Application
These coolers are designed specifically for mobile hydraulic applications where high performance and efficiency are required and physical size is minimised to allow easy installation. Typical applications include mobile cranes, concrete mixers and pump trucks, road paving machines & transmission cooling.

OK-ELH Product Features
These coolers use a combination of high performance cooling elements and hydraulic motors to give long trouble free operation in arduous mobile hydraulic applications. The compact design allows the coolers to fit most equipment and provide the highest cooling performance in heat dissipation whilst minimising space required.
- Cooling range 2-140 kW at ΔT 40 °C
- Hydraulic Motors from 6.3 to 22 cc
- Simple disassembly of components

Test procedure certified following EN 1048
OIL/AIR COOLER

DESCRIPTION

GENERAL
In hydraulic systems energy is transformed and transmitted. During this transformation and transmission losses occur, i.e. mechanical and hydraulic energy is converted into heat. It is the function of the cooler to dissipate this heat.

ADVANTAGES OF THE OIL/AIR COOLERS

- Environmentally friendly: exchange between air and oil not possible
- For commissioning only the existing hydraulic power can be used.
- Low operating costs, no additional cooling circuit necessary for the cooling medium, i.e. air

CONSTRUCTION
Oil/air cooler units consists of the (1) metal housing, (2) motor, (3) axial fan, (4) heat exchanger, (5) finger grid, (6) support and (7) feet. The oil connections are external.
1. TECHNICAL DETAILS

1.1. TABLE OF TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th></th>
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<td>2000</td>
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<td>130</td>
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</tr>
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<td>36.6</td>
<td>83</td>
<td>16</td>
<td>130</td>
<td>2000</td>
</tr>
</tbody>
</table>

- Mounting position: all positions possible
- For direction of rotation see arrow on cooler housing
- Cooling fluid
  - Mineral oil to DIN 51524
  - For other fluids, please contact our sales/technical department
- Hydraulic motor operating characteristics:
  - The hydraulic motors are reversible with drain port.
  - The motor oil flow Q can be calculated at nominal motor oil operating pressure as follows:

\[
Q = V_n \times n \times \eta_{vol} \times 10^3 \\text{[l/min]}
\]

\[
V_n = \text{motor displacement [cm}^3\text{/r]}
\]

\[
n = \text{fan speed [rpm]}
\]

\[
\eta_{vol} = \text{volumetric efficiency = 90% at motor oil operating pressure of 150 bar}
\]

Max. outlet side pressure: 120 bar
Max. drain pressure: 2 bar
Fluid viscosity range: 10-600 mm²/s (recommended 30-45 mm²/s)
Fluid temperature range: up to 90 °C
Mineral oil to DIN 51524/25 DIN 51511
Filtration: ISO/DIS 4406 Code 19/16- Filtration grade \( \beta_{25} > 75 \)
- The noise levels are only a guide as acoustic properties vary and depend on the characteristics of the room, connections, viscosity and resonance.
- Thermo-bypass for hydraulic motor drive: see chapter 4.
- Options: see accessory catalogue
1.2. HYDRAULIC DETAILS

1.2.1 Cooling capacity

depending on oil flow and the temperature differential $\Delta T$ between the oil inlet and air inlet

For calculations with low $\Delta T$ values (i.e. below 10 °C), please contact our technical support staff.

**OK-ELH2-5**

Tolerance: ± 5%

---

**OK-ELH6-11**

Tolerance: ± 10%

---

* : Values measured at $\Delta T = 40 \, ^\circ C$, may vary at lower $\Delta T$ values.
1.2.2 Pressure differential $\Delta p$ measured at 30 mm$^2$/s using mineral oil

OK-ELH2-5
Tolerance: $\pm$ 5%

![Graph of pressure drop vs. oil flow for OK-ELH2-5]

OK-ELH6-11
Tolerance: $\pm$ 10%

![Graph of pressure drop vs. oil flow for OK-ELH6-11]

For other viscosities the result must be multiplied by $K$

<table>
<thead>
<tr>
<th>Viscosity (mm$^2$/s)</th>
<th>10</th>
<th>15</th>
<th>22</th>
<th>32</th>
<th>46</th>
<th>68</th>
<th>100</th>
<th>150</th>
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<tr>
<td>Factor $K$</td>
<td>0.5</td>
<td>0.65</td>
<td>0.77</td>
<td>1</td>
<td>1.3</td>
<td>1.9</td>
<td>2.8</td>
<td>5.3</td>
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</table>
2. **MODEL TYPE**

(Also order example)

**Type of cooler**

OK ELH = Oil/air cooler

**Size / motor speed**

2-11 = See hydraulic details 1.2.

