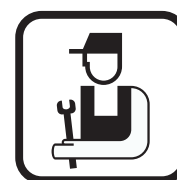
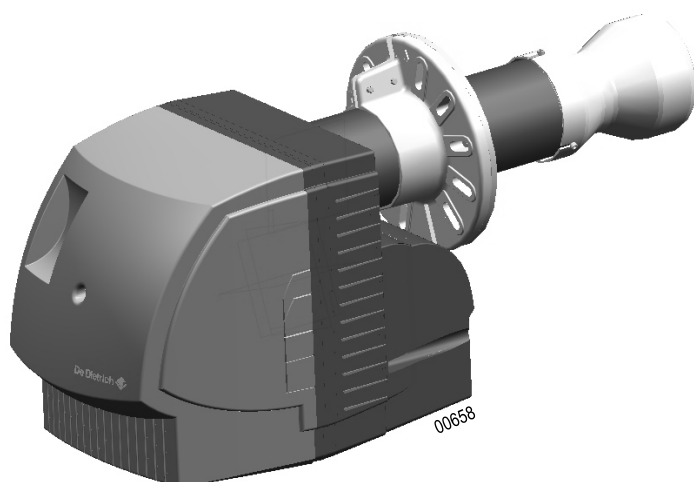


Fuel oil burner

M 300 S



Installation instructions

Declaration of conformity CE

Declaration of compliance D.R. 17/07/2009 - BE

Manufacturer SPM SAS
2, avenue Josué Heilmann
Z.I. de Vieux-Thann
F - 68800 Vieux-Thann

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+ 33 3 89 83 63 07

Issued by See end of notice

We hereby certify that the range of equipment specified below is in accordance with the format stated in the EC declaration of conformity, that it is manufactured and distributed in accordance with the regulations and requirements in european directives and with the regulations and requirements defined in the Royal Decree dated 17/07/2009:

Type of product Fuel oil burner

Model M 300 S

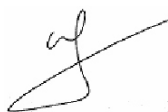
Applied standards
- Royal Decree dated 17/07/2009
- BImSchV 2010
- Standard EN 267
- 2006/95/EC Low Voltage Directive
Reference Standard: EN 60.335
- 2004/108/EC Electromagnetic Compatibility Directive
Reference Standards: EN 55.014 - EN 61000

Inspecting organisation TÜV Rheinland / Berlin-Brandenburg
OB 372005 Z2 - 13/12/2005 OB 842005 Z3 - 13/12/2005
OB 1022005 Z2 - 13/12/2005 OB 852005 Z3 - 13/12/2005
OB 1382005 T1 - 18/11/2005 OB 862005 Z3 - 13/12/2005
OB 1292005 E2 - 18/11/2005

Measured values
M 301-2 S: NOx = 138 mg/kWh ; CO = 8 mg/kWh
M 301-3 S: NOx = 138 mg/kWh ; CO = 8 mg/kWh
M 301-4 S: NOx = 132 mg/kWh ; CO = 6 mg/kWh
M 302-1 S: NOx = 134 mg/kWh ; CO = 39 mg/kWh
M 302-2 S: NOx = 170 mg/kWh ; CO = 12 mg/kWh
M 302-3 S: NOx = 141 mg/kWh ; CO = 4 mg/kWh
M 302-4 S: NOx = 143 mg/kWh ; CO = 4 mg/kWh
M 302-5 S: NOx = 144 mg/kWh ; CO = 7 mg/kWh
M 302-6 S: NOx = 146 mg/kWh ; CO = 14 mg/kWh

Date : 11/2009


Signature
Chairman
Mr Philippe WEITZ



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Security Measures

- Installation must be carried out in accordance with current laws.
 - Current safety and accident prevention regulations must be respected at all times.
 - Burner assembly, start up, operation and maintenance (inspection, servicing, repair) must be carried out by qualified, properly trained personnel.
 - Only the manufacturer is authorised to undertake repair work on the electrotechnical parts, flame detection devices and other safety equipment.
 - Changes and modifications not specified in this document and which may cause serious malfunction to the burner are prohibited..
 - **All work, except for adjusting the burner, shall only be carried out after the burner has stopped and after the power supply has been disconnected.**
 - We shall not accept any responsibility for any damage and disturbance arising from not following these instructions !
-  **The flame tube temperature is high. The baffle temperature is high. Handle with care.**

Important information

Handing over the system to the user

- When the system is being handed over to the user, the installation engineer shall draw particular attention to the actions that the user is authorised to carry out (when the burner is on safety for commissioning the system) and to the actions and modifications that may only be undertaken by qualified personnel.
- The user must ensure that only a qualified professional has maintained the burner.
- **This document is an integral part of the burner. Please keep it carefully in the furnace room near to the appliance.**

Installation maintenance

To get the most out of your burner and to avoid operating difficulties, make a a qualified technician carries out the following:

- Cleaning the combustion head.
- Replacing the fuel oil nozzle.
- Replacing the electrodes (If necessary).
- Checking the burner's operation.
- Checking and cleaning the boiler.
- Checking and cleaning the chimney.
- Checking and cleaning the new air heater input.

i For wearing parts, see the list of spare parts at the end of these instructions.

Used symbols

 **Caution danger !**
Risk of injury and damage to equipment.
Attention must be paid to the warnings on safety of persons and equipment.

i Specific information. Information must be kept in mind to maintain comfort.

①, ②, ③ Assembly stage
Ⓐ, Ⓑ, Ⓒ Markers

Burner description

1 Brief description

M 300 S range burners are compact fuel burners which meet standards on burners with air flow adjustment :

- They are delivered with cables connected.
- They are assembled onto the furnace with a sliding clamp.
- All of the parts are assembled on an easily accessible plate.
- The plate containing the parts is located for optimal maintenance.
- The flame is checked using a photo-resistant cell.
- Ignition is by electronic transformer.
- Insulation class : IP 21

Envisaged use

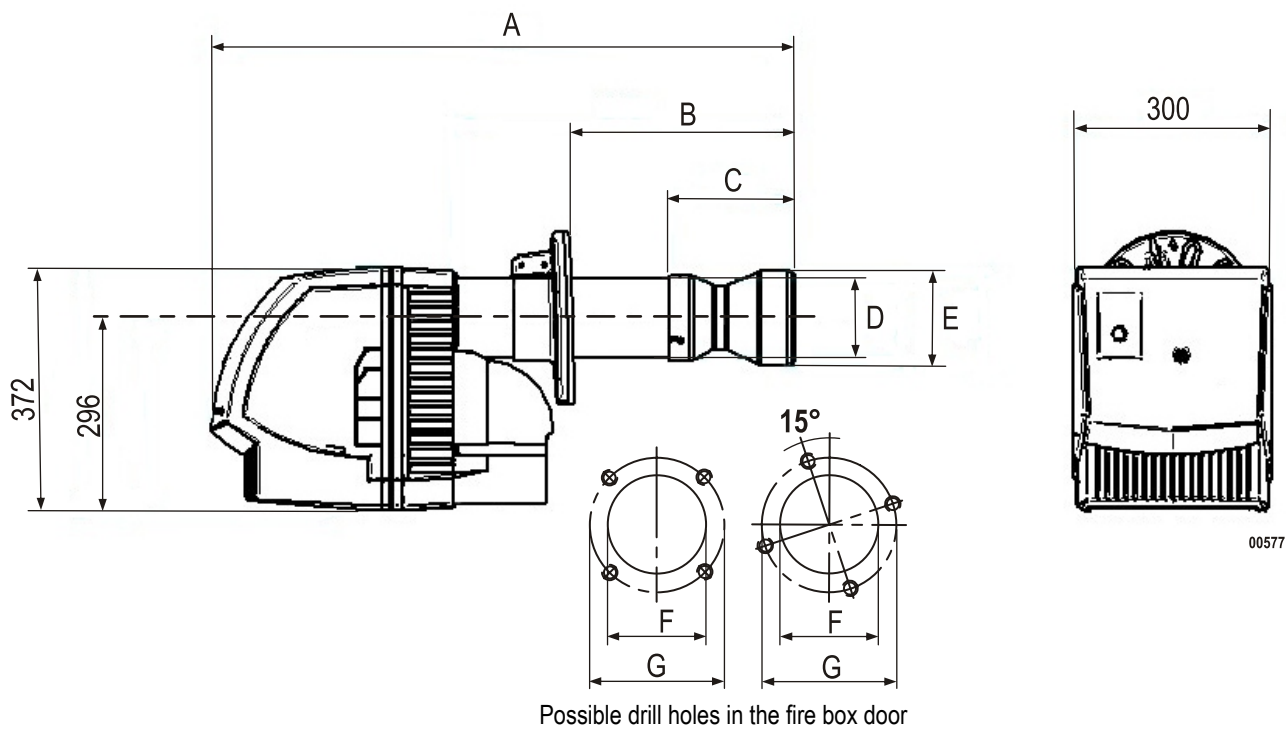
M 300 S range burners are designed to specifically operate with "hot water furnaces" for heating premises and domestic hot water.

Please contact us for other applications, industrial processes and specific applications.

Check for optimal compatibility with the burner equipment / furnace / flue in order to guarantee a low pollution operation. The layout and size of the flue shall be in accordance with the existing directives and regulations.

2 Dimensions

i Dimensions (in mm)



i Leave a minimum space of 1.00 m behind the burner, free of any obstacles to allow for maintenance.

