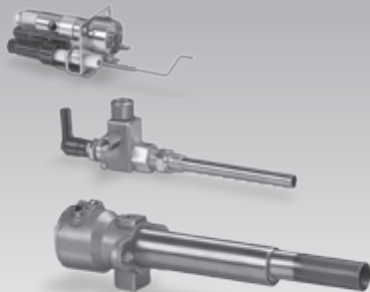


Operating instructions

Ionization pilot burners

ZAI, ZMI, ZKIH



Translation from the German

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Safety

Please read and keep in a safe place



Please read through these instructions carefully before installing or operating. Following the installation, pass the instructions on to the operator. This unit must be installed and commissioned in accordance with the regulations in force. These instructions can also be found at www.docuthek.com.

Explanation of symbols

•, **1**, **2**, **3**... = Action
> = Instruction

Liability

We will not be held liable for damages resulting from non-observance of the instructions and non-compliant use.

Safety instructions

Information that is relevant for safety is indicated in the instructions as follows:

DANGER

Indicates potentially fatal situations.

WARNING

Indicates possible danger to life and limb.

! CAUTION

Indicates possible material damage.

All interventions may only be carried out by qualified gas technicians. Electrical interventions may only be carried out by qualified electricians.

Conversion, spare parts

All technical changes are prohibited. Only use OEM spare parts.

Transport

On receipt of the product, check that the delivery is complete (see Part designations). Report any transport damage immediately.

Storage

Store the product in a dry place. Ambient temperature: see Technical data.

Checking the usage

Intended use

ionization-controlled pilot burners for safely igniting gas burners. The capacity of the pilot burner should be 2 to 5% of that of the main burner.

Can also be used as independently operated burners. For natural gas, town gas, coke oven gas and LPG. Other types of gas on request.

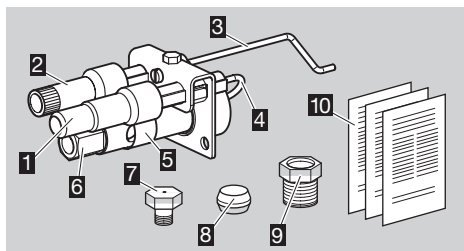
This function is only guaranteed when used within the specified limits – see also page 11 (Technical data). Any other use is considered as non-compliant.

SAFETY

Type code

ZAI	Thermo ionization pilot burner with two electrodes
K	Double-cone olive for 8 mm tube
TN	1/4" NPT internal thread

Part designations



- 1** Interference-suppressed adapter for ignition electrode
- 2** Adapter for ionization electrode
- 3** Ionization electrode
- 4** Ignition electrode
- 5** Air slide valve
- 6** Gas connection
- 7** 0.7 mm gas nozzle for LPG
- 8** Cone olive (only for ZAI K)
- 9** Cap screw (only for ZAI K)
- 10** Enclosed documentation: operating instructions

Gas connection – see type label.

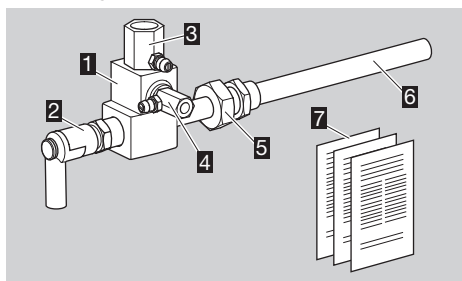


ZMI

Type code

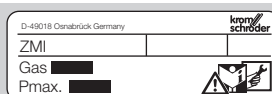
ZMI	ionization pilot burner with forced air supply and one electrode
16–25	Burner size
T	T-product
B	For natural gas
D	For town gas, coke oven gas
G	For LPG
150–1000	Flame tube length
R	Rp internal thread
N	NPT internal thread

Part designations



- 1** Burner housing
- 2** Interference-suppressed electrode adapter
- 3** Air nozzle
- 4** Gas nozzle
- 5** Mounting device
- 6** Flame tube
- 7** Enclosed documentation: operating instructions and flow rate curves

Burner size, gas type, rated capacity $P_{max.}$, flame tube length, connection – see type label.

