

# R20 / R30

Oil

Issued May 2004

Right reserved to effect technical changes in the interest of product improvement !



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## Overview

### General information

The installation of an oil-fired system must conform to extensive regulations and requirements. It is therefore the duty of the installer to be familiar with all applicable regulations and requirements. Installation, start-up and maintenance must be performed with utmost care. Fuel oil type EL to DIN 51603 must be used.

The burner must not be operated in rooms with high levels of air humidity (laundry rooms), dust or corrosive vapours.



#### Caution !

**Improper installation, adjustment, modification, operation or maintenance may result in physical injury or damage to property/equipment.**

**Read the instructions prior to use.**

**This product must be installed in conformity with the valid regulations (e. g. DIN-VDE, DIN-DVGW).**

The design and degree of protection of the burner make it suitable for operation in enclosed rooms.

### Declaration of conformity

We declare that GIERSCH R 20/30 Series oil blower burners with the assigned product identification numbers:

R20 CE-0031 AT 2345

R30-AE CE-0032 AT 2343

R30-Z-L CE-0032 AT 2344

meet the basic requirements of the following directives:

- "Low Voltage Directive" according to 73/23/EEC in conjunction with DIN VDE 0700 Part 1 / Ed. 04.88 and DIN VDE 0722 / Ed. 04.83
- "Electromagnetic Compatibility" according to Directive 89/336/EEC in conjunction with EN 55014 / Ed. 04.93 and EN 50082-1 / Ed. 01.92
- "Efficiency Directive" according to Directive 92/42/EEC in conjunction with DIN EN 267/ Ed. 12.96
- "Machinery Directive" as per directive 98/37/EEC

These products conform with the design sample tested at the designated centre 0031/0032.

### Checking scope of delivery and connection data

Before installing the GIERSCH oil burner please check the items supplied for completeness.

Items supplied:

Burner, fastening unit, separate operating instructions, technical information, flange gasket, one 7-pin and one 4-pin plug-type connector (for version -Z and -ZS only).



**Oil jets are not included in the standard specifications.**

### Operating instructions

The operating instructions together with this technical information leaflet must be displayed in a clearly visible position in the boiler room. It is essential to write the address of the nearest customer service centre in the operating instructions.

## Instruction of operating personnel

Faults are often caused by operator error. The operating personnel must be properly instructed in how the burner works. In the event of recurring faults, Customer Service should be notified.

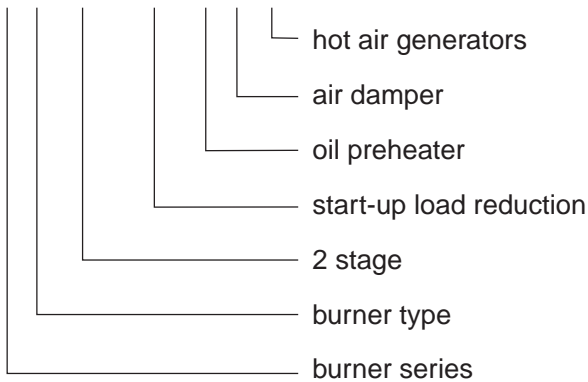
## Maintenance and customer service

The complete system should be checked once a year for correct functioning and leaks by a representative of the manufacturer or other suitably qualified person.

We accept no liability for consequential damage in cases of incorrect installation or repair, the fitting of non-genuine parts or where the equipment has been used for purposes for which it was not intended.

## Key for code designation

### R30 -Z / AE-V-L-WLE



## Technical specifications

Technical data	Burner type					
	R20-(L)	R20-V(-L)	R20-(L)-AE	R20-ZS-L	R30-AE	R30-Z-L
Min. burner output in kW	36	36	36		95	
Max. burner output in kW	166	77	166		273	
Min. boiler output in kW	33	31	33		87	
Max. boiler output in kW	153	71	153		251	
Fuel oil	Type EL, to DIN51603					
Method of operation	1-stage	1-stage	1-stage with startup relief	2-stage	1-stage with startup relief	2-stage
Voltage	1 / N / PE ~50 Hz / 230 V					
Current consumption Max. start / operation in A	2.3 / 1.1	3.2 / 2.0	2.3 / 1.1		2.8 / 1.6	
Electric motor (2850rpm) in W	180				250	
Oil pump in l/h	54				70	
Photoelectric cell	MZ 770S					
Control box	TF 830/832, DKW 972 (WLE)					
Weight in kg	16.5	17.8	17.5	18.5	29	
Noise emission in db(A)	≤ 73	≤ 68	≤ 73	≤ 73	≤ 75	

## Installation



### Installing flange and burner

When installing the sliding flange, only tighten screws 1 and 2 otherwise it will not be possible to secure the burner pipe with screw 3. Slide in the burner, adjust to furnace depth and tighten the screws in the following sequence: 3, 4, 5, raising the housing in the process.

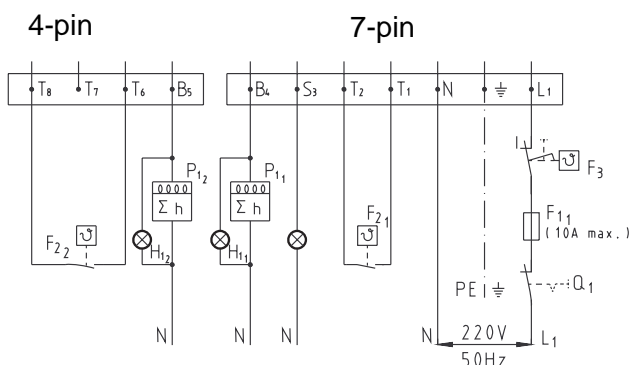
**Important:** Secure the sliding flange so that the clamping screw 3 is positioned at the top.

### Checking electrode setting

- Move the burner into the service position as described on Page 21.
- Check the ignition electrode setting (see Page 21).

### Establishing electrical connections

- Effect the electrical connection in the provided plug unit in accordance with the wiring diagram.
- **HEED LOCAL REGULATIONS !**
- Protect the electrical feed line with a 10 A fuse.
- Use flexible cable.



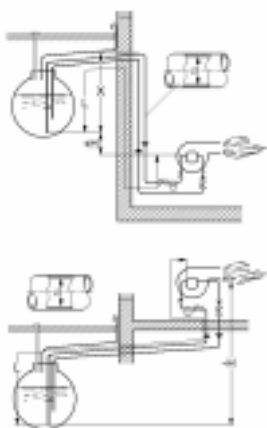
For the key to the circuitry symbols, see Pages 22-26.

### Connecting the oil

The table refers to heating oil EL 4.8 cSt and the inner diameter of the oil pipes. In the case of the suction line length 4 elbows, 1 valve and 1 check valve have been taken into consideration for the resistance. On account of possible gassing-off of the oil, dimension X should not exceed a length of 4 mtrs.

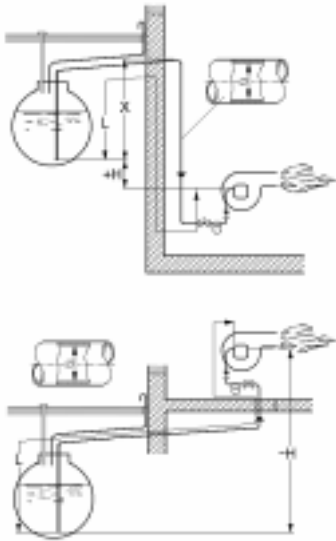
- Using the metal hoses provided connect the oil pump to the oil line.
- The pump should be connected to the feed and return lines (two-line system).
- If the tanks are positioned higher the pump can be converted to a single-line system.

#### Two-pipe system



pump	Di [mm]	H [m]								
		4	3	2	1	0	-1	-2	-3	-4
Suntec or Danfoss	6	21	18	16	13	11	8	5	-	-
	8	67	58	50	42	34	25	17	9	-
	10	100	100	100	100	82	62	42	21	-

Single pipe system



Oil throughput [kg/h]	Di [mm]	H [m]									
		4	3	2	1	0	-1	-2	-3	-4	
bis 2,5	4	77	68	58	49	40	31	22	13	-	
	6	100	100	100	100	100	100	87	64	18	
	8	100	100	100	100	100	100	100	100	56	
2,5-5,0	4	39	34	29	25	20	16	11	6	-	
	6	100	100	100	100	100	79	56	32	9	
	8	100	100	100	100	100	100	100	65	28	
5,0-10,0	4	19	17	15	12	10	8	-	-	-	
	6	98	86	74	63	51	39	28	16	4	
	8	100	100	100	100	100	100	88	51	14	
10,0-23,0	6	42	37	32	27	22	17	12	7	-	
	8	100	100	100	85	69	54	38	22	6	



For pure single-pipe operation the bypass stopper must be unscrewed out of the return line opening ② and the return line opening must be sealed with a gasket and metal stopper.

For conversion to single pipe system, we recommend to use a fuel oil filter with return feed. For this, the pump remains in two-pipe operation. Install flow and return burner pipes at the filter. Open the oil tap at the filter. Start the installation.

Oil pump

On the **version -AE** (startup relief) or **-Z** (two-stage) the oil burner starts up with a low pump pressure and switches to the higher pump pressure, i.e. full output, via the solenoid valve in the pump.

**-AE** Differential pressure max. 3 bar. Ex-works setting 10 and 13 bar.

**-Z** Ex-works setting 10 and 20 bar

The pump pressure can be set for the relevant output (see Table of settings Pages 12-13).

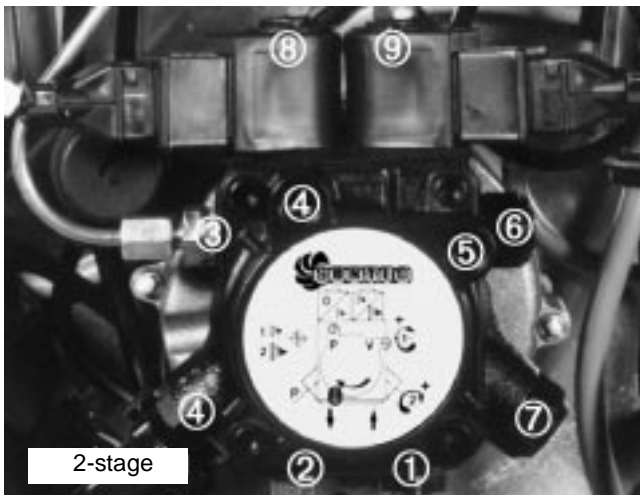
To do so:

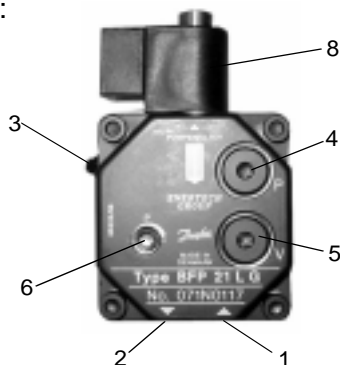
- Remove the sealing plug.
- Screw in the pressure gauge and adjust the pump pressure by means of the control valve in accordance with the table of settings.

Key to Suntec pump:

- ①= **Feed line**
- ②= **Return line**
- ③= **Pressure pipe connection**
- ④= **Pressure measuring connection**
- ⑤= **Vacuum measuring connection**
- ⑥= **Pressure adjustment 1st stage**
- ⑦= **Pressure adjustment 2nd stage**
- ⑧= **Solenoid valve 1st stage**
- ⑨= **Solenoid valve 2nd stage**

Suntec:



**Danfoss:**

- Remove the sealing plug ④.
  - Screw in the pressure gauge and adjust the pump pressure with the regulating screw ⑥.
- Key to Danfoss pump:

- ①=Flow
- ②=Return
- ③=Pressure tube connection
- ④=Pressure measuring connection
- ⑤=Vacuum measuring connection
- ⑥=Pressure adjustment
- ⑧=Magnetic valve

## Function

On version -WLE the control device TF 830/832 is replaced by DKW 972. The circuit diagrams (Pages 22-26) are valid for both control device versions.

### Function test of control box

Carry out the following checks after commissioning and each time after the burner has been serviced:

- Restart with covered up flame failure controller:  
The control device must switch to fault upon expiry of the safety period.
- Burner startup with flame failure controller exposed to external light, e.g. fluorescent lamp, lighter, incandescent lamp (daylight is not sufficient !):  
The control device must switch over to fault during the pre-ventilation period as a consequence of the external light.
- Normal startup - if burner is in operation during the post-ignition period black out the flame failure controller:  
(e.g. pull out the flame failure controller and cover it up !).  
TF 830/832: the ignition must switch on and upon expiry of the safety period the device must switch over to fault.  
DKW 972: The fuel supply must be immediately interrupted and a post-ventilation of 60 secs. must be initiated. A restart is then effected whereby the automatic firing device must go to fault position at the end of the safety period.
- Post-ventilation after flame cutoff.

