Installation and maintenance manual

Warm air heater WS/WO
(Copy of the original version)

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GB

Contents / Device description

Device description

Warm air heater, type WS, in accordance with DIN 4794 for oil and natural or liquefied petroleum gas, as a vertical or horizontal unit, with built-in double-inlet radial fan.

Warm air heater, type WS with fan

Warm air heater, type WO, without fan

Information signs / Safety instructions

General

These assembly and maintenance instructions are applicable exclusively to WOLF air heaters.

Before commencing assembly, start-up or servicing, these instructions are to be read by the personnel charged with that work.
The guidelines given in these instructions must be followed.
Failure to observe the assembly and maintenance instructions will nullify WOLF's warranty liabilities.

Qualified and trained personnel must be used for the assembly, commissioning and servicing of the warm air heater. In accordance with VDE 0105 Part 1, only trained electricians may work on electrical components (e.g. controller).

The specifications of VDE/ÖVE and of the local electricity supply company are applicable to the electrical installation work.

Information signs

The following symbols and information signs are used in these assembly and maintenance instructions. These important instructions concern personal safety and technical reliability.

"Safety instructions" identify instructions with which you must exactly comply to prevent injury and damage to the equipment.

Danger through 'live' electrical components.
Warning: Switch the ON/OFF switch to OFF before removing the casing.
Never touch electrical components or contacts when the ON/OFF switch is in the ON position. This brings a risk of electrocution, which may result in injury or death. The supply terminals are still “live” even when the ON/OFF switch is OFF.the supply terminals are still “live” even when the ON/OFF switch is OFF.

Attention

"Information" identifies technical instructions which you must observe to prevent damage and avoid malfunctions.

In addition to the assembly and maintenance instructions, information is also provided in the form of adhesive labels.
They must also be observed in the same way.

Safety instructions

- The air heater may only be operated within the power range prescribed in the technical documentation provided by WOLF.
- Use of the air heater in accordance with its specifications only includes its use for ventilation purposes.
  Only air may be delivered.
  This air must not contain any constituents that are injurious to health, inflammable, explosive, aggressive, corrosive or in any other way hazardous.
- Safety or monitoring equipment must not be removed, by-passed, or made non-functional in any other way.
- The air heater must only be operated when in a technically fault-free state. Malfunctions or damage that interfere, or could interfere, with safety must be immediately rectified in a workmanlike manner.
- Faulty components and device components must only be replaced with original WOLF spare parts.

Standards, Regulations

Observe the national standards and directives for the assembly and operation of the warm air heater!

Observe the data on the type plate of the warm air heater!

The following local regulations are to be observed when installing and operating the warm air heater:

- Installation conditions
- Supply and exhaust air devices as well as chimney connection
- Electrical connection to the power supply
- Technical rules of the gas supply company for the connection of the gas appliance to the local gas supply network

The following general regulations, rules and directives are to be observed in particular during the installation:

- (DIN) EN 12831 Heating systems in buildings - method for calculation of the standard heat load
- (DIN) EN 13384 Flue gas systems - thermal and fluid dynamic calculation methods
- (DIN) EN 50156-1 (VDE 0116 Part1) Electrical equipment for furnaces and ancillary equipment
- VDE 0470/(DIN) EN 60529 Specification for degrees of protection provided by enclosures
- (DIN) EN 1856-2 Chimneys - Requirements for metal chimneys
- (DIN) EN 267 Automatic forced draught burners for liquid fuels
- (DIN) EN 676 Automatic forced draught burners for gaseous fuels
- (DIN) EN 13842 Oil fired forced convection air heaters - Stationary for space heating

Beyond that, the following apply in particular to the installation and operation in Germany:

- Technical rules for gas installations DVGW TRGI 1986/1996 (DVGW worksheet G600 and TRF)
- DIN 18160 Flue gas systems
- VDE 0100 Specifications for the installation of high voltage systems with nominal voltages up to 1000 V.
- VDE 0105 Operation of high voltage systems, general specification
- KÜO - Federal sweeping and inspection regulations
- Saving of Energy Act (EnEG) with the regulations issued in addition:
  EneV Energy Saving Regulation (in the respectively valid edition)
- DVGW worksheet G637
- 2006/95/EC Low voltage directive
- 2004/108/EC EMC directive
- 2006/42/EC Machinery directive
- DIN 4755 Oil firing installations - Technical regulation for oil firing installation - Testing
- DIN 1298 Flue gas tubes - connection parts for heating plants
- TRF Technical regulations LPG
- FeuVO Regulations for fireplaces

