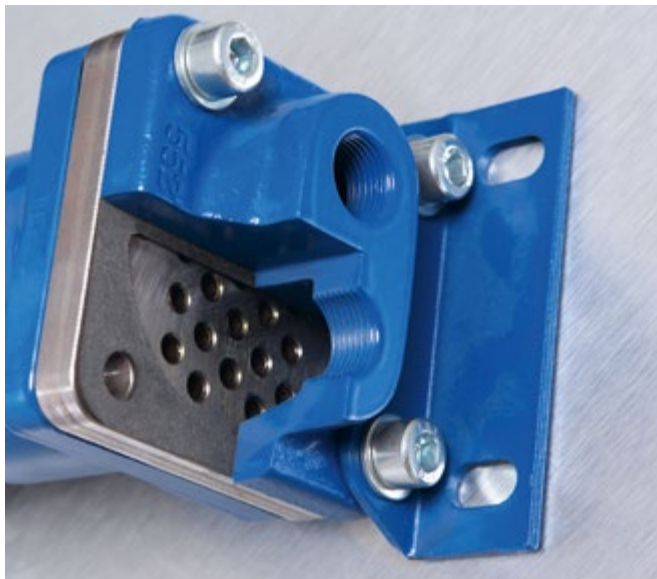
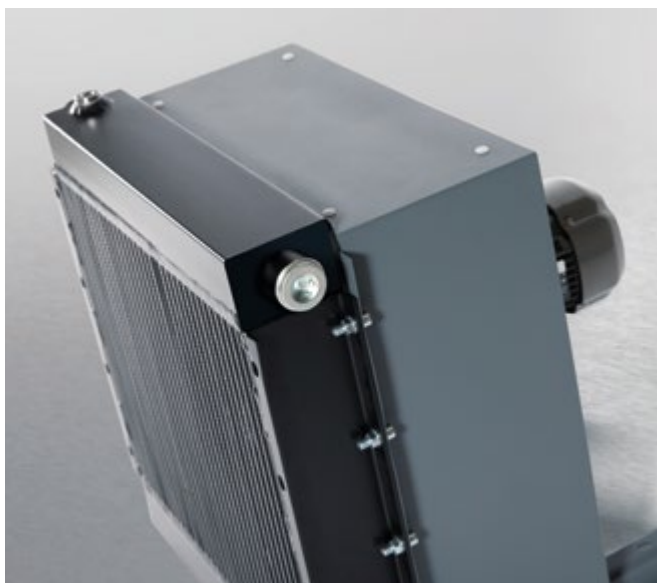