### Safety and switching functions

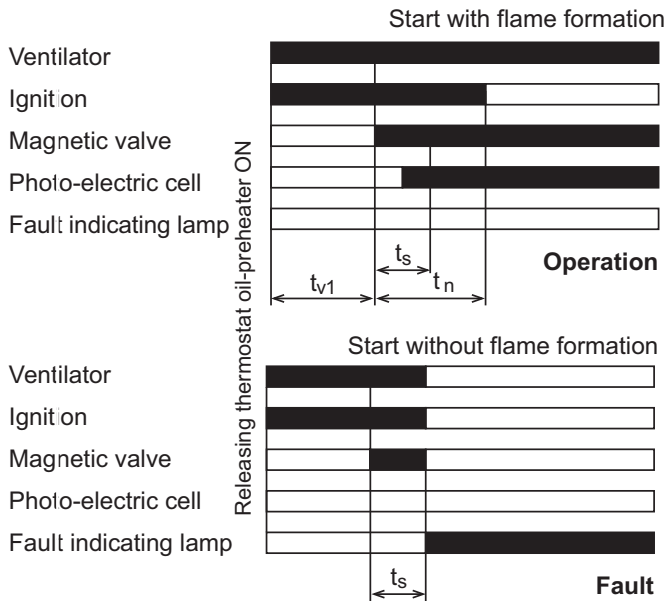
If a flame failure occurs during operation, the fuel feed shuts off immediately and the system tries a restart, with pre-aeration and retarded ignition. If no flame results, the control box shows a fault after the safety time. A restart takes place in all cases following a mains power failure. The control box shows a fault if the photoelectric cell detects a light source during the pre-aeration time, after the safety time.



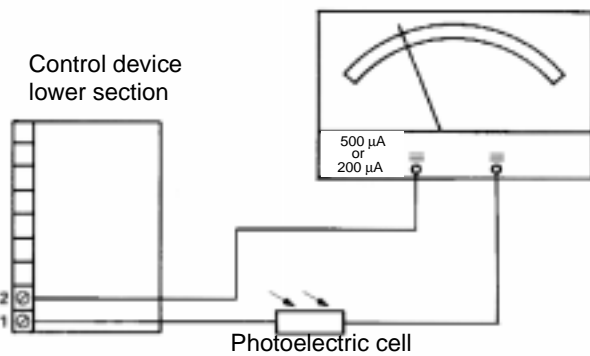
The control device may only be plugged in or unplugged, if the main switch is in the "OFF" position or if the 7-pin plug connector is disconnected, because the bottom part of the control device carries 230 V. The incidence of external light onto the photoresistor or onto the flame failure controller (e.g. through a sight glass or after-glowing refractory bricks) must be prevented. Only then is fault-free operation of the installation ensured.

Satronic:	TF 830 / 832	DKW 972
$t_{v1}$ = pre-ignition time + pre-ventilation	12 secs.	20 sec.
$t_s$ = safety period	10 secs.	5 sec.
$t_n$ = post-ignition time	20 sec.	7 sec.
Post-ventilation after flame cutoff	-	60 secs.
Delay after switching-off fault	90 secs.	-
Photoresistor (photoelectric cell)	MZ 770	
Minimum photocurrent [ $\mu$ A]	30	30

**TF 830/832 and DKW 972**



**Measurement of the photocurrent (MZ 770S only)**

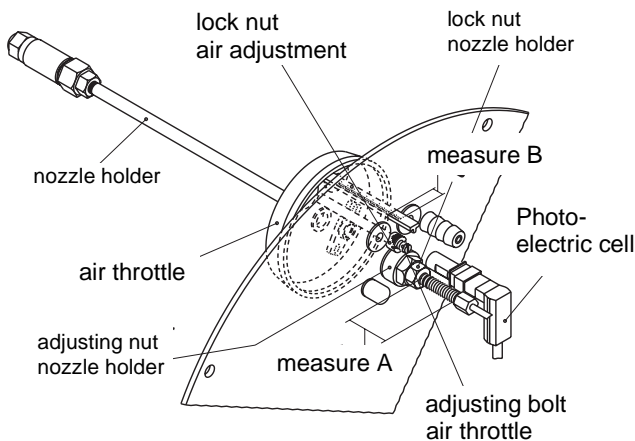


To measure the photocurrent the plug unit is withdrawn from the flame failure controller and the pair of measuring cables\* is installed between the plug and socket unit. The two measuring connections are connected to the measuring instrument. If there is a negative deflection of the measuring instrument, reverse the plug on the measuring instrument lead ! Set the measuring instrument to ampere metering for DC, measuring range up to approx. 200 µA !

**Sensible measuring accessories**

- Digital measuring instrument Art. no. 59-20-50 263
- \* Pair of measuring cables for photocurrent Art. no. 59-20-50 4317

**R20**



**Air volume adjustment**

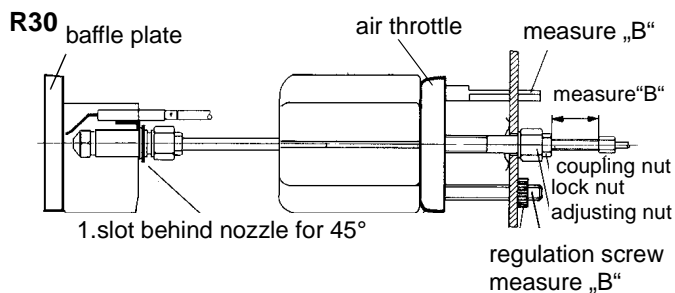
Dimensions "A" and "B" serve as orientation aids for easier adjustment of the air volume, which is altered in conformity with the nozzle selection tables, depending on the output.

Adjustment is effected via the adjusting nut (dimension "A") or via the adjusting screw (dimension "B"). If there is overpressure in the furnace, set dimension "A" lower and dimension "B" higher. If there is underpressure in the furnace, set dimension "A" higher and dimension "B" lower than the dimensional specifications in the nozzle selection table.

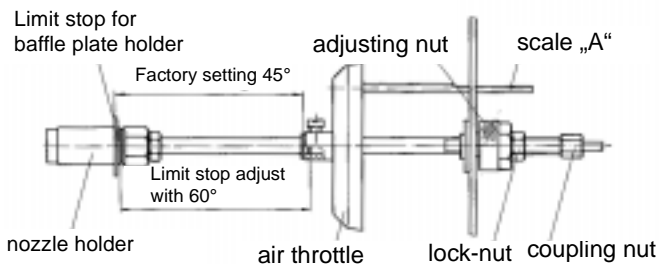
The flame pattern can be influenced more favorably with the aid of the air throttle adjuster.

The tables are for the purpose of presetting. Readjustment is required in any case in relation to the installation. After adjustment of the optimal combustion values the two lock nuts have to be tightened.

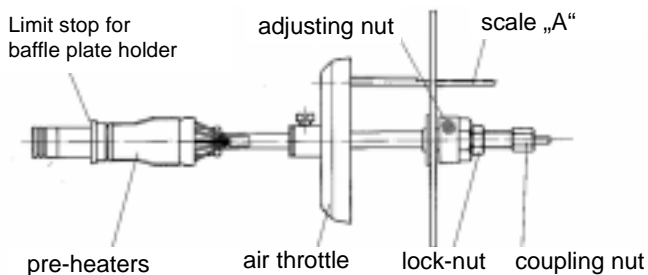




**R20 without preheating**



**R20-V-L**



**Servomotor**

(version -Z-L, -ZS-L, 2-stage with automatic economy device)

The air valve positioning motor adjusts the air valve position or trips the solenoid valve on two-stage burners with air shutoff. Adjustment is via limit switch cams on the positioning drive roller.

You can refer to the presetting table for the cam positions for adaptation of the burner to the requisite boiler output.

For this:

Remove cover from air valve positioning motor. Alter the cam positions via the adjusting screws with a standard screwdriver.

The switching cams can be readjusted when the burner is adjusted.

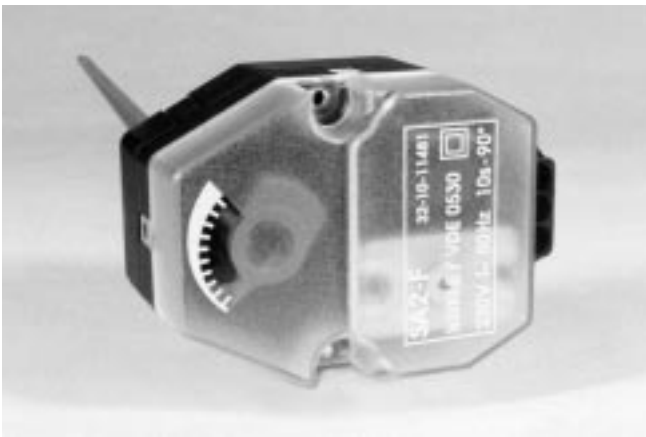
**Higher setting = More air, pressure increases**  
**Lower setting = Less air, pressure decreases**

## Function

Please note the following when adjusting the switch cams:

- Do not set cam position ST1 higher than ST2.
- Set cam position MV2 roughly 10°-20° above cam position ST1.
- Check cam position MV2 after correcting cam position ST1.
- After adjusting ST1 and ST2 it is necessary to switch over to the next stage so that the adjustment becomes effective.
- After having readjusted the burner, refasten the servomotor hood and set the switch on the lower part of the control unit to the position 2nd stage.

### Version -L (single-stage with automatic economy device)



On version -L burners an air damper prevents the furnace from cooling down when there is a burner stoppage. Control of the air damper is effected electrically. The air flap opens before the burner starts. Its position can be read off the servomotor. Position indicator "OPEN"-"CLOSED". For servicing/retrofitting heed circuit diagram on Pages 22-26.



Do not turn red positioning lever by hand as mechanism is destructible.

### Version V (with oil preheating)

The oil preheating is upline from the burner program sequence and remains in operation until the oil burner is switched off by the control thermostat. The switch-on status of the preheater is indicated by a control lamp in the bottom part of the control device. The cold-start disable is effected via a thermostat, which is integrated into the preheater, and which does not enable the supply of current to the control device until the heating-up has taken place. The electrical preheater is integrated into the nozzle holder and has a controlled heating output. This is adapted via a resistor to the relevant heat requirement.



### Version B (time meter)

Time meters are for the purpose of exact acquisition of the burner runtime and are best connected in parallel with solenoid valve Y6. The time meter is available as an accessory part both directly with the burner and as a retrofit kit.

The fuel consumption can be roughly determined with knowledge of the hourly oil throughput. The use of GIER SCH oil volume meters is recommended for exact determination of the fuel volume.

The values determined are for the purpose among other things of determining the annual degree of utilization. Longer burner runtimes mean a higher annual degree of utilization.

## Oil control (optional)

Measuring range:	1 to 40 l/h
Working temperature:	0-60 °C
Permissible pressure:	< 25 bar
Measuring accuracy:	± 2.5 %



This multifunction unit provides information about the oil consumption, the number of burner startups, the burner operating hours etc. and in addition warns if the oil throughput drops below the preset target value (e.g. blocked nozzle). Through early detection and elimination of the deficiency, uneconomical and environmentally harmful operation of the burner can be prevented. In operation ensure that the flow, pressure and temperature are within the permissible limits.

As a rule no special servicing of the oil control is necessary. Clean the upline dirt trap (in the pump and oil filter) when the annual burner check is performed !



**Caution: The display will go out 1 day after a mains interruption, (e.g. switched phase). However, all values are retained and can be called again when mains power is switched back on. The set and reset functions are not possible during a mains power failure.**

### Method of operation of the mode key

By briefly pressing the mode key the individual displays can be called in consecutive order. The relevant mode is displayed by a function symbol and/or the corresponding unit when the key is released.

The following functions can be displayed:

Function	Display
Momentary consumption	0000.00 l/h
Momentary consumption Stage 2	2. 0000.00 l/h
Oil volume (resettable)	◇ 000000 l
Oil volume (total)	* 000000 l
Total operating hours	⌚ 000000 h
Number of burner startups	⌋ 000000
Operating hours Stage 2	2.⌚ 000000 h
Number of burner startups stage 2	⌋ 2. 000000
Reduced throughput (see Service function)	⚠ Service

### **Resetting the oil volume counter**

Resetting of the oil volume counter can be effected in the mode  $\diamond$ :

=> *Hold down the key for at least 10 secs.*

Press the key, after 5 secs. the displayed value will flash for 5 secs. Subsequently the (old) value remains on the display again, now release the key and  $\square^L$  appears on the display.

### **Definition of the momentary consumption target value**

Definition of the momentary consumption target value is effected in the mode/function momentary consumption:

=> *Hold down the key for at least 30 secs., but 32 secs. at the longest*

Press the key, after 25 secs. the displayed momentary consumption will flash for 5 secs. As soon as the flashing stops, release the key. As confirmation the service symbol and the momentary consumption as the newly defined target value will flash for 5 secs.

