

Installation and operating instructions

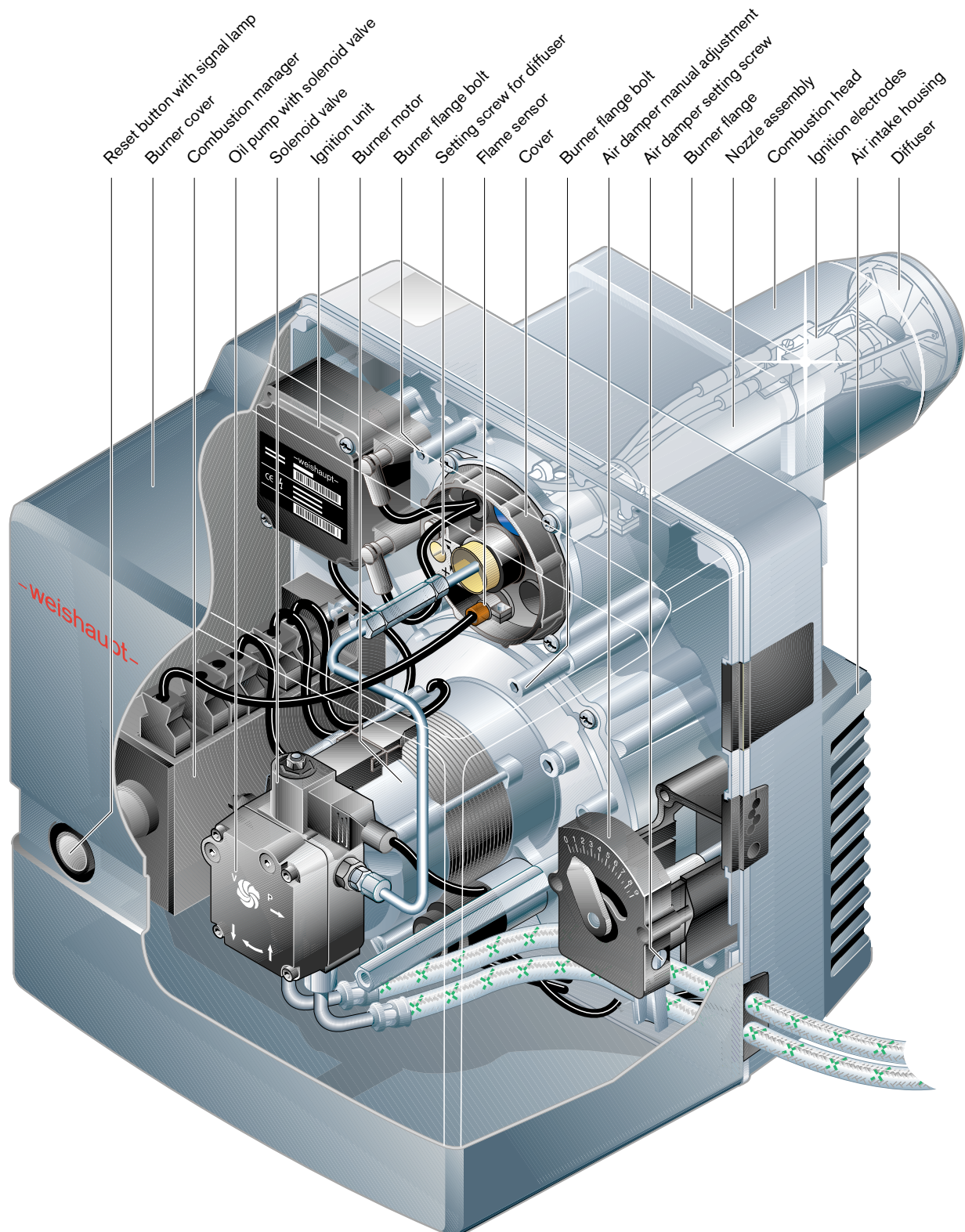
Weishaupt oil burners

WL10/2-C

83055502 - 1/2002

Info for engineers

– weishaupt –



Conformity Certification to ISO/IEC Guide 22

Confirmed by: Max Weishaupt GmbH

Address: Max Weishaupt Straße
D-88475 Schwendi

Product: Oil burner with fan
Type: WL10/2-C

The product described above conform to

Document No.: EN 267
EN 292
EN 50 081-1
EN 50 082-1
EN 60 335

In accordance with the guidelines

EMC	89/336/EU
LVD	73/23/EU
EED	92/42/EU
MD	98/37/EU

these products are labelled as follows



CE- 0036 333/02

Schwendi 09.04.2002

ppa. Dr. Lück ppa. Denkinger

The burners were type tested at an independent testing station (TÜV Bau und Betriebstechnik, Munich) and certified by DIN CERTCO.

Registration No.: 5G988/02

Comprehensive Quality Assurance is ensured by a certified Quality Management System to DIN ISO 9001.

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1 General information

These installation and operating instructions

- are an integral part of the equipment and must be kept permanently on site.
- are to be used by qualified personnel only.
- contain the relevant information for the safe assembly, commissioning and servicing of the equipment
- are for the attention of all personnel working with the equipment.

Explanation of notes and symbols



This symbol is used to mark instructions, which, if not followed, could result in death or serious injury.



This symbol is used to mark instructions, which, if not followed, could result in life threatening electric shock.



This symbol is used to mark instructions, which, if not followed, could result in damage to, or the destruction of the equipment and environmental damage.



This symbol is used to mark procedures, which you should follow.

1. Procedures with more than one step are
2. numbered.
- 3.



This symbol is used when you are required to carry out a test.

- This symbol is used to list points.

Abbreviations

Tab. Table
Ch. Chapter

Hand-over and operating instructions

The contractor is responsible for passing the operating instructions to the plant operator prior to hand-over. He should also inform the plant operator that these instructions should be kept with the heating appliance. The address and telephone number of the nearest service centre should be entered on the reverse of the operating instructions. The plant operator must note that an agent of the contractor or other suitably qualified person must inspect the plant at least once a year. To ensure regular inspections, -weishaupt- recommends a service contract.

The contractor should instruct the plant operator in the use of the equipment prior to hand-over and inform him as and when necessary of any further inspections that are required before the plant can be used.

Guarantee and liability

Weishaupt will not accept liability or meet any guarantee claims for personal injury or damage to property arising as a result of one or more of the causes below:

- Failure to use the equipment as intended
- Improper assembly, commissioning, operating or servicing of the equipment.
- Operating the appliance with defective safety equipment, or with non-recommended or non-functioning safety and protection devices
- Failure to follow the information in the Installation and Operating Instructions
- Alterations made to the construction of the equipment by the plant operator
- Fitting additional components not tested or approved for use with the equipment.
- Alterations made to the equipment by the plant operator (e.g. motor ratio - rating and speed)
- Alterations made to the combustion chamber, which hinders constructive, predetermined flame formation
- Inadequate monitoring of parts liable to wear and tear
- Improperly executed repairs
- Acts of God
- Damage caused by continued use despite the occurrence of a fault
- Use of incorrect fuel
- Obstruction or damage of the supply lines
- Use of non-original -weishaupt- spare parts

2 Safety information

Dangers when using the equipment

Weishaupt products are manufactured in accordance with the relevant existing standards and guidelines and the recognised safety laws. However, improper use of the equipment could endanger life of the user or a third party, or result in damage to the plant.

To avoid unnecessary danger, the equipment is only to be used:

- for its intended purpose
- under ideal safety conditions
- with reference to all the information in the installation and operating instructions
- in accordance with inspection and service work.

Faults, which could affect the safe operation of the burner, should be rectified immediately.

Personnel training

Only competent personnel may work on the appliance. Competent personnel according to this operating manual are persons who are familiar with the installation, mounting, setting and commissioning of the product and have the necessary qualifications such as:-

- Training, instruction or authorisation to switch electrical circuits and electrical devices on and off, to earth them and to mark them in accordance with the safety standards.

Organisational measures

- Everyone working on the plant should wear the necessary protective clothing.
- All safety devices should be checked regularly.

Informal safety measures

- In addition to the installation and operating instructions, local codes of practice should also be adhered to. Special attention should be paid to the relevant installation and safety guidelines given.
- All safety and danger notices should be kept in a legible condition.

Safety measures in normal operation

- Only use the equipment when all the safety devices are fully functional.
- At least once a year the equipment, including the safety devices, should be checked for signs of visible damage and to ensure that the safety devices are operating correctly.
- More frequent safety check may be required depending on plant conditions.

Electrical safety

- Work on the electrical supply should be carried out by a qualified electrician.
- Electrical components should be checked during servicing. Loose connections and heat damaged cables should be dealt with immediately.
- Should it be necessary to carry out work on live parts, a second person should be present to switch off the mains supply in an emergency.

Maintenance and fault rectification

- Necessary installation, service and inspection work should be carried out at the specified time.
- Inform the operator before beginning any service work.
- For all service, inspection and repair work, electrically isolate the equipment and ensure the mains switch cannot be accidentally switched back on. Cut off the fuel supply.
- If, during servicing or testing, control seal joints have to be opened, these have to be thoroughly cleaned to ensure tight sealing when re-assembling. Damaged seals must be replaced. Carry out a soundness test!
- Flame monitoring devices, limit controls, correcting elements and all other safety devices must be commissioned by, and may only be replaced by, the manufacturer or an authorised agent.
- Screwed connections, which have been loosened, must be re-tightened without cross-threading.
- Following service work, all safety devices should be tested to ensure they are functioning correctly.

Alterations to the construction of the equipment

- No alterations to the equipment are to be made without the approval of the manufacturer. All conversions require written confirmation from Max Weishaupt GmbH.
- Any parts not in perfect working order should be replaced immediately.
- No additional components may be fitted, which have not been tested for use with the equipment
- Use only -weishaupt- replacement and connection parts. Parts from other manufacturers are not guaranteed to be suitable to meet the necessary operational and safety requirements.

Alterations to the combustion chamber

- No alterations are to be made to the combustion chamber, which hinder constructive predetermined flame formation.

Cleaning of the equipment and waste disposal

- All materials used should be handled and disposed of correctly, with due regard to the environment.

3 Technical description

3.1 Permissible applications

The Weishaupt oil burner WL10 is suitable for:

- heat exchangers complying with EN303-2 or DIN4702-1
- for warm water installations with intermittent or continuous run (combustion manager switches off once in 24hrs.)
- air heaters

Any other use is only permissible with the written agreement of Max Weishaupt GmbH.

- The burner must **only** be operated with oil to DIN 51603-EL-1, fuel oil EL to ÖNORM-C1109 or standard fuel oil, Euro quality to SN 181 160-2 or preferably Öko fuel oil, CH quality to SN 181 1602
- Permissible ambient conditions see Ch. 8.5
- The burner **must not** be used outside. It is only suited to inside operation.
- The burner **must not** be used outside of its capacity range (see capacity graphs, Ch. 8.2).
- To ensure low emission combustion heat exchangers of the three pass principle and combustion chamber dimensions to EN 267 are recommended.

Type designation:

Type				
W	L	10	/2	-C
				Construction type
				Ratings range
				Size
				L= Fuel oil EL
				Weishaupt burner type W

3.2 Basic function

Burner type

- Fully automatic oil atomising burner with fan
- Single stage operation

Digital combustion manager

Main points:

- Safety via internal fuse
- Control and monitoring of all burner functions
- Safety via two microprocessors (reciprocal monitoring)
- Data bus connection (eBUS)
- Signal lamp to show operational status (see also Ch. 6):

Green	Burner operating
Flashing green	Burner operating with weak flame signal
Orange	Burner start, internal test
Flashing orange	Ignition phase
Red	Burner lockout
Flashing orange / red	Low voltage or internal safety fault
Flashing green / red	Extraneous light
2 x flashing red / orange, short pause	Over-voltage
Flashing red	Bridging plug No. 2 missing or contact in servomotor not made
Flickering red	Optical data transfer (not used)

Air regulation

- The air damper is set to the required position with the setting screw.

Electric servomotor (optional)

- Air damper closes automatically on burner shut down to prevent heat loss from the heat exchanger.
- The air damper is set to the required position with the setting screw on the servomotor.

Nozzle assembly

- The total oil throughput required is provided by a single nozzle.
- The diffuser is set as required with the setting screw.

Sequence of operations

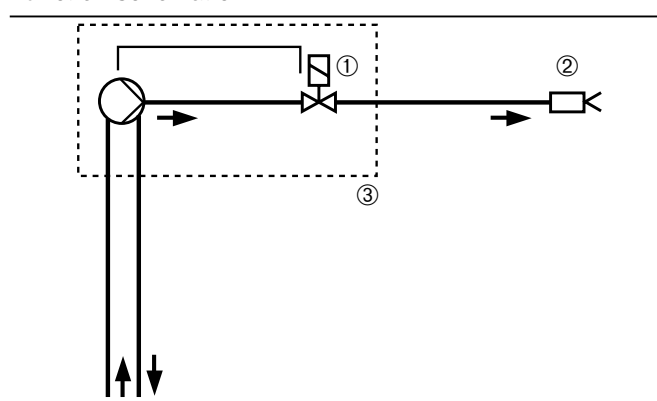
Demand for heat from the appliance's controller:

- Fan start - pre-purge of the combustion chamber, ignition
- Solenoid valve opens - fuel release
- Flame formation

Controlled shut down:

- Solenoid valve closes
- Post-purge of the combustion chamber
- Burner switches off

Function schematic



- ① Normally closed solenoid valve
- ② Nozzle assembly with one nozzle
- ③ Oil pump with the integral solenoid valve

Oil pump

AL 30C 9537

- Pump for distillate oil EL
- Integral pressure regulating valve
- One normally closed solenoid valve ⑤
- Bypass plug for conversion from two pipe to single pipe system

Technical data:

Pump pressure range _____ 8 to 15 bar

Supply rating _____ 40 l/h

Factory setting _____ 12 bar

Priming the pump

The pump primes itself automatically on two-pipe installations. On one-pipe installations it is only possible to prime the pump via the nozzle line or pressure test connection ①, when the solenoid valve ⑤ is open.