Burner	Side (mm)						
	A	B	C	D	E	F	G
M 302-1 S	635	100 → 200	-	100	-	120	150 → 170
M 301-2 S / M 302-2 S	687	140 → 230	-	120	-	min. 130	170 → 220
M 301-3 S / M 302-3 S	710	140 → 260	-	120	-	min. 130	170 → 220
M 301-4 S / M 302-4 S	725	140 → 270	-	120	-	min. 130	170 → 220
M 302-5 S	755	140 → 210	-	120	-	min. 130	170 → 220
M 302-6 S	882	190 → 340	190	120	142	min. 130	170 → 220

3 Technical data

M 301 S

Burner	M 301-2 S	M 301-3 S	M 301-4 S
Operation	1 stage	1 stage	1 stage
Nominal output [kW] ^{(1)*}	77 - 166	130 - 202	184 - 261
Fuel flow [Kg/h] ^{(2)*}	6.5 - 14	11 - 17	15.5 - 22
Power consumption [W]	360	550	550
Nominal power of the motor [W]	260 W - 2850 tr.min ⁻¹	380 W - 2850 tr.min ⁻¹	380 W - 2850 tr.min ⁻¹
Sound level at 1 m [dBA]	69	70	70
Net weight [kg]	21	21	21
Gross weight [kg]	24	24	24
Turbulence generator mark	2	3	4

M 302 S

Burner	M 302-1 S	M 302-2 S	M 302-3 S	M 302-4 S	M 302-5 S	M 302-6 S
Operation	2 stages	2 stages	2 stages	2 stages	2 stages	2 stages
Nominal output [kW] ^{(1)*}	75/98 - 142	80/113 - 160	94/181 - 217	142/192 - 275	126/202 - 430	114/179 - 460
Fuel flow [Kg/h] ^{(2)*}	6.3/8.2 - 12	6.7/9.9 - 13.5	7.9/15.3 - 18.3	12.0/16.2 - 23.2	10.6/17 - 36.3	9.6/15.1 - 38.8
Power consumption [W]	360	360	550	550	1000	1000
Nominal power of the motor [W]	260 W - 2850 tr.min ⁻¹	260 W - 2850 tr.min ⁻¹	380 W - 2850 tr.min ⁻¹	380 W - 2850 tr.min ⁻¹	650 W** - 2850 tr.min ⁻¹	650 W** - 2850 tr.min ⁻¹
Sound level at 1 m [dBA]	68	69	70	70	72	73
Net weight [kg]	22	22	22	22	30	30
Gross weight [kg]	25	25	25	25	33	33
Turbulence generator mark	1	2	3	4	5	5

(1) Power at an altitude of 400 m and at a temperature of 20°C. Calorific power of fuel oil: LHV = 11.86 kWh/kg

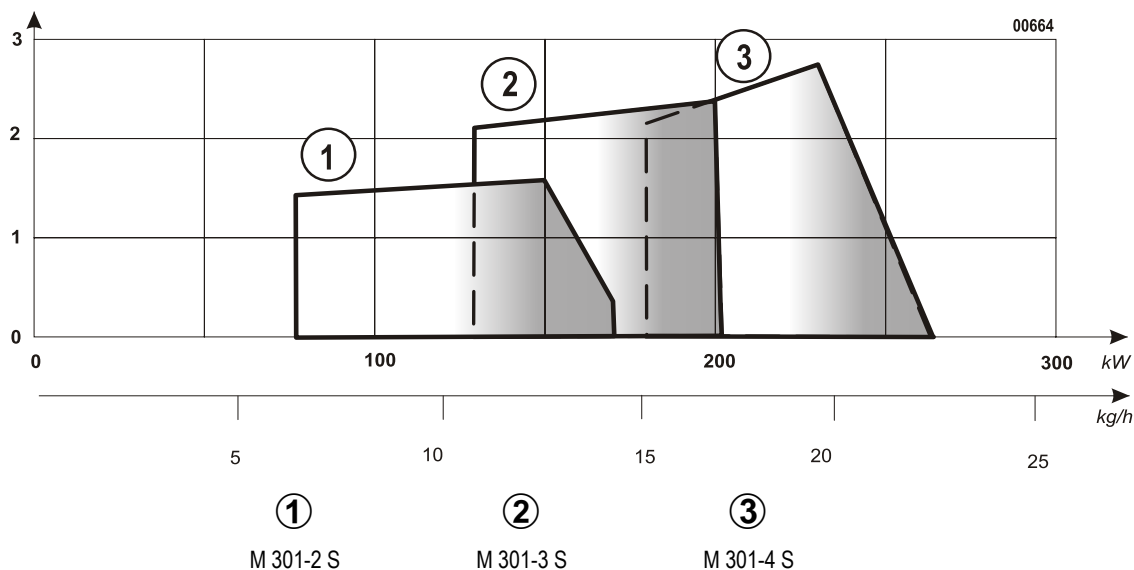
(2) Fuel: domestic fuel (max viscosity 6 mm²/s to 20°C).

* min. Stage1 / min. Stage2 - max Stage2

**Separate power supply (See Electrical diagram).

Power curves according to the EN 267 standard ⁽¹⁾ - M 301 S

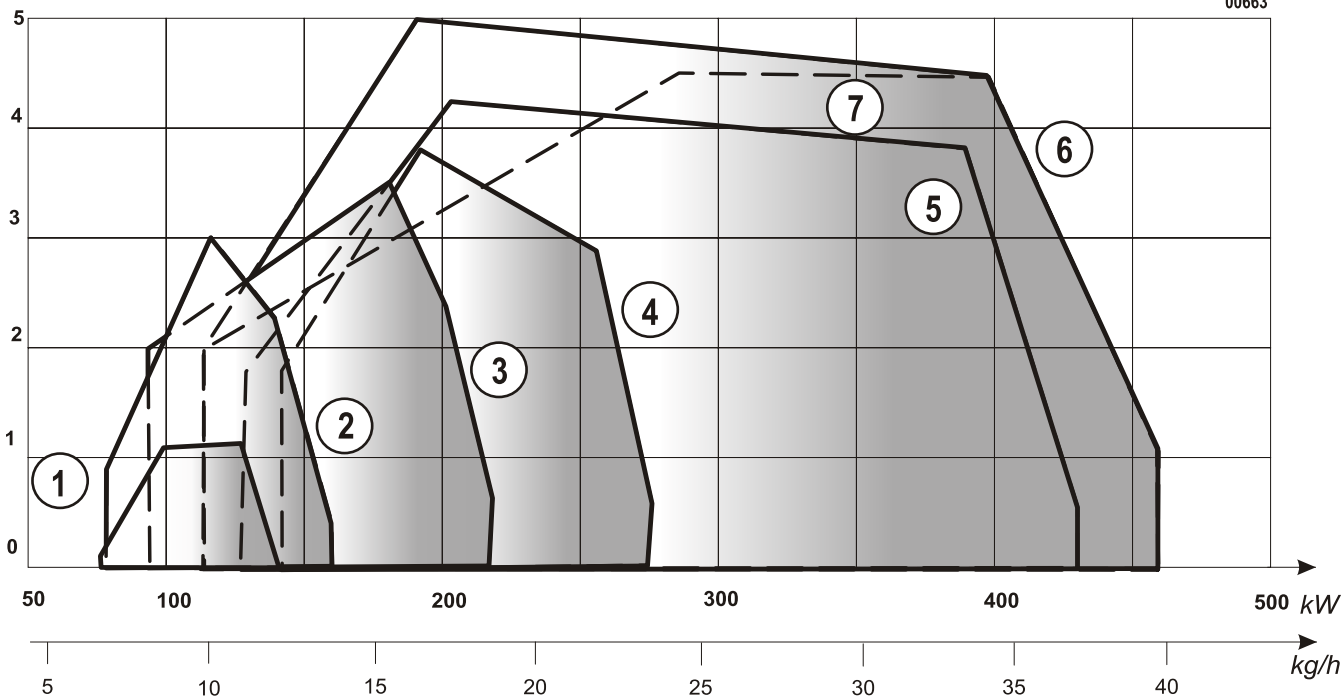
Fire box counter pressure (mbar)



Power curves according to the EN 267 standard ⁽¹⁾ - M 302 S

Fire box counter pressure (mbar)

00663



Standard EN 267

Standard EN 267
For Belgium

①

②

③

④

⑤

⑥

⑦

M 302-1 S

M 302-2 S

M 302-3 S

M 302-4 S

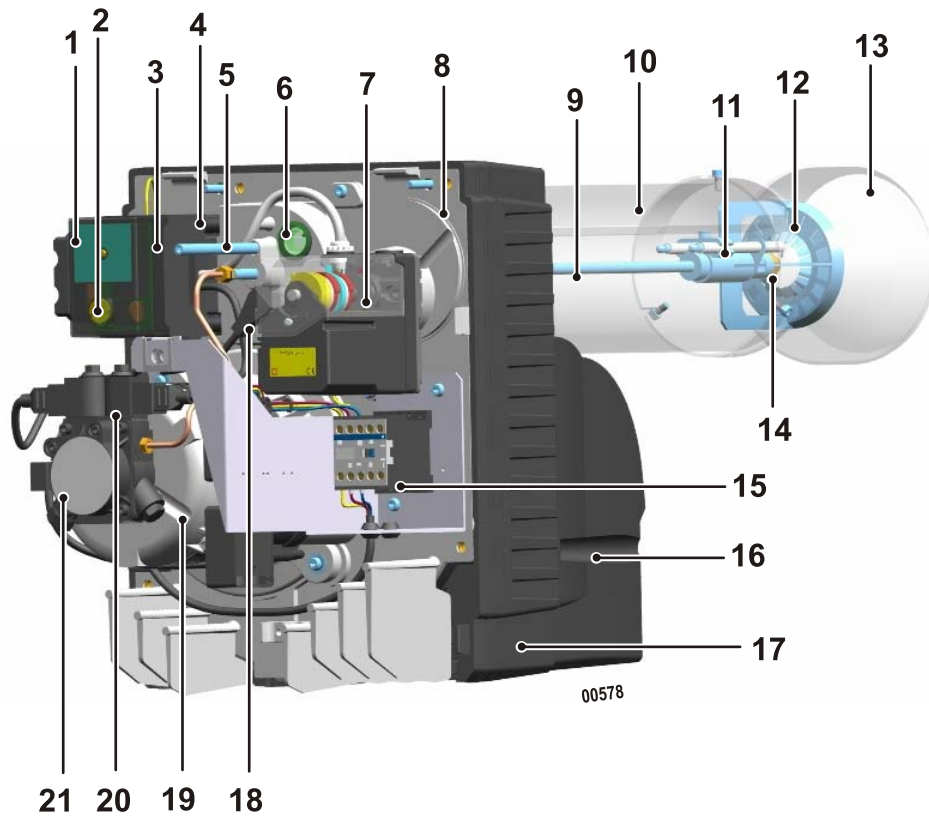
M 302-5 S

M 302-6 S

M 302-6 S

⁽¹⁾ Power at an altitude of 400 m and at a temperature of 20°C. Calorific power of fuel oil: LHV = 11.86 kWh/kg .