For two-stage burners the target value can be separately input in two output stages.

Following a change in burner output (nozzle change, change in pump pressure etc.) the target value, as specified above, has to be redefined. The old target value is thereby overwritten.

### **Service function**

If the oil flow is reduced by more than 10% (e.g. from a slowly blocking nozzle, preheater etc.), the service symbol appears on the display unit.

The prerequisite for this service function is previous input of the target value (see Definition of the momentary consumption target value) with correct burner operation.

### **Deactivation of the service function**

Procedure as for definition of the momentary consumption target value, however, hold down the key for longer than 32 secs. This clears the target value and the service symbol:

=> *Hold down the key for at least 32 secs.*

Upon being released the service symbol flashes and the zero value on the display flashes for 5 secs. as confirmation.

# Startup

## Adjustment tables

### R20(-L)(-AE)

Burner output	Boiler output where $\eta_k = 92\%$	Nozzle size	Nozzle spray angle	Oil pump pressure*	Oil throughput	Nozzle stem position dimension "A"
[kW]	[kW]	[USgal/h]	[°]	[bar]	[kg/h]	[mm]
40	37	0.75	60°S	13	3.4	13
45	41	0.85	60°S	13	3.8	15
55	51	1.00	60°S	13	4.6	16
60	55	1.10	60°S	13	5.1	18
65	60	1.25	45°S	13	5.5	19
75	69	1.35	45°S	13	6.3	20
85	78	1.50	45°S	13	7.2	22
95	87	1.75	45°S	13	8.0	23
110	101	2.00	45°S	13	9.3	26
125	115	2.25	45°S	13	10.6	29
140	129	2.50	45°S	13	11.8	32
150	138	2.75	45°S	13	12.7	39
165	152	3.00	45°S	13	13.9	50

\*Startup relief pressure 10 bar

### R20-V(-L)

Burner output	Boiler output where $\eta_k = 92\%$	Nozzle size	Nozzle spray angle	Oil pump pressure	Oil throughput	Nozzle stem position dimension "A"
[kW]	[kW]	[USgal/h]	[°]	[bar]	[kg/h]	[mm]
35	32	0.85	60°S/45°S	9.5	3.0	14
39	36	1.00	60°S/45°S	7.0	3.4	15
46	42	1.25	45°S	8.5	4.0	17
52	48	1.50	45°S	7.0	4.5	18
59	54	1.75	45°S	7.0	5.1	19
65	60	2.00	45°S	7.5	5.6	20
72	66	2.25	45°S	7.0	6.2	21

## R20(-L)(-AE)

### R20-ZS-L

Burner output		Boiler output where $\eta_k=92\%$	Nozzle size	Nozzle spray angle	Oil pump pressure		Oil throughput		Nozzle stem position dimension "A"	Air throttle position dimension "B"	Servomotor				Compression	
ST2	ST1				ST2	ST1	ST2	ST1			ST0	ST2	MV2	ST1	ST1	ST2
[kW]	[kW]	[kW]	[USgal/h]	[°]	[bar]	[bar]	[kg/h]	[kg/h]	[mm]	[mm]					[mbar]	[mbar]
49	36	45	0.75	60°S	20	10	4.2	3.0	7 - 9	15-17	0	80	10	5	3	6
56	39	52	0.85	60°S	20	10	4.8	3.3	9 - 11	16-19	0	80	15	8	3	6
66	43	61	1.00	45°S	20	10	5.	3.7	12-14	18-20	0	80	15	9	3	6
72	51	68	1.10	45°S	20	10	6.1	4.3	14 - 16	21-23	0	80	25	18	3	6
81	57.5	75	1.25	45°S	20	10	6.9	4.8	16-18	22-24	0	105	30	15	3	6
89	64	82	1.35	45°S	20	10	7.5	5.4	17-19	29-31	0	105	50	20	3	6
97	61	89	1.50	45°S	20	10	8.2	5.2	19-21	36-38	0	105	50	25	3	6
111	77	102	1.75	45°S	20	10	9.4	6.5	21-23	42-44	0	105	50	30	3	6
129	90	119	2.00	45°S	20	10	10.9	7.6	27-29	49-52	0	105	50	32	3	6
142	101	131	2.25	45°S	20	10	12.0	8.5	29-31	49-52	0	105	50	35	2.5	5
153	114	141	2.50	45°S	20	10	12.9	9.7	48-52	36-39	0	105	60	40	2.5	5

### R30-AE

Burner output	Boiler output where $\eta_k = 92\%$	Nozzle size	Nozzle spray angle	Oil pump pressure*	Oil throughput	Nozzle stem position dimension "A"	Nozzle stem position dimension "B"
[kW]	[kW]	[gph]	[°]	[bar]	[kg/h]	[mm]	[mm]
100	92	1.75	45°S	15	8.5	43	21
115	106	2.00	45°S	15	9.7	38	24
130	120	2.25	45°S	15	11.0	35	30
150	138	2.50	45°S	15	12.7	33	33
160	147	2.75	45°S	15	13.5	32	36
180	166	3.00	45°S	15	15.2	30	38
220	202	3.75	45°S	15	18.6	26	50
255	235	4.50	45°S	15	21.5	18	85
280	258	5.00	45°S	15	23.6	11	85

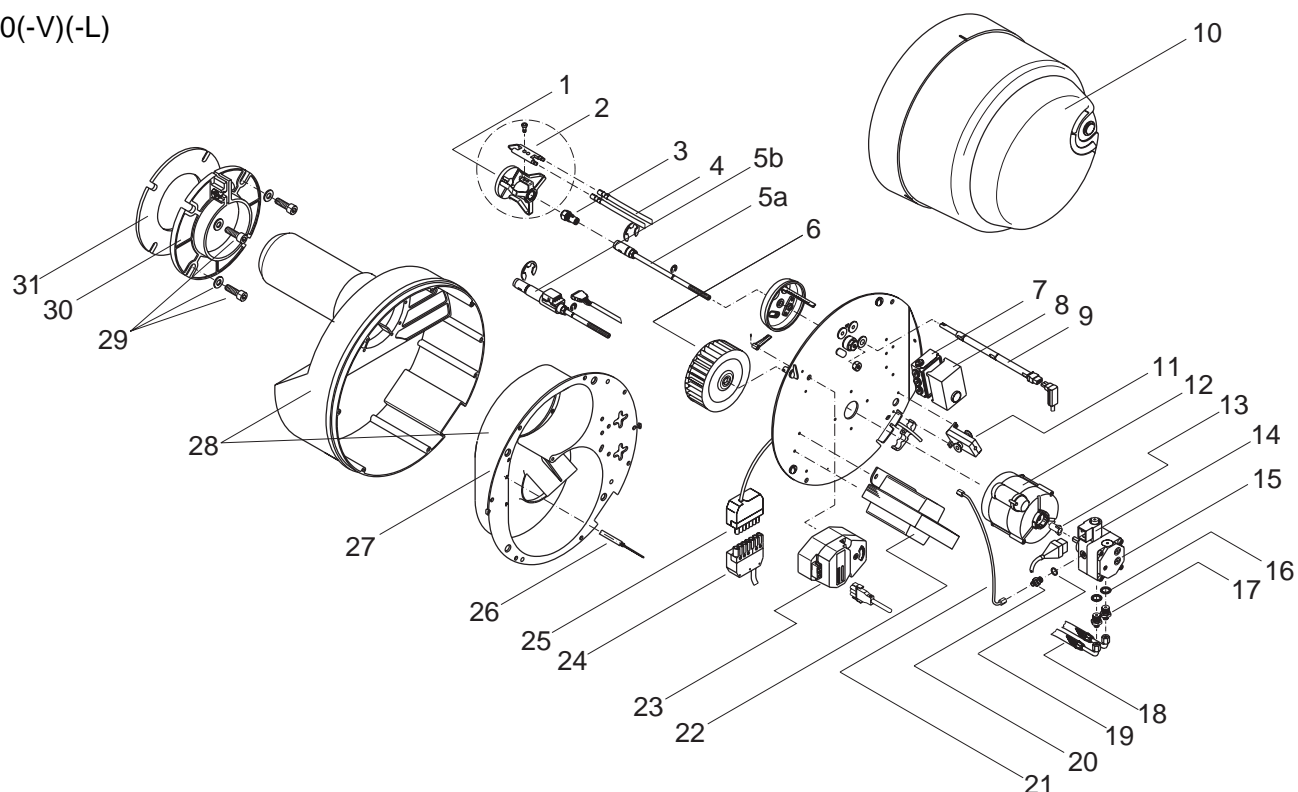
\*Startup relief pressure 12 bar

### R30-Z-L

Burner output		Boiler output where $\eta_k=92\%$	Nozzle size	Nozzle spray angle	Oil pump pressure		Oil throughput		Nozzle stem position dimension "A"	Air throttle position dimension "B"	Servomotor			
ST2	ST1				ST2	ST1	ST2	ST1			ST0	ST2	MV2	ST1
[kW]	[kW]	[kW]	[gph]	[°]	[bar]	[bar]	[kg/h]	[kg/h]	[mm]	[mm]				
143	102	132	2.25	45°S	20	10	12.0	8.6	32-36	38-40	0	115	55	45
160	113	147	2.50	45°S	20	10	13.4	9.5	30-33	42-44	0	115	60	50
176	124	162	2.75	45°S	20	10	14.8	10.4	28-31	44-46	0	115	60	50
195	138	179	3.00	45°S	20	10	16.4	11.6	25-28	43-47	0	115	65	55
217	156	200	3.50	45°S	20	10	18.2	13.1	22-25	52-56	0	115	65	55
247	179	227	4.00	45°S	20	10	20.8	15.0	14-18	59-63	0	115	75	60
273	203	254	4.50	45°S	20	10	23.0	17.1	5-7	88-92	0	115	80	65

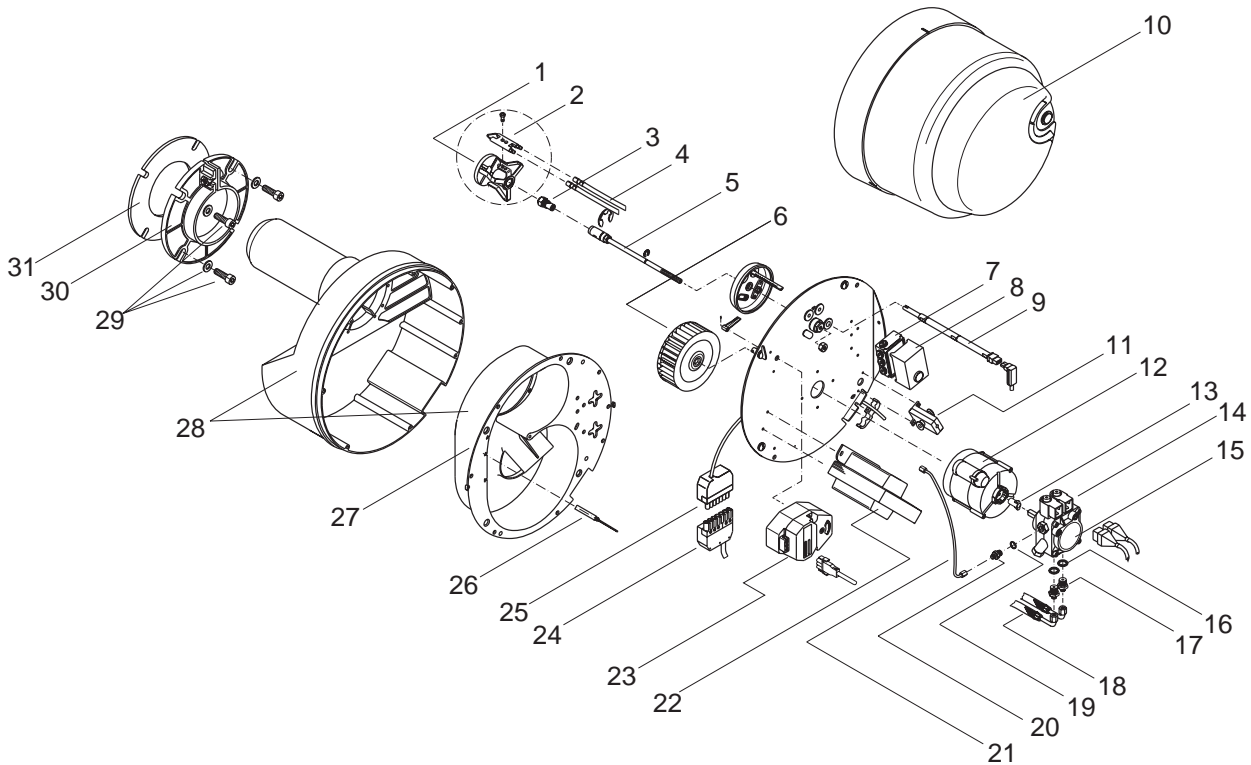
# Design

R20(-V)(-L)



