



## Operation and maintenance manual

### KP-400 M



Read these instructions carefully before installation, commissioning or maintenance of the burner!

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# 1. General

## 1.1. Forewords

Thank you for using Oilon-products. We hope you are content with the product and our service. This manual is intended to guide operation and maintenance of the product. We pursue to improve our products and services. Therefore we readily accept feedback about on our operation and maintenance manuals. Feedback may be sent to [info@oilon.com](mailto:info@oilon.com)




Installation and maintenance of the device must be performed by a certified personnel. If you need help with maintenance issues, please contact your nearest representative or Oilon Oy technical support. Contact information can be found on our website at [www.oilon.com](http://www.oilon.com)

## 1.2. Conventions in this Manual

### Warning symbols in this manual

Read these instructions carefully before installation, commissioning or maintenance of the burner. The given instructions must be followed.

Symbols used are :


 <b>DANGER!</b>	<p>Be careful. The DANGER symbol indicates a possible danger of bodily harm or lethal injury.</p>
 <b>CAUTION</b>	<p>Pay attention. The CAUTION sign indicates a possible danger of damage to the device, components or surroundings.</p>
 Note	<p>Notes indicate tips, hints and other essential information.</p>


**KEEP THIS MANUAL ALONG WITH THE INSTALLATION RECORD AND THE ELECTRICAL SCHEMES AVAILABLE NEAR THE BURNER!**


### 1.3. General information


#### Burner features and general information

Burners are fully automatic modulating burners for light fuel oil. Burner is suitable for most heating appliances such as hot water boilers, steam boilers, air heaters and thermo fluid boilers

 Note	Installation and comissioning of the burner may be carried out ONLY BY AUTHORISED PERSONNEL.
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 <b>DANGER!</b>	The connectors in the control box are under voltage. The safety cover is allowed to be opened only by authorized staff.
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 <b>DANGER!</b>	In case of fire or other danger: <ol style="list-style-type: none"> <li>1. Switch off the main switch</li> <li>2. Close main fuel shut-off valve</li> <li>3. Take appropriate actions</li> <li>4. Contact operation controller.</li> </ol>
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 Note	Burner control unit is meant for intermittent operation. For safety reasons, at least one controlled shutdown must take place every 24 hours.
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### 1.4. Watching the boiler room

#### Take care of the boiler room

- Maintain tidiness in the boiler room and keep the door closed.
- Make sure the there is always enough water and pressure in the heating system.
- Make sure the boiler and the chimney are swept regularly, at least once a year.
- Check the correct adjustment of the flue damper and the gate valve regularly.
- Make sure the burner room air-inlet gap is open.
- Make sure the shut-off valves on pressure gauges are shut.
- Make sure tightness of the pipeworks, safety appliances of the boiler system, pipeworks, and the burner are checked regularly according to rules and regulations of public authorities.
- Check boiler and it's components.
- Making a maintenance contract is recommended.

 <b>DANGER!</b>	<ul style="list-style-type: none"> <li>● Never use a naked flame while checking the burner or the boiler.</li> <li>● Never store any inflammable material in the boiler room.</li> <li>● Wear hearing protectors if there is noise in the boiler room.</li> </ul>
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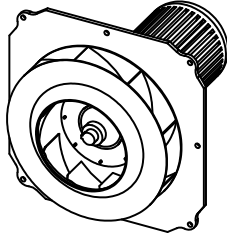
**DANGER!**

- IN CASE OF FIRE OR OTHER EMERGENCY
- Switch off the main switch.
- Close the main fuel shut-off valve outside the plant.
- Take appropriate actions.

## 2. Burner operation

### 2.1. Burner operation

Combustion air



Burner device has been provided with a fan that is tailored to produce high and steady air pressure, that is required to get a flawless ignition and good combustion in a modern combustion chamber. A servomotor controls the amount of air fed according to the amount of fuel combusted.

#### Pre-ventilation and ignition

Before ignition burner runs through pre-ventilation period.

During the pre-ventilation period the burner fan is ran with full load settings to exhaust explosive fumes from the boiler.

After the end of the pre-ventilation period servomotor turns to the position of ignition load and solenoid valve (NC) opens. The oil pressure begins to take effect on the nozzle control circuit. Oil flows from the nozzle. Spark between the ignition electrodes ignites oil spraying from the nozzle.

#### Atomizing

During burner operation the capacity controller drives the servomotor, which drives the oil regulator and air dampers between partial load and full load according to the capacity demand.

If the burner shuts down main solenoid valves closes. Oil pressure is released from nozzle valve. Nozzle valve springback closes the needle valve in the nozzle and closes the oil flow in the nozzle.

The oil quantity to be burnt (= burner capacity) is regulated by means of the oil regulator by throttling the oil return flow. At partial load the oil regulator is open and at full load closed.

Atomizing pressure is provided by the burner oil pump.

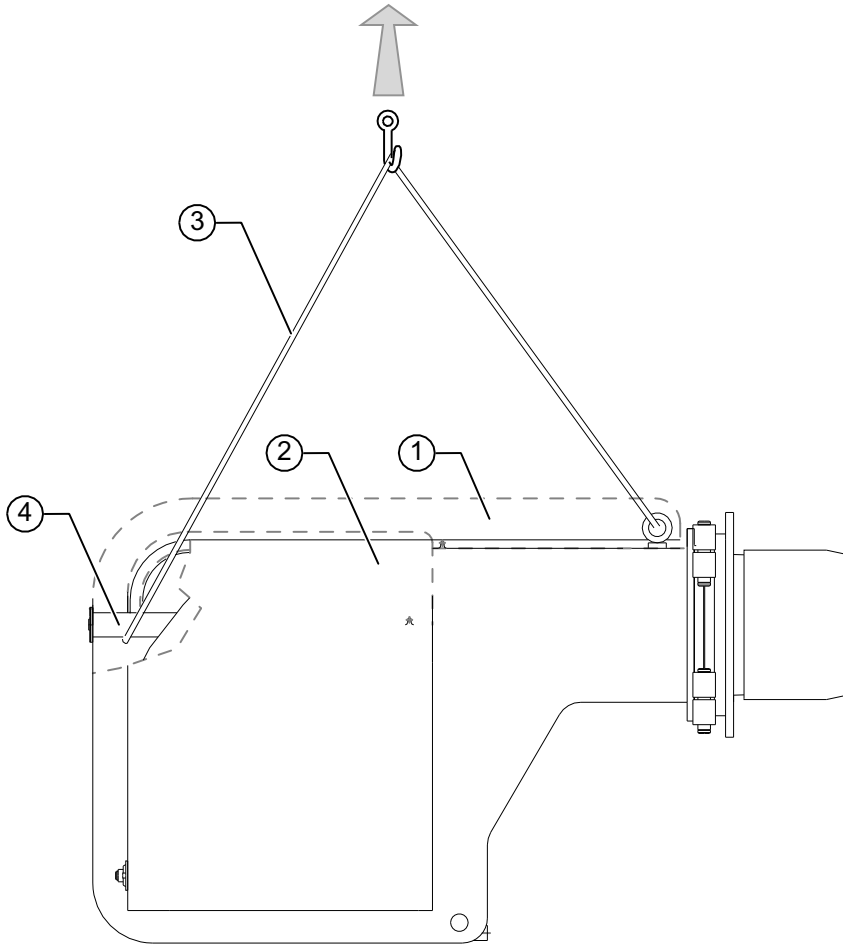
In-let oil pressure to the pump varies case-specificly; See 'Pump adjustments'.

The nozzle is controlled by the the control circuit pressure (open-close).

For safety reason there is a throttle plug in the control flow line fitted to the connection of solenoid valve (NC), with an aperture of  $\varnothing 1,5$  mm. This plug reduces the strong control flow, which is directed onto the spring-loaded piston.

