

R1

Edition June 2001
Technical changes in the sense of
product improvement reserved!

Oil



Overview

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General information

GIERSCH oil burners R1 are the result of many years of research and development work. Whilst our commitment is to supply you with the finest possible products, please note that for the best results, these oil burners must be properly calibrated during commissioning to meet local site conditions.

Care and accuracy when setting the burner will result in higher efficiency and lower fuel costs, to the satisfaction of our mutual customer.

To achieve low-emitting and economic combustion, the following information must absolutely be observed!

Tested and licensed according to DIN EN 267 for fuel oil EL according to DIN 51603.

Safety instructions

Observe the technical rules as well as the legal prescriptions and those of the building supervision when installing and operating the plant.

Installation, oil and flue gas connection, initial start-up, electrical connection as well as maintenance and overhaul work may only be performed by specialists.

For connecting the electrical supply, the VDE or ÖVE regulations and the regulations of the responsible electric supply company must be considered.

Work at electrical equipment may only be performed by a specialist in accordance with the relevant VDE and ÖVE prescriptions.



Danger of injuries at rotating fan on start-up in service position.

Maintenance

§ 9 of the heating installation decree requires regular maintenance of the plant to ensure a reliable and safe function of the appliance.

The appliance must be maintained yearly.

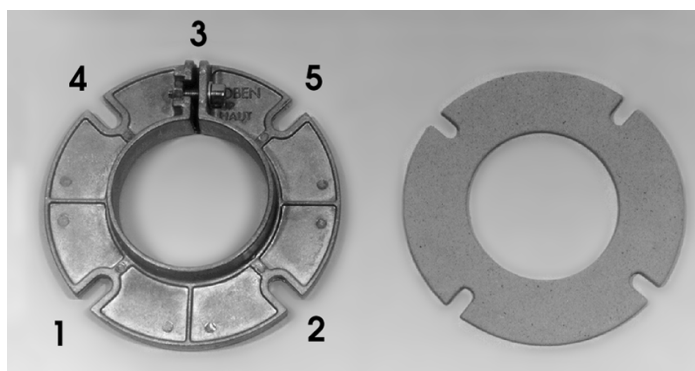
We recommend to conclude a maintenance contract with admitted specialists.

Key for code designation:

- B = with service hour meter
- L = with air damper
- OC = with Oil-Control
- V = with oil preheater
- WLE = for warm air heating with DKW 972 for R1-L

Installation of flange and burner

- Install the sliding flange and the gasket loosely on the boiler door.
- Slide burner into place.
- Observe the tightening sequence of the screws.
- Lift burner on tightening the screws.



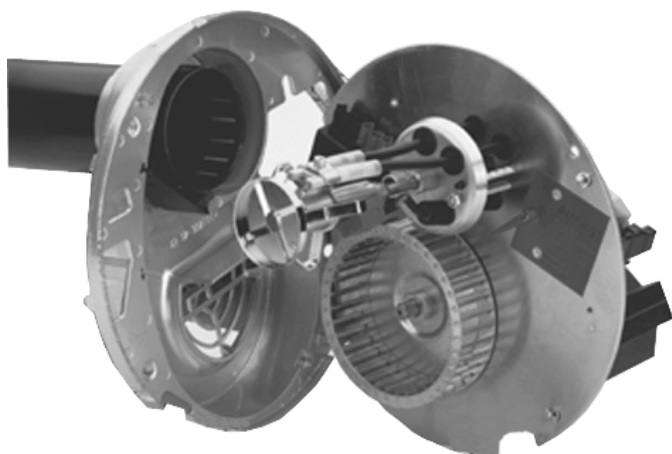
The sliding flange allows you to adjust the immersion depth of the burner tube perfectly to the corresponding combustion chamber.

Service position

- Loosen the snap closures and withdraw the base plate.
- Engage the buttons on the base plate into the crossed slots in the housing.

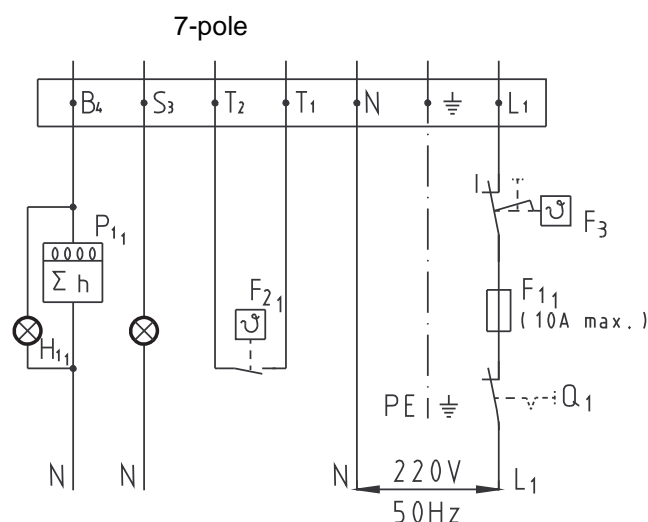


Danger of injuries at rotating fan on start-up in service position.



Connecting the electrical supply

- Wire the electrical supply to the plug-in plant as shown in the wiring diagram.
- OBSERVE THE LOCAL REGULATIONS!
- Protect the power supply with a 10 amp fuse.
- Use a flexible cable!



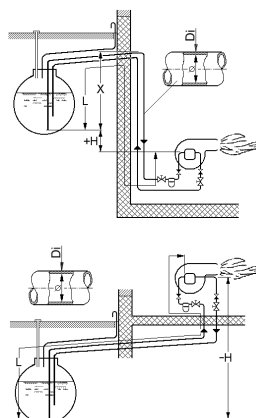
For explanation of switching symbols, see page 12

Oil connection

The table shows the maximum admissible lengths of supply lines. The values refer to fuel oil EL 4.8cSt and the inside diameter of the oil feed pipes. The calculated resistance for the supply lines include allowance for 4 elbows, 1 valve and 1 check valve for the resistance. The measure X should not exceed a length of 4 m, because of eventual degasifications of the oil.

