

# Heat exchangers

## Immersion heater

**Rexroth**  
Bosch Group

**AB-E 32-10**

2002-11-14

Replaces: Issue 2000-04-05

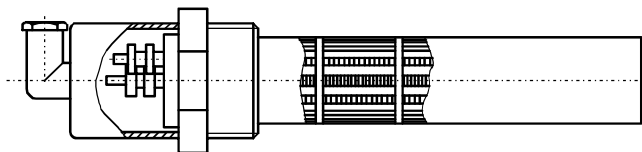
### 1 Area of application

Oil heaters to this standard are suitable for heating pressure fluids.

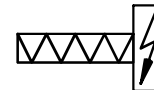
Table 1

<b>Mineral oil</b>	Mineral oil	HLP	to DIN 51524
	Emulsions	HFA-E	to DIN 24320
<b>Fire resistant pressure fluids</b>	Water emulsions	HFC	
	Phosphate ester	HFD-R	to VDMA 24317
	Organic ester	HFD-U	
<b>Fast bio degradable pressure fluids</b>	Triglyzerid (Rape seed oil)	HETG	
	Synthetic ester	HEES	to VDMA 24568
	Polyglycole	HEPG	

### 2 Model



Symbol



### 3 Type code

Example: **Heizkoerper AB32-10 / 3 D 400**

**AB standard**

**Power code** (see table 2)

**Phase code**

Single phase (230 V) / double phase (from 400 V) = E

Three phase (not possible with power code 4) = D

**Voltage**

E.g. 400 V = 400

Table 2

Power code	Power (W)	Heating area loading (W/cm <sup>2</sup> ) 1)	Installation possible in reservoir to AB-E 40-40 to AB-E 40-44
1	1000	2	from DN 63
2	2000		from DN 160
3	3000		from DN 250
4	370	0,7	from DN 63
5	740		from DN 160
6	1080		from DN 250

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Technical responsibility: BRI-AB/PMT

#### 4 Ordering example/match code

Heat exchanger, power code 1, phase code D, voltage 400 V:  
**HEIZKOERPER AB32-10/D400** Material no. **R900024794**

#### 5 Dimensions and selection table

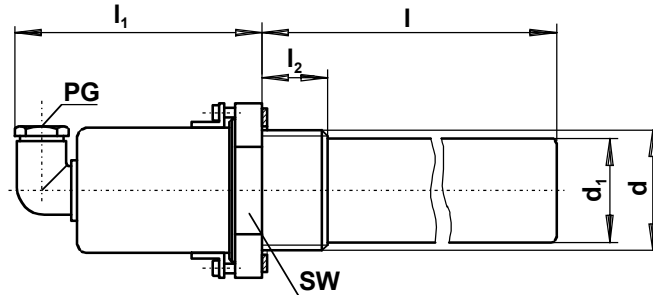


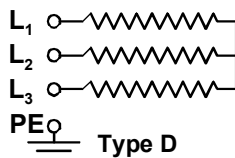
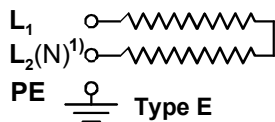
Table 3

Power code	Dimensions							Designation: Heizkoerper	Material no.
	d	d <sub>1</sub>	l	l <sub>1</sub>	l <sub>2</sub>	SW	PG		
1	G 1 1/2	42	400	ca. 96	25	60	11	AB32-10/1 D 400	R900024794
2	G 2	52	650	ca. 106	30	70	16	AB32-10/2 D 400	R900008368
3			950					AB32-10/3 D 400	R900008369
4	G 1 1/2	42	400	ca. 96	25	60	11	AB32-10/4 E 230	R900024795
5	G 2	52	650	ca. 106	30	70	16	AB32-10/5 D 400	R900024796
6			950					AB32-10/6 D 400	R900024797

#### 6 Technical data

Working pressure: max. 2 bar  
 Installation: horizontal  
 Voltage: standard to DIN IEC 38  
 special voltage on request  
 Material: housing = steel  
 cover = steel zinc plated  
 Insulation: IP 65  
 Weight: power code 1 + 4 = 1,8 kg  
 2 + 5 = 3,0 kg  
 3 + 6 = 4,1 kg

Connection:



1) N = 230 V, L<sub>2</sub> = upto 400 V

## 7 Heating area loading

Table 4

Pressure fluid		Heating are loading (W/cm <sup>2</sup> )	
		non moving area	moving fluid (~2 m/s)
Mineral oil	HLP	0,7	2
Oil-in-water-emulsion	HFA		0,7
Water glycole	HFC		2
Phosphate ester	HFD-R		0,7
Organic ester	HFD-U		
Triglyceride	HETG		
Synthetic ester	HEES		
Polyglycole	HEPG		