### 3. Installing the burner

#### 3.1. Lifting the burner

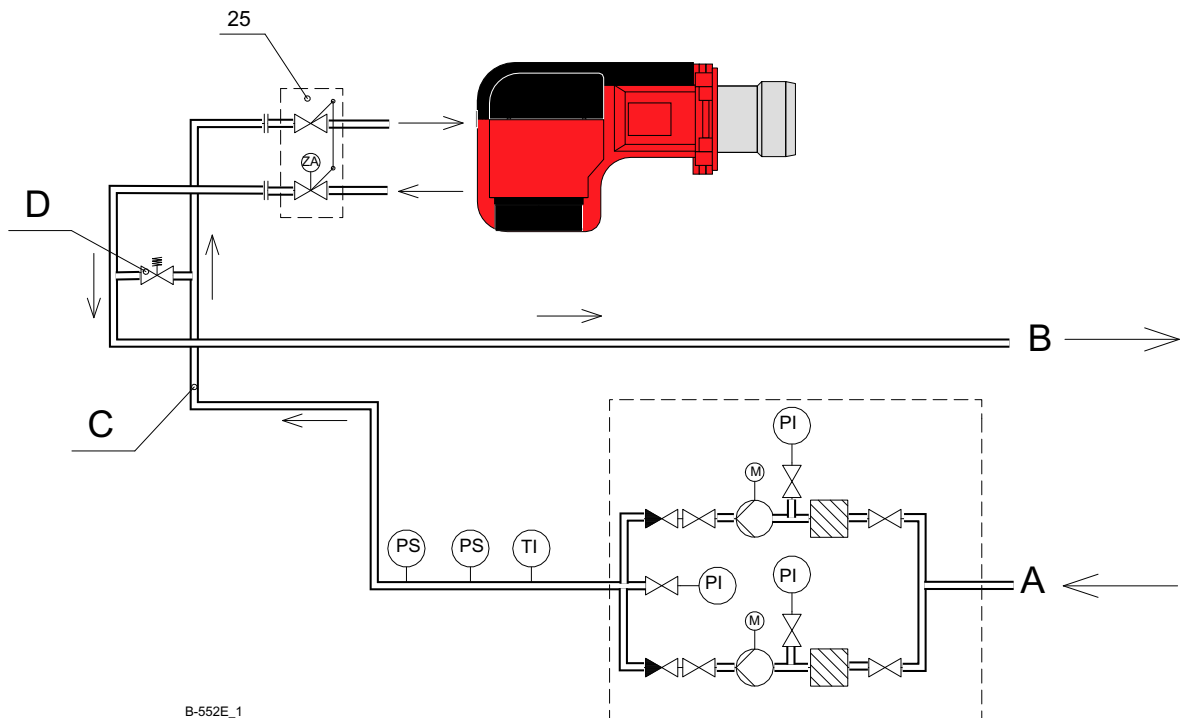


1. Protective cover
2. Protective cover
3. Lifting belt
4. Lifting pipe

- Remove protective covers
- Thread the lifting belt through lifting eyes and around the pipe.
- Lift as shown in the drawing

### 3.2. Exemplary Oil supply diagram

Oil supply diagram



B-552E\_1

25 - double closing valve (accessory)

A - Oil from tank

B - Return line to tank

C - Oil from pumping unit

D - Pressure regulating valve

The oil throughput from the pumping unit must be at least  $1,2 \times$  quantity of oil to be burned  $\text{kg/h} + 150 \text{ kg/h}$

Example

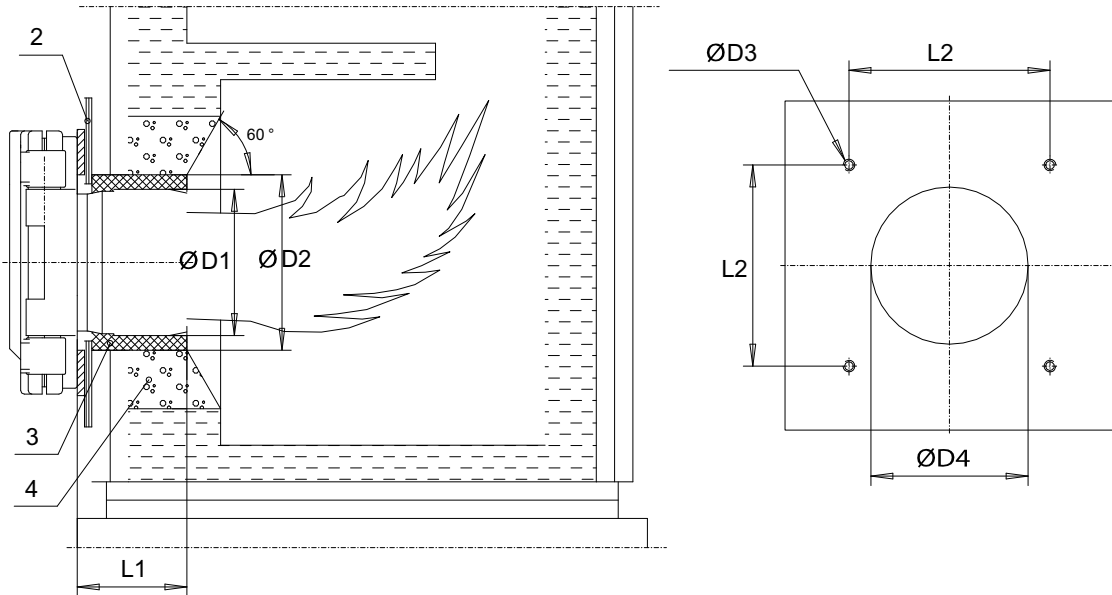
If	Then
burner capacity is 200kg/h	throughput must be $1,2 \times 200 \text{ kg/h} + 150 \text{ kg/h} = 390 \text{ kg/h}$

<b>!</b> Note	Pay attention to instructions from the pump manufacturer when dimensioning the pipeworks.
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### 3.3. Burner Installation

#### Mounting dimensions



1. Gasket
2. Mounting plate
3. Ceramic wool or similar
4. Refractory

Burner type	Dimensions in mm					
	D1	D2	D3	D4	L1	L2
KP 400M	300	340	M20	370	255	365

#### Burner mounting

The boiler front plate must be prepared in accordance with the given dimensions.

The threads of the bolts must be coated with graphite-bearing grease prior to fitting

The burner has to be installed in such a way that the motor shaft lies horizontally; however, it is not allowed to install the burner upside down.

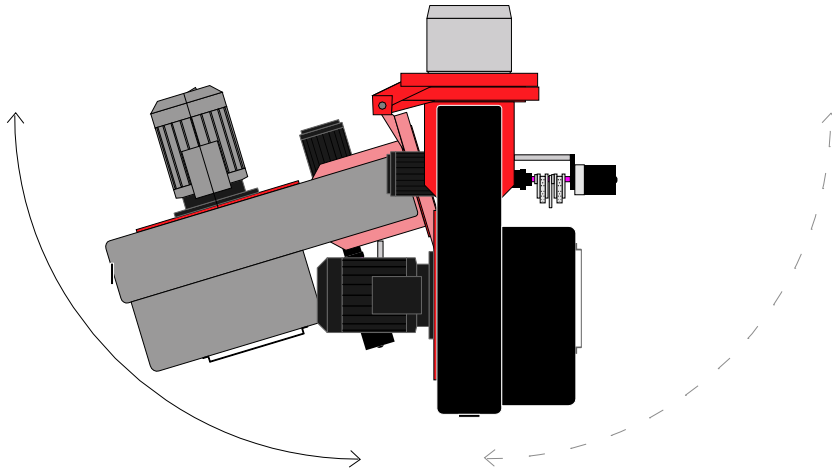
Remove the transportation bracket after the burner is attached to the boiler

Make sure there is enough free space on the side to allow the burner to swing fully open


	<p>The burner must be installed firmly. Vibrations may damage burner or its components.</p>
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### 3.4. Burner hinges

Standard composition

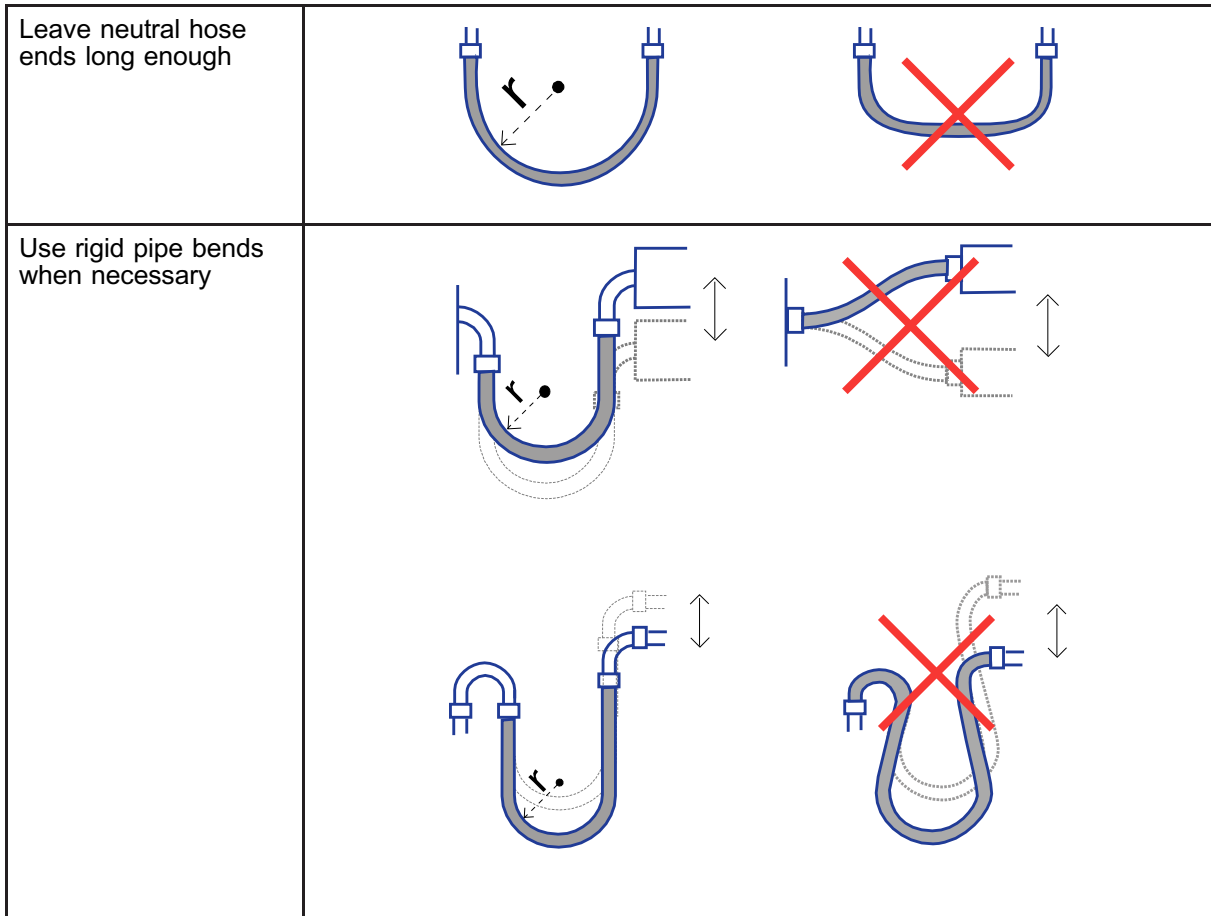


Default burner swings to the left. Right side hinging is delivered on request only.