Oil hoses

Technical data:

Pressure class A

DIN 4798-1

DN _____ 4

Length _____ 1200

Pump side connection* _____ G 1/8"

Installation side connection nipple _____ G 3/8"

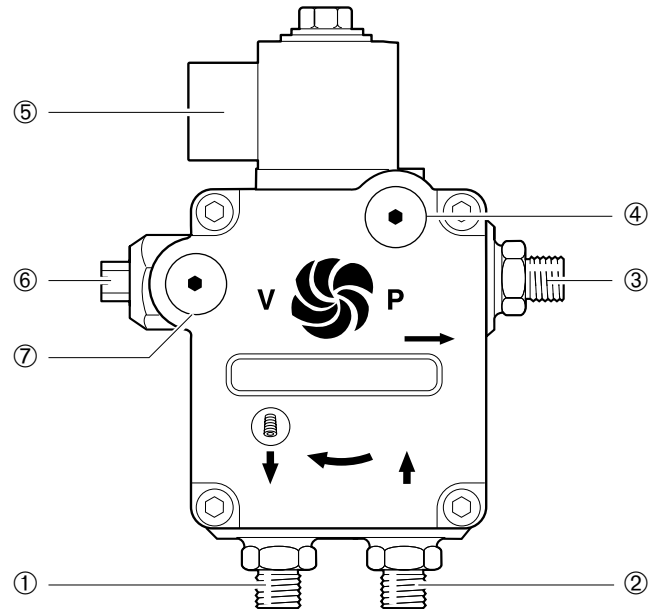
Nominal pressure _____ $P_N = 10$ bar

Test pressure _____ $P_P = 15$ bar

Operating temperature _____ $T_B = 70^\circ\text{C}$

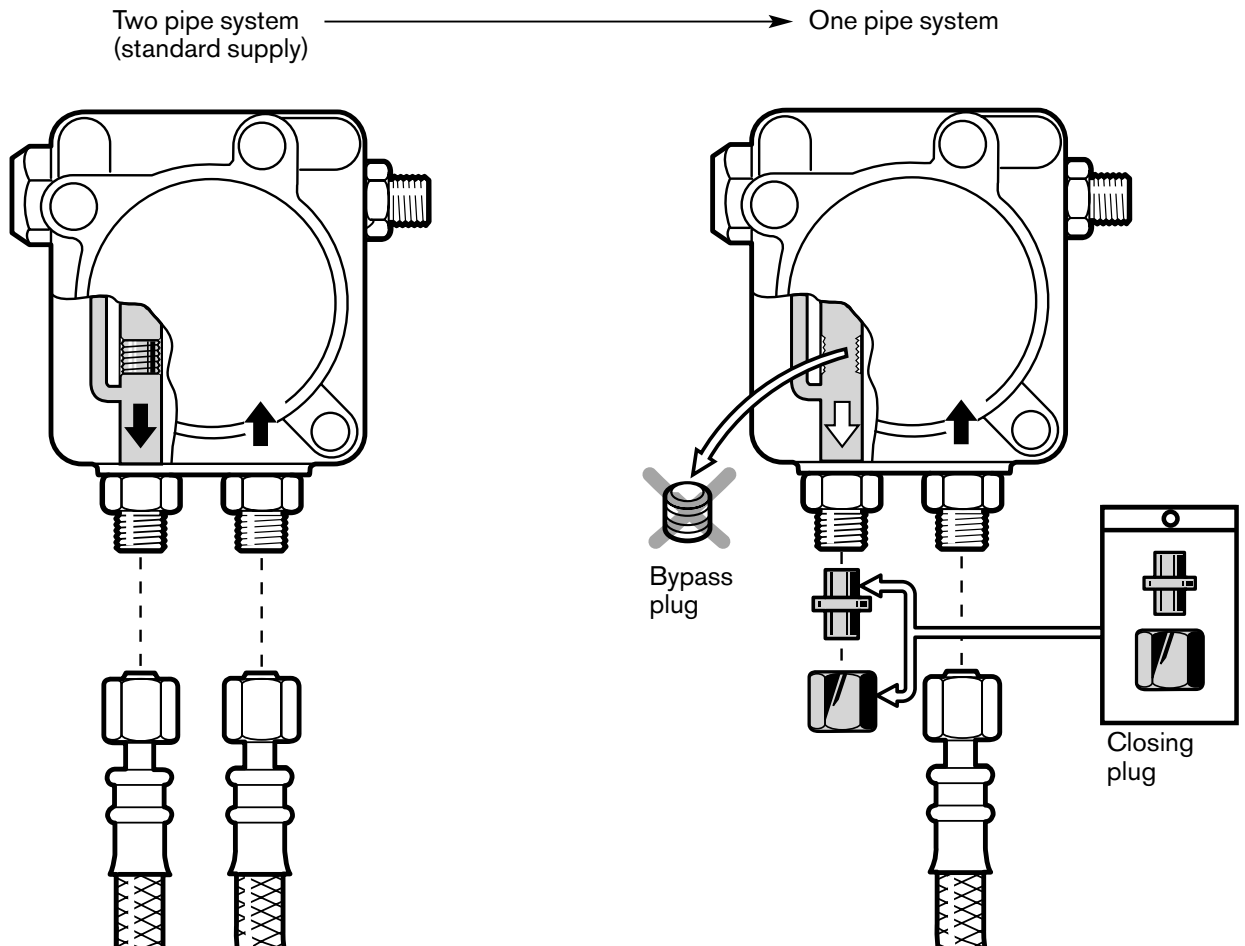
* Fitting 6x1 with M10x1 union nut

Oil pump AL30C 9537



- | | |
|-----------------------------------|------------------------------------|
| ① Return connection | ⑤ Solenoid valve (normally closed) |
| ② Suction connection | ⑥ Pressure regulating screw |
| ③ Nozzle supply | ⑦ Vacuum gauge connection G 1/8" |
| ④ Pressure gauge connection G 18" | |

Pump conversion (AL 30C)



4 Installation

4.1 Safety notes on installation

Electrically isolate the plant



Prior to installation switch off the mains switch and the safety switch.

Failure to comply could cause death or serious injury by electric shock.

4.2 Delivery, transportation and storage

Check delivery

Check the delivery to see that it is complete and that there has been no damage in transit. If the delivery is incomplete or damaged, contact the deliverer.

Storage

Be aware of the permissible ambient conditions when storing (see Ch. 8.5).

Transport

For the burner weight see Ch. 8.7.

4.3 Preparation for assembly

Check burner plate

- ☐ The burner rating must be within the operating range of the heating appliance. The ratings given on the burner plate are the minimum and maximum possible firing rates of the burner.
See capacity graphs Ch 8.2.

Space requirement

For burner dimensions see Ch. 8.6.

4.4 Oil supply

The operational safety of oil-fired plant is only guaranteed when the installation of the oil supply is carried out carefully. The plant must comply with DIN 4755 as well as all local regulations.

Note:

- Do not use cathode protection systems with steel tanks
- Select pipes of correct nominal bore
- Joints must be oil tight
- Avoid sharp bends
- Influence of the length of the suction line
- Pressure loss at the filter
- Avoid placing oil tanks outdoors and in areas subject to frost.
With oil temperatures $< 0^{\circ}\text{C}$, the separation of paraffin can cause oil lines, filters and nozzles to become blocked with wax.

- Max. flow pressure to the pump: < 2.0 bar
- Max. suction vacuum at the pump: < 0.4 bar



A suction vacuum > 0.4 bar can damage the pump

- The oil supply line must be fitted close to the burner so that the oil hoses can be connected tension free.
- Install an oil filter before the pump.
- After the oil lines have been installed; carry out a pressure test (see DIN 4755).
The burner must not be connected during the test!

Where the oil tank installation is at a higher elevation than the burner, please note:

Some local Codes of Practice may stipulate a shut off valve to stop the gravity flow of oil into the supply line during burner shut down.

-weishaupt- recommend the use of a solenoid valve ② in the supply line. The solenoid valve must be **slow closing** so as to relieve any oil pressure back to the oil tank. Control of the solenoid valve see Ch. 5.5

Ring main operation

When operating several burners, or with larger distances, -weishaupt- recommends the oil is supplied via a pumped ring main. For installation and operational drawings see technical worksheets.

Oil supply pump

If the permissible suction vacuum is exceeded, an oil supply pump must be used. Note:

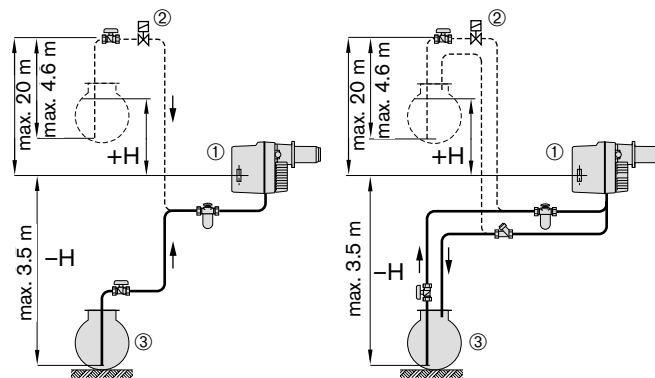
- Maximum supply pressure of 2 bar to the oil pump on the burner.
- Operation of the oil supply pump is generally in conjunction with the heat demand of the burner.

Pipeline lengths dependent on:

- Elevation difference (H) between pump and tank
- Oil throughput / pump type
- Pipe line diameter (DN)

The pressure losses of additional fittings are **not** included in the following selection table showing pipeline diameters.

Basic diagram of oil supply (typical only)



One pipe system

Two pipe system

- ① Oil pump on burner
- ② Solenoid valve (slow closing) or shut off valve to stop siphonic flow
- ③ Oil tank

One pipe system

Oil throughput [kg/h]	DN [mm]	H [m]															
		4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0	-0.5	-1.0	-1.5	-2.0	-2.5	-3.0	-3.5
Up to 2.5	4	93	90	87	83	77	72	66	60	55	49	43	38	32	26	21	14
	6	100	100	100	100	100	100	100	100	100	100	100	100	100	100	94	85
	8	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
2.5 to 6.3	4	44	41	39	36	34	31	29	26	24	21	19	16	13	11	8	6
	6	100	100	100	100	100	100	100	100	100	100	93	84	71	59	33	20
	8	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Two pipe system

Pump	DN [mm]	H [m]															
		4.0	3.5	3.0	2.5	2.0	1.5	1.0	0.5	0	-0.5	-1.0	-1.5	-2.0	-2.5	-3.0	-3.5
AL30C	6	26	24	23	22	20	19	18	16	15	13	12	11	9	8	6	5
	8	88	77	73	68	64	60	55	51	47	42	38	32	27	21	15	9
	10	100	100	100	100	100	100	100	100	100	100	93	82	67	53	38	24

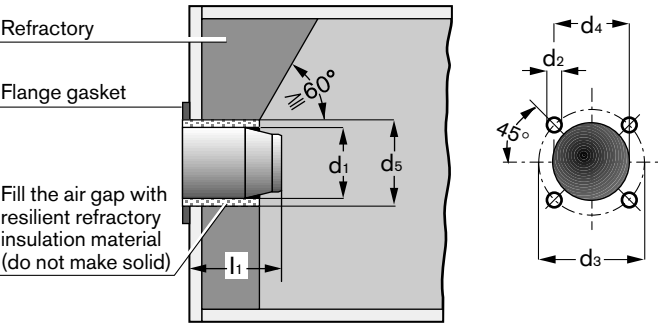
4.5 Burner installation

Prepare heating appliance

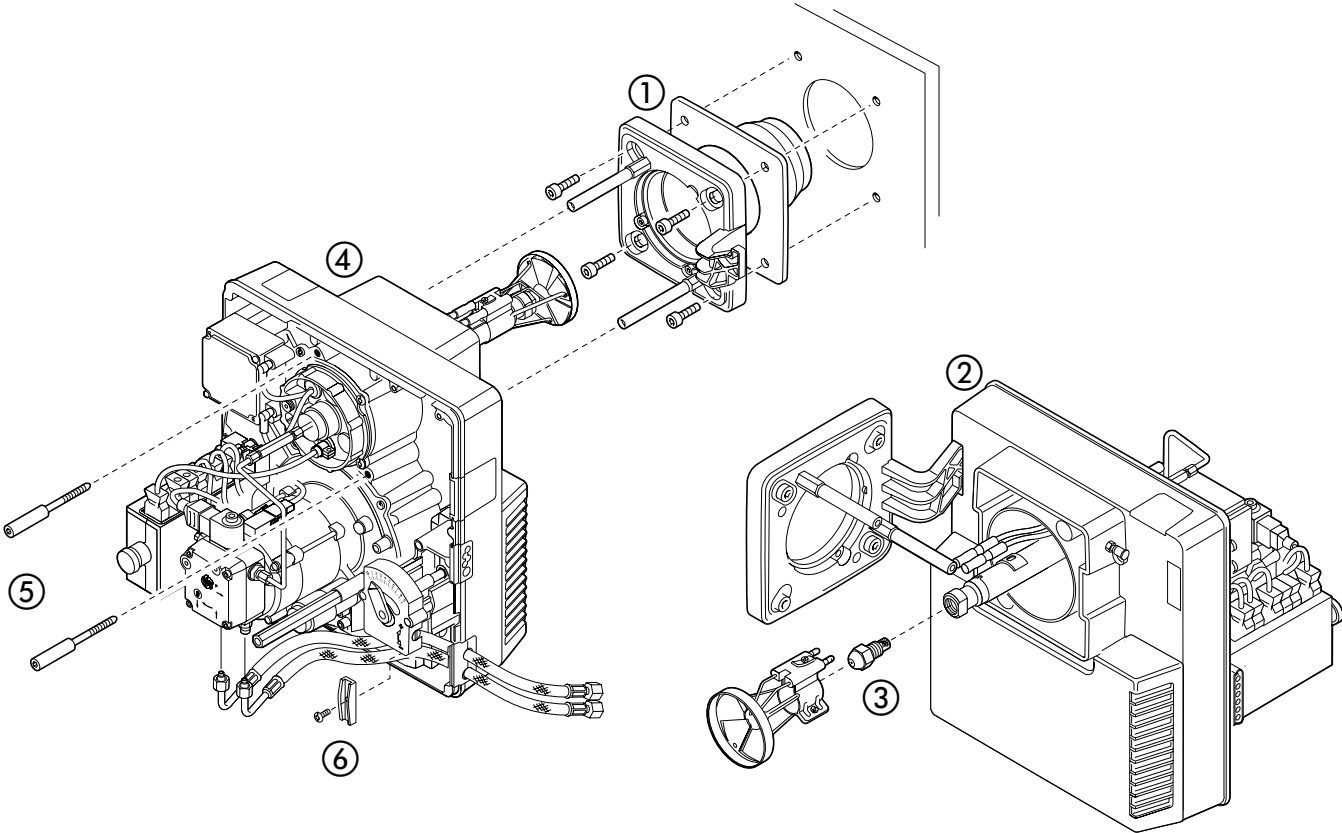
The diagram shows the refractory for a heating appliance without a cooled front. The refractory can be flat faced, or take a conical shape ($\geq 60^\circ$). Refractory may not be required on boilers with water-cooled fronts, unless the manufacturer gives other instructions.