OIL COOLERS

OIL COOLERS



CONTENT

ACI	111
ACIP	120
ACM	122
DOC	132
EKM / SKM	137
UKC	150

OIL AIR COOLER FOR INDUSTRIAL OPERATION

SERIES ACI



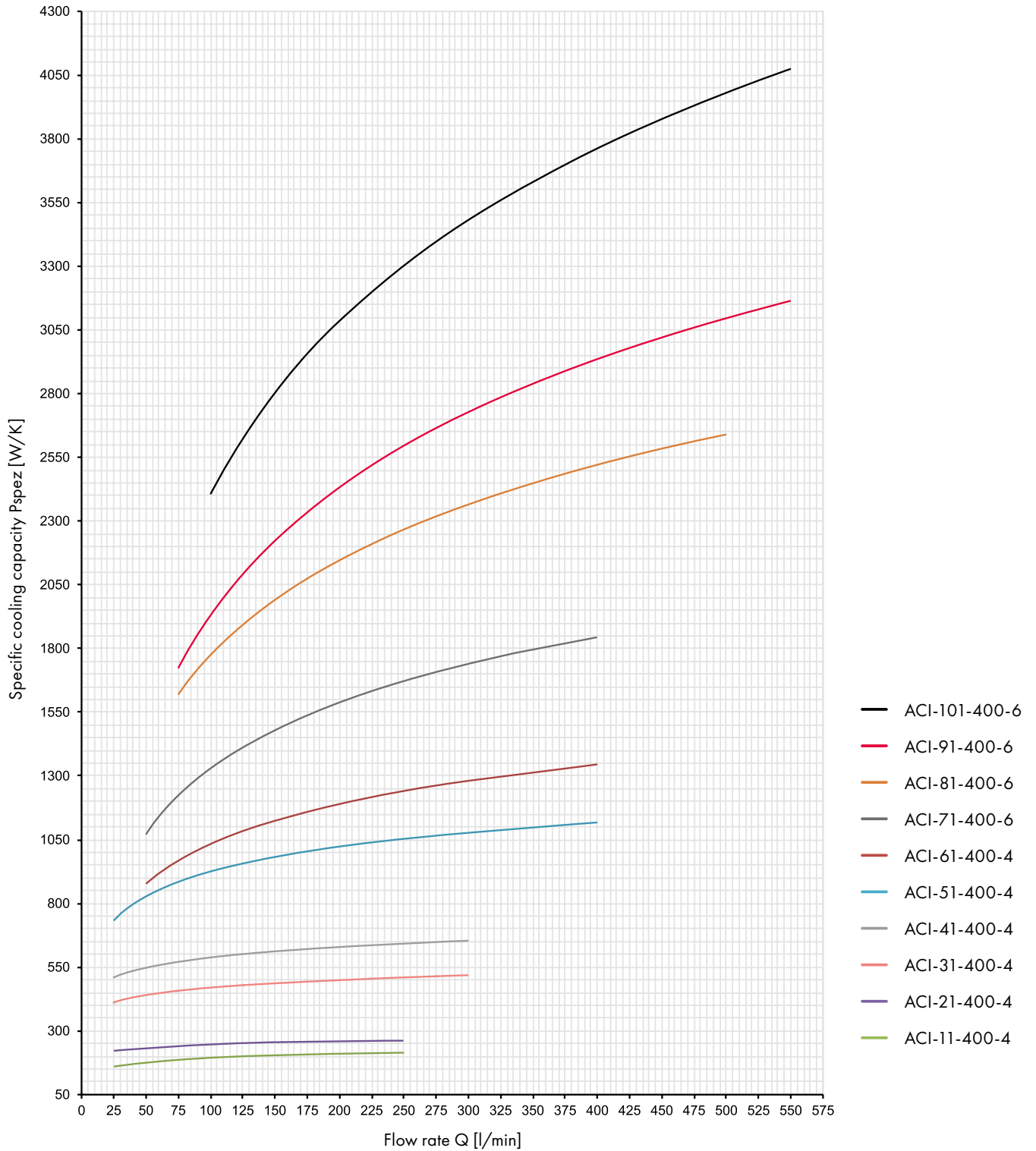
PRODUCT FEATURES

- Noise level reduction due to axial fan blades of the latest design
- Streamlined fan housing for optimisation of the air flow
- Air fins insensitive to contamination
- Static test pressure 25 bar according to DIN 50104
- Peak pressure resistance at 16 bar and 1×10^6 load cycles, $f = 1\text{ Hz}$
- Operating pressure: 16 bar
- Max. operating temperature: 120°C
- Powder-coated housing
- Drive motor: 230 - 400V, 50Hz (DC version 12/24V on request)
- Operation with all common hydraulic fluids of different viscosities (oil, HFA, HFC, etc.)
- Cooling block also available in 2-way design or with internal bypass-valve on request