 <p><b>CAUTION</b></p>	<p>Switch off the electric power from your burner before burner swing-out.</p>
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### 3.5. Installing hoses

#### Avoid torsion stress on hoses

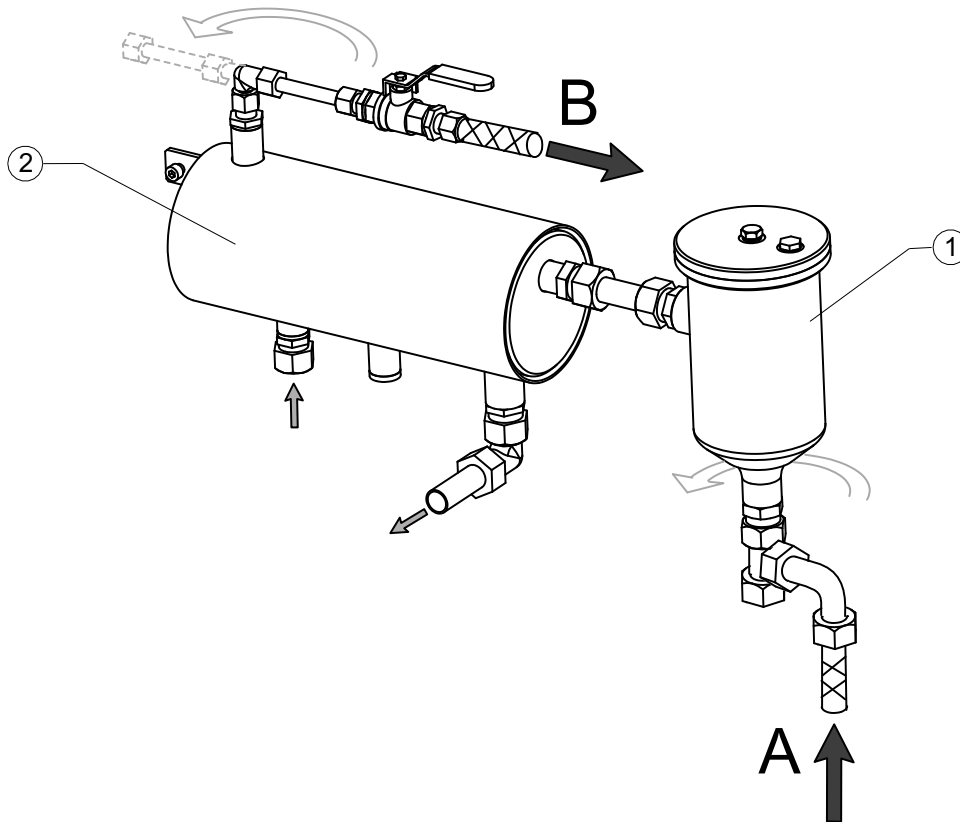


#### Minimum bend radius

Hose diameter	Minimum bend radius ( r )
Ø 12	130 mm
Ø 15	130 mm
Ø 22	170 mm

### 3.6. De-aerator and oil filter

#### Installation



A = Oil to burner

B = Oil to tank

1. Oil filter

2. De-aerator


### 3.7. Electric connections

#### Connections

The burner must be connected according to the electrical diagrams delivered together with the burner. General and local standards and regulations as well as requirements of electrical equipment on electrical connections must be adhered to. Burner instrumentation has to be configured with a switch that allows it to be disconnected from the low-voltage supply mains.

## 4. First start-up and adjusting

### 4.1. First start-up


 <p><b>DANGER!</b></p>	<p>Keep the boiler door closed while starting the burner and during burner operation.</p>
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#### First start-up


The following should be checked before first start-up:

- connections are correct (the rotation direction of the motor is correct)
- settings of boiler regulating and control devices are correct
- boiler and its equipment are in working condition
- the pipings are done correctly and the joints on pipes and components have no leaks
- valves in supply line are open
- there is sufficiently water in the heating system
- burner is getting sufficient air ( air in-let gap to the boiler room)
- there is oil in the tank
- oil temperature are adequate (viscosity)
- the instructions of boiler and burner manufacturers have been followed

	<p>Prior to first start-up and after changing the pump - oil pump must be vented. The pump must not operate without oil.</p>
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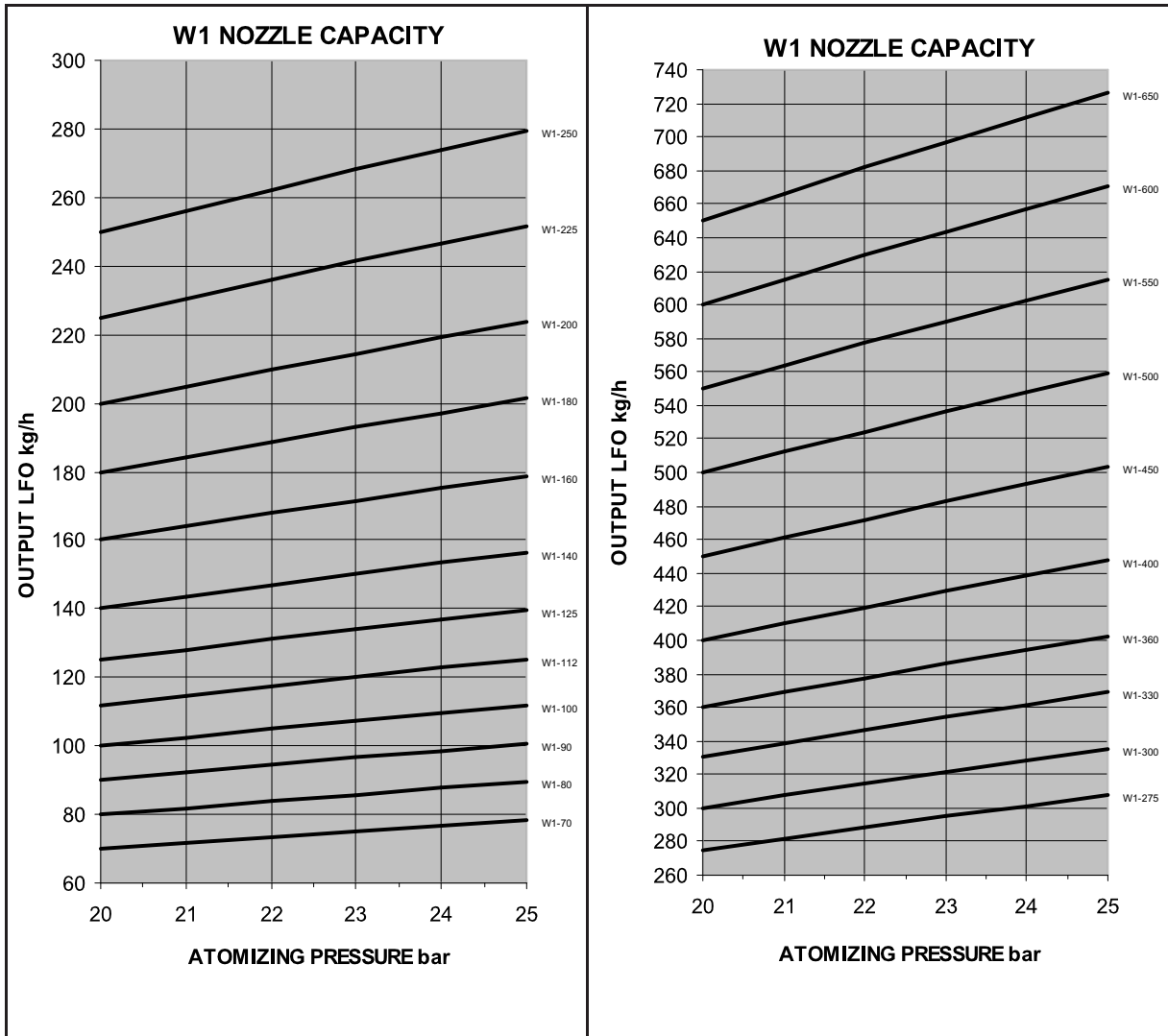
 <p><b>DANGER!</b></p>	<p>Never use a naked flame while checking the burner or the boiler.</p>
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 <p><b>DANGER!</b></p>	<p>Wear hearing protectors, if there is noise in the boiler room.</p>
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 <p><b>CAUTION</b></p>	<p>While adjusting the burner, make sure that minimum and maximum values for burner capacity are not exceeded. Values are marked on the type label.</p>
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### 4.2. Nozzle capacity charts

