

# Heat exchanger

## Oil / water

### system: plate heat exchanger

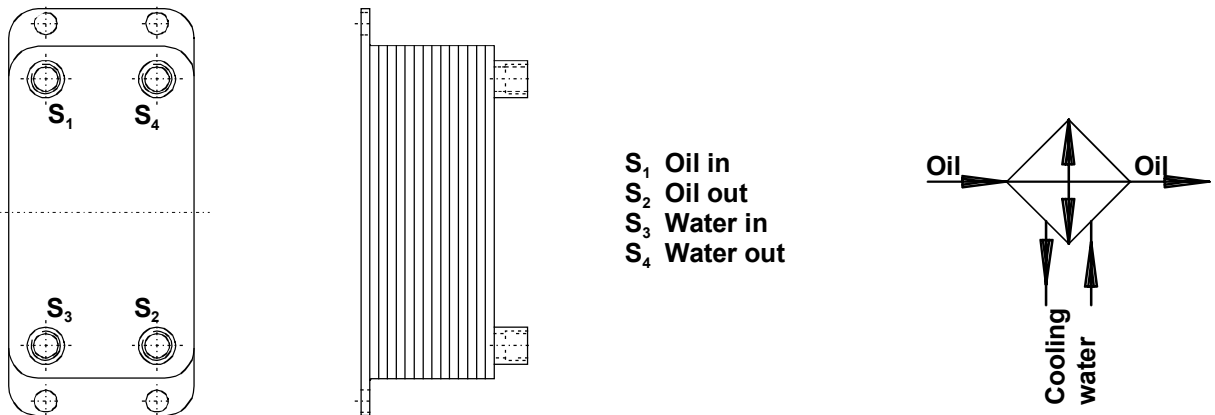
**AB-E 32-12**  
 2002-11-15

Replaces: Issue 1999-01-20

## 1 Area of application

The heat exchangers to this standard are soldered plate type heat exchangers, the bases and turbulence plates are made from stainless steel. Turbulence plates with differing forms ensure a turbulent flow. Due to the high thermodynamic utilisation of the heat conducting surfaces the plate type heat exchangers, for the same capacity, are compactor than the tube bundle type heat exchangers (AB-E 32-02/ AB-E 32-09).

## 2 Model



## 3 Type code

 Example: **Waermetauscher AB32-12 / 01 - K - 054 - 2 2**
**AB standard**
**Nominal size**