4 Main parts



- | | | | |
|----|---------------------------------------|----|----------------------|
| 1 | Command and safety box | 12 | Turbulence generator |
| 2 | Reset button | 13 | Flame tube |
| 3 | Command box socket | 14 | Filler |
| 4 | Ignition transformer | 15 | Contactora |
| 5 | Turbulence generator adjustment screw | 16 | Air enclosure |
| 6 | Flame display record | 17 | Housing |
| 7 | Servomotor | 18 | Flame detection cell |
| 8 | Part plate | 19 | Motor |
| 9 | Filling line | 20 | Solenoid valves |
| 10 | Intermediate tube | 21 | Fuel pump |
| 11 | Ignition electrode | | |

Fuel pump

It is a self aspirating geared pump which turns to the right (seen from above) :

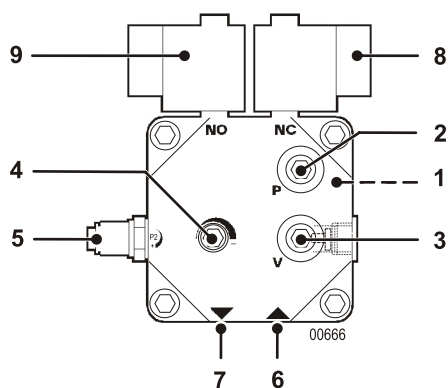
- Includes input filter and fuel pressure regulator.
- It is adjusted using a dual tube system but this may be changed to a single tube system.

i Carefully empty the fuel pump during start up.

! The single tube system is illegal in some countries. Please check existing legislation.

M 301 S

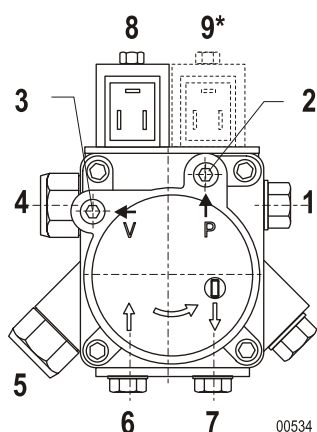
M 302-1 S / M 302-2 S / M 302-3 S / M 302-4 S



- 1 Nozzle output
- 2 Manometer measurement socket (Pressure)
- 3 Vacuum gauge measurement socket (Depression)
- 4 Setting the pressure pump (Stage1)
- 5 Setting the pressure pump (Stage2) *
- 6 Fuel aspiration
- 7 Fuel return
- 8 Solenoid valve speed 1
- 9 Solenoid valve speed 2 *

* For M 302 S only

M 302-5 S / M 302-6 S

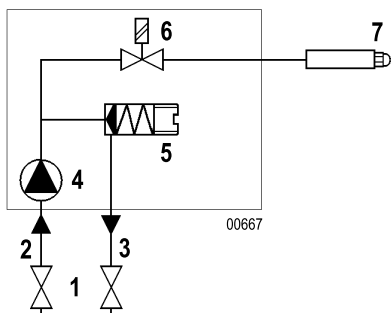


- 1 Nozzle output
- 2 Manometer measurement socket (Pressure)
- 3 Vacuum gauge measurement socket (Depression)
- 4 Setting the pressure pump (Stage1)
- 5 Setting the pressure pump (Stage2)
- 6 Fuel aspiration
- 7 Fuel return + Internal diversion plug
- 8 Solenoid valve speed 2
- 9 Solenoid valve speed 1

Burner	Pump type
M 301-2 S	DANFOSS BFP 21 R3
M 301-3 S / M 301-4 S	DANFOSS BFP 21 R5
M 302-1 S	DANFOSS BFP 52 R3
M 302-2 S / M 302-3 S / M 302-4 S	DANFOSS BFP 52 R5
M 302-5 S / M 302-6 S	SUNTEC AT 265

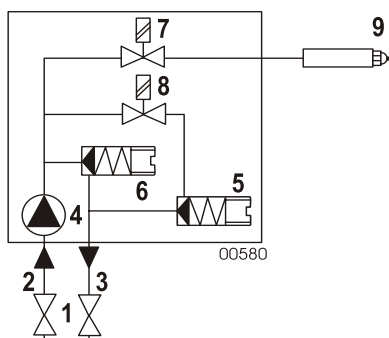
Pump type	BFP 21 R3	BFP 21 R5	BFP 52 R3	BFP 52 R5	AT 265
Ambient temperature (under the cover)	60°C	60°C	60°C	60°C	max 70 °C
Manufacturer's pressure margin	7 - 20 bar	7 - 20 bar	7 - 25 bar	7 - 25 bar	8 - 25 bar
Max depression	0.45 bar	0.45 bar	0.45 bar	0.45 bar	0.45 bar
Max input pressure	2 bar	2 bar	2 bar	2 bar	2 bar
Max pump air flow at 10 bar	→ 24 l/h	→ 42 l/h	→ 24 l/h	→ 42 l/h	-
Max pump air flow at 25 bar	-	-	-	-	→ 65 l/h

Hydraulic diagram - M 301 S

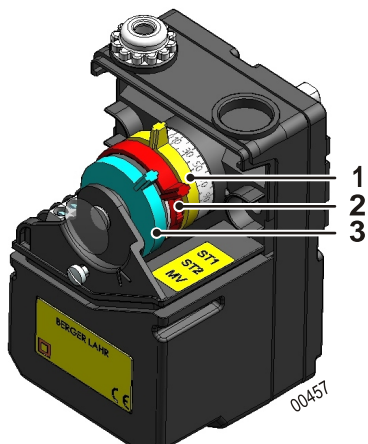


- 1 Stop cock
- 2 Fuel aspiration
- 3 Fuel return
- 4 Pump
- 5 Setting the pressure pump Stage1
- 6 Solenoid valve (Closed no voltage)
- 7 Filler

Hydraulic diagram - M 302 S

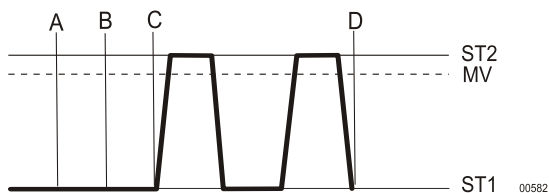


- 1 Stop cock
- 2 Fuel aspiration
- 3 Fuel return
- 4 Pump
- 5 Setting the pressure pump Stage2
- 6 Setting the pressure pump Stage1
- 7 Solenoid valve (Closed no voltage)
- 8 Solenoid valve (Open no voltage)
- 9 Filler



1	Cam ST1	Setting the air flow (Stage1)
2	Cam ST2	Setting the air flow (Stage2)
3	Cam MV	Electro-valve opening (Stage2)

i Set cam MV between ST1 and ST2 (5° below ST2).



A	Burner start up
A-B	Preventilation
B-C	Ignition
C	Passage in 2 speed
C-D	Regulation
D	Burner stop

Air setting servomotor - M 302-5 S / M 302-6 S

The servomotor drives the cams opening the air shutter.

To regulate the opening of the air shutter, use the ST1 cams for min. speed and ST2 for max speed.

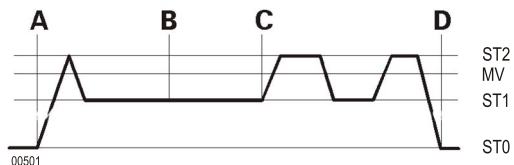
Set cam MV between ST1 and ST2 (5° below ST2). Set cam ST0 to 0°.

i For fine adjustment, use screws located on cams.

The servomotor ensures the following:



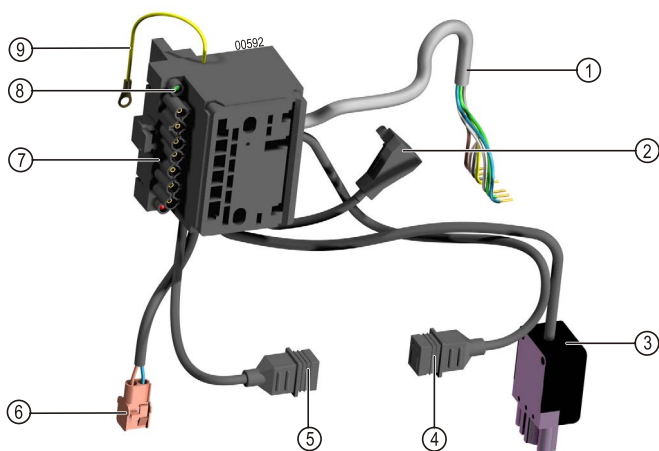
1	Cam MV	Electro-valve opening (Stage2)
2	Cam ST0	Closing air shutter (No air flow)
3	Cam ST2	Setting the air flow (Stage2)
4	Cam ST1	Setting the air flow (Stage1)



A	Burner start up
A-B	Preventilation
B-C	Ignition
C	Passage in 2 speed
C-D	Regulation
D	Burner stop

5 Base with cables - Command and safety box

! The base is a safety device and must not be opened.



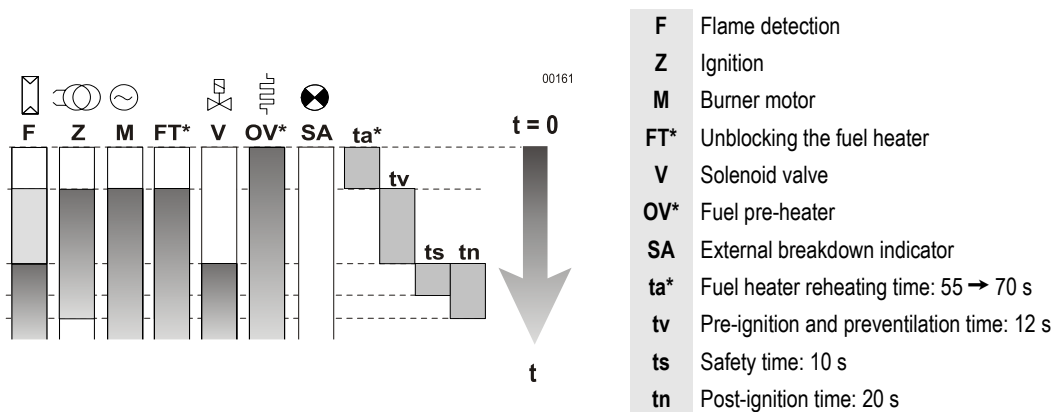
- | | |
|---|---|
| 1 | Servomotor connection cable
(For M 302 S only) |
| 2 | Flame detection cell connection |
| 3 | Burner to furnace connector (4 pole connector)
(For M 302 S only) |
| 4 | Electro-valve connection (Stage1) |
| 5 | Electro-valve connection (Stage2)
(For M 302 S only) |
| 6 | Contactor connection (2 pole connector)
(For M 302-5 S - M 302-6 S only) |
| 7 | Burner to furnace connector (7 pole connector) |
| 8 | Green LED
Ignited → Burner ignited
Off → Burner off |
| 9 | Earth connection to the parts plate |

Command and safety box

⚠ The command and safety box is a safety device which must only be stacked on the base or removed when the current has been switched off by the main heating installation switch. The command and safety box is a safety device which must not be opened.

