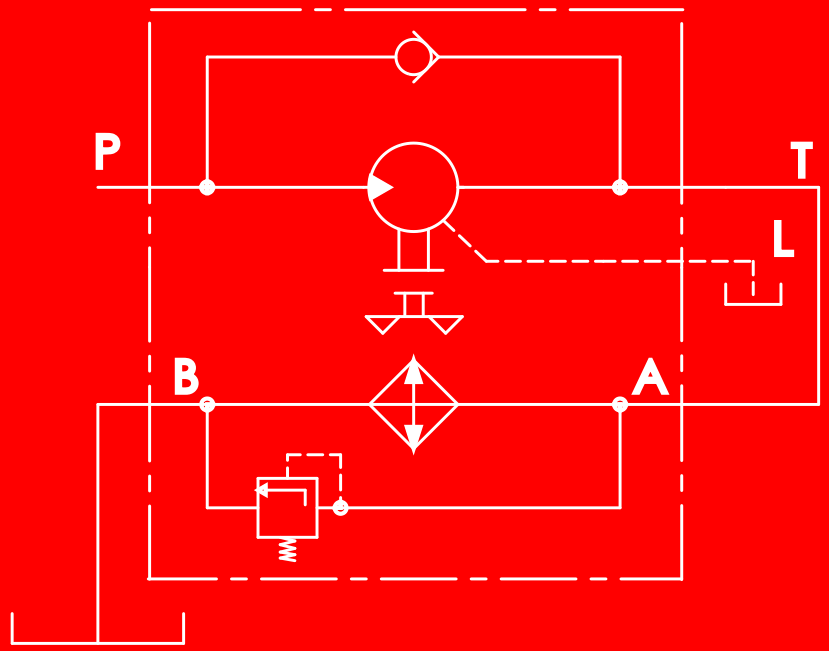
AIR BLAST COOLERS
OK-ELH SERIES (Hydraulic Fan Drive)

MAR 1.005.04.21

2021 Edition



PREFACE

The OK-ELH air blast cooler series is designed specifically for mobile hydraulic applications where high performance and efficiency are required and physical.
Size is minimized to allow easy installation.
These coolers use a combination of high performance cooling elements and hydraulic motors to give long trouble free operation in arduous mobile hydraulic applications.

HYDAC OK-ELH coolers are characterized by:

- Compactness, efficiency and high performance
- Cooling range 4 - 140 kW
- Hydraulic Motors from 6.3 to 22 cm³/r
- Robust Cooling element
- Hydraulically driven fan

WHY CHOOSE US ?

Quality

HYDAC is proud to be the first Australian hydraulic/motion & control company to be certified in accordance with the international standards ISO 9001, ISO 29001, ISO 14001, OHSAS 18001.

HYDAC Group has been also certified by the worldwide leading company in auditing and certifying SGS TUV SAAR.
HYDAC Group established and applied a quality management system in development, production, sales and service for components, units and system for hydraulics, filtration technology, fluid technology, process filtration, and electronics.

Certified System TM
Quality
ISO 9001
SAI GLOBAL

Certified System TM
Oil & Gas
ISO 29001
SAI GLOBAL

Certified System TM
Environment
ISO 14001
SAI GLOBAL

Certified System TM
Health & Safety
OHSAS 18001
SAI GLOBAL

Experience

HYDAC was founded in 1963 and is world leader in motion control and fluid technology. We operate in more than 50 countries with over 9,000 employees.

HYDAC Australia has more than 15 years experience in hydraulics and cooling systems. We manufacture and assemble complete systems for onshore and offshore applications.

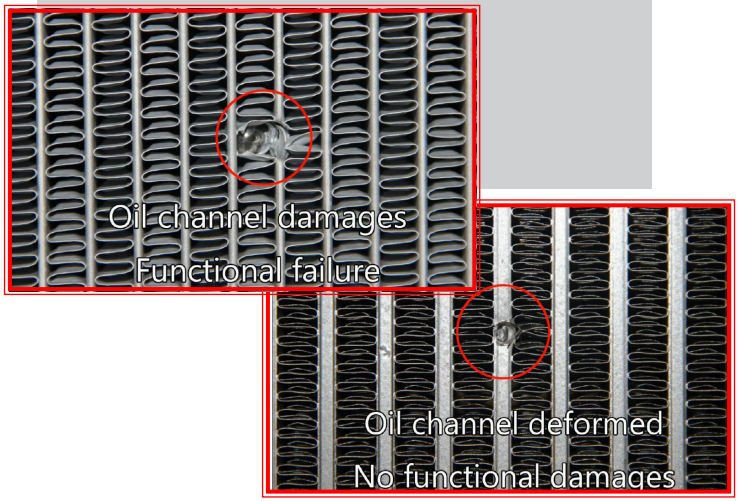
We are a true "engineering solutions provider" as it's our commitment to listen to our customer's needs and requirements. From mobile to industrial, small to huge. Hydac is one stop shop for all your engineering requirements.

SYSTEM CERTIFICATION ISO 9001 SGS

Performance & Endurance

HYDAC cooler core has been developed to provide the optimal cooling performance, with its “Plate and Bar” technology. HYDAC coolers have demonstrated impressive results both in cooling and robustness.

An impact test has proven that our “Plate & Bar” thechnology can withstand bullets and cause no functional damage compared to “Tube & Fins” technology.



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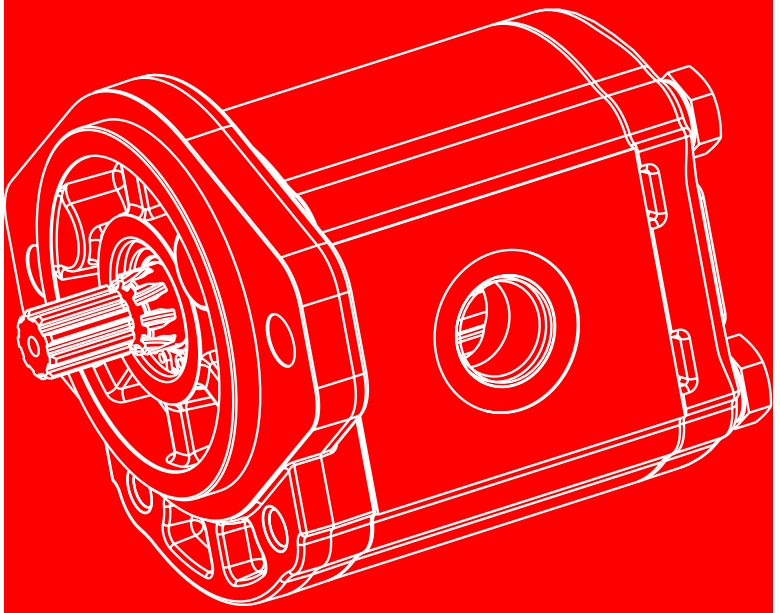
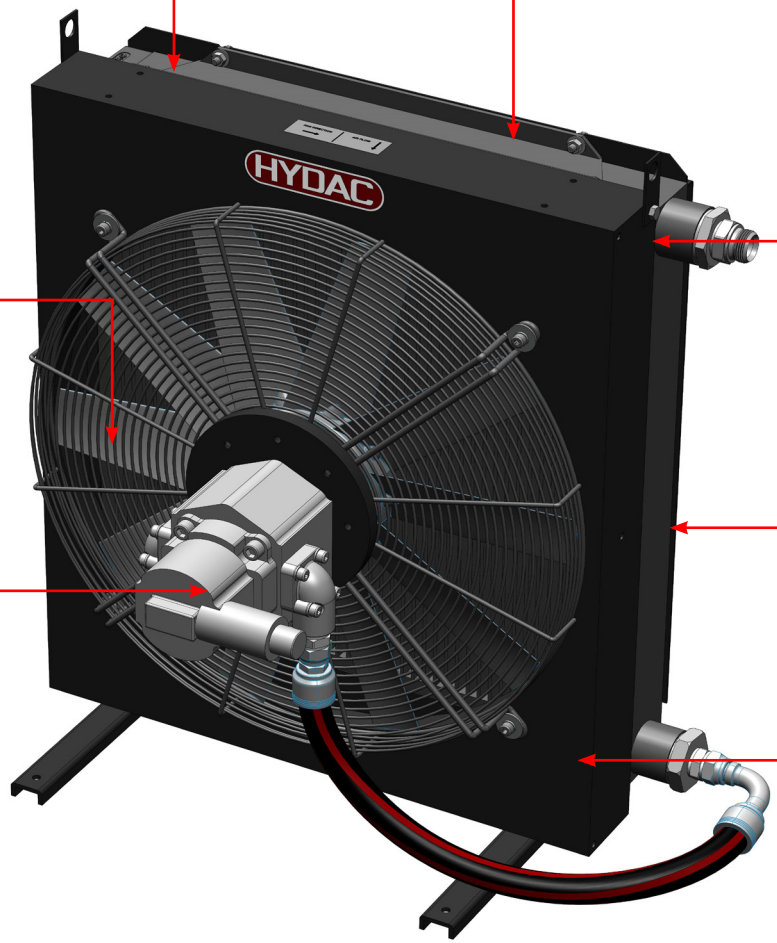


Fluids:
- Oils (mineral oil, synthetic oils, high viscosity oils, phosphate ester)
- Water+glycol
- Water+ corrosion inhibitors+glycol

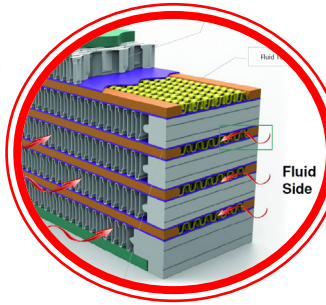
(if Glycol to be excluded then add 1% corrosion inhibitors for every 10% Glycol removed)

Fans:
Axial fan in suction version (standard)
Axial Fan in pushing version on request (note: about 10% reduction in cooling power)
Noise level: see technical data-sheet

Hydraulic motor:
reversible with drain port
- max. outlet side pressure: 120 bar
- max. drain pressure: 2 bar
- max. peak pressure: 6.3/14 cm³/U = 300 bar, 22 cm³/U = 200 bar
- Operating fluid: Mineral oil to DIN 51524/25 DIN 51511
- Fluid viscosity range: 10 - 600 mm²/s (recommended 30 - 45 mm²/s)
- Fluid temperature range: up to 90 °C
- Filtration : ISO/DIS 4406, Code 19/16, β25 > 75



Cooling element with “plate and bar” technology is a patented design. The turbulators inside the channels offer the best cooling capacity.



Integrated bypass channel. A valve opens the channel when the pressure exceeds the valve pressure setting.

Maximum Dynamic pressure: 16 bar
Max Static pressure: 21 bar

Color: RAL 9005 Opaque (Standard)
*Other colors on request

OK-ELH 8 /1.0 / H22TB /1 / S / IBP3 / CPLS

Cooler Type

OK-ELH = Air Blast cooler with Hydraulic Fan drive

Cooler Size

Size= 2-11

Cooler revision

Revision = 1.0

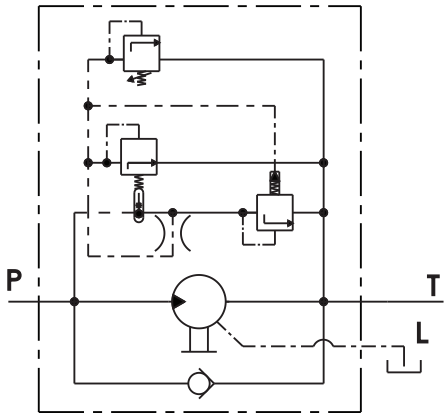
Hydraulic motor

- H6.3 = 6.3 cc/rev
- H14 = 14 cc/rev
- H22 = 22 cc/rev

Other displacements on request

Thermal Bypass (optional)

The thermal valve is a pilot-operated pressure relief valve with temperature dependent pressure control and is mounted on the hydraulic motor instead of the provided end cap. The pressure setting of the valve automatically changes depending on the temperature and thus controls the motor speed.
In addition to the actual temperature controlled pressure setting, maximum pressure relief and a recharging valve are fitted as a bypass check valve. The setting temperature values can be from +40 °C to +70 °C and the pressure can be controlled up to +100 °C. The minimum oil pressure at which the valve starts to work is 8 bar, i.e. this must be taken into consideration for the rest of the operating pressure range of the motor.



Special Features

- CPL= See appendix 2
- ATEX = see appendix 3

Above can be combined

Accessories

- IBP[1] = Pressure bypass valve
- (Standard setting is 3 bar. IBP2 or IBP6 on request)
- IBT[2](optional) = Thermal pressure bypass valve
- (Closes the bypass channel of the cooler when oil temperature reaches one of the temperature settings [(2)])
- PCD = Hydraulic motor port adaptors
- GP = vibration absorber
- LFG/LS = Element protection grid

Air Flow Direction

- S = Suction (standard)
  (Air pulled from the heat exchanger towards the fan)
- D = Blowing (on request)

Color

RAL 9005 Opaque (Black)

(1) Size 2-11 coolers come with IBP3 valve - It opens bypass channel when pressure exceeds the valve pressure setting
(2) Temperature settings available: 25°C,45°C,50°C,60°C,65°C,75°C (see appendix 1)

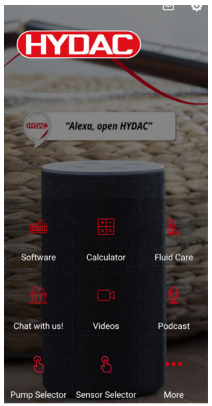
Heat load measurement is critical in cooler selection. Having an accurate heat load helps prevent cooler undersizing and therefore machine breakdown. The following steps can help you calculate the heat load of your machine.
This is optional and you can always contact us for help.