00	= 00
01	= 01
02	= 02

**Nominal size, version**

Short	= K
Long	= L

**No. of plates**

4 to 120 dependant on capacity

**Turbulence plates warm side 1)**

Built-in longitudinally	= 1
Built-in transversely	= 2

**Turbulence plates cold side 1)**

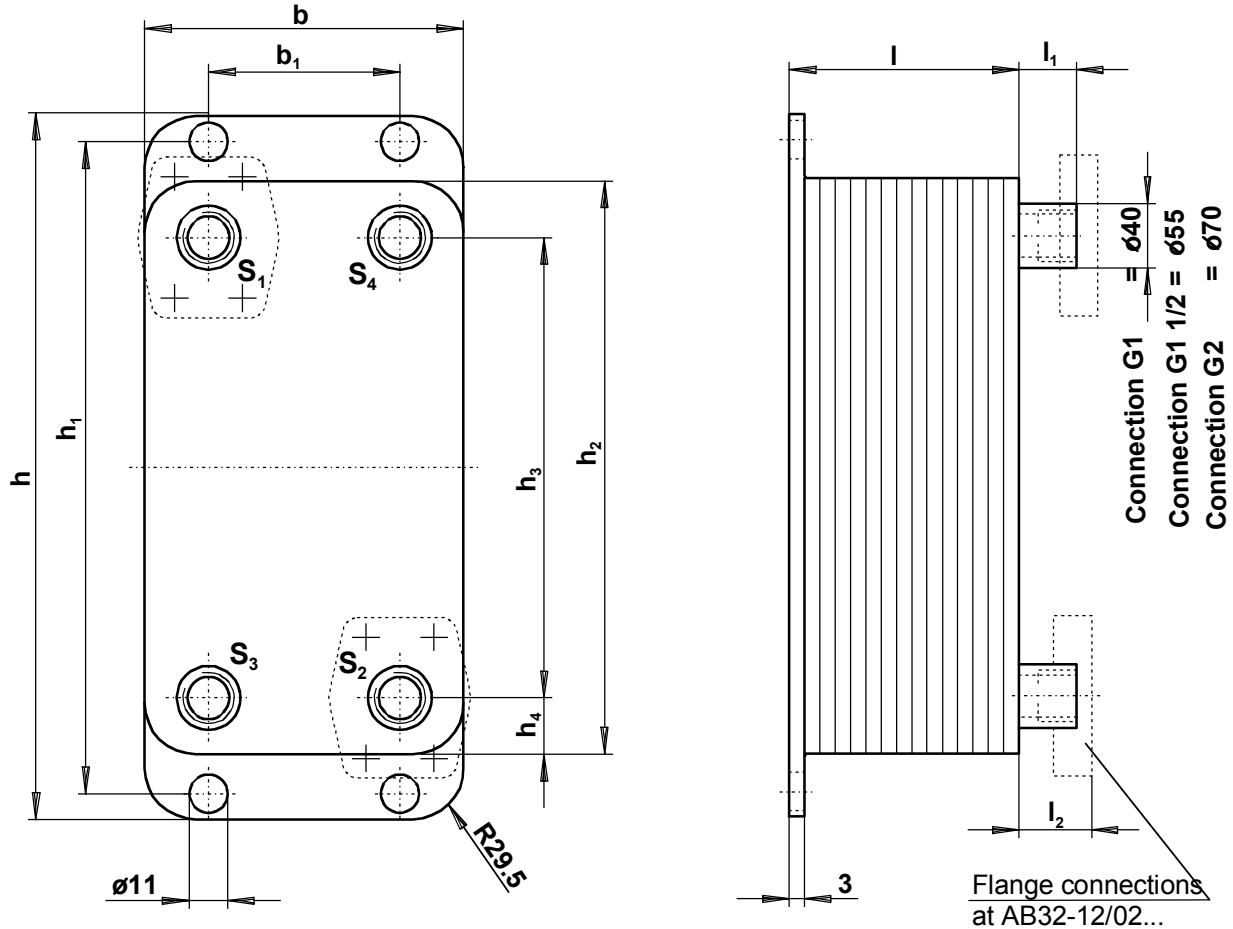
Built-in longitudinally	= 1
Built-in transversely	= 2

1) The turbulence plates are selected depending on flow rates and flow losses using the computer selection program.

#### 4 Ordering example/match code

Heat exchanger to AB-E 32-12, nominal size 00 short, 4 plates, turbulence plate built-in transversely:  
**WAERMETAUSCHER AB 32-12/00-K-004-22** Material no. **R900028815**

#### 5 Dimensions



S<sub>1</sub> Oil in  
 S<sub>2</sub> Oil out  
 S<sub>3</sub> Water in  
 S<sub>4</sub> Water out

Table 1

Designation: Waermetauscher	Dimensions										Empty weight kg	Connection			
	<i>b</i>	<i>b</i> <sub>1</sub>	<i>h</i>	<i>h</i> <sub>1</sub>	<i>h</i> <sub>2</sub>	<i>h</i> <sub>3</sub>	<i>h</i> <sub>4</sub>	<i>l</i>	<i>l</i> <sub>1</sub>	<i>l</i> <sub>2</sub>					
AB32-12/00-K	111	50	342	312	274	213	30,5	1) 4 + 4 x P	32		1,7+0,23xP	S <sub>1</sub> to S <sub>4</sub> = G 1"			
AB32-12/00-L			507	477	439	378					2,4+0,40xP				
AB32-12/01-K	168	94	451	421	383	309	37,0							2,9+0,48xP	S <sub>1</sub> to S <sub>4</sub> = G 1 1/2"
AB32-12/01-L			699	669	631	557								4,8+0,87xP	
AB32-12/02-K	225	140	554	524	488	403	42,5			37	42	5,0+0,83xP	S <sub>1</sub> + S <sub>2</sub> = SAE 2" 2) S <sub>3</sub> + S <sub>4</sub> = G 2"		
AB32-12/02-L			884	854	818	733						8,3+1,50xP			

1) P = No. of plates

Connection SAE 2" standard pressure series (see AB-E 22-15)

## 6 Selection table

Table 2

Nominal size 00, short		Nominal size 01, short		Nominal size 02, short	
Designation: Waermetauscher AB32-12/...					
	Material no.		Material no.		Material no.
00-K-004-22	R900028815	01-K-030-22	R900028855	02-K-054-22	R900028892
00-K-006-22	R900028816	01-K-036-22	R900028856	02-K-072-22	R900028895
00-K-008-22	R900028817	01-K-054-22	R900028859	02-K-088-22	R900028897
00-K-010-22	R900028818	01-K-066-22	R900028861	02-K-104-22	R900028899
00-K-014-22	R900028820	01-K-084-22	R900028864		
00-K-018-22	R900028822	01-K-090-22	R900028865		
00-K-030-22	R900028825				
00-K-034-22	R900028826				