Please note

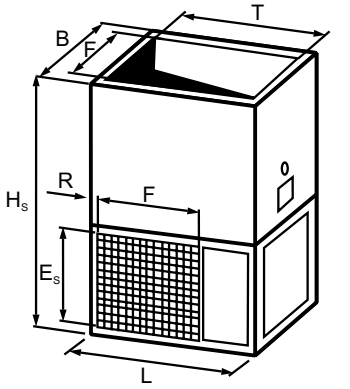
Attention When the warm air heater is operated with LPG below ground-level line, the special requirements in accordance with TRF are to be observed.

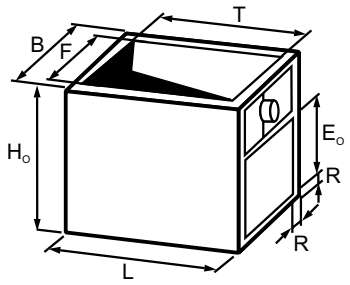
Attention Warm air heaters must be registered in accordance with the corresponding federal construction codes.

Attention When warm air heaters with a total thermal output of more than 50 kW are installed outside of furnace rooms, the corresponding guidelines of construction supervision are to be observed.

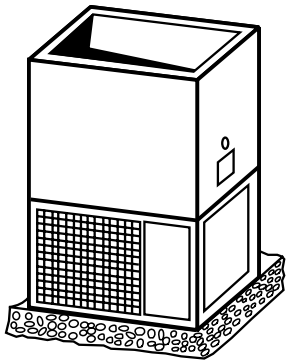
Attention Keep operating instructions in a clearly visible place next to the warm air heater.

Technical Data:

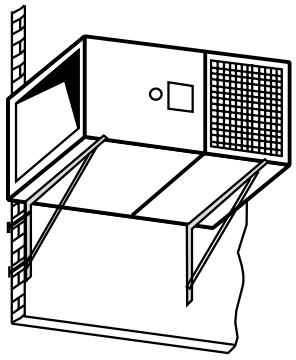




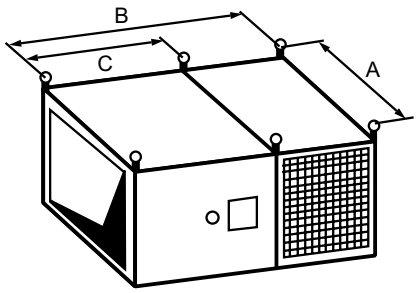
Floor assembly



Wall mounting



Ceiling suspension on lifting eyebolts



Dimensions (mm)

Type	External dimensions				Air inlet lateral / rear side				Air outlet	
WS/WO	L	B	H_S	H_O	E_S	E_O	F	R	F	T
40	630	630	1260	800	380	380	550	40	550	550
63	800	700	1410	910	420	420	620	40	620	720
100	1100	730	1730	1100	550	550	650	40	650	1020
160	1250	910	1950	1250	580	580	790	60	790	1130
250	1600	1090	2510	1600	790	790	970	60	970	1480
400	1600	1090	2630	1600	910	790	970	60	970	1480

Weights (kg)

Typ	**40**	**63**	**100**	**160**	**250**	**400**
WS	130	190	240	400	650	770
WO	90	130	170	270	400	450

Warm air heaters can be placed horizontally or vertically.

Air heaters in horizontal execution are to be fixed onto non-flammable ground, tightly supported over their entire circumference, otherwise an increased amount of intake air may cause overloading of the motor. For fire safety reasons, the WS must be mounted on a non-flammable surface.

Air heaters in vertical execution can be fixed onto the wall by brackets or onto the ceiling by means of lifting eyebolts.

Wall and ceiling must be non-flammable and must be designed by the customer for sufficient stability (for weights, see table). The load bearing capacity must be sufficient to prevent risk to persons.the load bearing capacity must be sufficient to prevent risk to persons.

Attention

The air heater must in all cases be fixed in such a way that maintenance and cleaning work can be carried out without problems and so that unimpeded supply of combustion air is ensured.