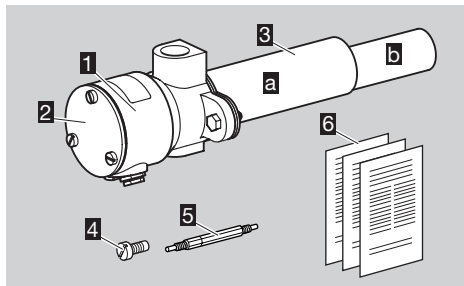


ZKIH

Type code

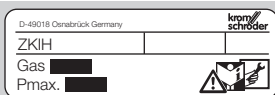
ZKIH	Ionization pilot burner with forced air supply
150–1000	Burner tube length
/100	Flame tube length
R	Rp internal thread

Part designations



- 1 Burner housing
- 2 Burner housing cover
- 3 Burner tube set, comprising protective tube **a** and flame tube **b**
- 4 Retaining screw for nozzle insert (in burner housing)
- 5 Nozzle insert (in burner housing)
- 6 Enclosed documentation: operating instructions and flow rate curves

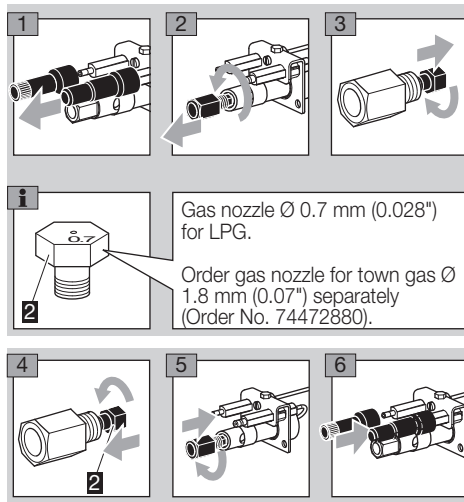
Rated capacity P_{\max} , gas type – see type label.



Setting the gas type

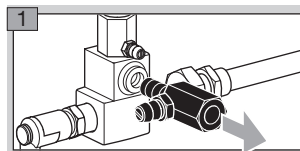
ZAI

- ▷ Pilot burners ZAI are set for natural gas on delivery.
- ▷ If the pilot burner is to be used with a different type of gas, retrofit the burner for its use.



ZMI

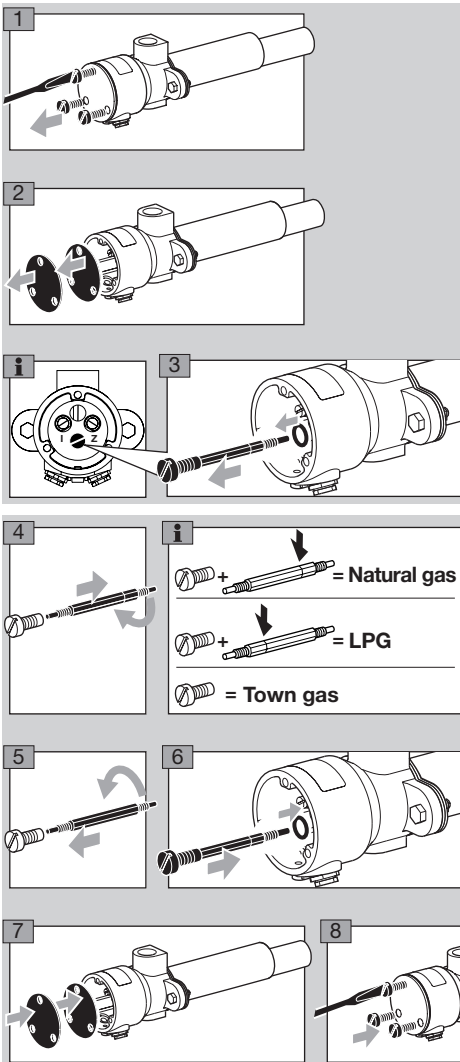
- 1 Check if the nozzle diameter is suitable for the required gas type.
- ▷ When changing the nozzle, remove the residue of sealant from the burner housing.
- ▷ Suitable nozzles – see page 10 (Accessories).