Seq. No.	Designation	PU	Order No.
1	Retarding disc with retainer and twin electrode	1	32-90-10143
1	Diaphragm plate with retainer and twin electrode for WLE	1	47-90-21254
2	Twin electrode	5	32-50-20642
2	Twin electrode for WLE	5	33-50-10711
3	Nozzle	1	on request
4	Ignition cable 600 mm long	10	47-50-10385
5a	Nozzle stem for R20	1	32-90-11509
5b	Nozzle stem with oil preheater and cable for R20-V	1	52-90-21342
6	Impeller dia.146 x 62 mm	1	32-90-10139
7	Lower section, control box	1	31-90-22664
8	Control device TF830	1	37-90-10936
8	Control device DKW 972 for fan-assisted air heater	1	47-90-21731
9	photoelectric cell MZ 770S	1	47-90-21037
10	Burner cover	1	32-90-11742
11	Safety switch	1	32-90-11499
12	Motor 230 V / 50 Hz 180 W with cable	1	32-90-11507
13	Coupling for motor	10	37-50-11586
14	Solenoid valve coil for oil pump Danfoss BFP	1	57-90-10919
14	Solenoid valve coil for oil pump Suntec AS	1	47-90-21524
15	Oil pump Danfoss BFP 21 LG with connection parts	1	47-90-10834
15	Oil pump Suntec AS 47D with connection parts for R20-V-L	1	47-90-12644
16	Gasket 13 x 18 x 2	50	37-50-11293
17	Hose stem R1/4 x 6 LL	10	47-50-20862
18	Oil hose NW4 1200 mm long	1	47-90-10802
19	Gasket 10 x 14 x 2	50	37-50-10788
20	Pressure pipe stem dia. 1/8	5	37-50-20200
21	Pressure pipe for oil pump - nozzle stem	1	31-90-23246
22	Ignition transformer 2 x 5 kV / 20 mA with cable	1	47-90-20777
23	Positioning drive SA2-F with cable	1	57-90-11592
24	Plug unit, 7-pin, black/brown	5	37-50-11015
25	Socket unit 7-pin black/brown with cable	5	47-50-11839
26	Air flap for R20-L and R20-V-L	5	32-50-11595
27	Plastic housing insert	1	32-90-11744
28	Housing with burner pipe	1	32-90-11508
29	Fastening unit	10	32-50-11646
30	Sliding flange	1	32-90-10136
31	Flange gasket	5	32-50-10261

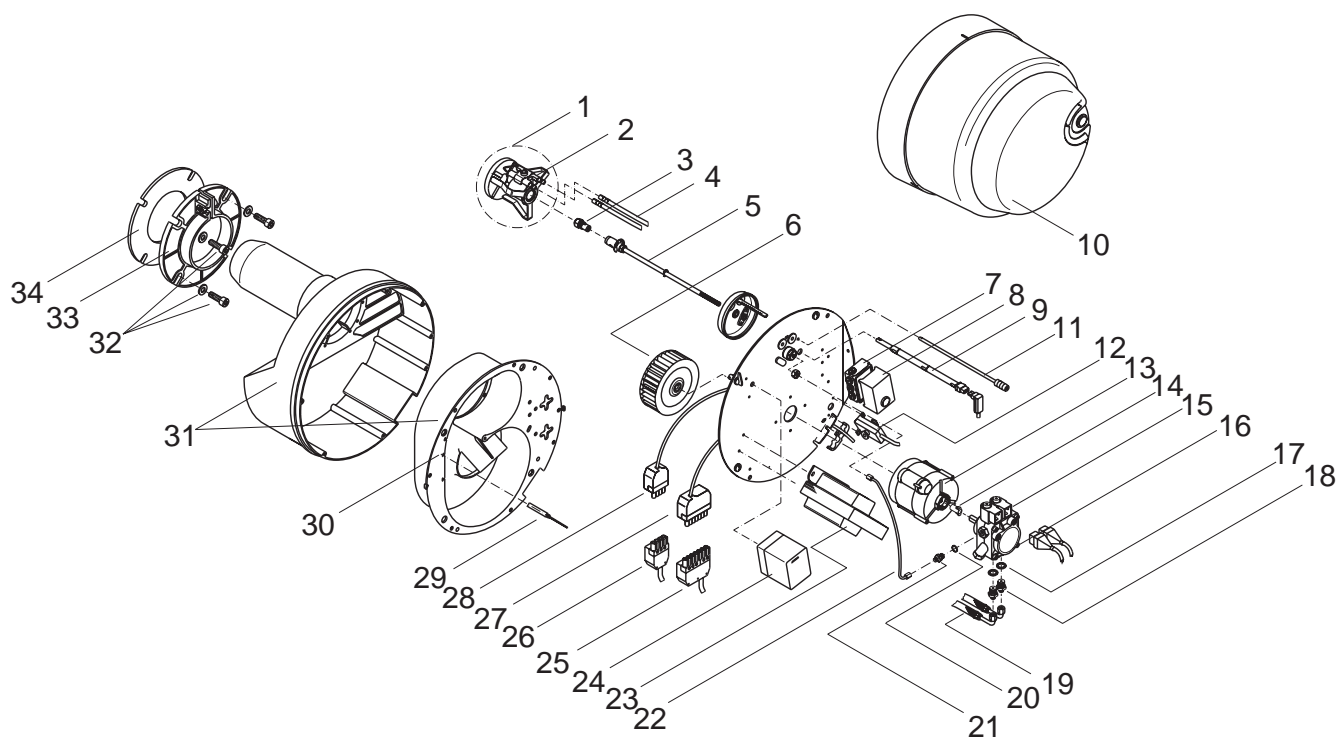
R20(-L)(-AE)



Seq. No.	Designation	PU	Order No.
1a	Retarding disc with retainer and twin electrode	1	32-90-10143
1b	Diaphragm plate with twin electrode for fan-assisted air heater	1	47-90-21254
2	Twin electrode	1	32-50-20642
2	Twin electrode for WLE	5	33-50-10711
3	Nozzle	1	on request
4	Ignition cable 600 mm long	10	47-50-10385
5	Nozzle stem	1	32-90-11509
6	Impeller dia.146 x 62 mm	1	32-90-10139
7	Lower section, control box	1	31-90-22664
8	Control device TF832	1	37-90-10955
8	Control device DKW 972 for fan-assisted air heater	1	47-90-21731
9	photoelectric cell MZ 770S	1	47-90-21037
10	Burner cover	1	32-90-11742
11	Safety switch	1	32-90-11499
12	Motor 230 V / 50 Hz - 180 W with cable	1	32-90-11507
13	Coupling for motor	10	37-50-11586
14	Solenoid valve for oil pump Suntec AT 2/3	1	47-90-22048
15	Oil pump Suntec AT 245 with connection parts	1	47-90-12645
16	Gasket 13 x 18 x 2	50	37-50-11293
17	Hose stem ND 6 dia.1/4	10	37-50-11348
18	Oil hose ND6 1200 mm long	1	47-90-11347
19	Gasket 10 x 14 x 2	50	37-50-10788
20	Pressure pipe stem dia. 1/8	5	37-50-20200
21	Pressure pipe dia. 20 f. oil pump Suntec- nozzle stem	1	31-90-23246
22	Ignition transformer 2 x 5 kV / 20 mA with cable	1	47-90-20777
23	Positioning drive SA2-F with cable	1	57-90-11592
24	Plug unit, 7-pin, black/brown	5	37-50-11015
25	Socket unit 7-pin black/brown with cable	5	47-50-11839
26	Air flap (for R20-L)	5	32-50-11595
27	Plastic housing insert	1	32-90-11744
28	Housing with burner pipe	1	32-90-11508
29	Fastening unit	10	32-50-11646
30	Sliding flange	1	32-90-10136
31	Flange gasket	5	32-50-10261