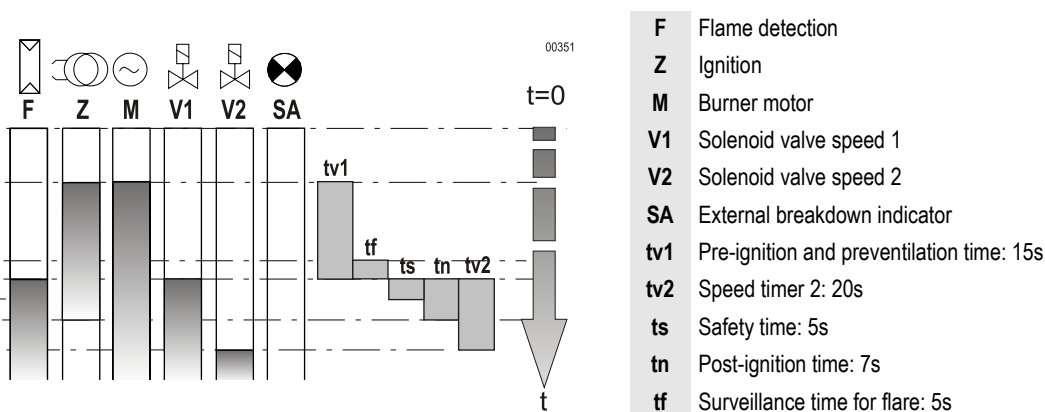
1 Operating cycle

TF 874 - M 301 S



* except M 301 S/M 302 S

DKO 976 - M 302 S



2 Safety (For DKO 976 only)

The DKO 976 command box is operated by a microprocessor.

In the event of a disturbance, the LED is lit for 10 seconds, then the signal is switched off by a disturbance code, indicating the nature of the fault. Breakdown diagnoses are indicated in the table below.

Malfunction description code

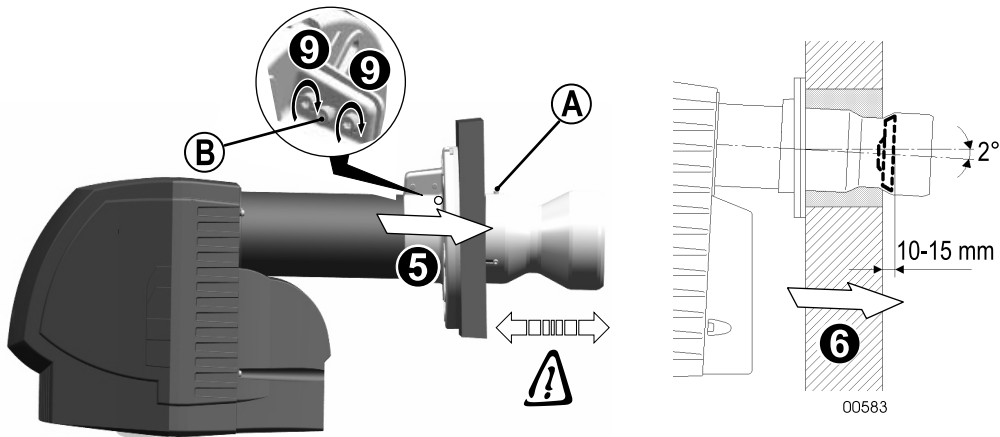
| Short press ■ Long press . Short pause -- Long pause

3 Diagnosing breakdowns (For DKO 976 only)

Error code	Type of fault	Cause of fault
■ ■ ■ ■	Disturbance occurrence while in safety time	No flame detection
■ ■ ■	Unwanted light during prevention	Unwanted light Cell defective
■ ■ ■ ■ -- ■ ■ ■ ■	Manual or external disturbance	External fault

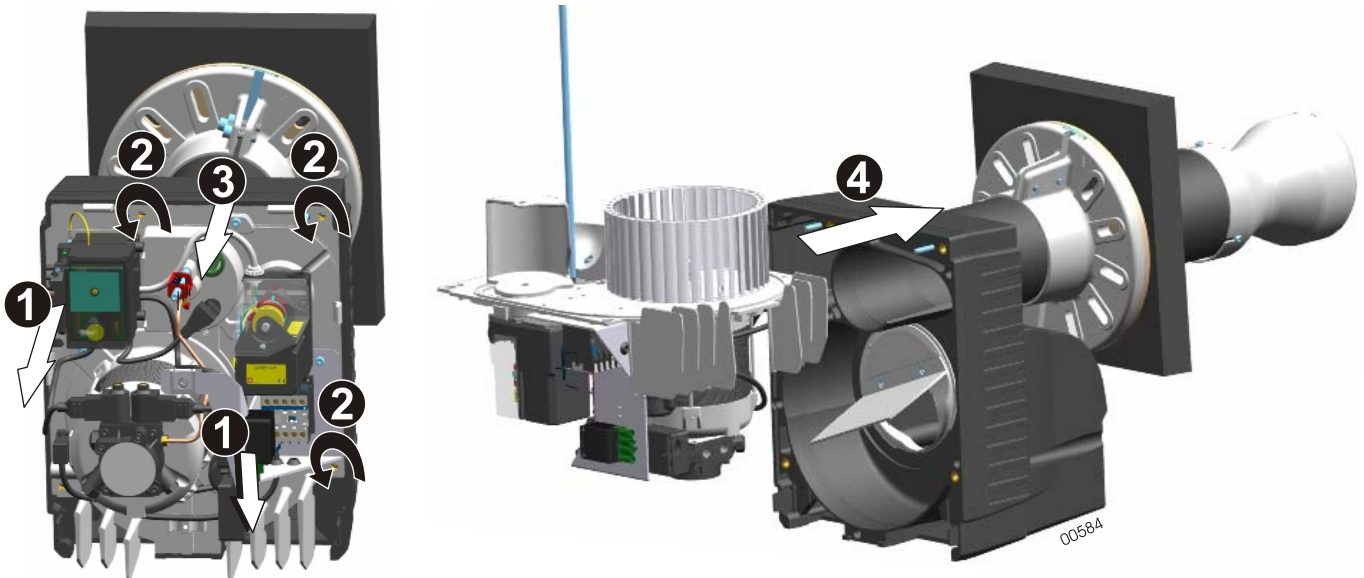
SATROPEN is a pocket terminal displaying disturbances and the intensity of the flame signal. It is available as an option.

2 Burner location



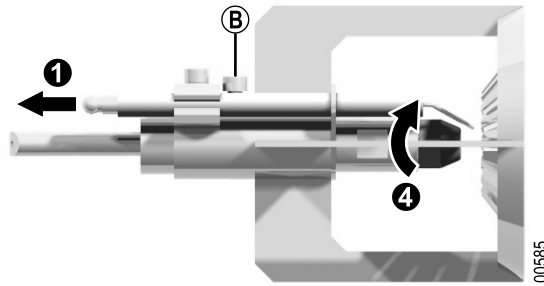
- ❶ Unscrew the 3 screws (A).
- ❷ Remove flame tube. Tighten screw (B).
- ❸ Push the burner towards the back through the furnace door.
- ❹ Assemble the flame pipe onto the intermediate pipe.
- ❺ Push the burner into the fire box so that the flame moves past the interior insulation of the fire box door by 160 mm (For M 302-6 S only).
- ❻ Press the burner into the hearth door so that the turbulator exceeds the 10-15 mm insulation inside the hearth door (M 301 S - M 302-1 S - M 302-2 S - M 302-3 S - M 302-4 S - M 302-5 S).
- ❼ Fill in the resulting gap between the intermediate tube and the fire box door with insulating, fireproof material.
- ❽ Untighten screw (B).
- ❾ Tighten the sliding clamp screws.

3 Maintenance



- ❶ Disconnect the electrical connection connectors.
 - ❷ Unscrew the 5 rapid action screws.
 - ❸ Extract the parts plate from the housing.
 - ❹ Position the component holder plate on the studs on the casing.
- ⚠ Avoid any mechanical force on the turbine. Do not use the turbine as a support point in order to stop it from turning.**

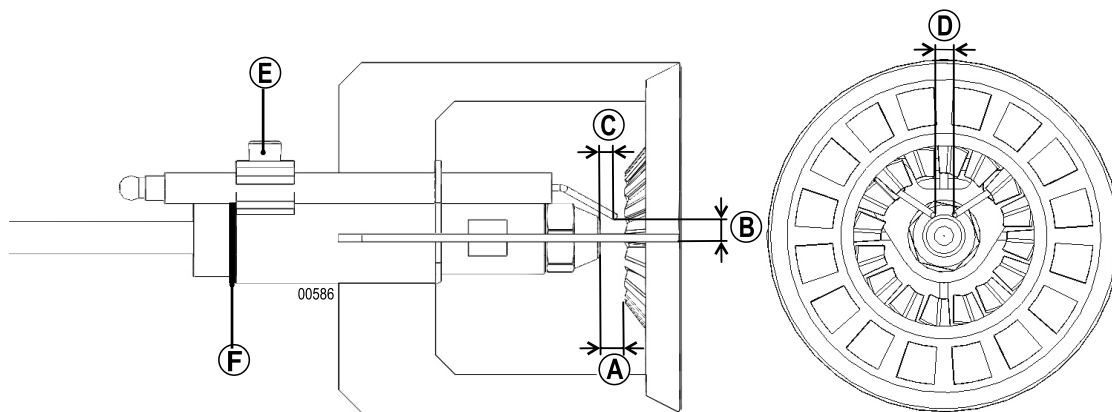
4 Fuel oil nozzle assembly



- ❶ Disconnect the ignition electrode cables.
- ❷ Untighten screw (B). Remove the turbulator.
- ❸ Check the capacity of the nozzle in terms of the required furnace power and its performance.
- ❹ Tighten the nozzle.
- ❺ Position the turbulator. Tighten screw (B).
- ❻ Connect the ignition electrode cables.