MATERIALS

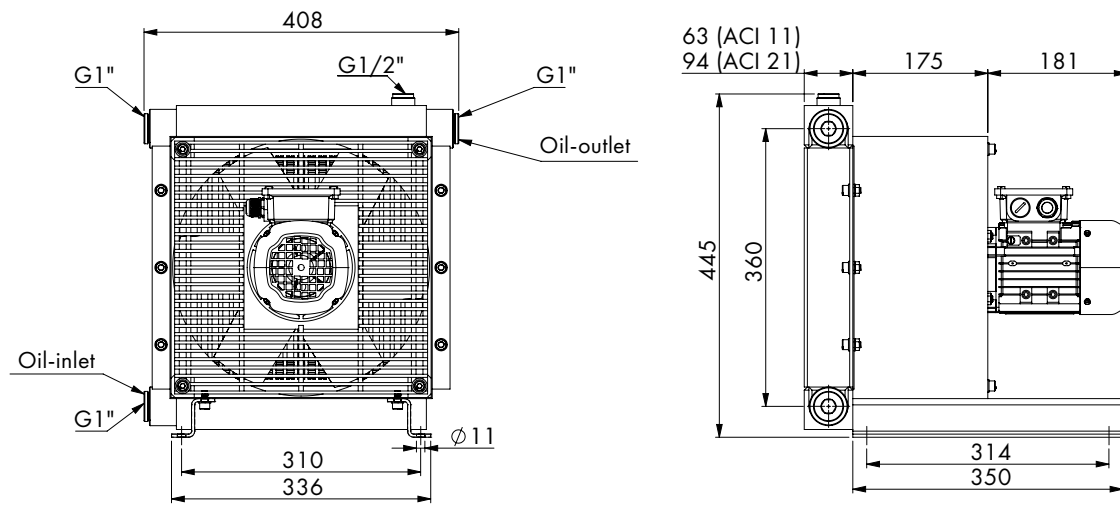
Component	Material	Surface
Cooler block	Aluminum	powder-coated according to RAL 9006
Fan housing	Steel	powder-coated according to RAL 7012
Axial-fan	Plastic (PAG)/Aluminium	
Protection grid	Steel	galvanized
Mounting feet	Steel	powder-coated according to RAL 7012

COOLING CAPACITY



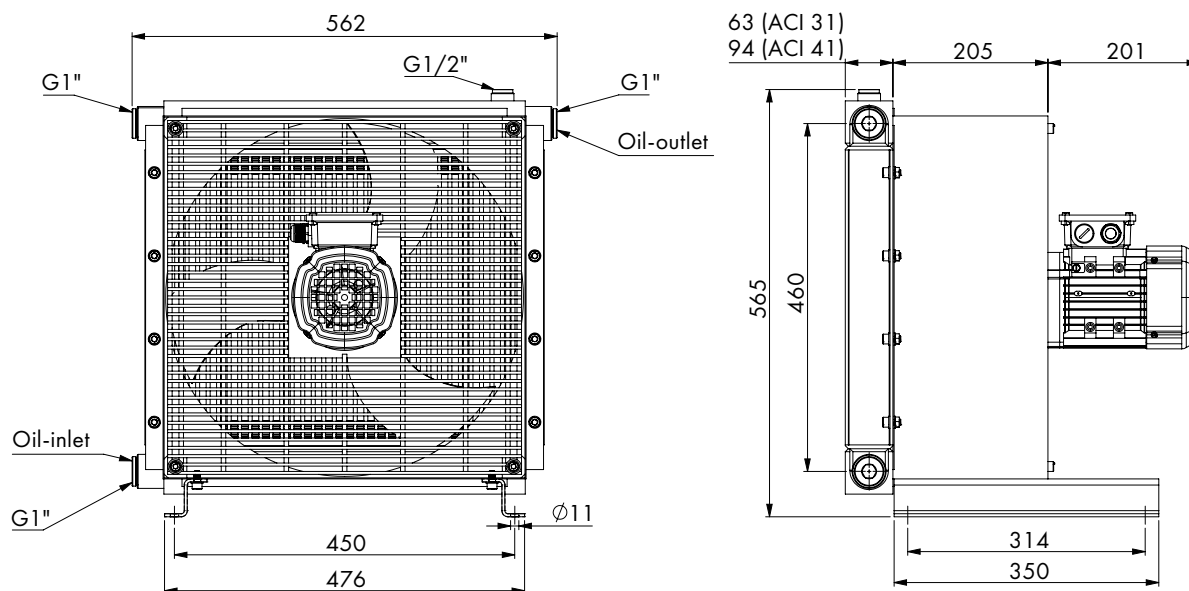
The specific cooling capacity indicated in the graph was determined on the test bench, test oil ISO VG 46, oil-inlet temperature 60°C. The actual cooling capacity may deviate by approx. $\pm 5\%$ depending on the installation site and other operating parameters.