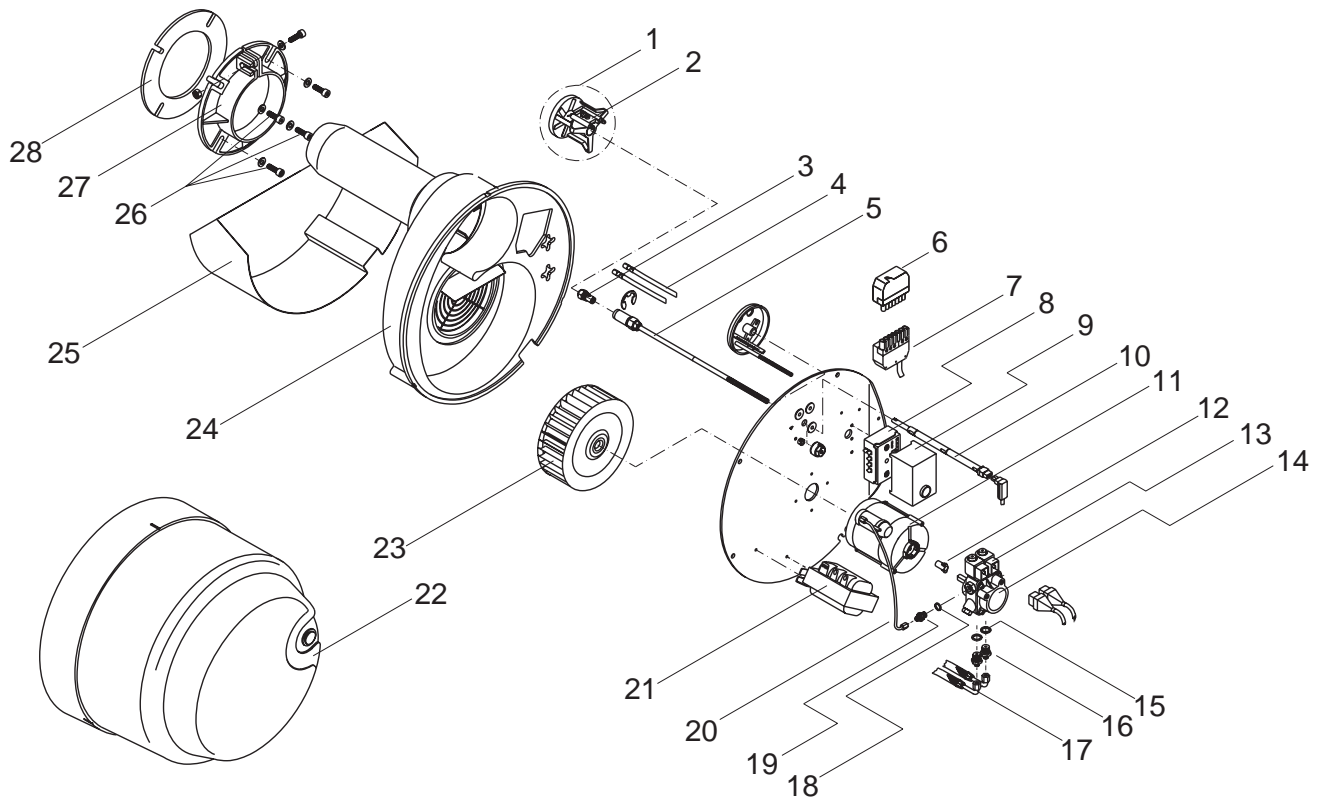


## R20-ZS-L



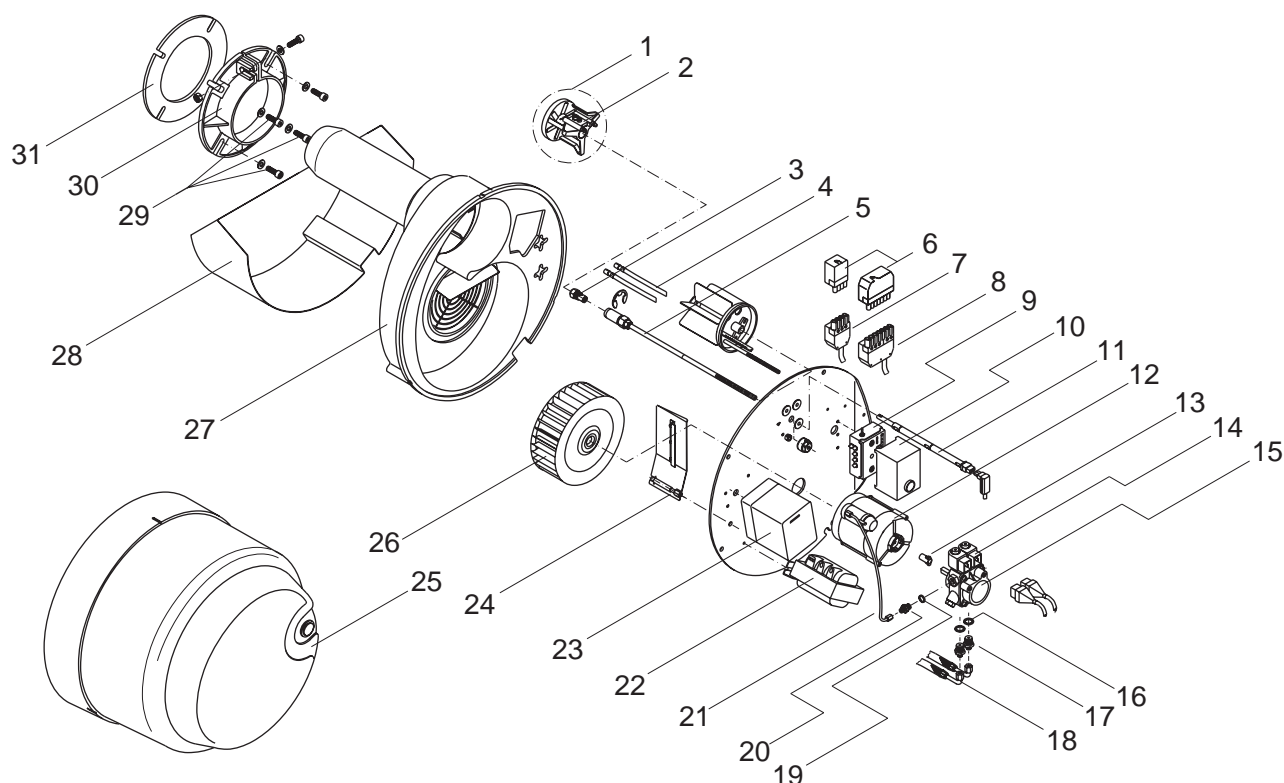
Seq. No.	Designation	PU	Order No.
1	Retarding disc with retainer and twin electrode	1	32-90-10143
1	Diaphragm plate with twin electrode (for fan-assisted air heater)	1	47-90-21254
2	Twin electrode	1	32-50-20642
2	Twin electrode for WLE	5	33-50-10711
3	Nozzle	1	on request
4	Ignition cable 700 mm long	1	47-90-10308
5	Nozzle stem	1	32-90-12650
6	Impeller dia.146 x 62 mm	1	32-90-10139
7	Lower section, control box	1	31-90-22664
8	Control device TF832	1	37-90-10955
8	Control device DKW 972 (for fan-assisted air heater)	1	47-90-21731
9	photoelectric cell MZ 770S	1	47-90-21037
10	Burner cover	1	32-90-11742
11	Measuring stem dia. 4 x 1 150 mm long	1	42-90-23254
12	Safety switch	1	32-90-11499
13	Motor 230 V / 50 Hz 180 W with cable	1	32-90-11507
14	Coupling for motor	10	37-50-11586
15	Solenoid valve for Oil pump Suntec AT 2/3	1	47-90-22048
16	Oil pump Suntec AT 245 with connection parts	1	47-90-12645
17	Gasket 13 x 18 x 2	50	37-50-11293
18	Hose stem ND 6 dia. 1/4"	10	37-50-11348
19	Oil hose ND 6 1200 mm long	1	47-90-11347
20	Gasket 10 x 14 x 2	50	37-50-10788
21	Pressure pipe stem dia. 1/8"	5	37-50-20200
22	Pressure pipe for oil pump -nozzle stem	1	31-90-23246
23	Ignition transformer 2 x 5 kV / 20 mA with cable	1	47-90-20777
24	Actuating drive STA 3.5 B0	1	47-90-24393
25	Plug unit, 7-pin, black/brown	5	37-50-11015
26	Plug unit 4-pin, black/green	5	37-50-11143
27	Socket unit 7-pin black/brown with cable	5	47-50-11243
28	Socket unit, 4-pin, green, with cable	5	47-50-11840
29	Air flap	1	32-90-10176
30	Plastic housing insert	1	32-90-11744
31	Housing with burner pipe	1	32-90-11508
32	Fastening unit	10	32-50-11646
33	Sliding flange	1	32-90-10136
34	Flange gasket	5	32-50-10261
No illu.	Connection cable for STA 3.5 B0	1	47-90-22458

R30-AE



Seq. no.	Designation	PU	Order No.
1	Retarding disc with retainer and twin electrode	1	33-90-10708
2	Twin electrode	5	33-50-10711
3	Nozzle	1	on request
4	Ignition cable 700 mm long	1	47-90-10308
5	Nozzle stem	1	33-90-10706
6	Socket unit 7-pin black/brown	5	37-50-20731
7	Plug unit, 7-pin, black/brown	1	37-50-11015
8	Lower section, control box	1	31-90-22664
9	Control device TF832	1	37-90-10955
9	Control device DKW 972 for fan-assisted air heater	1	47-90-21731
10	photoelectric cell MZ 770S	1	47-90-21037
11	Motor 230 V / 50 Hz 250 W	1	33-90-10335
12	Coupling for motor	10	37-50-11586
13	Solenoid valve for Oil pump Suntec AT 2/3	1	47-90-22048
14	Oil pump Suntec AT245 with connection parts	1	47-90-12645
15	Gasket 13 x 18 x 2	50	37-50-11293
16	Hose stem ND 6 dia. 1/4	10	37-50-11348
17	Oil hose ND 6 1200 mm long	1	47-90-11347
18	Gasket 10 x 14 x 2	50	37-50-10788
19	Pressure pipe stem dia. 1/8	5	37-50-20200
20	Pressure pipe f. oil pump -nozzle stem	1	31-90-23246
21	Ignition transformer cpl. as spare	1	47-90-20777
22	Burner cover	1	33-90-30204
23	Impeller dia.180 x 75 mm	1	33-90-10590
24	Housing with burner pipe	1	33-90-11926
25	Intake silencer	1	33-90-12009
26	Fastening unit	10	32-50-11014
27	Sliding flange	1	33-90-10681
28	Flange gasket	5	33-50-10191

## R 30-Z-L



Seq. No.	Designation	PU	Order No.
1	Retarding disc with retainer and twin electrode	1	33-90-10708
2	Twin electrode	5	33-50-10711
3	Nozzle	1	on request
4	Ignition cable 700 mm long	1	47-90-10308
5	Nozzle stem	1	33-90-10706
6	Socket unit 11-pin	1	37-90-11135
7	Plug unit 4-pin, black/green	5	37-50-11143
8	Plug unit, 7-pin, black/brown	5	37-50-11015
9	Lower section, control box	1	31-90-22664
10	Control device TF832	1	37-90-10955
10	Control device DKW 972 (for fan-assisted air heater)	1	47-90-21731
11	photoelectric cell MZ 770S	1	47-90-21037
12	Motor 230 V / 50 Hz 350 W	1	33-90-10335
13	Coupling for motor	10	37-50-11586
14	Solenoid valve for Oil pump Suntec AT 2/3	1	47-90-22048
15	Oil pump Suntec AT245 with connection parts	1	47-90-12645
16	Gasket AL 13 x 18 x 2	50	37-50-11293
17	Hose stem ND 6 dia. 1/4	10	37-50-11348
18	Oil hose ND 6 1200 mm long	1	47-90-11347
19	Gasket 10 x 14 x 2	50	37-50-10788
20	Pressure pipe stem dia. 1/8	5	37-50-20200
21	Pressure pipe for oil pump nozzle stem	1	31-90-23246
22	Ignition transformer cpl. as spare	1	47-90-20777
23	Actuating drive STA 3.5 B0	1	47-90-24393
24	Air flap	1	43-90-23298
25	Burner cover	1	33-90-30204
26	Impeller dia. 180 x 75 mm	1	33-90-10590
27	Housing with burner pipe	1	33-90-11926
28	Intake silencer	1	33-90-12009
29	Fastening unit	10	32-50-11014
30	Sliding flange	1	32-90-10681
31	Flange gasket	5	33-50-10191
No illu.	Connection cable for STA 3.5 B0	1	47-90-22458

## Service instructions/dimensions

### Boiler/burner conditioning

Precise boiler/burner conditioning is necessary for low-emission and energy-saving combustion. For this purpose a burner is assigned to the boiler in accordance with the working ranges (Page 28) and in consideration of the resistance at the heating gas face. The insertion depth of the burner tube is optimally adjusted by way of the sliding flange to the relevant combustion chamber.

### Smokestack connection

The prerequisite for perfect operation of the furnace is a correctly dimensioned smokestack. Dimensioning is effected in accordance with DIN 4705 in consideration of DIN 18160 and based on the boiler and burner outputs.

For operation on a sliding basis, provide smokestacks as per DIN 18160 part, group 1. The exhaust gas mass flow of the total rated heat output must be put in for the calculation. The effective smokestack height is counted from burner level. Furthermore, we refer you to the statutory building regulations of the individual German federal states.

Select a smokestack design so that the danger of condensation or of a cold smokestack inner wall is reduced to a minimum.



**For exact adjustment and stabilization of the smokestack draught we recommend the installation of a draught limiter.**

By this means:

- any draught fluctuations are equalized
- moisture in the smokestack is largely excluded
- stoppage losses are reduced.

Connection pieces should be introduced into the smokestack with a gradient of 30° or 45° viewed in flow direction. It is best to provide exhaust gas pipes with thermal insulation.

**Important:**For the refurbishment of existing installations, over-dimensioned smokestack cross-sections or unsuitable smokestacks are very often specified for NT operation etc. We recommend that you make an appraisal of the smokestack system together with the responsible local chimney sweep prior to installing the boiler plant so that suitable refurbishing measures can also be defined at an early stage for the smokestack (e.g. insertion of a stainless steel pipe, centrifuging of the flue, installation of an induced draught ventilator).

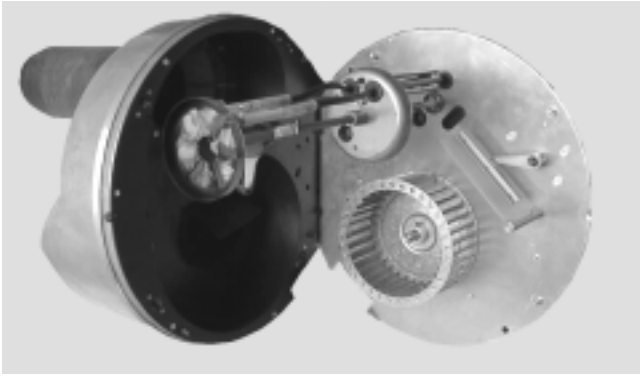
### Exhaust gas thermometer

For exhaust gas temperature monitoring the heating system should be equipped with an exhaust gas thermometer. The higher the exhaust gas temperature, the greater the exhaust gas loss.

Rising exhaust gas temperatures indicate increasing deposits that will reduce the degree of combustion efficiency.

In the event of an increasing exhaust gas temperature have the heating installation cleaned and readjusted by a skilled person.

R 20 / R 30



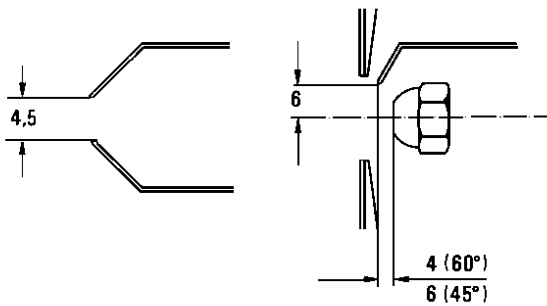
### Servicing position



**Risk of injury by fan wheel during activation in service position.**

- Release quick-release locks and detach base plate.
- Suspend base plate with retaining buttons in cross recesses of housing.

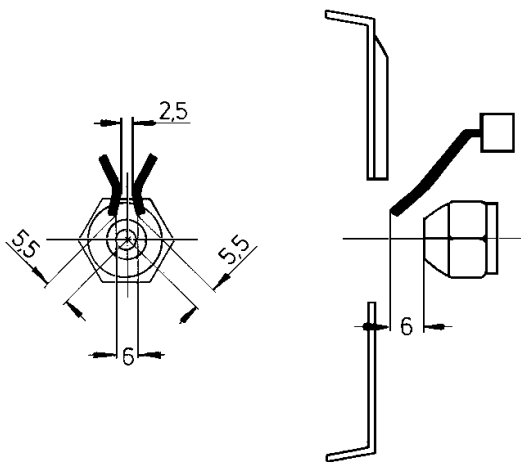
R 20



### Control dimensions for the ignition electrode

The ignition electrodes are preset. The specified dimensions (Fig.) are for control purposes.