5 Positioning the turbulator and ignition electrodes

Ignition electrodes

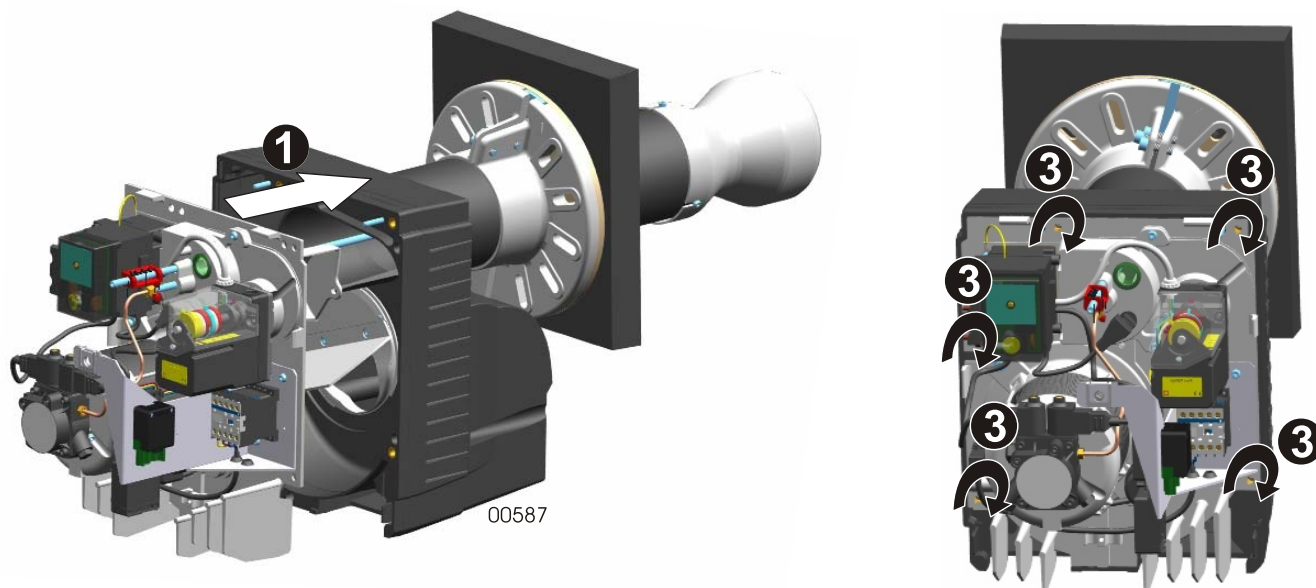


	Filler	Number of rings (F)	Side (mm)			
			(A)	(B)	(C)	(D)
M 302-1 S	45°	2	5	4	4	5
M 301-2 S / M 302-2 S	45°	2	6	4	4	5
M 301-3 S / M 302-3 S	45°	2	6	4	4	5
M 301-4 S / M 302-4 S	45°	2	7	4	4	5
M 302-5 S	45°	2	7	6	5	5
M 302-6 S	60°*	1	7*	6*	5*	4*
	45°	2	8	6	6	4

* Remove a 1 mm ring (For 60° fillers).

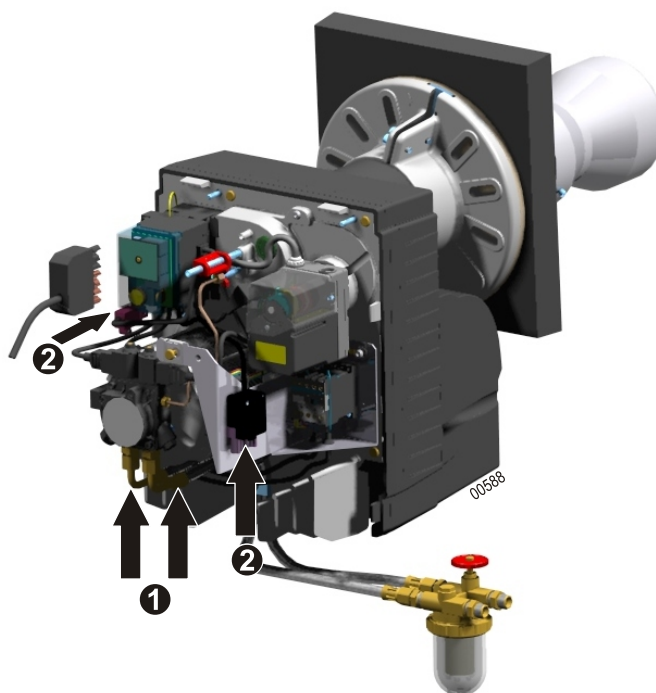
- ❶ Check the sides indicated below.
 - ❷ To change the position the ignition electrodes, unblock them using the tightening screw (E).
 - ❸ Place the ignition cable around the nozzle line. Connect the ignition electrode cables.
- i** Be careful not to mask the flame detector to avoid any problems with flame checking.

6 Positioning the mechanism



- 1 Carefully place the fuel oil line into the flame tube.
- 2 Attach the parts plate onto the housing.
- 3 Tighten the 5 quick tightening screws.

7 Fuel and electrical connections



- 1 Connect the burner pipes to the fuel installation.
- 2 Connect the electrical connectors.

⚠ For safety reasons, do not connect the fuel until start up !

Adjustment

Recommendations for measuring combustion

i Fine tune the burner so that it meets the existing local regulations.

It is important that the flow of combustion products between the chimney and the furnace nozzle is sealed in order to avoid measurement errors. In order to measure combustion, Keep to the burner's operating times:

- 10 min operation (Boiler at temperature),
- 20 min operation (Cold boiler).

After assembling and setting the burner:

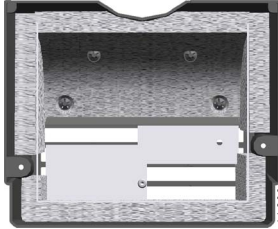
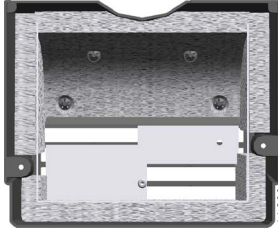
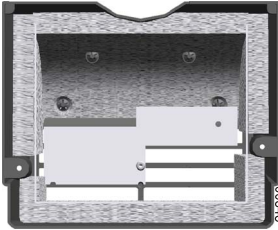
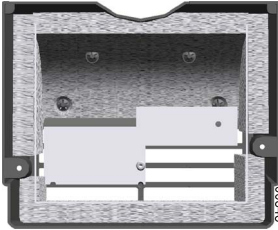
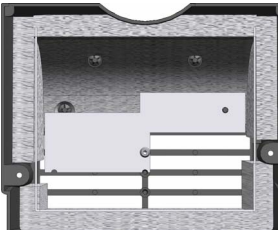
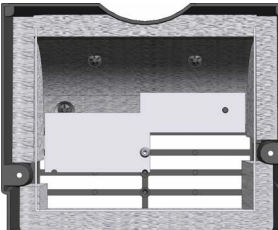
- Check the soot index,
- Check the smoke gas emission values.

⚠ Keep to the advised settings to avoid having flame surveillance problems at low powers.

Sound optimisation (For M 302-5 S / M 302-6 S only)

The diagram shows the air chamber interior.

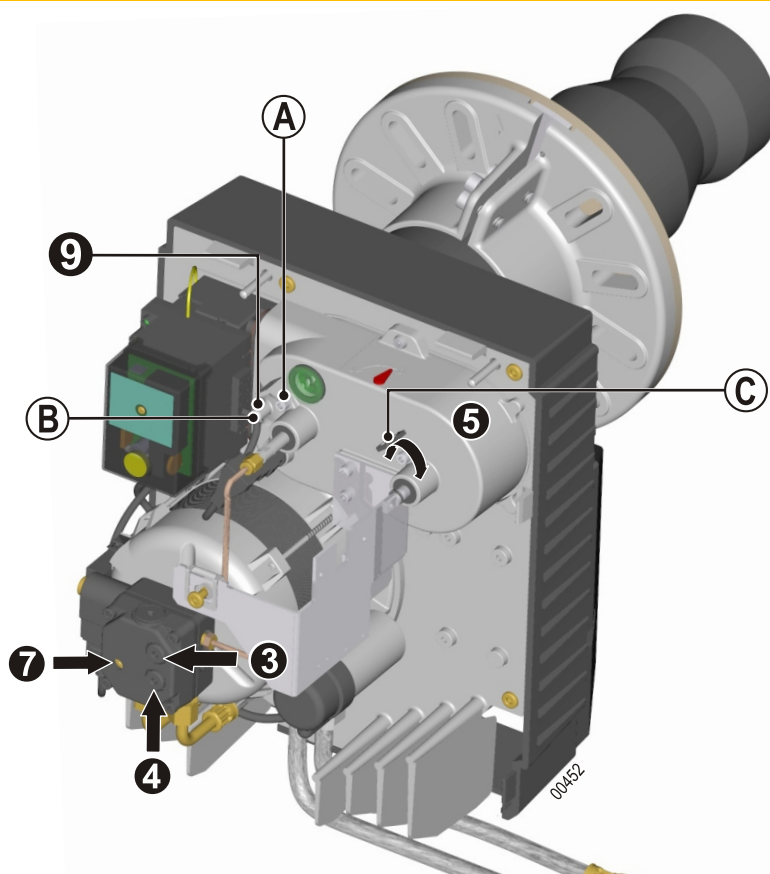
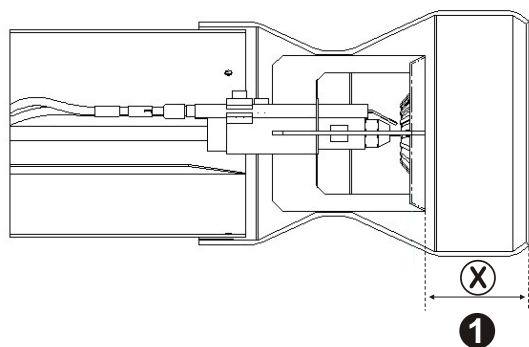
Place the cap in accordance with the required power. Attach cap.

Burner	Maximum output (kW)	Position (Cap)	Sound gain
M 302-5 S	210		2 dBA
M 302-6 S	170		2 dBA
M 302-5 S	315		1.7 dBA
M 302-6 S	265		2 dBA
Factory setting			
M 302-5 S	410		1 dBA
M 302-6 S	385		1 dBA

1 Recommended Settings M 301 S

Burner	Burner power [kW]	Nozzle Danfoss [GPH]	Fuel oil pressure [bar]	Air setting (Distribution bar C)	Indicative setting for the head position (Distribution bar B) (mm)	Size X (mm)	Value CO ₂ (%)
M 301-2 S	80	1.65 / 45° S	13.5	12	33	54	12.5
	100	2.00 / 45° S	13.5	15	30	51	
	120	2.50 / 45° S	12.5	20	28	49	
	140	3.00 / 45° S	11.0	26	25	46	
	160	3.50 / 45° S	11.5	33	24	45	
M 301-3 S	140	3.00 / 45° S	11.5	17	26	41	
	160	3.50 / 45° S	12.0	20	25	40	
	180	4.00 / 45° S	12.0	24	23	38	
	200	4.50 / 45° S	11.0	29	21	36	
M 301-4 S	180	4.00 / 45° S	12.5	19	26	55	
	200	4.50 / 45° S	11.0	23	25	54	
	240	5.00 / 45° S	13.5	33	20	49	
	260	5.50 / 45° S	12.5	43	18	47	

In grey: factory setting.