Gas type	Nozzle dia. [mm (inch)]	
	ZMI 16	ZMI 25
B	0.94 (0.037)	1.40 (0.055)
G	0.76 (0.029)	1.05 (0.041)
D	1.30 (0.051)	1.78 (0.070)

ZKIH

- ▷ Pilot burners ZKIH are set for natural gas on delivery.
- ▷ If the pilot burner is to be used with a different type of gas, retrofit the burner for its use.



- ▷ For operation with town gas, screw the retaining screw back in without the nozzle insert – do not store the nozzle insert in the connection box: danger of short-circuits.

9 After conversion to another type of gas, adjust the air volume – see page 7 (Commissioning).

Installation

⚠ DANGER

Risk of explosion! Ensure the connection is gas-tight.

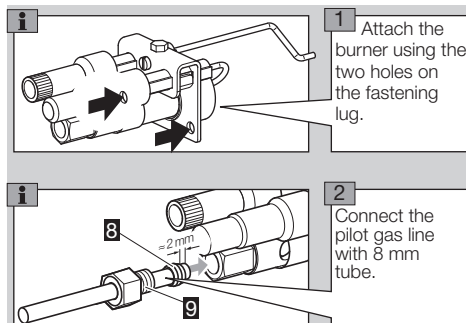
- ▷ Install the pilot burner so that reliable ignition of the main burner is guaranteed.
- ▷ Attach the pilot burner securely.
- ▷ We recommend that a filter be installed in the gas and air supply line respectively.

ZAI

- ▷ Inlet pressure:
natural gas: max. 35 mbar (14 "WC),
town gas: max. 30 mbar (12 "WC),
LPG: max. 60 mbar (23 "WC).
- ▷ In the case of higher inlet pressures, insert a gas restrictor orifice.
- ▷ Ensure air intake is not obstructed.
- ▷ The ZAI has bare electrodes and no protective flame tube. Protective tube, see page 10 (Accessories).

⚠ WARNING

Risk of injury! Observe the projecting ionization electrode.



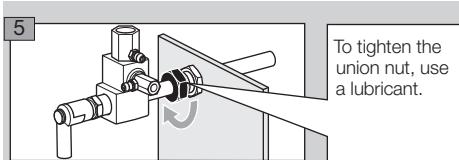
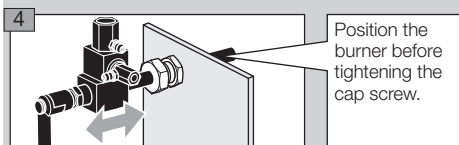
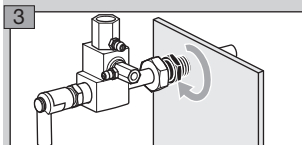
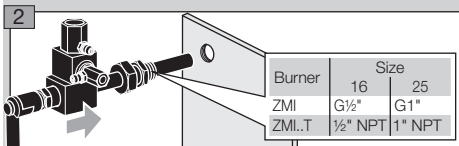
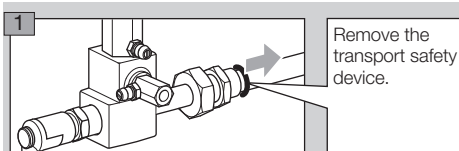
- ▷ When tightening the cap screw **9**, ensure that the cone olive **8** is correctly positioned – lubricate the cone olive.
- ▷ ZAI flow rate curve – see www.docuthek.com

ZMI

- ▷ Recommended inlet pressures:
gas: 50 – 60 mbar (19.7 – 23.6 "WC),
air: 50 – 60 mbar (19.7 – 23.6 "WC).
- ▷ Install pressure regulators and adjusting cocks in the air and gas supply lines upstream of the burner so that the air and gas pressures can be adjusted.