It must be possible to switch off operating controls for air heaters and fuel supply immediately in the event of danger. For this reason, they must be mounted at a height that can be reached from the ground, otherwise it may not be possible to switch them off safely.

A buffer zone of 1m must be kept clear around the air heater in order to safeguard the air intake and permit operation at all times. Any parts placed too close to the fan could be sucked in, which could result in damage to the components.

Attention

Air heaters must normally be connected to own chineys.
The connection of multiple air heaters to one chimney is not permitted.

The length of the connection piece between air heater and chimney shall not exceed 2 m and shall be guided upwards towards the chimney.

When using steel chimneys, a soot collector is to be installed directly at the smoke tube outlet of the air heater so that the condensate produced is removed before the heating compartments.

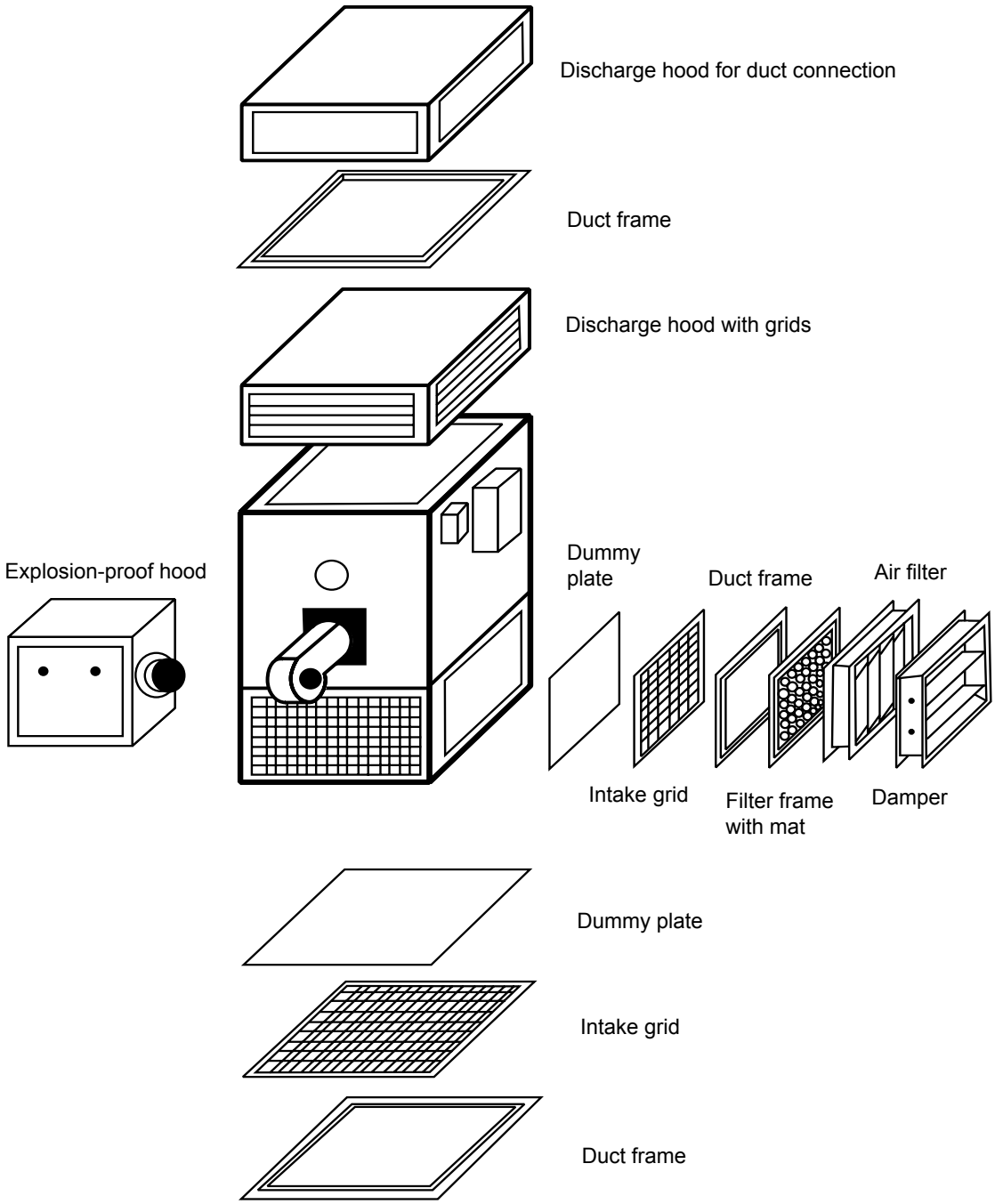
Steel chimneys are subject to approval of the building authorities prior to commissioning.