- Connect the oil pump to the oil lines using the flexible couplings supplied.
- The pump should be connected with flow and return lines (two-pipe system).
- In case of tanks set at higher levels, the pump can be converted to a single pipe system.

Two-pipe system

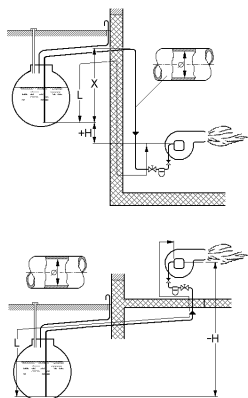


Pomp	Di [mm]	H [m]								
		4	3	2	1	0	-1	-2	-3	-4
Suntec or Danfoss	6	21	18	16	13	11	8	5	-	-
	8	67	58	50	42	34	25	17	9	-
	10	100	100	100	100	82	62	42	21	-

Installation

Oil pump

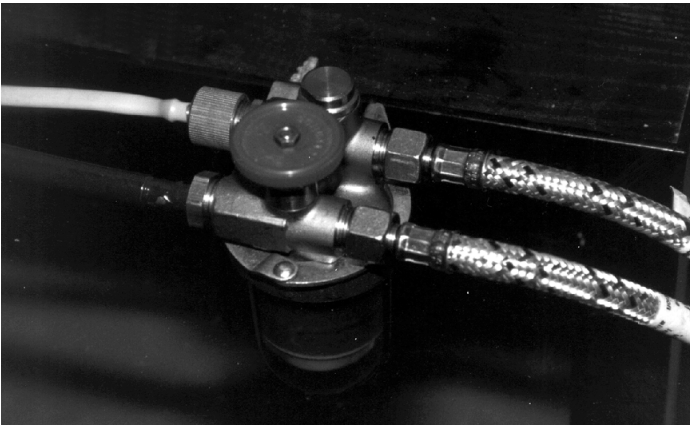
Single pipe system



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 mere single pipe operation, unscrew the deviation plug in the return opening ② and seal the return opening with a gasket and a metal plug.

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 up the plant.



Oil pump

The pump pressure can be adjusted according to the respective capacity (see adjusting table p. 14). For this:

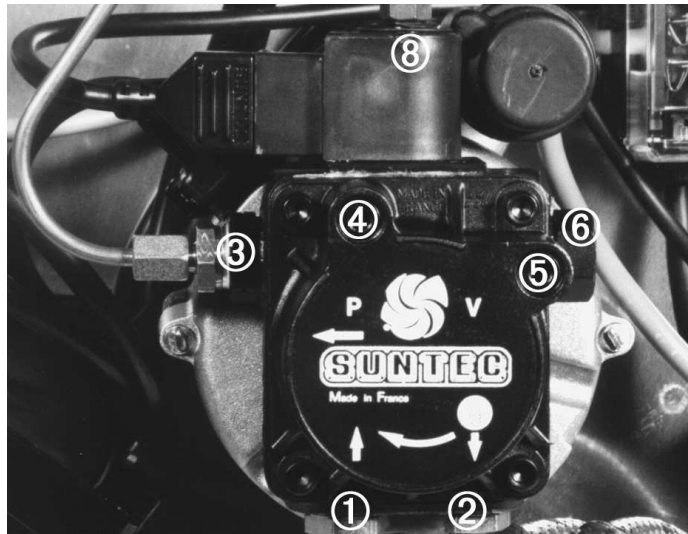
- Remove the sealing plug ④.
- Screw in the pressure gauge and adjust the pump pressure with the regulating screw ⑥ .

The pump pressures indicated on the adjusting tables are approximate values only and can be regulated to suit plant conditions, if necessary.

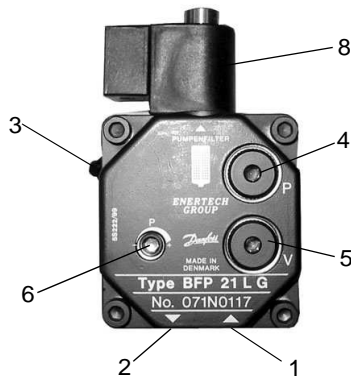
Attention: The full pump pressure at the manometer of the oil pump „Suntec AS47“ is achieved after oil release only!

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

Suntec:



Danfoss:



- Remove the sealing plug ④.
 - Screw in the pressure gauge and adjust the pump pressure with the regulating screw ⑥ .
- ① =Flow
 - ② =Return
 - ③ =Pressure tube connection
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 - ⑥ =Pressure adjustment
 - ⑧ =Magnetic valve

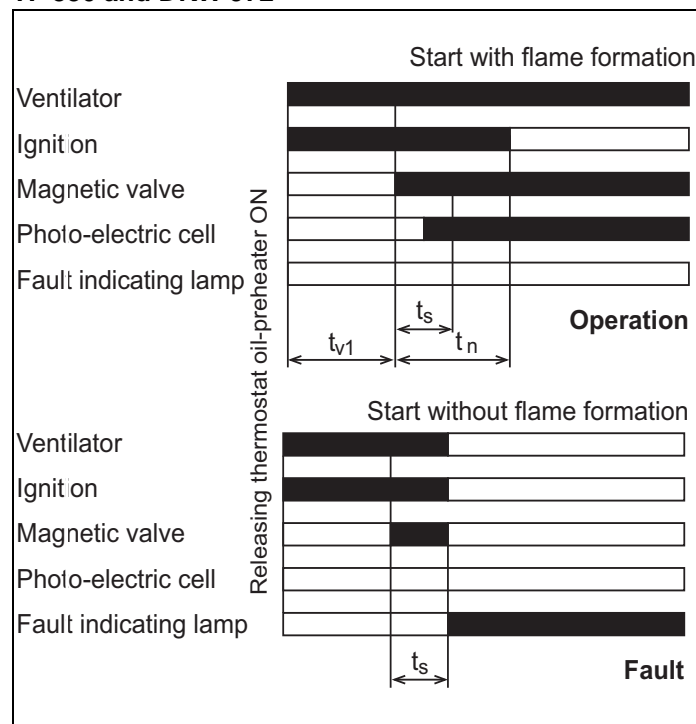
	R1 (-L)	R1-V (-L)
Factory setting:	13 bar	8 bar
We recommend:	10-15 bar	7-10 bar