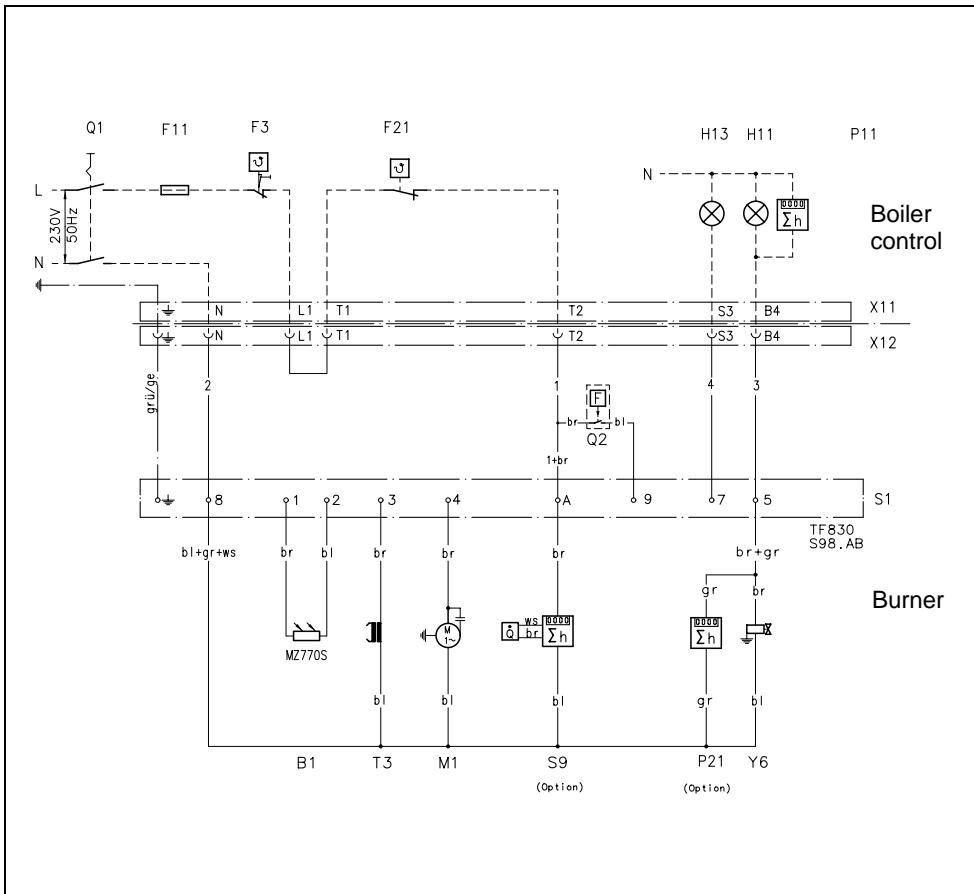
R 20-WLE / R 30(-WLE)



## Circuit diagram R20

The circuit diagrams are valid both for control devices TF 830/832 and for DKW 972.

### R20

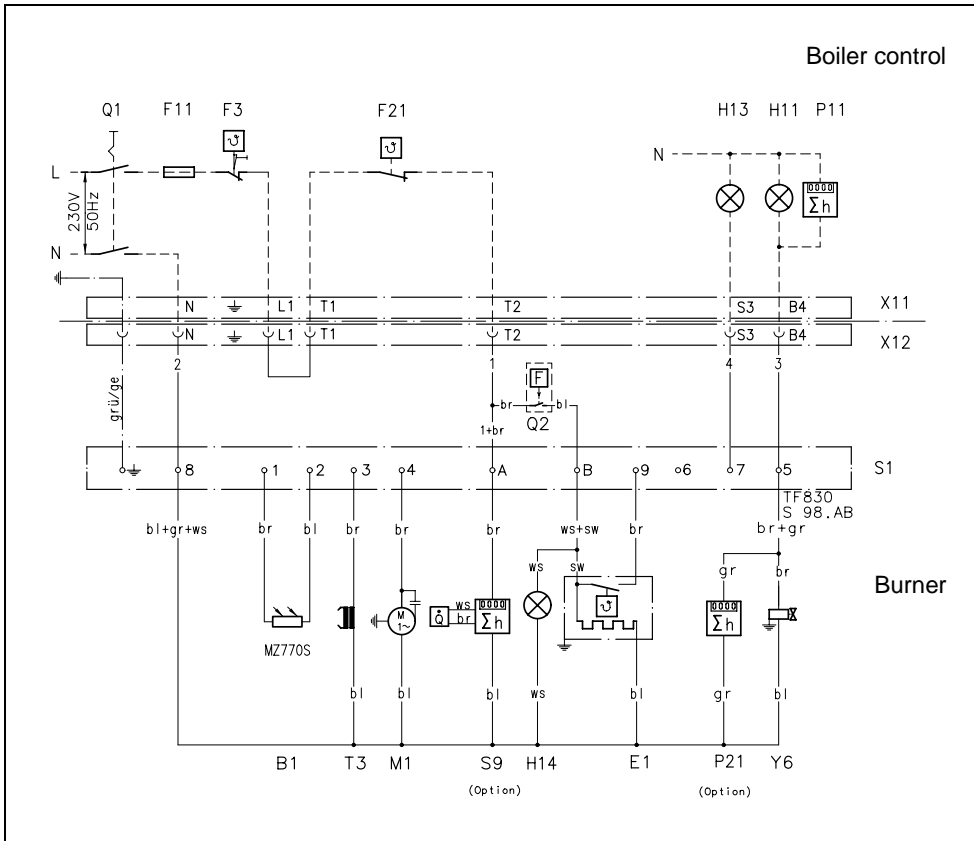


- A Loop terminal A
- B Loop terminal B
- B1 Flame failure controller
- E1 Preheater
- E2 Actuating drive air damper
- F11 Ext. fuse boiler control 6.3 AT/ max.10AF
- F21 Ext. temp. controller
- F3 Safety temperature limiter
- H11 Ext. operating lamp 1st stage
- H13 Ext. lamp fault message
- H14 Oil preheater control lamp
- M1 Burner motor
- P11 Ext. time meter 1st. stage
- P21 Time meter 1st stage (optional)
- Q1 Main heating switch
- Q2 Safety switch
- S1 Control device TF 830
- S9 OC / oil control (optional)
- T3 Ignition transformer
- X11 Plug unit boiler control (7-pin, bl/br)
- X12 Socket unit burner
- Y6 Oil solenoid valve

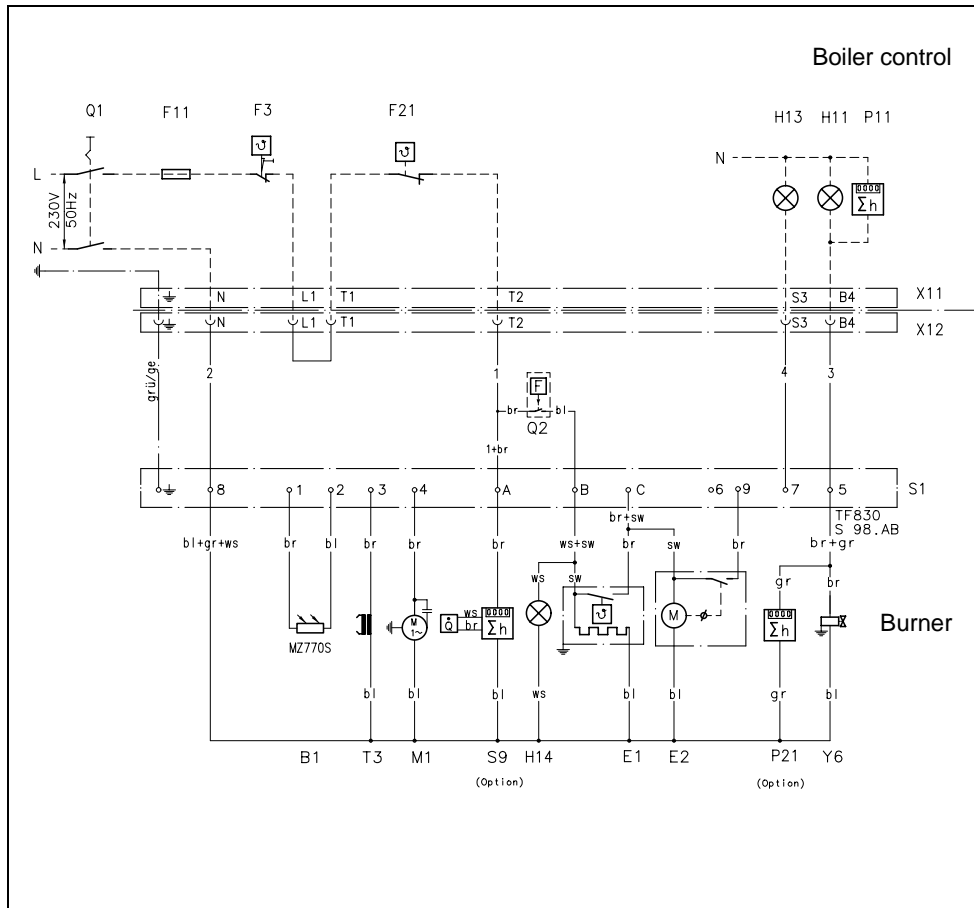
Colour key:

- bl = blue
- br = brown
- ge = yellow
- grü = green
- rt = red
- sw = black
- vio = violet
- ws = white

### R20-V



R20-V-L

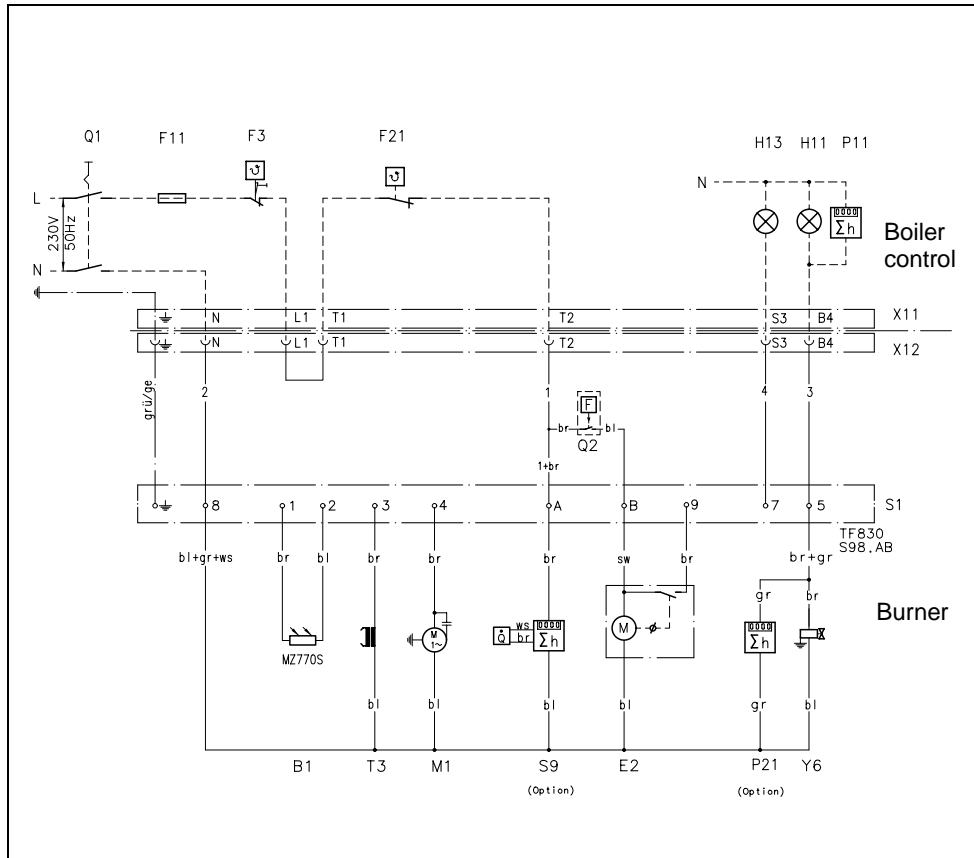


- A Loop terminal A
- B Loop terminal B
- B1 Flame failure controller
- C Loop terminal C
- E1 Preheater
- E2 Actuating drive air damper
- F11 Ext. fuse boiler control 6.3 AT/ max.10 AF
- F21 ext. Temp. controller
- F3 Safety temperature limiter
- H11 Ext. operating lamp 1st stage
- H13 Ext. lamp fault message
- H14 Oil preheater control lamp
- M1 Burner motor
- P11 Ext. time meter 1st stage
- P21 Time meter 1st stage (optional)
- Q1 Main heating switch
- Q2 Safety switch
- S1 Control device TF 830
- S9 OC / oil control (optional)
- T3 Ignition transformer
- X11 Plug unit boiler control (7-pin, bl/br)
- X12 Socket unit burner
- Y6 Oil solenoid valve