Dimensions (mm)

Type		**40**	**63**	**100**	**160**	**250**	**400**
WS/WO	A	600	770	1070	1210	1560	-
WS/WO	B	1230	1380	1700	1910	2470	-
WO	C	770	880	1070	1210	1560	-
WS	C	-	-	-	1250	1600	-

Fitting of accessories

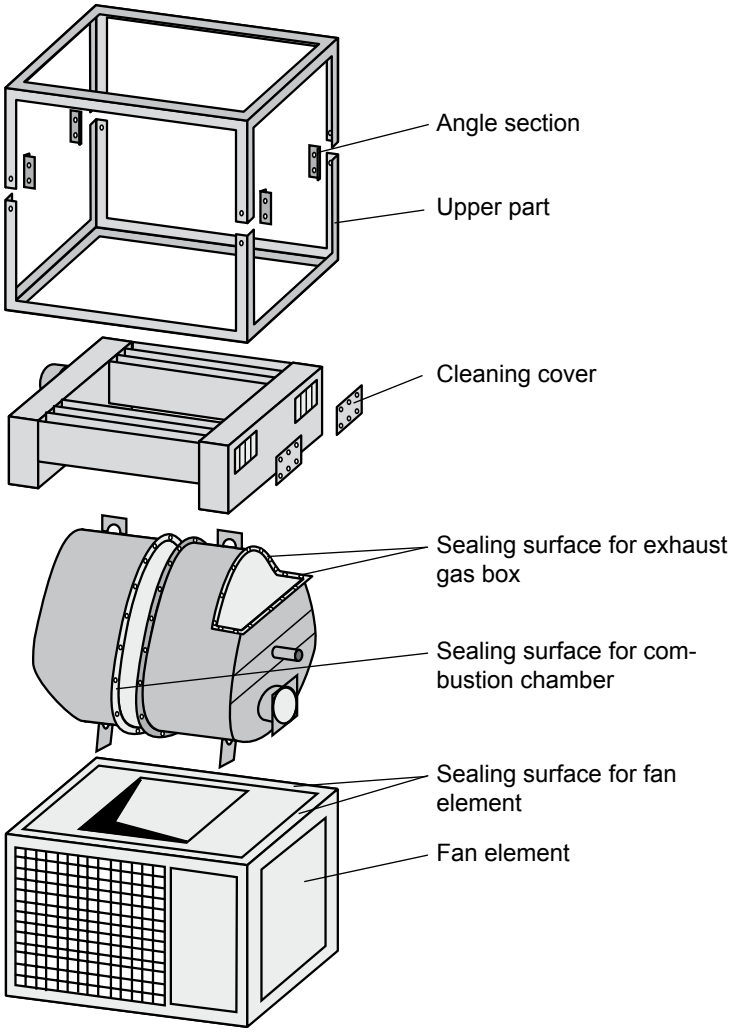
Fit accessories according to scope of delivery as indicated in the drawing.



Dismountable Units

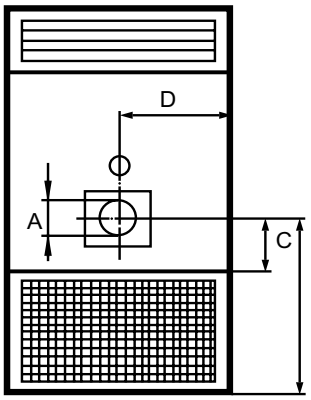
Units which can be dismantled are delivered pre-assembled from the factory.
Prior to the installation they are disassembled and then assembled again in the reverse order.
The following materials needed for installing and sealing the unit are supplied:

Nuts and bolts
Heat resistant sealing cord
TTesamollesamoll
Elastic sealing material