Combustion head	Dimensions in mm					
	d1	d2	d3	d4	d5	l1
W10/2-C	99	M8	150	110	120	132

Refractory and drilling dimensions



Installation steps ① to ⑥



Note when installing the nozzle and diffuser:

- Nozzle selection, see Ch. 4.7
- Distance between nozzle and diffuser, see Ch. 7.5
- Setting the ignition electrodes, see Ch. 7.4

Note Change the nozzle as described in Ch. 7.3.



Connecting the oil hoses

If the oil hoses are connected incorrectly, the oil pump can run dry and thus become damaged.
Note the directional supply and return arrow indications on the oil pump and filter when connecting the hoses.
Ensure the hoses are not kinked and are tension free.



Danger of getting burned

Some burner parts (e.g. flame tube, burner flange, etc.) become hot during burner operation and should be allowed to cool prior to service work being carried out.

Installation of burner rotated through 180°

The burner can also be mounted turned through 180°. In doing so the oil line must be changed (oil line available as an accessory).

- ☞ Turn the oil pump through 180° and fit new oil line (accessory)
- ☞ Turn the nozzle head and diffuser so that the ignition electrodes are uppermost.

4.6 Electrical connection

- ✎ Check polarity of the connection plugs.
Wiring diagram see Ch. 5.5.
- ✎ Connection to the mains supply should be carried out to the wiring diagram relevant for the type of unit.

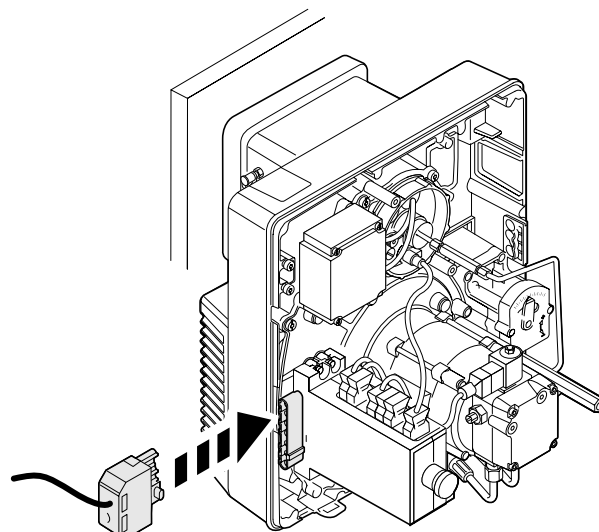
Notes for Austria

Electrical isolation with a minimum of 3 mm contact gap, acting on all poles, must be fitted adjacent to the burner.

Possibilities are:

- Switch (without micro-contacts) with required separation characteristics
- Circuit breaker
- Contactor
- Screw in type fuse with clearly recognisable designation

Electrical connection



4.7 Nozzle selection

Nozzle make	Characteristic	Firing rate
Fluidics,	45° S, 45°H	35 - 70 kW
Danfoss, Steinen	60° S, 60°H	35 - 70 kW

Nozzle size (USgph)**	10 bar		12 bar		14 bar	
	kW	kg/h	kW	kg/h	kW	kg/h
0.65	–	–	–	–	34.5	2.9
0.75	–	–	36.9	3.1	40.5	3.4
0.85	38.1	3.2	41.7	3.5	45.2	3.8
1.00	45.2	3.8	50.0	4.2	53.6	4.5
1.10	50.0	4.2	54.7	4.6	58.3	4.9
1.25	55.9	4.7	61.9	5.2	66.6	5.6
1.35	60.7	5.1	66.6	5.6	–	–
1.50	67.8	5.7	73.8	6.2	–	–

The table is based on information supplied by the nozzle manufacturer.

**Referenced to 7 bar

For nozzle size 1.00 the use of Fluidics or Danfoss nozzles is recommended.

Spray characteristic and spray angle alter depending on atomising pressure.

Conversion of firing rate in [kW] to oil throughput in [kg/hr]:

Oil throughput [kg/hr] = firing rate [kW] / 11.9

Atomising pressure

Recommended pump pressure: 10 ... 12 ... 14 bar

Factory setting: 12 bar

Example of nozzle selection for WL10/2-C

Required firing rate $Q_F = 54.7$ kW

Gives an oil throughput of: $54.7 / 11.9 = 4.6 \text{ kg/h}^{①}$

taking the recommended pump pressure into consideration, the pump selection results in:

12 bar / 4,6 kg/h

Nozzle size **1.10 gph**

① Using this value the air damper / diffuser setting must be selected from the setting diagrams in Ch. 5.3

5 Commissioning and operation

5.1 Safety notes on initial commissioning

The initial commissioning must only be carried out by the supplier, manufacturer or their appointed agent. At this time, all the control and safety equipment must be checked to ensure correct operation and, if it can be adjusted, it should be checked that it has been set correctly.

Furthermore the correct fusing of the circuits and the measures for contact protection of electrical equipment and of all wiring must be checked.

5.2 Preparations for initial commissioning

Venting the suction line



The suction line must be fully filled with oil and vented prior to the initial commissioning. Otherwise, the pump can become seized as a result of running dry.

☞ Vent by hand using a suction pump.

Connect manometer ①

For measuring the fan pressure into the mixing head whilst the burner is being adjusted.

Connect ammeter ②

To measure sensor current during setting (use test adaptor No. 13; order No. 240 050 12 04/2).

Response limit for extraneous light: _____ $<15\mu\text{A}$

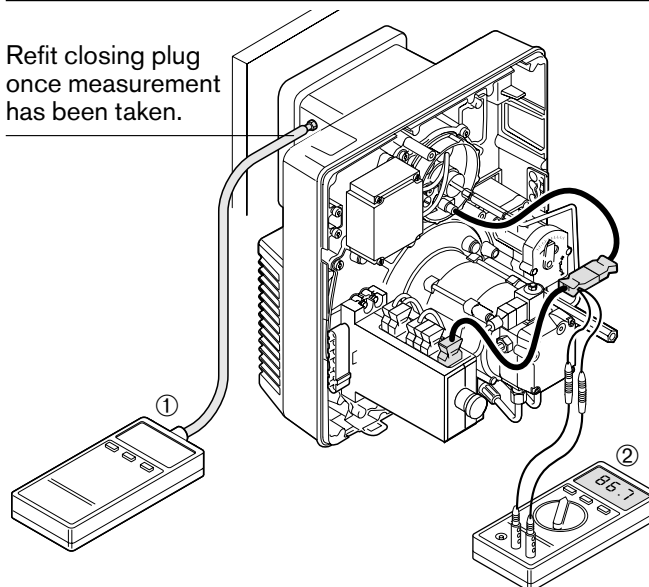
Response limit for operation: _____ $>30\mu\text{A}$

Recommended sensor current range: _____ $40 - 100\mu\text{A}$

Max. achievable sensor current: _____ approx. $120\mu\text{A}$

Connect instruments

Refit closing plug once measurement has been taken.

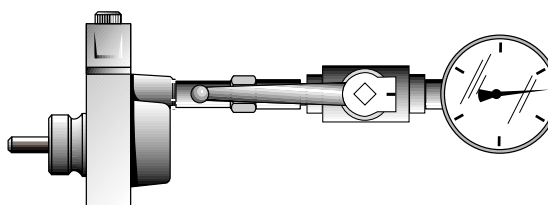


Connect a pressure gauge to the oil pump

1. Connect pressure gauge (see Ch. 3.2).

2. Connect vacuum gauge (see Ch. 3.2).

Pressure gauge on the oil pump (for commissioning)



Checklist for initial commissioning

- ☐ The heating appliance must be assembled ready for operation.
- ☐ The operating instructions of the heat exchanger must be followed.
- ☐ The whole plant must be wired correctly.
- ☐ The heating appliance and the heating system must be sufficiently filled with heating medium.
- ☐ Flues must be free from obstructions.
- ☐ The ventilators on air heaters must work correctly.
- ☐ Sufficient fresh air must be available.
- ☐ The required test points for combustion analysis must be available.
- ☐ Ensure soundness of the heat exchanger and the flue gas section up to the test point to avoid extraneous air from falsifying the test results.
- ☐ Water level controls must be set correctly.

- ☐ Thermostat, pressure switch and other safety devices must be in operating position.
- ☐ There must be a heat demand.
- ☐ Fuel lines must be purged of air.
- ☐ The correct nozzle must be selected and fitted correctly (see Ch. 4.7).
- ☐ The distance between the diffuser and nozzle must be set correctly (see Ch. 7.5).
- ☐ Ignition electrodes must be set correctly (see Ch. 7.4).

Note

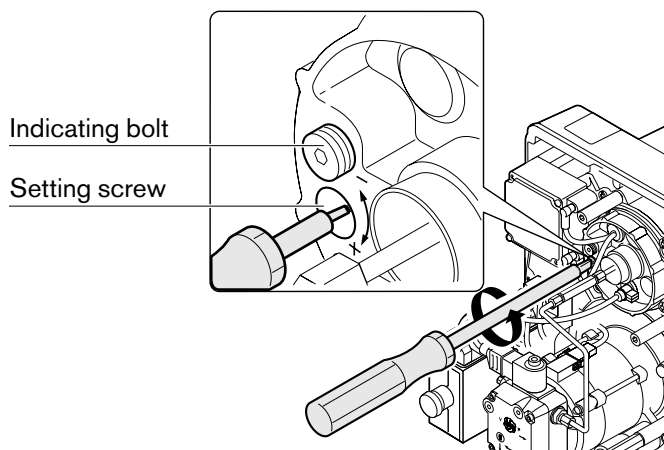
Dependent on site requirements, further checks may be necessary. Note the instructions for the individual items of plant equipment.

5.3 Commissioning and setting

Initial setting values for diffuser and air damper

The burner can be preset for first commissioning using the scale values for setting the diffuser and the air damper. The setting values are based on maximum combustion chamber resistances in accordance with EN 303. The settings need to be adjusted to suit the actual combustion chamber resistance in order to optimise combustion.

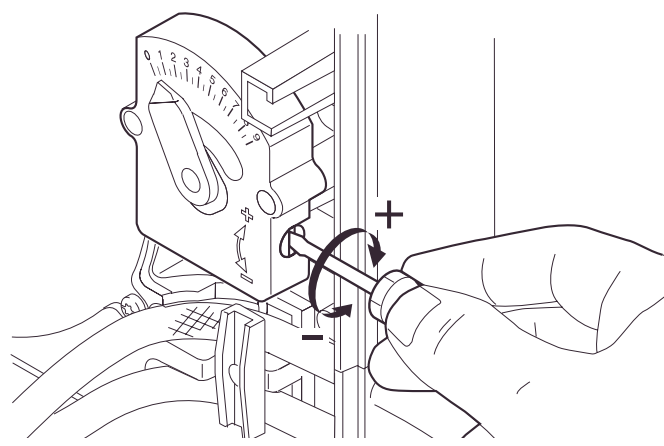
Setting the diffuser



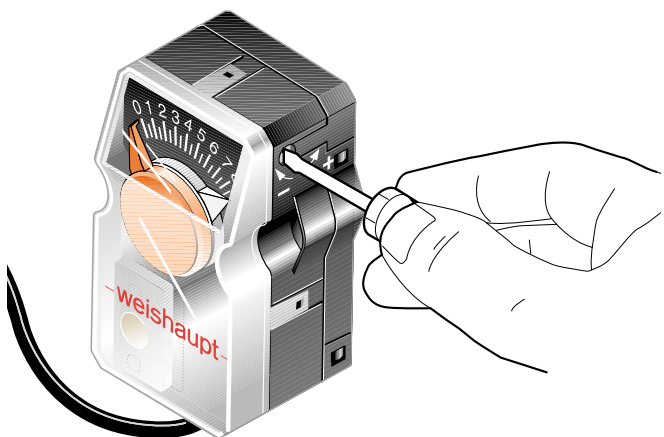
Setting the diffuser

Turn setting screw until scale shows the preset value at indicating bolt.