- 1 Adjust size (X) with the adjustment screw (A).
- 2 The position of the head on the adjustment is read by using a quick setting (B) or by measuring size (X) for finer adjustment.
- 3 Assemble the manometer in fuel pump .
- 4 Assemble the vacuometro in fuel pump .
- 5 Adjust the air valve opening.
- 6 Start the burner.
- 7 Set the pump pressure.
- 8 Measure the vacuum, do not exceed 0.35 bar.
- 9 Check the pressure in the head.
- 10 Measure the combustion.
- 11 Reset the adjustments to set the required CO₂.
- 12 Check the burner start up.
- 13 Refer to the settings in the table "Check Table" in the user manual.

2 Recommended Settings M 302 S

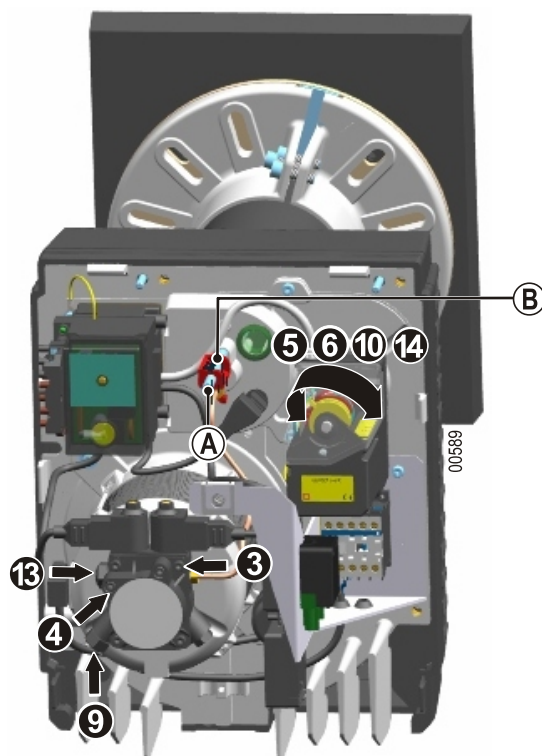
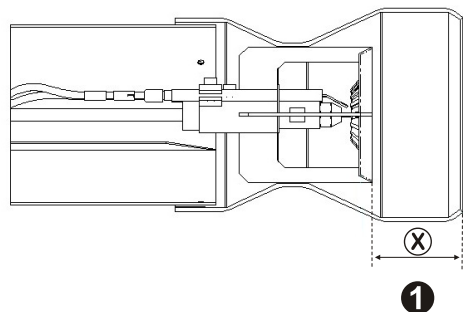
Burner	Burner power ⁽²⁾ [kW]	Nozzle Danfoss [GPH]	Fuel oil pressure ⁽²⁾ [bar]	Air shutter position ⁽²⁾	Indicative setting for the head position \textcircled{B} (Distribution bar) (mm)	Size \textcircled{X} (mm)	Value CO ₂ ⁽²⁾ (%)
M 302-1 S	80 / 115	1.75 / 45° S	10.5 / 22.0	11 / 21	27	31	12.5/13.2
	90 / 130	2.00 / 45° S	10.5 / 23.5	12 / 22	23	27	
M 302-2 S	80 / 115	1.75 / 45° S	11.0 / 22.0	10 / 16	28	49	
	100 / 140	2.25 / 45° S	10.0 / 21.5	12 / 21	25	46	
	120 / 160	2.50 / 45° S	12.0 / 23.5	16 / 27	24	45	
M 302-3 S	120 / 155	2.50 / 45° S	12.5 / 22.5	15 / 22	33	48	
	125 / 175	2.75 / 45° S	10.5 / 21.0	14 / 24	30	45	
	155 / 205	3.50 / 45° S	11.0 / 20.0	20 / 34	28	43	
M 302-4 S	130 / 195	3.00 / 45° S	10.0 / 23.5	12 / 25	32	61	
	140 / 210	3.50 / 45° S	9.5 / 21.0	13 / 28	30	59	
	180 / 230	4.00 / 45° S	12.5 / 21.5	21 / 37	28	57	
	205 / 255	4.50 / 45° S	11.5 / 19.0	25 / 44	25	54	

Burner	Burner power ⁽²⁾ [kW]	Nozzle Danfoss [GPH]	Fuel oil pressure ⁽²⁾ [bar]	Air setting servomotor ST1 / ST2 ⁽¹⁾⁽²⁾	Head pressure ⁽²⁾ [mbar]	Indicative setting for the head position \textcircled{B} (Distribution bar) (mm)	Size \textcircled{X} (mm)	Value CO ₂ ⁽²⁾ (%)
M 302-5 S	145 / 210	3.50 / 60° S	10 / 22.5	35 / 42	4.1 / 8.0	10	59	12.5/13.2
	215 / 315	5.00 / 60° S	10 / 23.0	48 / 62	4.4 / 10.3	1	50	
	285 / 400	6.50 / 60° B	10 / 19.0	60 / 110	7.7 / 13.7	-2	47	
	310 / 435*	6.50 / 60° B*	12 / 23.0*	68 / 110*	9.3 / 14.3*	-2*	47*	
M 302-6 S	120 / 170	2.75 / 60° S	10 / 21.0	25 / 35	3.7 / 6.6	22	97	
	205 / 275	4.50 / 60° S	11 / 22.5	45 / 52	4.8 / 8.7	16	89	
	270 / 385	6.00 / 60° S	10 / 20.5	54 / 74	4.1 / 9.4	1	74	
	325 / 455*	7.00 / 60° S*	10 / 20.0*	60 / 95*	6.2 / 11.9*	-4*	69*	

(1) The MV cam must always be located between the ST1 and ST2 cams

(2) Stage1 / Stage2

* Without cover in the air box.



- ❶ Adjust size (X) with the adjustment screw (A).
- ❷ The position of the head on the adjustment is read by using a quick setting (B) or by measuring size (X) for finer adjustment.
- ❸ Assemble the manometer in fuel pump .
- ❹ Assemble the vacuometro in fuel pump .
- ❺ Adjust cam ST0 = 0°.
- ❻ Change cams ST1 and ST2 to obtain the required power.
- ❼ The MV cam must always be located between the ST1 and ST2 cams (5° below ST2).
- ❽ Start the burner.
- ❾ Check the pressure in the head (Stage2). Check the combustion and the stability of the flame.
- ❿ Set the pump pressure (Stage2).
- ⓫ Adjust cam ST2 in terms of the CO₂ value.
- ⓬ Move the servomotor backwards and forwards to restart the position of the cam ST2.
- ⓭ Check the pressure in the head (Stage1). Check the combustion and the stability of the flame.
- ⓮ Set the pump pressure (Stage1).
- ⓯ Adjust cam ST1 in terms of the CO₂ value.
- ⓰ Move the servomotor backwards and forwards to restart the position of the cam ST1.
- ⓱ Measure the combustion.
- ⓲ Check the burner start up and the (1→2 ; 2→1) speed passages Adjust cam MV (If necessary).
- ⓳ Refer to the settings in the table "Check Table" in the user manual.

Checking and maintenance

Checking the operation

When commissioning or after checking the burner, carry out the following checks :

Take out the flame detection cell, obscure it and then start it	→	At the end of the safety period, the command and safety box must be placed on safe. The burner will stop.
The burner is operating : Take out the flame detection cell and obscure it	→	Start again, at the end of the safety period, the control board must be placed on safety mode.
The burner ignites with the flame detector cell lit	→	The control device must be on safety mode after approximately 15 secs pre-ventilation. The burner will stop.

Final checks

Before leaving the installation , the installation engineer must :

- Ensure the proper working of the furnace and thermostat equipment ;
- Ensure that the thermostats are properly set ;
- Check that the new air duct opening meets existing regulations ;
- Fill in the check sheet on the back of the user manual ;
- Note down his name and telephone number on the user manual ;
- Bring the user instructions attached to this document to the attention of the user, in particular the paragraph "Burner on safety" ;
- Give the user manual to the user.

Maintenance procedure

The burner and the furnace must be checked, cleaned and set at least once a year.

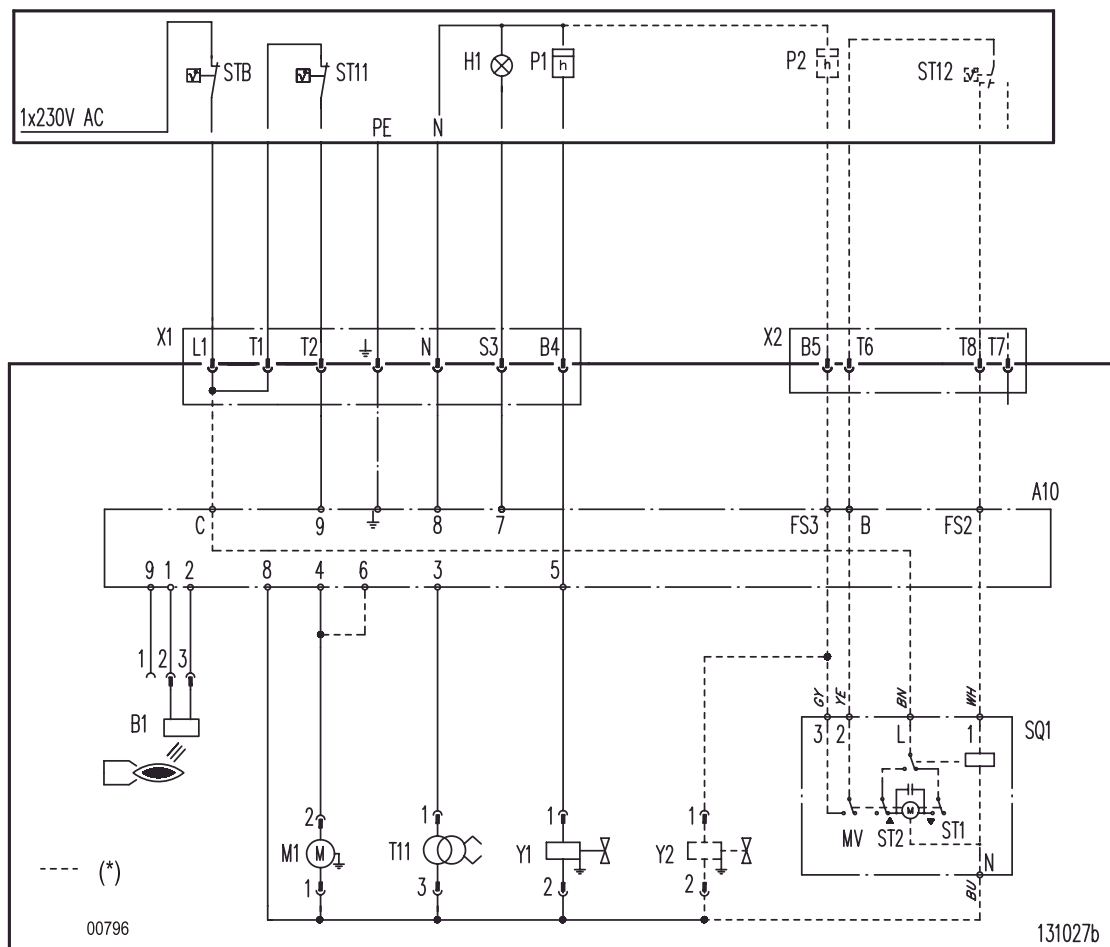
These actions must be carried out by a qualified technician.