Nozzle capacity charts Fluidics 12 W1



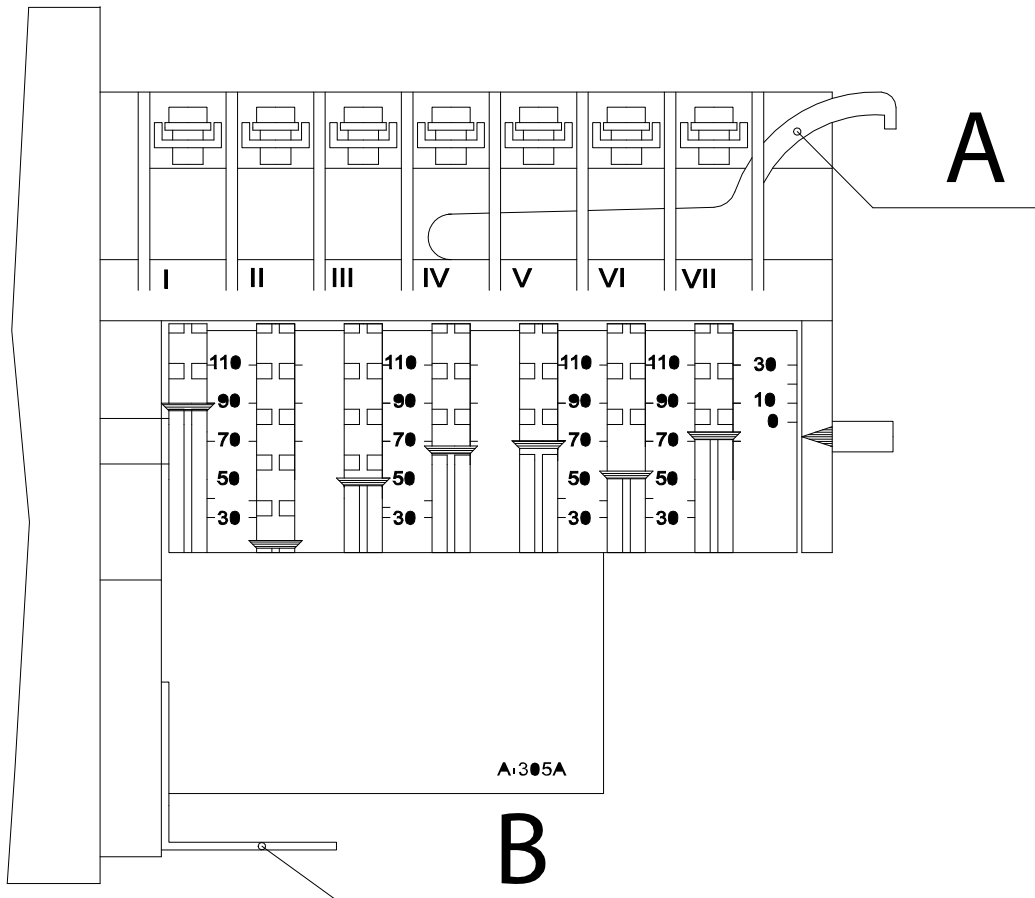
#### Fuel consumption by boiler capacity

$q = \frac{P}{\mu} \cdot Q$	<p>P = boiler capacity kW                  μ = boiler efficiency, 0,80-0,95                  Q = heat value, kWh/kg                  q = fuel demand, kg/h (Note! all nozzles)</p>
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Heat value for light fuel oil approx. 11,86 kWh/kg and for heavy fuel oil approx. 11,22 kWh/kg. Check exact values from supplier.

### 4.3. Adjusting combustion air

#### Cam switch position in principle SQM 10...-motor



#### Cam switch function in a modulating burner


Cam switches (limit switches) are set at the factory during testing as follows:

II	Air dampers closed (approx. 0°). With gas fuel shutdown, ignition capacity and part capacity
III	Ignition capacity (approx. 30°)
IV	Part capacity, when switching between part capacity levels (approx. 40°)
V	Part capacity, when switching from full capacity to part capacity (approx. 45°)
I	Full capacity (approx. 130°)

- A = adjusting key
- B = release switch

Release switch B enables manual setting of the adjusting mechanism

Difference between IV and V must be approx. 3-5°. Cam switches VI and VII are not in use.

 Note	Do a flue gas analyzis to verify adjustments
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#### 4.4. Adjusting pressure drop in combustion head

##### Effect of the adjustment ring

Position of the adjustment ring effects on the pressure drop in the combustion head. Pressure drop is adjusted by moving the adjustment ring back and fort thus altering the gap between the adjustment ring and the diffuser plate. With a small load the adjustment ring is positioned to the front and with a full load in the rear.

If...	Then...	And...
the adjustment ring is not positioned rear enough with a full capacity	there is too much pressure drop in the combustion head	the igniton is poor OR improper burning due to inadequate amount of air (high CO-content) OR flame tear-off from the diffuser disc when switching to higher capacity
the adjusment ring is too rear with lower capacity	there is not enough pressure drop	deficcient combustion (O <sub>2</sub> -values too high)

##### Combustion head pressure drop minimum

- with gas 2 mbar
- with heavy fuel oil 4 mbar
- with light fuel oil 3 mbar

##### Note!

If the position of the adjustment ring has to be altered in relation to the diffuser disc, the air velocity and quantity in the combustion head will change. Check the combustion values by flue gas analysis and, if nbsary, adjust the combustion air quantity to be adequate.

##### Adjusting the combustion air

Combustion air volume is adjusted with the adjusting cam.

1. Check the surplus oxygen level from the gas flue after every adjustment with a flue gas analysator.
2. Set the combustion air levels within the operation range of the servomotor

Guideline values

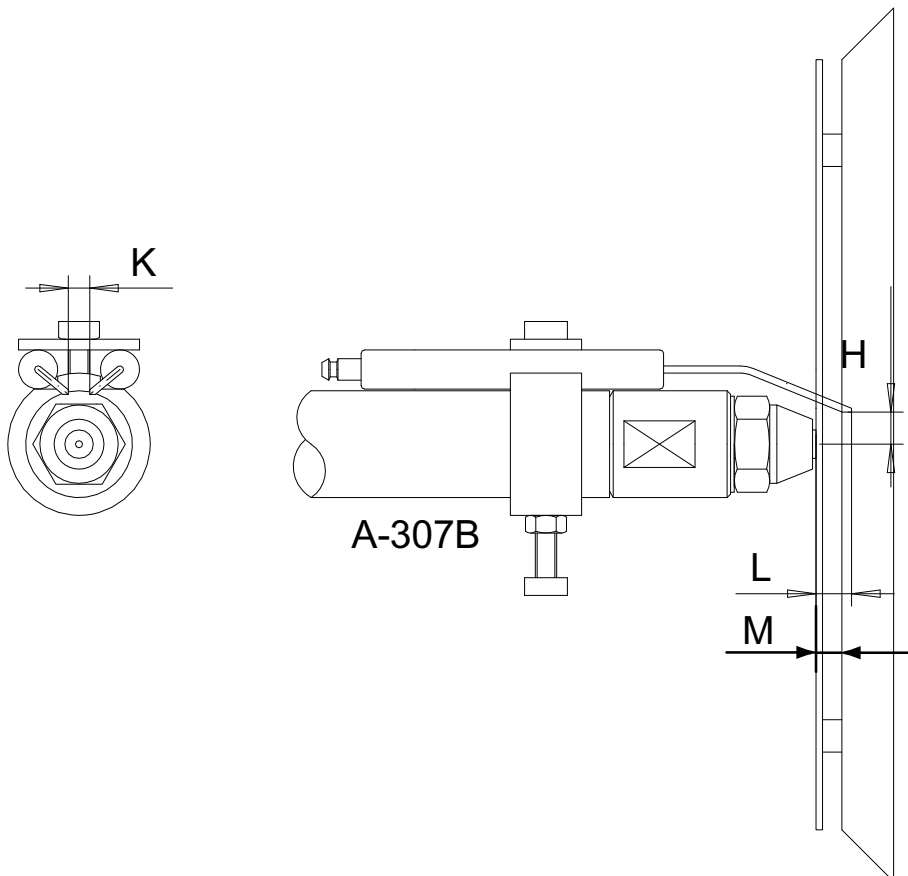


CAPACITY	FUEL	O <sub>2</sub> -LEVEL %
Ignition, minimum- and part capacity	Heavy fuel oil	4,5 - 6
Full power	Heavy fuel oil	3 - 4,5
Ignition, minimum- and part capacity	Light fuel oil	3,5 - 4,5
Full capacity	Light fuel oil	3 - 4

#### 4.5. Setting the burner head

##### Setting the ignition electrodes

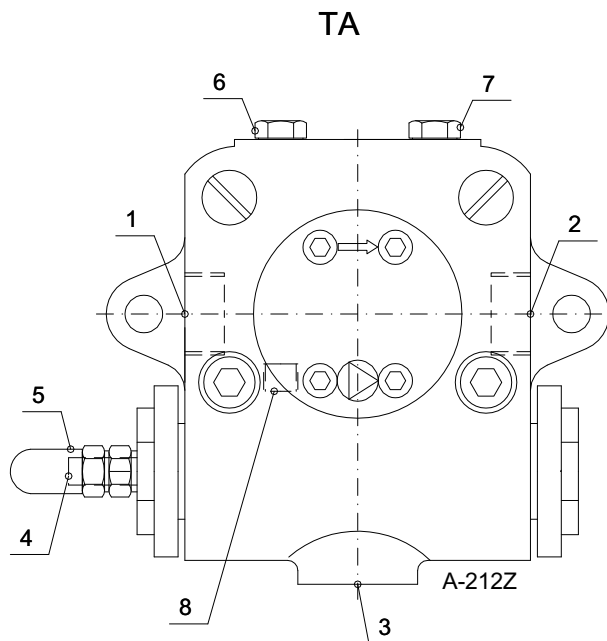
Check and set the ignition electrode spark gap and the distance of the nozzle to the ignition electrodes and diffuser disc as show on the drawing.



