozzle until it closes

Opening pressure = 13 bar (fully open at 20 bar)
Closing pressure = 10 bar

7 Control needle
8 Nozzle opening spring
9 Stop needle

Nozzle selection, type W1 - 50°



Throughputs apply to closed return
Density: 840 kg/m³
Viscosity: 5 mm²/s
Nozzle type: W1-50°

Return nozzle

Fluidics nozzle W1 is a return nozzle with integral, spring-loaded stop needle. The flow is regulated by changing the return pressure, while the supply pressure is held constant. Before commissioning, the nozzle size must be compared with the output conveyed. Replace the nozzle if necessary (see nozzle selection diagram).

Nozzle selection diagram

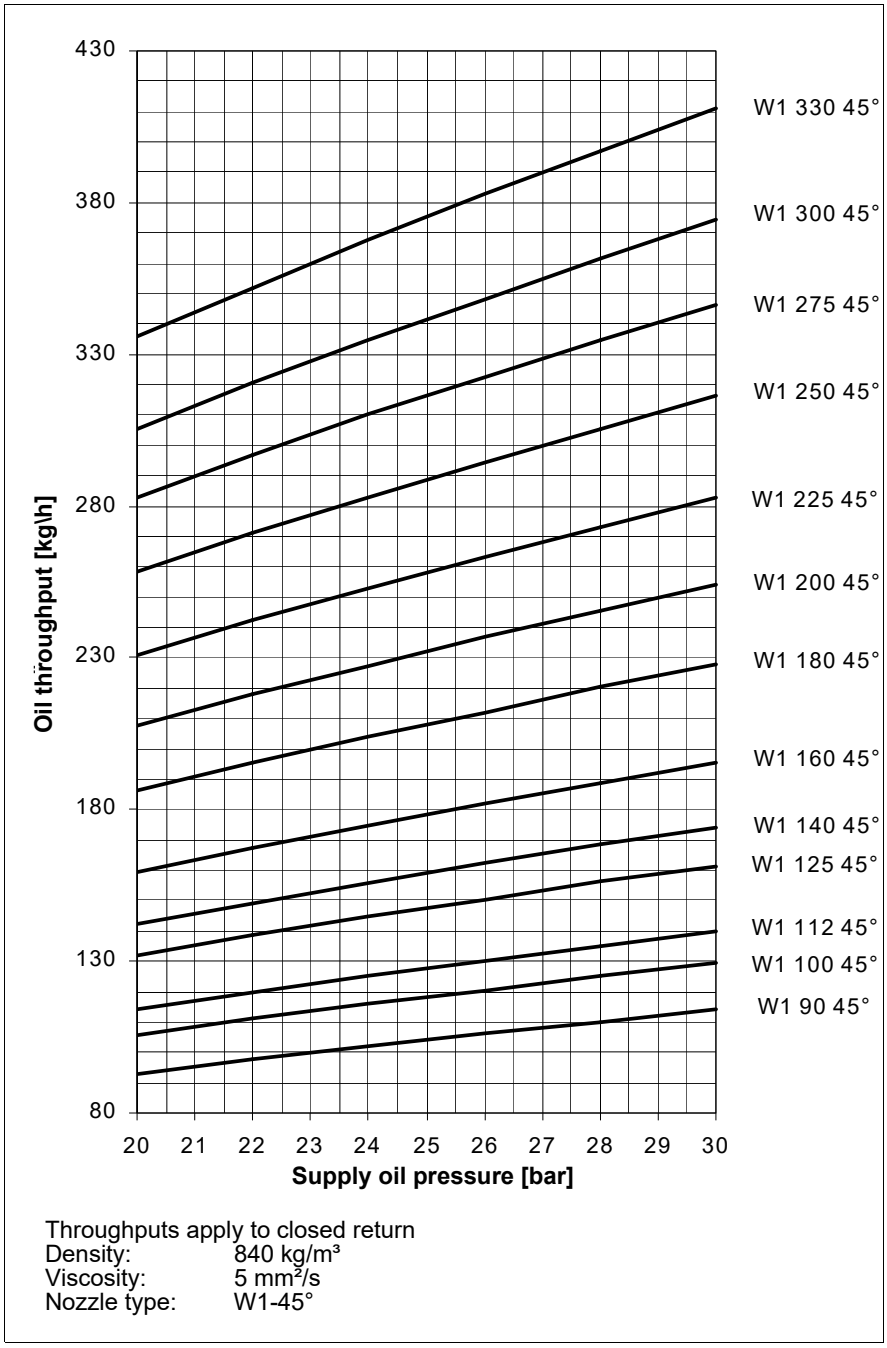
The diagram shows the maximum flow rates of the return nozzles in relation to the flow oil pressure.

Supply pressure:	min. 20 bar max. 30 bar
Nominal supply pressure:	28 bar
Return pressure:	min. 8 bar

Example

Required oil throughput	180 kg/h
Nozzle size according to diagram	W1-160
Supply pressure as per diagram	28 bar

Nozzle selection, type W1 - 45°



Throughputs apply to closed return
Density: 840 kg/m³
Viscosity: 5 mm²/s
Nozzle type: W1-45°

Return nozzle
Depending on burner size and the furnaces concerned, it may be possible to use Fluidics nozzles W1 with a spray angle of 45°.
The correct nozzle is selected as appropriate to the combustion chamber delivered with the burner.

Nozzle selection diagram

The diagram shows the maximum flow rates of the return nozzles in relation to the flow oil pressure.

Supply pressure:	min. 20 bar
	max. 30 bar
Nominal supply pressure:	26 bar
Return pressure:	min. 8 bar

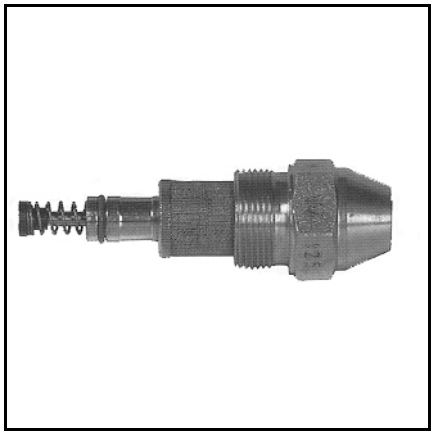
Example

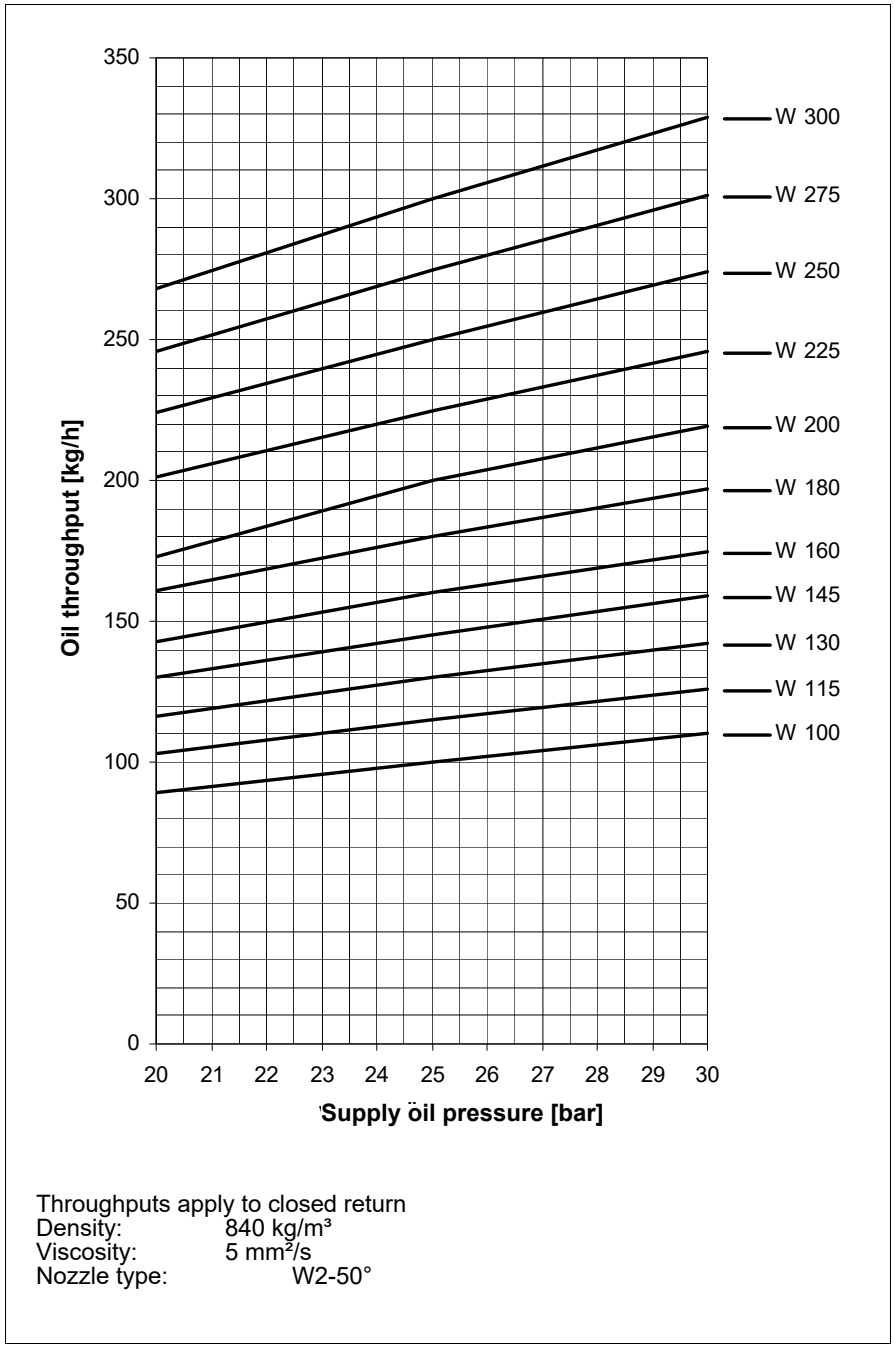
Required oil throughput	130 kg/h
Nozzle size according to diagram	W1-112
Supply pressure as per diagram	26 bar

Allocation of nozzle - W1 - 45°/50°

Supply pressure 25 / 28 bar			
Fluidics fuel oil nozzle	**~Maximum power 25 bar**	**~Maximum power 28 bar**	**Size of the control shaft with a maximum pressure of 2 bar in the circulation loop**
Fluidics W1 100	1300	1400	1.6
Fluidics W1 112	1500	1600	2.0
Fluidics W1 125	1650	1750	2.0
Fluidics W1 140	1850	1950	2.0
Fluidics W1 160	2100	2200	2.5
Fluidics W1 180	2400	2500	2.5
Fluidics W1 200	2650	2800	2.5
Fluidics W1 225	3000	3150	3.0
Fluidics W1 250	3300	3500	3.0
Fluidics W1 275	3650	3850	4.0
Fluidics W1 300	3950	4200	4.0
Fluidics W1 330	4350	4600	4.0
Fluidics W1 360	4750	5000	5.0
Fluidics W1 400	5300	5600	5.0
Fluidics W1 450	5950	6300	5.0
Fluidics W1 500	6600	7000	6.0
The control shaft is selected using a regulating ratio of 1:3.			

Nozzle selection, type W2 - 45°/50°





Throughputs apply to closed return
Density: 840 kg/m³
Viscosity: 5 mm²/s
Nozzle type: W2-50°

Return nozzle

Fluidics nozzle W is a return nozzle with integral, spring-loaded stop needle. The flow is regulated by changing the return pressure, while the supply pressure is held constant. Before commissioning, the nozzle size must be compared with the output conveyed. Replace the nozzle if necessary (see nozzle selection diagram).

Nozzle selection diagram

The diagram shows the maximum flow rates of the return nozzle in relation to the flow oil pressure.

Supply pressure: min. 20 bar
max. 30 bar
Nominal supply pressure: 28 bar
Return pressure: min. 8 bar

Example

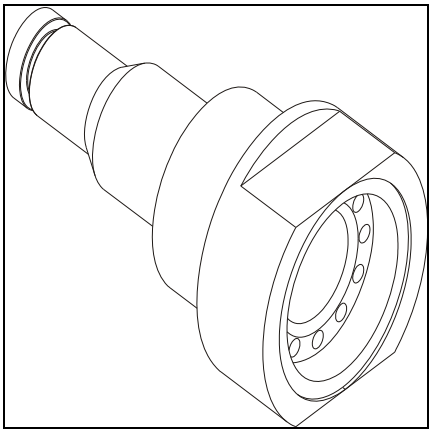
Required oil throughput 238 kg/h
Nozzle size according to diagram W2-225
Supply pressure as per diagram 28 bar

Allocation of nozzle - W2 - 45°/50°

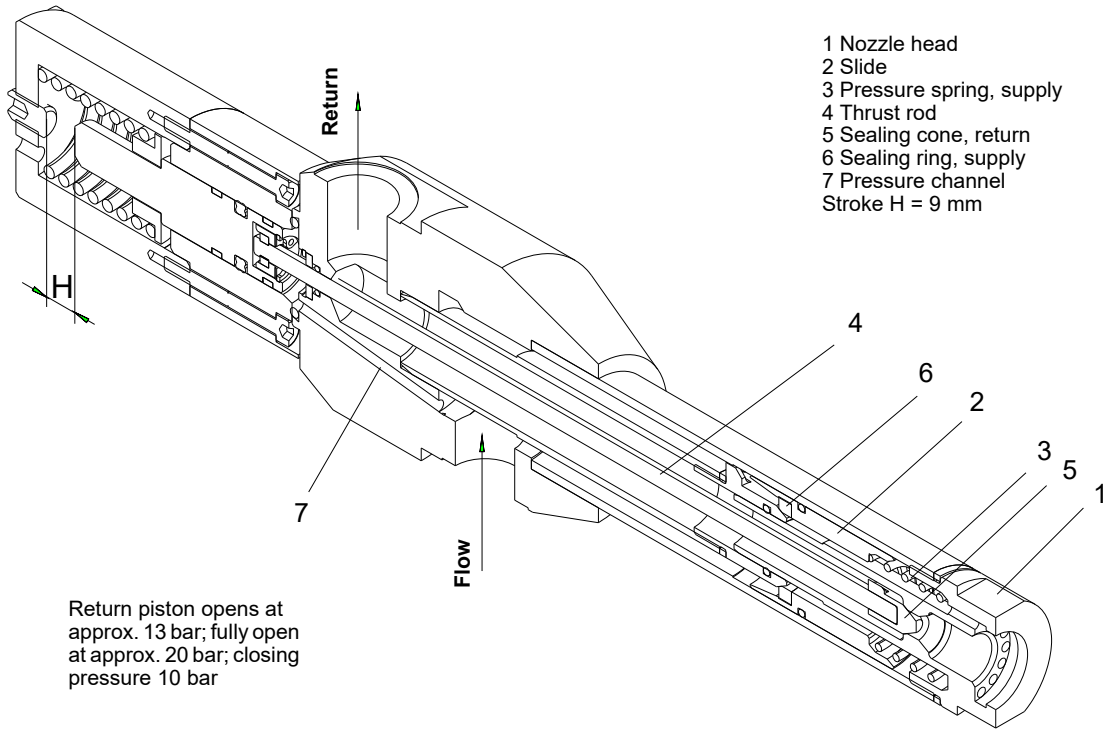
Supply pressure 25 / 28 bar			
Fluidics fuel oil nozzle	**~Maximum power 25 bar**	**~Maximum power 28 bar**	**Regulation spindle size Pressure in the loop pipe 2 bar max.**
Fluidics W2 100	1150	1250	2.0
Fluidics W2 115	1350	1450	2.0
Fluidics W2 130	1550	1650	2.0
Fluidics W2 145	1700	1800	2.0
Fluidics W2 160	1900	2000	2.0
Fluidics W2 180	2150	2250	2.5
Fluidics W2 200	2350	2500	2.5
Fluidics W2 225	2650	2800	3.0
Fluidics W2 250	2950	3100	3.0
Fluidics W2 275	3250	3450	4.0
Fluidics W2 300	3550	3750	4.0
Fluidics W2 330	3900	4100	4.0
Fluidics W2 360	4250	4500	4.0
Fluidics W2 400	4750	5000	5.0
Fluidics W2 450	5350	5650	5.0
Fluidics W2 500	5950	6300	6.0
When selecting the regulation spindle, a minimum setting ratio of 1:3 must be ensured.			