Checking control box function - Flame control

After initial firing or burner maintenance the following checks must be carried out:

1. Restart burner with photo-electric cell covered:
control box must indicate a fault after end of the safety time.
2. Start burner with photo-electric cell exposed to outside light, e.g. fluorescent lamp, lighter, light bulb (daylight is insufficient!!):
control box must indicate a fault due to outside light within the pre-aeration time.
3. Normal start - when the burner is in operation, darken photo-electric cell during the post-ignition time:
(e.g. withdraw and cover photo-electric cell!)
TF 830: ignition must switch on, after end of the safety time the control box shows a fault.
DKW 972: the fuel supply should be shut off immediately and a post-aeration phase of approx. 60 sec. activated. Afterwards, the burner attempts to re-start and the control box should then perform a safety cut-out after expiry of the safety period.

TF 830 and DKW 972



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. The system restarts automatically after an interruption in the power supply. The system restarts automatically after an interruption in the power supply. The control box shows a fault if the photo-electric cell detects a light source during the pre-aeration time, after the safety time.



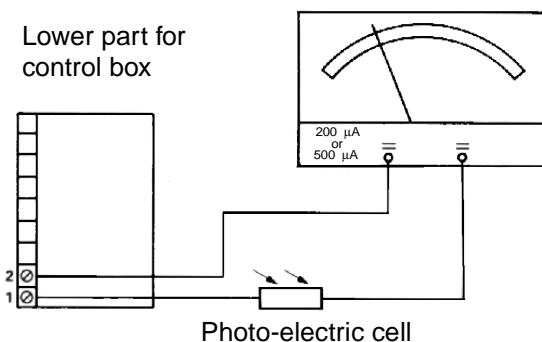
The control box may only be plugged or unplugged when the main switch is „OFF“ or when the 7-pole plug-in connector is disconnected, as 230 V are supplied to the lower part of the control box.

The photoresistor or the photo-electric cell must not be exposed to outside light (e.g. from an inspection glass or the afterglow of fire bricks). This is the only way to ensure a faultless function of the plant.

Satronic:	TF 830	DKW 972
t_{v1} = pre-ignition time + pre-aeration	12 sec.	20 sec.
t_s = safety time	10 sec.	5 sec.
t_n = post-ignition time	20 sec.	7 sec.
post-aeration after flame failure	non	60 sec.
Delay after switching-off fault	90 sec.	non
Photoresistor (photo-electric cell)	MZ 770	
min. photo-electric current [μA]	30	30

Measurement of photo-electric current (MZ 770)

At negative deflection of the measuring instrument exchange plug for testing line!



Adjust the measuring instrument to amp measurement for DC, measuring range up to approx. 200 μA !

Reasonable measuring accessories

digital measuring instrument part no. 59-20-50263

Start-up

Nozzle selection

Nozzle selection

The mentioned oil throughputs of the adjustment table (p. 14) refer to a viscosity of c. 1.8 cSt for pre-heated fuel oil and c. 4.8 cSt for fuel oil with c. 20°C. The dimension „A“ refers to a height of c. 200 m above sea level and to a room air temperature of c. 20°C and the usual furnace pressure. The nozzle recommendations of the nozzle selection table must strictly be adhered to, as optimum combustion values are obtained under these conditions only. We recommend Danfoss nozzles S.

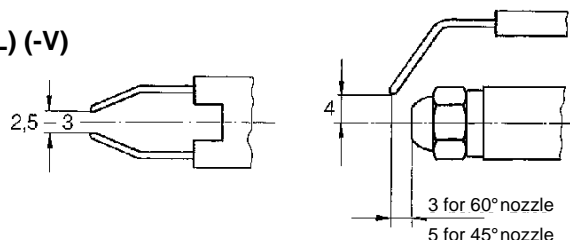
Insert nozzle

- Unplug the ignition cable.
- Loosen the screw at the baffle plate holder and remove the baffle plate.
- Unscrew the plastic plug from the nozzle holder.
- **DO NOT DAMAGE THE SEALING SURFACE!**
- Choose the nozzle using the adjustment table (p. 14) and screw into place.
- Remount the baffle plate up to the sealing ring resp. to the pre-heater and tighten the screw.
- Plug in ignition cable, insert base plate into housing and secure with snap closures.

Adjustment of the ignition electrodes

The ignition electrodes are works-regulated. Dimensions (Fig.) for checking only.