- Place fan element in position.
- Place combustion chamber components on fan element.
- Seal combustion chamber components with heat resistant sealing cord and screw together with the nuts and bolts supplied (sealing cord is compressed and forms a seal).
- Place exhaust gas box on combustion chamber.
- Remove front cleaning covers on exhaust gas box.
- Lay heat resistant sealing cord on the sealing surface of the exhaust gas box and screw it on with the nuts and bolts supplied.
- Stick the Tesamoll provided on to the sealing surface of the fan element; in addition, seal with elastic sealing material (from the cartridge supplied).
- Put on upper part. Depending on the order, the sections of the upper part may be separate and have to be screwed together with the angle sections.
- Connect fan element and upper part together using nuts and bolts supplied.
- Fit cladding panels.

Installation of burner



Attention

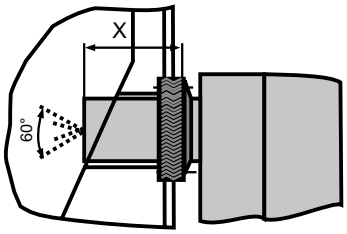
The warm air heater may only be operated with forced draught oil burners according to DIN 4787 or with forced draught gas burners according to DIN 4788, either with natural gas or LPG.

The burner must be fitted with an automatic firing device with 15 sec. pre-ventilation period in accordance with DIN 4794. This device must be approved for air heaters, otherwise there is a risk of explosion during the start-up phase of the burner.

If the burner plate has no bores, the opening for the fire tube and the threads for the fastening bolts have to be made by the customer.

Attention

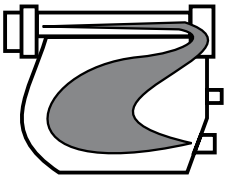
The immersion depth of the burner must not be less than the minimum value X given in the table. At its maximum immersion depth, it may protrude only so far that the tip of the flame cannot under any circumstances touch the rear wall of the combustion chamber, otherwise there is a risk of overheating and hence burning through the rear wall of the combustion chamber.

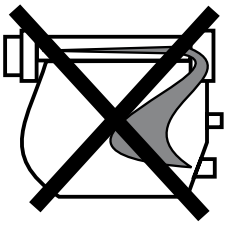


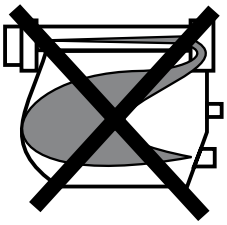
The burner manufacturer's installation instructions should generally be regarded as paramount.

Dimensions (mm)

Type WS/WO		**40**	**63**	**100**	**160**	**250**	**400**
WS/WO	A Ø	151	151	151	186	186	265
WS	B	715	743	945	1030	1311	1431
WO	C	255	243	315	330	401	401
Fire tube length X	min.	70	100	120	150	150	150
	max.	105	135	170	210	225	225







Attention

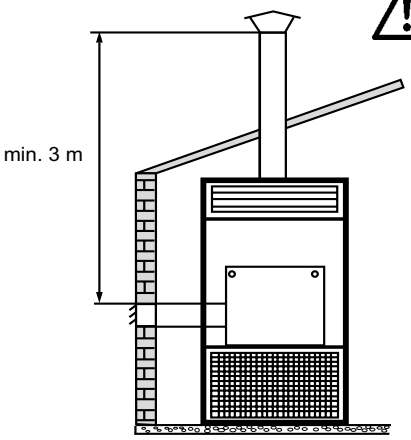
The fuel throughput must correspond to the thermal output as specified in the order. Andernfalls droht Gefahr einer Unter- bzw. Überbelastung der Brennkammer.

Set the burner so that an even combustion chamber load is achieved. Flames may not impinge on the rear wall. Recommended nozzle angle 60°.

At an ambient temperature of 20 °C and nominal thermal output, the average temperature of the flue gas downstream of the flue gas port must not fall below 160 °C or exceed 200 °C during continuous operation. If the exhaust gas temperature lies below 160 °C, measures should be taken to prevent damage due to the formation of condensation. If the flue gas temperature lies above 200 °C, adjustments (e.g. to the burner) are required.

Observe the installation and operating instructions for the burner.

Explosion-proof hood



In case the combustion air has to be taken in from the outside (e. g. for garages, workshops, etc.), an explosion-proof hood with an airtight duct system must be installed. Make sure that the combustion air intake is positioned at least 3 m below the chimney outlet. Otherwise there is a risk of short circuiting.