**Type code and modification number**

**Hydraulic motor displacement**

H6.3 = 6.3 cm³/r
H14 = 14 cm³/r
H22 = 22 cm³/r
H..TB = hydraulic motor with thermo-bypass (for more information see chapter 4)

**Paint**

1 = RAL 9005 (Standard)

**Air flow direction**

S = Suction (Standard)

**Accessories** (for more information see brochure accessories)

AITF50 = Thermostat (fixed)
LFM = Air filter on the air suction (Attention: with clean filter the cooling power decreases by ~8%)
LFG = Air filter grid on the air suction (Attention: with clean filter the cooling power decreases by ~5%)
GP = Vibration Absorber
FU = Feet for alternative mounting arrangement (only for ELH2-5; for the others the feet are already included)
IBP = Heat exchanger with integrated bypass
IBT = Heat exchanger with integrated thermo-bypass
3. DIMENSIONS

3.1. ELH2-4

<table>
<thead>
<tr>
<th></th>
<th>A1 ±5</th>
<th>B ±10 6.3 cc</th>
<th>B ±10 14 cc</th>
<th>B ±10 22 cc</th>
<th>C1 ±5</th>
<th>E1 ±5</th>
<th>E2 ±5</th>
<th>E3 ±5</th>
<th>E4 ±2</th>
<th>E5 ±2</th>
<th>F</th>
<th>W1 min</th>
<th>W2 min</th>
<th>Z1</th>
<th>Plug</th>
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<td>270</td>
<td>283</td>
<td>297</td>
<td>384</td>
<td>199</td>
<td>57</td>
<td>324</td>
<td>288</td>
<td>80</td>
<td>14X10</td>
<td>200</td>
<td>150</td>
<td>G1*</td>
<td>M22X1.5</td>
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<tr>
<td>ELH3</td>
<td>356</td>
<td>279</td>
<td>292</td>
<td>306</td>
<td>420</td>
<td>230</td>
<td>63</td>
<td>370</td>
<td>329</td>
<td>100</td>
<td>14X10</td>
<td>250</td>
<td>180</td>
<td>G1*</td>
<td>M22X1.5</td>
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<tr>
<td>ELH4</td>
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<td>294</td>
<td>306</td>
<td>321</td>
<td>500</td>
<td>289</td>
<td>80</td>
<td>450</td>
<td>421</td>
<td>150</td>
<td>13X10</td>
<td>350</td>
<td>200</td>
<td>G1*</td>
<td>M22X1.5</td>
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</table>
3.2. ELH5

<table>
<thead>
<tr>
<th>A1</th>
<th>B ±10</th>
<th>B ±10</th>
<th>B ±10</th>
<th>C1</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>E4</th>
<th>E5</th>
<th>F</th>
<th>W1</th>
<th>W2</th>
<th>Z1</th>
<th>Plug</th>
</tr>
</thead>
<tbody>
<tr>
<td>±5</td>
<td>6.3 cc</td>
<td>14 cc</td>
<td>22 cc</td>
<td>±5</td>
<td>±5</td>
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<td>±2</td>
<td>±2</td>
<td></td>
<td>min</td>
<td>min</td>
<td></td>
<td></td>
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<tr>
<td>ELH5</td>
<td>460</td>
<td>311</td>
<td>323</td>
<td>338</td>
<td>350</td>
<td>490</td>
<td>200</td>
<td>580</td>
<td>400</td>
<td>250</td>
<td>G1 1/4&quot;</td>
<td>M22X1.5</td>
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</tbody>
</table>
3.3. ELH6-8

|       | A1  | B±10 | B±10 | B±10 | B±10 | B1  | C1  | D1  | D2  | D3  | D4  | E1  | E2  | E3  | OF  | W1  | W2  | Z1  | Z2  | Z3  |
|-------|-----|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| OK-ELH6 | 635 | 383  | 395  | 410  | 72   | 593 | 255 | 482 | 295 | 620 | 500 | 75  | 103 | 9   | 1000| 600 | G1  | 1/4"| 88  | M22x1.5 |
| OK-ELH8 | 762 | 383  | 395  | 410  | 53   | 695 | 255 | 482 | 295 | 749 | 628 | 75  | 94  | 9   | 1100| 700 | G1  | 1/4"| 97  | G3/4" |