! CAUTION

Burner fault! If used as pilot burner, the gas and air pressures must be higher than the connection pressures of the main burner.



6 Hand tighten the union nut, mark a position for gas-tight installation and then tighten with a further turn (360°).

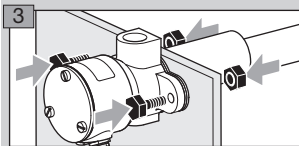
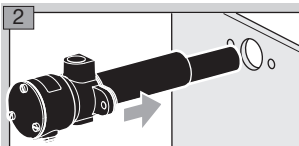
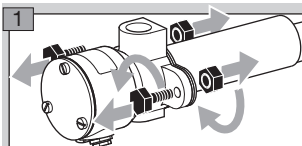
7 Connect the pilot gas line with Rp ¼ and the air line with Rp ½.

ZKIH

Inlet pressure:

	Gas [mbar ("WC)]
Natural gas	20 (8)
Town gas	17 (6.8)
LPG	30 (12)

- ▷ Flow rate curves – see www.docuthek.com
- ▷ In the case of higher gas pressures, insert a gas restrictor orifice – see page 10 (Accessories).



4 Connect the pilot gas line with Rp ¼ and the air line with Rp ½.

- ▷ For connecting pilot gas and air lines with NPT thread, order the adapter set – see page 10 (Accessories).

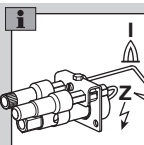
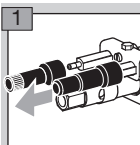
Wiring

⚠ DANGER

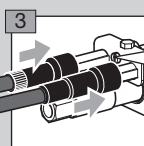
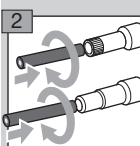
Electric shocks can be fatal! Before working on possible live components, ensure the unit is disconnected from the power supply.

- ▷ For the ionization and ignition cables, use unscreened high-voltage cable:
FZLSi 1/7 -50 to 180°C (-58 to 356°F),
Order No. 04250410,
or
FZLK 1/7 -5 to 80°C (23 to 176°F),
Order No. 04250409.
- ▷ Wire the burner as shown in the connection diagrams of the automatic burner control unit/ignition transformer.

ZAI



I = Ionization electrode
Z = Ignition electrode

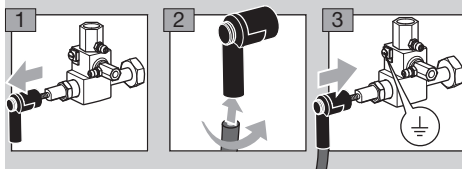


Screw for PE wire ⊕

4 Connect the PE wire for burner ground to the fastening lug on the burner insert.

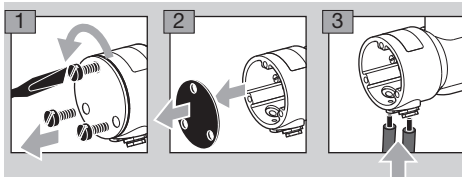
ZMI

▷ Flame control with single-electrode operation.

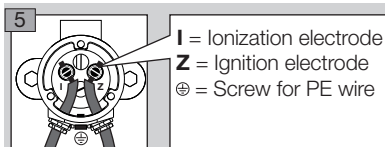


4 Route the PE wire directly to the automatic burner control unit.

ZKIH



4 Tighten the PG cable gland.



6 Tighten ionization and ignition cables securely.

⚠ WARNING

Electric shocks can be fatal! Live components in the housing connection chamber.

7 Replace seal and cover and screw into place.

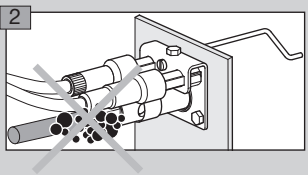
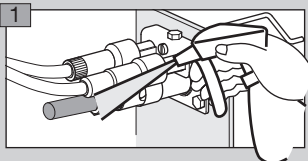
8 Connect the PE wire for burner ground to the burner.