 **A significant increase in smoke temperature indicates that dirt is blocking the furnace and must be cleaned.**

1. Turn off the main heating installation switch and disconnect the burner from the electrical installations.
2. Check the condition of the combustion chamber and the smoke circuits. Clean the boiler tubes if necessary.
3. Put the burner in the maintenance position.
4. Check and clean the fuel filters. Replace if necessary. Check the nozzle condition. Check the electrode condition (Replace every year if necessary). Check and clean the new air inlet in the boiler room.
5. Disassemble and clean all burner parts (a cleaning product for the combustion head is available as a spare part option).
6. Replace defective parts.
7. Turn the burner to the operating position
8. Assemble the manometer and the vacuum gauge in the burner's pump.
9. Check the burner's electrical connections. Activate the main switch in the installation.
10. Start the burner. Adjust the burner.
11. Measure the combustion (furnace operating).
12. Note down the measurements made and the material that has been replaced on the check sheet on the back of the user manual.
13. Make a final operating check and carry out all final checks.

Electrical diagram

M 302-1 S / M 301-2 S / M 302-2 S / M 301-3 S / M 302-3 S / M 301-4 S / M 302-4 S

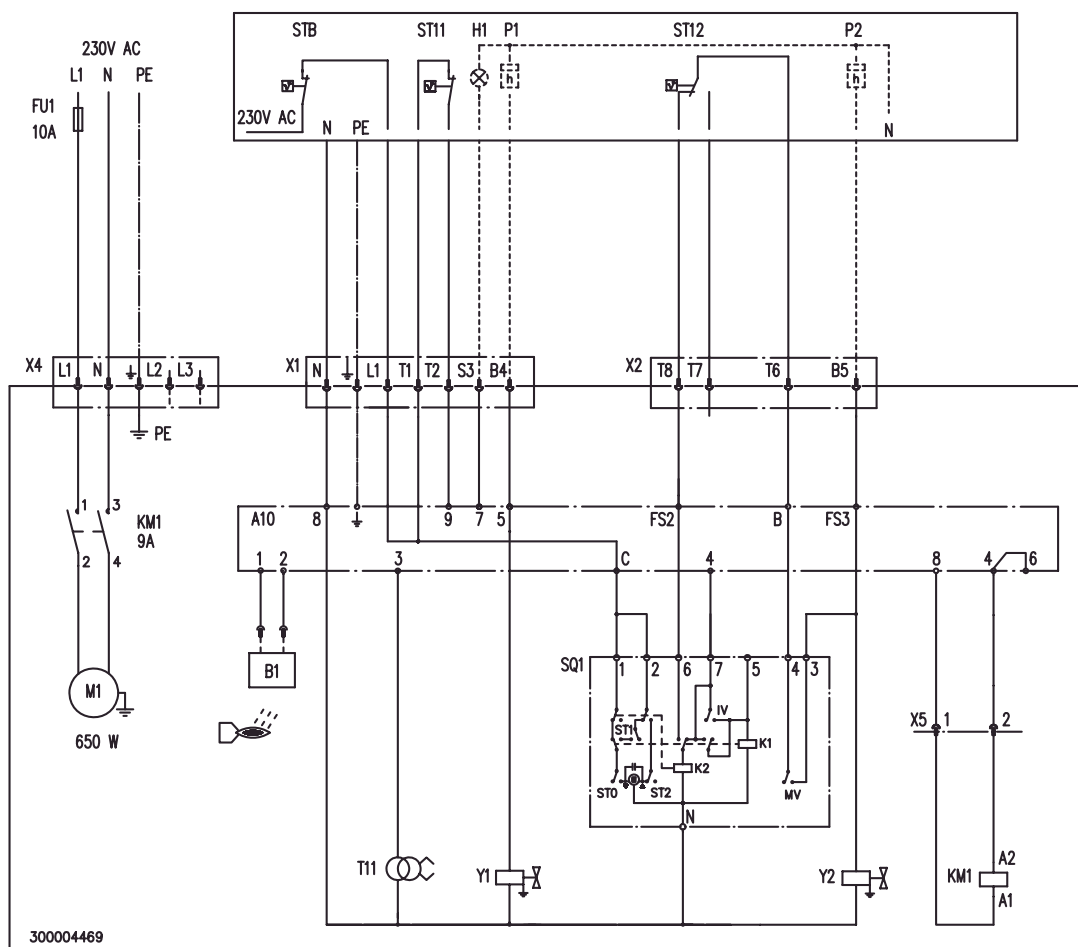


---- (*) Operation with 2-stage burner

A10	Command and safety box	ST12	Operational thermostat (Stage2)*
B1	Flame detector	T11	Ignition transformer
KM1	Contacteur	X1	7 pole connector
M1	Turbine motor	X2	4 pole connector
H1	Burner fault	Y1	Solenoid valve speed 1
SQ1	Air shutter servomotor	Y2	Solenoid valve speed 2*
STB	Safety thermostat	P1	Hour run meter (Stage1)
ST11	Operational thermostat (Stage1)	P2	Hour run meter (Stage2)*

* For M 302 S only


Earth according to local regulations.



300004469

00591

A10	Command and safety box	T11	Ignition transformer
B1	Flame detector	X1	7 pole connector
KM1	Contactors	X2	4 pole connector
M1	Turbine motor	X4	5 pole connector
H1	Burner fault	X5	2 pole connector
SQ1	Air shutter servomotor	Y1	Solenoid valve speed 1
STB	Safety thermostat	Y2	Solenoid valve speed 2
ST11	Operational thermostat (Stage1)	P1	Hour run meter (Stage1)
ST12	Operational thermostat (Stage2)	P2	Hour run meter (Stage2)

 Earth according to local regulations.

Operating incidents

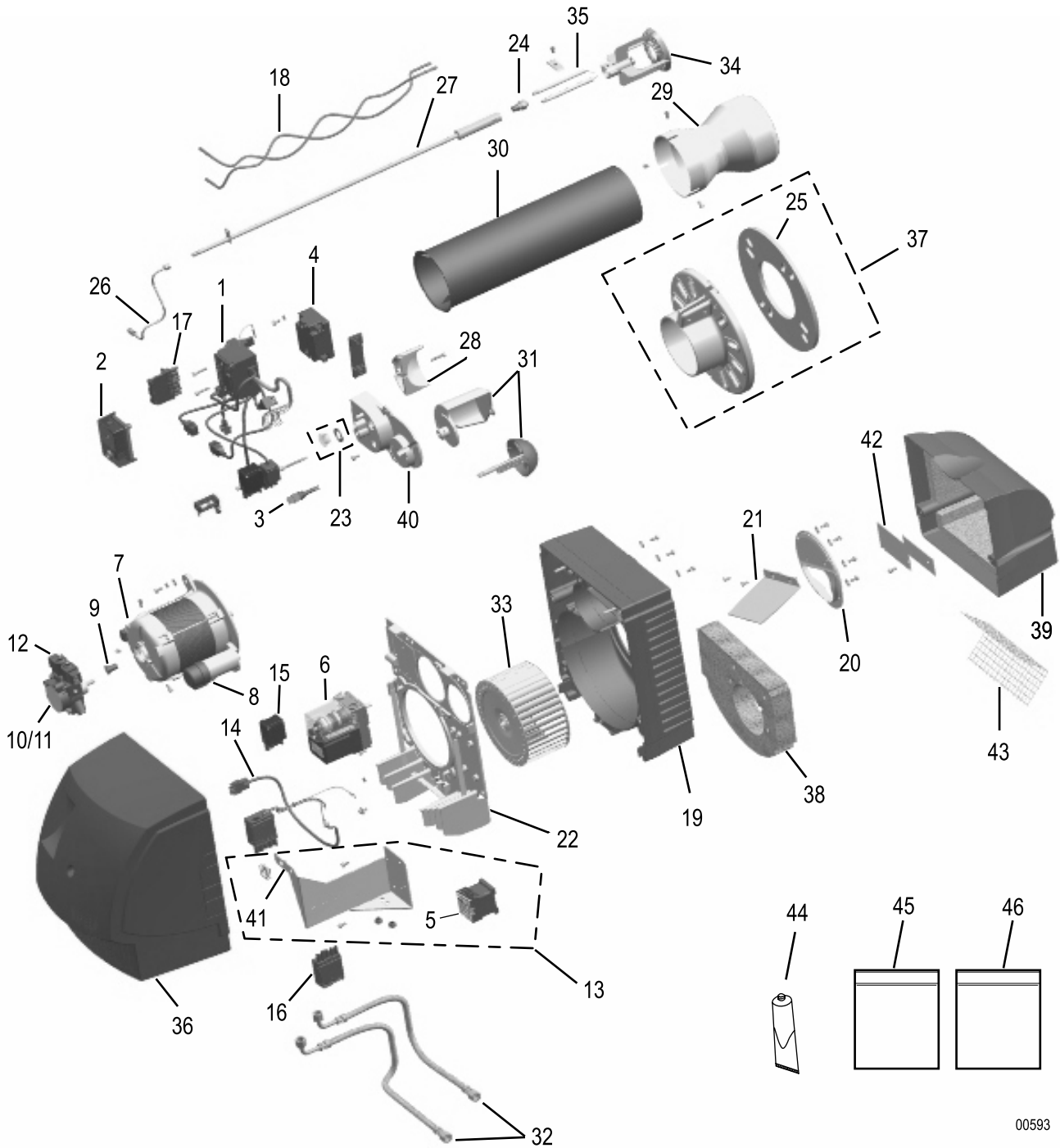
Prior to any action, the technician must carry out the following checks :

- Are the furnace and the burner receiving voltage (indicator lit, safety thermostat switched on) ?
- Is the fuel-oil supply guaranteed ?
- Are the regulator or the furnace thermostat requesting heat (requesting) ?
- Is the smoke circuit in a good enough condition to allow combustion (Date of last cleaning) ?