Electrical supply

The electrical connection must be carried out only by a qualified electrician in accordance with DIN 57116/VDE 0116.

The rules and regulations of the VDE and the local utility company must be observed.

Electrical wiring according to enclosed wiring diagrams.

Before it is brought into operation, the installation must undergo a safety inspection in accordance with VDE 0701 Part 1 and VDE 0700 Part 500.

According to DIN VDE 0116 section 5, a switch (circuit breaker) must be provided with for every burner of firing plants with solid, liquid or gaseous fuels with which the electrical equipment of the burner can be switched off.

According to section 7, a main switch is necessary for switching off in case of danger for nominal thermal loads exceeding 50 KW.

According to VDE 0116 this is to be mounted in an easily accessible place outside the room in which the firing plant is installed and marked accordingly.

Connection of threephase standard motors

Attention

The supply voltage must correspond to the motor voltage. Check protective motor switch for correct setting range. Use fuses as specified by the protective switch manufacturer (see also documentation regarding switch cabinet data).

Motor connection at 3 x 400 V:

1 motor, single speed	up to	3	kW	direct start
	more than	4	kW	Y/Δ start
1 motor, two-speed	up to	3	kW	direct start
	more than	3	kW	delayed speed changing
2 motors, single speed	up to	2,2	kW	direct start
	more than	3	kW	Y/Δ start
2 motors, two-speed	up to	2,4	kW	direct start
	more than	2,4	kW	delayed speed changing

With Y/Δ start, use star-delta contactor with automatic change-over from Y to Δ.

Measure the motor current!

Attention

The current consumption measured behind the fuse must not exceed the rated current as specified on the motor name plate.

With Y/Δ starting, the operating current of the individual motor feed lines must not exceed the value "nominal current / √3".

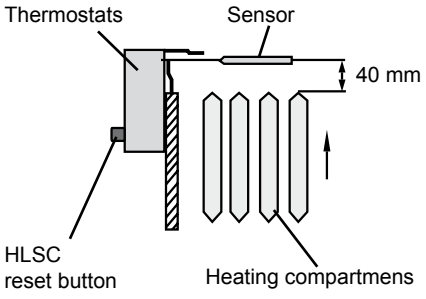
Set the protective motor switch to this value.

Three-phase motors must always be provided with a motor protection.

Double thermostat and safety thermostat

Attention

Warm air heaters must only be operated with double and safety thermostats. The thermostat will always be installed by the manufacturer at the correct position with respect to the type of assembly.



The function of the double and safety thermostat has to be checked when the air heater is taken into operation for the first time and then at least once a year.

The sensors shall be positioned at least 40 mm in air direction behind the heating compartments.
The double thermostat is delivered with the following settings:

Fan ON at 40°C
Fan OFF at 35°C
Burner OFF at max. 80°C

The safety thermostat will switch off the burner at 100°C and will be locked through a restart locking device.

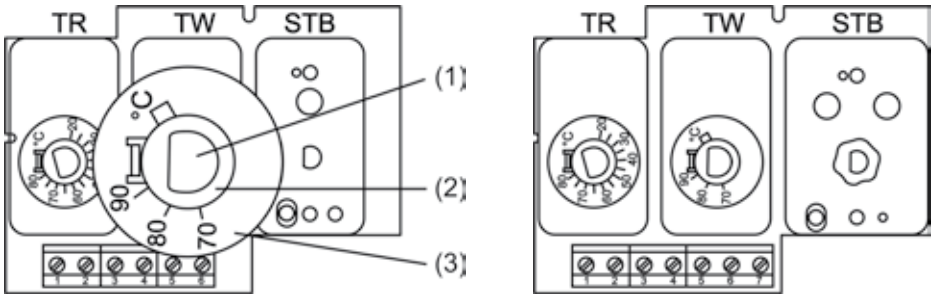
At temperatures below -20 °C, the safety thermostat engages. The thermostat must be released manually.