## 7 Suitability

Table 3

Pressure fluids			Suitability
Mineral oils	Mineral oil	HL, HLP to DIN 51524	suitable
	Emulsions	HFA-E to DIN 24320	
Fire resistant pressure fluids	Water emulsions	HFC	
	Phosphate ester	HFD-R to VDMA 24317	
	Organic ester	HFD-U	not suitable
Fast bio degradable pressure fluids	Triglyceride (Rape seed oil)	HETG	
	Synthetic ester	HEES to VDMA 24568	
	Polyglycole	HEPG	

## 8 Water quality

Table 4

Water type	Water quality	Source of supply	Suitability
Sweet water	Drinking water	Municipal water works, springs	suitable
	Industrial water	Cooling tower circuits, factory wells	
	Stream and river water		
Sea water		High sea	not suitable
Brackish water	Mixture of sea and river water	Coastal areas, mouths of rivers, harbours	

## 9 Technical data

Material:	Plates and connections	1.4301
	Solder	copper
Perm. operating pressure:	oil side	16 bar
	water side	10 bar
Permissible operating temperature:		200°C

## 10 Calculations

Table 5

Min. requirements to enable calculation:		From these it follows that:	
Oil flow	$V_{Oil}$ (l/min)	ETD =	$t_{Oil} - t_{KE}$ (K)
Power loss	$P_V$ (kW)	Inlet temperature difference	$P_{01} = \frac{P_V}{ETD}$ (kW/K)
Inlet temperature (oil)	$t_{Oil}$ (°C)		
Inlet temperature (cooling water)	$t_{KE}$ (°C)	Specific cooling capacity	ETD = 1 K

	<b>HLP/HFD</b>	<b>HFC</b>	<b>HFA</b>
<b>Cooling</b>	$\Delta t_{Oil} = \frac{36 \times P_V}{V_{Oil}}$	$\Delta t = \frac{17,2 \times P_V}{V}$	$\Delta t = \frac{14,7 \times P_V}{V}$ (K)

**Warming H2O**  $\Delta t_K = \frac{14 \times P_V}{V_K}$  (K)      Cooling water requirements  $V_K = 0,5 \times V_{Oil}$  to diagrams 1 and 2

Example:

**Given:**

$P_V = 16$  kW;  $V_{Oil} = 40$  l/min;  $t_{Oil} = 60^\circ\text{C}$ ;  $t_{KE} = 20^\circ\text{C}$ ;

ETD =  $60 - 20 = 40$  K;  $P_{01} = \frac{16}{40} = 0,4$  kW/K

**Selected:**

Type AB32-12/00-K-014-22 (see diagram 1)

$\Delta t_{Oil} = \frac{36 \times 16}{40} = 14,4$  K;       $\Delta t_K = \frac{14 \times 16}{20} = 11,2$  K