ACI-11/ACI-21



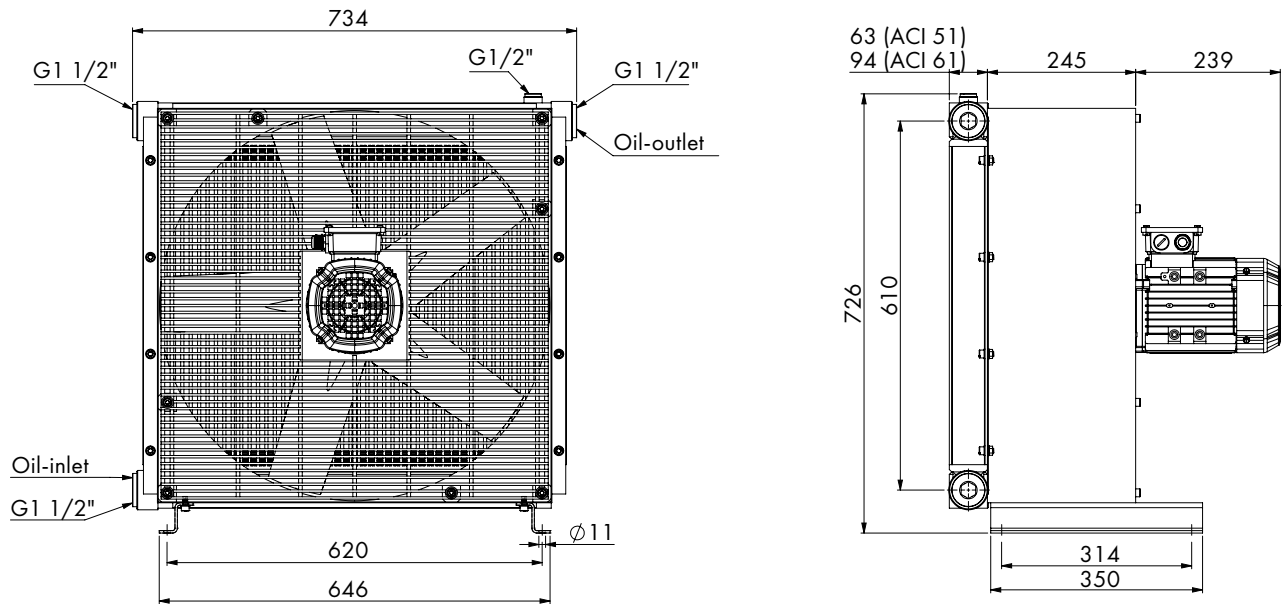
Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-11-400-4	0.18	0.58	1500	0.49	61	17
ACI-21-400-4	0.18	0.58	1500	0.5	62	20

ACI-31/ACI-41



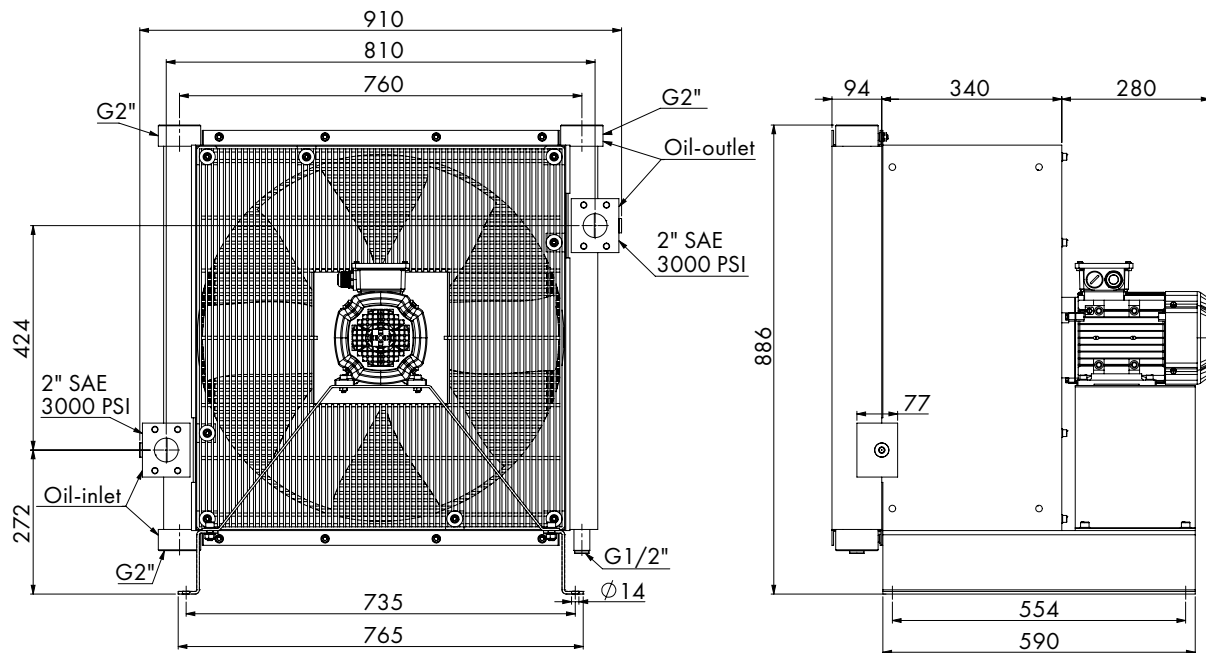
Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-31-400-4	0.37	0.89	1500	0.75	58	25
ACI-41-400-4	0.37	0.89	1500	0.76	62	32