Air damper setting



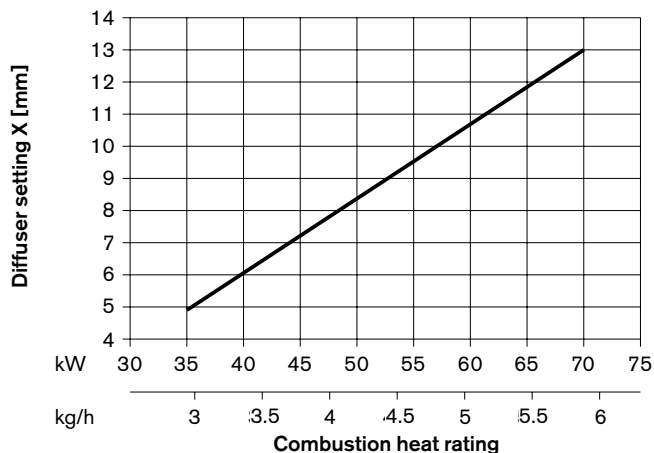
Air damper setting on servomotor (optional)



Generally, CO₂ values between 12.0% and 13.0% are achievable at the presetting stage. Presetting does not replace the necessary flue gas measurements and combustion optimisation.

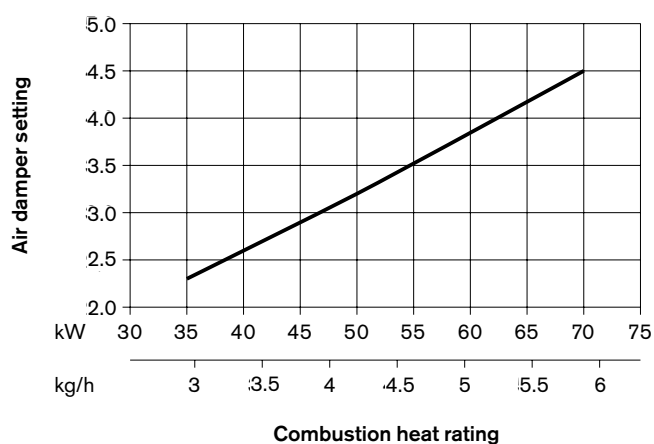
Note Combustion heat rating is dependent on nozzles used (see Ch. 4.7)!

Basic diffuser setting values



Note The setting screw is flush with the housing when diffuser setting is 0 (scale is not visible).

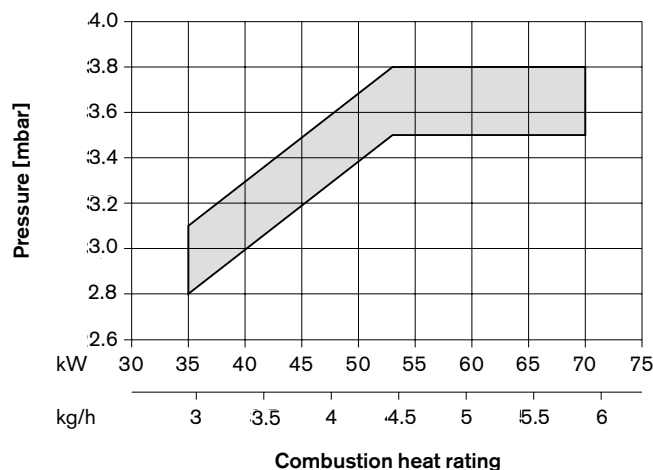
Basic air damper setting values



Guide values for fan pressure into the mixing head

For the first commissioning the burner is set as per the setting values given in the diagrams, the given guide values for the fan pressure into the mixing head will result, depending on the combustion chamber resistance of the appliance.

Pressure guide values behind the mixing head



Danger of explosion!

CO build-up due to incorrect setting of the burner. Check CO levels and carry out a smoke number test.

When there is a CO increase or smoke, optimise combustion. CO should not exceed 50 ppm. Smoke number < 1.



Danger of getting burned

Some burner parts (e.g. flame tube, burner flange, etc.) become hot during burner operation and should be allowed to cool prior to service work being carried out.

Commissioning

- ☐ The air damper and diffuser must be preset in accordance with the required combustion heat rating.
- ☐ There must be a demand for heat from the appliance.
- ☞ Establish a power supply to the burner. Mains and safety switch ON. Burner starts in accordance with its sequence of operations (see Ch. 5.5).
- ☞ Set pump pressure.
- ☞ Optimise air setting via combustion values.
- ☞ Set excess air observing the pressure into the mixing head (see diagram).
 - Pressure side via diffuser position
 - Suction side via opening angle of air damper
- ☞ Check combustion (see Appendix).

Optimising combustion

- Increase pressure and mixing speed:
 - ☞ Turn the diffuser setting screw to the left (-)
Diffuser to head gap is decreased.
 - ☞ As the excess air is reduced, increase the air damper opening angle.

Possibilities for improving stability

- Reduce mixing pressure at the diffuser:
 - ☞ Turn the diffuser setting screw to the right (+).
Diffuser gap is increased.
 - ☞ As the excess air is increased, decrease the air damper opening angle.
- Fit the next smaller size of nozzle and increase the pump pressure.
- Change nozzle manufacture.

Note

After every alteration, recheck the combustion figures and adjust settings as necessary (see Appendix).

Final tasks



Pressure measuring devices such as manometers and gauges can be damaged by continuous use, causing an uncontrolled oil leak.

After setting the burner, remove pressure measuring equipment. Close connection points.

- ☞ Record flue gas measurements on the commissioning sheet.
- ☞ Visually check the installation for soundness, and oil lines for leaks.
- ☞ Mount burner cover on burner.
- ☞ Advise operator on use of the equipment.

5.4 Shutdown periods

For short breaks in operation

(e.g. flue cleaning etc.):

- ☞ Isolate the burner from the power supply.

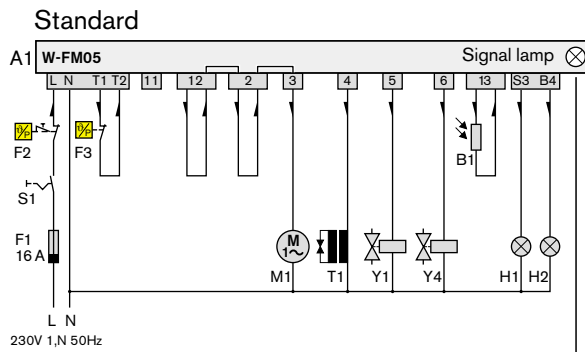
During longer shutdown periods

- ☞ Isolate the burner from the power supply.
- ☞ Close all fuel cut-off devices.

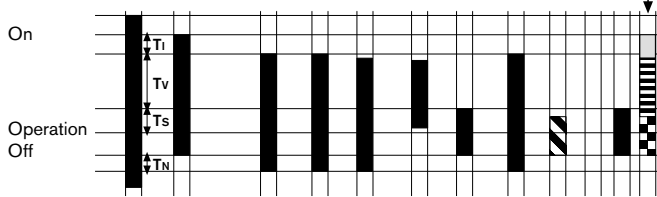
5.5 Sequence of operations and wiring diagrams

Sequence of operations diagram

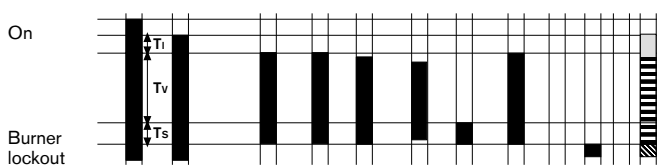
WL10/2-C



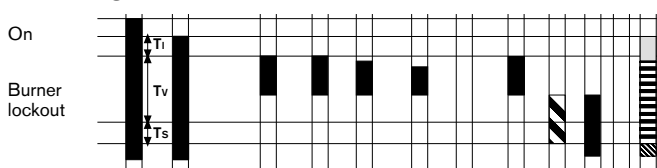
Start with flame formation



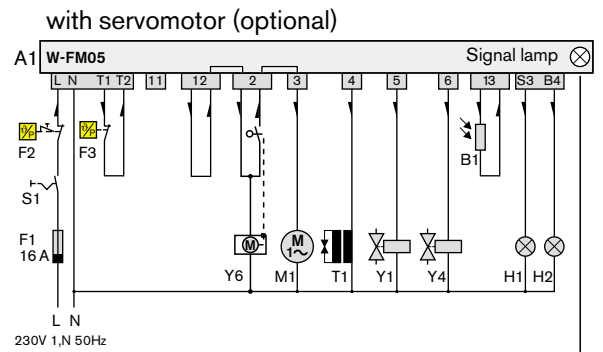
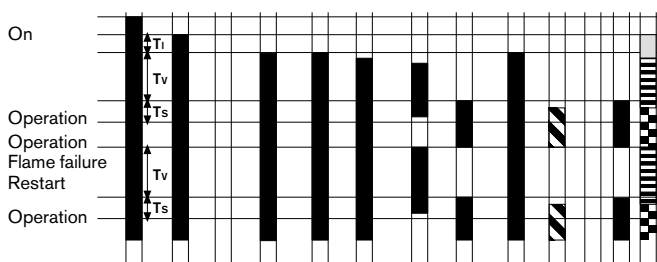
Start without flame formation



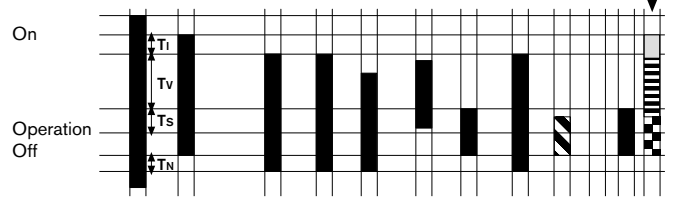
Flame signal at burner start



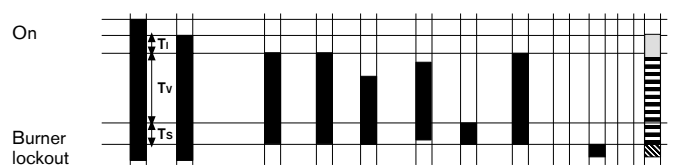
Flame failure during operation



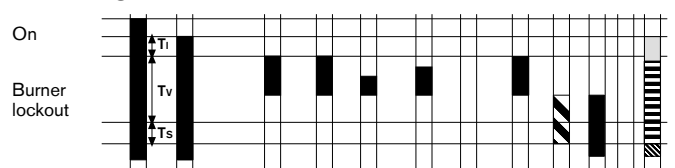
Start with flame formation



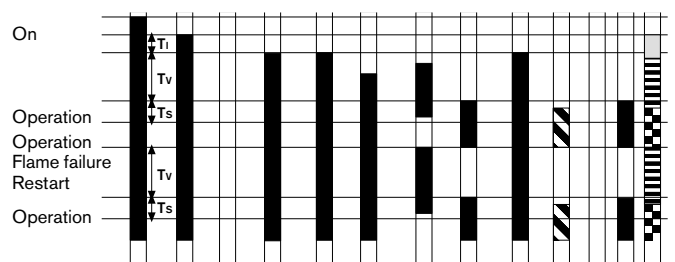
Start without flame formation



Flame signal at burner start



Flame failure during operation



Legend

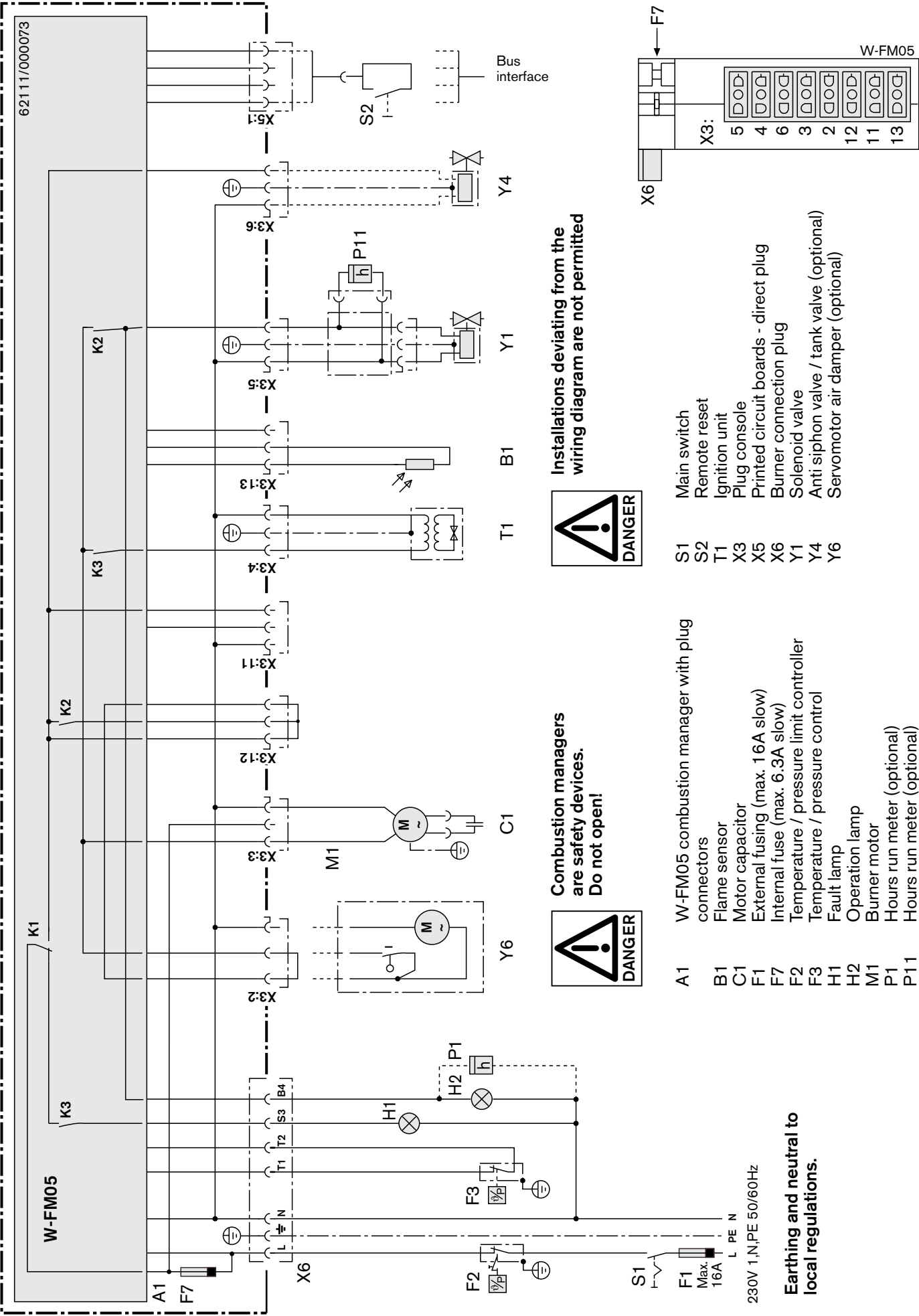
- A1 W-FM05 combustion manager
- B1 Flame sensor
- F1 Fuse
- F2 Temperature / pressure limit control
- F3 Temperature / pressure control
- H1 Fault lamp
- H2 Operation lamp
- M1 Burner motor
- S1 Main switch
- T1 Ignition unit
- Y1 Solenoid valve
- Y4 Anti siphon valve / tank valve (optional)
- Y6 Servomotor (optional)

Symbols

- Voltage on
- ▨ Flame signal present
- Current path
- Start = orange
- ▤ Ignition phase = flashing orange
- ▦ Burner operation = green
- ▧ Fault = red

Switching times

- Initialisation time T_I : 1 s.
- Pre-purge time T_V : 18 s.
- Safety time T_S : 4 s.
- Post purge time T_N : 2 s.