Faults	Probable causes	Solution
The burner will not start.	✗ There is no voltage.	→ Reset the thermostat. → Check the fuses and switches. → Assemble the thermostat or adjustment deposit (set higher than the furnace temperature).
The motor does not start.	✗ Motor defective.	→ Replace the motor.
Mechanical noises.	✗ Damaged motor bearings.	→ Replace the motor.
	✗ Turbine friction.	→ Check its location.
Absence of ignition arch.	✗ Short circuit in the ignition electrodes.	→ Set the gap between the ignition electrodes.
	✗ Ignition electrodes too far apart.	→ Set the gap between the ignition electrodes.
	✗ Dirty, wet electrodes.	→ Clean or replace the ignition electrodes.
	✗ Electrode cable connection fault.	→ Check the connections.
	✗ Ignition electrodes insulation defective.	→ Replace the electrodes.
The command box is placed on safety.	✗ Ignition electrode cables defective.	→ Replace ignition cables.
	✗ Transformer defective.	→ Replace the ignition transformer.
	✗ Dirty flame detection cell.	→ Clean the cell.
The pump does not aspirate fuel.	✗ The flame is lost.	→ Correct burner setting.
	✗ Flame detection cell defective or cables defective.	→ Replace cell or cables.
	✗ Damaged motor/pump coupling.	→ Replace coupling.
The pump does not aspirate fuel.	✗ Inlet filter, tubes or pump cover not sealed.	→ Replace inlet filter. → Tighten joints or cover.
	✗ Fuel input - output inverted.	→ Change the connection.
	✗ Retaining valves closed.	→ Open valves.
	✗ Filter or inlet filter obstructed.	→ Replace filter or inlet filter.
Noises from the pump.	✗ The pump is aspirating air.	→ Check the seal on the ventilation tube.
	✗ The pump is operating on empty.	→ Clean the filter, see aspiration tube. → Check that the size of the supply tubes is correct, that there they are not restricted or dirty and that the fuel is not too cold.
Poor combustion hygiene.	✗ Poor setting.	→ Check the burner settings.
	✗ Lack of air.	→ Correct air flow.
	✗ Dirty or worn nozzle.	→ Replace nozzle.
	✗ Absence of spray.	→ Connect the electro-valve. → Replace nozzle. → Replacing the pump.
	✗ Dirty combustion head	→ Clean combustion head
	✗ Dirty air aspiration routes.	→ Clean.
	✗ Furnace chamber insufficiently ventilated.	→ Improve ventilation.

Spare parts - M 300 S - 300003201-002-F



i To order a spare part, quote the reference number next to the part required.





00593

Ref.	Description	Reference	Models
1	Base with cables	9795-5503	M 301 S
		200000896	M 302-1 S M 302-2 S M 302-3 S M 302-4 S
		200003750	M 302-5 S M 302-6 S
2	Command and safety box DKO 976	9795-5736	M 302 S
	Command and safety box TF 874	9790-6701	M 301 S
3	Flame detection cell	9790-1209	
4	Transformer	9795-5097	
5	Contactora	9795-5089	
6	Air shutter servomotor	200003735	M 302-5 S M 302-6 S
		200000890	M 302-1 S M 302-2 S M 302-3 S M 302-4 S
7	motor 260 W	9794-8220	M 302-1 S M 301-2 S M 302-2 S
	motor 380 W	9794-8222	M 301-3 S M 302-3 S M 301-4 S M 302-4 S
	motor 650 W	9795-5322	M 302-5 S M 302-6 S
8	Condenser 8 µF	9795-1055	M 302-1 S M 301-2 S M 302-2 S
	Condenser 12 µF	9795-1056	M 301-3 S M 302-3 S M 301-4 S M 302-4 S
	Condenser 16 µF	9795-1057	M 302-5 S M 302-6 S
9	Motor coupling	9790-2600	
10	Fuel pump BFP 21 R3	9794-8223	M 301-2 S
	Fuel pump BFP 21 R5	9794-8225	M 301-3 S M 301-4 S
	Fuel pump BFP 52E R3	9794-8228	M 302-1 S
	Fuel pump BFP 52E R5	9794-8269	M 302-2 S M 302-3 S M 302-4 S
	Fuel pump AT 265	9795-5053	M 302-5 S M 302-6 S
11	Fuel oil filter pump	9790-3064	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		9794-1728	M 302-5 S M 302-6 S

Ref.	Description	Reference	Models
12	Solenoid valve	9795-5384	M 302-5 S M 302-6 S
		9790-9075	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
13	Support + Contactor	200003731	M 302-5 S M 302-6 S
14	cable	200003754	M 302-5 S M 302-6 S
15	4 pole connector	9531-7384	
16	5 pole connector	9794-1404	M 302-5 S M 302-6 S
17	7 pole connector	9531-7395	
18	High voltage cables	200004901	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		9795-6325	M 302-5 S
		200004780	M 302-6 S
19	Housing	9795-5849	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		300004271	M 302-5 S M 302-6 S
20	Air input flange	9795-1000	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		200003714	M 302-5 S M 302-6 S
21	Duo-press	9795-1001	M 301-3 S M 302-3 S
		9795-1002	M 301-4 S M 302-4 S
		9795-1003	M 302-5 S M 302-6 S
22	Part plate	9795-1039	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		200003715	M 302-5 S M 302-6 S
23	Indicator	9795-5108	

Ref.	Description	Reference	Models
24 	Filler 1.35 / 45° S Danfoss	9790-3414	
	Filler 1.50 / 45° S Danfoss	9790-3425	
	Filler 1.65 / 45° S Danfoss	9794-8548	
	Filler 1.75 / 45° S Danfoss	9790-3428	
	Filler 2.00 / 45° S Danfoss	9790-3429	
	Filler 2.25 / 45° S Danfoss	9795-5171	
	Filler 2.50 / 45° S Danfoss	9790-3430	
	Filler 2.75 / 45° S Danfoss	300019452	
	Filler 3.00 / 45° S Danfoss	9794-8549	
	Filler 3.50 / 45° S Danfoss	9794-8550	
	Filler 4.00 / 45° S Danfoss	9794-8551	
	Filler 4.50 / 45° S Danfoss	9794-8552	
	Filler 5.50 / 45° S Danfoss	9794-8553	
	Filler 6.00 / 45° S Danfoss	9795-5430	
	Filler 5.00 / 60° S Danfoss	300007425	
	Filler 6.00 / 60° S Danfoss	300007426	
	Filler 3.00 / 45° B Danfoss	9795-5431	
	Filler 4.50 / 45° B Danfoss	9795-5478	
	Filler 5.00 / 45° B Danfoss	9795-5432	
	Filler 5.50 / 45° B Danfoss	9795-5433	
Filler 6.50 / 45° B Danfoss	9795-5434		
Filler 7.50 / 45° B Danfoss	9795-5435		
Filler 5.50 / 60° B Danfoss	9795-5439		
25 	Gasket	9794-6296	M 302-1 S
		9794-6908	M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S M 302-5 S M 302-6 S
26	Fuel oil supply pipe	200000488	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		300004930	M 302-5 S M 302-6 S
27	Filling line	9794-8343	M 302-1 S
		9794-8253	M 301-2 S M 302-2 S
		9794-8255	M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		300006676	M 302-5 S
		300004931	M 302-6 S
28	1/2 Sphere	300003773	M 302-5 S M 302-6 S

Ref.	Description	Reference	Models
29	Flame tube	9794-8345	M 302-1 S
		9794-8247	M 301-2 S M 302-2 S
		9794-8251	M 301-3 S M 302-3 S
		9794-8249	M 301-4 S M 302-4 S
		9794-8974	M 302-5 S
		300004933	M 302-6 S
		30	Intermediate tube
31	Cone	200000284	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
	Air shutter	200003730	M 302-5 S M 302-6 S
32	Flexible	9794-3407	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		300005170	M 302-5 S M 302-6 S
33	Turbine 180x70	300013151	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
	Turbine 180x90	300013152	M 302-5 S M 302-6 S
34	Turbulence generator	9794-8531	M 302-1 S
		9794-8263	M 301-2 S M 302-2 S M 301-3 S M 302-3 S
		9794-8265	M 301-4 S M 302-4 S
		9794-8976	M 302-5 S M 302-6 S
35 	Ignition electrode	9794-8245	
36	Top cover	200003753	
37 	Flange + Gasket + Mounting equipment	9790-0863	M 302-1 S
		9794-9535	M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S M 302-5 S M 302-6 S

Ref.	Description	Reference	Models
38	Housing foam	300004830	M 302-5 S M 302-6 S
39	Air enclosure	9795-1040	M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		200003736	M 302-5 S M 302-6 S
40	Air box	9795-5945	M 301 S
		9795-5946	M 302-1 S M 302-2 S M 302-3 S M 302-4 S
		200003712	M 302-5 S M 302-6 S
41	Servomotor support	200000487	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
	Support	200003751	M 302-5 S M 302-6 S
42	Cap	200004610	M 302-5 S M 302-6 S
43	Protective grid	9795-5173	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
44	High temperature grease	9794-8947	Option
45	Special equipment set	9794-8237	M 302-1 S M 301-2 S M 302-2 S M 301-3 S M 302-3 S M 301-4 S M 302-4 S
		300005172	M 302-5 S M 302-6 S
46	Set of screws	9794-8231	
	SATROPEN	9795-5443	Option



Wearing parts: See reference 11, 24, 25, 35, 37

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