M14 nozzle adapter
Nozzle selection - Sonic model

Only L-EF3:
To use the burner with inverted combustion chambers, Sonic nozzles with a spray angle of 45° can be used. A special adapter is required in order to fit this model into the nozzle rod (see illustration). The correct nozzle is selected as appropriate to the combustion chamber delivered with the burner.



Return nozzle rod RDG



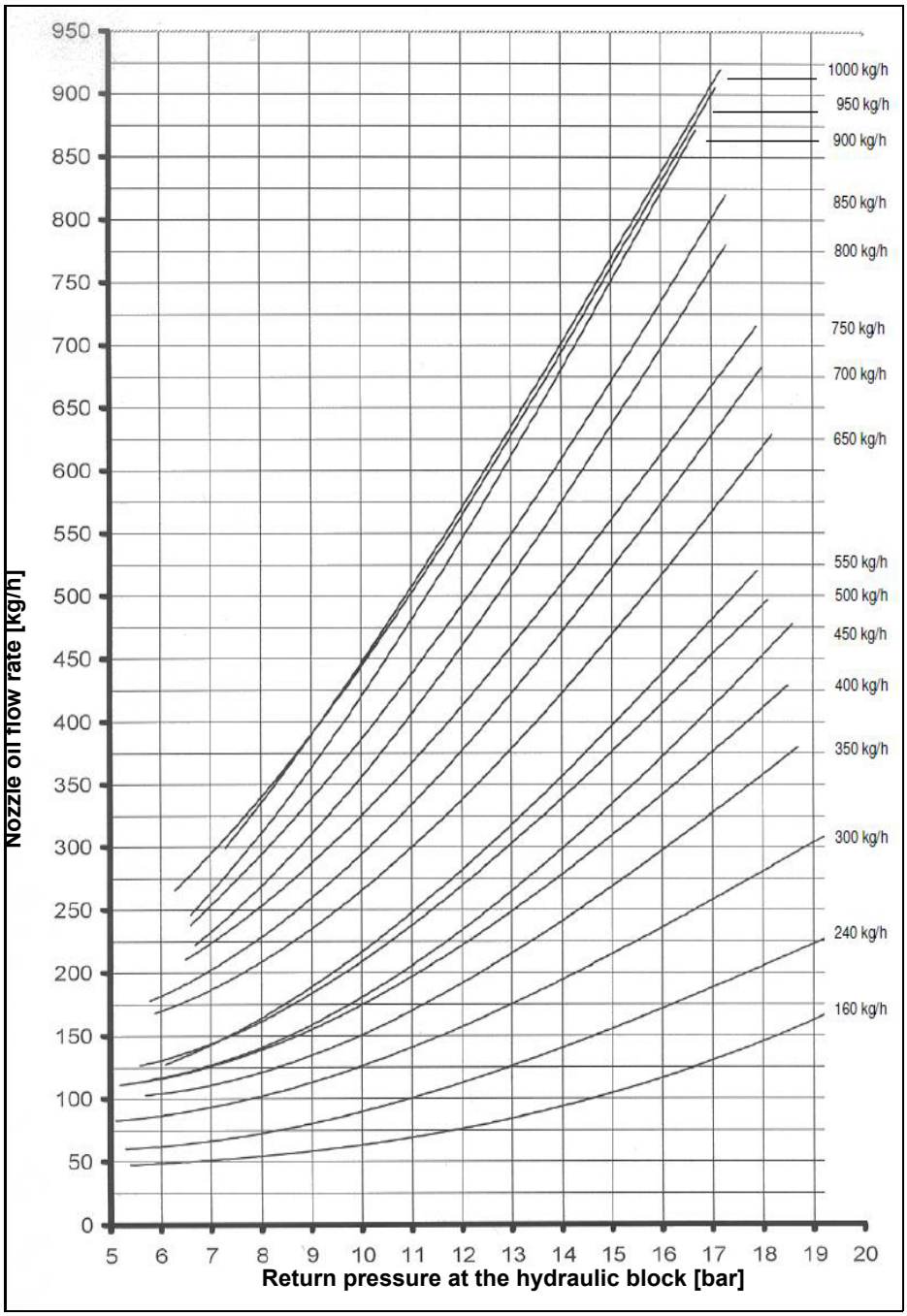
Description of functions
The return nozzle rod RDG1250 is intended for return nozzles without integrated shut-off and connecting thread M14 (e.g. Sonic DZ1000, CBM M14). The shut-off takes place in the supply using a slide with a sealing ring (item 2, 6) and in the return using a sealing cone (item 5), the associated thrust rod (item 4) and the piston-spring system in the rear part of the nozzle rod. The RDG1250 is opened hydraulically, from about 3 bar in the supply and from 13 to 20 bar in the return. After opening the solenoid valves, the oil pressure acts upon the return piston via the pressure channel (item 7) and upon the slide in the supply.

The return piston, including thrust rod and sealing cone, is held open by the absolute pressure of the oil. A pressure loss occurs at the slide due to the oil flowing in the supply, and this keeps it open. In other words, in a normal case both closing elements open almost simultaneously. The oil in the supply is led through the holes in the nozzle head to the nozzle. The connection to the return is blocked by the threaded fitting of the nozzle.
Within the nozzle, some of the oil is led back to the nozzle rod via the return hole of the nozzle. The return quantity is adjusted by a regulating valve depending on the output. If the return piston and therefore the thrust rod are not pushed fully open because the pump pressure is too low (< 20 bar), throughput deviations can be expected, since the sealing cone influences the return in this case.
The stroke of H = 9 mm is set in the factory. Modification on the system is not required.

Please note during re-installation:
- A slide that releases the oil supply of the atomisation nozzle operates in the front area of the nozzle holder RDG 1250. In order to provide reliable operation, no clamped connection (electrode holder, deflector holder) may be installed within 100 mm of the front edge.
- When the screw connections are being tightened at the hydraulic hoses, attention must be paid to having torsion-free locking and using a second spanner for counterholding.

Nozzle selection, type Sonic 60°

Diagram - Sonic-Spray DZ 1000-60°
return nozzle with regulated return.
extra-light fuel-oil
Supply pressure 28 bar.



The Sonic-Spray return nozzle is available from the supplier with various ratings and with spray angles of 45°, 60° and 80°.

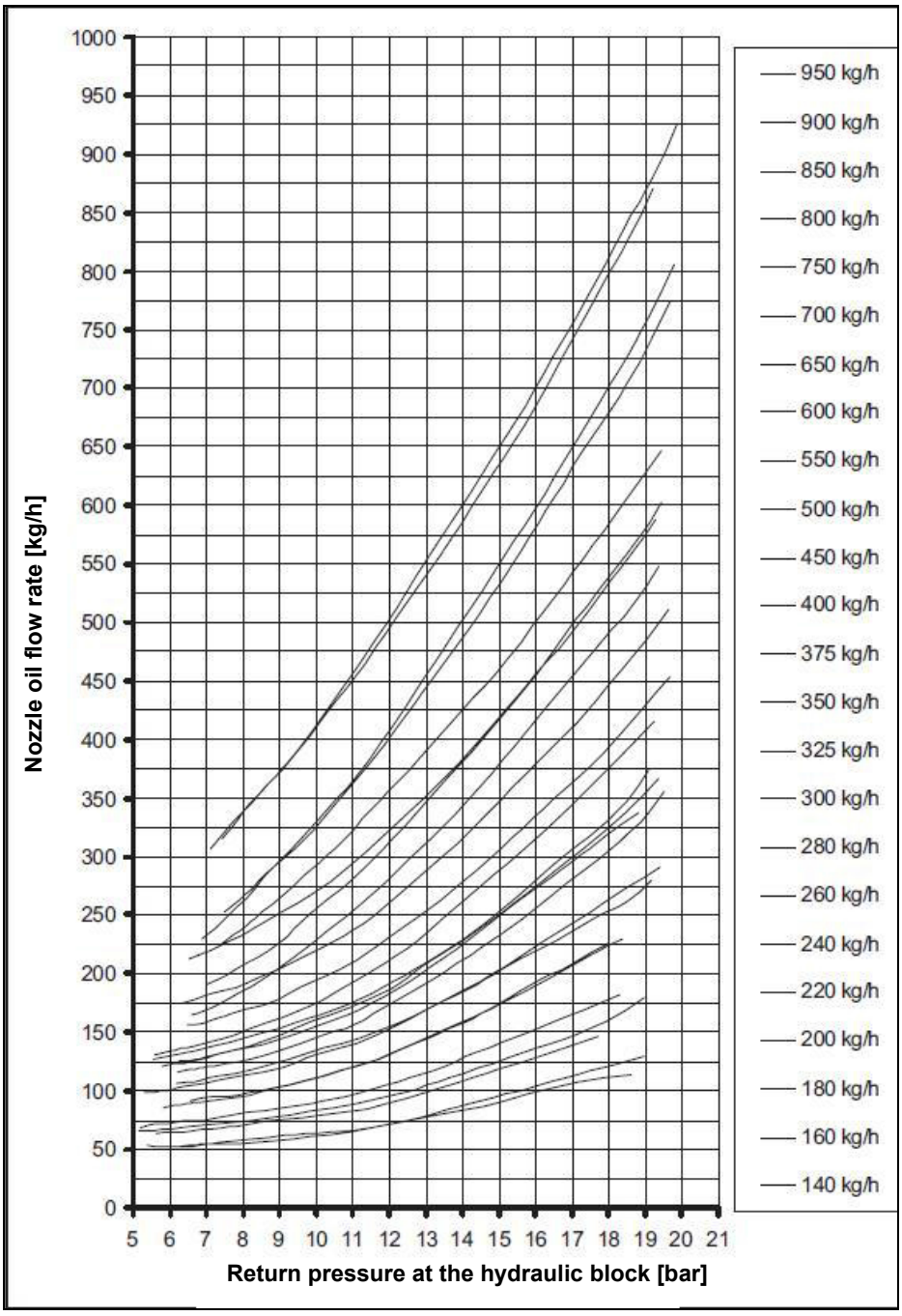
Preference should be given to the use of 45° nozzles with reverse firing, 60° nozzles with three-pass boilers and 80° nozzles in combination with swirl combustion components.

Allocation of nozzle - Sonic 60°

Supply pressure 25 / 28 bar			
Sonic fuel oil nozzle	**~Maximum power 25 bar**	**~Maximum power 28 bar**	**Size of the control shaft with a maximum pressure of 2 bar in the circulation loop**
Sonic 160kg-60°	1700	1800	3.0
Sonic 240kg-60°	2400	2550	4.0
Sonic 260kg-60°	2600	2750	4.0
Sonic 280kg-60°	2900	3050	5.0
Sonic 300kg-60°	3300	3500	5.0
Sonic 325kg-60°	3700	3900	5.0
Sonic 350kg-60°	3900	4150	5.0
Sonic 375kg-60°	4100	4350	5.0
Sonic 400kg-60°	4500	4750	5.0
Sonic 450kg-60°	5100	5400	5.0
Sonic 500kg-60°	5300	5600	5.0
Sonic 550kg-60°	5900	6250	6.0
Sonic 600kg-60°	6700	7100	6.0
Sonic 650kg-60°	6900	7300	7.0
Sonic 700kg-60°	7500	7950	7.0
Sonic 750kg-60°	7800	8250	7.0
Sonic 800kg-60°	8450	8950	8.0
Sonic 850kg-60°	8900	9400	8.0
Sonic 900kg-60°	9550	10100	8.0
Sonic 950kg-60°	9750	10300	8.0
Sonic 1000kg-60°	9900	10450	8.0
The control shaft is selected using a regulating ratio of 1:3.			

Nozzle selection, type Sonic 45°

Diagram - Sonic-Spray DZ 1000-45°
return nozzle with regulated return.
Fuel: domestic fuel-oil,
Supply pressure 28 bar.



The Sonic-Spray return nozzle is available from the supplier with various ratings and with spray angles of 45°, 60° and 80°.

Preference should be given to the use of 45° nozzles with reverse firing, 60° nozzles with three-pass boilers and 80° nozzles in combination with swirl combustion components.

Allocation of nozzle - Sonic 45°

Supply pressure 25 / 28 bar			
Sonic fuel oil nozzle	**~Maximum power 25 bar**	**~Maximum power 28 bar**	**Size of the control shaft with a maximum pressure of 2 bar in the circulation loop**
Sonic 140kg-45°	1300	1350	2.5
Sonic 160kg-45°	1400	1500	3.0
Sonic 180kg-45°	1700	1800	3.0
Sonic 200kg-45°	1950	2050	3.0
Sonic 220kg-45°	2050	2200	4.0
Sonic 240kg-45°	2500	2650	4.0
Sonic 260kg-45°	2600	2750	4.0
Sonic 280kg-45°	2950	3150	4.0
Sonic 300kg-45°	3250	3450	5.0
Sonic 325kg-45°	3600	3850	5.0
Sonic 350kg-45°	3950	4200	5.0
Sonic 375kg-45°	4150	4400	5.0
Sonic 400kg-45°	4250	4500	6.0
Sonic 450kg-45°	4550	4850	6.0
Sonic 500kg-45°	5000	5250	7.0
Sonic 550kg-45°	5800	6150	7.0
Sonic 600kg-45°	6500	6900	7.0
Sonic 650kg-45°	6800	7200	8.0
Sonic 700kg-45°	7250	7650	8.0
Sonic 750kg-45°	8000	8450	8.0
Sonic 800kg-45°	8650	9150	8.0
Sonic 850kg-45°	9100	9650	8.0
Sonic 900kg-45°	9600	10150	8.0
Sonic 950kg-45°	10050	10650	8.0
The control shaft is selected using a regulating ratio of 1:3.			

Electronic burner controller

Description
The electronic burner controller is a programmable automatic firing device with an integrated electronic compound controller. There may be additional functions, depending on the equipment and model.
The following burner-specific controllers are used.