**Diagram:**
- A1
- B±10
- B±10
- B±10
- B±10
- B1
- C1
- D1
- D2
- D3
- D4
- E1
- E2
- E3
- OF
- W1
- W2
- Z1
- Z2
- Z3

**Dimensions:**
- Drain port: M12x1.5 (depth 13)
- Top fixing points: M8 (2x)
- 4xM6 (depth 13)

**Notes:**
- **OK-ELH6**
- **OK-ELH8**

**Table:**
- Dimensions and tolerances for A1, B±10, B±10, B±10, B±10, B±10, B1, C1, D1, D2, D3, D4, E1, E2, E3, OF, W1, W2, Z1, Z2, Z3.
3.4. ELH9-11

<table>
<thead>
<tr>
<th></th>
<th>A1</th>
<th>B±10</th>
<th>B±10</th>
<th>B1</th>
<th>C1</th>
<th>D1</th>
<th>D2</th>
<th>D3</th>
<th>D4</th>
<th>E1</th>
<th>E2</th>
<th>E3</th>
<th>ØF</th>
<th>W1</th>
<th>W2</th>
<th>Z1</th>
<th>Z2</th>
<th>Z3</th>
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<tbody>
<tr>
<td>OK-ELH9</td>
<td>910</td>
<td>504</td>
<td>519</td>
<td>45</td>
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<td>410</td>
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<td>450</td>
<td>880</td>
<td>760</td>
<td>85</td>
<td>92</td>
<td>9</td>
<td>1200</td>
<td>900</td>
<td>G1 1/2&quot;</td>
<td>114</td>
<td>G3/4&quot;</td>
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<tr>
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<td>46</td>
<td>971</td>
<td>460</td>
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<td>500</td>
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<td>1400</td>
<td>900</td>
<td>G1 1/2&quot;</td>
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<td>560</td>
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<td>1060</td>
<td>75</td>
<td>93</td>
<td>9</td>
<td>1600</td>
<td>1000</td>
<td>G1 1/2&quot;</td>
<td>119</td>
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</table>
4. TEMPERATURE SENSING VARIABLE SPEED HYDRAULIC MOTOR

4.1. DESCRIPTION

The thermo valve is a pre-controlled pressure valve with temperature-dependent pressure control and is mounted on the hydraulic motor in place of the existing cover plate.

The pressure setting of the valve automatically changes dependent on the temperature and thus controls the motor speed. In addition to the actual temperature-controlled pressure setting, a mechanical maximum pressure control and a recharging valve are fitted as a non-return valve.

The switching temperature values can be set from 40 to 70 °C and the pressure can be controlled up to 100 °C: please contact our sales for the dimensioning of the thermo-bypass.

All the standard hydraulic motors can be used with the thermo-bypass.

The minimum oil pressure at which the thermo control starts to work is 8 bar, i.e. a maximum residual power consumption corresponding to 8 bars is to be foreseen also in by-pass phase.

4.2. DIMENSIONS

4.3. SCHEME

5. CERTIFICATION FOLLOWING EN 1048

Hydac SA design and manufacture high quality coolers that are tested and certified to give reliable and repeatable high performance. To ensure the performance is accurate, testing in compliance with a recognised international test standard is the best solution. For air/liquid coolers this is EN1048.

Hydac SA test procedure complies with the requirements of EN1048 and both the procedure and test equipment are independently inspected and certified by TÜV SÜDDEUTSCHLAND.

The cooler performance details in this brochure have been tested following EN1048.

6. NOTE

The information in this brochure relates to the operating conditions and applications described. For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.