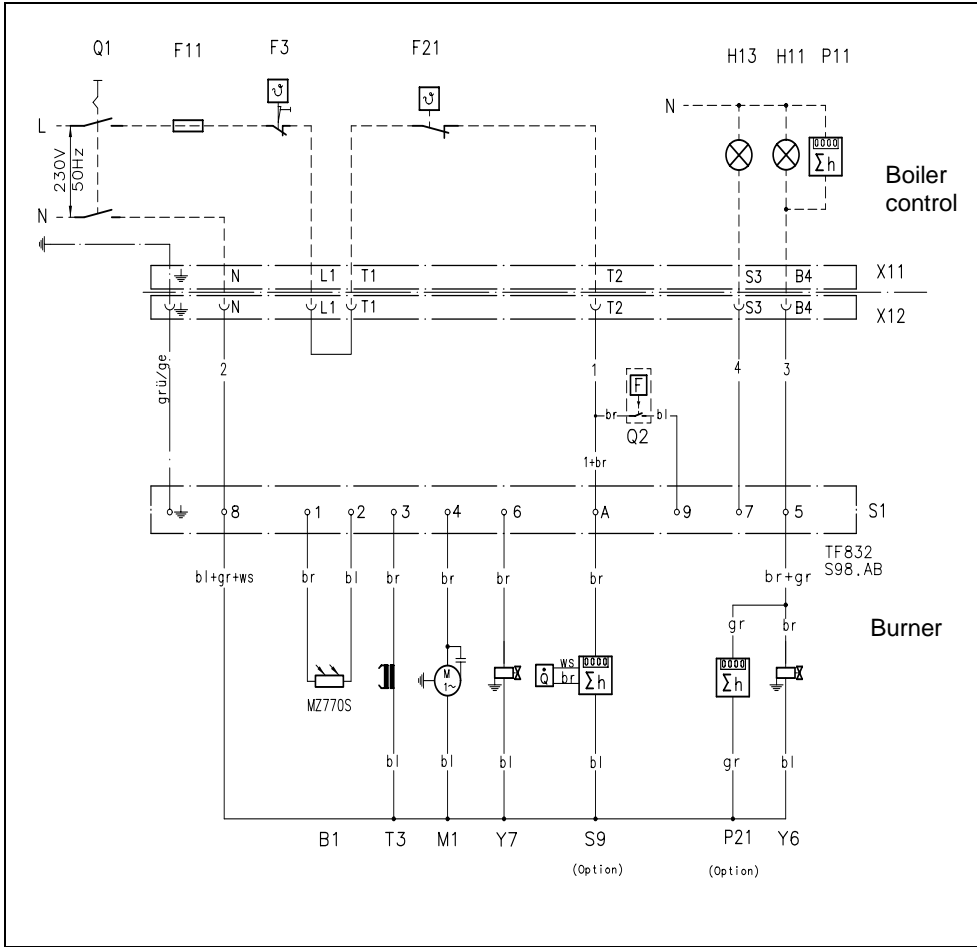
Colour key:

- bl = blue
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- rt = red
- sw = black
- vio = violet
- ws = white

R20-L



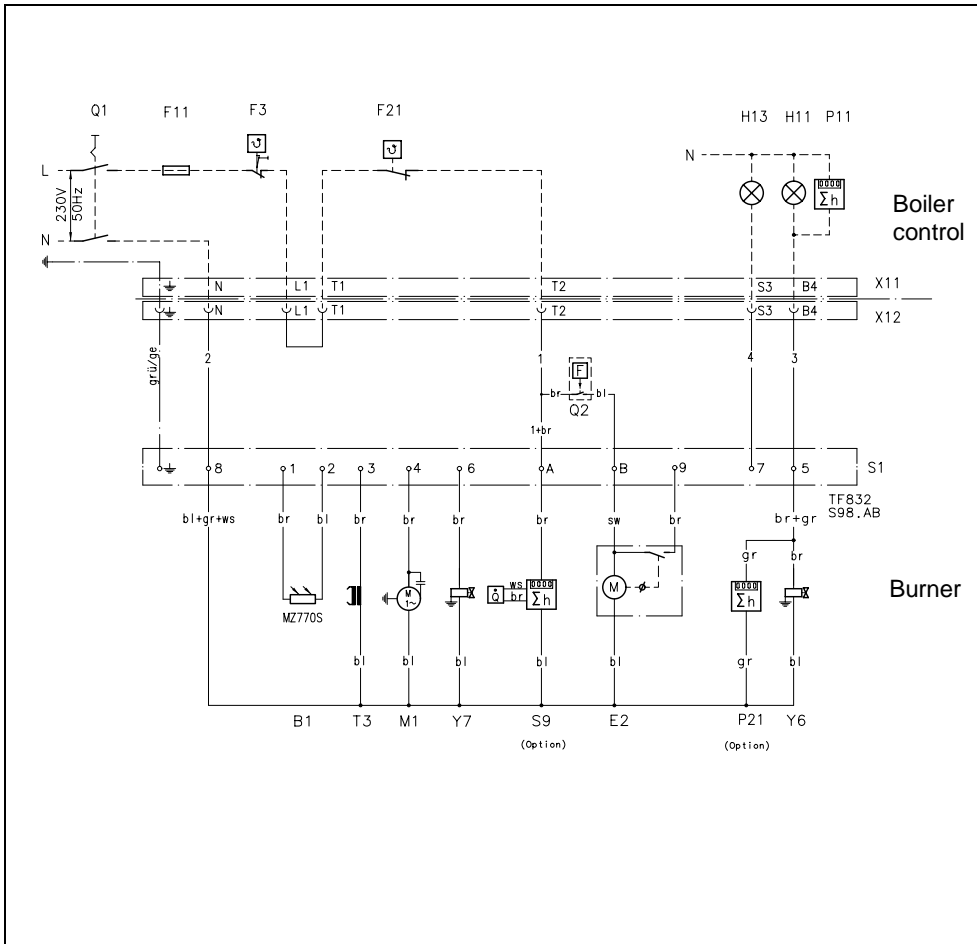
R20-AE



- A Loop terminal A
- B Loop terminal B
- B1 Flame failure controller
- E2 Actuator drive air damper
- F11 Ext. fuse boiler control 6.3 AT/ max.10AF
- F21 Ext. temp. controller
- F3 Safety temperature limiter
- H11 Ext. operating lamp 1st stage
- H13 Ext. fault indicator lamp
- M1 Burner motor
- P11 Ext. time meter 1st. stage
- P21 Time meter 1st. stage (optional)
- Q1 Main heating switch
- Q2 Safety switch
- S1 Control device TF832
- S9 OC / oil control (optional)
- T3 Ignition transformer
- X11 Plug unit boiler control (7-pin, bl/br)
- X12 Socket unit burner
- Y6 Oil solenoid valve
- Y7 Oil solenoid valve 2nd stage

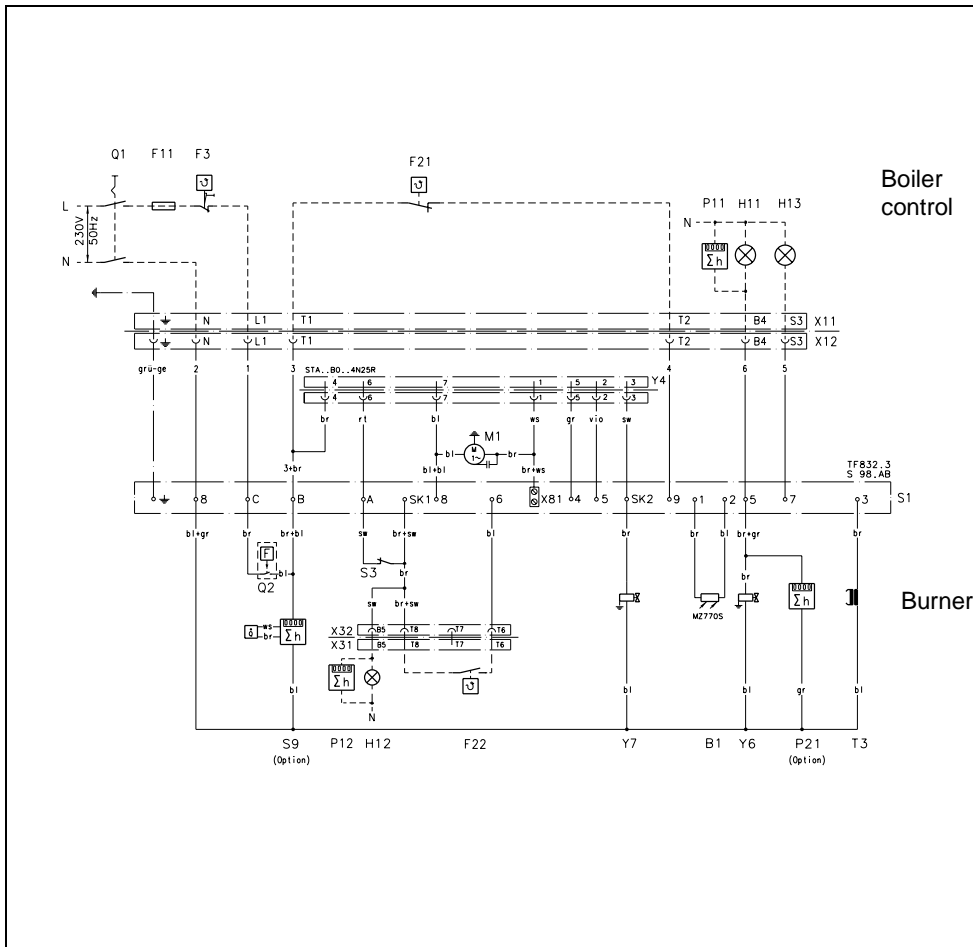
Colour key:  
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 br = brown  
 ge = yellow  
 grü = green  
 rt = red  
 sw = black  
 vio = violet  
 ws = white