1 Step 1: Record the Temperature Increase

- Set time to zero and record the initial temperature
- Start the machine and record the ambient temperature and the temperature increase over a 30 minutes time interval. You can use the below tools to measure:
  - HYDAC HMG4000. Learn more at https://www.hydac.com.au/hmg-4000.html
  - Infrared thermometer
  - Visual temperature gauge
  - Any other tool that can measure the temperature rise accurately

2 Step 2: Calculate the Heat Load

- To calculate the heat load. Follow one of the below options:
  - Download the HYDAC app



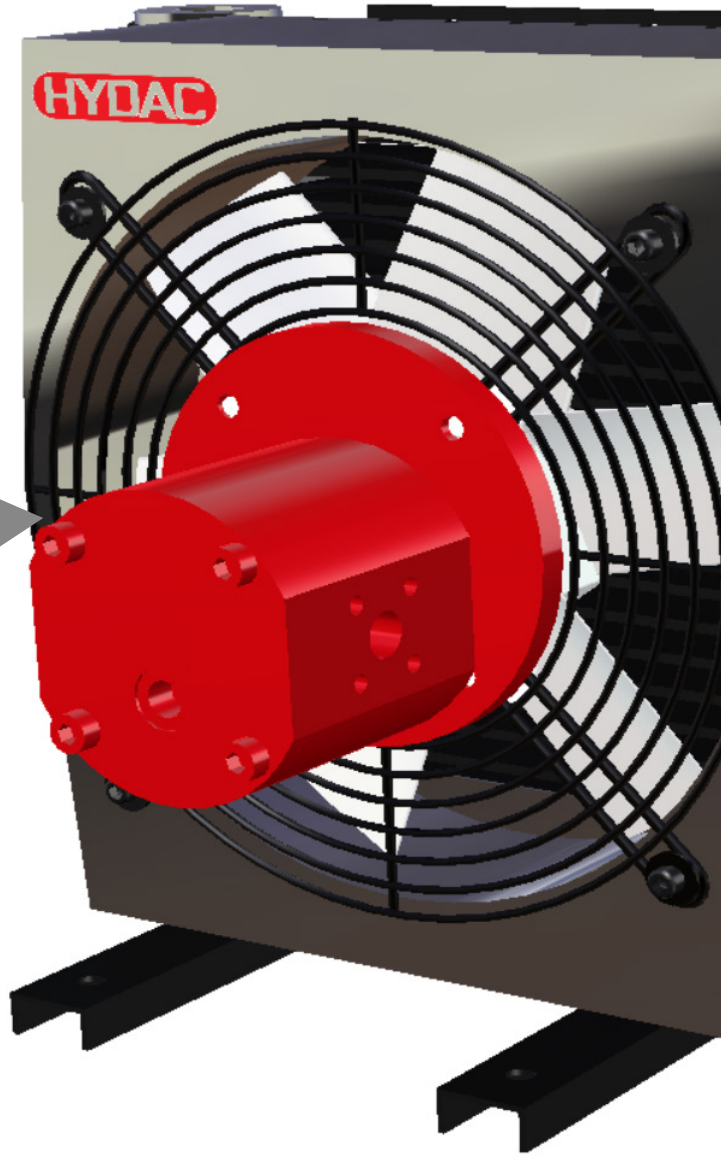
  - Use the heat load formula $Pv = \frac{\Delta T_{Oil} \times cp_{Oil} \times \delta_{Oil} \times V_{Oil}}{t \times 60}$ where:
    - ΔT = temperature difference
    - cp= specific heat capacity of the mineral oil = 1.88 kJ/kg.K
    - δ_{oil} = Density of mineral oil = 0.915 kg/l
    - V_{oil} = Tank volume
    - t= time interval in minute

3 Step 3: Select the Right Cooler

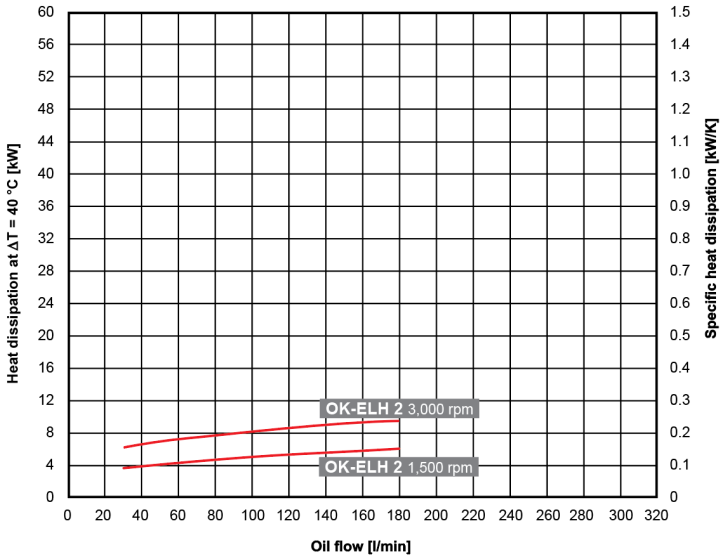
- First calculate the specific heat capacity :
  - Use the specific cooling capacity formula $P_{01} = \frac{P_V}{T_1 - T_2}$ where:
    - Pv = Heat load calculated in step 2
    - T_1= Max oil temperature
    - T_2= Ambient temperature at the time of the heat load measurement
  - Check out the heat dissipation curves in this catalogue to identify the cooler solution - We recommend adding a safety margin when you select the cooler.

OK-ELH2

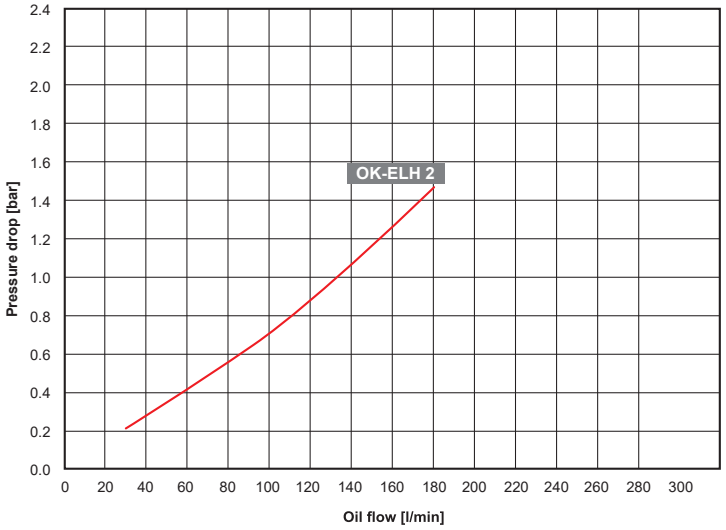
Hydraulic motor displacements	:	6.3 cc/rev	14 cc/rev
Fan speed	:	Up to 3000 rpm	
Required pressure for max speed (at 34 cSt)	:	20 bar	
Cooler Volume	:	2.0 L	
Noise level at 3000 rpm	:	87 SPL dB(A) @1m distance	
Weight	:	11 kg	



Cooling Capacity and Pressure Drop



Tolerance: ±5 %

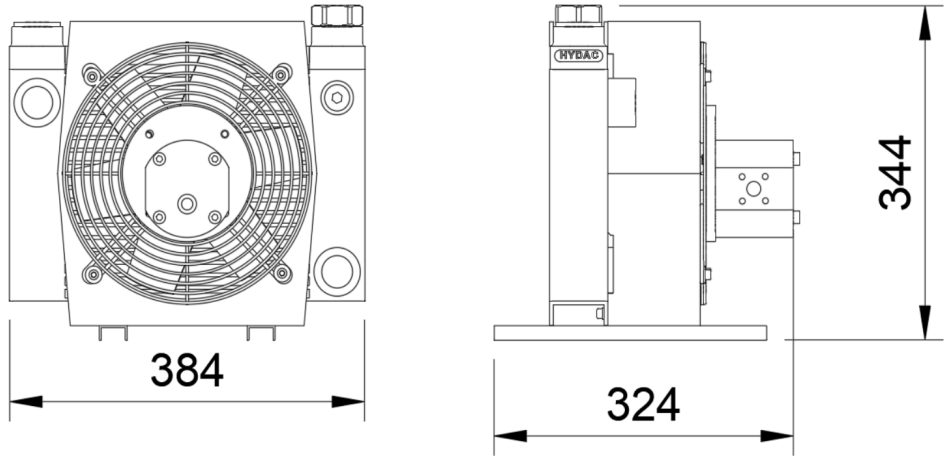


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

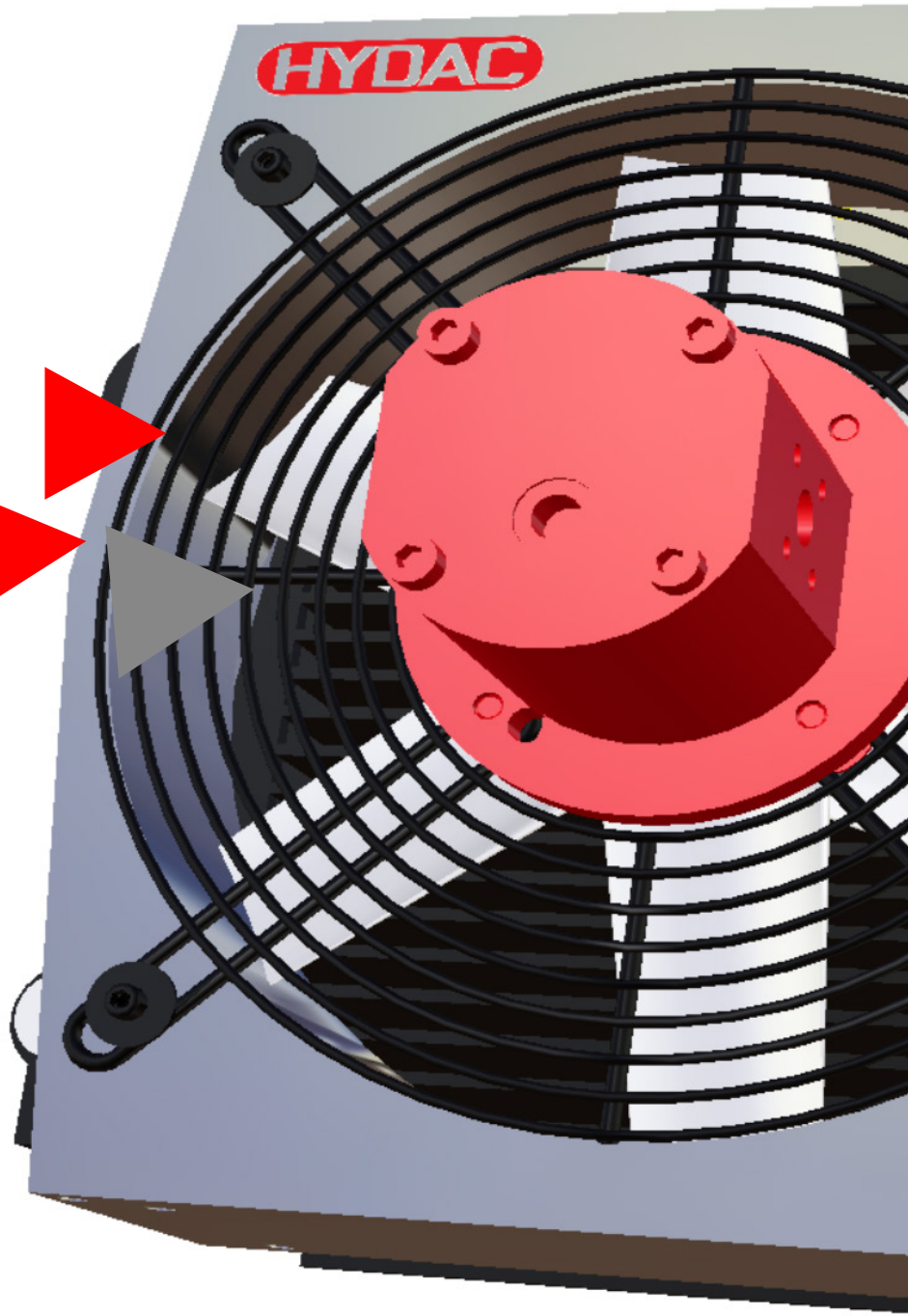


*Dimensions in mm

HYDAC Australia's OK-ELH 2 Range

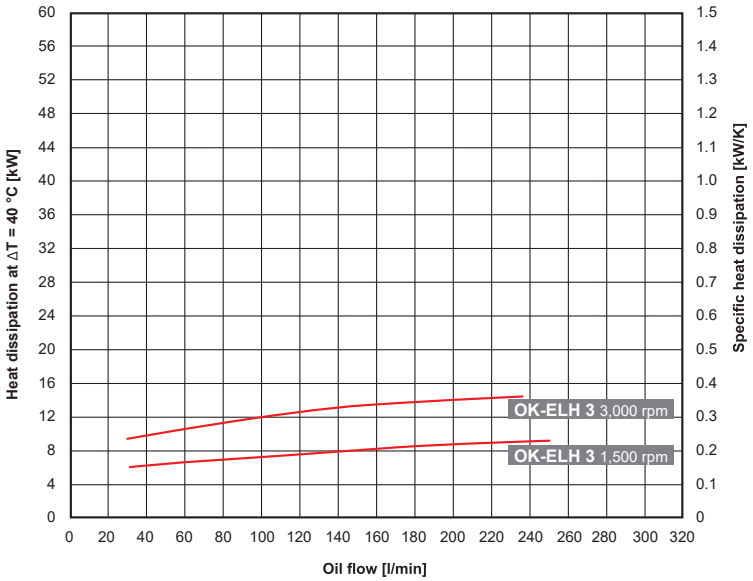
Code	Description
2354233	OK-ELH2/1.0/H14/1/S/IBT60-2
2355183	OK-ELH2/1.0/H14/1/S/IBT45-3
3441258	OK-ELH2/1.0/H6.3TB/1/S/AITF50
4167760	OK-ELH2/1.0/H14/1/S/IBP3/ATEX CPL1 (MAR2)