**Correction factors for capacities p 01 and oil side pressure loss**

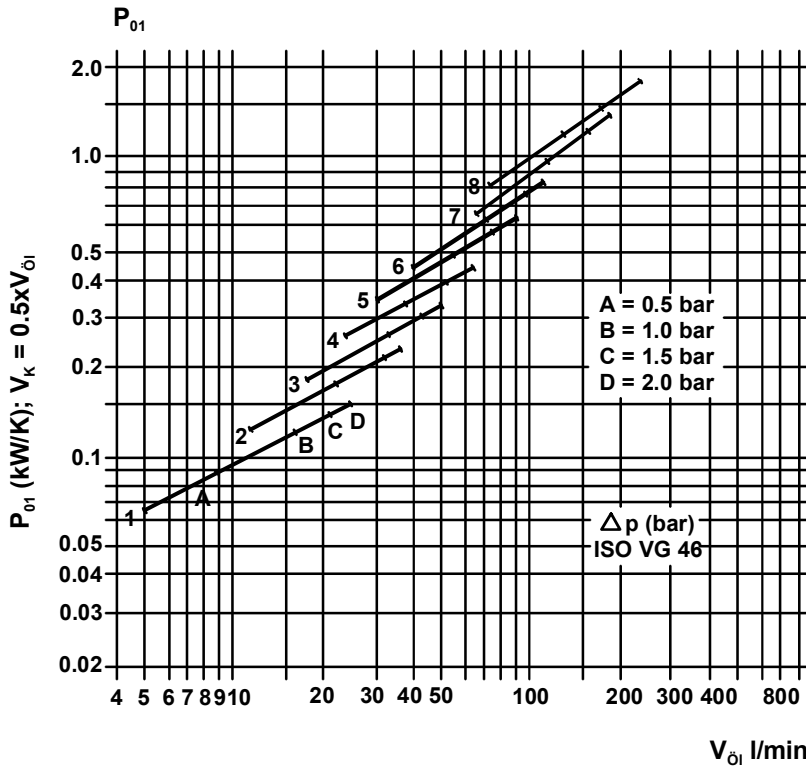
Table 6

Viscosity	ISO VG							
	22	32	46	68	100	150	220	320
Factor f1 p 01	1,10	1,06	1,00	0,95	0,88	0,82	0,76	0,70
Factor f2 $\Delta p$ oil	0,70	0,80	1,00	1,30	1,70	2,30	2,90	3,90

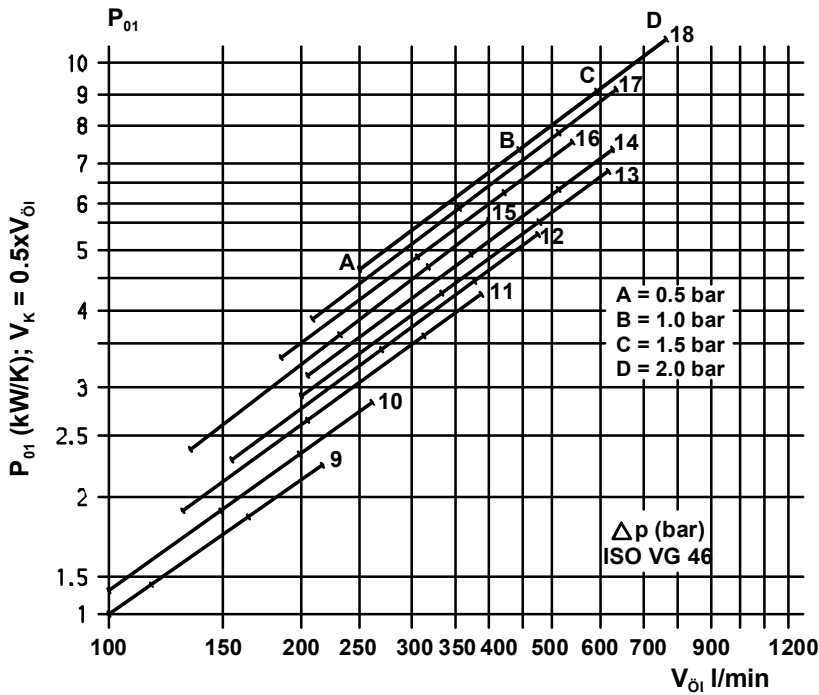
# 11 Capacity

A programme is available on the IDV computer to aid in the selection of a heat exchanger. The following diagrams are only intended to enable a quick selection of a suitable heat exchanger.

## 11.1 Diagram 1



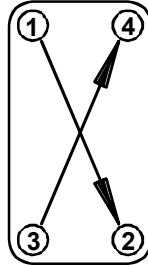
## 11.2 Diagram 2



## 12 Installation guidelines

### 12.1 Mounting position

The mounting position can be either horizontal or vertical.  
The pipe work is to be connected unstressed and vibration free.  
Flow direction



**1: Oil in**  
**2: Oil out**  
**3: Water in**  
**4: Water out**

### 12.2 Controls

On/off control of the cooling water by means of a water control valve to AB-E 21-23 and thermostat to AB-E 31-32 is preferred to the proportional control of the water supply by a control valve to AB-E 21-22. Proportional control of contaminated water causes floating particles to be deposited, this is due to the low water velocity in the partial load range and leads to corrosion. If contaminated water (industrial, stream or river water) is used for cooling, a dirt trap to AB-E 22-15 should be fitted in the supply line.

### 12.3 Cleaning, cold side (water)

The flow exchangers to AB-E 32-12 can be cleaned by flushing with water in the opposite direction to the medium flow, or they can be chemically cleaned. Decalcification can be achieved by using a 5% strength citric or acetic acid solution.

## 13 For other standards see

[AB-E 03-18](#) Sheet 2 Bore face for heat exchangers