5.6 Operating the W-FM 05

Function of the illuminated push button

The illuminated push button integrated into the W-FM 05 has the following functions:

- Resetting at burner lockout.
- Supplying an optical diagnostic code
- Optical data transfer (not used).

Depending on the outset conditions (burner operating or burner lockout) the illuminated push button has to be pressed 1 or 5 seconds to start the required function.

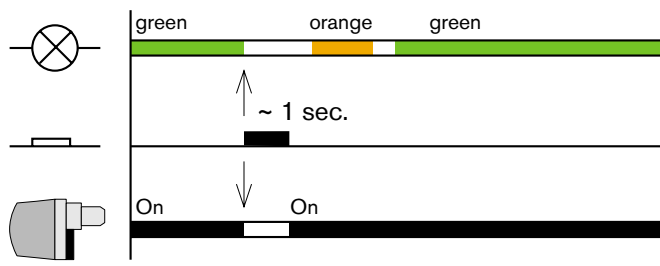
Accidental operation of the push button for less than 1 second:

Code stops flashing, combustion manager remains in the off position.

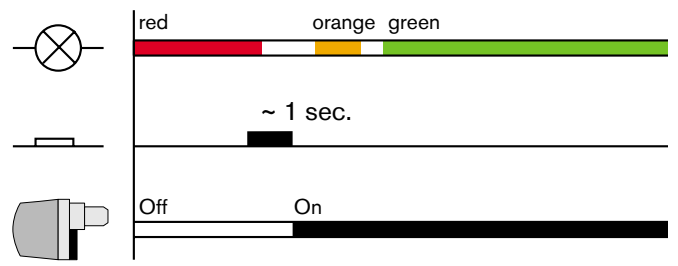


Press illuminated push button only lightly until the switch point can be felt. Pressing the push button too hard can damage the combustion manager.

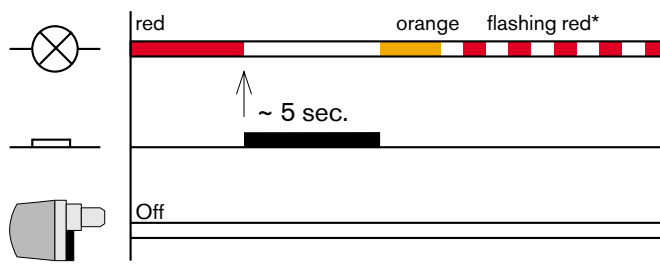
Burner operation ⇒ switch off



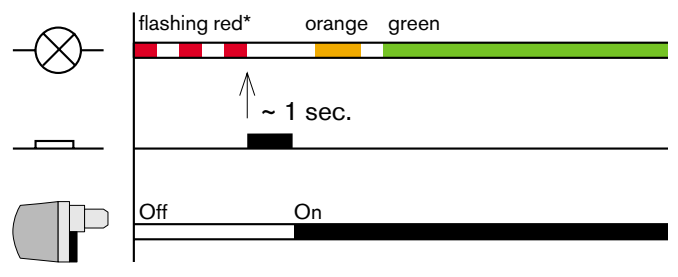
Burner lockout ⇒ reset



Burner lockout ⇒ diagnostic code ON



Burner lockout ⇒ diagnostic code OFF



* Assignment diagnostic codes see Ch. 6

6 Fault conditions and procedures for rectification

The burner is found either out of operation, in lockout (signal lamp shows red) or burner operation is hindered (signal lamp flashes orange/red or green/red).

If faults occur, check first that the basic requirements for operation are met.

- ☐ Is there a supply of electricity?
- ☐ Is there any fuel oil in the tank?
- ☐ Are all regulating controls for room and boiler temperature, water level interlocks, limit switches etc. set correctly?

If it has been established that the lockout is not due to any of the above, all the burner functions must be checked.



To avoid damage to the plant, do not reset the burner more than twice. If the burner locks out for a third time call for a service engineer.



Fault conditions should be rectified only by qualified and experienced personnel.

Reset:

with diagnostic code output (see Ch. 5.6):

From onset of lockout wait for error analysis time of approx. 5 seconds, then press reset button until the signal lamp switches to orange (approx. 5 seconds), determine flashing code, then press reset-button for a further second to reset.

without diagnostic code output:

Press reset button until the red light goes out (approx. 1 second).

Condition	Cause	Rectification
Combustion manager W-FM05		
Interpreting lamp signals		
Off	No heat request or no voltage supply	
Red	Lockout Diagnostic codes to limit probable causes: (press reset-button approx. 5 seconds) 2 x flashes 4 x flashes 7 x flashes 10 x flashes	no flame at end of safety time flame simulation/ extraneous light 4 x flame failure during one operation phase no specific error code
10 min. orange then red	8 x flashes By pressing reset (approx. 1 sec.) the flashing code list in the internal memory is deleted	bridging plug No. 2 missing or contact in servomotor does not close
Flashing red/green (lockout after 24 secs.)	Extraneous light	Find cause and rectify
Flashes 2 x red/orange then short pause	Over-voltage	Check external voltage supply
Flashes orange/red	Low voltage or internal fault Internal F7 fuse has blown	Check external voltage supply, replace combustion manager Replace fuse (Ch. 7.13)
Flashing green	Burner operation with low flame signal Limit values: Short circuit recognition in sensor circuit: Response limit for operation: Response limit for operation: Recommended monitoring current range: Max. attainable sensor current:	Check burner setting or flame sensor soiled <2 kΩ corresponds to > 110 μA <15μA >30μA 40 to 100μA approx. 120μA

Condition	Cause	Rectification
Lamp signals continued Flashing red	Bridging plug No.12 missing	Plug in bridging plug 12
	Optical data transfer activated (not used)	Press reset button > 5 secs. combustion manager changes to diagnostic code or operating mode
Motor Does not run	Capacitor defective	Replace capacitor
	Oil pump seized	Replace oil pump
	Motor defective	Replace motor
	Servomotor does not switch	Replace servomotor
Signal lamp flashes orange / red	Internal fuse F7 has tripped (Ch. 7.13)	Replace internal fuse (6.3A slow) Check burner components Replace damaged parts as necessary
Ignition No ignition	Ignition electrodes short circuited or gap too large	Adjust ignition electrodes
	Ignition electrodes dirty and damp	Clean ignition electrodes
	Insulation cracked	Replace ignition electrodes
	Ignition cable charred	Replace ignition cable, find cause and rectify
	Ignition unit defective	Replace ignition unit
Oil pump Does not supply oil	Shut off valve closed	Open shut off valve
	Suction valve leaking	Clean / replace suction valve
	Oil line leaking	Tighten connections
	Pre-filter blocked	Clean pre-filter
	Anti-siphon valve does not open	Check valve, if necessary replace
	Pump filter fouled	Clean pump filter
	Filter leaking	Replace filter
	Oil pump defective	Replace oil pump
Loud mechanical noise	Oil pump drawing air	Tighten connections
	Vacuum in oil line is too high	Clean filter. Fully open shut off valve in front of the burner (linked ball valve)
Solenoid valve Solenoid valve does not open	Coil defective	Replace coil
Signal lamp flashes red/green	Extraneous light	Find source of light and eliminate
Solenoid valve does not close tightly	Foreign particles on valve seat or in the protective filter	Replace oil pump

Condition	Cause	Rectification
Nozzle		
Irregular atomisation	Aperture partially blocked	Replace nozzle
	Nozzle filter heavily fouled	Replace nozzle
	Worn through extended use	Replace nozzle
No oil throughput	Nozzle blocked	Replace nozzle
Oil leaks out as burner motor starts	Oil pump solenoid valve is not tight	Replace oil pump
Flame sensor does not react to flame	Flame sensor defective	Replace flame sensor
Combustion head Heavy soot deposits	Defective nozzle	Replace nozzle
	Burner incorrectly set	Correct settings
	Amount of combustion air changed	Reset burner
	Boiler room insufficiently ventilated	Ensure sufficient boiler room ventilation as per local regulations
Voltage supply Signal lamp flashes orange / red	Voltage supply low voltage < 170 V	Check external supply voltage
	Internal fuse F7 has tripped (see Ch. 7.13)	Replace fuse (6.3A slow)
Signal lamp flashes 2 x red/orange then short pause	Voltage supply has excess voltage > 260 V	Check external voltage supply
Signal lamp remains off at heat request from boiler control	No voltage available	Check voltage supply
	Combustion manager defective	Replace combustion manager
General operation problems Start up problems, burner does not start, no flame formation despite ignition and fuel supply	Incorrect setting of the ignition electrodes	Correct setting (see Ch. 7.4)
	Diffuser too close to front edge of flame tube	Check setting If necessary adjust dimension S1 (see Ch. 7.5)
Signal lamp flashes green	Sensor current too low (limit values see combustion manager W-FM05 - Interpreting light signals)	Check burner setting for instability and pulsing flame
Burner / combustion pulsating strongly or booming	Mixing head incorrectly set diffuser too close to front edge of flame tube	Check setting of mixing head, increase dimension S1 as necessary (see Ch. 7.5)
	Wrong nozzle	If possible, select a nozzle with the next smallest throughput and increase the pump pressure. If necessary change nozzle manufacture
Flame failure after safety time T_S	Flame sensor dirty	Clean flame sensor
	Flame sensor defective	Replace flame sensor
Note	After adjusting the burner settings, always carry out a combustion test.	

7 Servicing

7.1 Safety notes on servicing



Failure to carry out maintenance and service work properly can have severe consequences, including the loss of life. Pay close attention to the following safety notes.



Danger of getting burned
Some burner parts (e.g. flame tube, burner flange, etc.) become hot during burner operation and should be allowed to cool prior to service work being carried out.

Qualified personnel

Only qualified and experienced personnel must carry out maintenance and service work.

Prior to all maintenance and service work:

1. Electrically isolate the equipment
2. Close all fuel carrying shut off devices
3. Remove the 7-pole connection plug from the boiler controller

After all maintenance and service work:

1. Function test.
2. Check flue gas losses as well as CO₂ / O₂ / CO values, smoke No.
3. Complete a test sheet

Endangering operational safety

Maintenance work on the following parts may only be carried out by the manufacturer or their appointed agent of the individual components.

- Flame sensor
- Combustion manager
- Solenoid valve
- Servomotor

7.2 Servicing plan

Service interval

The operator should ensure that combustion plant is serviced at least

- once a year -

by an agent of the supplier or other suitably qualified person.

Test and clean

- Fan wheel and air inlet (see Ch. 7.8 and 7.10)
- Ignition equipment (see Ch. 7.4 and 7.5)
- Combustion head and diffuser (see Ch. 7.5)
- Filter
- Oil pump filter
- Air damper (see Ch. 7.10)
- Flame sensor
- Nozzle filter / nozzle (see Ch. 7.3)
- Oil hoses

Function test

- Operation of the burner with the sequence of operations (see Ch. 5.5)
- Ignition equipment
- Oil pressure switch (where fitted)
- Flame monitoring
- Pumping pressure and vacuum suction of the pump
- Tightness of oil carrying components

7.3 Removing and refitting nozzle

Removal

- 1. Remove burner and place into service position (see Ch. 7.8)
- 2. Remove ignition cables ①
- 3. Remove screw ②
- 4. Remove diffuser ③ from the nozzle assembly
- 5. Remove nozzle
When changing the nozzle support the nozzle assembly.
Spanner size nozzle / nozzle assembly : SW16 / SW 19

Refit

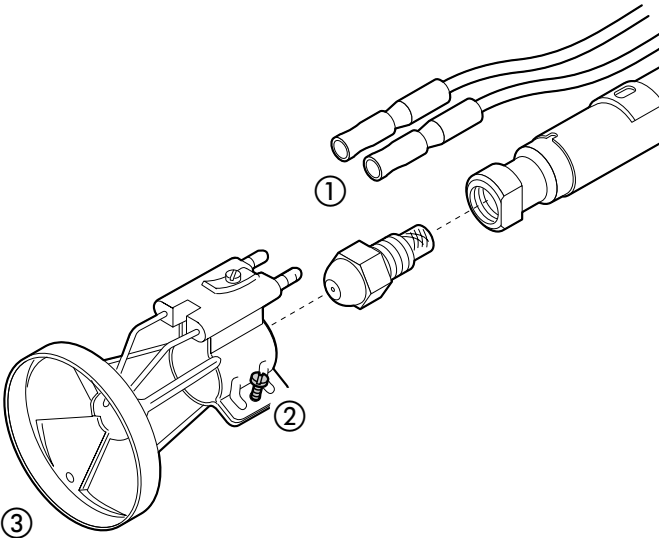
Refitting is carried out in reverse order.
Please note:

- The correct nozzle must be selected and fitted correctly.
- The distance between nozzle and diffuser (see Ch. 7.5)
- The ignition electrode setting (see Ch. 7.4)

Note If nozzle is soiled:

- Do not clean nozzle
- Always use new nozzle.