H	9 mm
K	3 mm
L	10 mm
M	8 mm

## 4.6. Oil pump

### Oil pump connections



1. Suction line connection
2. Oil to nozzle
3. Return line connection
4. Pressure adjustment
5. Protective cap
6. Oil inlet pressure gauge port
7. Oil pressure gauge port (to nozzle) / air venting
8. By-pass plug

Pump body includes a drilling to accept an electric preheater.

The pump has a built-in pressure control system

### Pump values

TECHNICAL DATA	PUMP TA
Viscosity limits for incoming fuel: Light fuel oil	1.5 - 12 mm <sup>2</sup> /s (cSt)
Max. oil inlet pressure to burner	5 bar
Pump operating pressure (=atomizing pressure) for light fuel oil	20 - 25 bar

- Note! 1 bar = 100 kPa.

### Pump pressure adjustment

Use the pressure adjustment screw. Turn the screw clockwise to increase the pressure. Install a pressure gauge/valve -assembly if necessary.

### Venting the oil pump

1. Loosen the plug of the pressure gauge port. Note! Do NOT remove the plug.
2. Let the burner operate for a while. Bubbles of air come out of the opening
3. Retighten the plug when no more bubbles appear

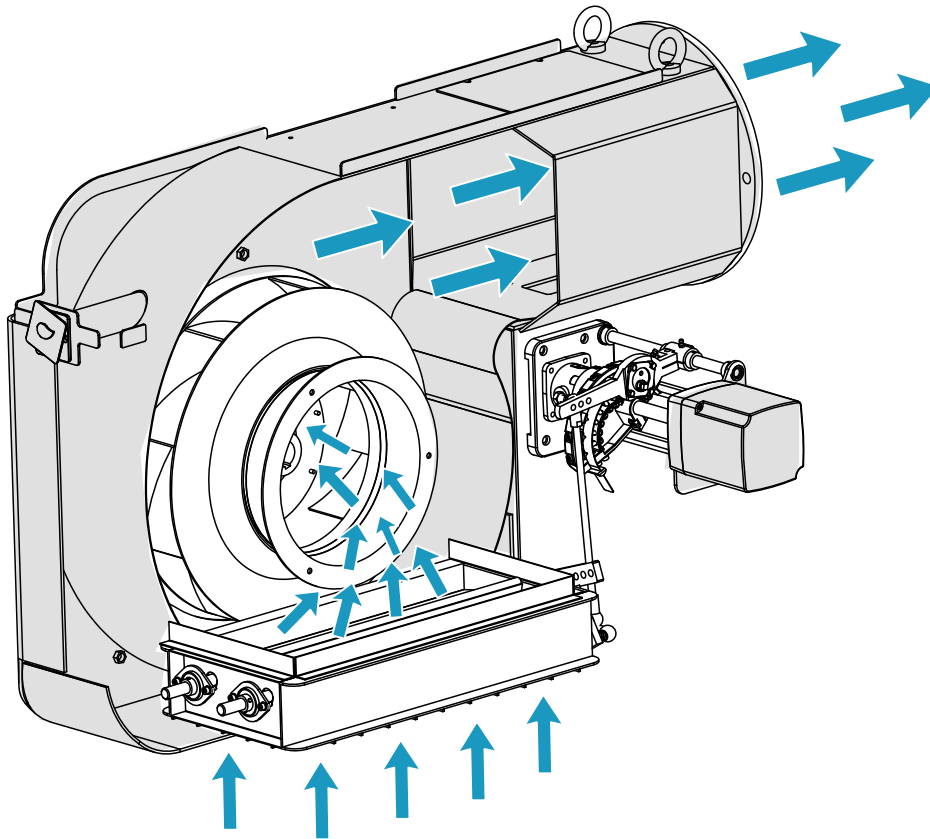
<b>!</b> Note	The pump is self-priming. The pump is intended for use in two-pipe system (=ring main system).
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## 4.7. Compound regulator

The oil quantity to be burned is determined by nozzle size and oil pump pressure. The oil regulator controlled by the servomotor regulates the return oil flow according to the capacity demand.

At partial capacity the oil regulator is open so that the oil throughput in the valve is at maximum and return flow pressure and nozzle capacity are adequate.

At full capacity the oil regulator is closed whereupon the oil throughput is at minimum and the pressure at maximum. The air quantity is matched to the oil quantity to be burnt by means of the spring band on the adjustable cam disc (see "Adjustable cam disc").

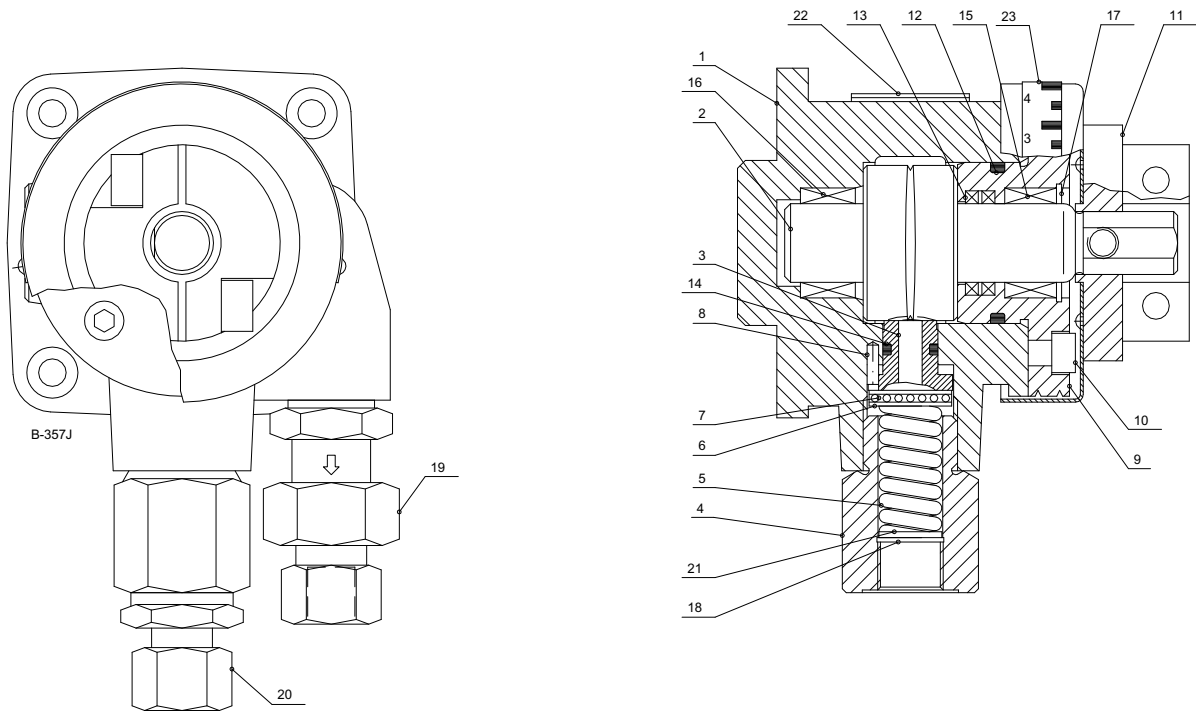


The burner is preadjusted at the factory. Accurate adjustments to be made with a flow meter at site

<p><b>!</b> Note</p>	<p>Do a flue gas analyzis to verify adjustments</p>
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## 4.8. Oil regulator

### Oil regulator components



1. Body
2. Dosing shaft
3. Dosing nozzle
4. Nipple
5. Pressure spring
6. Thrust washer
7. Roller bearing
8. Spring cotter
9. Front flange
10. hexagonal socket screw
11. O-ring
12. X-ring
13. O-ring
14. Needle bearing
15. Needle bearing
16. Retainer ring
17. Retainer ring
18. Non-return valve
19. Coupling
20. Washer
21. Indicator
22. Scale

- B - Oil to valve
- C - Oil from valve

### Oil regulator function


A pointer indicates the turn angle of the servomotor shaft. At point 1 the dosing shaft is open. Return flow is at maximum and return pressure at minimum. At point 13 the dosing shaft is closed. Return flow is at minimum and return pressure is at maximum.