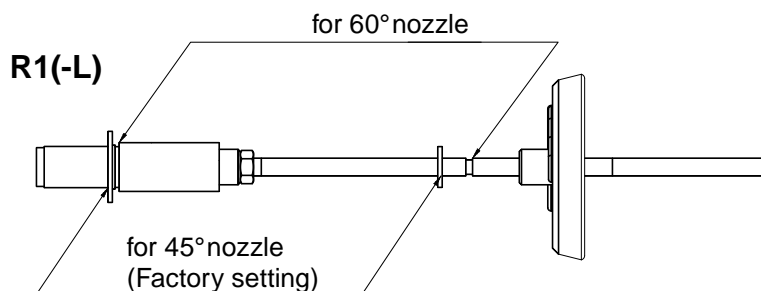
R1 (-L) (-V)



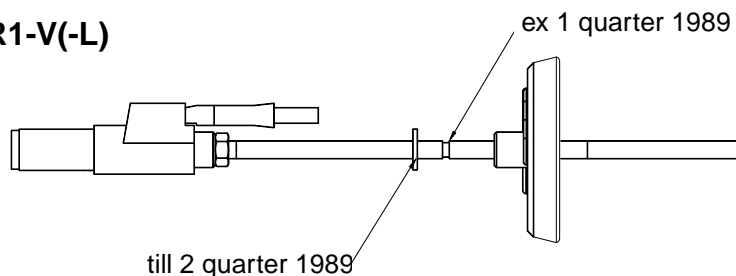
Air adjustment (measure „A“)

Dimension „A“ (see adjustment table p. 14) serves as a guide for burner adjustment. Dimension „A“ describes the position of the nozzle connection with baffle plate in the burner tube cone. Clockwise rotation of setting nut: The air throughput is increases, the CO₂ rate in the flue gas reduced. On measuring the CO₂ at the measuring point in the flue gas tube, the correct adjustment of „A“ is continuously checked.

For R1 (-L): Check position of the stops of baffle plate and air throttle. First slot behind the nozzle for spraying angle 45°, rear slot for 60°.



R1-V(-L)



Start-up (R1-L / R1-V-L)

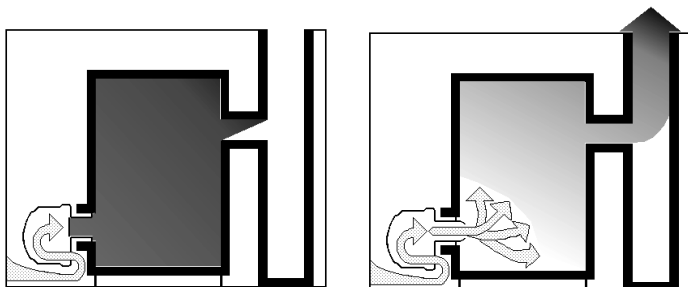
Start-up of burner: During standstill, the air damper is closed. After opening the air damper, ignition and pre-aeration (c.15 sec.) are switched on. Then the magnetic valve opens and releases the oil. Then the required pump pressure is set according to the adjustment table (page 14). After a short operation period, measurements (CO₂, soot and flue gas temperature) can be taken. If necessary, the air quantity can be readjusted by means of the setting nut.

Design - L (with actuator SA2-F)

For burners of design -L, an air damper prevents cooling of the furnace during standstill. The air damper of single-stage burners is controlled by the actuator SA2-F.

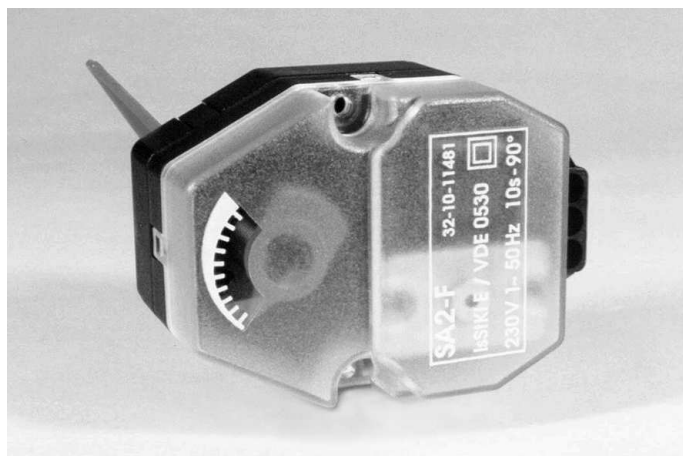
This actuator opens the air damper electrically by a lever. The air damper is closed by elastic force in the actuator. The air damper position („Open“ or „Closed“) can be recognized from the red indicating lever.

Do not actuate the red lever manually, as this may destroy the mechanism!



With Giersch saving automation:
the boiler keeps warm during the
heating periods!
⇒ Less energy consumption!

Without saving automation:
cold air cools the combustion chamber.



Design -V (with oil preheating)

Oil preheating is part of the burner firing programme and remains in operation until the burner is switched off by the controlling thermostat.

A light in the lower part of the control box shows when the preheater is in use. The burner has a cold start lock out that operates via a thermostat in the oil preheater, which releases the current to the control box only after heating up. The preheater is integrated into the nozzle holder and has a controlled heating capacity, which works via a PTC resistor.

Design -B (with service hour meter)

The service hour meter gives an exact record of the operating time. It is connected in parallel to the magnetic valve Y6. The service hour meter can be supplied with the burner, or as an add-on item at a later date.

Annual consumption can be worked out if the oil throughput per hour is known. The GIER SCH Oil-Control can be used to find out actual running costs.

The obtained values can be used e.g. to find out the annual consumption. Longer working phases increase the annual consumption.

Design - OC (with Oil-Control)

Measuring range:	1 to 40 l/h
Operating temperature:	0-60°C
Admissible pressure:	< 25 bar
Measuring accuracy:	± 2.5%
Display preservation after disconnection	c. 24 h
The display is extinguished, but all values remain stored and can be recalled after mains connection.	

This multifunctional appliance informs about oil consumption, the number of burner start-ups, the operating hours of the burner etc. and furthermore warns if the oil throughput is less than the set-point value (e.g. clogged nozzle). An early detection and remedy of the malfunction can prevent the burner from operating uneconomically and harmfully to the environment.

The Oil-Control must be operated within the throughflow, pressure and temperature limits shown above.

No special maintenance of the Oil-Control is required. The dirt catch-pan (installed in the pump resp. in the oil filter) is to be cleaned at the annual checking of the burner!