OK-ELH3

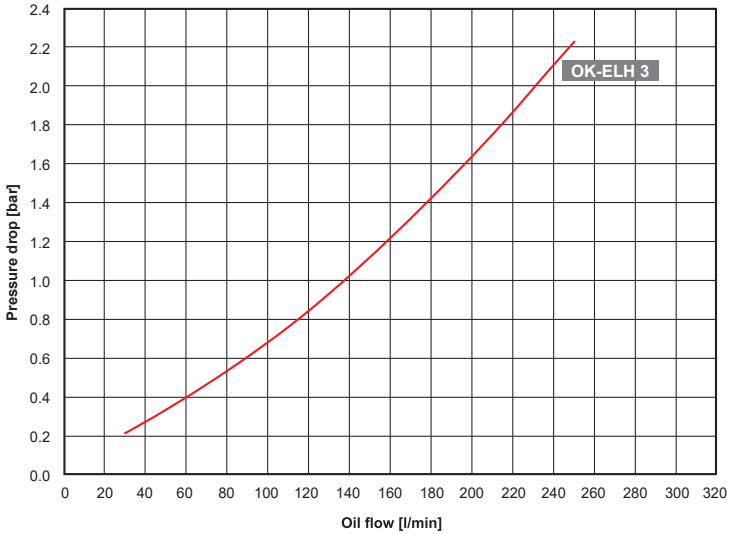


Hydraulic motor displacements	:	6.3 cc/rev	14 cc/rev	22.0 cc/rev
Fan speed	:	Up to 3000 rpm		
Required pressure for max speed (at 34 cSt)	:	20 bar		
Cooler Volume	:	2.2 L		
Noise level at 3000 rpm	:	89 SPL dB(A) @1m distance		
Weight	:	13.0 kg		

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

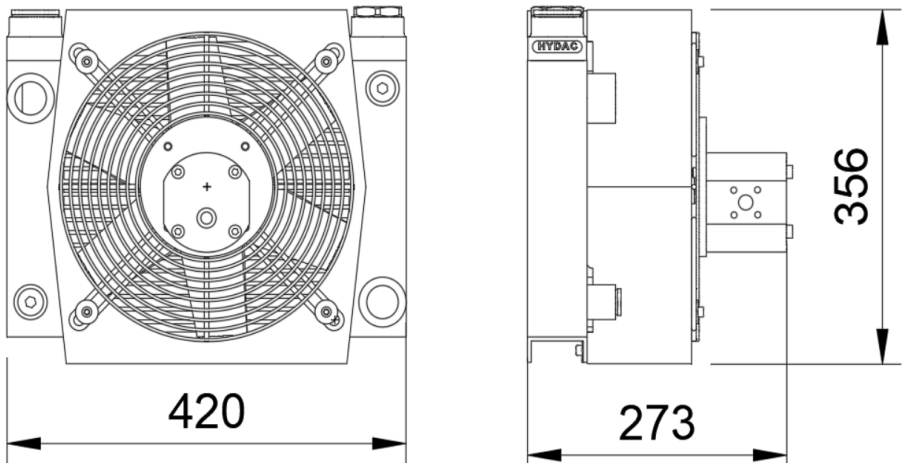


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

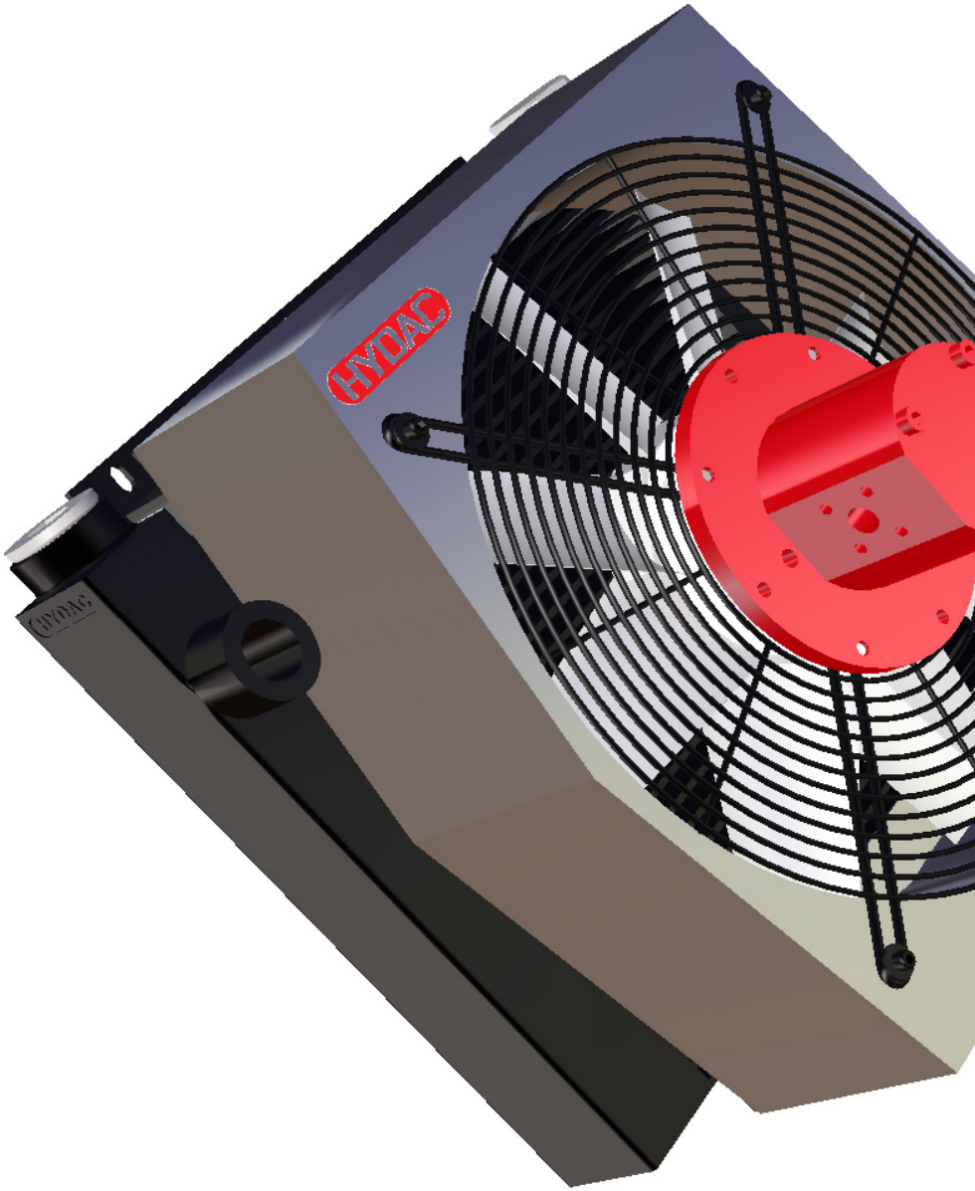
Dimensions



*Dimensions in mm

HYDAC Australia's OK-ELH 3 Range

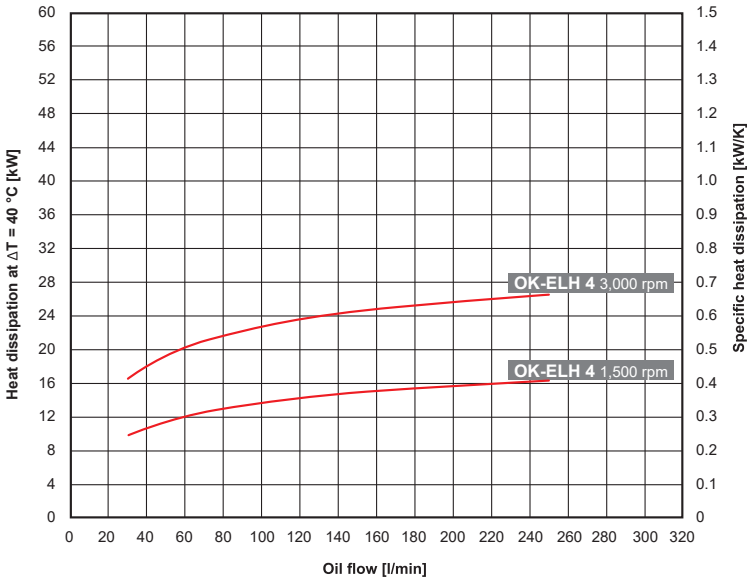
Code	Description
3314310	OK-ELH3/1.0/H6.3/1/S/IBP3
3466647	OK-ELH3/1.0/H14/1/S/IBP3
3574069	OK-ELH3/1.0/H22/1/S/IBP3



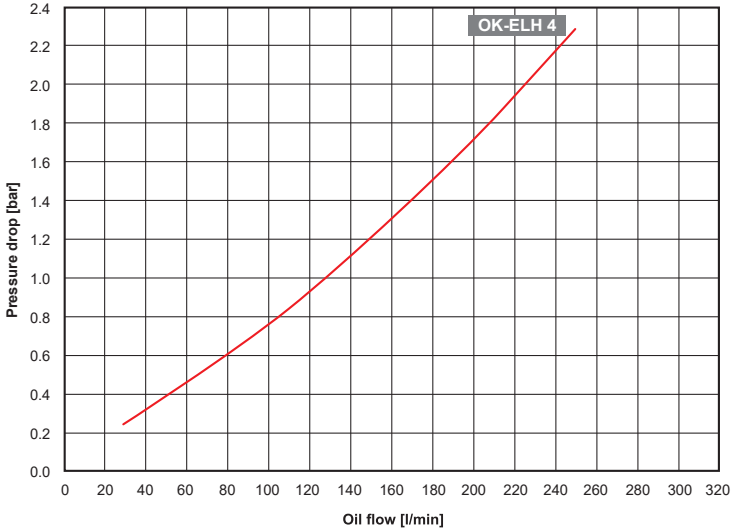
OK-ELH4

Hydraulic motor displacements	:	6.3 cc/rev	14 cc/rev	22.0 cc/rev
Fan speed	:	Up to 3000 rpm		
Required pressure for max speed (at 34 cSt)	:	50 bar	30 bar	20 bar
Cooler Volume	:	3.0 L		
Noise level at 3000 rpm	:	92 SPL dB(A) @1m distance		
Weight	:	18.0 kg		