Tightness test

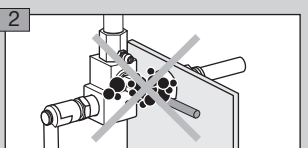
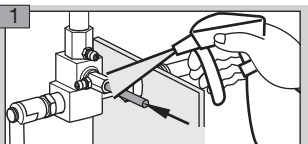
⚠ DANGER

Risk of explosion and poisoning! To ensure that there is no danger resulting from a leak, check the gas connections on the burner for leaks immediately after the burner has been put into operation.

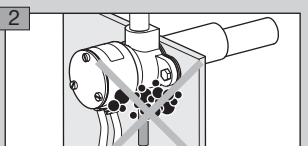
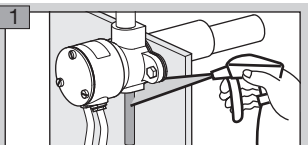
ZAI



ZMI



ZKIH



Commissioning

⚠ DANGER

Risk of explosion! Please observe the appropriate precautions when igniting the burners.

Risk of poisoning! Open the gas and air supply so that the burner is always operated with excess air – otherwise CO will form in the furnace chamber. CO is odourless and poisonous! Conduct a flue gas analysis.

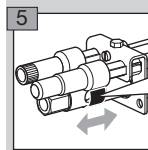
ZKIH: electric shocks can be fatal! The burner housing cover must be fitted before igniting the burner.

- ▷ Arrange the adjustment and commissioning of the burner with the system operator or manufacturer.
 - ▷ Check the entire system, upstream devices and electrical connections.
 - ▷ Pre-purge the furnace chamber with air (5 x furnace chamber volume) before every ignition attempt.
 - ▷ Fill the gas line to the burner carefully and correctly with gas and vent it safely into the open air – do not discharge the test volume into the furnace chamber. Risk of explosion!
 - ▷ If the burner does not ignite although the automatic burner control unit has been switched on and off several times: check the entire system.
 - ▷ After ignition, monitor the gas and air pressures measured on the burner and the flame. Measure the ionization current. Switch-off threshold – see automatic burner control unit operating instructions.
- 1** Switch on the system.
 - 2** Open the manual valve.
 - 3** Ignite the burner via the automatic burner control unit.
 - 4** Adjust the burner.
- ▷ Set the ionization current by adjusting the air volume.

⚠ DANGER

Risk of explosion in case of CO being formed in the furnace chamber! An incorrect change of the burner settings may change the gas/air ratio and lead to unsafe operating conditions. CO is odourless and poisonous!

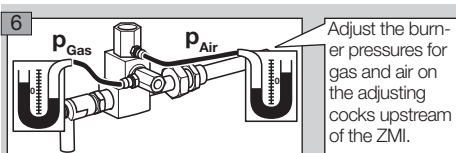
ZAI



The air slide is open on delivery. Only close the air slide if the burner flame is not stable.

ZMI

- 5** Set the pressure regulators for the gas and air supply pressures to the maximum admissible values, whereby the gas and air supply pressures should be identical.



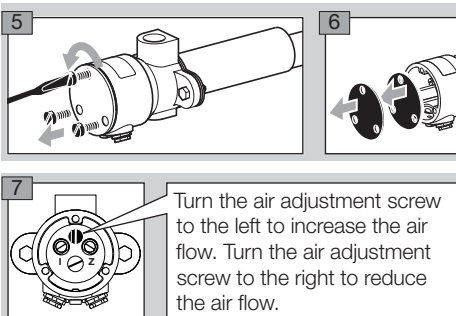
- ▷ The air inlet pressure must always be higher than the gas inlet pressure: operating characteristic diagrams – see www.docuthek.com.
- ▷ Inlet pressure:
 - gas: 20 – 50 mbar (8 – 20 "WC),
 - air: 20 – 50 mbar (8 – 20 "WC).

