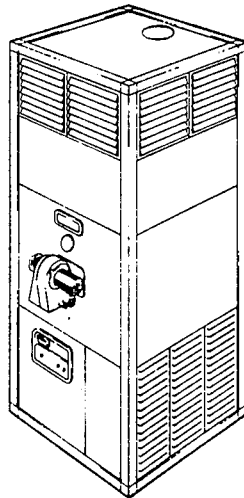


Dantherm®

INSTRUCTION MANUAL KA/KAL 45 - 120 150 - 300 III



CONTENTS:

1. Description of the function	p. 2
2. Components	p. 2
3. Installation	p. 4
4. Starting of the heater	p. 8
5. Room thermostat and remote control station	p. 10
6. Service and maintenance	p. 11
7. Fault-finding	p. 13
8. Wiring diagrams	p. 15

MANUFACTURER:

A/S Dantherm
Jegstrupvej
DK-7800 Skive
Tel: +45 97 52 41 44
Fax: +45 97 52 61 34
Telex 66712 dk

1. DESCRIPTION OF THE FUNCTION

Dantherm warm air heaters are indirect-fired warm air heaters. The heat which is produced in the combustion chamber by means of an oil or gas burner is released to the air which by means of a fan is blown around the combustion chamber and the heat exchanger.

The heater functions in the following way:

- When the room thermostat has given a signal to the heater, the burner starts with pre-ventilation of the combustion chamber. Shortly after the burner starts.
- When the temperature in the heater after a couple of minutes has reached approx. 50°C, the fan starts automatically. The delayed start of the fan prevents cold air from being blown into the room.
- When the room thermostat has given a signal to the heater to stop, the burner stops and the fan continues. After a couple of minutes the temperature in the heater has fallen to approx. 30°C and then the fan also stops automatically.

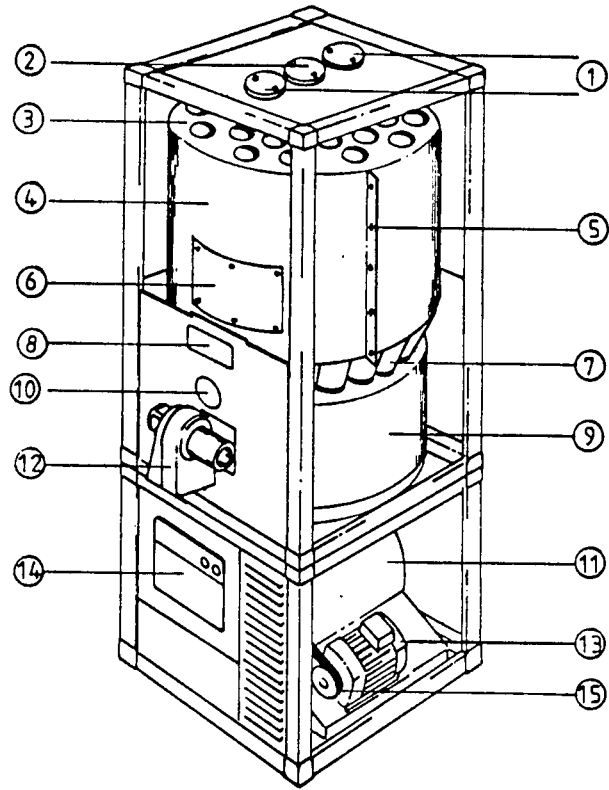
The reason why the fan continues for a while, is that the combustion chamber and the heat exchanger have to be cooled down slowly in order to avoid thermal strains and resulting damages.

The heaters are standard intended for free blowing operation, with optional duct connections available for ducted systems.

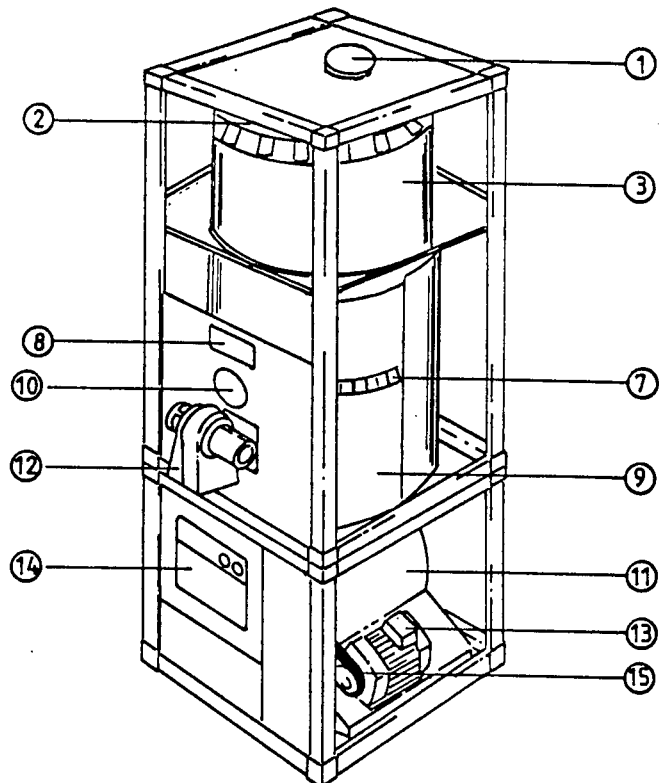
2. COMPONENTS

1. Flue outlet spigots
2. Explosion door
3. Heat exchanger
4. Removable cleaning door for heat exchanger
5. Bolts for cleaning door
6. Inspection/cleaning door
7. Heat exchanger tubes
8. Thermostat box
9. Combustion chamber
10. Inspection door
11. Fan
12. Burner
13. Fan motor
14. Control panel
15. V-belt