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

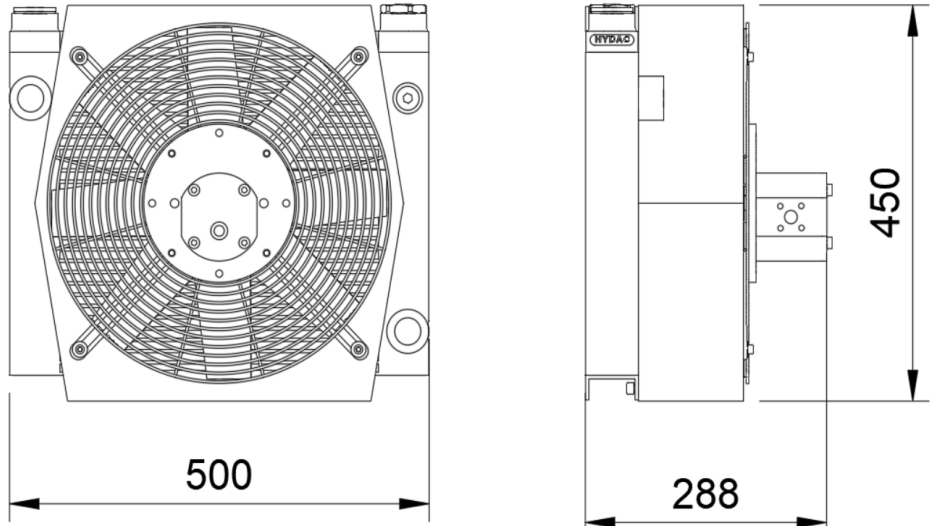


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions



*Dimensions in mm

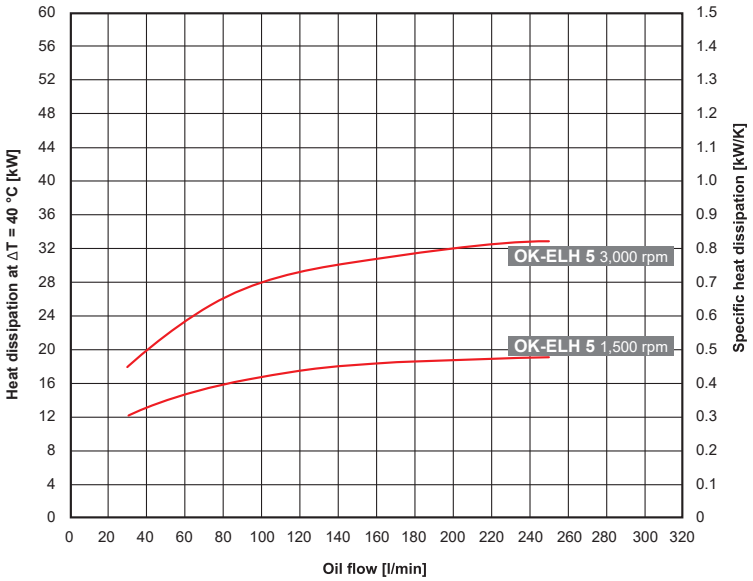
HYDAC Australia's OK-ELH 4 Range

Code	Description
3473567	OK-ELH4/1.0/H6.3/1/S/IBP3
3219230	OK-ELH4/1.0/H14/1/S/IBP3
3571156	OK-ELH4/1.0/H22/1/S/IBP3
2354163	OK-ELH4/1.0/H6.0/1/S/IBT45-3

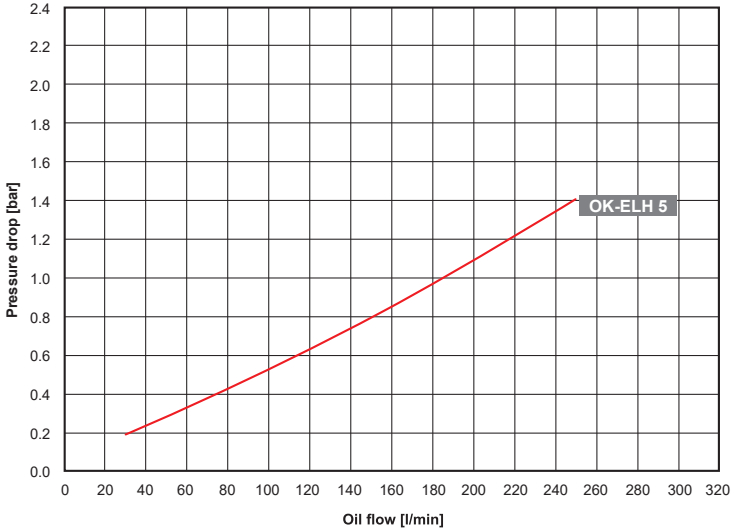
OK-ELH5

Hydraulic motor displacements	:	6.3 cc/rev	14 cc/rev	22.0 cc/rev
Fan speed	:	Up to 3000 rpm		
Required pressure for max speed (at 34 cSt)	:	70 bar	30 bar	20 bar
Cooler Volume	:	5.2 L		
Noise level at 3000 rpm	:	93 SPL dB(A) @1m distance		
Weight	:	24.0 kg		

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

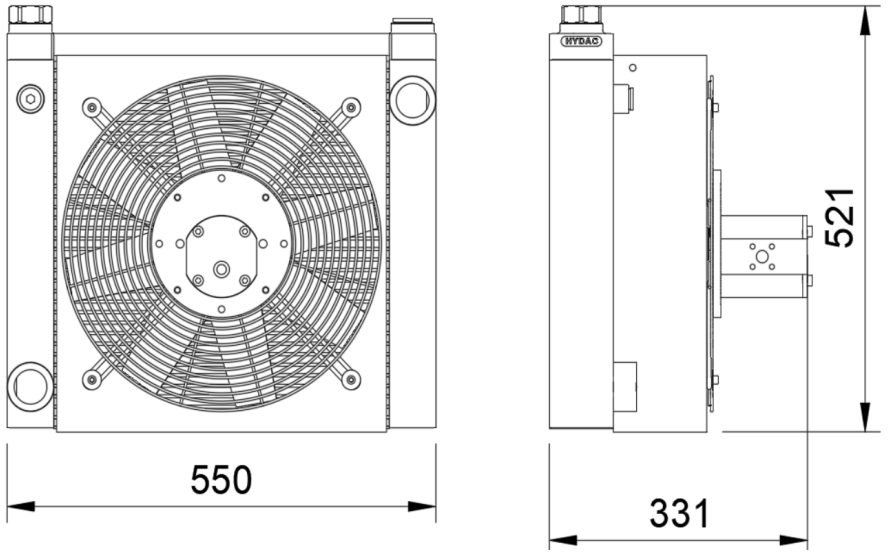


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

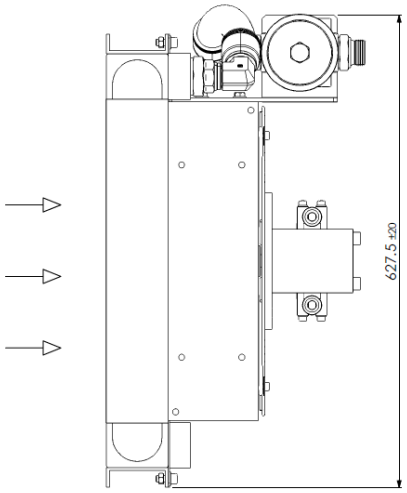


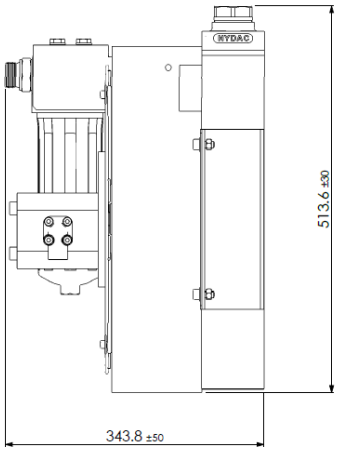
*Dimensions in mm

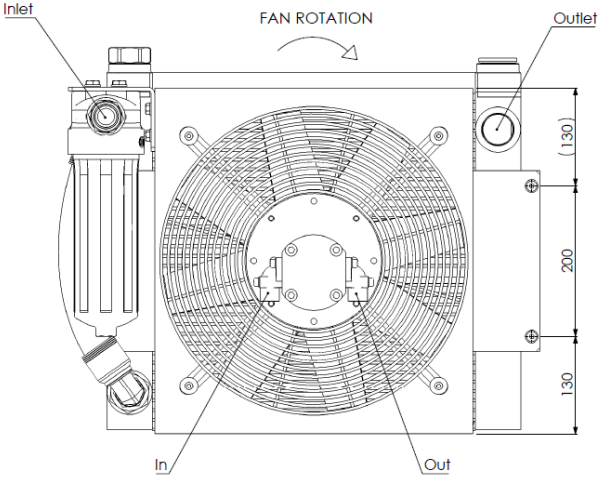
HYDAC Australia's OK-ELH 5 Range

Code	Description
2354099	OK-ELH5/1.0/H6.3/1/S/IBP3
2354735	OK-ELH5/1.0/H8/1/S/IBP3
4087524	OK-ELH5/1.0/H11/1/S/IBP3
3339261	OK-ELH5/1.0/H14/1/S/IBP3
3739699	OK-ELH5/1.0/H14TB/1/S/IBT45-3
2354382	OK-ELH5/1.0/H22/1/S/IBP3
3251283	OK-ELH5/1.0/H22/1/S/IBT45-3

SPECIAL



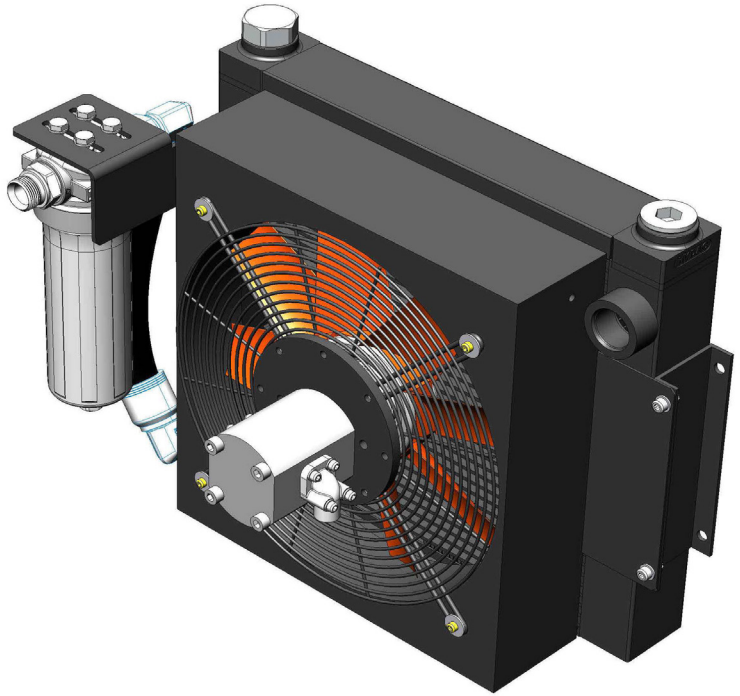




CMS1/O/H22/S/MFX200/4/IBT45-3/130-14

HYDAC P/N: 2354711

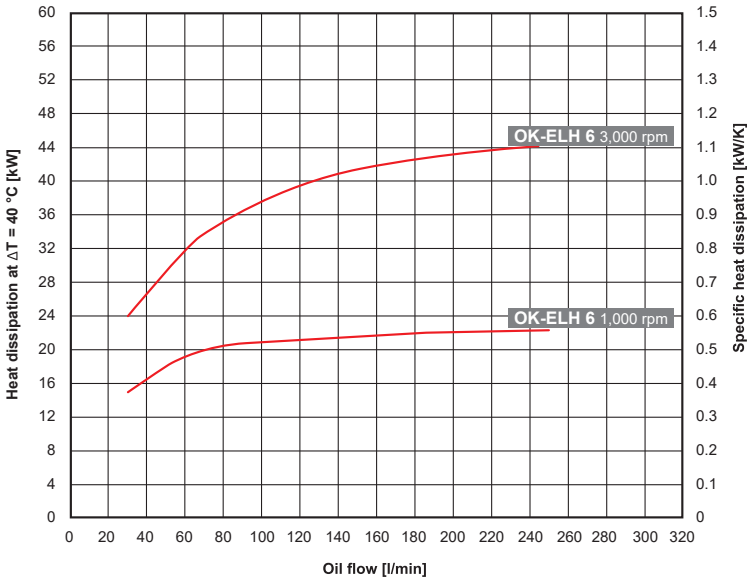
Filter: MFX200
Filter element: 10 micron
Filter bypass setting: 3.5 bar
Cooler core integrated temperature- pressure bypass valve: IBT45-3
Hydraulic motor: 22 cc/rev



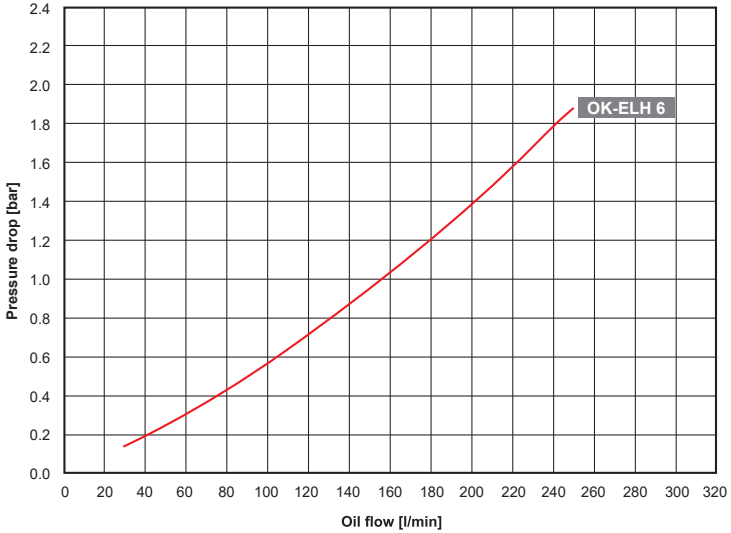
OK-ELH6

Hydraulic motor displacements	:	6.3 cc/rev	14 cc/rev	22.0 cc/rev
Fan speed	:	Up to 3000 rpm		
Required pressure for max speed (at 34 cSt)	:	150 bar	70 bar	50 bar
Cooler Volume	:	4.6 L		
Noise level at 3000 rpm	:	96 SPL dB(A) @1m distance		
Weight	:	43.0 kg		