Function of the Mode button

By pressing the Mode button briefly, the individual displays can be recalled in sequence. The corresponding mode is displayed with a function symbol and / or the corresponding unit on releasing the button.

Design

Design - OC (with Oil-Control)

The following functions can be displayed:

Mode	Function	7 segment display	Unit
	Momentary consumption	6-digit 2 decimals (0000.00)	Oil quantity in litres per hour (l/h)
2. x	Momentary consumption stage 2	6-digit 2 decimals (0000.00)	Oil quantity in litres per hour (l/h)
◇	Adding counter (resettable)	6-digit 0 decimals (000000)	Oil quantity in litres (l)
✱	Totalisator	6-digit 0 decimals (000000)	Oil quantity in litres (l)
⌚	Total service hour meter	6-digit 0 decimals (000000)	Service hours (h)
┐┌	Number of burner start-ups	6-digit 0 decimals (000000)	Burner connections
2.⌚ x	Service hour meter stage 2	6-digit 0 decimals (000000)	Service hours stage 2 (h)
┐┌ 2. x	Number of burner connections	6-digit 0 decimals (000000)	Conne- ctions stage 2
 Service	Reduced throughput (see Service function)		

x= only for two-stage burners!

Resetting the adding counter

Mode ◇ allows to reset the adding counter:

=> *Keep button pressed for at least 10 sec.*

Press the button, after 5 sec. the displayed value flashes for 5 sec. Then the (old) value in the display stops flashing, now release the button, 0^L appears in the display.

Defining the set-point value of the momentary consumption

The set-point value of the momentary consumption is defined in the mode/function Momentary consumption:

=> *Press the button for at least 30 sec., but not longer than 32 sec.*

Press the button, after 25 sec. the displayed momentary consumption flashes for 5 sec. Release the button as soon as flashing stops. As acknowledgement, the service symbol and the momentary consumption as newly defined set-point value flash for 5 sec.

After modifying the burner capacity (Nozzle change, modification of the pump pressure etc.), the set-point value must be redefined as mentioned above. By this, the old set-point value is overwritten.

Service function

If the oil throughput is reduced by more than 10% (e.g. on gradually clogging nozzle, preheater etc.), the service symbol appears on the display.

As a prerequisite for this service function, the set-point value must be entered in advance (see Defining the set-point value of the momentary consumption) during correct burner operation.

Disabling the service function

Proceed as for defining the set-point value of the momentary consumption, but keep button pressed for more than 32 sec. This deletes the set-point value and the service symbol:

=> *Press the button for at least 32 sec.*

After releasing the button, the service symbol and the zero value flash on the display for 5 sec. as acknowledgement.

Adjustment boiler - burner

For less emission and economic combustion an exact adjustment of boiler - burner is necessary. Under consideration of the combustion chamber resistance, a burner will be chosen for the boiler in accordance with the working scopes (page 16).

Connection of the chimney

For optimum plant efficiency, the correct flue dimensions are needed. These parameters correspond to those in DIN 4705 and DIN 18 160 and the respective boiler and burner capacities.

In case of flues in continuous operation, according to DIN 18 160, Part 1 Group I, the flue gas volume of the total rated heat loading has to be considered when preparing the calculations. The effective chimney height starts from the burner level. Apart from that, installers must comply with all local and national building regulations.

When choosing the flue type, make sure that the risk of condensation resp. cold inner chimney wall is minimized.



We recommend the installation of a draught stabilizer.

Thus, it is ensured that:

- Variations in the draught are compensated
- Moisture in the chimney are minimized
- Standing losses are minimized

Insert a connecting piece into the chimney with a gradient in the direction of flow, of 30° to 45°. Insulate the waste gas tubes with lagging.

Important!

During the sanitation of an existing plant often overdimensioned chimney cross sections or unsuited chimneys for low temperature function etc. are indicated. It may be advisable to consult with the cleaning contractor before installation so that any changes needed to facilitate maintenance can be built into the original design (e.g. installation of a refined steel tube, centrifuge of the fire place, assembling of a suction blower, etc.).

Flue gas thermometer

The heating plant should have a flue gas thermometer to control flue gas temperature - the hotter the flue gas, the greater the heat loss.

High flue gas temperatures increase sediment, which reduces efficiency of the heating plant.

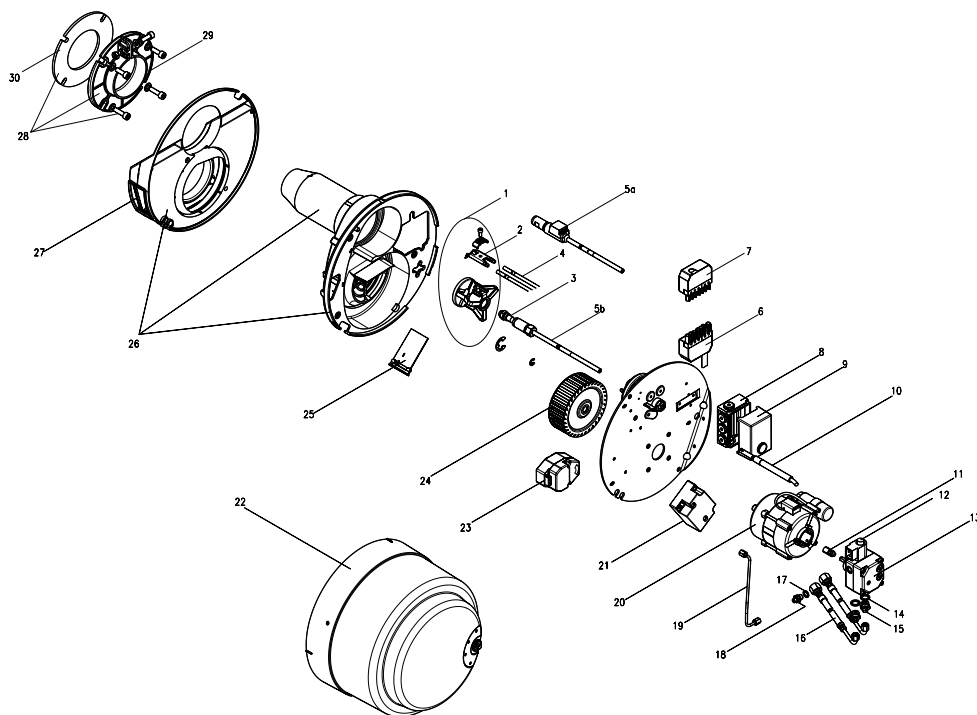
Increasing flue gas temperatures signal that the plant requires cleaning and resetting by qualified service staff.