**!** Note

The pressure gauge on the regulator shows the return pressure. There is a number on the dosing shaft and on the indicator which shows the size of the groove on the shaft.

## 5. Maintenance

### 5.1. Burner maintenance


	<p>Cut off electric current from the burner and close manual shut-off valves always before any maintenance work. Cutting power is adequate when just inspecting the device.</p>
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To maintain flawless operation it is recommended to do the following at least once a year:

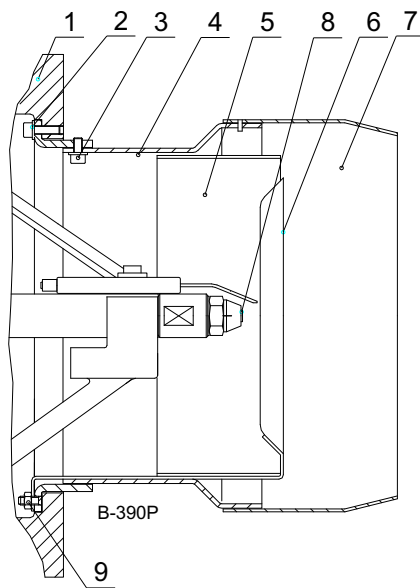
1. Check the burner head extension and change if necessary.
2. Check the diffuser disc and change if necessary.
3. Clean the ignition electrodes and check their setting.
4. Change the oil nozzle if it is worn or damaged.
5. Check the position, condition and cleanness of the flame detector.
6. Clean filters. Filters may have to be cleaned more often depending on circumstantial conditions.
7. Check the air dampers lock screws and the servomotor axle lock. Retighten if necessary.
8. Check and lubricate the joints on adjustment rods.
9. Check the oil pump capacity.
10. Clean your burner from dust and moisture.
11. Check regularly the combustion characteristics by flue gas measurements (after refilling of the storage tank or at least once a year).
12. Check if the oil tank needs to be cleaned. The oil tank must be cleaned at least every 4-5 years.

Correct installation and adjustments and regular maintenance ensure correct operation of the burner.

- Service the burner annually
- Use only original spare parts. When ordering spare parts please give the burner type and serial number indicated on the burner nameplate or manufacturing card

	<p>The burner contains electric and electronic components. Adhere to rules and regulations from local authorities when disposing.</p>
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## 5.2. Dismounting the combustion head



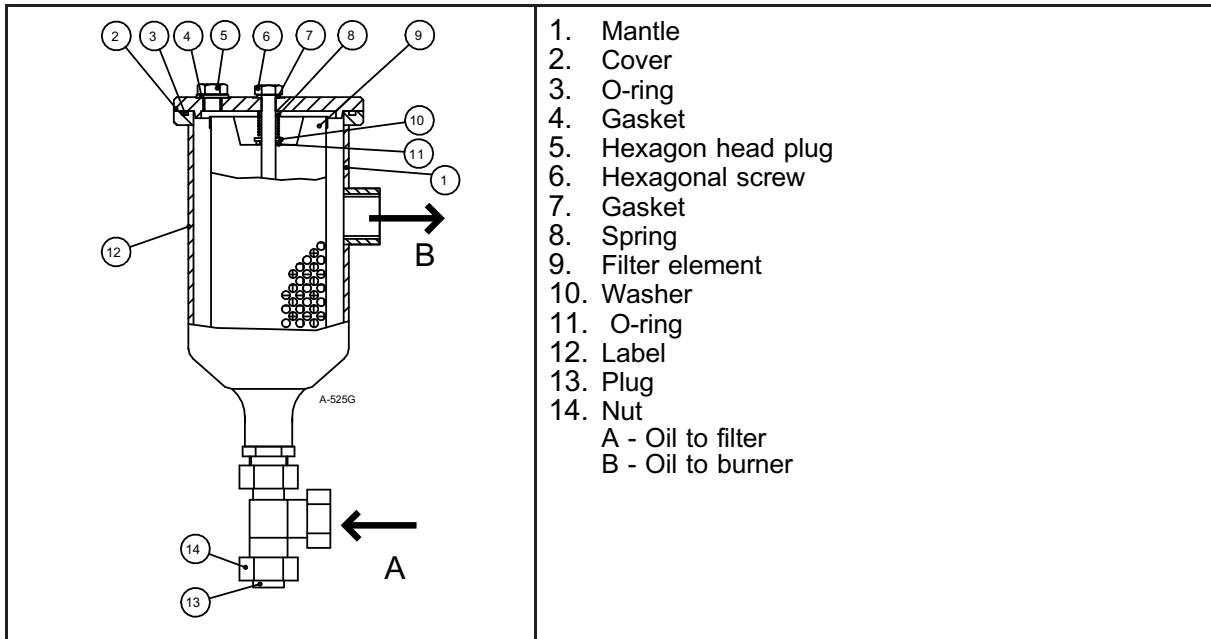
1. Burner body
2. Fixing screw of combustion head
3. Fixing screw of combustion head guide
4. Combustion head guide
5. Adjustment ring
6. Diffuser disc
7. Combustion head extension
8. Nozzle
9. Fixing bolt of diffuser disc

- Detach the burner from boiler or open boiler door.
- Detach fixing screws of combustion head guide.
- Detach fixing screws of adjustment ring.
- Pull out the adjustment ring.
- Detach fixing bolts of diffuser disc.
- Pull out the diffuser disc.
- Pull out the combustion head guide along with combustion head extension from the fire chambers side. The combustion head extension is fixed with rivets to combustion head guide.
- Reassemble in reverse order



### 5.3. Oil filter

#### Oil filter components



<p><b>Note</b></p>	<p>Before filter cleaning make sure that oil does not flow to the filter.</p>
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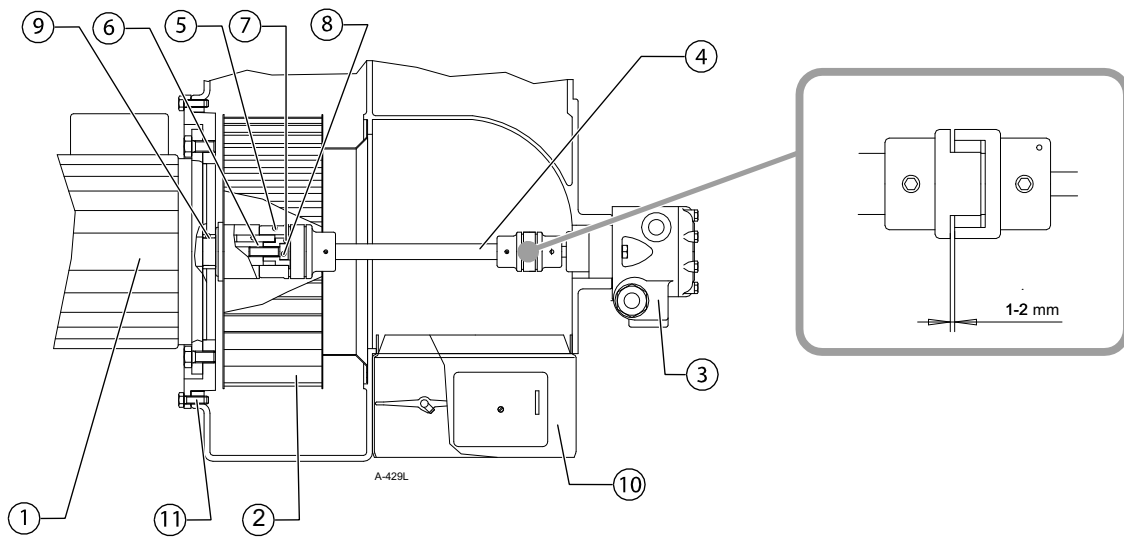
#### Cleaning

- Remove the plug by loosening the nut.
- Loosen the hexagonal screw and open the filter cover and remove the element. A suitable solvent and a soft brush, which does not damage the screen, can be used for cleaning of the element.
- If there is some dirt in the filter, it can be removed by for ex. vacuuming. Check the condition of O-rings as well as the condition of the washer.
- Lock the plug with nut.
- Place the filter element into the filter and then the cover.
- Fasten the fastening screw on the cover with a torque of 25 - 30 Nm.

### 5.4. Changing burner motor

<p><b>DANGER!</b></p>	<p>Cut off electric power from the burner and make sure the motor is not under voltage</p>
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**Components**



1. Motor
2. Fan wheel
3. Oil pump
4. Intermediate shaft
5. Coupling head
6. Wedge
7. Intermediate bushing
8. Fixing screw for fan wheel
9. Base bushing
10. Air dampers
11. Fixing screw for mounting flange

**Dismounting the fan wheel**

- Switch off the electric power from the burner.
- Disconnect the electric cable of the motor.
- Remove pressure pipe from the oil pump.
- Remove air dampers. Do not let the air dampers hang on servomotor cable!
- Unscrew screws of oil pump.
- Support with hand the intermediate shaft and withdraw the oil pump.
- Unscrew screws in the mounting flange of the motor and remove the motor (note the weight of the motor).
- Unscrew the fixing screw of the fan wheel.
- Remove intermediate bushing and coupling head.
- Withdraw the fan wheel from the motor shaft using an extractor.
- Loosen the wedge and the base bushing.