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

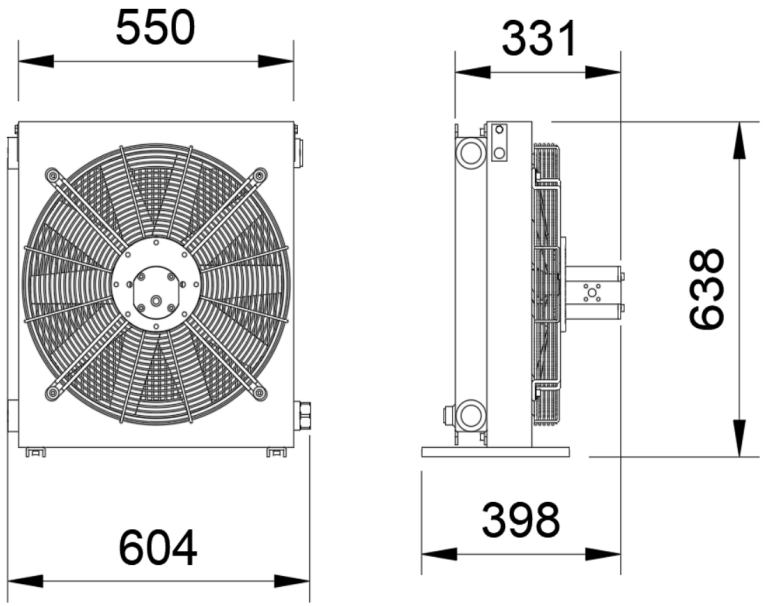


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

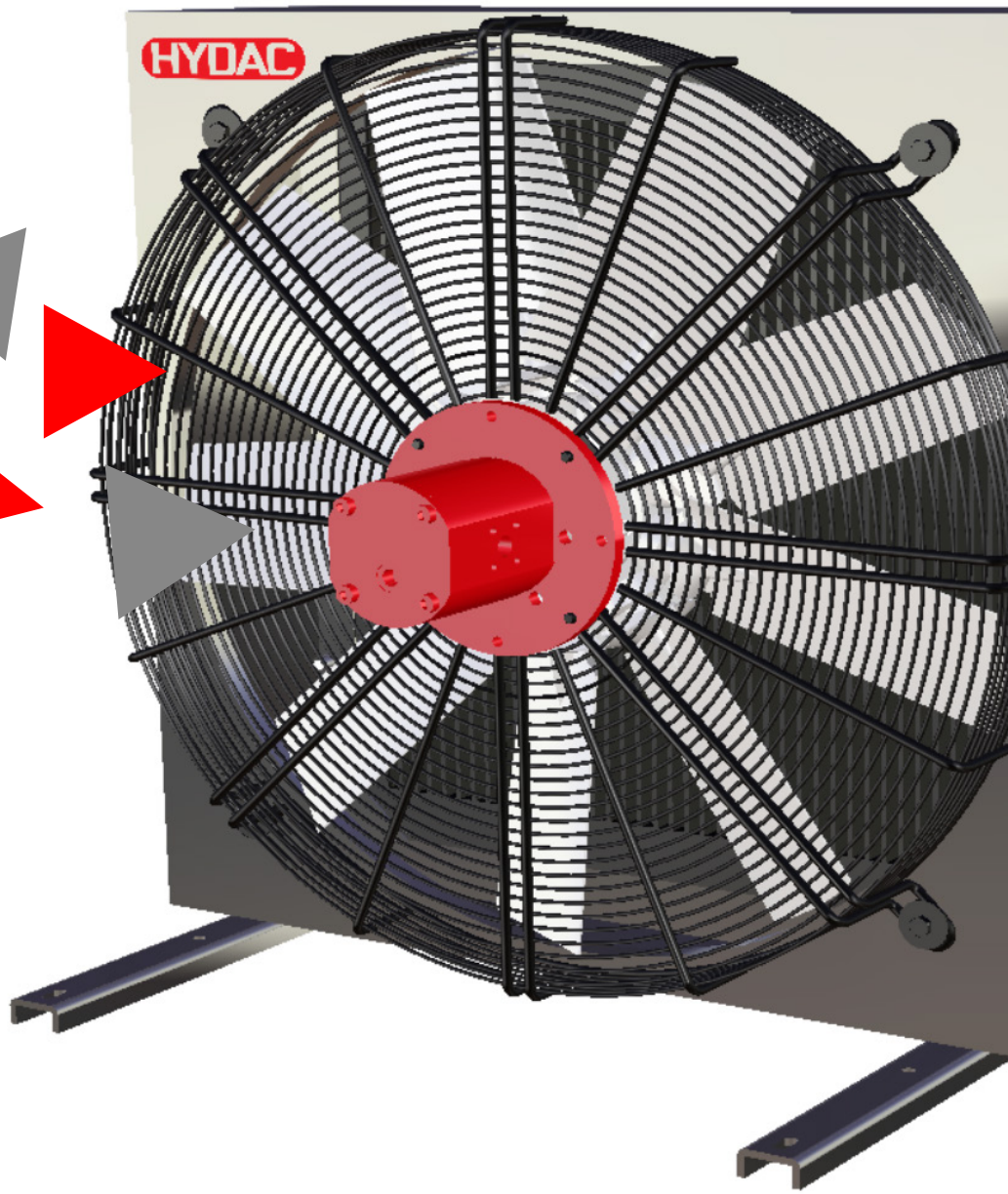


*Dimensions in mm

HYDAC Australia's OK-ELH 6 Range

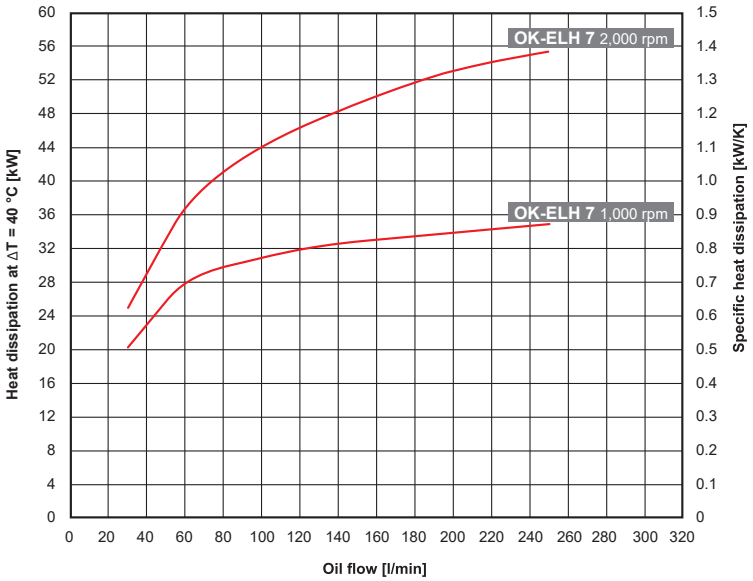
Code	Description
3242367	OK-ELH6/1.1/H6.3/1/S/IBP3
4318607	OK-ELH6/1.1/H6.3/1/S/IBT45-3
4331228	OK-ELH6/1.1/H6.3TB/1/S/IBT45-3
3210152	OK-ELH6/1.1/H14/1/S/IBP3
3635573	OK-ELH6/1.1/H14/1/S/IBT45-3
3854589	OK-ELH6/1.1/H14TB/1/S/IBT45-3
4031777	OK-ELH6/1.1/H22/1/S/IBP3*

OK-ELH7

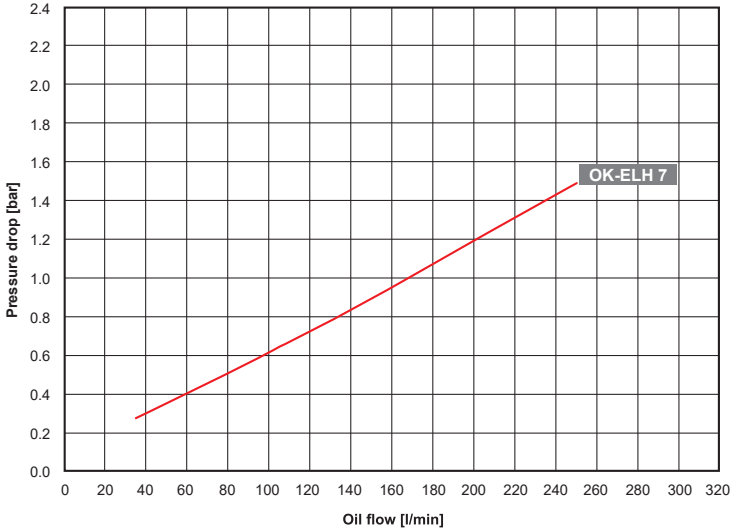


Hydraulic motor displacements	:	14 cc/rev 22.0 cc/rev
Fan speed	:	Up to 2000 rpm
Required pressure for max speed (at 34 cSt)	:	220 bar 140 bar
Cooler Volume	:	5.2 L
Noise level at 2000 rpm	:	98 SPL dB(A) @1m distance
Weight	:	50.0 kg