KA/KAL 45 - 120



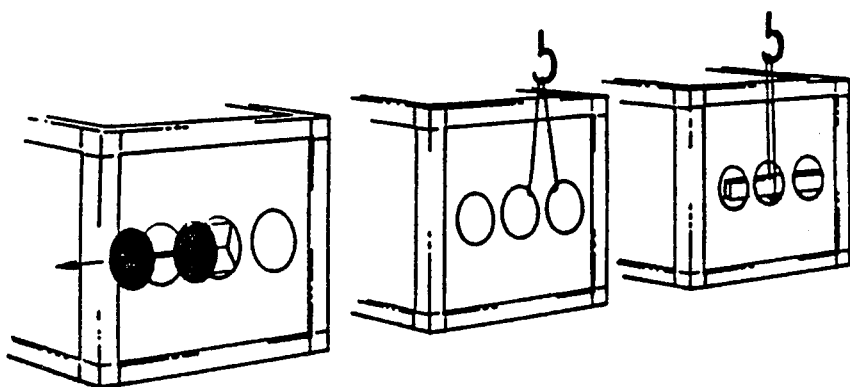
KA/KAL 150 - 300



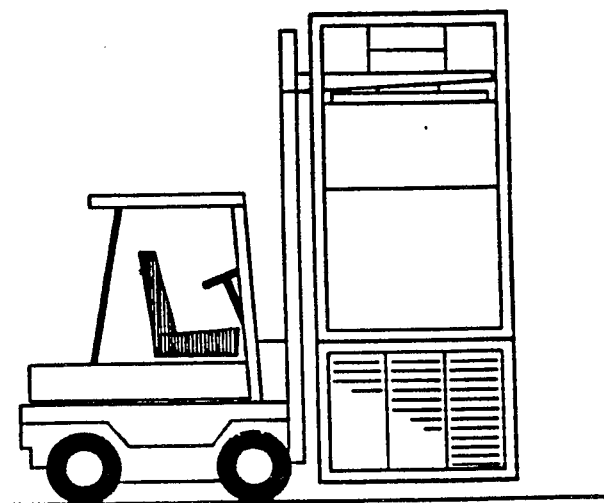
3. INSTALLATION

KA 45 - 120

In order to be able to erect the heaters which are supplied in a horizontal position it is necessary to remove the explosion door and the cover panel. After this a rope must be led through the openings of the flue gas collector or a piece of timber be pushed into the flue gas collector and a rope be put around the timber.



Now the heater can be erected carefully by means of a crane or a fork lift and it can also be transported in this way. The small models can be erected manually. As an alternative it is possible to transport the heaters in vertical position. In order to do this the two air discharge grilles on the side must be removed; the heater can now be lifted by closely set fork arms placed between heat exchanger and flue gas collector. The heater can now be lifted and transported to the required place.



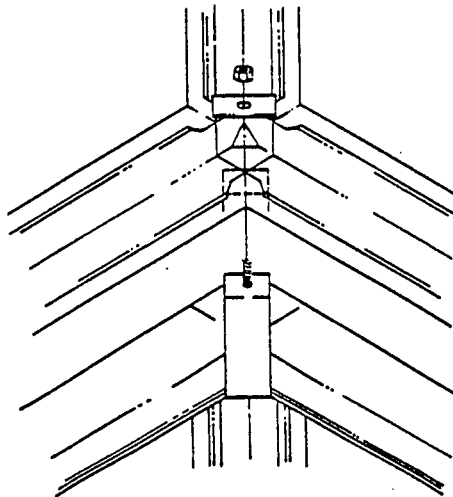
KA 150 - 180

A crane or a fork lift must be used for erection and transport to the place of installation. A rope is led through the opening of the chimney and is fixed to a noose which is placed in the middle of the flue gas collector. Then the heater can be lifted.

KA 250 - 300

The warm air heaters type KA/KAL 250 - 300 are delivered in two sections which are assembled in the following way:

- Place the fan section at the place of installation.
- Remove the four screws and the bottom plate from the fan section
- Stick the supplied rubber seal to the upper frame of the fan section
- Remove left and right hand side cover panels from the combustion chamber section
- Position the combustion chamber on top of the fan section by means of a fork lift or crane (see paragraph about installation of KA 150 - 180).
- Screw the two sections together



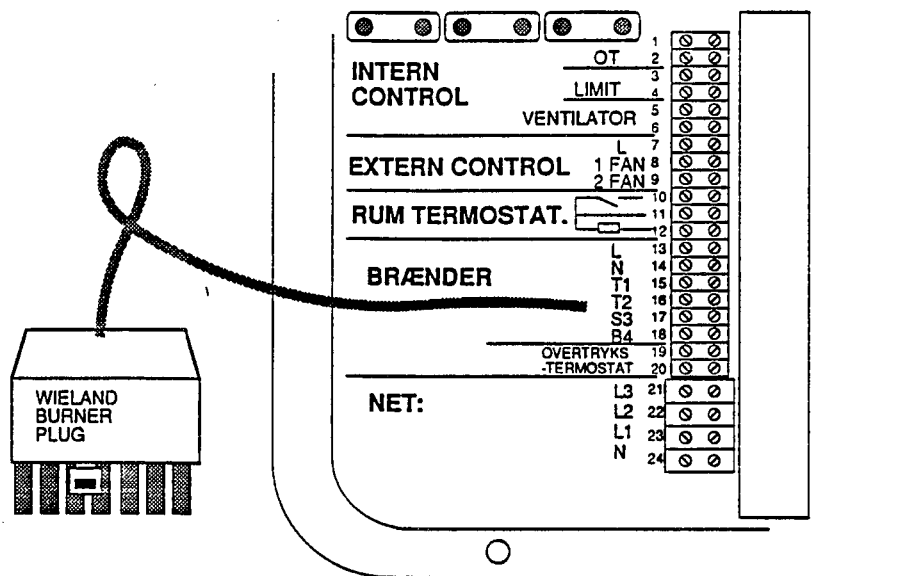
- Finally refit the cover panels

IMPORTANT!

When the heater has been assembled it must not be transported in a hanging position any more, as this may cause the fan section to be torn off.

ELECTRICAL CONNECTION

When opening the control panel, the following terminals are visible:



"INTERN CONTROL": The terminals 1-6 are for connection of the OT/LIMIT/FAN thermostats. On heaters type KA 45 - 180 these thermostats are ready-wired from the factory. On heaters type KA 250 - 300 the six cables which are hanging out from the combustion chamber section must be connected to the above-mentioned terminals. Those cables are identically numbered from 1 to 6.

"EXTERN CONTROL": An external fan control switch can be connected between terminal 7 and 8 (see wiring diagram in paragraph 8). Terminal 9 has no function in a standard heater.