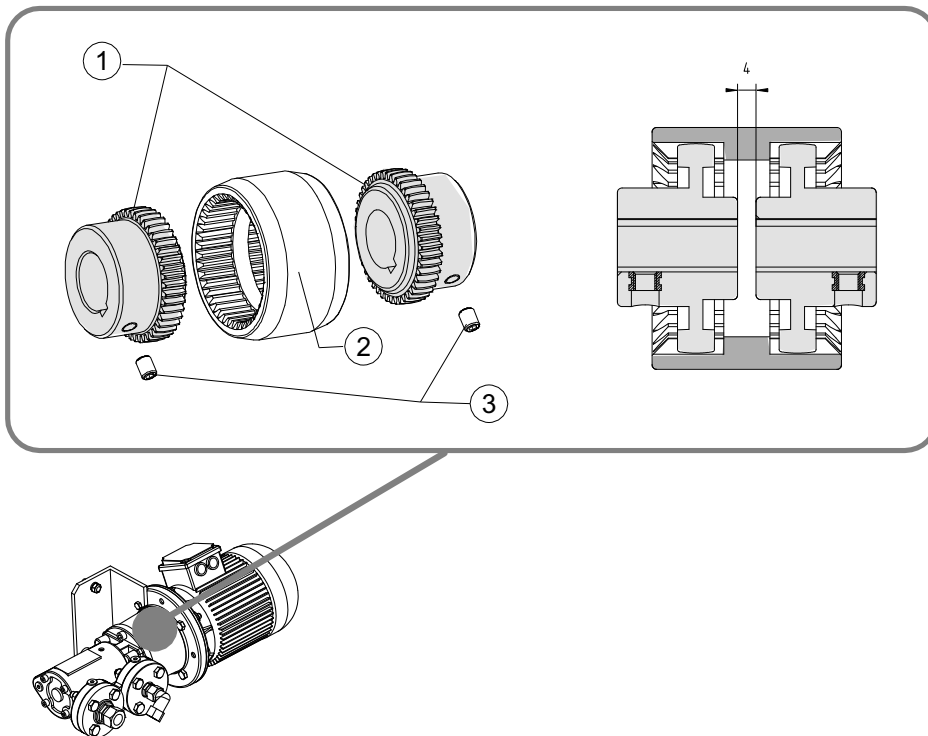
**Mounting the fan wheel**

- Place the base bushing.
- Set the wedge into the shaft slot.
- Pull the fan wheel to its place using a binder plug. The fan wheel lies against the base bushing.
- Place the coupling head and the intermediate bushing.
- Fasten the fan wheel with fixing screws to the motor shaft.
- Place the motor and fasten the screws.
- Support with hand the intermediate shaft and install the oil pump. Fix the pump with locking screws.

- Check the axial gap of the coupling heads (1-2 mm). Adjust, if necessary.
- Place the air dampers.
- Fix the pressure pipe of the oil pump (remember to vent the oil pump).
- Connect the electrical cable to the motor.
- Fix the fuses and connect the burner to the mains (check direction of rotation in the motor).

## 5.5. Oil pump coupling

### Oil pump coupling components



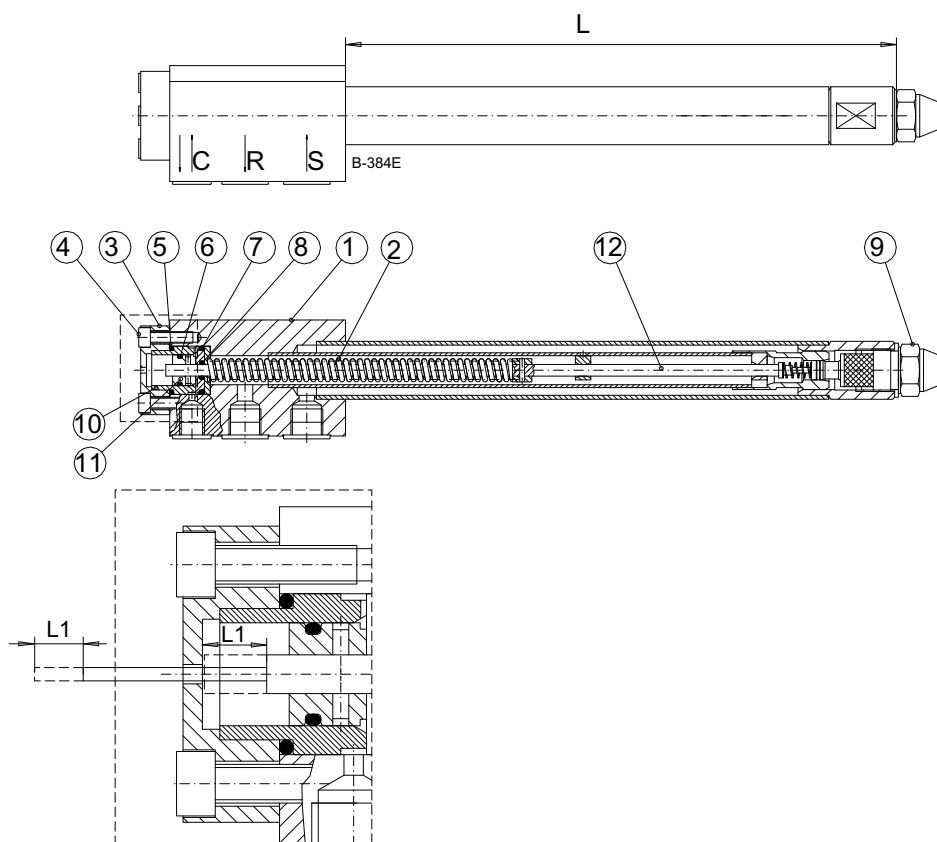
1. Hub
2. Sleeve
3. Set screw

Set a distance between the hubs. See image.

<p><b>!</b> Note</p>	<p>Check the correct assembly direction for hubs</p>
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## 5.6. Nozzle Valve RPL-1

### RPL-1 Components



1. Body
2. Break spring
3. Rear cover
4. Hexagonal socket screw
5. O-ring for cover 18,72 x 2,62 Viton
6. O-ring for piston 12 x 2 Viton
7. O-ring for bottom plate 18,72 x 2,62 Viton
8. O-ring for spindle 6 x 2 Viton
9. Oil nozzle
10. Cylinder
11. Piston
12. Spindle

C Control circuit

R Return from nozzle

S Outlet to nozzle

L Nominal size of nozzle valve

L1 Nozzle open position (chacking the spindle movement )

### RPL-1 Operation principle

The opening of the nozzle valve is controlled by solenoid valves and oil pressure. The force of the oil pressure on the piston must exceed the force of the spring. The pressure of the spring closes the nozzle valve, when the oil pressure stops having effect on the nozzle valve. The needle valve of the nozzle closes. The needle in the nozzle valve is complete withdrawn when the oil pressure in the control circuit is approx. 1800 kPa (approx. 18 bar).

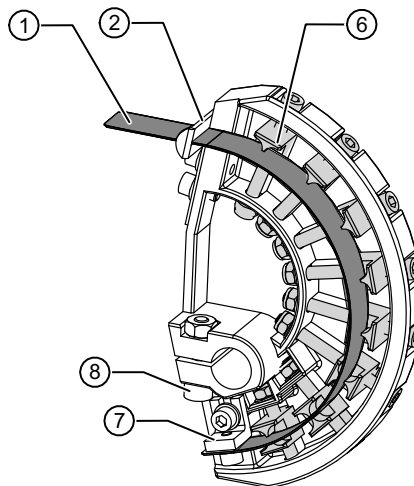
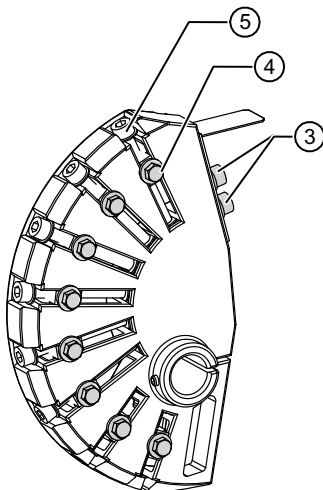
### When to change nozzle

If the nozzle seems to be functioning improperly, you may clean the nozzle with diesel oil. If cleaning does not fix the problem, the properties of the nozzle have got worse and the nozzle has to be changed. The new nozzle has to be of same type as the original.

If there is an oil leak from the hole in the rear cover , change the nozzle or install a repair kit.

## 5.7. Adjusting cam

### Adjusting cam components



#### 1. Spring band

- 1.1. Spring band guide
- 1.2. Locking screws of spring band guide
- 1.3. Adjusting guide locking screw
- 1.4. Adjusting screw
- 1.5. Adjusting guide
- 1.6. Locking guide
- 1.7. Axle lock (hexagon socket-head screw)

### Adjusting cam function


The adjusting cam regulates the air flow into the burner relative to the quantity of atomized fuel.