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

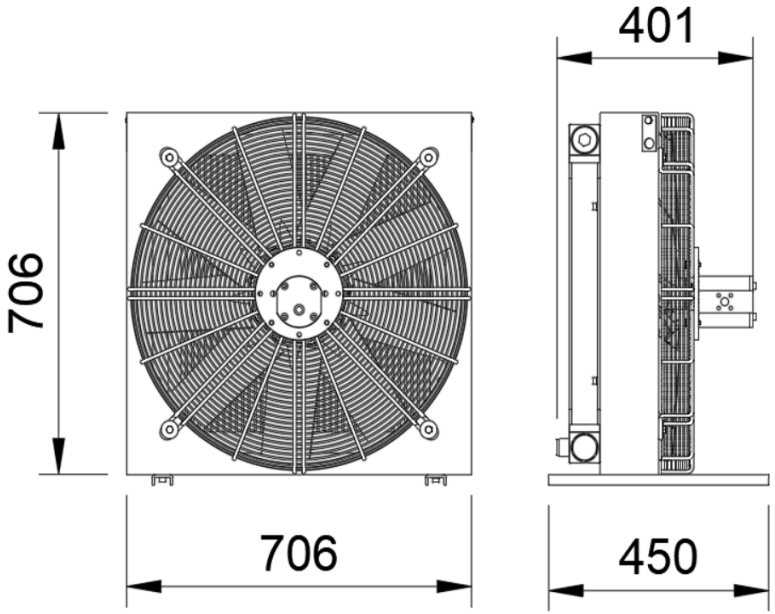


measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

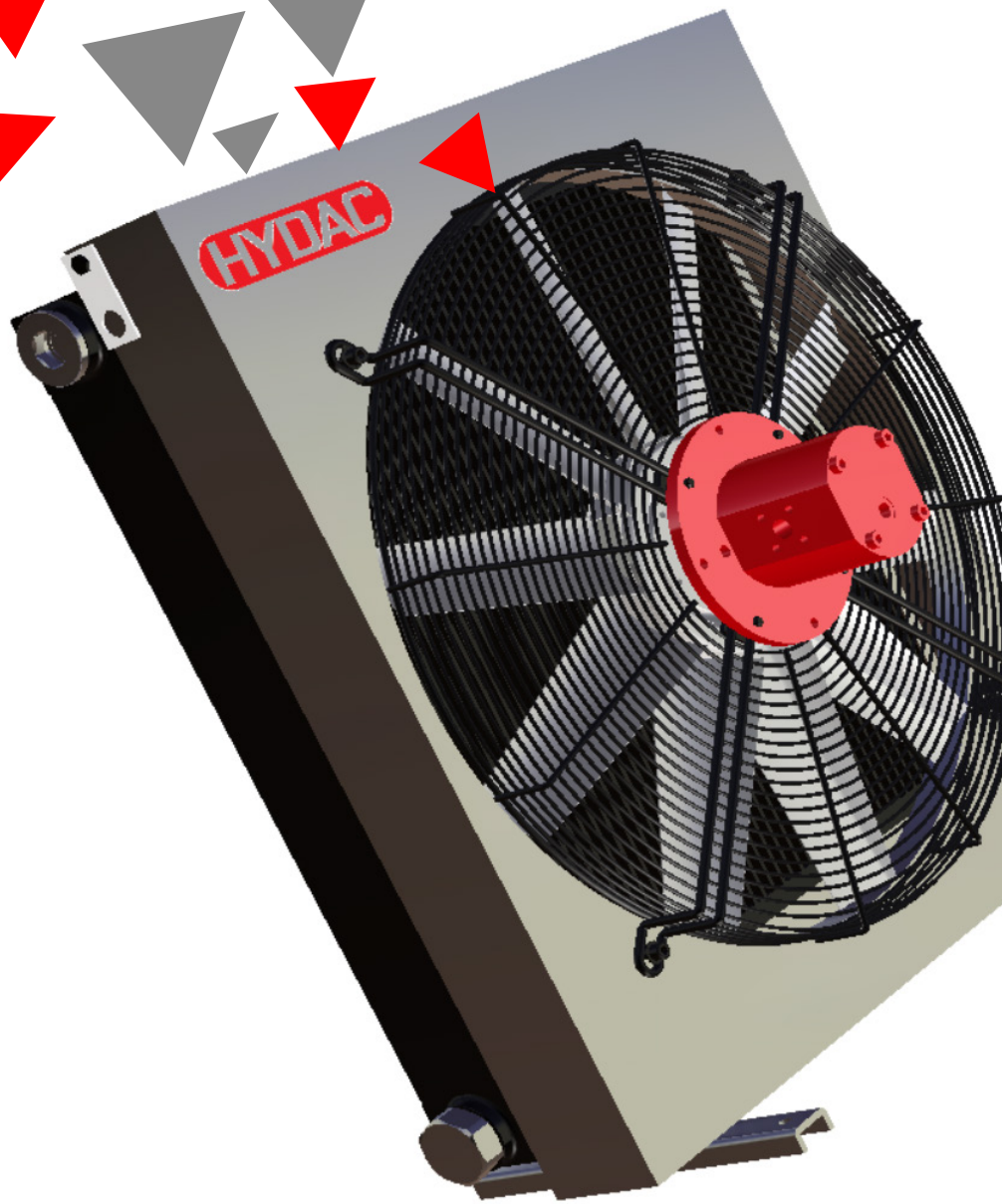
Dimensions



*Dimensions in mm

HYDAC Australia's OK-ELH 7 Range

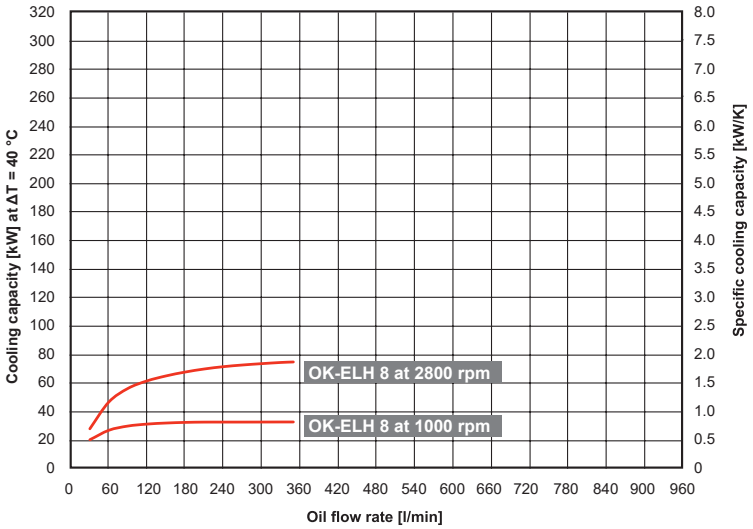
Code	Description
3466650	OK-ELH7/1.0/H14/1/S/IBP3
3562072	OK-ELH7/1.0/H22/1/S/IBP3
4157279	OK-ELH7/1.0/H22TB/1/S/IBT45-3



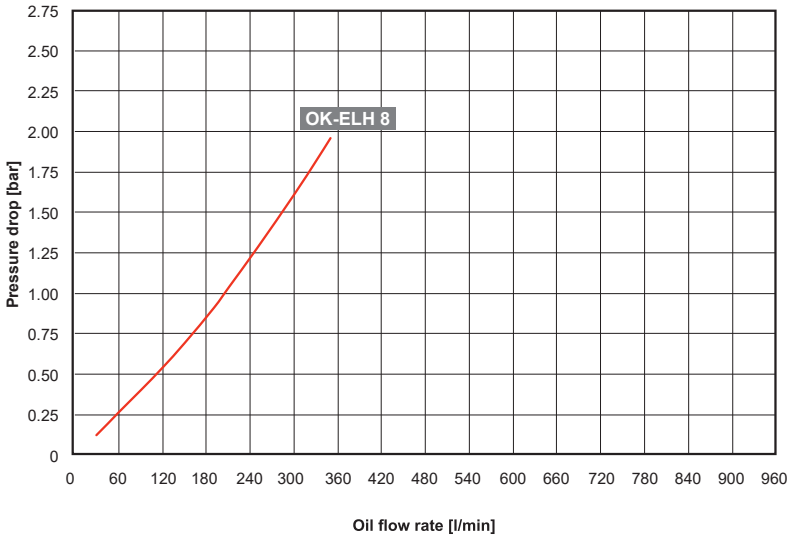
OK-ELH8

Hydraulic motor displacements	:	6.3 cc/rev	14.0 cc/rev	22.0 cc/rev
Fan speed	:	Up to 2800 rpm		
Required pressure for max speed (at 34 cSt)	:	270 bar	120 bar	80 bar
Cooler Volume	:	8.3 L		
Noise level at 2800 rpm	:	98 SPL dB(A) @1m distance		
Weight	:	67.0 kg		

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

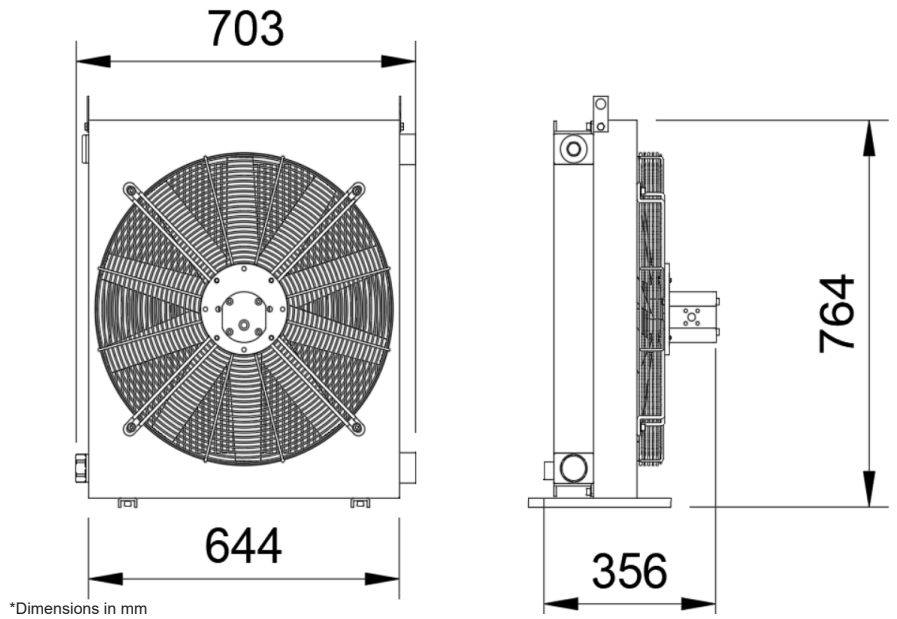


Measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

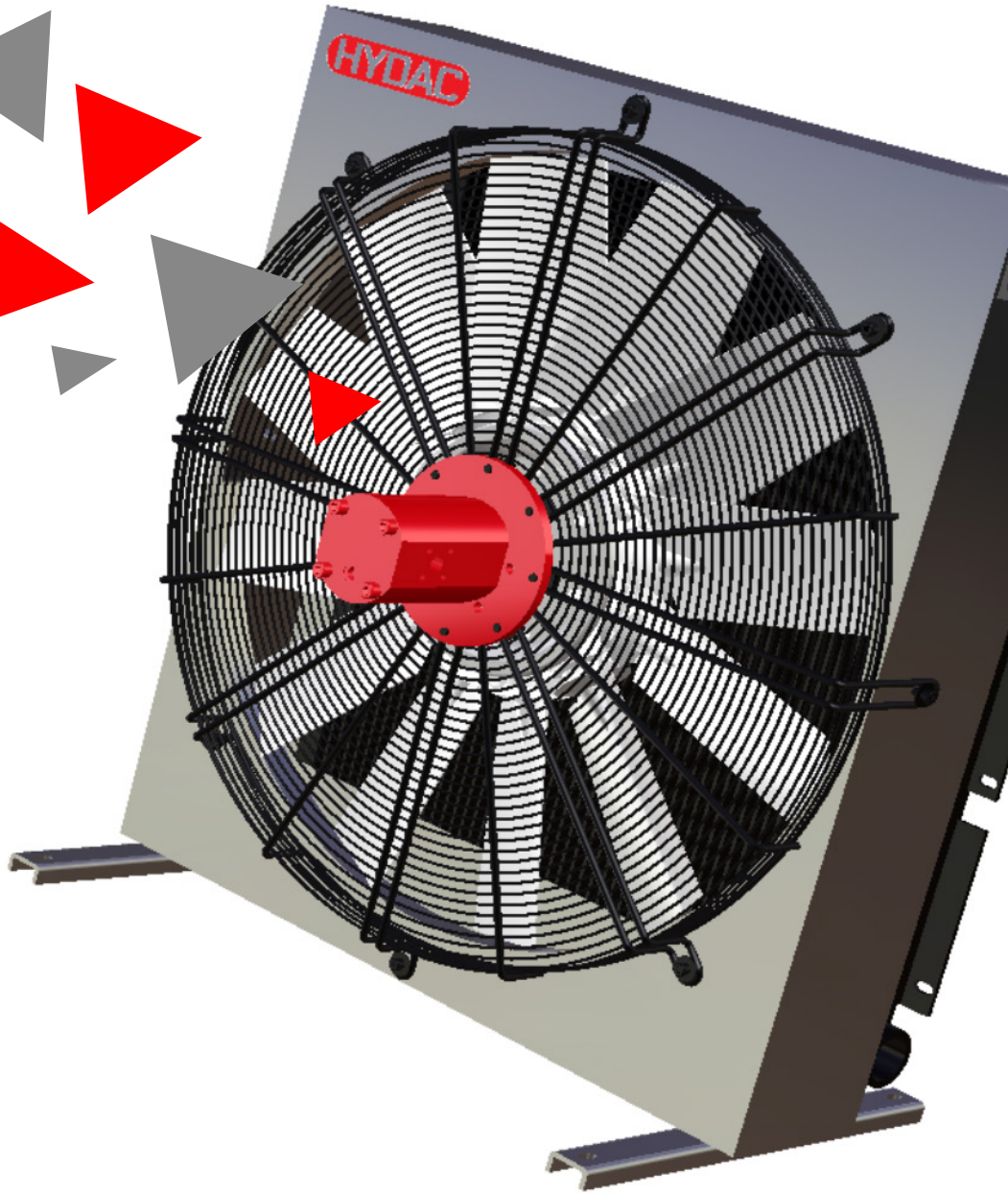


*Dimensions in mm

HYDAC Australia's OK-ELH 8 Range

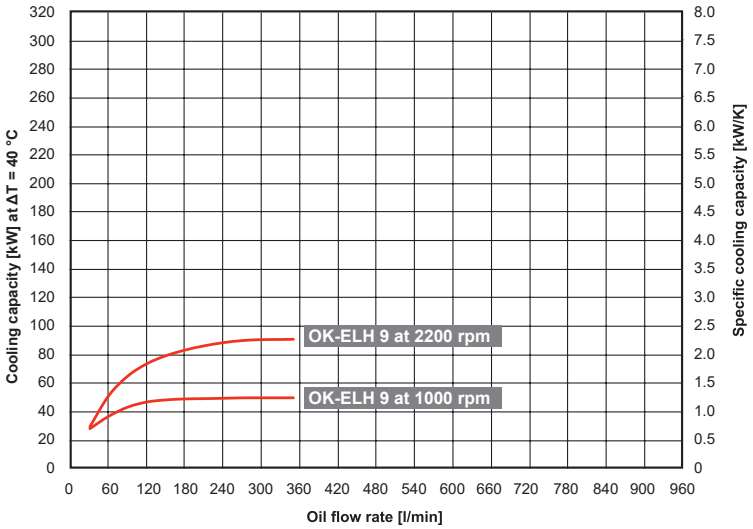
Code	Description
3741317	OK-ELH8/1.0/H6.3/1/S/IBP3
2354724	OK-ELH8/2.0/H11/1/S/IBP3
3222526	OK-ELH8/1.0/H14/1/S/IBP3
3258145	OK-ELH8/1.0/H14TB/1/S/IBT45
3362520	OK-ELH8/1.0/H22/1/S/IBP3
3541248	OK-ELH8/1.0/H22/1/S/IBP3/CPL1
2351199	OK-ELH8/1.0/H22/1/S/IBT50-3
2354687	OK-ELH8/1.0/H32TB/1/S/IBT45-3/LFG