"RUM TERMOSTAT": Connection of room thermost. (Further details in paragraph 5).

"BRÆNDER": Connection of burner by means of a Wieland plug to terminals 13 - 18 (see wiring diagrams in paragraph 8). The terminals 19-20 are only used in Denmark for heaters connected to a gas burner. In all other versions these terminals are bridged.

"NET": Current supply (3 x 400 V) is connected to these four terminals. On heaters for 3 x 230 V terminal 24 is missing, as only three phases are available for this tension. When connecting the phases, ensure that the fan is turning in the right direction. (See paragraph 8).

GENERAL

When installing the heater, local regulations and requirements must be taken into consideration.

When installing the heater, assure that the heater is accessible at the side and in front so that cover panels can be removed for servicing.

The room in which the heater is positioned must be sufficiently ventilated. When the heater is working there must not be negative pressure in the room, not even if other exhaust systems in the building are working; if so the fresh air supply to the burner will be reduced - causing bad combustion and disturbance of the heater operation. If there is a risk of negative pressure in the plant room, a tube or duct connection must be established providing fresh air to the burner.

Oil or gas connection is to be carried out by qualified personnel.

The flue gas installation is to be carried out in accordance with the prevailing local regulations.

The heater is connected in accordance with the wiring diagrams at the back of this book and to the tension mentioned on the nameplate of the heater.

During installation, adjusting and start-up of the burner, all technical data supplied by the burner manufacturer must be followed.

The electrical connection of the burner takes place in accordance with the wiring diagram which is included in the instruction manual.

Screws which might have loosened during transport have to be tightened before start-up.

All supply air and discharge air openings of the heaters and ducts are to be opened before start-up in order to be adjusted later when the plant is running.

FUSES

3 x 400 V - 50 Hz

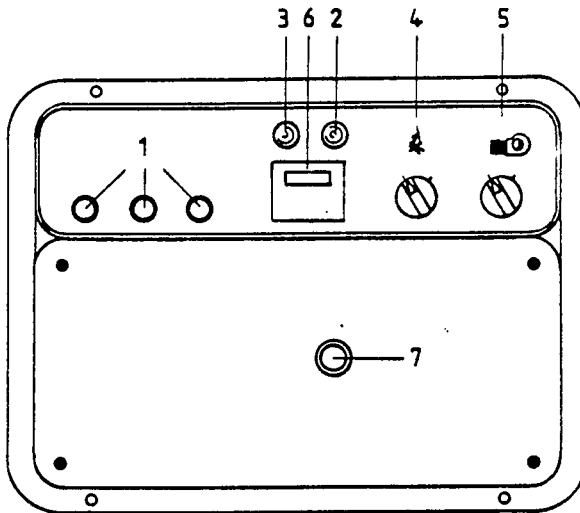
KA 45	KA 60	KA 90	KA 120	KA 150	KA 180	KA 250	KA 300
10 A	10 A	10 A	10 A	20 A	20 A	35 A	35 A

3 x 230 V - 50 Hz

KA 45	KA 60	KA 90	KA 120	KA 150	KA 180	KA 250	KA 300
10 A	10 A	16 A	20 A	25 A	25 A	50 A	50 A

4 . STARTING OF THE HEATER

CONTROL PANEL



1. Conduit connectors for mains power, thermostat connections and sensor cable for KA 250 - 300
2. Control lamp for power supply
3. Control lamp for burner failure
4. Switch for burner
5. Switch for fan
6. Hour meter
7. Reset for thermal relay

Switch on electricity to the heater (control lamp for power supply is on)

- Start the fan by turning the fan switch to the MAN position. Check that the fan is running the right way (The direction of rotation is indicated by an arrow on the fan housing). If this is not the case, swap over two phases on the electricity connection to the heater.
- Set the required running condition on the two service switches.

POSITION 0/AUTO

- Control lamp for power supply is on
- The warm air heater is off

POSITION 0/MAN

- Control lamp for power supply is on
- Burner is off
- The fan is running continuously (f.inst. summer ventilation)

POSITION 1/AUTO

- Control lamp for power supply is on
- The burner is controlled on and off via the room thermostat according to the heating requirements. If no room thermostat is fitted, the burner runs continuously.
- The fan starts when a temperature of approx. 50°C has been reached.
- When the burner switches off, the fan will still be running until the air discharge temperature has fallen to approx. 30°C.

POSITION 1/MAN

- Control lamp for power supply is on
- Burner is controlled on and off via the room thermostat according to the heating requirements. If no room thermostat is fitted, the burner runs continuously.
- The fan runs continuously

IMPORTANT!

The warm air heater can only be switched off by the room thermostat or the rotary switch.

The fan will be running for some time after having switched off the heater in order to cool down the combustion chamber.

Switching off the heater by the main switch may cause over-heating of the heater. The combustion chamber will be damaged if it is overheated repeatedly.

If the temperature inside the heater for some reason or another rises to more than 80°C, the combination thermostat will cut off the oil burner, but leave the fan in operation.

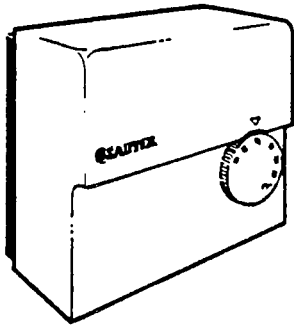
As soon as the temperature inside the heater has dropped to less than 80°C, the oil burner will automatically start.

Should the temperature, even though the burner has been switched off, rise to more than 100°C, then the power supply will be cut off via the temperature limit thermostat in the thermostat box. The warm air heater is switched on again by activating the RESET-switch.

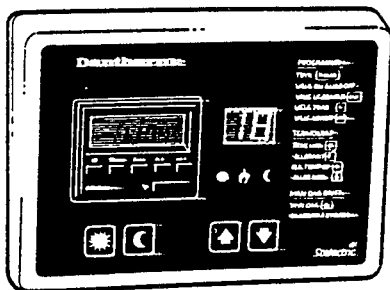
If the heater is switched off several times by the combi thermostat or the temperature limit thermostat, reference is made to the section 7 "Faultfinding".