Burner controller	**BT 320**	**BT 330**
Manufacturer	Lamtec	
Technical data	Operating voltage: 230 VAC Frequency: 50/60 Hz Power consumption: max. 30 VA Ambient temperature: during operation: -20...+60°C Storage: -25 to +60°C	
	2 motorised actuator outputs (1x constant 0...10V, 0/4...20mA)	3 motorised actuator outputs (1x constant 0...10V, 0/4...20mA)
Operating mode	Intermittent	Continuous operation
Components and integrated functions	Servomotor STE4,5 Customer interface integrated valve leak check Programming unit	
optional equipment	Speed control extension module LCM extension module O2/CO regulation Field bus connection (with LMC100): - Profibus - Modbus - Ethernet (Modbus TCP)	

Additionally, some burners are delivered without a controller and all components are connected to a terminal block. The burner controller in this case does not form part of the burner's scope of delivery.

Burners equipped with the BT3xx control unit are controlled and regulated using a manual terminal (display) or PC software. The user instructions for the display and the PC are included in the additional operating instructions for the BT3xx:

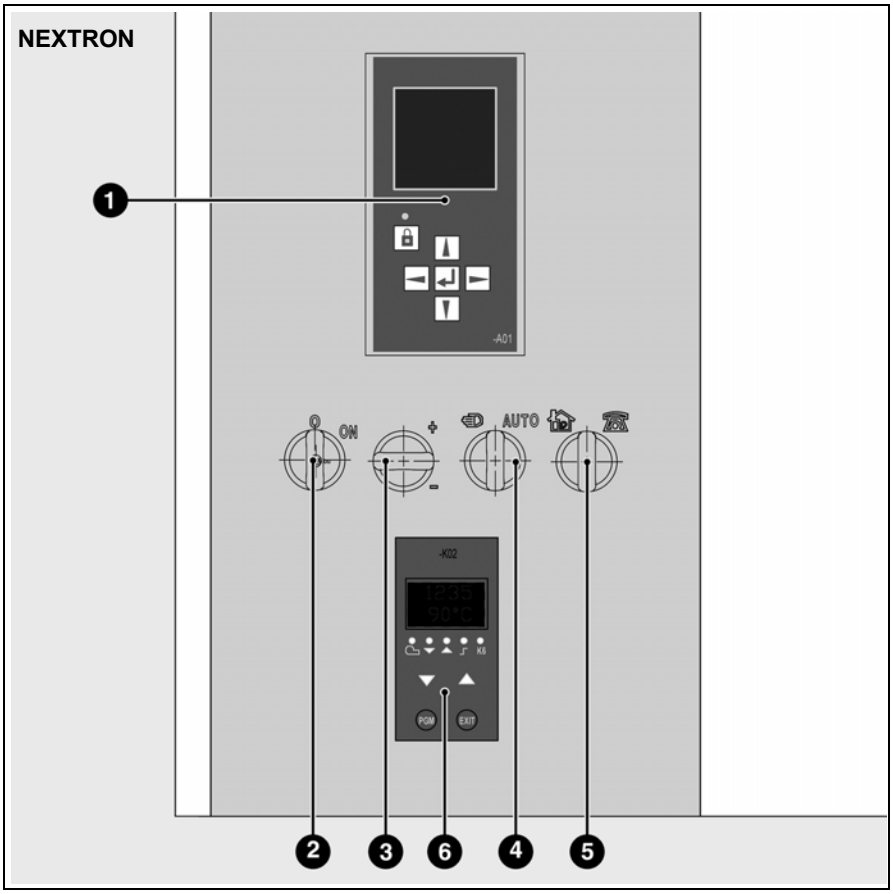
- 4200104856xx Description of the unit, display, settings
- 4200101753xx Remote Software
- 4200107815xx CO/O2 regulation
- 4200101785xx List of fault codes
- 4200101815xx List of parameters

Commissioning
Commissioning must be carried out by trained and expert personnel only. For the wiring of the system, the relevant electrical diagram for the burner and all local standards and legal regulations must be observed.

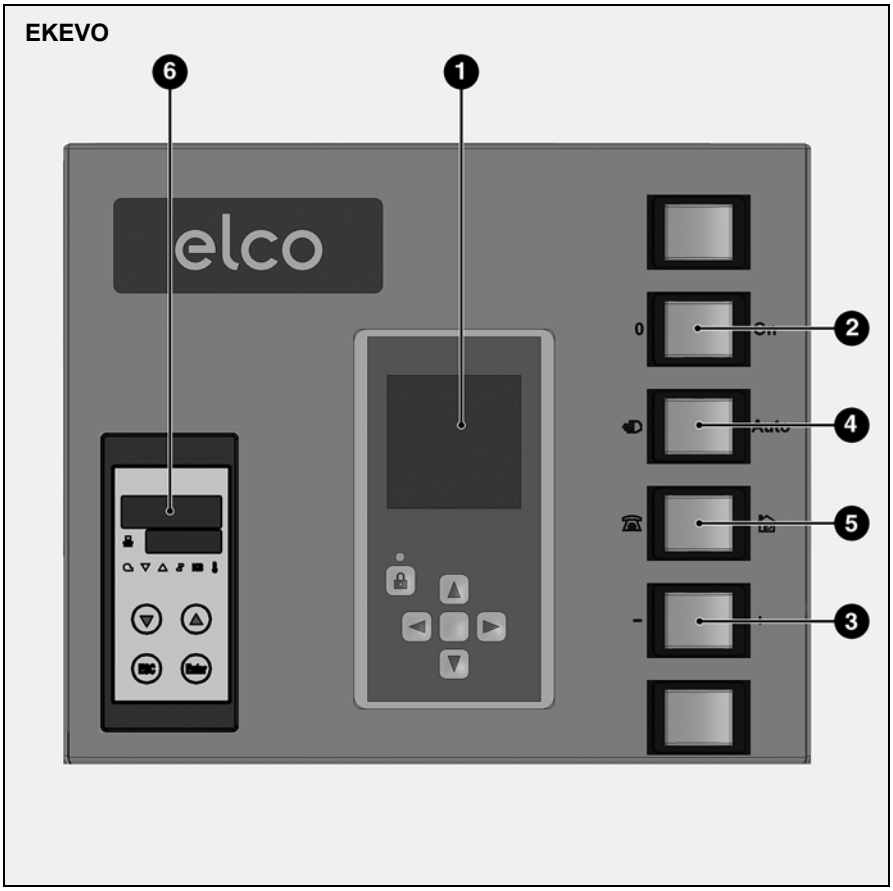
The procedure described in the relevant operating instructions for the burner controller must be observed. The burner controller has a burner-specific factory setting. At the time of initial commissioning, it must be checked whether the parameters have been appropriately configured to meet the requirements of the system. The servomotors must similarly be checked for correct adjustment.
During the I/O test, the manual fuel shut-off valves must be kept closed at all times. It is not permitted to extend fixed safety times using external circuitry.

Save the data after starting the burner and after changing any data in the Burnertronic control unit (e.g. changed curves or parameters.) To this end backup all the data. The relevant procedure is described in the operating instructions "BurnerTronic BT300 - Remote Software, Maintenance" (Art. No. 4200 1017 53xx) under chapters "Files" and "Data Saving". This will allow the burner to restart easily and quickly after replacing the Burnertronic control unit.

Switch cabinet door layout



1 Manual terminal for controlling the burner control unit
2 Switch / light indicator control voltage
3 Power control +/-
4 Manual / Automatic switch
5 Local - 0 REMOTE switch
6 Power controller (option)



Note: The above information is for standard equipment. Burners with a separate control system (Etamatic) and the "solid door" option do not have premounted frames in the control cabinet.

Servomotor STE
Servomotor STM 40

The BT300 electronic control system works with the STE4.5 numerically controlled servomotor. For monitoring the function and direction of rotation, there is a driver with digital feedback via encoder disc.
Observe the commissioning procedure for BT300.
The connection is documented in the burner wiring diagram.

Note:
Before commissioning, the zero position of the servomotors MUST be checked. The servomotor is sealed. Opening the servomotor invalidates the warranty!

Model	STE 4.5
Power supply:	24 VDC ± 20%
Power consumption:	7.5 W
Angle of rotation:	90°
Run time:	5s/90° @ 180 Hz
Nominal torque:	3 Nm
static holding moment:	2.6 Nm
Dimensions (WxHxD):	90 x 136 x 116

The STM 40 servomotor is used in conjunction with various electronic compound control systems. Priority with products supplied by “Lamtec” (Etamatic, Etamatic OEM, VMS, FMS). With some types of burner, the motor is also used as a servomotor for other servo components independently of the compound control system (e.g. nozzle rod safety adjustment). Please refer to the appropriate section of the operating instructions.

The electrical diagram for the burner shows how to establish the servomotor's electrical connection.

Observe the documentation issued by the manufacturer.

Technical data

Voltage:	230 V AC
Frequency:	50 Hz
Angle of rotation:	90°
Running time:	40 sec. for 90°
Nominal torque:	15 Nm
Static holding moment:	8 Nm
Dimensions (W x H x D):	93 mm x 144 mm x 149 mm
Potentiometer (fitted):	5 kΩ

Lamtec 6 / 16 Nm servomotor

Technical data

6 Nm:

Voltage:	230 V AC
Frequency:	50 Hz
Angle of rotation:	90°
Running time:	60 sec. for 90°
Nominal torque:	6 Nm
Static holding moment:	4,5 Nm
Dimensions (W x H x D):	101 mm x 117 mm x 170,5 mm
Potentiometer (fitted):	5 kΩ

Technical data

16 Nm:

Voltage:	230 V AC
Frequency:	50 Hz
Angle of rotation:	90°
Running time:	40 sec. for 90°
Nominal torque:	16 Nm
Static holding moment:	12 Nm
Dimensions (W x H x D):	102 mm x 120 mm x 153 mm
Potentiometer (fitted):	5 kΩ

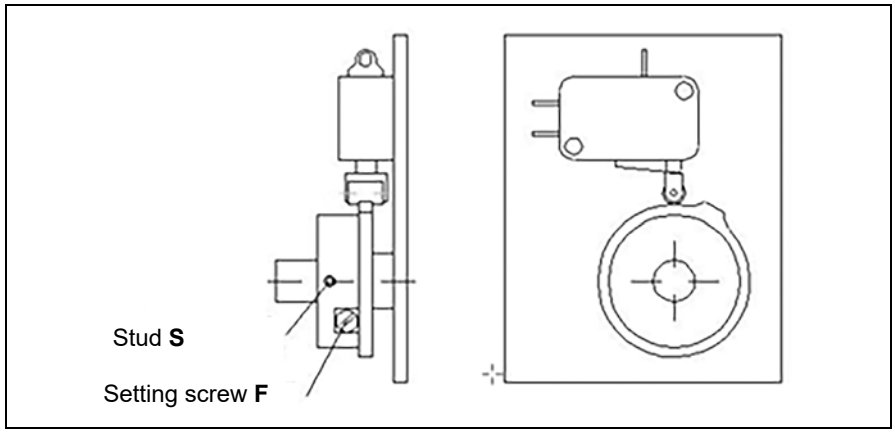
Like the STM 40, the Lamtec 662R2127 servomotor is also used with "Lamtec" branded products (Etamatic, Etamatic OEM, VMS, FMS).
For instructions on how to connect the servomotor, please see the electrical diagram for the burner.

Safety instructions for setting the STM40 and the Lamtec servomotor

- Once the safety settings have been adjusted, check whether the electrical signals on the servomotor–particularly the position reading–corresponding to the mechanical position of the servomotor! This is particularly important for limit switches!
- Before commissioning, make sure limit switches are properly set to prevent the actuator from reaching the mechanical stop.
  This could consume too much current and hence damage the actuator, the motor or the mechanics.

WARNING
When working on open servomotors that are ready to run, there is a risk of touching live parts (24/115/230/400V AC~) ! Risk of electrocution!

Setting limit switches on Lamtec servomotor
Limit switches with 15° step locking cams have a factor setting of 90° or 135°.
For precision regulation, adjust screw "F" using a screwdriver until a light click is heard in the switch.
Check regulation by moving electrically to the switching point, readjust if necessary and insert stud "S" on the camshaft using a 1.5 mm spider wrench. As with the limit switch, for precision regulation, adjust screw "F" using a screwdriver until a light click is heard in the switch. Check the switching position by rotating electrically; tighten stud "S" and secure against loosening.



Flame sensor

The flame sensor is a component of the flame monitoring system.

In interaction with the automatic combustion control unit, it suppresses stray flame during burner start-up and monitors the presence of flame during burner operation.

Depending on the requirements of the burner and fuels, the flame sensor may be an optical sensor that monitors light radiation in the ultraviolet, infrared or visible spectrum emitted by the flame.

In some gas burners, flame monitoring is achieved by means of ionisation. In this case, no optical flame sensor is present.

The flame sensors used are listed in the table below.

Table: flame sensor

Description	Spectral range	Area of use	Connection	Operating mode	Manufacturer	Comments
FFS 08 (IR)	IR	Fuel-oil, gas and dual fuel burners	Etamatic	Continuous operation	Lamtec	Sensitivity setting
FFS 08 UV-1	UV	Fuel-oil, gas and dual fuel burners	Etamatic	Continuous operation	Lamtec	Sensitivity setting
QRA-2 KPL	UV	Gas and dual fuel burners	BT300	intermittent	Siemens	
IRD 1020	IR	Fuel-oil, gas and dual fuel burners	BT300	BT320: intermittent	Satronic (Honeywell)	Operating status, sensitivity setting
KLC J8-508-3	-	Fuel-oil, gas and dual fuel burners	BT300	BT320: intermittent	BST	Operating status, sensitivity setting

The appropriate type of flame sensor is selected based on the spectral range of the flame radiation, the mode of operation required and the burner controller used.

For the electrical connection, please refer to the electrical diagram and the supplementary information for the individual flame sensors contained in the manufacturer's documentation.

Note:
The flame sensors must be regularly inspected for dirt and cleaned as necessary. The sensor windows of the optical flame sensors must be kept free of dust. The ionisation rods must be checked for burn-up and replaced if necessary.

QRA2

Using a UV probe for flame monitoring
With this monitoring method, the UV radiation from hot flame gases is used to create the flame signal.
A radiation detector is a UV-sensitive tube with two electrodes to which voltage is constantly applied. When illuminated with light from the 190...270 nm range of the spectrum, it fires and applies current to the flame signal amplifier. The UV tube does not react to the after-glow of fireclay in the furnace, sunlight, daylight or the lighting used to illuminate the boiler room.

The tubes have a service life of approx. 10,000 hours at ambient temperatures of up to 50°C; higher ambient temperatures reduce the service life considerably.

Cleaning the probe
The UV sensor window must be checked at regular intervals for dirt, and then cleaned. The sensor window must be kept free of dust. If this measure proves unsuccessful, the tubes must be replaced.