Nominal heat capacity in kilowatts	Limits for flue gas losses %			
	installed before the 31.12.1982	installed from the 1.1.1983 on	installed from the 1.10.1988 on, in the area mentioned in Art. 3 of the Unification Treaty from the 3.10.1990 on, or considerably modified by the 31.12.1997	installed from the 1.1.1998 on
over 4 to 25	15	14	12	11
over 25 to 50	14	13	11	10
over 50	13	12	10	9

Service information

Explosion drawing and parts list R1(- V)(-L)

Explosion drawing and parts list R1(- V)(-L)



ZBZ_1-535

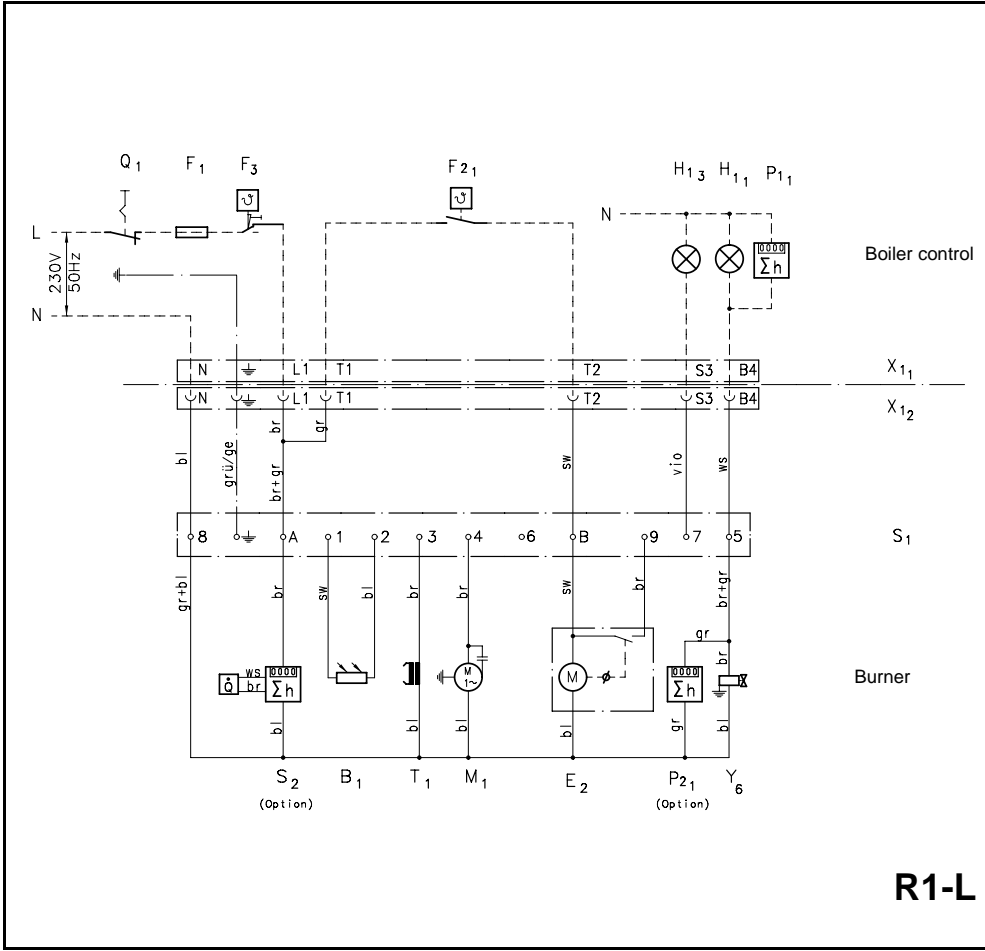
Pos.	Designation	PU ¹⁾	Art.-no.
1	Baffle plate with holder and twin electrode cpl.		31-90-20869
2	Twin electrode	5	31-50-11411
3	Nozzle		auf Anfrage
4	Ignition cable 440 mm of lengh.	2	47-50-26739
5a	Preheater incl. nozzle connection		51-90-20450
5b	Nozzle connection or R1		51-90-20972
6	Plug 7-pole black-brown	5	37-50-11015
7	Jack 7-pole black-brown		37-90-20731
8	Lower part of control box 9-pol.		31-90-22807
9	Control box TF 830.3		37-90-10936
9	Control box DKW 972 Mod. 05 50/60 Hz for WLE		47-90-21731
9	Control box DKW 972 as a substitute for MMO 872		47-90-22543
10	Photo electric cell MZ 770		37-90-10118
11	Couplinf for motor	10	37-50-11586
12	Solenoid valve for Oilpump Suntec AS, AT and ALE		47-90-12582
12	Solenoid valve for Oilpump Danfoss BFP		57-90-10919
13	Oilpump Suntec AS 47D cpl.		47-90-12644
13	Oilpump Danfoss BFP 21LG cpl.		47-90-10834
14	Sealing ring 13 x 18 x 2	50	37-50-11293
15	Hose nipple NW4 R1/4 x 6LL	10	47-50-20862
16	Oil hose NW4 1200 mm of lengh cpl.	2	47-50-10802
17	Sealing ring 10 x 14 x 2	50	37-50-10788
18	Pressure pipe nipple R1/8	5	37-50-20200
19	Pressure pipe R1 for Danfoss/Suntec		31-90-10929
20	Motor 230 V / 50 Hz 90 W with cable		31-90-11582
21	elektr. ignition transformer mod. 26/35		47-90-24469
22	Burner top		31-90-10102
23	Actuator SA2-F		57-90-11592
24	Fan ø120 x 42 mm		31-90-10106
25	Air damper	5	37-50-20971
26	Housing with burner tube for R1		31-90-11604
27	Integrated silencer		31-90-21660
28	Montage kit cpl. to make up for No. 28, 29, 30		31-90-11421
30	Flange gasket for R1	5	31-50-10104