5. ROOM THERMOSTAT AND REMOTE CONTROL STATION

ROOM THERMOSTAT



REMOTE CONTROL STATION*



The room thermostat is connected to the terminals 10, 11 and 12 in the control panel and it controls the heat supply to the room by switching on and off the burner.

The thermostat should be placed away from the direct air flow of the heater and at a height of approx. 1.5 m above floor level. The thermostat should be placed in a position where it cannot be exposed to direct sunshine, draught or heat from machinery etc.

Instead of a room thermostat a remote control station can be used controlling the heat production 7 days a week by means of a time switch and a day/night thermostat.

The remote control station is connected to the terminals 10, 11, 12 and 21, respectively L3 in the control panel.

Further specifications can be obtained from the instruction manual enclosed with each panel.

* optional extra

6. SERVICE AND MAINTENANCE

Once a year the heat exchanger and the combustion chamber have to be cleaned for soot, and at the same time we recommend that the heater is checked and adjusted by a qualified engineer in order to ensure economic operation.

The combustion chamber and the heat exchanger are cleaned in the following way:

KA/KAL 45 - 120

- Switch off power
- Remove the burner
- Open the inspection door
- Remove the explosion door
- Remove the upper cover panels of the cabinet
- Take away the bolts at the left and the right hand side of the heat exchanger and remove a third of the heat exchanger panel in front (= the cleaning door).
- The combustion chamber and the rear flue tubes of the heat exchanger are cleaned from beneath through the burner opening of the combustion chamber by means of a brush.
- The front flue tubes are cleaned through the opening in the heat exchanger
- The heat exchanger is cleaned by means of a brush through the upper opening in the explosion door and through the front opening in the heat exchanger
- The soot can now be sucked out from the combustion chamber and the heat exchanger by a vacuum cleaner.
- When the heat exchanger has been cleaned a new glass fibre rope seal has to be placed at the bottom side of the cleaning cover before the heater is assembled again.
- Check the fan belt and tighten, if required.

KA/KAL 150 - 300

- Switch off power
- Remove the burner
- Open the inspection door over the burner
- Remove the upper cover panels of the cabinet
- Remove the explosion door at the flue gas collector
- Combustion chamber is cleaned from beneath through the burner opening and the cleaning door.
- Flue gas collector and flue tubes are cleaned through the opening in the explosion door.
- The soot can now be sucked out from the combustion chamber and the gas collector by a vacuum cleaner.
- Check the tension of the belt and tighten, if required.

When doing service on the burner, follow the instructions supplied by the burner manufacturer.

7. FAULT FINDING

In case of break-downs, first go through the following points:

- Check that there is oil in the tank and that all valves are open.
- Check that there is power to the heater
- Check that the room thermostat, respectively remote control station is set at a temperature which is higher than the ambient temperature.
- Check that inlet air filters are clean and that inlet and discharge air grilles are not blocked.

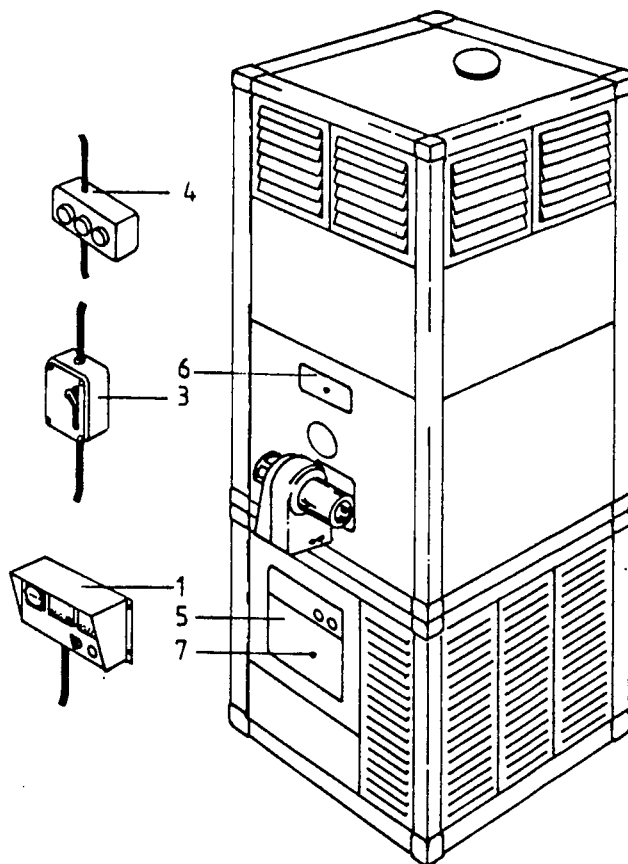
If these points are in order, check the heater in accordance with the following fault-finding diagram:

CHECK:

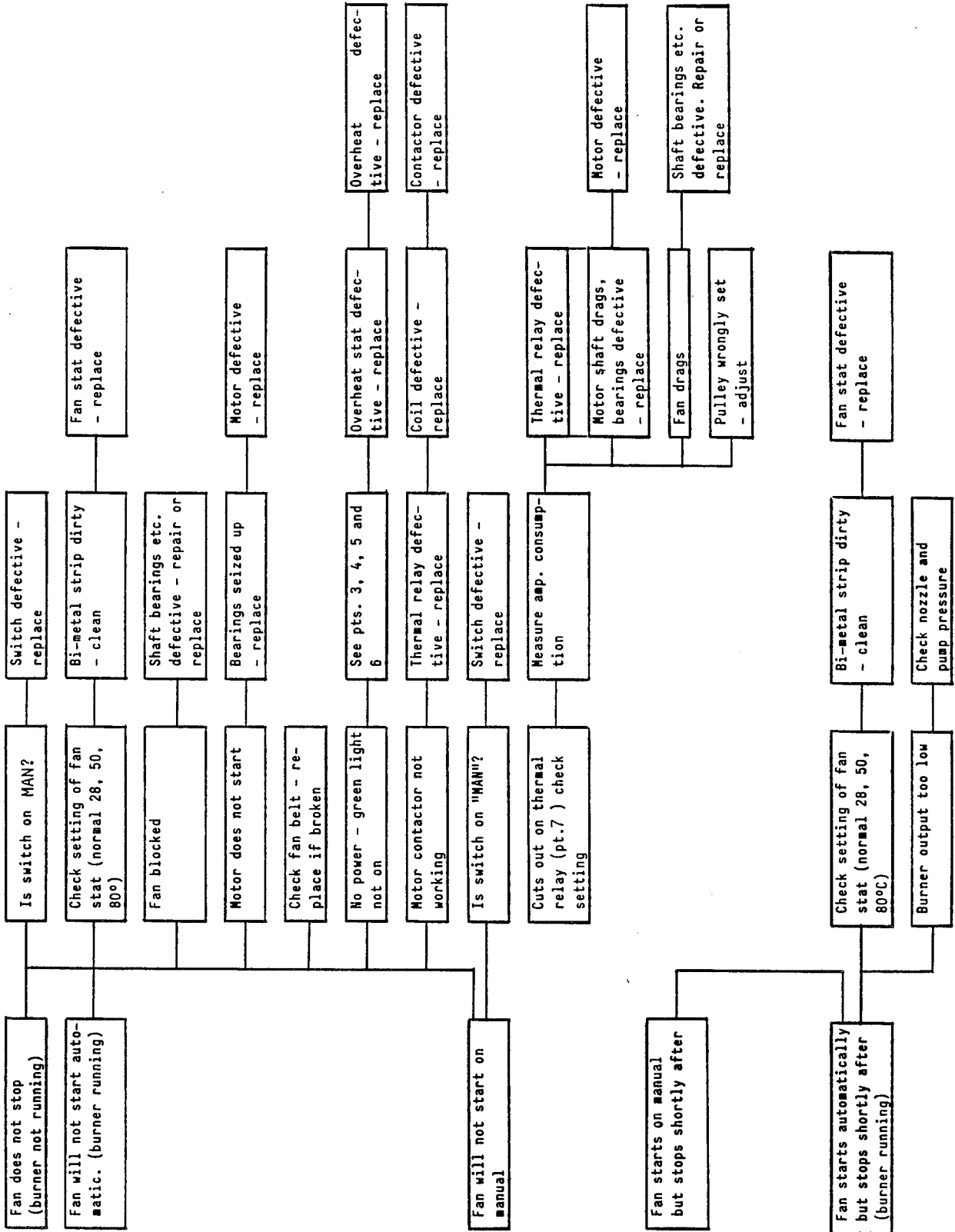
1. Room thermostat or remote control station
3. Main switch
4. Main fuse
5. Cartridge fuse (in the control panel)

PRESS:

6. RESET for overheating
7. RESET for thermal relay

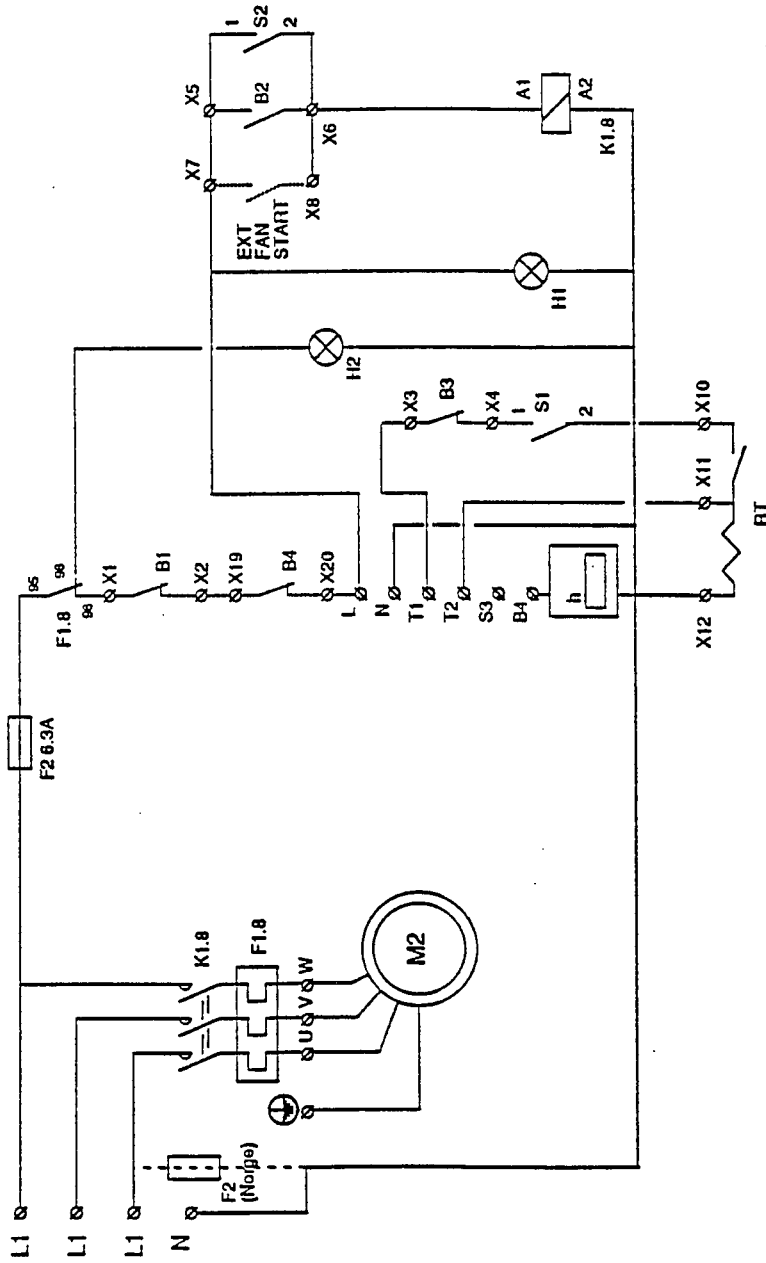


FAULT-FINDING DIAGRAM



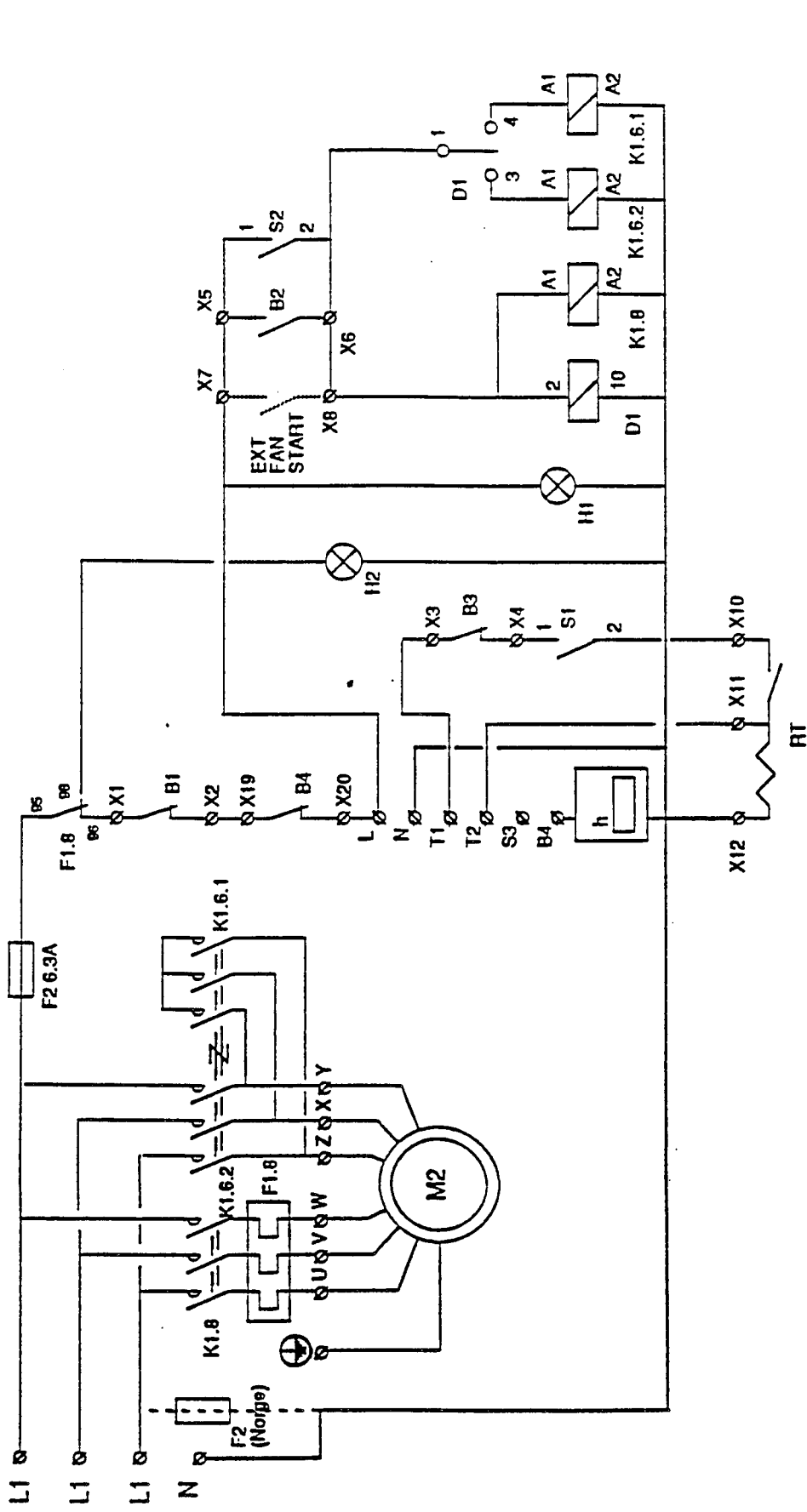
8. WIRING DIAGRAMS

KA WITH DIRECT FAN START



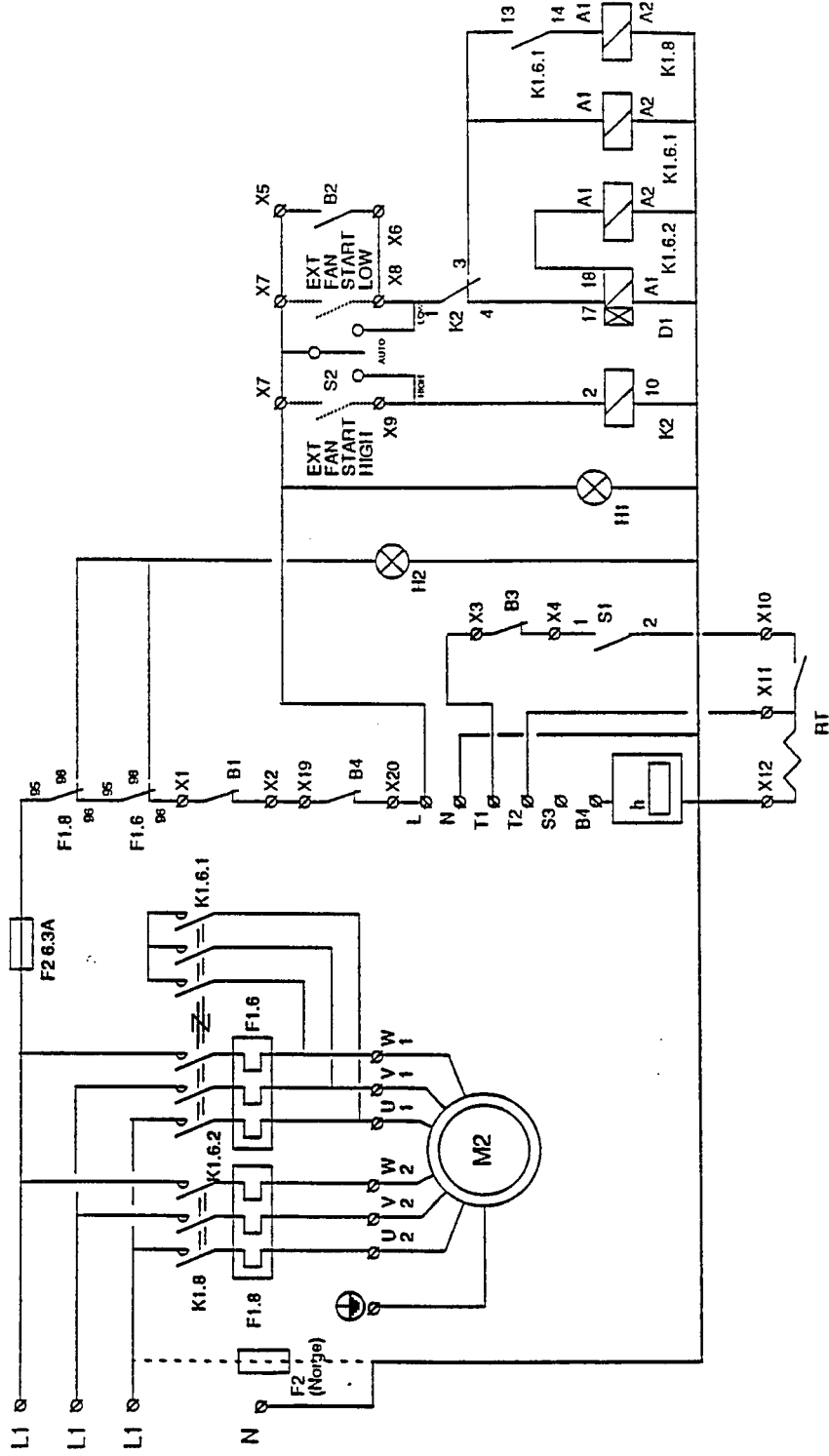
- L: Phase
- N: Neutral
- B1: OT thermostat
- B2: FAN thermostat
- B3: LIMIT thermostat
- B4: Excess-pressure thermostat (only DK)
- F1.8: FAN thermal relay
- F2: Fuse 6,3 Amp
- H1: Green lamp
- H2: Red lamp
- h: Hour meter
- K1.8: Contactor
- M2: FAN motor
- RT: Room thermostat
- S1: Burner switch
- S2: FAN switch
- X: Terminal strip