Flame sensor

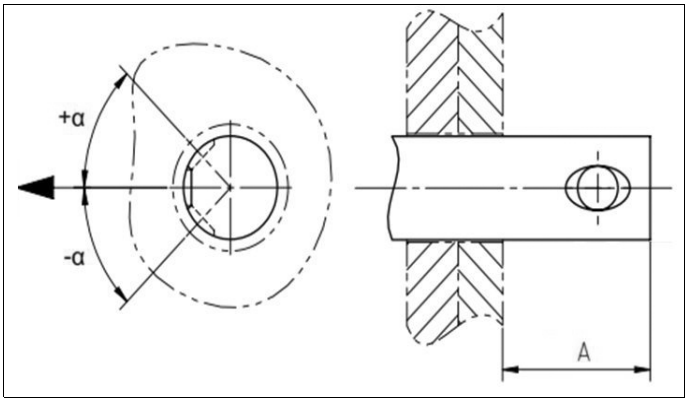
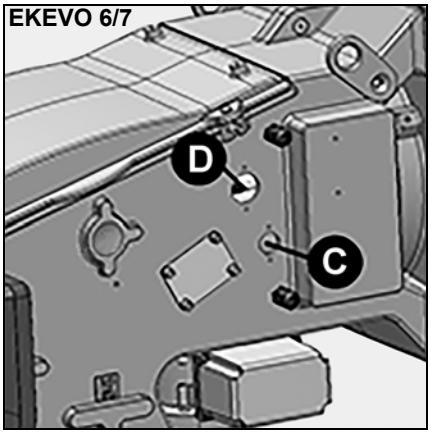


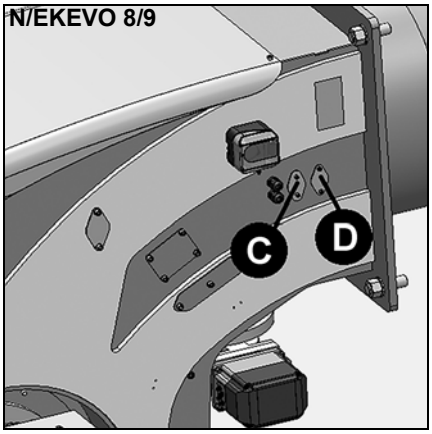
Table: cell setting

Burner	FFS08 (IR)		QRA 2		KLC	
	A [mm]	Angle α [°]	A [mm]	Angle α [°]	A [mm]	Angle α [°]
N/EKEVO 6	60	0	25	0	Standard	0
N/EKEVO 7 L-E	35	0	31	0	Standard	0
N/EKEVO 7 L-EF3	35	0	31	0	Standard	0
N/EKEVO 8-9	76	0	48	0	Standard	0

EKEVO 6/7



N/EKEVO 8/9



Burner	Installation location		
	KLC	QRA 2	FFS 08
N/EKEVO 6/7	C	C	D
N/EKEVO 8	C	C	D
N/EKEVO 9	C	C	D

Electrical connection
Checks before commissioning

All electrical installation and connection work must only be carried out by a suitably qualified electrician.

N.B.: The applicable guidelines and directives must be observed, as well as the electrical circuit diagram supplied with the burner.

Before connecting the burner, it is essential to ensure that the entire burner has reached the ambient temperature. Otherwise, there is a risk that condensation will form on electronic components resulting in damage to property and personal injury!

Electrical connection
The electrical connections, i.e. the installation materials and all the connectors and earth/ground connections, must be installed in compliance with the specifications.
The electrical installation of the burner must be carried out in accordance with the circuit diagram drawn up for the furnace.
The electrical connection of the burner may only be performed by authorised specialists.

WARNING:
Electrical shock hazard! There is a risk of coming into contact with live parts! This could lead to fatal electrical shock!

Before working on electrical components, switch off the electricity supply via an omnipolar cut-off switch. Check that the power supply is completely off and take all safety precautions to prevent involuntary reconnection

Please note:
When installing the connection cable, the cable loops selected must be large enough to allow the boiler door to swivel open. It is also essential to check the tightness of the electrical connections on the terminal blocks of all electrical motors. If necessary, tighten them within the maximum torque (see the chapter “General information regarding burner installation”). When electrical connection work is complete, the wiring for the burner electrics must be checked. This includes checking the direction of rotation of the fan or the fuel-oil pump motor.

Checks before commissioning
The following must be checked before initial commissioning:
- That the burner is assembled in accordance with the instructions given here.
- That the burner is pre-set in accordance with the values in the adjustment table.
- Setting the combustion components.
- The heat generator must be ready for operation, and the operating regulations for the heat generator must be observed.
- All electrical connections must be correct.
- The heat generator and heating system must be filled with water and the circulating pumps must be in operation.
- The temperature regulator, pressure regulator, low water detectors and any other safety or limiting devices that might be fitted must be connected and operational.
- The exhaust gas duct must be unobstructed and the secondary air system, if available, must be operational.
- An adequate supply of fresh air must be guaranteed.
- A heat dissipation system must be available.
- The fuel supply lines must be assembled correctly, checked for leaks and bled.
- A standard-compliant measuring point must be available for measuring the exhaust gas, the exhaust gas duct up to the measuring point must be free of leaks to prevent anomalies in the measurement results.

Fuel-air compound control

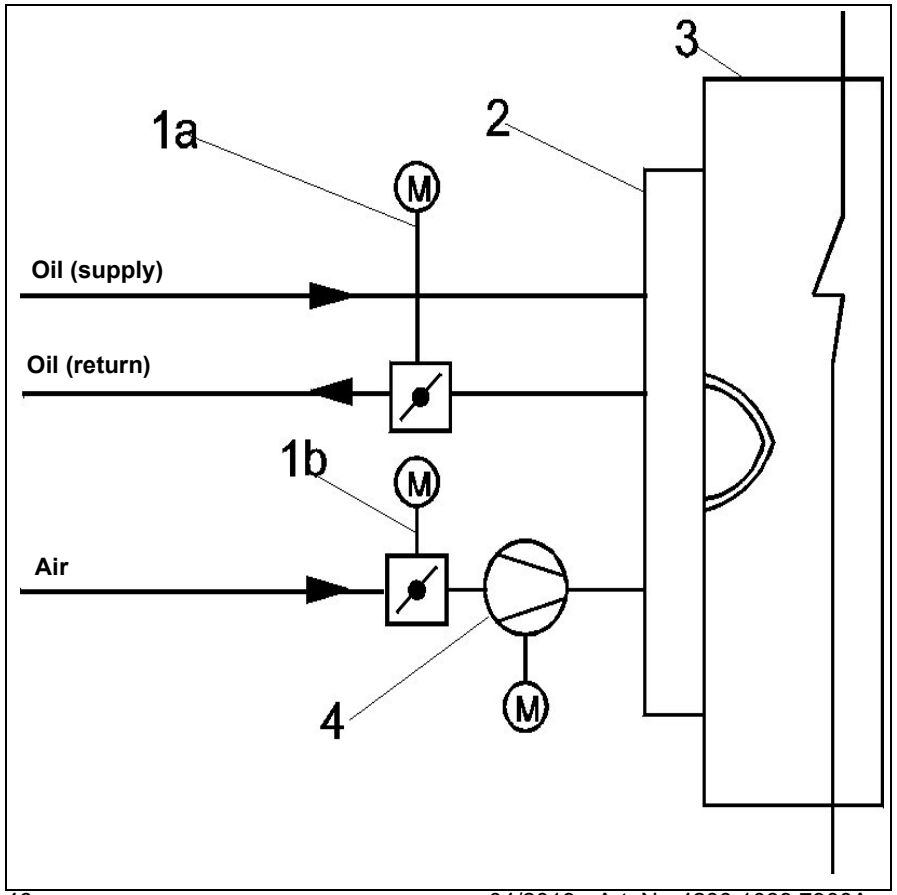
Fuel-air compound control
This compound pneumatic control system with precision-adjustment capability has been designed to allow the fuel and air flow rates to be steadily varied in sliding mode for an adjustment of the fuel-air ratio over the whole control range. The infinitely variable control increases or decreases output to any point within the control range suitable for the current heat requirement.

Electronic compound control
The air flap, the gas flap and the oil regulating valve in the return are each fitted with a servomotor that controls the position of these servo components. At the factory, the air curve of the compound controller is configured in such a way that the air flap is closed at the minimum setting and open at the maximum setting.
As part of burner commissioning, the servo components for the fuel and air are assigned permanently defined positions in relation to burner output. During burner operation, the servo components move into these positions with great accuracy. This precision is a fundamental prerequisite for permanently ensuring low-emission combustion. The gas pressure should be corrected at the gas pressure regulator if necessary.

Proceed in accordance with the commissioning instructions for the electronic compound control system when making gradual adjustments to the load points (fuel flow rate, air flow rate).
Where possible, a combustion measurement should be carried out at each point.

Equipment option: speed control
The burners can be equipped with a speed controller as an option. During long burner operating periods in the partial load range in particular, the reduction in blower speed helps to conserve electrical energy and reduce noise emissions from the burner blower itself. The speed of the blower is measured by a Namur sensor and controlled to the programmed reference value for the current output level.

Equipment option: O_2 control
To improve the efficiency of the system, the combustion manager can be equipped with residual oxygen or CO control (CO control available only with the use of a Lamtec burner controller). The residual oxygen is measured in the flue gas of the heating system by an O_2 measuring probe with zirconium oxide sensor and sent to the combustion manager as a correction factor. Thanks to O_2 control, it is possible to eliminate variations in ambient conditions (e.g. combustion air temperature and humidity, calorific value fluctuations, etc.) and significantly reduce the air surplus required for calibration. Reference value deviations are controlled by corrections to the blower speed or the position.



1a Oil control valve with servomotor
1b Air control dampers with servomotor
2 Burner
3 Boiler
4 Combustion air fan

Burner power adjusting sequence

The burner is operated and adjusted using a handheld device or a PC (serial interface).

For information on startup and commissioning, see also the separate instructions for the BT300:
- 4200104856xx Description of the unit, display, settings
- 4200101753xx Remote software
- 4200107815xx CO/O2 regulation
- 4200101785xx List of fault codes
- 4200101815xx List of parameters

Before starting up the burner:

- set the control unit in accordance with the operating instructions for the BT 3xx (Item No.:4200 1048 56xx).
- pre-set the safety pressure switches (see each section: air, gas and fuel oil pressure switches).

Follow the instructions in the "Checks" section!

Adjusting sequence (Short description)
- Switch on burner (switch on control voltage and control chain),
- The burner program starts
- Adjust preventilation position of air flap (and also frequency converter if necessary) in accordance with required ventilation for boiler system (see chapter entitled Preventilation)
- Set starting heat output of burner to max. 33% of nominal load (adjust primary gas pressure at regulator if necessary, see section entitled Gas pressure regulation)
- Burner adjustment over the entire load range (the primary gas pressure must be adjusted at the regulator if necessary, see section entitled Gas pressure regulation)
- Check power setting and control behaviour in the event of a load change
- Adjust safety pressure monitor (see respective chapter Gas, air and oil pressure monitor)
- Check effectiveness of safety equipment (flame sensor, air, gas and oil pressure monitor, leaktightness checking)
- Save burner control parameters on external data medium (recommendation)

Please note:
If changes are made to the primary gas pressure, test all burner power settings. (O2, power, control range, burning behaviour, etc.).

Inspection

Before commissioning the system for the first time, the following inspections must be carried out:

- Observe the operating instructions of the boiler manufacturer. The boiler must be fitted and ready to operate
- The heating system must be filled with sufficient water
- The entire system must be checked to ensure that the electrical wiring of all the system components is correct
- Check the direction of rotation of the burner motor
- Ensure that the temperature or pressure regulator, the limiter, the safety switches and electrical limit switches are set correctly.
- Check the gas connection pressure
- Check for leaks in the gas supply elements
- Check bleeding of the fuel supply lines (no trapped air)
- Are exhaust gas ducts open and is there an adequate supply of fresh air?
- Is the burner in the start position: air flap in the "CLOSED" position?
- The automatic firing device for the electronic compound is unlocked and in the starting position

Important:
No object which is capable of being sucked up (for example, cloths, instructions) must be left within 0.5m of the burner air extraction intake. If these objects are sucked into the burner, it may lead to malfunctions and dangerous operating states. This may result in a switch to malfunction mode or damage to the environment and to the installation, and may even cause injury.

Fuel-oil commissioning

Open all the gate valves on the fuel-oil supply system.
- Set the fuel selection via remote control to "Fuel-oil"
- Fill the pump with fuel-oil
- Attach manometer for supply and return pressure monitoring.
- Set the pressure gauge for pressure regulation on the intake side of the pump or check the ring line pressure.

Bleeding
Switch on the burner briefly and check whether the direction of rotation is correct. Bleed the fuel-oil tube and the fuel-oil pump.

Please note:
At the factory, the hydraulic system is filled with test oil. When commissioning the unit for the first time, this may cause ignition problems. To protect the pump If the oil pressure regulator is depressurised in the as-delivered condition, this means that no pressure has been set. When commissioning the burner, the oil pressure must be increased slowly until it reaches the operating value.

Before the first fuel release, a function test of the burner program sequence must be carried out.
- Open the fuel-oil gate valve
- Disable oil solenoid valve in supply (e.g. disconnect plug,
- remove coil, unplug)
- Start the burner and monitor the program sequence to ensure that the correct start-up sequence is followed:

1. Fan on
2. Preventilation of air flaps
3. Air pressure regulation
4. Part load of air flap
5. Pump starts
6. Ignition
7. Valves open (disconnected valve remains shut)
8. Lockout after safety time expires (see control and safety unit)

- Valve closes again
- Unlock control and safety unit of electronic combination

Preventilation

Preventilation:
Care must be taken to ensure that the boiler system is adequately preventilated. The system-specific instructions must be observed. The burner is designed so that it is preventilated when the full load setting is selected. The preventilation times depend on the automatic firing devices and can be referred to in the relevant chapter.

Assuming the conditions in the area or the boiler unit
are the same for preventilation and standard burner operation (loss of boiler pressure, temperatures), the air rate delivered by the burner for preventilation may be calculated as follows:

Please note:
in the case of electronic compound controls (BT300/ Etamatic), the nominal load and nominal preventilation position may be different, depending on the setting. If this is the case, the heat output that is reached in the preventilation position during actual burner operation must be applied for the calculation.

$$V_{\mathbf{air}} = \frac{Q_N \times V_{L\min} \times \lambda}{Hi} \times \frac{(t_{\mathbf{air}} + 273) \times 1013 mbar}{273 \times p_{amb}}$$

$$V_{\mathbf{air}} = \frac{3000 kW \times 9{,}56 Nm^3/Nm^3 \times 1{,}17}{10{,}35 kWh/Nm^3} \times \frac{(20°C + 273 K) \times 1013 mbar}{273 K \times 980 mbar} = 3597\ Bm^3/h$$

Example			
Nominal heat output setting	QN	3000	kW
Combustion air requirement	VL min	9,56	Nm^3/Nm^3; Nm^3/kg
Calorific fuel value	Hi	10,35	kWh/Nm^3; Nm^3/kg
Intake air temperature	tLuft	20	°C
Barometer level	pamb	980	mbar
Excess air	?	1,17	
Preventilation rate	VLuft	?	Bm^3/h

Guide values		
	Calorific value Hi	Combustion air requirement VLmin
Natural gas E	10.35 kWh/Nm^3	9.56 Nm^3/Nm^3
Natural gas L	8.83 kWh/Nm^3	8.45 Nm^3/Nm^3
Fuel-oil EL	11.86 kWh/Nm^3	11.1 Nm^3/kg

Fuel-oil start-up mode
Fuel-oil operating mode
General safety functions

Fuel-oil start-up mode
If heat is required by the furnace, the electronic combustion manager receives an operation request.
When the automatic firing device program has come to its end, the burner will be turned on.