Changing the nozzle



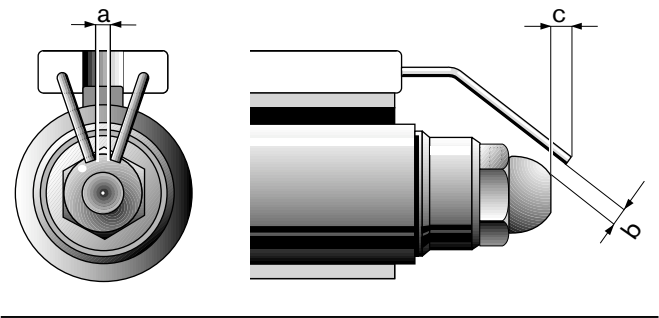
7.4 Ignition electrode setting

➡ Remove nozzle assembly (see Ch. 7.3)

Note The ignition electrodes must not touch the nozzle's oil atomisation spray cone!

Burner type	Dimensions in mm		
	a	b	c
WL10/2-C	2.0...2.5	1.5 -2.0	1.0-2.0

Ignition electrode setting



7.5 Mixing head setting

If the combustion head and the diffuser have heavy soot deposits, or are very oily internally, the combustion head settings must be checked. Dimension S1 (distance from the diffuser to the front edge of the flame tube) can only be checked when the burner is mounted onto a hinged boiler door. Otherwise, the nozzle assembly must be removed (see Ch. 7.6) and dimension L checked instead.



Incorrect setting of the mixing head can lead to soot and CO formation.

Basic setting

1. Adjust the indicating bolt ⑥ by turning the setting screw ⑦ to scale setting 0 (dimension $X = 0$). The indicating bolt ⑥ must be level with the back plate.
2. Dimension S1 or L must be checked.

If dimensions differ:

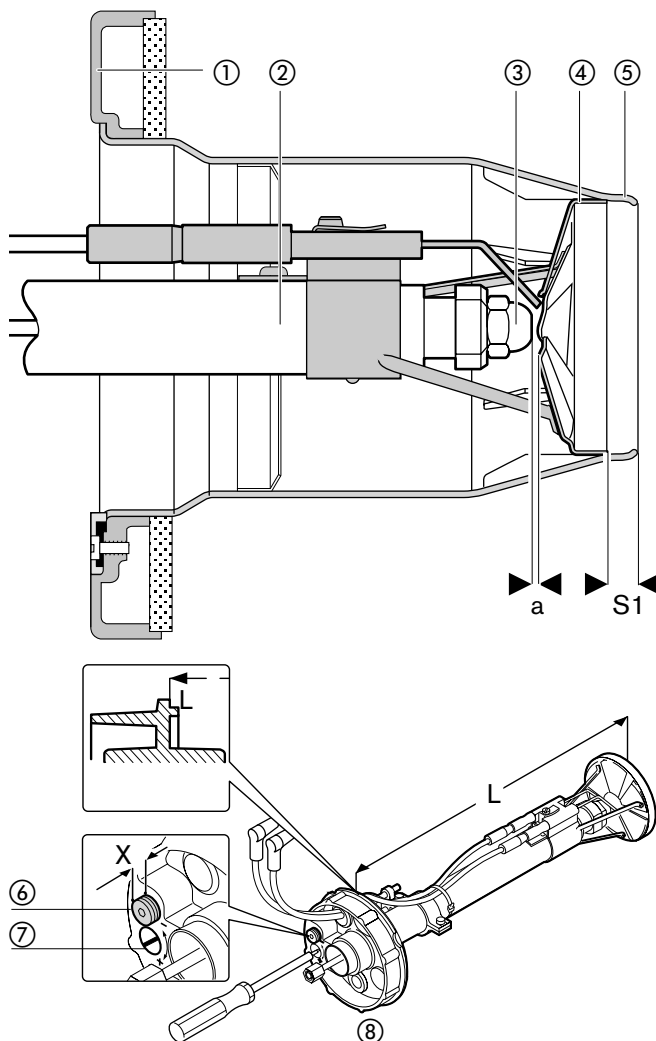
1. Set dimension S1 or L by turning the setting screw ⑦.
2. Remove the cap from the end of the indicating bolt ⑥.
3. With SW3 Allen key return the indicating bolt ⑧ to the zero position.
4. Refit the cap to the end of the indicating bolt.

Note Always carry out ratings related settings of the diffuser with the setting screw. Never turn the indicating bolt!

Basic setting

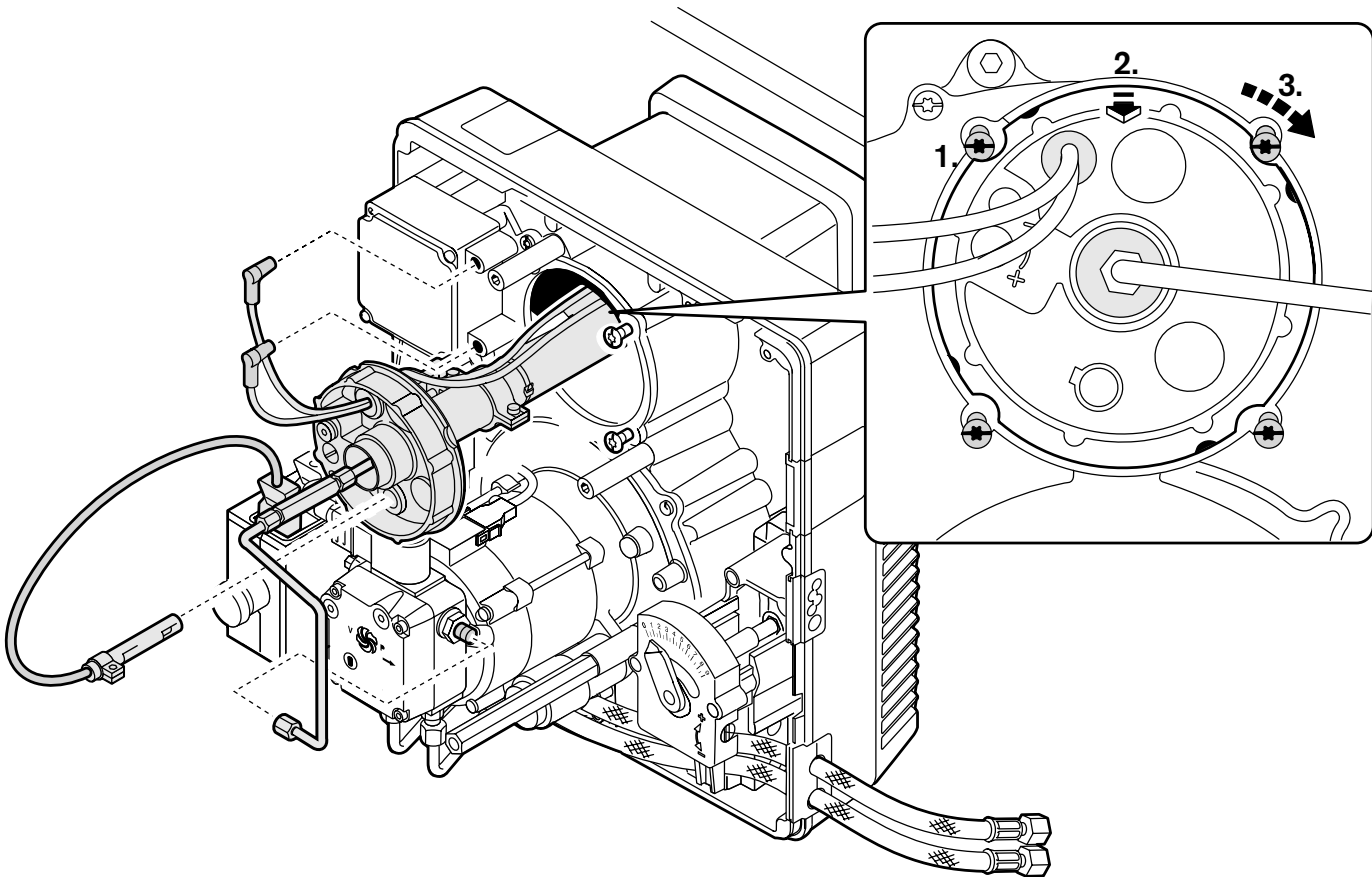
	L mm	X mm	S1 mm	a mm
WL10/2-C	276 ± 0.5	0	8.5	3.5

Setting the mixing head

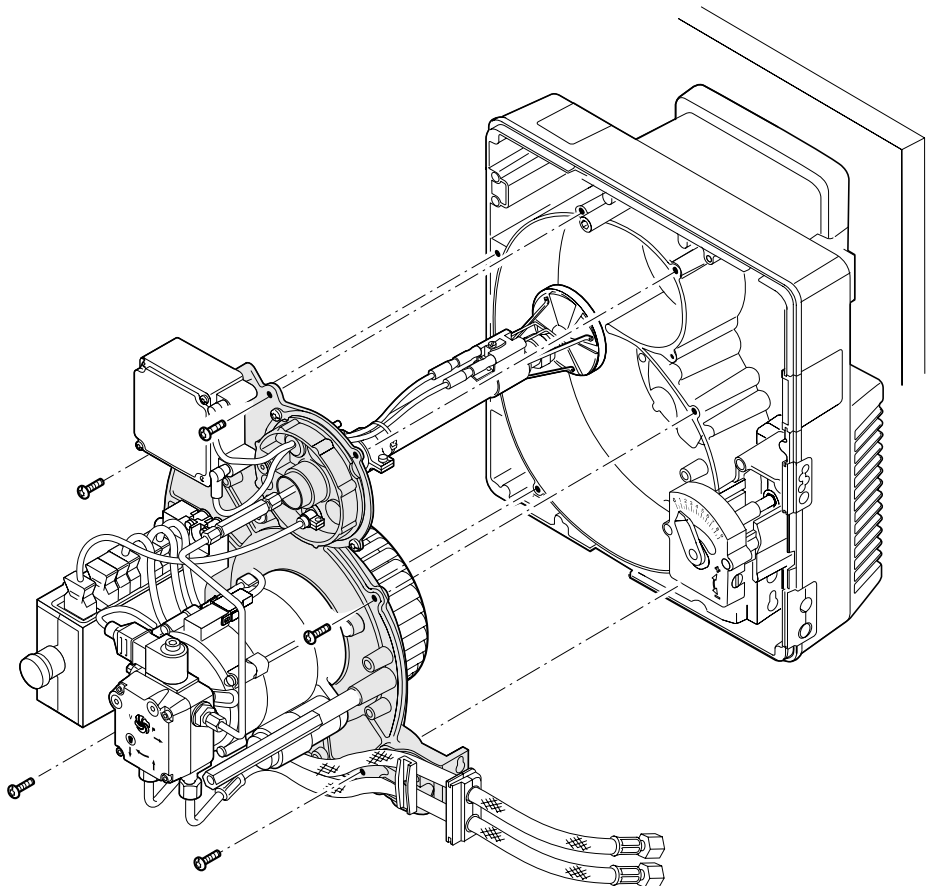


- | | |
|-------------------|-------------------------|
| ① Burner flange | ⑤ Combustion head |
| ② Nozzle assembly | ⑥ Indicating bolt |
| ③ Nozzle | ⑦ Setting screw |
| ④ Diffuser | ⑧ Nozzle assembly cover |

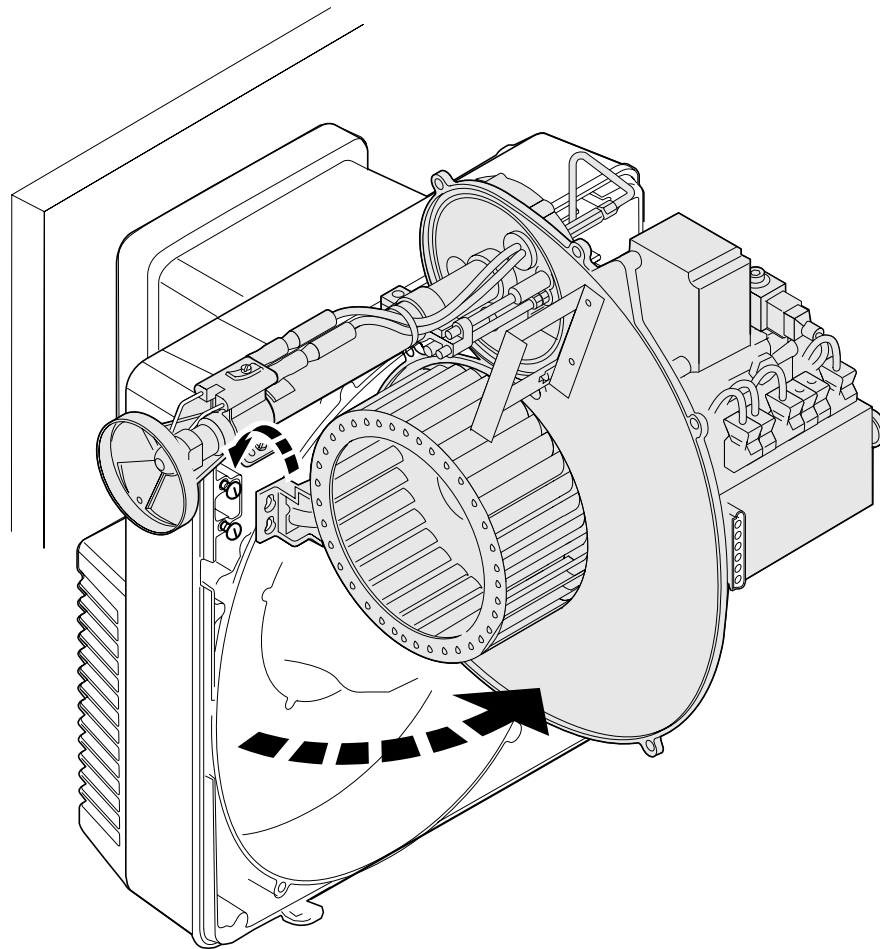
7.6 Removing and refitting nozzle assembly