## 8 Calculations

### 8.1 Heating

When heating the following applies:  
(taken heating time into account)

$$P_w = \frac{V_B \cdot c \cdot \rho (T_1 - T_2)}{Z}$$

$P_w$  = Heat input in kW

$V_B$  = Oil quantity in reservoir to be heated in dm<sup>3</sup>

$c$  = Specific heat in kWh/kgK 2)

$\rho$  = Density in kg/dm<sup>3</sup> 2)

$T_1$  = Required fluid temperature in °C

$T_2$  = Outlet temperature (usually the same as the ambient temperature) in °C

$Z$  = Heating time in h

2) For values c and p see table 5

When calculating the heat input, it has to be taken into account that heat will be lost to the surrounding area during heating.

Table 5

Pressure fluid		Specific heat c (kWh/kgK) 3)	Density $\rho$ (kg/dm <sup>3</sup> ) 3)
Mineral oil	HLP	0,00052	0,88
Öl-in-water-emulsion	HFA	0,00116	0,99
Water glycole	HFC	0,00092	1,08
Phosphate ester	HFD-R	0,00035	1,25
Organic ester	HFD-U	0,00057	0,92

3) The values stated are approx. For exact values the fluid manufacturer should be contacted.

### 8.2 Temperature maintenance

To maintain a constant temperature in a system due to low ambient temperature the following applies:

$$Q_w = K \cdot A (T_1 - T_2)$$

$Q_w$  = Heat input in kW.

$K$  = Heat conductivity of the radiating surfaces in kW/m<sup>2</sup>K.

$A$  = Heat radiating from surfaces of reservoirs, components and pipework in m<sup>2</sup>.

$T_1$  = Required fluid temperature in °C.

$T_2$  = Ambient temperature in °C.

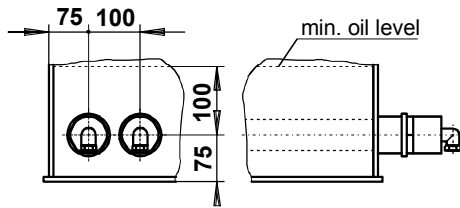
Practicable calculation for heat radiation is:

In still air: $K = 0,01 \frac{\text{kW}}{\text{m}^2\text{K}}$	In moving air: $K = 0,02 \frac{\text{kW}}{\text{m}^2\text{K}}$
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## 9 Installation

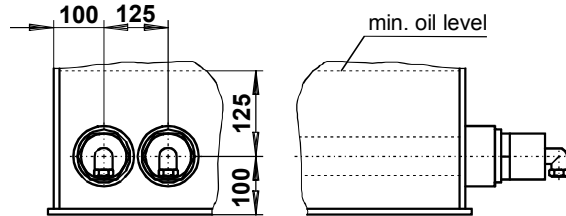
The heaters are mounted horizontally in reservoirs, with a small clearance from the bottom of the reservoir and as far as possible below the minimum oil level. The heating area must be always covered by the pressure fluid, see pictures 1 and 2. Recommended installation dimensions for heaters to AB-E 32-10.

Picture 1



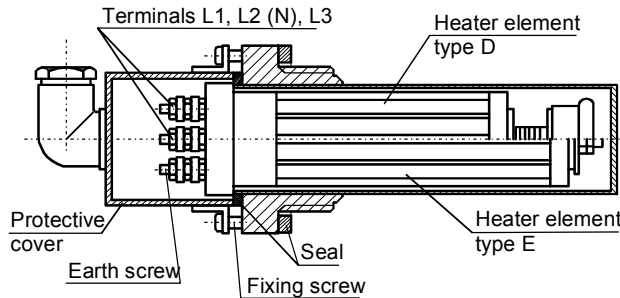
Valid for power codes 1 + 4

Picture 2



Valid for power codes 2 + 5 and 3 + 6

The heater element can be removed without having to drain the oil reservoir. The protective cover and earth screw have to be removed to enable the element to be withdrawn.



## 10 Spare parts

### 10.1 Heater element

When ordering the complete type code as stated on the name plate must be stated.

### 10.2 Protective cover seal

Power code 1, 4 = O-ring 39 x 2,5 NBR  
 2, 3, 5, 6 = O-ring 53 x 2,5 NBR

### 10.3 Thread seal

Power code 1, 4 = Seal ring 48,0 / 55,0 x 2,0 - St A – DIN 7603, Material no. R900004660  
 2, 3, 5, 6 = Seal ring 60,0 / 68,0 x 2,5 - St A – DIN 7603, Material no. R900004664