The air flap is **closed when the burner is out of operation**.
The automatic firing device controls and monitors start-up. The burner fan starts up and the electrical servomotor opens the air flap to the full load position so the furnace and the exhaust hoods are ventilated at the specified air rate.
Shortly after the preventilation process has been started the safety device used to detect an absence of air is switched to the operating position within a certain time, i.e. the minimum air pressure setting must be reached and maintained until the burner is turned off. After the expiry of the preset preventilation time, the air flap is set to partial-load position. Pre-ignition takes place and the fuel-oil is then released.

The solenoid valves open and release the oil, which is under pressure, to the nozzle and return. The fuel-oil is nebulised, mixed with the combustion air and ignited. A normal, steady flame must be formed within the safety time. When the safety time elapses, a flame signal must be sent to the automatic firing device via the flame monitor and must remain in place until the control system is switched off. The start-up programme for the burner is completed.

Fuel-oil operating mode
After the flame has developed, the output control will be enabled. This brings the burner to its operating position. The output controller will now automatically control the burner between its partial-load and full-load positions.
Depending on the heat demand, the electric servomotor will be fed with the open or close command via the regulator and thus increase or decrease the gas and air flow rates.
This compound control system will vary the positions of the oil control valve and air valve, and thus regulate the oil flow rate in combination with the air flow rate. The stepless control makes it possible to operate the burner at any desired stage between its partial-load and full-load positions. The burner is shut down from the partial load position. The air flap will be closed when the burner is in its off position so as to prevent cold air from flowing through the burner, heat generator and chimney. The interior cooling losses will be greatly minimised.

Warning: If gate valves have been installed in the exhaust gas tract, they must be fully opened during the start-up phase, otherwise there is a risk of a low-speed detonation or an explosion! The open-position of the shut-off damper can be assured by the integration of the opening contact of the shut-off damper in the safety chain of the heat generator.

Important:
No object which is capable of being sucked up (for example, cloths, instructions) must be left within 0.5m of the burner air extraction intake. If these objects are sucked into the burner, it may lead to malfunctions and dangerous operating states. This may result in a switch to malfunction mode or damage to the environment and to the installation, and may even cause injury.

General safety functions
In case a flame does not develop when starting the burner (fuel release), the burner controller will shut off at the end of the safety period (fault lock-out). A lockout will also occur in the case of flame failure during operation, air flow failure during the pre-ventilation phase and pressure failure during the whole period of burner operation. Any failure of the flame signal at the end of the safety period and a flame signal during the preventilation phase (external light control) will result in a lockout with the automatic firing device being locked. The fault is indicated by the fault signal lamp lighting up. The automatic firing device can be unlocked immediately after a lockout by pressing the unlocking key.
The automatic firing device will return to its starting position and proceed with the restart of the burner. If there is a power failure, the control system is shut down. After voltage recovery, the burner can be automatically restarted unless another interlock is active, e.g. one caused by the safety circuit. In any case, the fuel-oil supply will be immediately stopped upon occurrence of a fault.

When using the burner control system (electronic compound control) all operational and fault messages may be indicated in plain text on an optionally available operating and display module.

Maintenance

Burner and boiler servicing must only be carried out by a professionally qualified heating engineer. The system operator is advised to take out a service contract to guarantee regular servicing. Depending on the type of installation, shorter maintenance intervals may be necessary.

Please note:
If maintenance is not carried out properly in accordance with these instructions, system malfunctions and dangerous operating conditions could ensue. This may result in a breakdown, damage to property and the environment and personal injury. A log must be kept of all maintenance and servicing work. All wear parts must be replaced in accordance with the specified cycle times (see table below).

For maintenance work, the floor of the work area must be free of dirt and slip-resistant. Provision must be made for adequate lighting.

When maintaining heavy components (e.g. the fan motor), suitable lifting equipment must be used.
Before carrying out any maintenance or cleaning work on the burner, the following steps must be followed.
1. Turn off the power supply and protect the system from accidental start-up
2. Interrupt the supply of fuel
3. Check the system for residual power and ensure that steps 1 and 2 have been effective
4. Before opening the burner casing, ensure that the fan motor has stopped completely.

Failure to observe these instructions may result in severe or fatal injuries and/or damage to property.
• Use original spare parts.
If original spare parts are not used, the system may no longer be CE-compliant.

Please note:
Each time maintenance work is carried out, it is essential to ensure that no tools, cleaning cloths or other items are left in the burner housing. Any items left behind could affect the functionality of the burner and could result in damage to property or personal injury!

Work recommended as part of annual burner maintenance:
- Burner test run, input measurement in the boiler room
- Clean the combustion components and replace defective parts if necessary
- Clean the fan wheel and the fan
- Remove, check and replace the nozzle.
- Check the setting of the combustion components and check the seal between the gas head and burner tube for leaks
- Check the ignition electrodes and ignition sparking. Clean and readjust if necessary
- Clean the flame sensor
- Clean the air flap and check that it moves easily
- Check whether the fan wheel is deformed or cracked
- Visual inspection of the burner's electrical components; eliminate malfunctions if necessary
- Check burner start-up (combustion performance, emissions, burner output)
- Leakage test
- Function tests on the burner's safety equipment, the safety chain for the boiler system (air pressure and fuel-oil pressure switches, the flame monitor, the leak detection device, the safety valves, the safety chain components). The maintenance and safety specifications for the boiler system must be complied with.
- Flame monitor and automatic firing device function check
- Visually check the tightness of all fittings, especially the connections of all control mechanisms (gas valve, air vent, fuel-oil regulation) and the ventilation turbine, and tighten them if necessary.
- Check the fuel-oil hydraulics for leaks.
- Check whether the oil hoses are damaged or twisted
- Clean the burner inside and out
- Correct the adjustment values if necessary
- Draw up a measurement report*

* The following values must be recorded at a minimum:
- Type of fuel
- Wobbe index (heat value); calorific value
- Fuel-oil mass flow
- Lowest and highest useful combustion efficiency; also 1 to 2 intermediate values
- Fuel-oil and air pressures (burner head, setting pressure, fan pressure, furnace pressure, fuel-oil pressures)
- Exhaust gas emissions (NOx, O2, CO, CO2, soot) as a percentage/ ppm
- Temperature and humidity of the combustion air
- Flue gases temperature
- Atmospheric air pressure

General checks
- Emergency stop button function check

Cleaning and lubricating instructions
- Depending on the cleanliness status of the combustion air, the fan impeller, ignition electrodes, flame sensors and air flaps must be cleaned as required.
- For burner with mechanical compound controller:
- lubricate ball heads on the adjusting screws for the compound controller.
- The bearing points of the burner moving parts require no maintenance.
- Damage to ball bearings should be detected and eliminated at an early stage to avoid greater consequential damage. Listen to the motor bearing noise to identify possible irregularities.

Warning!
- Before restarting the burner following maintenance work, make sure that any unions unscrewed during maintenance work are tight and firmly in place. Check the connections of the components located in the burner (e.g. the parts of the combustion head) before closing the cover. Check the cover too. Incorrectly connected or defective components may cause malfunctioning and hazardous operation. This may result in a switch to malfunction mode or damage to the environment and to the installation, and may even cause injury (risks of serious or fatal injury).

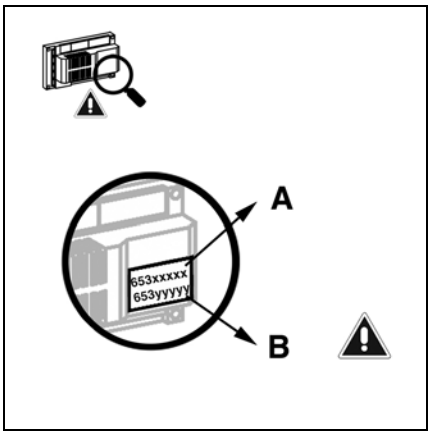
Maintenance
Replacing the control unit

Warning!
Replace any damaged or defective components! Replace safety components before their end of life! Never operate the burner with damaged or defective parts. Using defective or damaged components may cause malfunctioning and hazardous operation. This may result in a switch to malfunction mode or damage to the environment and to the installation, and may even cause injury (risks of serious or fatal injury).

Safety-related components	Recom. useful service life	Min. operating cycles
Air pressure switch	**10 years**	**-**
Automatic firing device with flame monitor for the burner	**10 years**	**250 000**
Flame monitor (UV cells)	**10,000 hours of operation**	
Flame monitor (not UV cells)	**10 years**	**250 000**
Fuel-air ratio control	**10 years**	**-**
Servomotor STE…(Schneider Electric)	**10 years**	**2,000,000**
Servomotor SQM 1../2.. (Siemens)	**Depends on usage**	**150 000**
Servomotor SQM 5... (Siemens)	**Depends on usage**	**250 000**
Servomotor STM 30/40 (Schneider Elektrik)	**10 years**	**500 000**
Servomotor 01-15/30 Schimpf	**10 years**	**2 000 000**
Oil hoses	**5 years**	**-**
Fuel-oil valves	**10 years**	**250 000**
Pressure relief valve	**10 years**	**-**
Useful service life of wear parts *		
Auxiliary relay	**Depends on usage**	**50 000**
Cooling fan frequency converter (ACS310)	**3 years**	**25,000 hours of operation**
Cooling fan frequency converter (ACH550 / ACH580)	**6 years (in aggressive atmosphere ** not more than 3 years)**	**60,000 hours of operation (in aggressive atmosphere ** not more than 3 years)**
Motor	**40,000 hours of operation**	

The list contains the minimum number of switching cycles and the shortest possible service life for wear parts* and safety-related components. The actual service life could be much higher and this depends on the operating conditions. For reasons of operational and functional safety, the recommended periods of use should not be exceeded.
* Wear parts in the case of 25 years of machine usage
** Ambient temperature permanently over 40°C, extremely wet or dusty conditions, cyclic overload or continuous nominal (maximal) load

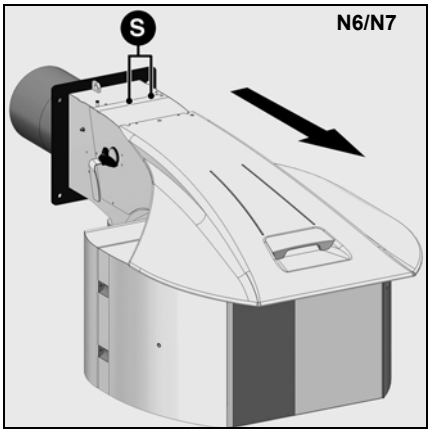
Note
When replacing the Burnertronic BT XXX it is recommended to save the data before disassembling the appliance. To this end backup all the date. The relevant procedure is described in the operating instructions "BurnerTronic BT300 - Remote Software, Maintenance" (Art. No. 4200 1017 53xx) under chapters "Files" and "Data Saving". This will allow the burner to restart easily and quickly after replacing the Burnertronic.

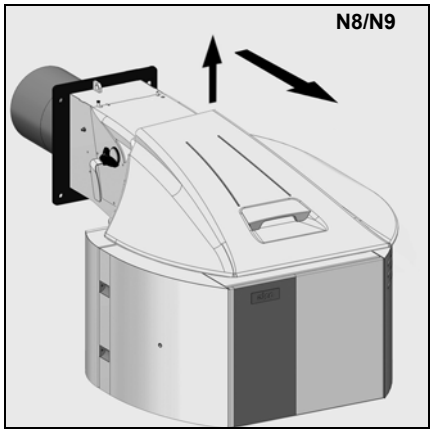


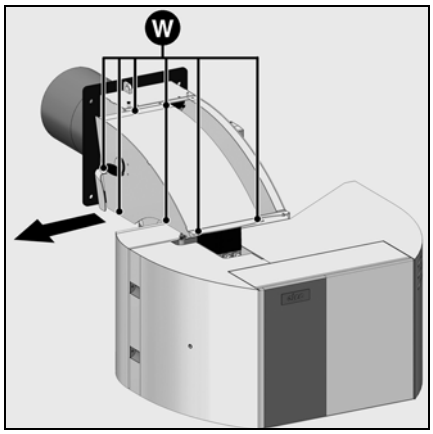
Note for replacing the control unit (Burnertronic):
Two different spare parts can be installed in order to replace the control unit! Please see the order reference on the label:
- Select the item code for the spare part in accordance with the marking displayed on unit BT3xx:
- **A:** Standard settings, without specific parameter configuration: specific burner configuration must be performed on the system (commissioning can only be carried out using the PC-Remote Software tool)
- **B:** unit programmed in the factory, with parameter configuration specific to the burner or to the customer (factory setting). To order this code, the following information must be made available: the item code, the order code, the manufacturing serial number (see rating plate). If no changes have been made to the burner, recommissioning can be carried out via the display (except for burners equipped with O2 and CO regulation and a Profibus, in which case the PC-Remote Software must be used)

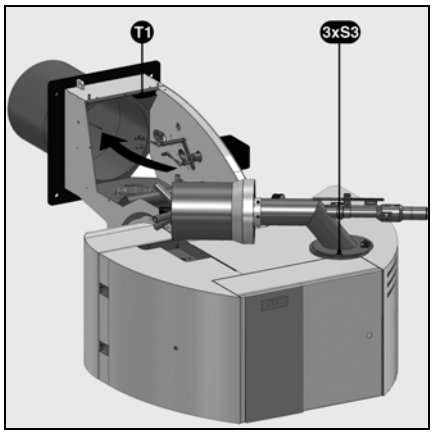
Attention! if a single item code is shown on the unit label, this means it is a BT3xx fully preconfigured according to variant **B**, nevertheless when ordering the spare part it is not necessary to provide the item code, order code and manufacturing serial number. As for variant **B**: if no changes have been made to the burner, recommissioning can be carried out via the display (except for burners equipped with O2/ and CO regulation and a Profibus, in which case the PC-Remote Software must be used)

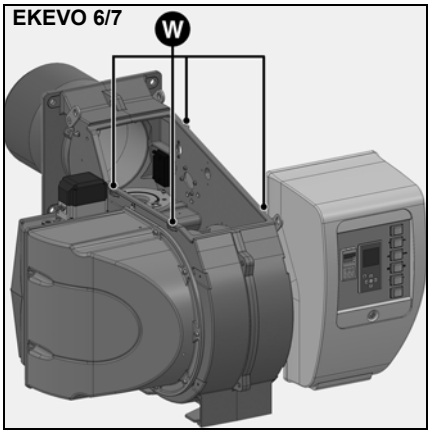
Maintenance

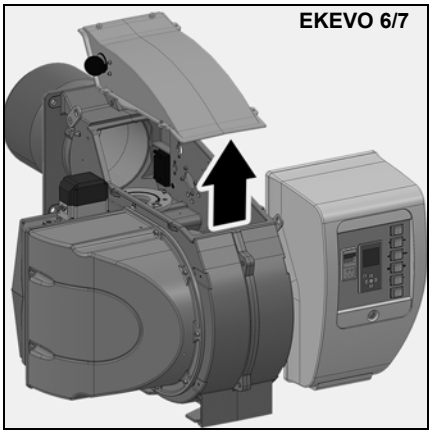












Checking the combustion components

- N6/N7: Unscrew the 2 screws **S**, remove the burner cover.
- N8/N9: Live the front end of the burner and remove rearwardly.
- EKEVO : Unscrew the 6 screws **W**, remove the housing cover.
- Remove the 7 screws **W** to remove the combustion components access cover.
- Remove the combustion components.
- Check the ignition electrodes and ignition cables, replace them if necessary (see chapter on control / maintenance, combustion components).
- Clean the deflector.
- Check adjustments and settings during installation.