OK-ELH9

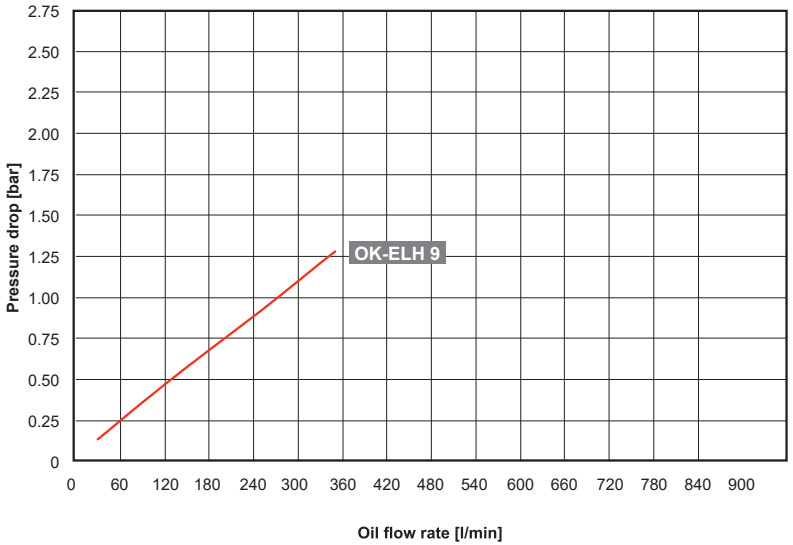


Hydraulic motor displacements	:	14.0 cc/rev 22.0 cc/rev
Fan speed	:	Up to 2200 rpm
Required pressure for max speed (at 34 cSt)	:	120 bar 80 bar
Cooler Volume	:	11.3 L
Noise level at 2200 rpm	:	98 SPL dB(A) @1m distance
Weight	:	85.0 kg

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

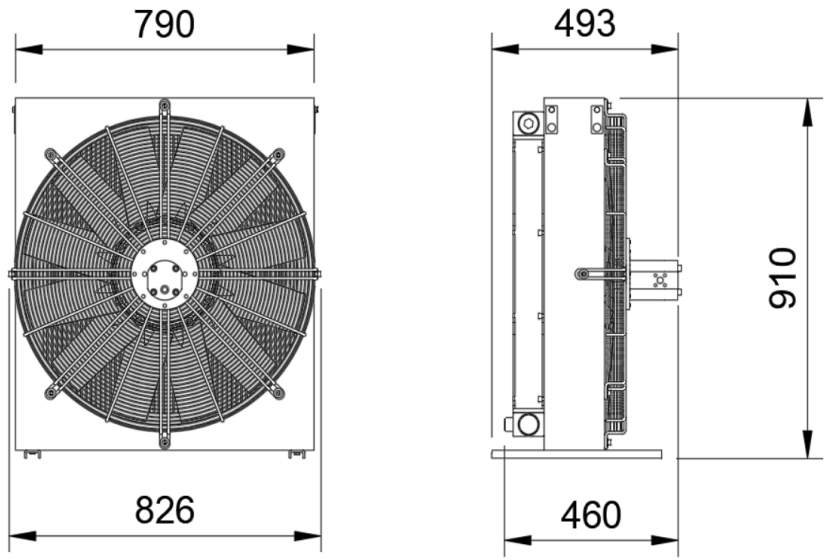


Measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

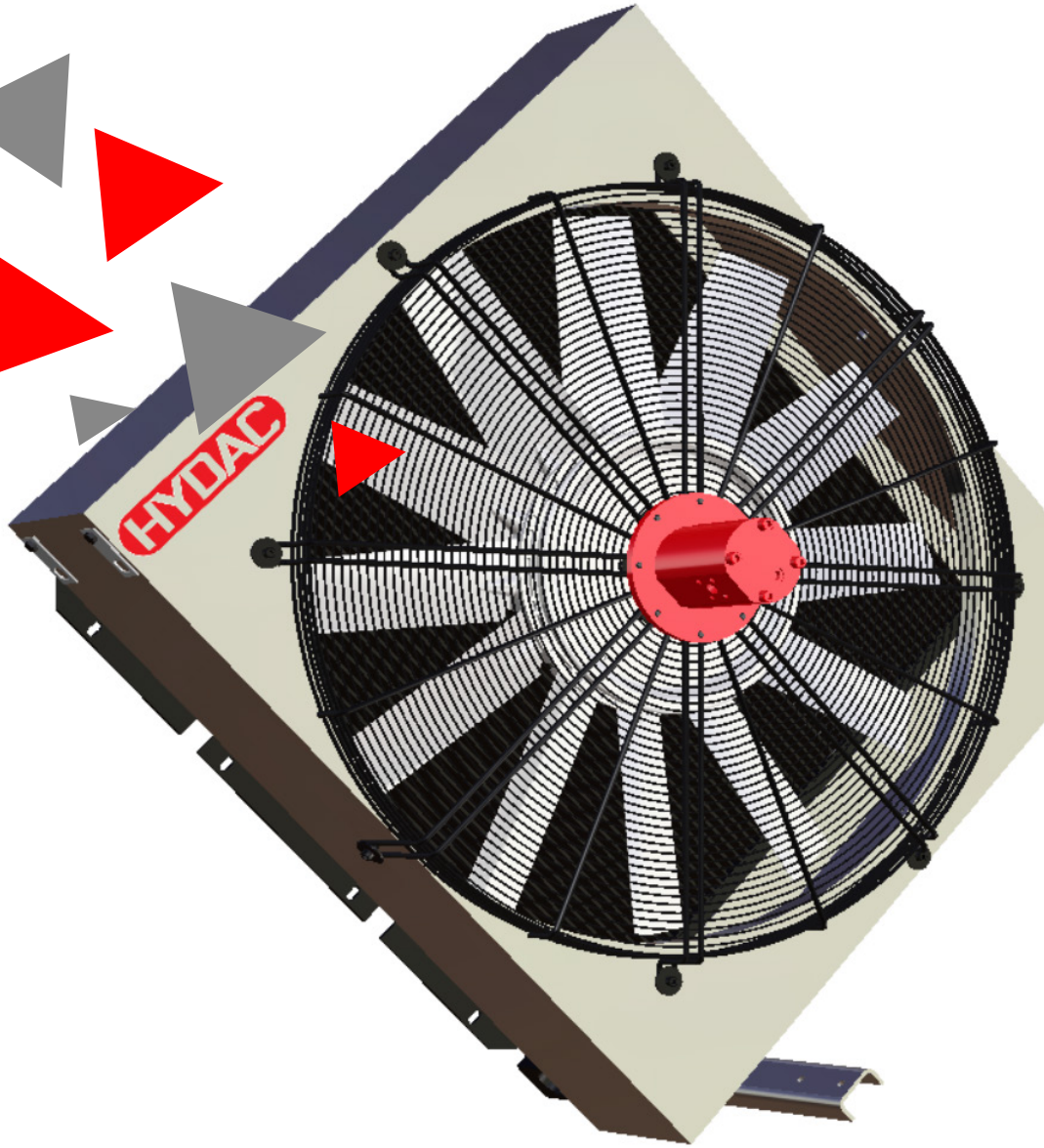


*Dimensions in mm

HYDAC Australia's OK-ELH 9 Range

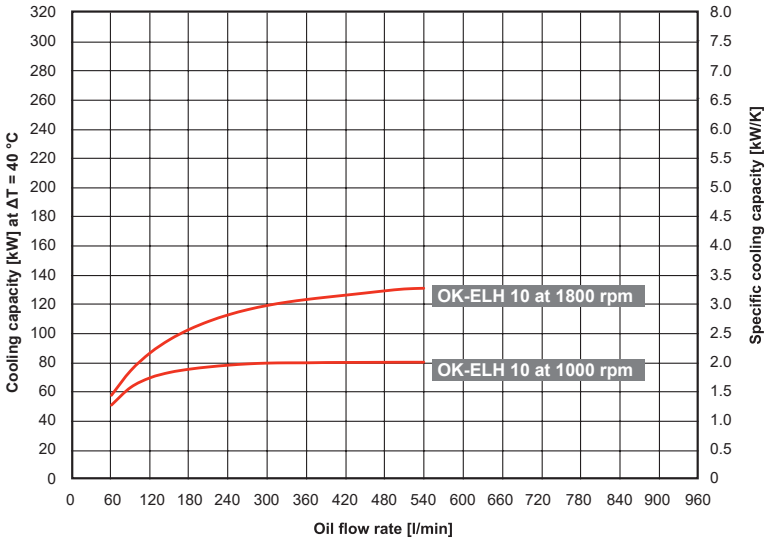
Code	Description
3166870	OK-ELH9/1.0/H14/1/S/IBP3
3156238	OK-ELH9/1.0/H22/1/S/IBP3
2354275	OK-ELH9/1.0/H22/1/S/IBT45-3

OK-ELH10

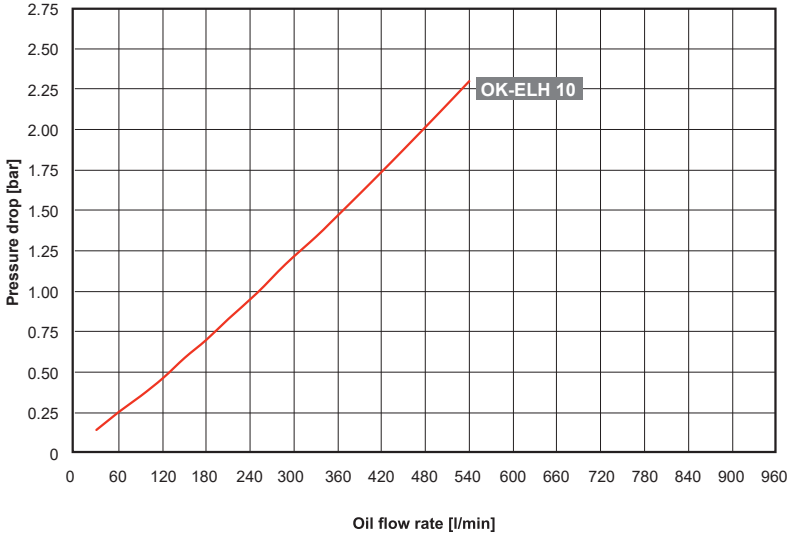


Hydraulic motor displacements	:	14.0 cc/rev 22.0 cc/rev
Fan speed	:	Up to 1800 rpm
Required pressure for max speed (at 34 cSt)	:	210 bar 140 bar
Cooler Volume	:	16.5 L
Noise level at 1800 rpm	:	98 SPL dB(A) @1m distance
Weight	:	110.0 kg

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

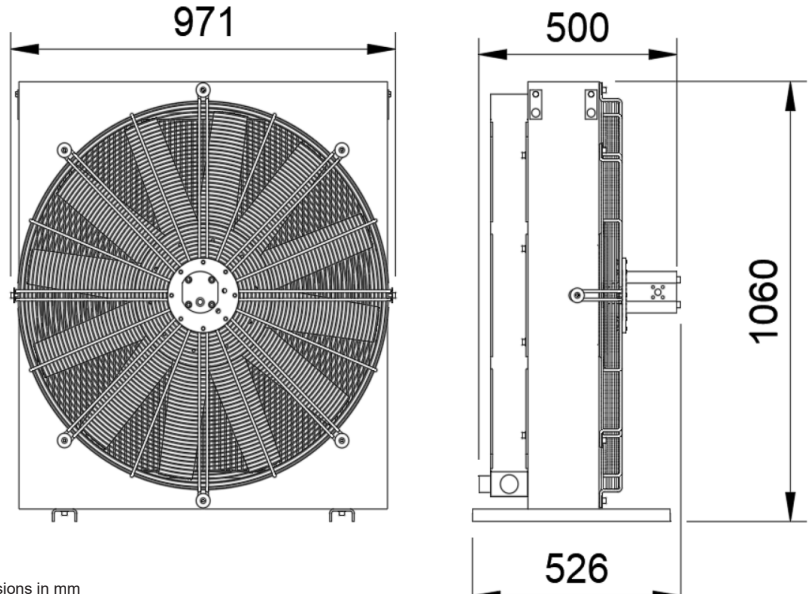


Measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions



*Dimensions in mm

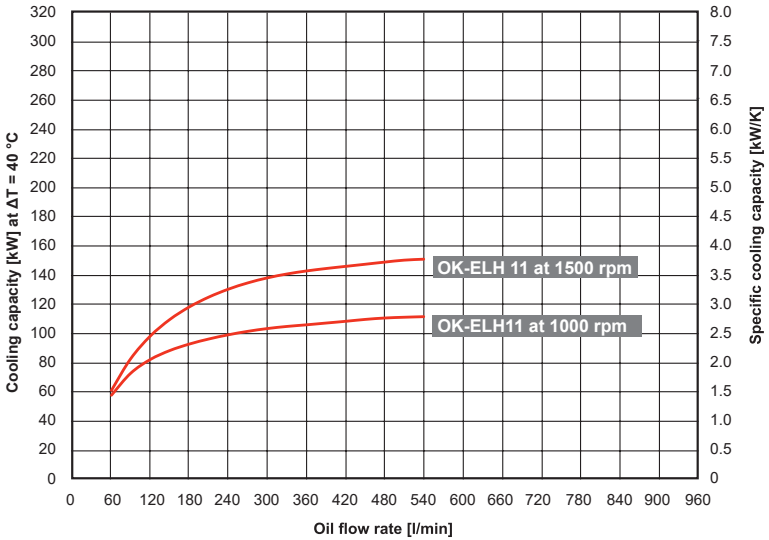
HYDAC Australia's OK-ELH 10 Range

Code	Description
3219617	OK-ELH10/1.0/H22/1/S/IBP3
3562873	OK-ELH10/1.0/H22TB/1/S/IBP3
3606884	OK-ELH10/1.0/H22TB/1/S/IBT45-3