ZKIH

- ▷ Inlet pressure for air adjustment screw set at the factory:

	Gas [mbar ("WC)]	Air [mbar ("WC)]
Natural gas	20 (8)	20 (8)
Town gas	17 (6.8)	35 (13.8)
LPG	30 (12)	30 (12)

- ▷ If the air inlet pressure cannot be set to the recommended value owing to the factory setting of the air adjustment screw, readjust the air adjustment screw.



- 8** Replace seal and cover and screw into place.

Maintenance

- ▷ We recommend an annual function check.

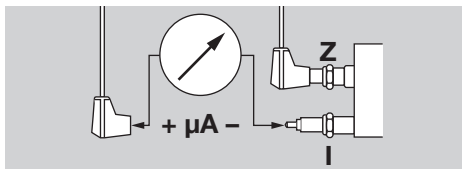
⚠ DANGER

Electric shocks can be fatal! Before working on possible live components, ensure the unit is disconnected from the power supply.

Risk of burning! Dismantled burner components can be hot due to outflowing flue gases.

Risk of explosion and poisoning during burner adjustment with an air deficiency! Adjust the gas and air supply so that the burner is always operated with excess air – otherwise CO will form in the furnace chamber. CO is odourless and poisonous! Conduct a flue gas analysis.

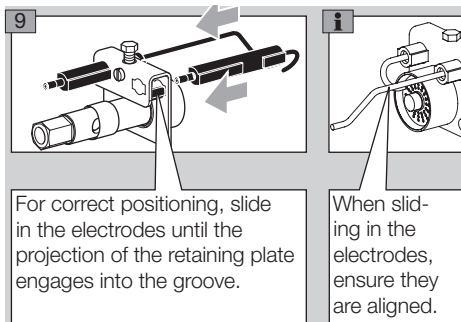
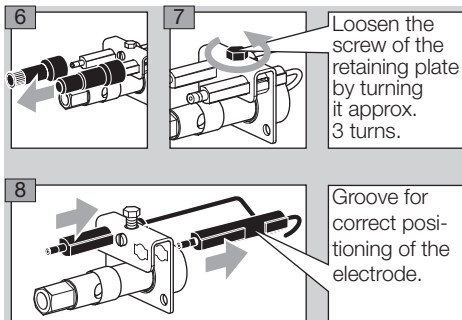
- 1 Check the ionization and ignition cables.
 - 2 Measure the ionization current.
- ▷ The ionization current must be at least 5 μA and must not vary.



- 3 Disconnect the system from the electrical power supply.
- 4 Shut off the gas and air supply – do not change the restrictor settings.
- 5 Check the nozzles for dirt.

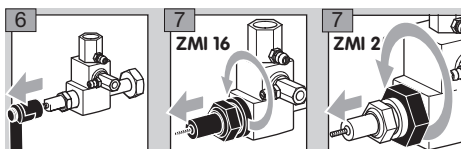
Replacing the electrodes

ZAI

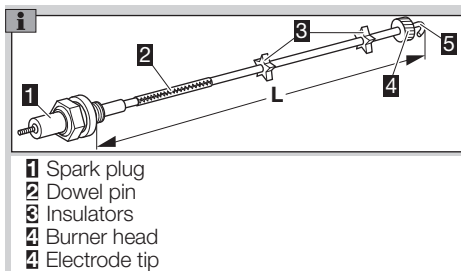


- 10 Once the electrodes have been positioned, hand tighten the retaining plate screw using a spanner (approx. 3 turns).
- ▷ After tightening, the electrodes cannot be moved any more.

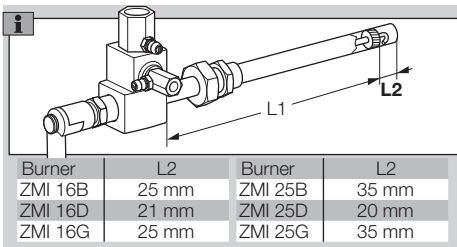
ZMI



- ▷ Ensure that the electrode length does not change.