Double and safety thermostat
Functional principle of the warm air heater

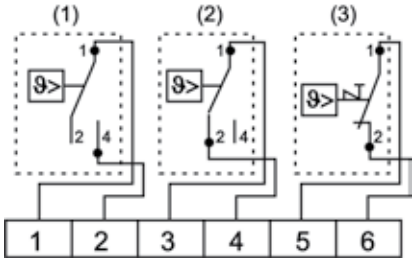
Structure of double and safety thermostat

(1) Set point adjuster
(2) Set point indicator
(3) Interior scale

- Remove the casing cover and adjust the set point adjuster with a screwdriver.
- Fit the casing cover and screw it tight.



Connection diagram - double and safety thermostat



(1) TR (fan)
(2) TC (burner)
(3) HLSC (burner)

The 3 functions of the double and safety thermostat

1. **Fan controller (TR)**
   Controls the switching on and off of the recirculating air fan. The switching point is set with the “Setting lever TR”.

   Set point approx. 40 °C.

2. **Temperature controller for the burner (TC)**
   The temperature controller limits the device/exhaust temperature. The switching point is set with the “Setting lever TC”.

   Set point approx. 80 - 85 °C.

3. **High-limit safety cut-out (HLSC)**
   Assumes the control function of the temperature controller.

   Switching point set permanently to 100 °C.

   A restart block prevents the burner from being restarted after tripping.

   The reset button (RESET) must be manually actuated from the outside with the casing cover closed.

   The operating conditions of the appliance must be checked before resetting the HLSC in order to avoid the HLSC temperature being exceeded again.

Functional principle of the warm air heater

The forced-draught burner switches on after setting the operating switch to the “Winter” position.

The combustion chamber with heat exchanger is now heated.

After reaching the set point temperature the supply air fan switches on automatically. Warm air is blown out.

Depending on the heat requirement the functional sequence described above is repeated.

In case of heating operation via a room thermostat (operating switch in the “Winter” position), the functional sequence described above runs automatically in accordance with the respective heat requirement.

All appliance functions are carried out and securely monitored fully automatically by the double and safety thermostat and the automatic burner (component of the forced-draught burner).

After the appliance is switched off via the operating switch or by the room thermostat, the supply air fan continues to run for a certain time until the combustion chamber or heat exchanger has cooled down and then switches off automatically.

Except in an emergency, the appliance must never be disconnected from the electricity supply before the expiry of the entire cool-down phase.

Commissioning / heating mode / shutdown

Commissioning

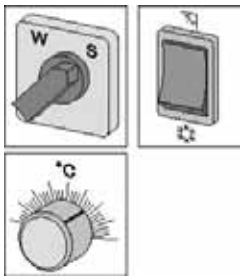
The commissioning of the appliance and the forced-draught burner must be carried out by the manufacturer or an expert authorised by the manufacturer. During the commissioning the function and correct adjustment of all regulating, control and safety devices must be checked.

- The commissioning of oil and gas-fired appliances must always be carried out by authorised technical personnel.
- Check that all nuts and bolts for fixing the fan and burner are tight.
- If necessary, open the outlet grille and adjust it according to the requirements.
- Check the settings on the double and safety thermostat.
- Switch the on-site main switch or circuit breaker on.
- Adjust the room thermostats higher than the existing room temperature.
- Open the fuel supply line and place the operating switch in the “Winter” position.
- Adjust the fuel oil or gas throughput in accordance with the heating load of the appliance.
- Adjust the burner to optimum values in accordance with the manufacturer’s specifications, but at least in accordance with the Federal Immission Protection Act.
- Measure the chimney draught in the cold and warm condition.
- Prepare a measuring record and hand it over to the user for keeping. Familiarise the user with the system.
- Submit the specialist company declaration as well as the company accreditation of the respective specialist installation company to the responsible authorities.

Important notes on corrosion in the heat exchanger

- **Note that the exhaust gas temperature difference may not fall below 160 Kelvin.** This prevents the temperature from falling below the dew point and avoids the resulting corrosion in the heat exchanger.
- If the appliance is not adjusted to its nominal heating load or is designed for a larger heating requirement than is necessary, the burner operates only in cyclic operation. Since the required operating temperature is not reached in cyclic operation, this results in the increased formation of condensate and corrosion in the heat exchanger.

Heating operation

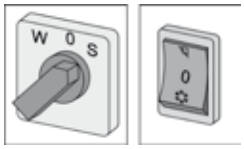


The appliance operates fully automatically according to the desired room temperature.