KA WITH STAR-DELTA FAN START



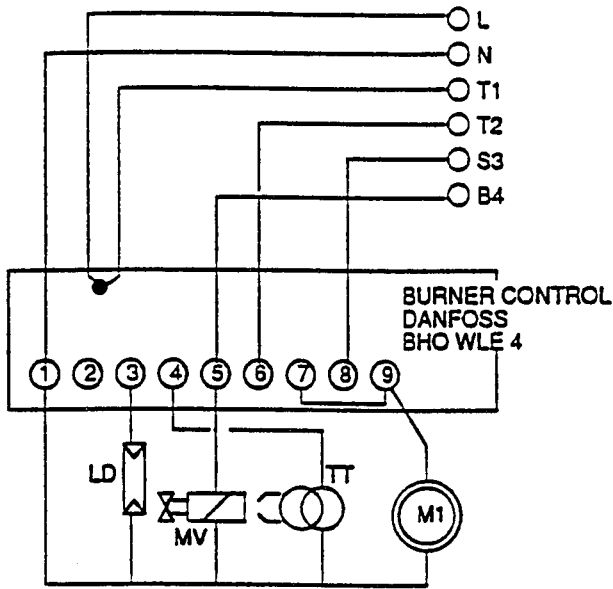
- L: Phase
- N: Neutral
- B1: OT thermostat
- B2: FAN thermostat
- B3: LIMIT thermostat
- B4: Excess-pressure thermostat (only DK)
- D1: Y/D delay
- F1.8: FAN thermal relay
- F2: Fuse 6, 3 Amp
- H1: Green lamp
- H2: Red lamp
- h: Hour meter
- K1.6.1: Y contactor
- K1.6.2: D contactor
- K1.8: Y/D contactor
- M2: FAN motor
- RT: Room thermostat
- S1: Burner switch
- S2: FAN switch
- X: Terminal strip

KA/KAL WITH TWO-STEP FAN MOTOR

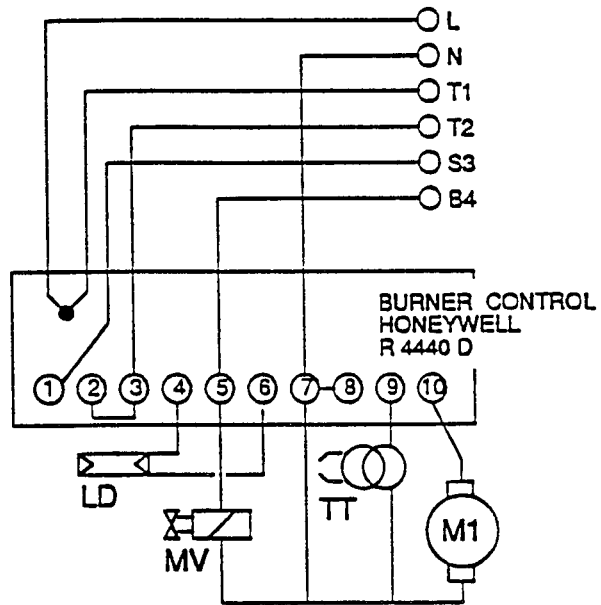


- L: Phase
- N: Neutral
- B1: OT thermostat
- B2: FAN thermostat
- B3: LIMIT thermostat
- B4: Excess-pressure thermostat (only DK)
- D1: ON delay
- F1.6: FAN thermal relay
- F1.8: FAN thermal relay
- F2: Fuse 6,3 Amp
- H1: Green lamp
- H2: Red lamp
- h: Hour meter
- K1.6.1: HIGH contactor
- K1.6.2: LOW contactor
- K1.8: HIGH contactor
- K2: LOW/HIGH contactor
- M2: Fan motor
- RT: Room thermostat
- S1: Burner switch
- S2: FAN switch AUTO-LOW-HIGH
- X: Terminal strip