- 8 Remove dirt from electrodes and insulators.
 - 9 If the electrode tip or insulators are damaged, replace the electrode.
- ▷ Before changing the electrode, measure the total length **L**.
- 10 Connect the new electrode with the spark plug using the dowel pin.
 - 11 Adjust spark plug and electrode to the measured total length **L**.
 - 12 Screw the electrode into the burner housing.
 - 13 Check distance **L2**:



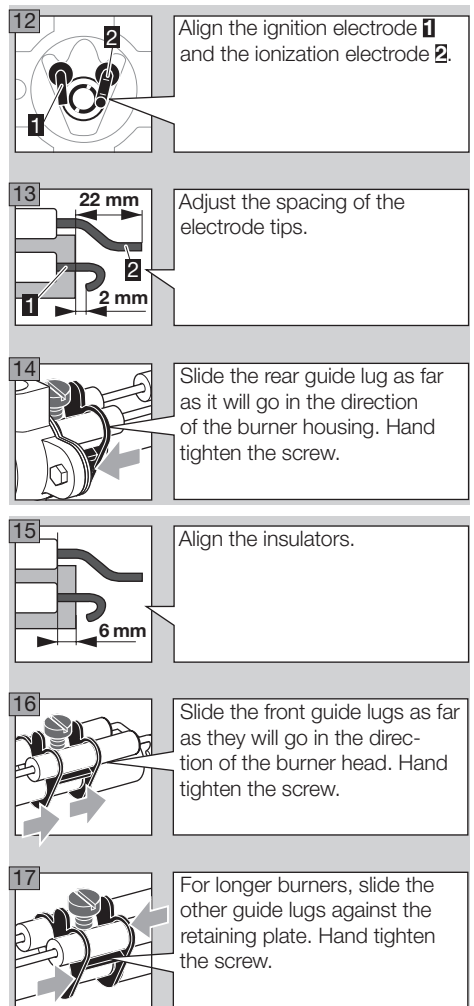
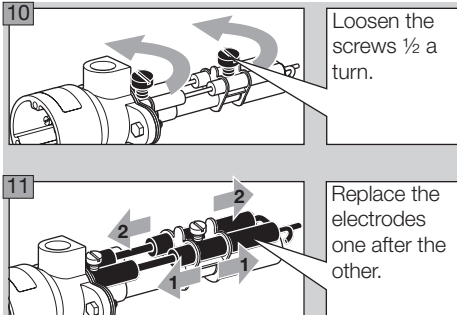
ZKIH

- 6 Undo the housing cover screws, remove seal and housing cover.
- 7 Unscrew the ionization and ignition cables.

⚠ WARNING

High-voltage risk! Live components in the housing connection chamber.

- 8 Unscrew the PE wire for burner ground from the burner.
- 9 Remove the burner – see page 4 (Installation).
 - ▷ Removal and reassembly of the electrodes is facilitated, when the housing is placed in a vertical position on a smooth working surface.



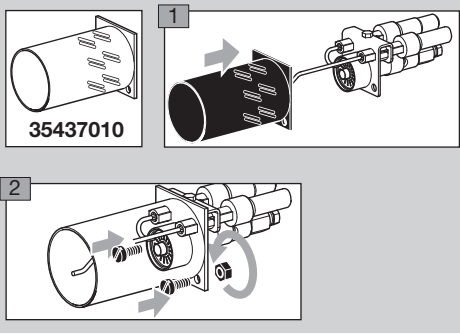
ZAI, ZMI, ZKIH

- Reconnect the electrode adapters.
- Produce a maintenance report.

Accessories

Protective tube set

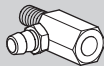
- For ZAI, heat-resistant.