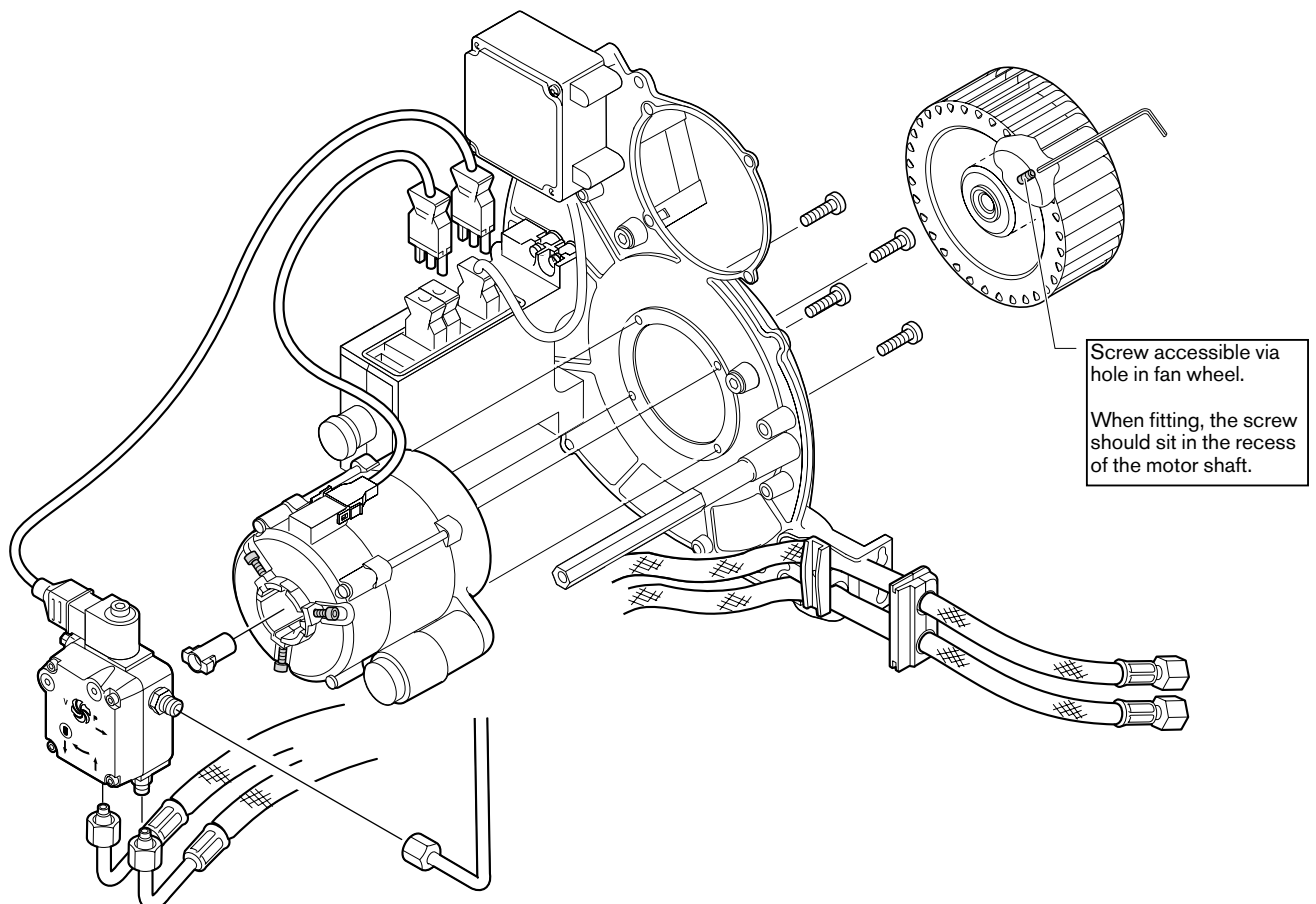
7.7 Removing and refitting housing cover



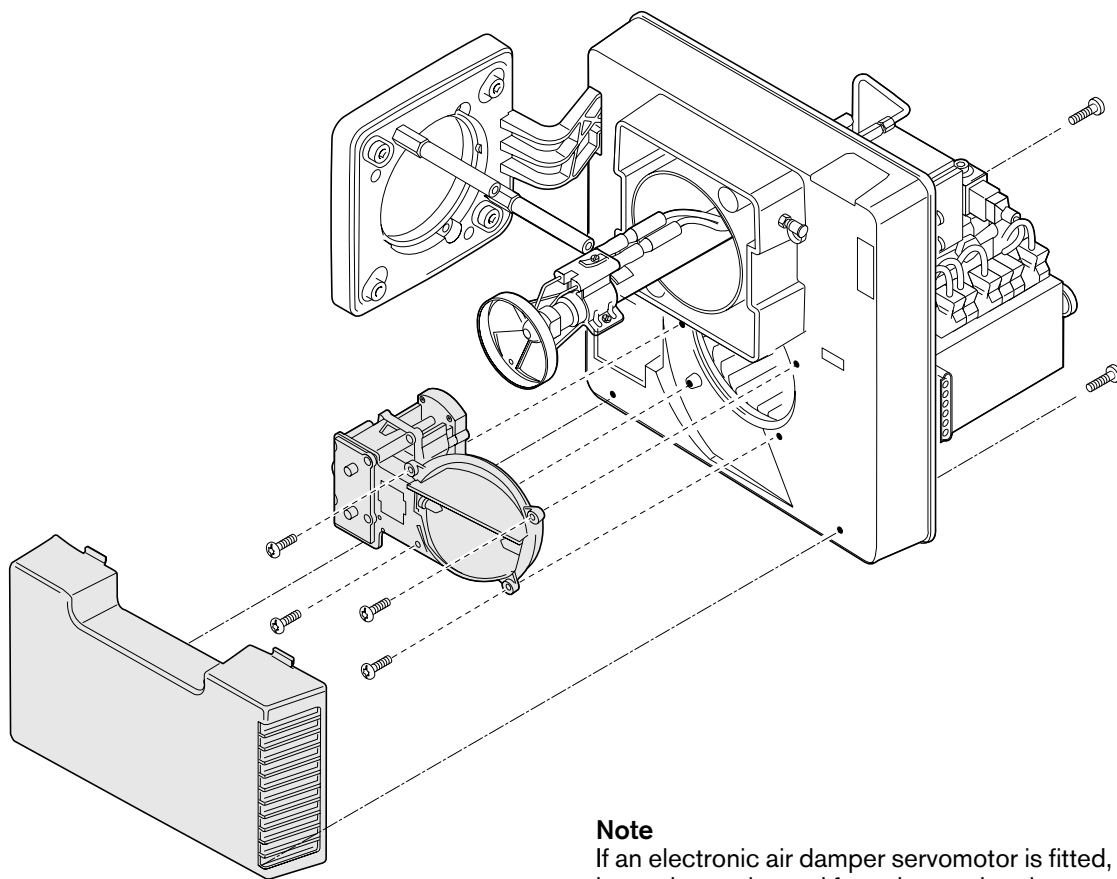
7.8 Service position



7.9 Removing and refitting oil pump, fan motor and fan wheel



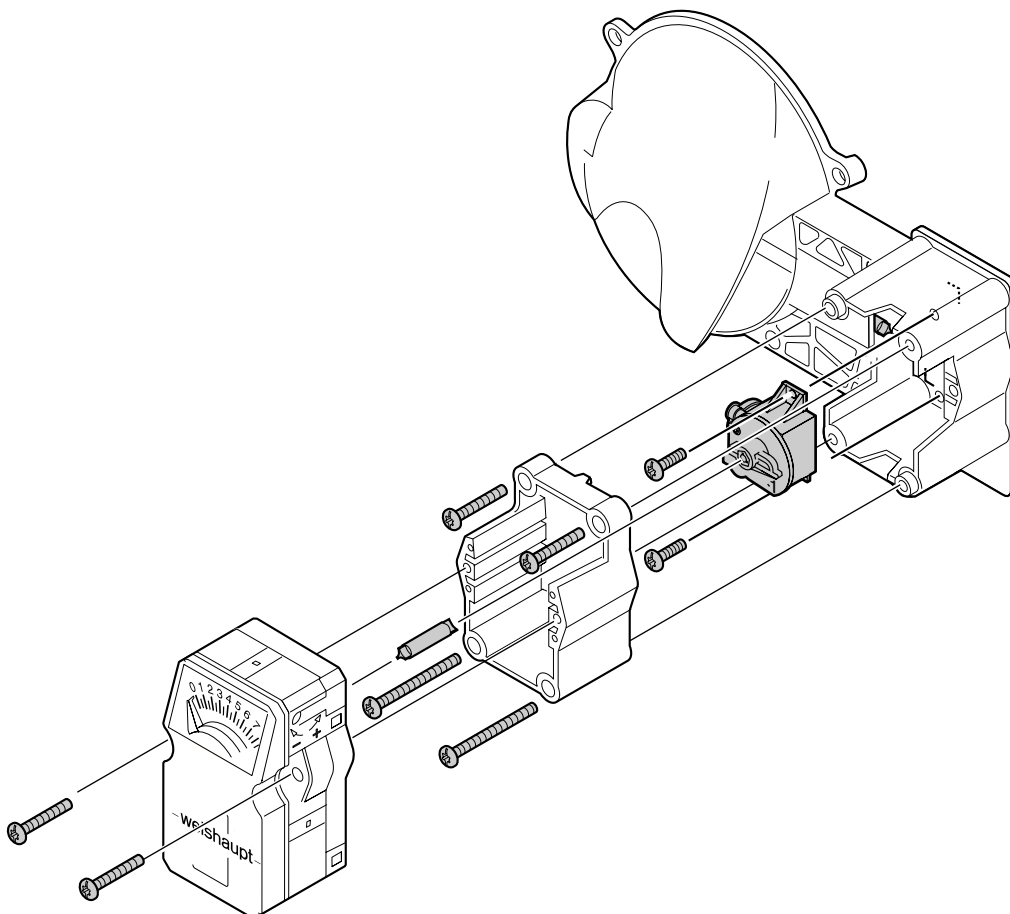
7.10 Cleaning the air regulator housing and air damper



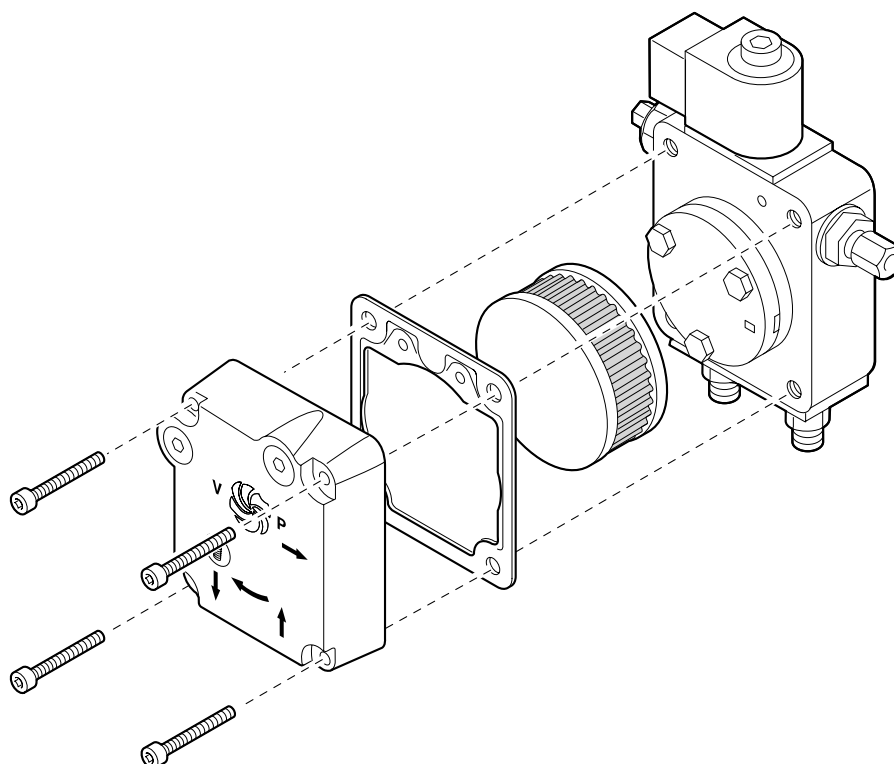
Note

If an electronic air damper servomotor is fitted, plug No. 2 has to be unplugged from the combustion manager prior to removing the air damper.