Profile of the spring band sets the dampers positions at any point within the adjusting range. The profile of the band can be shaped with the adjusting guide and the adjusting screws.

The air dampers are connected to the adjusting cam with the adjusting lever. The adjusting lever moves according to the profile of the spring band. Combustion values have to be verified by doing a flue gas analysis with every adjusting cam individually.

**Adjusting the spring band**

Adjust the spring band by turning the adjusting screws

 <p><b>CAUTION</b></p>	<p>The edges of the spring band are sharp. Unwary handling may cause slashes</p>
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**Changing the spring band**

1. Remove the servomotor along with its locking plate from the compound-regulator.
2. Release the first adjusting lever from compound-regulator
3. Release the adjusting flange
4. Release the locking screw of the spring band and the spring band guide.
5. Replace the damaged spring band
6. Reassemble the components by following these instructions in reverse order


**5.8. Trouble shooting hints**

**Basic checks**

In the event of fault conditions the basic requirements for correct operation must be first examined:

1. Check the electric supply (control and supply voltages).
2. Check the fuse on the control unit by pressing the control unit reset button. If the fuse is intact this should cause a fault condition lockup.
3. Check that all regulating and control devices are correctly set.
4. Check that all the safety devices are in normal operating condition
5. Check is the burner getting fuel, are the valves in fuel line open, is there oil in the tank
6. Check is there sufficiently water in the heating system?
7. Check that the direction of motor rotation is correct

If the error does not resolve with means mentioned above, examine functions of burner control device and use trouble shooting hints to locate fault. Using measuring equipment may be useful.

 <p>Note</p>	<p>Burner control device may vary. Refer to manufacturer documentation.</p>
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Below is a list of symptoms and possible causes to help trouble shooting.

**Start failure**

- A break in control circuit
- Faulty air difference meter
- Faulty control device
- Faulty servomotor
- Faulty servomotor limit switch
- Air dampers or adjustable cam disc is stuck

**Start failure: Burner motor**

- A break in main circuit
- Heat relay triggered
- Fuse triggered
- Faulty motor contactor
- Faulty motor
- Faulty control device
- Oil pump pressure too low
- Faulty pressure switch

**Start failure: Oil pump motor**

- Break in main circuit
- Heat relay triggered
- Fuse triggered
- Faulty motor contactor
- Faulty motor
- Faulty control device
- Oil pump pressure too low
- Faulty pressure switch

**Start failure: Poor or no air pressure**

- Wrong adjustments of the air pressure difference switch
- Air pressure difference switch tube dirty
- Faulty air pressure difference switch
- The fan is dirty
- Wrong rotation direction of the motor

**Ignition failure**

- Dirty or worn ignition electrodes, insulator cracked
- Ignition electrodes too far apart
- Ignition cable damaged
- Faulty ignition transformer
- Connection joint of ignition transformer is loose or damaged
- Faulty control device

**No flame establishment**

- faulty coil on solenoid valve
- damaged cable
- Faulty control device
- Ignition capacity set too low
- O<sub>2</sub>-level too high

- Air pressure difference too high
- Nozzle does not open
- Nozzle piston clogged (modulating burners)
- Clogged throttle plug
- Oil atomizing pressure low
- Faulty O-ring on the nozzle
- Faulty main solenoid valve
- Faulty coil on main solenoid valve
- Oil viscosity too high.
- Temperatur too low

#### **Oil pump failure**

- Supplies no oil or atomizing pressure is too low : Dirty filter
- Supplies no oil or atomizing pressure is too low : Leaking suction line of transfer pump
- Pump capacity decreased : pump is worn or faulty
- Loud mechanical noise : insufficient in-let pressure to the burner
- Loud mechanical noise : In-let oil temperatur too low
- In-let oil pipings connected incorrectly

#### **Error after flame establishment**

- Incorrect burner adjustment
- Dirty filters
- Clogged nozzle
- oil preheater is faulty or oil preheater's capacity is inadequate
- incorrect setting on low limit of oil temperature
- Supply oil temperature too low

#### **Oil leaks into the combustion chamber**

- Nozzle valve and main oil valve or nozzle valve and non-return valve do not close properly
- Valves are leaking
- Constant oil leak from the nozzle valve when the nozzle is closed : A leak in non-return valve or main solenoid valve

#### **Poor combustion**

- Unburned oil accumulate to combustion chamber
- CO-level too high
- Test spot too high
- Air pressure difference in the burner head is too low
- Combustion chamber is too narrow
- Wrong position of the diffuser disc
- Distance between ignition electrodes and the nozzle is incorrect

#### **Error due to flame monitoring**

- Incorrect position of flame detector
- Flame detector is unclean
- The flame is too weak (not bright enough)
- Faulty flame detector (due to damage or age)
- Faulty control device



- Incorrect flame signal due to extraneous light
- Oil or carbon deposits burn in combustion head
- Valves do not close

#### **Damage in burner head**

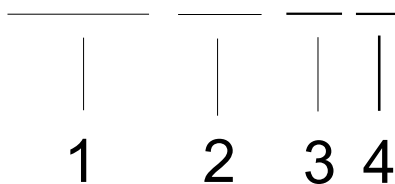
- Distance between diffuser disc and nozzle incorrect
- Combustion air settings are not correct
- Not enough supply air to the boiler room for constant combustion
- Incorrect size of the nozzle or wrong type
- Nozzle is worn
- Part capacity setting too low (H-T-burners)

## 6. Technical data

### 6.1. Type labelling on Oilon burners

Example of type labelling

GRP-150 M-II



Label element 1: Fuel

KP	Light fuel oil
RP	Heavy fuel oil
GP	Gas
GKP	Gas + light fuel oil
GRP	Gas + heavy fuel oil

Label element 2: burner size categorization

Label element 3: method of control

H	Two-stage
T	Three-stage
M	Modulating
ME	Modulating with a separate fan
P	High-Low or modulating with an electronic controller
LH	High-low with a preheater
	On-Off

Label element 4: possible additional code

## 6.2. Technical data

### Burner technical data

Weight	KP-400 M : 450 kg
Capacity kW	KP-400 M : 1000 - 3500
Capacity kg/h	KP-400 M : 85 - 300
Control unit	LAL 2.25 / LOK16 / PLC
Oil pump	KP-400 M : TA4
Oilhose connection (suction)	R 1"
Oilhose connection (return)	R ½"
Degree of protection	IP44
Control voltage	230 V (-15%... +10%), 50 Hz, 1-phase
Control voltage *on request*	230 V, 60 Hz, 1-phase
Control voltage *on request*	110 V, 50 Hz, 1-phase
Control voltage *on request*	110 V, 60 Hz, 1-phase
Supply voltage	380...420 V, 50 Hz, 3-phase
Supply voltage *on request*	440 V, 60 Hz, 3-phase
Supply voltage *on request*	690 V, 50Hz Hz, 3-phase
Supply voltage *on request*	690 V, 60Hz Hz, 3-phase

### Suply voltage option 380 V 50 Hz

Fan motor output kW	KP-400 M : 7,5
Fan motor current IN [ A ]	KP-400 M : 14,7
Fan motor efficiency [ % ]	KP-400 M : 85,1
Fan motor speed [ r/min ]	KP-400 M : 2915

Pump motor output kW	KP-400 M : 1,5
Pump motor current IN [ A ]	KP-400 M : 3,4
Pump motor speed [rpm]	KP-400 M : 42850
Pump motor efficiency [ % ]	KP-400 M : 79,7

**Supply voltage option 440 V 60 Hz**

Fan motor output kW	KP-400 M : 8,6
Fan motor current IN [ A ]	KP-400 M : 14,6
Fan motor efficiency [ % ]	KP-400 M : 86,5
Fan motor speed [ r/min ]	KP-400 M : 3430

Pump motor output kW	KP-400 M : 1,75
Pump motor current IN [ A ]	KP-400 M : 3,4
Pump motor speed [rpm]	KP-400 M : 3420
Pump motor efficiency [ % ]	KP-400 M : 79,7

**Supply voltage option 690 V 50 Hz**

Fan motor output kW	KP-400 M : 7,5
Fan motor current IN [ A ]	KP-400 M : 8,1
Fan motor efficiency [ % ]	KP-400 M : 87
Fan motor speed [ r/min ]	KP-400 M : 2855

Pump motor output kW	KP-400 M : 1,5
Pump motor current IN [ A ]	KP-400 M : 1,9
Pump motor speed [rpm]	KP-400 M : 2870
Pump motor efficiency [ % ]	KP-400 M : 80,1

**Supply voltage option 690 V 60 Hz**

Fan motor output kW	KP-400 M : 8,6
Fan motor current IN [ A ]	KP-400 M : 9,1
Fan motor efficiency [ % ]	KP-400 M : 87,6
Fan motor speed [ r/min ]	KP-400 M : 3455

Pump motor output kW	KP-400 M : 1,75
Pump motor current IN [ A ]	KP-400 M : 2,3
Pump motor speed [rpm]	KP-400 M : 3460
Pump motor efficiency [ % ]	KP-400 M : 80,1



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