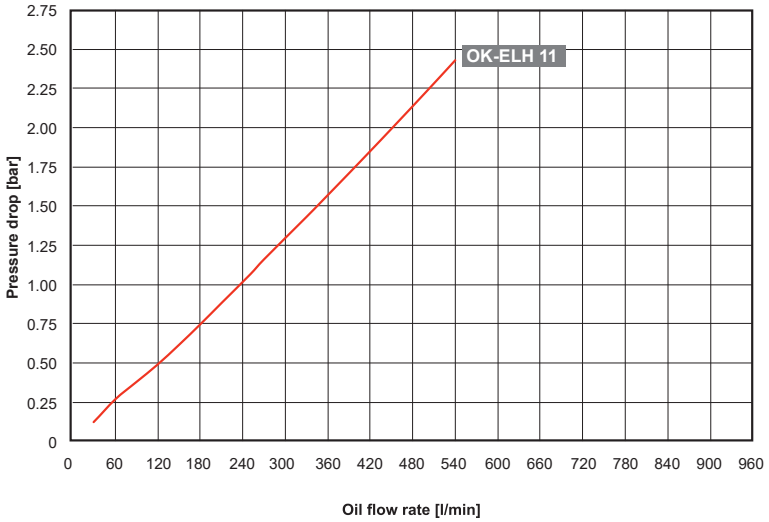
OK-ELH11

Hydraulic motor displacements	:	14.0 cc/rev 22.0 cc/rev
Fan speed	:	Up to 1500 rpm
Required pressure for max speed (at 34 cSt)	:	270 bar 180 bar
Cooler Volume	:	25.0 L
Noise level at 1500 rpm	:	99 SPL dB(A) @1m distance
Weight	:	155.0 kg

Cooling Capacity and Pressure Drop



Tolerance: ±5 %

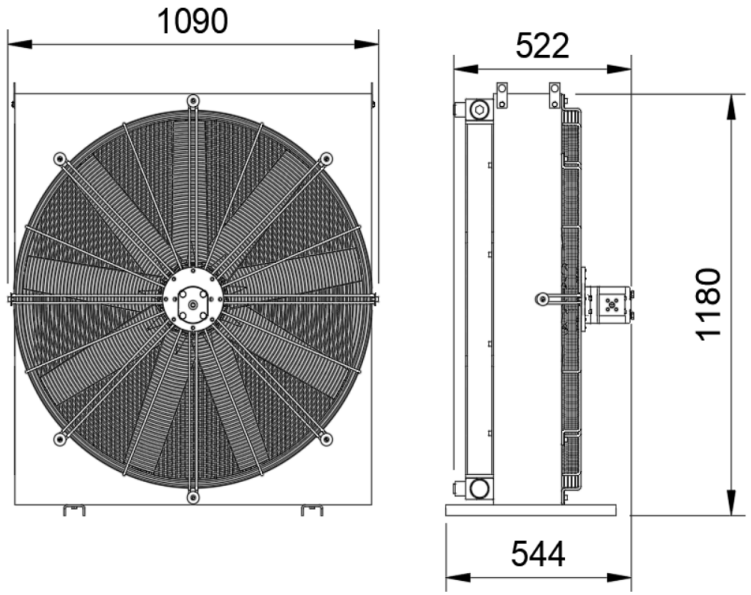


Measured at 30 mm²/s
Tolerance: ±5 %

For other viscosities. The pressure loss can be multiplied by the conversion factor K

Viscosity (mm²/s)1	01	5	22	30	46	68	100	150
Factor K	0.35	0.5	0.75	1.01	.4	1.92	.5	3.5

Dimensions

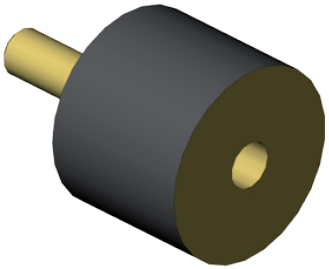


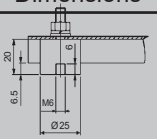
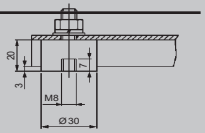
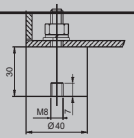
*Dimensions in mm

HYDAC Australia's OK-ELH 11 Range

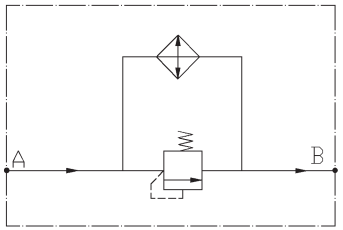
Code	Description
3170606	OK-ELH11/1.0/H14/1/S/IBP3
4197705	OK-ELH11/1.0/H14/1/S/IBP3/ATEX/CPLS
4547540	OK-ELH11/1.0/H14TB/S/IBP3/CPLS
3240901	OK-ELH11/1.0/H22/S/IBP3
3378112	OK-ELH11/1.0/H22TB/1/S/IBP3
2354849	OK-ELH11/1.0/H22/1/S/LFG/IBT45-3
2354290	OK-ELH11/1.0/H22TB/1/S/IBT45-3
2354712	OK-ELH11/1.0/H22/1/S/IBP3/ATEX-IECEx

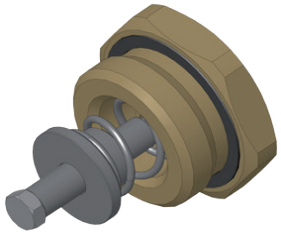
Vibration Absorbers



Code	Cooler Type	Dimensions
2506800	OK-ELH3-4-6-8	
2355427	OK-ELH5-7-9	
2506197	OK-ELH 10-11	

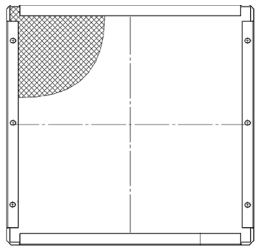
Integrated Pressure Bypass Valve





Code	Description	Available opening pressure
3137865	IBP2	2
3137866	IBP3	3
3238002	IBP4	4
3285038	IBP6	6

Element Protection grid

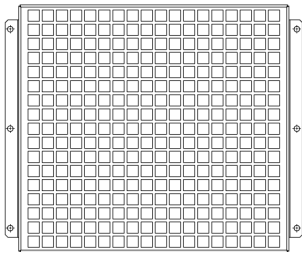


LFG (Luft Filter Gitter): Air Filter grid

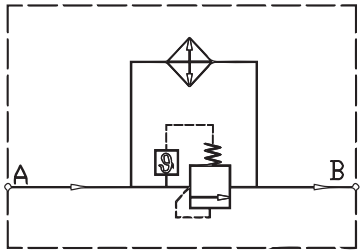
Protective grid with a metal mesh that helps prevent the radiator core from clogging with small particles.
Steel network = □1x1 mm

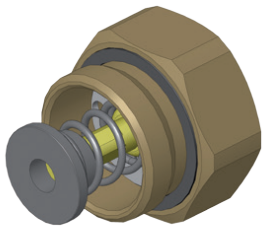
LS (Luftschutzgitter gegen Steine): protection grid against stones

Metal grid with hole size of □ 20x20mm



Integrated Temperature - Pressure Bypass Valve





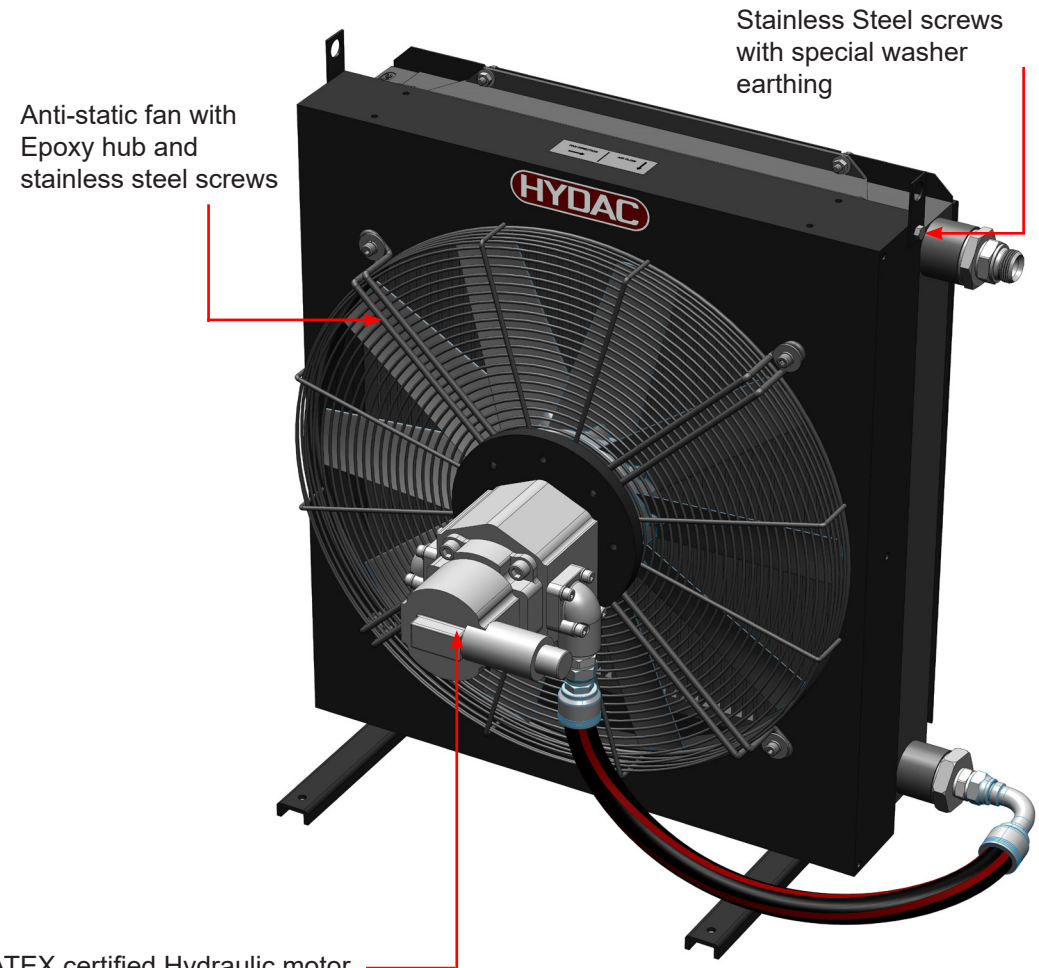
Code	Description	Available closing temperatures	Available opening pressure
3442907	IBT25 - 2 bar *	25	2
3137938	IBT45 - 2 bar *	45	2
3193660	IBT45 - 3 bar *	45	3
3207640	IBT45 - 4 bar *	45	4
3341645	IBT45 - 6 bar *	45	6
3239495	IBT50 - 3 bar	50	3
3137867	IBT60 - 2 bar *	60	2
3316726	IBT60 - 3 bar *	60	3
3143587	IBT65 - 2 bar *	65	2
3727405	IBT75 - 2 bar *	75	2

The protection levels are verified in neutral salt spray tests following EN ISO 9227. Quality and performance are guaranteed in every condition.

Standard	CPL1	CPL2	CPLS
Atmosphere with low level of pollution, rural areas. Places where condensation may occur.	Atmospheres with moderate sulfur dioxide pollution and humidity. Coastal areas with low salinity.	Industrial areas and coastal areas with moderate to high salinity.	For industrial offshore applications
Test resistance not applicable	Key features: • Stainless steel fastners • Epoxy fan hub	Key features: • Radiator core and fan grid with Nanokote coating • Metalwork with 3 coat system. • Stainless steel screws • Epoxy fan hub • 1440 hours salt spray test.	• Special coating system with HERESITE

OVERVIEW

ATEX feature is available for applications in potentially explosive areas in order to prevent serious personal injury and damage to equipment, the highest possible level of safety must be achieved in such potentially explosive locations. Numerous requirements in terms of laws, regulations, directives and standards have been issued worldwide to enhance the level of safety.
In the context of globalization these have been combined, at least in Europe, into harmonized directives for explosion protection.
In the EU, the so-called ATEX directive regulates explosion protection (ATEX is the abbreviation of Atmosphere Explosible). This directive of the European Parliament and the Council (RL 94/9/EG) which has been in force since 1994 regulates “the alignment of laws of the member states relating to equipment and protection systems specifically for use in potentially explosive locations”.
The target group includes amongst others the manufacturers of equipment. Following a revision in July 2003, all new equipment must be realized according to this directive. This directive applies to areas where potentially explosive gases and dust are present and also in mining.



MAR 1.005.04.21