PU = packing unit 1, 5, 10, 20, 50 pieces

Service information

Wiring diagrams

Wiring diagrams

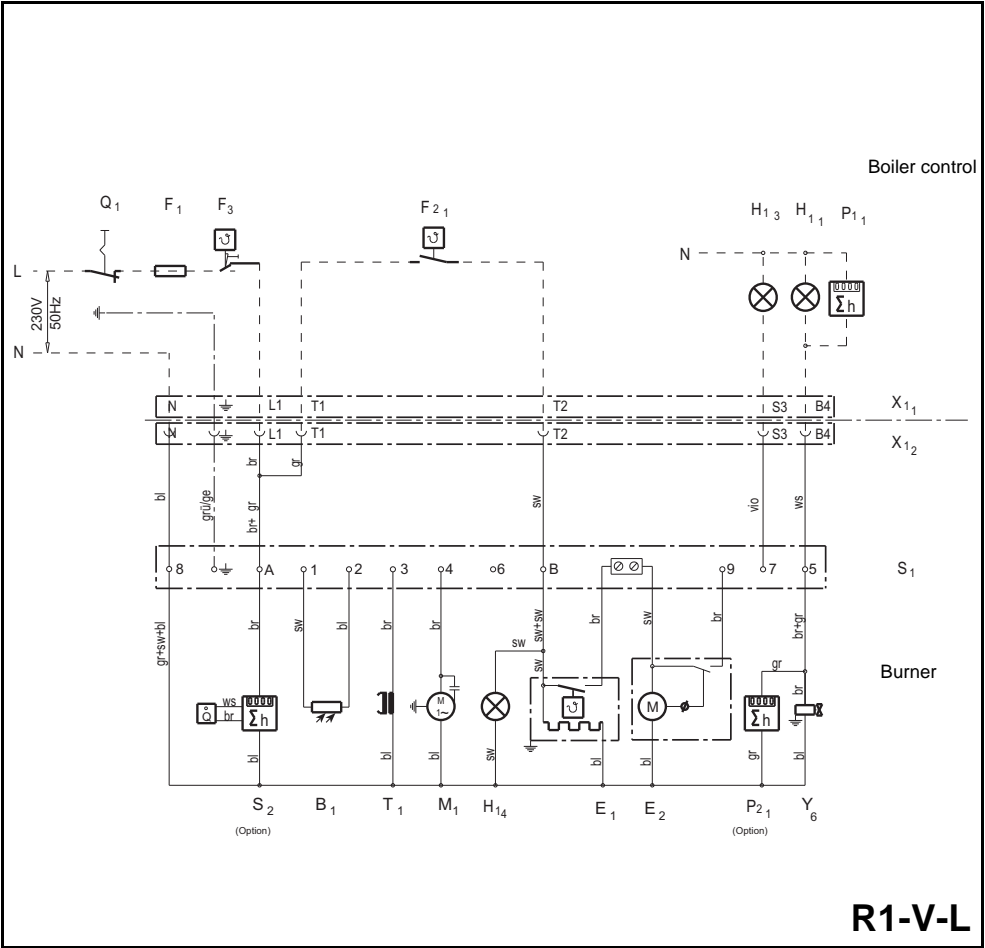


- B₁ Photo-electric cell
- E₁ Preheater
- E₂ Air damper actuator
- F₁ Ext. fuse
(max. 10 amp recommended)
- F₂₁ Ext. temperature controller
- F₃ Ext. safety temp. limiter
- H₁₁ Ext. pilot lamp
- H₁₃ Ext. lamp fault message
- H₁₄ Oil preheater pilot lamp
- P₁₁ Ext. service hour meter
- P₂₁ Service hour meter burner
(option)
- Q₁ Heating main switch
- M₁ Burner motor
- T₁ Ignition transformer
- Y₆ Oil magnetic valve
- X₁₁ Plug boiler control
- X₁₂ Jack burner
- S₁ Combustion unit Satronic
TF 830 / DKW 972
- S₂ Oil Control

PE = protective conductor

- bl = blue
- br = brown
- ge = yellow
- gr = grey
- grü = green
- sw = black
- vio = violet
- ws = whitr