Cleaning the fan

- Disconnect the motor by unplugging it from the power supply.
- Remove the fan wheel.
- Clean the fan wheel.
- Do not use pressure media.
- Reassemble.

Note:
To install and dismantle the fan wheel, refer to the chapter on maintenance/ fan wheel.

Maintenance
Checking / installing the combustion components

Cleaning the cover
- Do not use abrasive products or products containing chlorine.
- Clean the cover with water and a suitable cleaning product.
- Refit the cover.

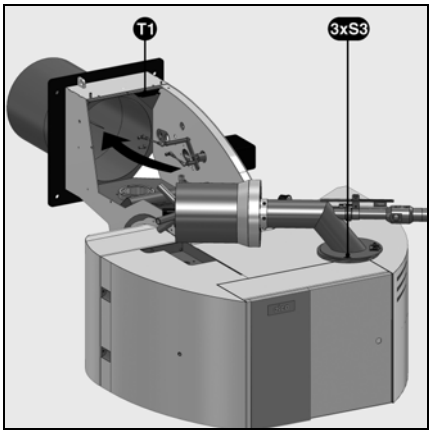
Cleaning the burner body
- Do not use any cleaning product with hydrocarbon-based solvent.
- Cleaning products based on surface active agents are allowed.

Important
After every operation: check the combustion parameters and real operating condition (doors closed, cover fitted etc.). Record the results in the relevant documents.

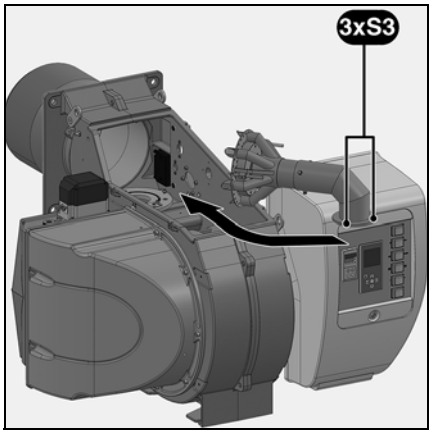
Important
Once the pressure switches have been set, they must be protected to prevent settings from being altered. For example, this can be done by placing a spot of varnish on at least one of the screws on the equipment's protective cover.
After the burner is maintained or after safety device equipment settings for the burner have been changed (e.g. pressure switches), the safety equipment for the burner must be checked to ensure it is working properly. After burner maintenance, the boiler safety chain must also be checked to ensure that it is working properly in accordance with the current specifications. This check must be carried out with the operator's agreement.

Checking the flue gas temperature
- Check the flue gas temperature at regular intervals.
- Clean the boiler if the flue gas temperature is more than 30 °C above the value measured at the time of commissioning.
- Use a flue gas temperature gauge to make the check easier.

Installing the combustion components
- Check the deflector (if it is dirty or sooty, clean it).
- Check the nozzles (if they are clogged, dirty or damaged replace them).
- Check the ignition transformers
- Check the electrode settings
- Check the ignition cables
- Check the quick-action coupling for the fuel-oil connection
- Connect the ignition cable to the electrodes and the transformers
- Connect to the oil supply.
- Insert the combustion components into the flame tube, tighten the securing screws **S3**.
- Connect ignitions cables to the combustion components
- Connect ignitions cables to the ignition transformer **T1**.

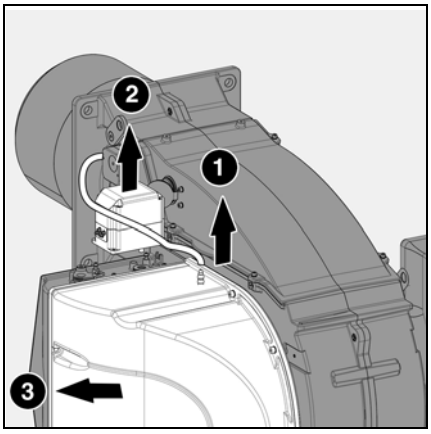


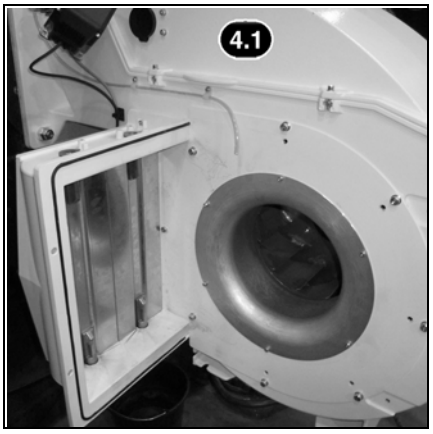
Note: To provide an example, only the scenario with burner N6 L-EF3 is shown on this page.

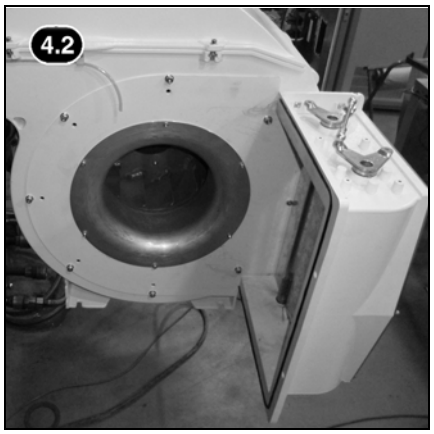


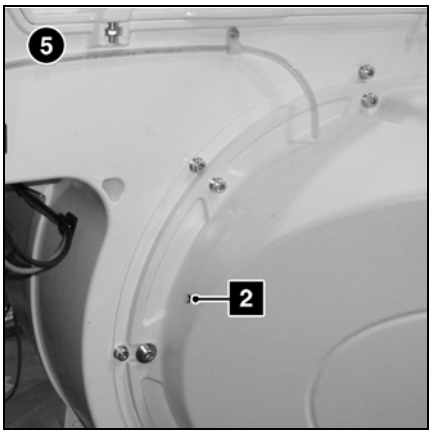
Note: To provide an example, only the scenario with burner EKEVO 6 L-EF3 is shown on this page.

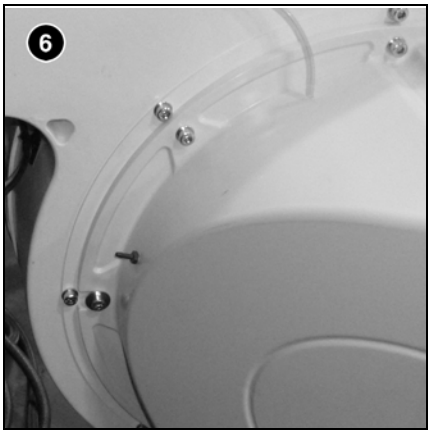
EKEVO 6/EKEVO 7
Rotation procedure of air box

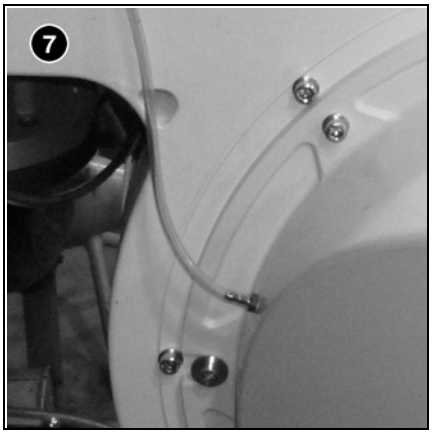


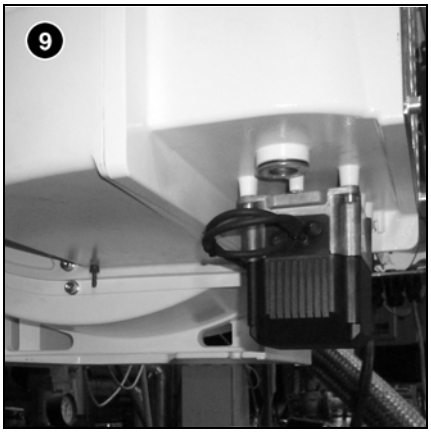


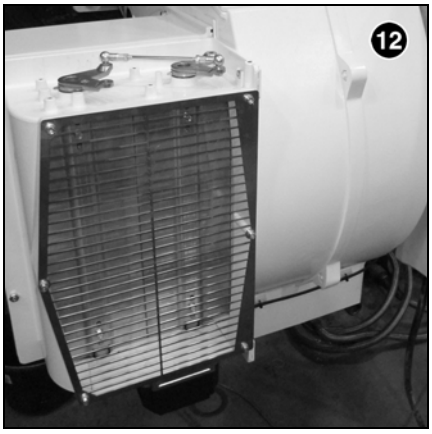












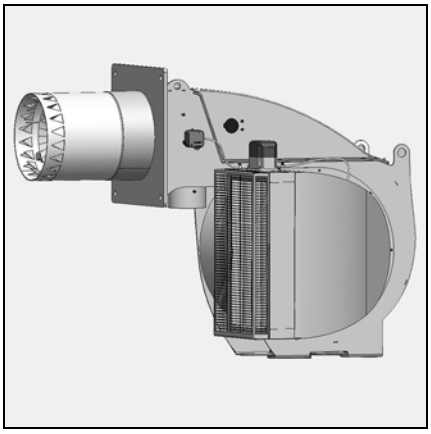
Rotation procedure of air box

1. Remove the flexible air hose.
2. Disassemble the servomotor from the air flap and fasten it to the casing.
3. Disassemble the cover of the air box.
4. Unfasten the air box support, swing it towards the new desired position and fasten it again (rotation possible in 45° steps)
5. Put the air box cover back on.
6. Remove the original pressure connection hose and place it in position 2 (this location has a factory-assembled plug)
7. Fit the hose again and remove the clamp fitting (plug the hole again with the screw)
8. Cut all the clamp fittings along the power supply cable of the servomotor as far as the switch cabinet.
9. Remove the power supply cable from the servomotor and fasten it in its new position (if there is no Namur sensor, no action is needed in the cabinet wiring)
10. Fit the cable again by following a new path (bottom of rear side)
11. Fit 2 additional clamp fittings for the power supply cable (2 adhesive pieces and clamps are provided as accessories)
12. 2 graduated scales indicate the position of the air flap

Burner assembly label

If the air box was rotated, the label may be upside down. Stick a new label (provided with the accessories) on the old one to make it easy to read.

EKEVO 8/EKEVO 9
Rotation procedure of air box



Installation instructions for air box rotation on the burner
By default the air box opening on the EK EVO is pointing in the direction of the boiler. However, if an air duct connection is provided, it is possible to orient the air box, with certain adjustments, in the direction of this duct. In principle the air box can be turned from its basic position in 45° increments, up to 180°, in an anticlockwise direction. The corresponding procedure is described below.

Air box lifting points

1. Removing the servomotor
In order to remove and reinstall the air box in a different position, it will be necessary, prior to doing so, to remove the air flap servomotor. Remove the 4 M5 servomotor screws and loosen the screw on the air flap shaft coupling to remove the drive. The length of the drive cable has been designed for the basic position. For other positions, other cable lengths are required, and in part will be routed to other attachment points. By opening the cable clamps and pulling the cables up to the switch cabinet, sufficient cable length can be obtained.

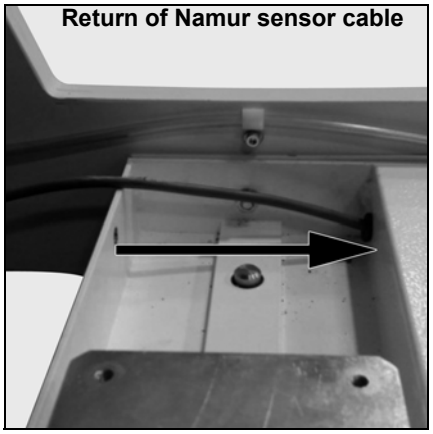
2. Removing the air box grille
Remove the air box grille, in order to access all the screws on the air box. To remove the air box grille, loosen 2 screws on the underside and 2 nuts on the upper side.

3. Using lifting equipment
The use of lifting equipment (lifting crane, lifting table, or equivalent) facilitates air box removal. When a lifting crane is available, it is possible to affix a lifting ring (M8) to the air box in the space provided for this purpose. Remove the bolt for this. In this case, the air box can be removed by one person. Without lifting equipment, the presence of a second person during air box removal is advised (air box weight is around 37kg).

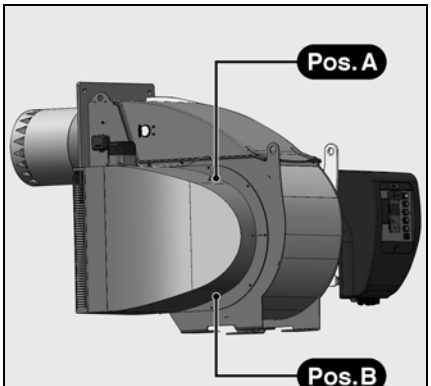
4. Special notes for using a frequency converter
When using a frequency converter for the burner blower, a Namur sensor is integrated for recording and transmitting the feedback signal to the control box. In this case, disconnect the Namur sensor cable (blue cable) in the switch cabinet and pull it up to the air box before removing the latter.

5. Removing the air box
Then proceed with the removal of the air box by loosening the screw connections. If a Namur sensor is integrated, pay close attention to it. Pull the cable in the direction of Namur sensor, so as not to damage the cable.

Return of Namur sensor cable



EKEVO 8/EKEVO 9
Rotation procedure of air box



Pressure tap positions

6. Removing and rotating the air box support
Before you can orient the air box in the desired position, unscrew its support and turn it accordingly. The following positions are permissible: forward (basic position), in 45° steps in an anticlockwise direction, until the opening is facing backwards.

7. Installing the air box
As soon as the air box support has been oriented in its new position, the air box can be installed. Once again pay particular attention to the Namur sensor wiring, where present. Take care not to pinch the sensor cable.

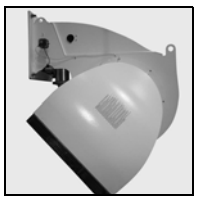
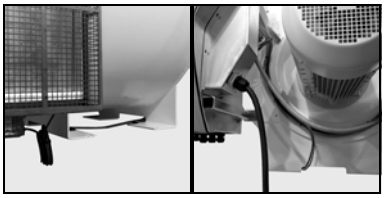
8. Changing the differential pressure output of the air pressure switch
Depending on the air box position, the detector requires a different positioning. The plug for the other position can therefore be swapped with the detector on that side.

9. Installing the servomotor
When the air box is fully installed, the servomotor can be remounted. By pulling on the cable, as described in 1., a sufficient length of cable can be made available. When installing the drive, ensure that the servomotor is in its initial position (0°) and that the air flap is closed. The drive can then be coupled to the air flap shaft. Retighten the screws on the coupling.

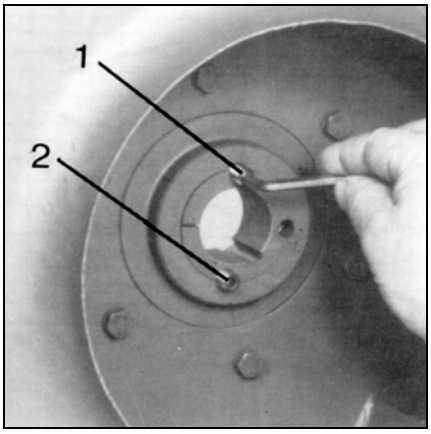
10. Installing and routing the cables
By changing the position of the air box, the wiring must also be partially modified. For this, additional attachment points are required. They are described in the table below. If some cables are longer than required, rewind the cables to a length of approx. 1m, to facilitate maintenance work on the sensor/ actuator (Namur sensor on air box exterior).