R20-L-AE



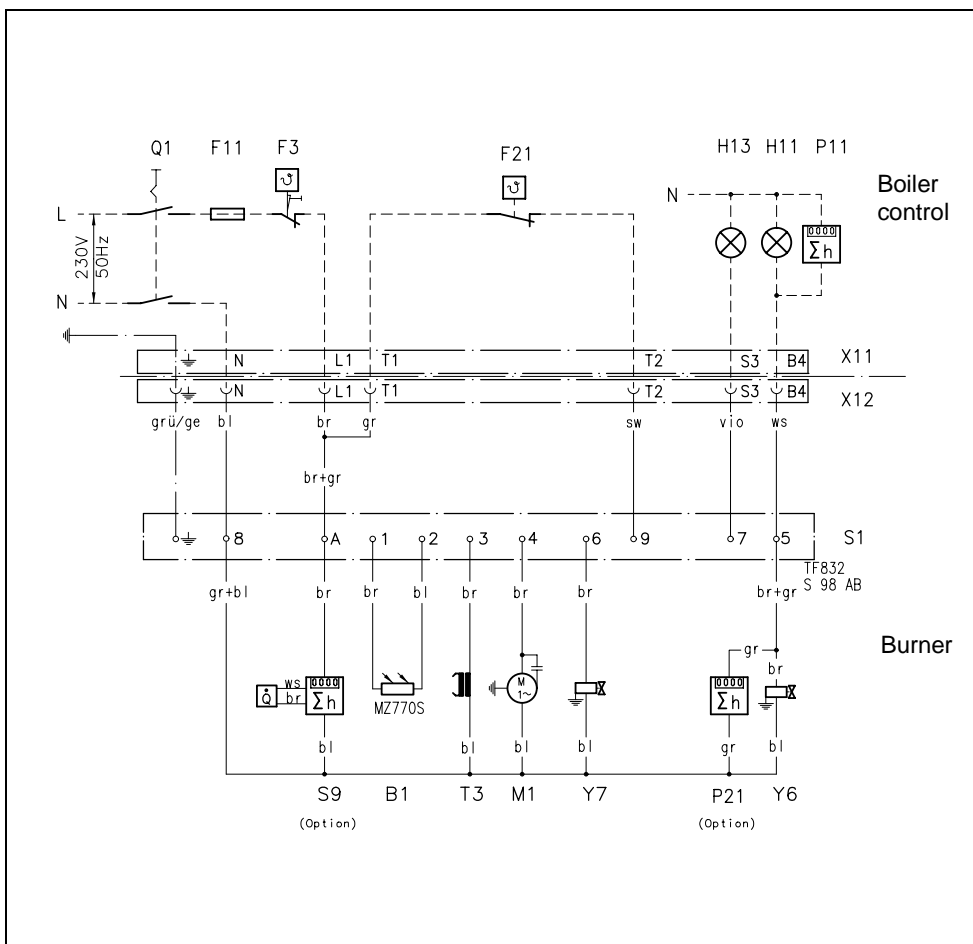


R20-ZS-L



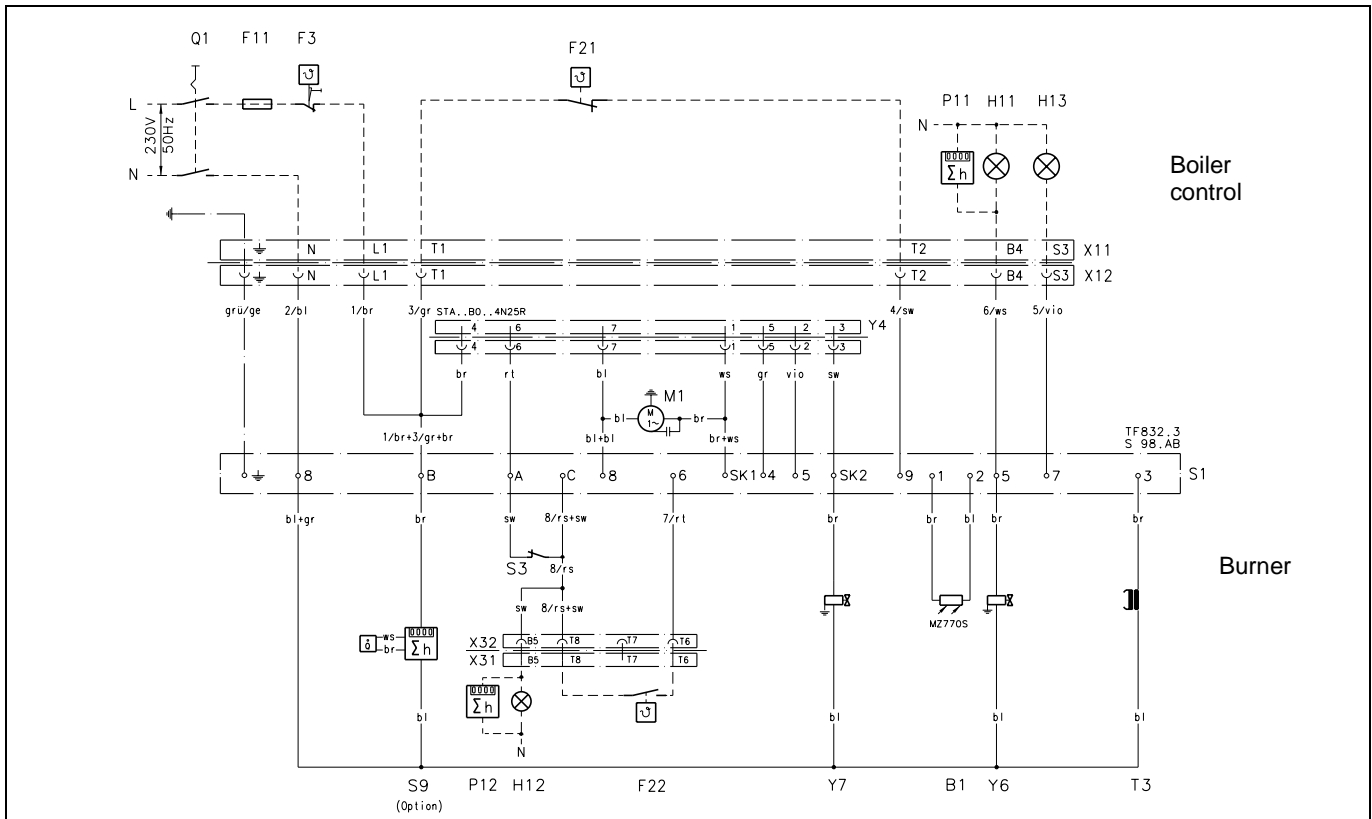
- A Loop terminal A
- B Loop terminal B
- B1 Flame failure controller
- F11 Ext. fuse boiler control 6.3 AT/ max.10AF
- F21 Ext. temp. controller
- F22 Ext. temp. controller 2nd stage
- F3 Safety temperature limiter
- H11 Ext. ON lamp, level 1
- H12 Ext. ON lamp, level 2
- H13 Ext. fault indicator lamp
- M1 Burner motor
- P11 Ext. time meter, level 1
- P12 Ext. time meter 2nd stage
- P21 Time meter (optional)
- Q1 Main heating switch
- Q2 Safety switch
- S1 Control device TF 832
- S3 Switch 1st/2nd stage
- S9 OC / oil control (optional)
- SK1 Loop terminal S1
- SK2 Loop terminal S2
- T3 Ignition transformer
- X11 Plug unit boiler control (7-pin, bl/br)
- X12 Socket unit burner (7-pin, bl/br)
- X31 Plug unit boiler control (4-pin, bl/green)
- X32 Socket unit burner (4-pin, bl/green)
- Y4 Actuating drive
- Y6 Oil solenoid valve
- Y7 Oil solenoid valve 2nd stage

R30-AE



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- bl = blue
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  - vio = violet
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R30-Z-L



Key:

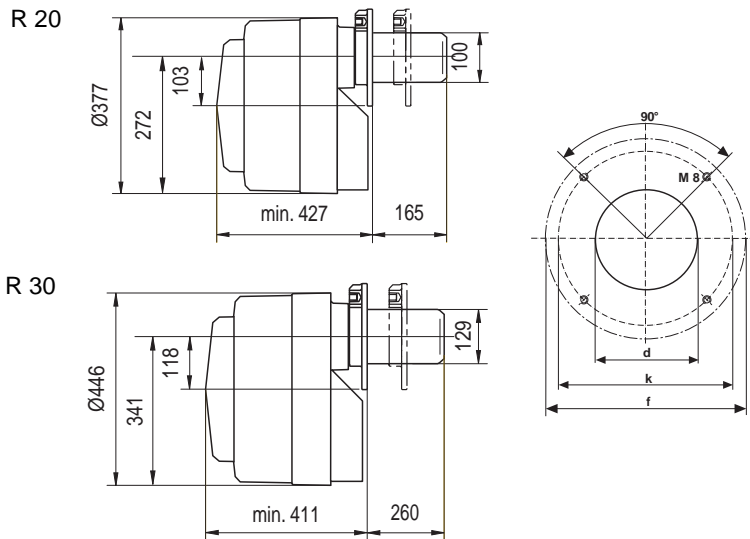
- |     |   |     |  |
|-----|---|-----|--|
| A   | Loop terminal A                           | T3  | Ignition transformer                       |
| B   | Loop terminal B                           | X11 | Plug unit boiler control (7-pin, bl/br)    |
| B1  | Flame failure controller                  | X12 | Socket unit burner (7-pin, bl/br)          |
| F11 | Ext. fuse boiler control 6.3 AT/max.10 AF | X31 | Plug unit boiler control (4-pin, bl/green) |
| F21 | Ext. temp. controller                     | X32 | Socket unit burner (4-pin, bl/green)       |
| F22 | Ext. temp. controller 2nd stage           | Y4  | Actuating drive                            |
| F3  | Safety temperature limiter                | Y6  | Oil solenoid valve                         |
| H11 | Ext. ON lamp, 1st stage                   | Y7  | Oil solenoid valve 2nd stage               |
| H12 | Ext. ON lamp, 2nd stage                   |     |  |
| H13 | Ext. fault indicator lamp                 |     |  |
| M1  | Burner motor                              |     |  |
| P11 | Ext. time meter, 1st stage                |     |  |
| P12 | Ext. time meter 2nd stage                 |     |  |
| P21 | Time meter (optional)                     |     |  |
| Q1  | Main heating switch                       |     |  |
| Q2  | Safety switch                             |     |  |
| S1  | Control device TF 832                     |     |  |
| S3  | Switch 1st/2nd stage                      |     |  |
| S9  | OC / oil control (optional)               |     |  |
| SK1 | Loop terminal S1                          |     |  |
| SK2 | Loop terminal S2                          |     |  |

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  - ws = white

## Troubleshooting

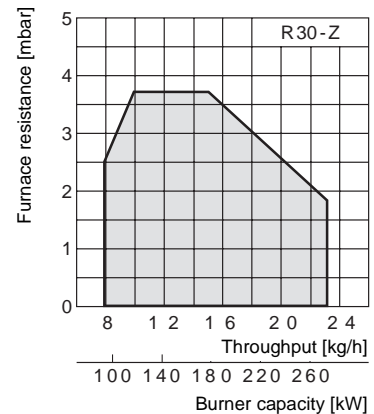
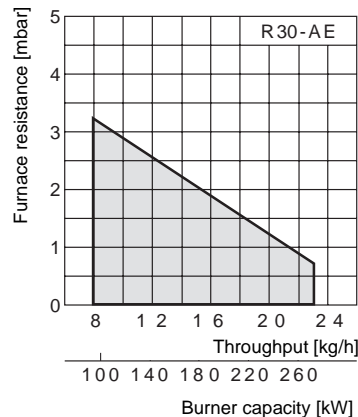
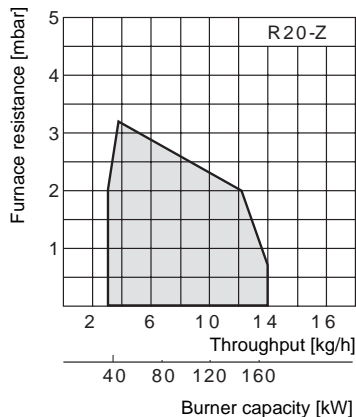
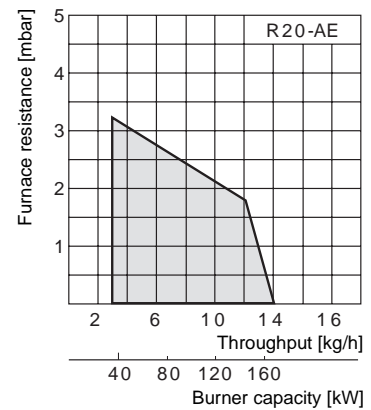
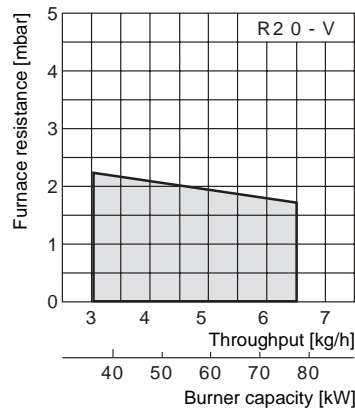
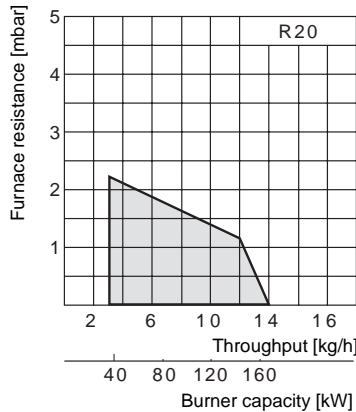
Fault	Cause	Elimination
Burner motor will not run	Fuse defective Safety thermostat locked Temperature of the controller adjustment exceeded Control box defective Motor defective Oil preheater: heater or thermostat enable defective Air valve positioning motor does not open or does not switch through Coupling motor/pump defective Mains voltage too low	Replace Unlock After temperature drop make new attempt to start Replace Replace Replace Replace Provide adequate mains voltage
Burner starts up (does not start up) and after expiry of the safety period switches to fault	a) With flame: Flame failure controller soiled, defective, not properly plugged in or not correctly adjusted Control device defective b) Without flame formation: No ignition  Burner receiving no oil: Valves, oil line closed Oil tank empty Filter soiled Oil line leaky Pump defective Foot-actuated valve leaky Nozzle soiled or defective Solenoid valve defective Filter in solenoid valve blocked External light source Coupling motor/pump defective Oil preheater blocked Mains voltage more than 15 % under rated value	Clean, replace, plug in correctly Replace Check ignition electrode and adjustment, ignition transformer and cable  Open Top up oil Clean Seal Replace Seal Replace nozzle Replace Clean filter and replace solenoid valve see Functional control of control device Replace Replace Provide adequate mains voltage
Flame extinguishes during operation	Oil supply consumed Nozzle filter blocked Oil filter or oil feed lines soiled Air inclusions Solenoid valve defective	Top up oil Clean nozzle filter or replace nozzle Clean filter and lines Check suction line and fittings Replace
Mixing unit very oily or has intense coke scaling	Wrong adjustment Wrong nozzle size Incorrect quantity of combustion air Furnace room not enough ventilated	Correct the adjustment measures Replace Readjust the burner Ensure sufficiently large aeration apertures
Burner operating intermittently	Oil throughput excessive	Install a control device with interception circuit
Radio and TV interference	Ignition flashover to the nozzle or baffle plate Weak capacity of antenna	Correct ignition electrode Order a control of the antenna Install a generator condenser or resistance type suppressors

## Burner overall dimensions / boiler connection dimensions (All dimensions in mm)



	R 20	R 30
Pipe outer dia. d	102	130
Hole circle dia. k	170(140-180)	170-200
Outside dia. f	194	220

## Working ranges



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