Place the appliance in heating mode as follows.

1. Switch the on-site main switch or circuit breaker on.
2. Open the fuel supply line.
3. Set the operating switch in the switchbox to the “Winter” or “☼” position.
4. Set the room thermostat to the desired room temperature.
5. Note that the forced-draught burner switches on automatically when heat is required, but the supply air fan only switches on when the set point temperature has been reached. This avoids the undesired output of cold air.

Ventilation



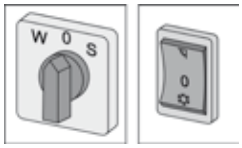
The appliance operates permanently in ventilation mode.

Thermostatic control is not possible.

The burner is not activated.

Set the operating switch in the switchbox to the “Summer” or “” position.

Shutdown

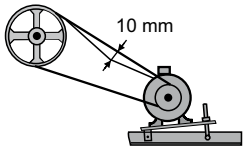


- Set the operating switch in the switchbox to the “0” position.
- The supply air fan continues to run in order to cool the heat exchanger and may start up several times before finally switching off.

Warning

- **The appliance must never be switched off by means of the main switch or emergency switch before the expiry of the complete cool-down phase (except in an emergency).**
- In case of a longer shutdown, the on-site main switch or circuit breaker should be switched off after shutdown and the fuel supply line closed.

Maintenance



The warm air heater shall be serviced by an expert technician at least once a year.

We recommend that a service contract is concluded.

V-belt tension and pulley alignment may change during transport. The V-belts should have enough play so that they can be pressed in by approx. 10 mm.

Cleaning

The warm air heater shall be cleaned at least after each heating period.

Prior to cleaning the flue gas ducts, the front and rear casing panels and the cleaning lid must be removed (cleaning brush available under accessories). Clean combustion chamber through burner aperture and extract the dirt.

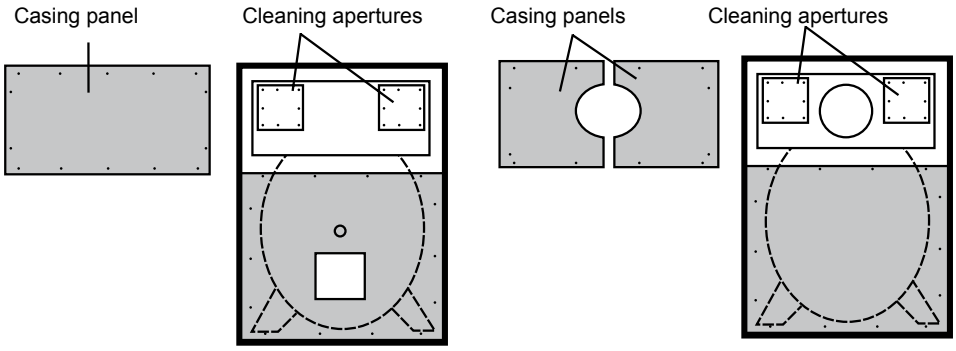
Depending on the unit type the rear of the flue gas conduits is eqipped with turbulators. Remove prior to cleaning and insert into previous position, afterwards.

Attention

Notice: The external left and right conduits must not be equipped with turbulators because they can lead to the formation of condensation and consequent destruction of the exhaust gas ducts.

Then seal cleaning apertures again and replace seal, if necessary. Otherwise there is a risk of suffocation.otherwise there is a risk of suffocation.

Clean air filter, if necessary (can be regenerated wet or dry).



Faults	Causes	Elimination
Burner switches off, although the room thermostat demands heat	a) Setting of burner thermostat too low.	Higher setting of burner thermostat.
	b) Duct resistance too high, therefore insufficient air supply.	Increase air volume by changing the drive (observe current consumption). If necessary, clean impeller. Check direction of rotation.
	c) Incorrect V-belt tension or alignment.	Correct (see maintenance).
	d) Defective double or safety thermostat.	Replace thermostat.
Overcurrent relay in switch cabinet switches off fan-motor a short time after starting.	Air volume too high, and motor takes up too much current (motor overload).	Reduce fan speed by replacing the pulleys until the actual current consumption corresponds to the rated current as specified on the motor name plate.
	Warm air heater in vertical execution not resting on foundation over its entire circumference. Motor overload due to secondary air intake.	Level foundation.