Gas nozzle

- For ZAI:
- 1.8 mm.
 - For operation with town gas.
- Order No. 74472880

For ZMI and ZMI..T:

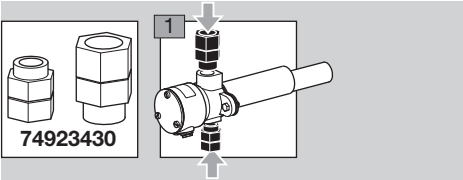


Burner	Gas type*	mm (inch)	Order No.	
			ZMI	ZMI..T
ZMI 16	B	0.94 (0.037)	75455010	75442157
	G	0.76 (0.029)	75455147	75448032
	D	1.30 (0.051)	75455146	—
ZMI 25	B	1.40 (0.055)	75455012	75443157
	G	1.05 (0.041)	75455149	75448031
	D	1.78 (0.070)	75455148	—

- * B = Natural gas
G = LPG
D = Town gas/coke oven gas

Adapter set

- For connecting the pilot burner ZKIH to pilot gas and air lines. Comprising one adapter with 1/4-18 NPT internal thread and one adapter with 1/2-14 NPT internal thread.



Gas restrictor orifice

- Rp 1/4".
- For operation of the ZKIH at the following inlet pressures:

Inlet pressure in mbar			Hole mm	Order No.
Natural gas	Propane	Town gas		
—	—	20–50	2.3	74452740
23–50	—	50–200	1.5	74452742
50–120	—	200–1500	1.2	74452744
120–450	50–200	—	0.9	74452745
450–1500	200–1500	—	0.6	74452747

Technical data

ZAI

Capacity: approx. 1.8 – 3 kW.

Gas types: natural gas, LPG (gaseous) and coke oven gas.

Gas inlet pressure: 20 – 60 mbar (8 – 24 "WC), depending on the gas type.

Condition on delivery: for natural gas, max.

30 mbar (12 "WC),

(gas inlet pressures – see www.docuthek.com,

Kind of document: Flow rate curve).

Flame control: with ionization electrode.

Ignition: direct spark ignition (5 kV ignition transformer).

Ignition electrode adapter: interference-suppressed.

Ignition head made of galvanized steel.

Retaining plate made of galvanized steel.

ZMI

Capacity:

ZMI 16: 0,8 to 2 kW,

ZMI 25: 2.5 to 4 kW (1.5 to 3.3 kW when used with town gas, coke oven gas).

Gas inlet pressure: 15 to 70 mbar (6 to 27 "WC).

Air inlet pressure: 15 to 90 mbar (6 to 35 "WC),

each depending on the gas type

(burner pressures – see www.docuthek.com, Kind of document: Flow rate curve).

Burner length increments: 100 mm.

Gas types: natural gas, LPG (gaseous) and coke oven gas; other gases on request.

For cold air only.

Flame control: with ionization electrode.

Ignition: direct spark ignition (5 kV ignition transformer).

Ignition electrode adapter: interference-suppressed.

Housing: AlSi.

Flame tube: heat-resistant steel.

Max. temperature at the tip of the flame tube:

< 1000°C (< 1832°F),

< 900°C (< 1652°F) for $\lambda < 1$.

ZKIH

Capacity: approx. 2 to 5 kW.

Gas types: natural gas, LPG (gaseous) and coke oven gas.

Gas inlet pressure: 5 to approx. 50 mbar (2 to approx. 20 "WC),

air inlet pressure: 5 to approx. 30 mbar (2 to approx. 12 "WC),

each depending on the gas type

(burner pressures – see www.docuthek.com, Kind of document: Flow rate curve).

On delivery: natural gas setting (gas and air pressures: 20 mbar (8 "WC)).

For cold air only.

Flame control: with ionization electrode.

Ignition: direct spark ignition (5 kV ignition transformer).

Housing: AlSi.

Protective tube: stainless steel.

Flame tube: heat-resistant steel.

Max. temperature at the tip of the flame tube:

< 1000°C (< 1832°F),

< 900°C (< 1652°F) for $\lambda < 1$.

Max. temperature of the protective tube: 500°C (932°F).