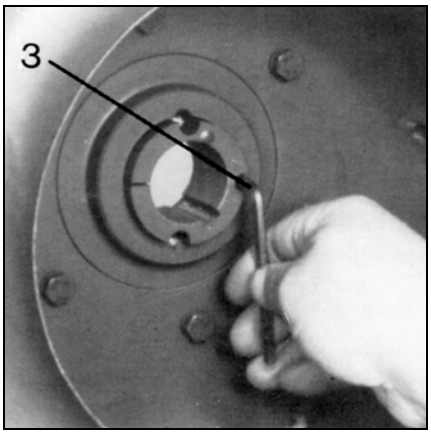
11. Connecting the Namur sensor cable in the switch cabinet
If a Namur sensor is integrated, it is also necessary to connect its cable in the switch cabinet.

EKEVO 8/EKEVO 9
Rotation procedure of air box

	Figure	Wiring adjustment	Air pressure switch pressure tap
Basic position			Pos. A
45°		as basic position	Pos. A
90°		3 additional adhesive attachment flanges on burner feet 	Pos. A
135°		3 additional adhesive attachment flanges on burner feet 	Pos. B
180°		2 additional adhesive attachment flanges on burner feet 	Pos. B

N6/N7/N8/N9 - EKEVO 6/7/8/9
Fan wheel setting





The fan wheel can be stopped at any position on the motor shaft.
To achieve a high slipping torque, the surface of all the parts to be inserted into one another must be clean and grease-free.

Removing the fan wheel

Note:
Before removing the fan wheel, a mark must be made on the shaft in order to ensure that the wheel is in the same position after reinstallation. If the wheel position on the shaft is changed axially, efficiency may be reduced and this could result in reduced air output.

To remove the wheels, undo the screws (items 1 and 2); screw one of them into the hole in the bushing to half a thread fitting (item 3) as a lever screw and pull. This loosens the bushing. The loosened disc unit can now be removed by hand without force and without causing damage.

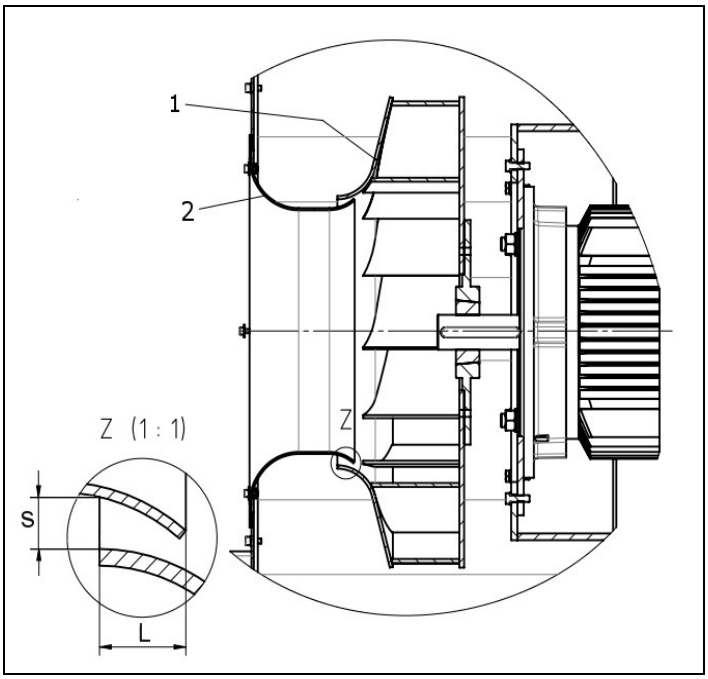
Fan wheel installation
- Clean all the bare surfaces and degrease them
- Insert the discs and bushings into one another, align the holes.
- Align the screws on opposite sides (items 1 and 2) and tighten them evenly.

The following tightening torques must be observed:
SM 16, bushing no. 1615 - hub bore 28 :
Tightening torque 20 Nm

SM 20, bushing no. 2012 - hub bore 38 and 42 mm:
Tightening torque 30 Nm

SM 25, bushing no. 2517 - hub bore 42 and 48 mm:
Tightening torque: 50 Nm

SM30 bushing no. 3030 - hub bore 55 mm
Tightening torque: 90 Nm

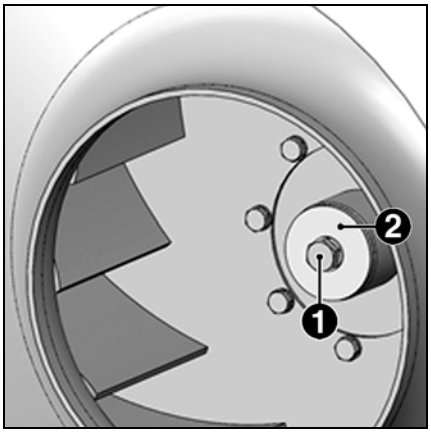


1 - Blow turbine
2 - Air conveyor

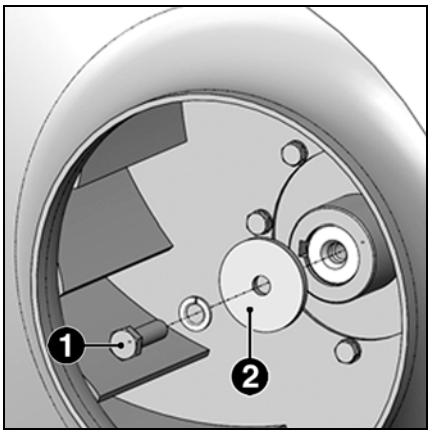
Burner	L [mm]	Burner	L [mm]
N/EKEVO 6 L-E	17	N/EKEVO 6 L-EF3	17
N/EKEVO 7.3600 L-E	12	N/EKEVO 7.3600 L-EF3	17
N/EKEVO 7.4500 L-E	17	N/EKEVO 7.4500 L-EF3	17
N/EKEVO 8.5800 L-E	18	N/EKEVO 8.5700 L-EF3	15
N/EKEVO 8.7100 L-E	22	N/EKEVO 9.6500 L-EF3	19
N/EKEVO 9.8700 L-E	9	N/EKEVO 9.8700 L-EUF	9
N/EKEVO 9.10400 L-E	17	N/EKEVO 6 9.10400 L-EUF	17

Important: The air conveyor must be positioned in relation to the blower turbine so that a gap (S) of a constant size is achieved around its entire circumference.

Fan wheel setting EKEVO 6/7



Because of its design the turbine can be fitted to the drive shaft only in a fixed position. The same position is consequently ensured every time it is assembled. There is no need for any further adjustment of the axial cover through the air conveyor.



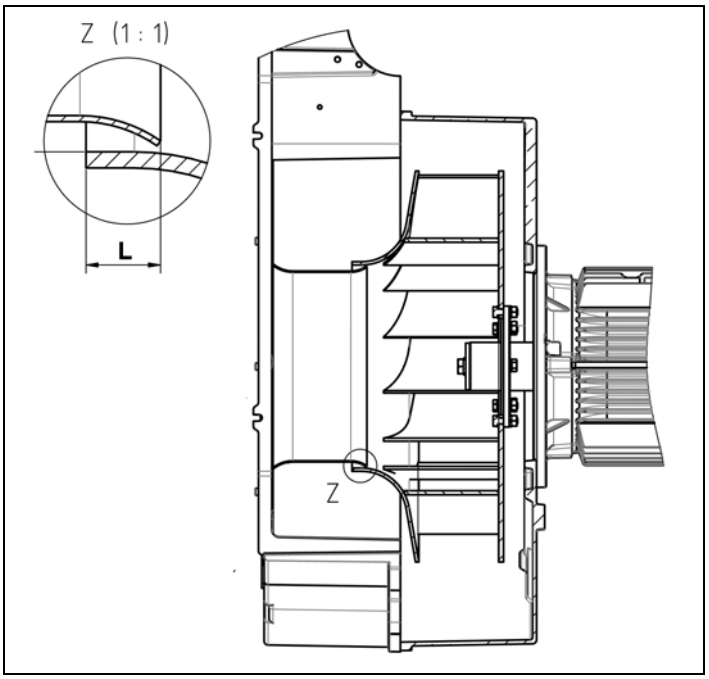
Disassembling the turbine

- Loosen the screw (pos. **1**) and remove the washer (pos. **2**) to disassemble the turbine.
- Then separate the turbine from the shaft end and make sure it is not damaged.

Assembling the turbine

- Before assembling, clean and degrease all the bare surfaces.
- To fit the turbine slide it as far as the axial stop on the shaft end. Fit the washer again (pos. **2**) using the screw (pos. **1**) and tighten it to 45Nm.
- Fasten the screw (pos. **1**) using LOCTITE 243. Before fitting the turbine, visually check for any damage.

To avoid any unbalance risks, do not re-use damaged turbines!



Burner	L [mm]
N6/EKEVO 6.2400	17
N6/EKEVO 6.2900	12
N7/EKEVO 7.3600	17
N7/EKEVO 7.4500	18
N8/EKEVO 8.5700	22
N9/EKEVO 9.6500	17

Exhaust gas measurements

Exhaust gas measurement
In order to ensure efficient and fault-free operation, the burner must be adjusted with reference to the specific system. The fuel combustion air compound controller, which is used to set the burner to clean combustion, is used for this. To do this, exhaust gas measurements must be carried out. To determine the efficiency and quality of combustion, the percentage of CO_2 or O_2 and the flue gases temperature must be measured. Before the test is carried out, it is essential to ensure that the boiler and/or the exhaust gas system are properly sealed.

False air distorts the measurement
If possible, the exhaust gases should not have any residual oxygen content (O_2) and/or they should contain as much carbon dioxide (CO_2) as possible.
In all load stages, the carbon monoxide content of the exhaust gases must be below the limit values specified in the relevant current specifications. If fuel-oil is being used, the permissible smoke spot number in the exhaust gas must not be exceeded.

Calculating the volumetric flow rate for gas
The combustion output (Q_F) of a boiler is the amount of heat supplied by the gas in a time unit.
When commissioning the system, the fuel volume flow must be set in accordance with the nominal heat output of the boiler.

Example:

Nominal heat output	Q_N	1000 kW
Efficiency rating of the boiler	n_K	0,88
Calorific value of the gas	H_u	9.1 kWh/m³
Gas pressure	p_u	100 mbar
Barometer level	p_{amb}	980 mbar
Gas temperature	t_{gas}	15 °C
Standard pressure	pn	1013 mbar

$$Q_F = \frac{Q_N}{n_K} = \frac{1000}{0,88} = 1136kW$$

Volumetric flow for gas in its normal state:

$$V_{Bn} = \frac{Q_N}{H_U \cdot n_K} = \frac{1000}{9,1 \cdot 0,88} = 125m^3/h$$

Volumetric flow for gas in the operating state:

$$V_{BB} = V_{Bn} \cdot \frac{T}{273} \cdot \frac{p_n}{p_{amb} + p_u} = m^3/h$$

$$= 125 \cdot \frac{273 + 15}{273} \cdot \frac{1013,25}{980 + 100} = 123,9m^3/h$$

Relationship between O2 and CO2 rate for natural gas H (CO2max =11.86%)

$$O_2 = 21x\frac{CO_{2max} - CO_{2meas}}{CO_{2max}} = \%$$

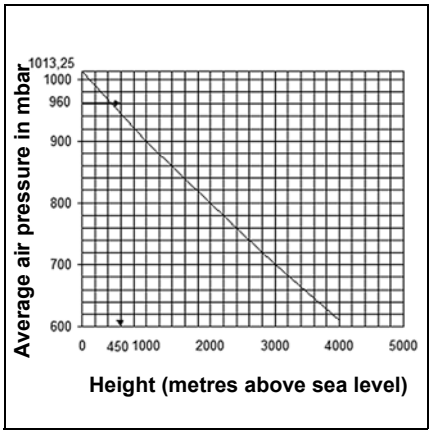
$\%O_2$	$\%CO_2$	$\%O_2$	$\%CO_2$
0,00	11,86	3,00	10,16
0,10	11,80	3,10	10,10
0,20	11,75	3,20	10,04
0,30	11,69	3,30	9,99
0,40	11,63	3,40	9,93
0,50	11,58	3,50	9,87
0,60	11,52	3,60	9,82
0,70	11,46	3,70	9,76
0,80	11,41	3,80	9,70
0,90	11,35	3,90	9,65
1,00	11,29	4,00	9,59
1,10	11,24	4,10	9,53
1,20	11,18	4,20	9,48
1,30	11,12	4,30	9,42
1,40	11,07	4,40	9,36
1,50	11,01	4,50	9,31
1,60	10,95	4,60	9,25
1,70	10,90	4,70	9,19
1,80	10,84	4,80	9,14
1,90	10,78	4,90	9,08
2,00	10,73	5,00	9,02
2,10	10,67	5,10	8,97
2,20	10,61	5,20	8,91
2,30	10,55	5,30	8,85
2,40	10,50	5,40	8,80
2,50	10,44	5,50	8,74
2,60	10,38	5,60	8,68
2,70	10,33	5,70	8,63
2,80	10,27	5,80	8,57
2,90	10,21	5,90	8,51

Relationship between O_2 and CO_2 rate for domestic fuel-oil (CO_2max =15.40%)

% O_2	% CO_2	% O_2	% CO_2
0.00	15.40	3.00	13.19
0.10	15.33	3.10	13.12
0.20	15.25	3.20	13.04
0.30	15.18	3.30	12.97
0.40	15.11	3.40	12.89
0.50	15.03	3.50	12.82
0.60	14.96	3.60	12.75
0.70	14.88	3.70	12.67
0.80	14.81	3.80	12.60
0.90	14.74	3.90	12.53
1.00	14.66	4.00	12.45
1.10	14.59	4.10	12.38
1.20	14.52	4.20	12.31
1.30	14.44	4.30	12.23
1.40	14.37	4.40	12.16
1.50	14.29	4.50	12.08
1.60	14.22	4.60	12.01
1.70	14.15	4.70	11.94
1.80	14.07	4.80	11.86
1.90	14.00	4.90	11.79
2.00	13.93	5.00	11.72
2.10	13.85	5.10	11.64
2.20	13.78	5.20	11.57
2.30	13.71	5.30	11.49
2.40	13.63	5.40	11.42
2.50	13.56	5.50	11.35
2.60	13.48	5.60	11.27
2.70	13.41	5.70	11.20
2.80	13.34	5.80	11.13
2.90	13.26	5.90	11.05

Mean barometer readings

	Height above sea level [m]	Mean barometer readings [mbar]
Aachen	205	991
Berlin	50	1009
Dresden	120	1000
Erfurt	315	978
Frankfurt/M.	104	1004
Hamburg	22	1011
Cologne	45	1009
Leipzig	130	998
Magdeburg	79	1005
Munich	526	955
Nuremberg	310	980
Rostock	4	1013
Stuttgart	297	984
Schwerin	59	1010
Ulm	479	960



Exhaust gas measurements Diagnosing and remedying faults

Exhaust gas loss
Exhaust gas loss by way of free heat will occur as a result of the temperature difference between the fuel-air mixture entering the furnace chamber and the gases discharged. Any increase in the excess of air and the resultant higher exhaust gas volume will cause the exhaust gas loss to rise.
It is calculated as follows:

$$q_A = (t_A - t_L) \cdot \left(\frac{A_1}{CO_2} + B \right)$$

q_A = exhaust gas loss in %
t_A = flue gases temperature in °C
t_L = combustion air temperature in °C
CO_2 = carbon dioxide content in %

	Fuel-oil EL	Fuel-oil S	Natural gas	Town gas	Liquid gas
A_1 =	0.50	0.490	0.370	0.350	0.420
B =	0.007	0.007	0.009	0.011	0.008

Example:
Data measured in natural gas mode:

CO_2 content of the exhaust gases	10.8 %
Flue gases temperature	195°C
Air intake temperature	22°C

The exhaust gas loss can be calculated as follows:

$$q_{Af} = (195 - 22) \cdot \left(\frac{0,37}{10,8} + 0,009 \right) = 7,48\%$$

Measured values in fuel-oil operation:

CO_2 content of the exhaust gases	12.8 %
Flue gases temperature	195°C
Air intake temperature	22°C

The exhaust gas loss can be calculated as follows:

$$q_{Af} = (195 - 22) \cdot \left(\frac{0,49}{12,8} + 0,007 \right) = 7,83\%$$

In the vent of a fault, proceed with checking the basic conditions for a proper operation of the boiler system:
1. Is electric power available?
2. Is there fuel-oil in the tank?
3. Is there any gas pressure?
4. Are the shut-off valves opened?
5. Are all control and safety devices, e.g. boiler thermostat, low water detector, limit switches, etc. properly set?