R1-L



R1-V-L

Fault diagnosis

Establishment	Cause	Elimination
Burner motor does not run	Fuse defective Safety thermostat locked Temperature of the controller adjustment exceeded Control box defective Motor defective Oil preheater: Heating or releasing thermostat defective Servomotor does not open resp. switch through Coupling motor–pump defective Operating voltage to low	replace unlock after drop in temperature, renewed trial to start replace replace replace replace replace take care for enough operating voltage
Burner does (not) start and locks out after end of the safety time	a) with flame: Photo-electric cell contaminated, defective, not fitted or adjusted correctly Control box defective Viewing glass of mixing device contaminated b) without flame: no ignition Burner receives no oil: Oil line valves closed Oil tank empty Filter contaminated Oil line leaky Pump defective Foot valve leaky Nozzle contaminated or defective Magnetic valve defective Filter in magnetic valve clogged Outside light Coupling motor–pump defective Oil preheater clogged Operating voltage more than 15% under nominal value	clean, replace, refit replace clean check ignition electrodes and adjustment, ignition transformer and cables open refill with oil clean seal replace seal clean nozzle filter or replace nozzle replace clean filter or replace magnetic valve see Function control Control box replace replace take care for enough operating voltage
Flame extinguishes during operation	Oil supply used up Nozzle filter clogged Oil filter or oil flow lines clogged Air locks Magnetic valve defective	fill up with oil clean nozzle filter or replace nozzle clean filter and lines check suction line and fittings replace
Mixing device very much oiled or has very much coke deposit	Wrong nozzle size Incorrect quantity of combustion air Furnace room not enough ventilated	Wrong adjustment correct the adjustment measures replace readjust the burner take care of sufficiently big aeration apertures
Burner runs intermittently	Too much oil throughput	install a control box with checking device

Service information

Adjustment table

Adjustment table



The values given in the tables are only setting values for start-up. The system settings required in each case must be redefined if values such as boiler output, calorific value and altitude deviate.

A correction is required in any case.

Type / Burner capacity kW	Boiler capacity with η_k 92% kW	Nozzle spraying angle °S	Nozzle size Danfoss S gph	Pump pressure bar	Oil throughput- c. kg/h	Rough air adjustment Measure "A" mm
R1-L with integrated silencer						
17.5	16	60	0.40	10	1.5	5.5
20.5	19	60	0.40	14	1.7	6.5
24	22	60	0.50	12	2.0	8.5
28	26	60	0.55	12	2.4	9.5
32.5	30	60	0.60	13	2.7	11.5
36	33	45	0.65	11	3.0	12.5
41	37.5	45	0.75	13	3.5	14.5
47.5	43.5	45	0.85	14	4.0	17.5
53	48	45	1.00	12	4.4	18.5
R1-V-L with integrated silencer						
13	12	60	0.40	8	1.1	4.0
15	14	60	0.40	10	1.3	4.5
18	16.5	60	0.50	8	1.5	5.5
20	18.5	60	0.50	10	1.7	6.5
21.5	20	60	0.55	8	1.8	7.0
23	21	60	0.55	9	1.9	7.5
25	23	60	0.60	8	2.1	8.0
26.5	24.5	60	0.60	10	2.2	9.5
29.5	27	45	0.65	10	2.5	10.5
32.5	30	45	0.75	10	2.7	11.5
35.5	32.5	45	0.85	9	3.0	13
38.5	35.5	45	0.85	10	3.2	13.5
41	37.5	45	1.00	9	3.5	15
45	41.5	45	1.10	8	3.8	16
48.5	44.5	45	1.10	9	4.1	16.5
51.5	47.5	45	1.10	10	4.3	18.5
53	49.5	45	1.25	10	4.6	20.5

Declaration of conformity

We declare that the oil fan burners GIER SCH R1 comply with the basic requirements of the following directives:

- „Elektromagnetic Compatibility" according to directive 2004/108/EEC
- „Machine Directive" according to directive 2006/42/EEC together with DIN EN 60204-1
- „Efficiency Directive" according to directive 2006/42/EEC together with DIN EN 267 / Ed. 10.91

Technical data

	R1 (-L)	R1-V (-L)
Burner capacity	1.2 - 4.5 kg/h =14 - 53 kW	1.0 - 4.5 kg/h =12 - 53 kW
recommended boiler capacity	12.5 - 48 kW 11-41 Mcal/h	11 - 48 kW 9.5-41 Mcal/h
Voltage	230 V/ 50 Hz	230 V/ 50 Hz
max. current consumption	1.9 A	2.7 A
Motor	90 W	90 W
Oil pump (gear flow capacity)	54 l/h	54 l/h
Weight in kg	12	12
Noise emission in dB (A)	62	62

Burner construction measures

All measures in mm.

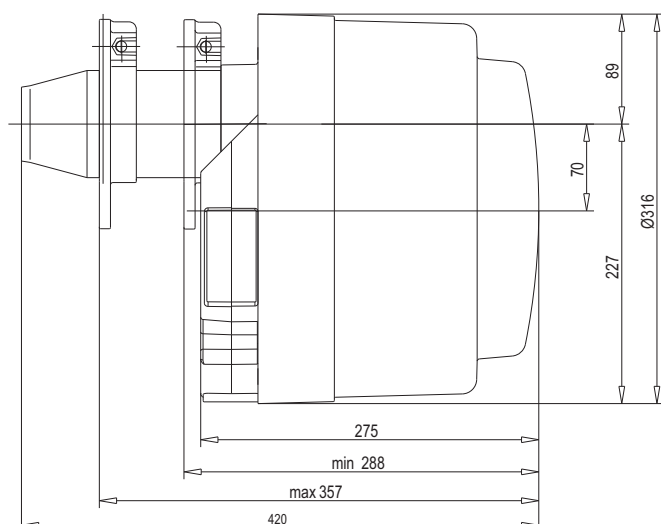
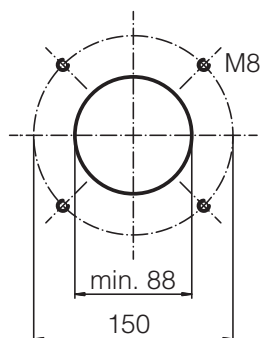


Fig. R1(-V) (-L)

Boiler connection measures

All measures in mm.



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Working ranges

TÜV-tested working ranges according to DIN EN 267.
The working ranges refer to a height of approx. 200 m above sea level and a room temperature of approx. 20°C.