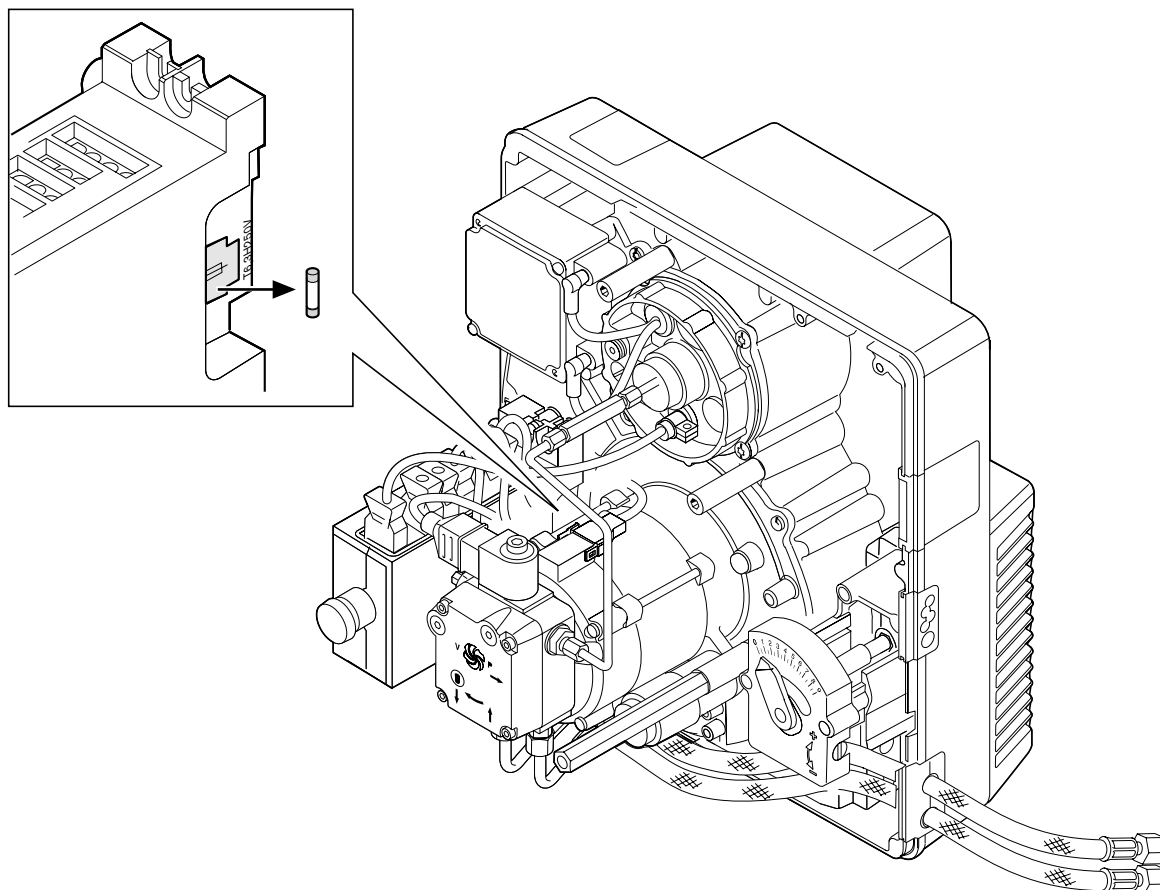
7.11 Removing and refitting air damper angle gear



7.12 Removal and refitting oil pump filter



7.13 Replacing internal fuse (W-FM05)



8 Technical data

8.1 Burner equipment

Burner-type	Combustion manager	Motor	Servomotor (optional)	Fan wheel	Ignition unit	Flame sensor	Oil pump
WL10/2-C	W-FM05	ECK 03/F-2 230V, 50Hz 2870 rpm 0.13 kW; 0.95 A Cap. 4 µF	W-St 02/2	146x40	W-ZG01	QRB1B	AL30 C 9537

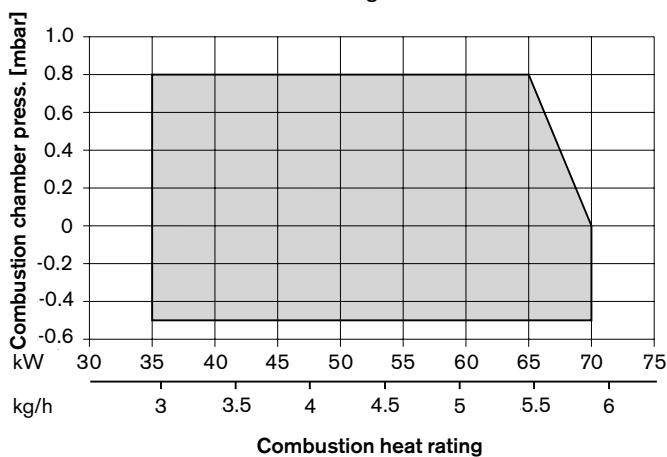
8.2 Capacity Graphs

Burner type **WL10/2-C**

Combustion head W10/2-C
Combustion rating 35 to 70 kW
2.9 to 5.9 kg/h

Capacity graph to EN 267

All ratings data given relate to an air temperature of 20° C and an installation altitude of 500 m.



8.3 Permissible fuels

Fuel oil DIN 51603-1
Austria: Fuel oil EL to ÖNORM-C1109
Switzerland: Standard oil, Euro-quality or preferred
Öko fuel oil, CH-quality (SN 181 160-2)

8.4 Electrical data

Mains voltage _____ 230 V
Mains frequency _____ 50 Hz
Consumption- Start _____ 0.33 kW
 Operation _____ 0.20 kW
Current _____ 1.1 A
External fusing _____ 16 A slow
Internal fusing W-FM 05 _____ 6.3 A slow

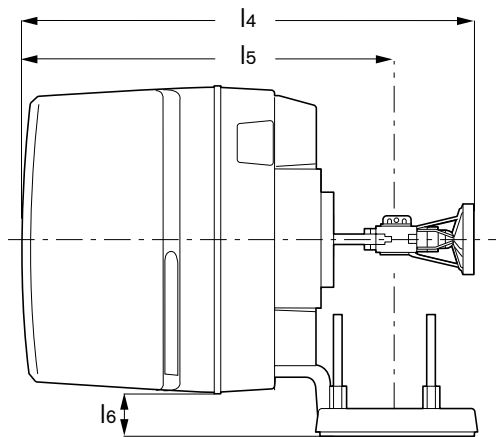
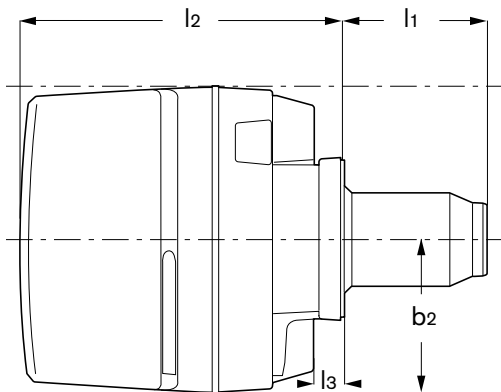
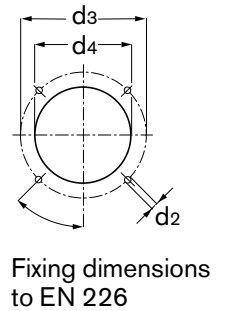
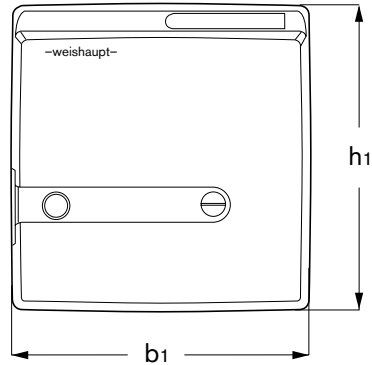
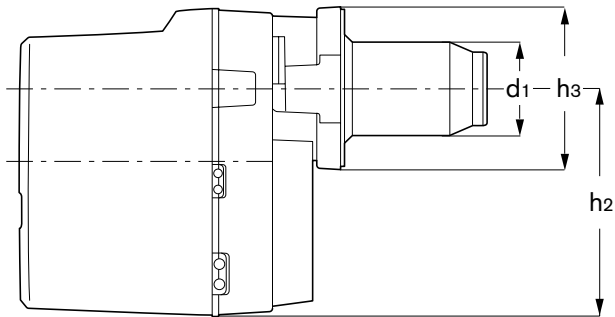
8.5 Permissible ambient conditions

Temperature	Humidity	Requirements for EMC	Low voltage guideline
In operation: -15°C* to +40°C	max. 80% rel. humidity no dew-point	Guideline 89/336/EC EN 50081-1	Guideline 73/23/EC EN 60335
Transport / storage: -20 to +70°C		EN 50082-1	

* With the relevant suitable fuel oil and / or the relevant layout of oil hydraulics.

8.6 Dimensions

Burner type	Dims. mm															
	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	b ₁	b ₂	h ₁	h ₂	h ₃	d ₁	d ₂	d ₃	d ₄	
WL10/2-C	140	345	27	476	398	51	330	165	353	270	165	99	M8	150-170	110	



8.7 Weight

WL10/2-C
Burner _____ approx. 14.0 kg

Appendix

Content

- Combustion analysis

Combustion analysis

For safe, economic and environmentally friendly operation of the plant, flue gas measurements are essential when commissioning.

Example of a simplified calculation for determining the CO₂ setting value

Given: CO_{2 max.} = 15.4 %

At smoke limit measured (smoke number ≈ 1):

CO_{2 meas.} = 14.9 %

Gives excess air : $\lambda \approx \frac{CO_{2\ max.}}{CO_{2\ meas.}} = \frac{15.4}{14.9} = 1.03$

To provide for a safe amount of excess air, increase λ by 15%: $1.03 + 0.15 = 1.18$

CO₂ value to be set with excess air $\lambda = 1.18$ and 15.4% CO_{2max.}:

$CO_2 \approx \frac{CO_{2\ max.}}{\lambda} = \frac{15.4}{1.18} = 13.0\ %$

The CO content must not be more than 50 ppm.

Be aware of the flue gas temperature

Flue gas temperature for full load is the result of the burner setting to the maximum required combustion heat input to the heat exchanger.

The flue gas installation should also be set out to protect against damage through condensation (excluding acid-proof chimneys).

Determination of flue gas losses

The oxygen content of the undiluted flue gas and the difference between the flue gas and the combustion air temperature must be determined. The oxygen content and the flue gas temperature must be measured at the same time at one point. Instead of oxygen content, the carbon dioxide content of the flue gas can also be measured. The combustion air temperature is measured in the proximity of the burner air intake.

The flue gas losses are calculated when measuring the oxygen content according to the equation:

$q_A = (t_A - t_L) \cdot \left(\frac{A_2}{21 - O_2} + B \right)$

If the carbon dioxide content is measured instead of the oxygen content, the calculation is carried out according to the equation:

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

whereby:

- q_A = flue gas losses in %
- t_A = flue gas temperature in °C
- t_L = combustion air temperature in °C
- CO₂ = % carbon dioxide content in dry flue gas
- O₂ = % oxygen content in dry flue gas

	Fuel oil
A ₁	= 0.50
A ₂	= 0.68
B	= 0.007

Weishaupt products and service

Max Weishaupt GmbH, D-88475 Schwendi
Tel. (0 73 53) 8 30, Fax (0 73 53) 8 33 58
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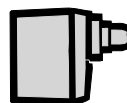
Weishaupt (U.K.) Ltd.
Stoke Gardens, Slough SL1 3QD
Tel. (01753) 51 23 45
Fax (01753) 51 25 85

Neachells Lane, Willenhall
West Midlands, WV13 3RG
Tel. (01902) 60 98 41
Fax (01902) 63 33 43

– weishaupt –

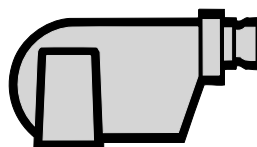
Oil, gas and dual fuel burners types W and WG/WGL up to 570 kW

They are used mainly in houses and small buildings.
Advantages: fully automatic, reliable operation, individual components easily accessible, easy to service, quiet operation.



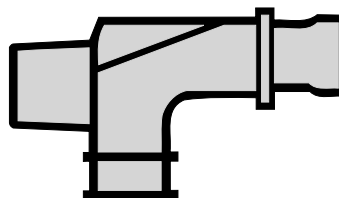
Oil, gas and dual fuel burners types Monarch R, G, GL, RGL – up to 10.900 kW

These are used on all types and sizes of central heating plant. The basic model which has proved successful over many years is the basis for a variety of versions. These burners have founded the outstanding reputation of Weishaupt products.



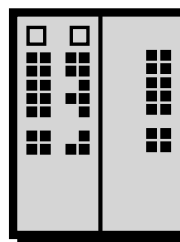
Oil, gas and dual fuel burners types WK – up to 17.500 kW

WK types are decidedly industrial burners.
Advantages: Built to the modular system, load dependent variable combustion head, sliding two stage or modulating operation, easy to service.



Weishaupt control panels, the proven complement to Weishaupt burners

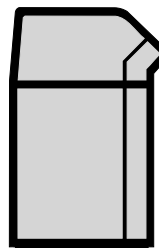
Weishaupt burners and Weishaupt control panels form the ideal unit, a combination which has already proved successful in hundreds of thousands of combustion installations. The advantages: Cost saving during planning, installation, servicing and guarantee work. The responsibility belongs to one manufacturer.



Weishaupt Thermo Unit / Weishaupt Thermo Gas.

These Units combine the technical innovations and operating efficiencies developed from over 1 million installations.

Weishaupt Thermo Gas and Weishaupt Thermo Unit provide the ideals of complete heating centres for houses and appartments.



Product and service are the complete Weishaupt achievement

An extensive service organisation guarantees Weishaupt customers the greatest possible reliability. In addition our customers are looked after by heating firms who have been working with Weishaupt for many years.