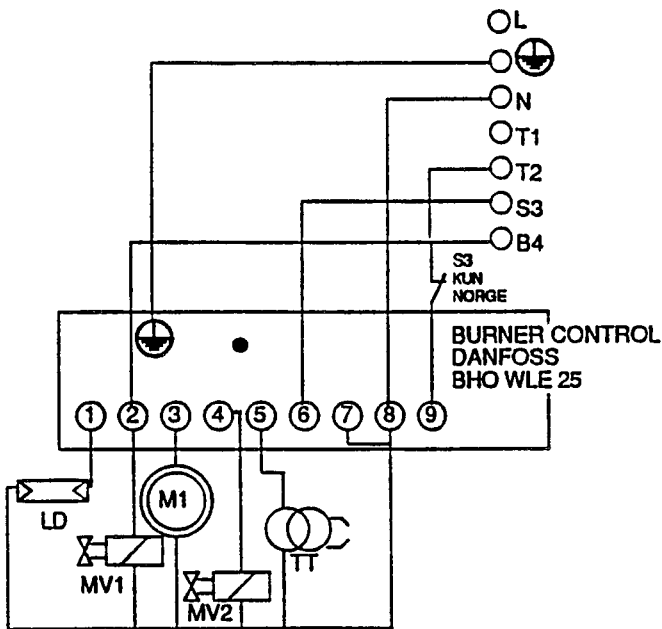
DESCRIPTION OF THE CONNECTIONS OF THE BURNER



Burner control box
Danfoss BHO WLE 4



Burner control box
Honeywell R 4440 D



Burner control box
Danfoss BHO WLE 25

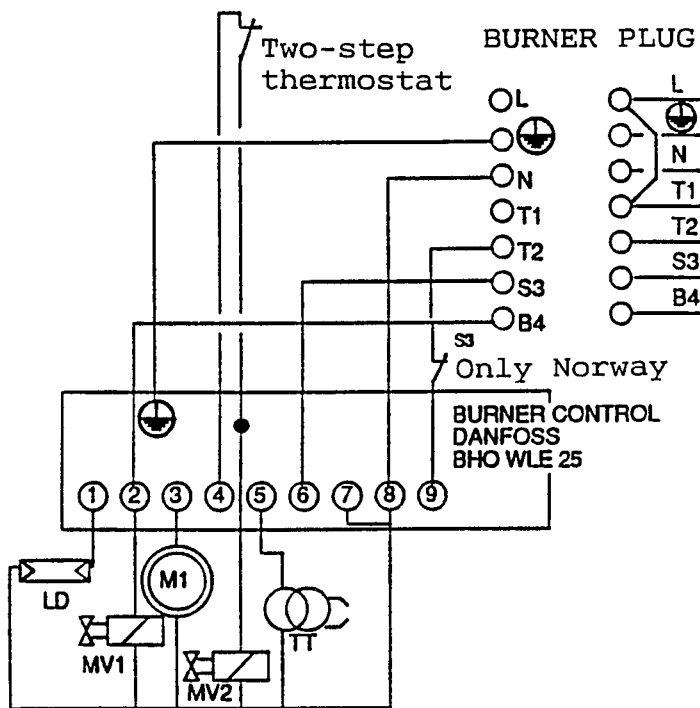
- S3: Limit switch at burner (only Norway)
- LD: Photocell
- TT: Ignition transformer
- MV: Solenoid valve
- M1: Burner motor

Plug: Wieland 18/7 according to DIN 4791

FITTING OF TWO-STEP THERMOSTAT TO TWO-STEP BURNER

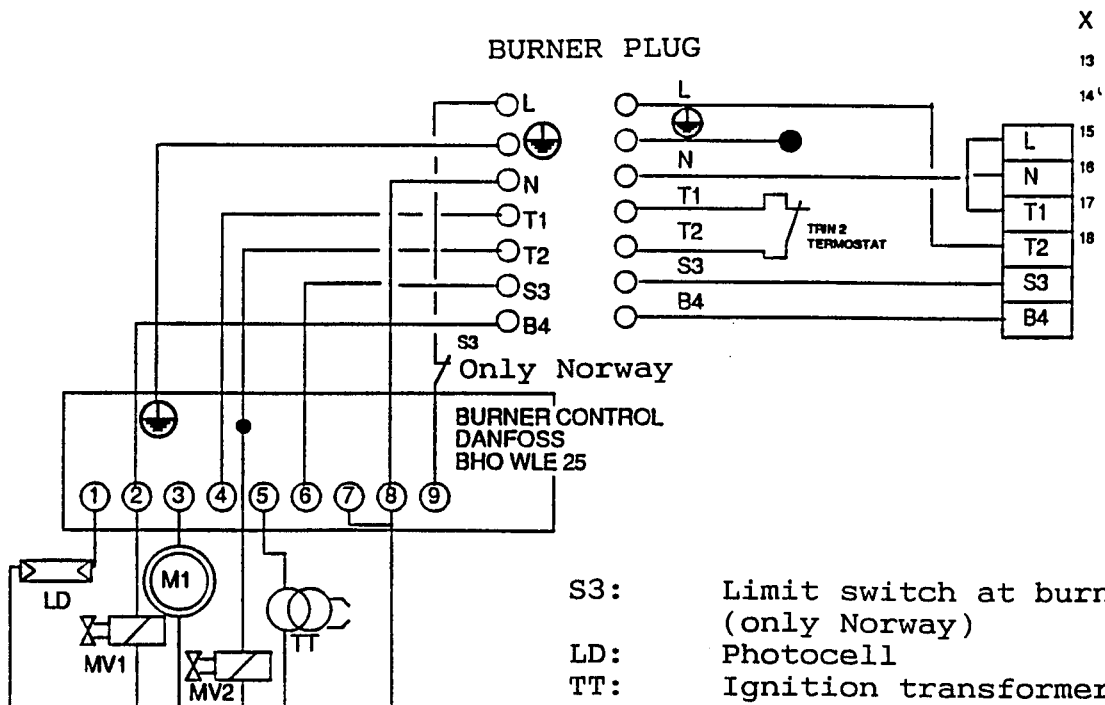
1. The lead from the MV2 valve is removed from terminal 4.
2. The lead coming out of the two-step thermostat is fitted to terminal 4 and is connected with the lead from the MV2 valve by means of a splicing sleeve.

CONNECTION OF TWO-STEP THERMOSTAT IN THE BURNER CONTROL BOX:



Plug: Wieland ST 18/7
acc. to DIN 4791

CONNECTION OF TWO-STEP THERMOSTAT IN THE CONTROL PANEL:



- S3: Limit switch at burner (only Norway)
- LD: Photocell
- TT: Ignition transformer
- MV: Solenoid valve
- M1: Burner motor