1. Ignition - ignition failure

Cause	Remedy
Ignition electrode short circuit.	Adjust.
Wide ignition electrode spacing.	Adjust.
Dirty and wet electrodes.	Clean.
Cracked insulator.	Replace.
Defective ignition transformer.	Replace.
Defective automatic firing device.	Replace.
Burnt ignition cable.	Replace; search for cause and eliminate.
Pilot burner failure.	Adjust ignition gas pressure
Ignition gas valve does not open.	Search for cause and eliminate
Defective solenoid.	Replace

2. Motor is not running

Cause	Remedy
Motor protection relay and fuses.	Check and replace if required.
Air pressure switch not changed over or defective.	Check and replace if required.
Defective motor.	Replace.
Defective power contactor.	Replace contactor.
Fan motor starts but stops after 20-25 secs.	Check for solenoid leaks
Fan motor starts, but stops after about 10 secs in pre-ventilating mode.	Air pressure switch does not switch, defective : replace, clogged: clean, electrical connections: check

3. Pump not supplying fuel-oil

Cause	Remedy
Gate valves closed	Open
Filter clogged	Clean or replace the filter cartridge
Filter not properly sealed	Replace
Leak in fuel-oil tube	Tighten the unions
Leak in intake valve	Remove and clean or replace
Direction of rotation of pump	Check
Gearbox damaged	Replace pump
Capacity has deteriorated	Replace pump
- Loud mechanical noises	
Pump is taking in air	Tighten the unions
Fuel-oil tube vacuum too high	Clean the filter, open valves completely
For heavy-grade fuel-oil: incorrect oil temperature	Check reheater: Thermostat setting, cracked dirt

Diagnosing and remedying faults

4. Nozzle - uneven atomisation

Cause	Remedy
Nozzle loose	Tighten
Bore partially clogged	Remove and clean or replace
worn as a result of prolonged usage	Replace
- No fuel-oil supply:	
Nozzle clogged	Remove clean
Nozzle leak	Replace
Leak in nozzle line shut-off	Replace

5. No response to flame by Automatic firing device with flame sensor

Cause	Remedy
Dirty flame sensor.	Clean.
Burner fails to start.	Check connection with the automatic firing device
Automatic firing device warning light on; flame fault	Unlock and search for cause
Ionisation current too weak.	Check combustion setting
Burner starts without flame formation: solenoid valve not opening	Coil, detector defective, check connection
Lack of gas or gas pressure too low.	Check gas pressure regulator, gas valve, gas filter. Is the equipment gas cock open?

6. Combustion components - poor combustion values heavy internal oil deposits or heavy coke deposits (fuel-oil mode)

Cause	Remedy
Incorrect settings.	Correct settings.
Incorrect burner head	Replace
Nozzle too big or too small	Replace
Incorrect nozzle spray angle	Replace nozzle
High or low combustion air flow rate.	Readjust burner.
Furnace chamber not sufficiently ventilated.	The boiler room must be ventilated through an unlockable opening with a cross section of at least 50 % of all chimney cross sections in the furnace.

7. Solenoid valve fails to open

Cause	Remedy
Defective coil.	Replace coil or valve
Defective automatic firing device.	Replace automatic firing device.
Will not close properly: dirt on sealing surfaces	Open valve; remove foreign matter; replace valve if required.

8. Cleaning and lubricating instructions

Depending on the cleanliness status of the combustion air, the fan impeller, ignition electrodes, flame sensors and air flaps must be cleaned as required.

For burner with mechanical compound controller:
lubricate ball heads on the adjusting screws for the compound controller.

The bearing points of the burner moving parts require no maintenance.
Damage to ball bearings should be detected and eliminated at an early stage to avoid greater consequential damage. Listen to the motor bearing noise to identify possible irregularities.

Faults

- **According to DIN 4788, components with technical safety-related functions may not be repaired. On the other hand, they may be replaced by original parts or parts of equal quality.**

How to proceed in case of hazards
- Switch off the emergency switch
- Close fuel valves
- Use suitable extinguishing equipment, e.g. fire extinguisher in acc. with DIN 14 406, fire class B,C.
- Servicing work on pressure switches, automatic actuators, limiters and automatic firing devices or other safety devices may only be carried out by the relevant manufacturer or by service engineers authorised to service the individual items of equipment on their behalf.
- If third parties work on the system, our obligations under warranty become void.

If system faults occur, proceed with checking the basic conditions for proper operation of the system.

Make a check for the following:
1. Is fuel available, is it flowing through the lines and is the supply pressure adequate?
2. Is power being supplied to the system?
3. Is all control and safety equipment such as temperature controller, safety limiter, water failure cut-out, electrical limit switches, etc., functioning properly and correctly adjusted? If it is found that none of the above reasons for the fault applies, the burner functions must be thoroughly checked.

Prevailing conditions:
The burner will be found to be out of operation and in faulty and interlocked position. Proceed with searching for the cause of the fault and eliminate it. Unlock the automatic firing device by pressing the fault eliminate key and start the burner.

The start-up program will be initiated and should be carefully monitored. The possible cause of the fault may be quickly found by referring to the fault indicator on the automatic firing device and watching the start-up and operating program.

Manufacturer's declaration according to 1.BImSchV, § 6, paragraph (1)

We

Elco Burners GmbH
Herbert-Liebsch-Str. 4a
01796 Pirna

declare that following listed burners as of 2010 are in conformity with the specifications of the 1.BImSchV (version: 26.01.2010). The burners keep the required NOx emission limits measured according to Annex 3 and EN267, EN676.

Type	Model	Output				
Gas burners						
N 6.2400	G-E / G-R / G-V	Natural Gas:	390	-	2500	kW
N 6.2900	G-E / G-R / G-V	Natural Gas:	400	-	3000	kW
N 7.3600	G-E / G-R / G-V	Natural Gas:	580	-	4100	kW
N 7.4500	G-E / G-R / G-V	Natural Gas:	680	-	5000	kW
EKEVO 6.2400	G-E	Natural Gas:	390	-	2650	kW
EKEVO 6.2900	G-E	Natural Gas:	400	-	3200	kW
EKEVO 7.3600	G-E	Natural Gas:	580	-	4300	kW
EKEVO 7.4500	G-E	Natural Gas:	680	-	5400	kW
N 8.5800	G-E	Natural Gas:	740	-	6570	kW
N 8.7100	G-E	Natural Gas:	800	-	7800	kW
N 9.8700	G-E	Natural Gas:	880	-	9200	kW
N 9.10400	G-E	Natural Gas:	960	-	11200	kW
EKEVO 8.5800	G-E	Natural Gas:	620	-	6570	kW
EKEVO 8.7100	G-E	Natural Gas:	610	-	8150	kW
EKEVO 9.8700	G-E	Natural Gas:	780	-	9700	kW
EKEVO 9.10400	G-E	Natural Gas:	850	-	11230	kW
N 6.2400	G-EF3 / G-VF3	Natural Gas:	340	-	2300	kW
N 6.2900	G-EF3 / G-VF3	Natural Gas:	360	-	2850	kW
N 7.3600	G-EF3 / G-VF3	Natural Gas:	500	-	3900	kW
N 7.4500	G-EF3 / G-VF3	Natural Gas:	600	-	4200	kW
EKEVO 6.2400	G-EF3	Natural Gas:	340	-	2500	kW
EKEVO 6.2900	G-EF3	Natural Gas:	340	-	2900	kW
EKEVO 7.3600	G-EF3	Natural Gas:	470	-	3980	kW
EKEVO 7.4500	G-EF3	Natural Gas:	510	-	4290	kW
EKEVO 7.5800	G-EF3	Natural Gas:	620	-	5530	kW

Continuation: Manufacturer's declaration according to 1.BImSchV, § 6, paragraph (1)

Type	Model	Output				
EKEVO 6.2400	G-EU2	Natural Gas:	360	-	2530	kW
EKEVO 6.2900	G-EU2	Natural Gas:	420	-	3100	kW
EKEVO 7.3600	G-EU2	Natural Gas:	480	-	4330	kW
EKEVO 7.4500	G-EU2	Natural Gas:	640	-	4900	kW
EKEVO 7.5800	G-EU2	Natural Gas:	600	-	5800	kW
N 8.5800	G-EU3	Natural Gas:	640	-	5800	kW
N 8.7100	G-EU3	Natural Gas:	700	-	7100	kW
N 9.8700	G-EU3	Natural Gas:	850	-	8530	kW
N 9.10400	G-EU3	Natural Gas:	900	-	10200	kW
EKEVO 8.5800	G-EU3	Natural Gas:	600	-	6070	kW
EKEVO 8.7100	G-EU3	Natural Gas:	700	-	7700	kW
EKEVO 9.8700	G-EU3	Natural Gas:	850	-	8530	kW
EKEVO 9.10400	G-EU3	Natural Gas:	910	-	10500	kW
EKEVO 9.13000	G-EU2	Natural Gas:	1700	-	13000	kW
N 6.2200	G-EU2N	Natural Gas:	350	-	2300	kW
N 7.3400	G-EU2N	Natural Gas:	490	-	3700	kW
N 9.7200	G-EU2N	Natural Gas:	970	-	7840	kW
N 9.7500	G-EU2N	Natural Gas:	1020	-	8250	kW
N 10.10000.30	G-EU2N	Natural Gas:	1150	-	10900	kW
N 10.10000.37	G-EU2N	Natural Gas:	1310	-	10900	kW
EKEVO 6.2200	G-EU2N	Natural Gas:	360	-	2380	kW
EKEVO 7.3400	G-EU2N	Natural Gas:	530	-	3720	kW
EKEVO 9.7200	G-EU2N	Natural Gas:	1070	-	8020	kW
EKEVO 9.7500	G-EU2N	Natural Gas:	1050	-	8300	kW

Dual-fuel burners

EKEVO / N 6.2400	GL-RZ3/EZ3	Natural Gas:	290	-	2550	kW
		Light fuel oil	730	-	2470	kW
EKEVO / N 6.2900	GL-RZ3/EZ3	Natural Gas:	290	-	3100	kW
		Light fuel oil	730	-	2790	kW
EKEVO / N 7.3600	GL-RZ3/EZ3	Natural Gas:	300	-	3600	kW
		Light fuel oil	1090	-	3600	kW
EKEVO / N 7.4500	GL-RZ3/EZ3	Natural Gas:	450	-	4730	kW
		Light fuel oil	1270	-	4730	kW
EKEVO / N 6.2400	GL-EF3	Natural Gas:	280	-	1920	kW
		Light fuel oil	360	-	1920	kW
EKEVO / N 6.2900	GL-EF3	Natural Gas:	340	-	2890	kW
		Light fuel oil	480	-	2890	kW
EKEVO / N 7.3600	GL-EF3	Natural Gas:	470	-	3980	kW
		Light fuel oil	680	-	3980	kW
EKEVO / N 7.4500	GL-EF3	Natural Gas:	510	-	4500	kW
		Light fuel oil	740	-	4500	kW

Continuation: Manufacturer's declaration according to 1.BImSchV, § 6, paragraph (1)

Type	Model	Output				
EKEVO / N 8.5700	GL-EF3	Natural Gas:	830	-	6450	kW
		Light fuel oil	1100	-	6450	kW
EKEVO / N 9.6500	GL-EF3	Natural Gas:	860	-	6950	kW
		Light fuel oil	1200	-	6600	kW
EKEVO / N 7.4500	GL-E	Natural Gas:	410	-	4750	kW
		Light fuel oil	1300	-	4750	kW
EKEVO / N 8.5800	GL-E	Natural Gas:	800	-	5350	kW
		Light fuel oil	1350	-	5350	kW
EKEVO / N 8.7100	GL-E	Natural Gas:	820	-	7340	kW
		Light fuel oil	1470	-	7340	kW
EKEVO / N 9.8700	GL-EUF	Natural Gas:	1040	-	8500	kW
		Light fuel oil	1800	-	8500	kW
EKEVO / N 9.10400	GL-EUF	Natural Gas:	1160	-	9570	kW
		Light fuel oil	2550	-	9570	kW
N 10.14000	GL-EUF	Natural Gas:	2200	-	16000	kW
		Light fuel oil	3300	-	14000	kW

Oil burners

EKEVO / N 6.2400	L-EF3	Light fuel oil	360	-	1850	kW
EKEVO / N 6.2900	L-EF3	Light fuel oil	480	-	2950	kW
EKEVO / N 7.3600	L-EF3	Light fuel oil	680	-	4070	kW
EKEVO / N 7.4500	L-EF3	Light fuel oil	740	-	4820	kW
EKEVO 6.2400	L-EZ3	Light fuel oil	730	-	2470	kW
EKEVO 6.2900	L-EZ3	Light fuel oil	730	-	2790	kW
EKEVO 7.3600	L-EZ3	Light fuel oil	1090	-	3600	kW
EKEVO 7.4500	L-EZ3	Light fuel oil	1270	-	4730	kW
EKEVO / N 8.5700	L-EF3	Light fuel oil	1100	-	6450	kW
EKEVO / N 9.6500	L-EF3	Light fuel oil	1200	-	6600	kW
EKEVO / N 7.4500	L-E	Light fuel oil	1300	-	4750	kW
EKEVO / N 8.5800	L-E	Light fuel oil	1350	-	5350	kW
EKEVO / N 8.7100	L-E	Light fuel oil	1470	-	7340	kW
EKEVO / N 9.8700	L-EUF	Light fuel oil	1800	-	8500	kW
EKEVO / N 9.10400	L-EUF	Light fuel oil	2550	-	9570	kW

Pirna, 16.04.2018

i.V.
- Signature -

elco

www.elco-burners.com **www.elco.net**

Made in the EU. Non contractual document.