ACI-51/ACI-61



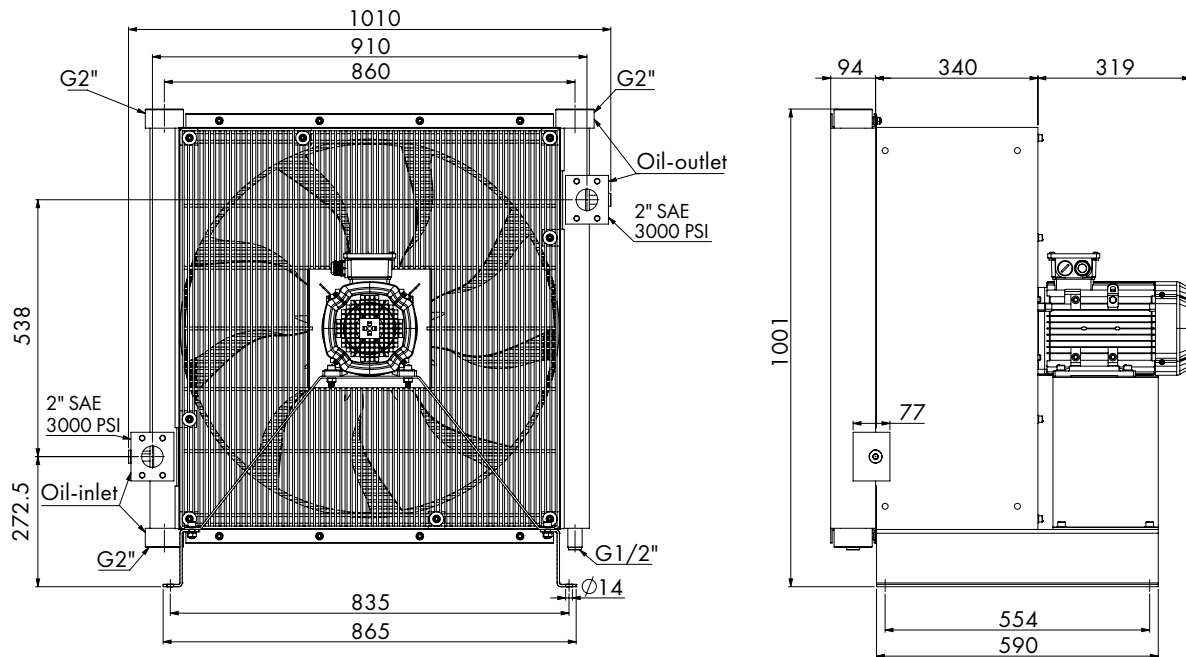
Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-51-400-4	0.75	1.71	1500	1,7	69	40
ACI-61-400-4	0.75	1.71	1500	1,5	69	49

ACI-71



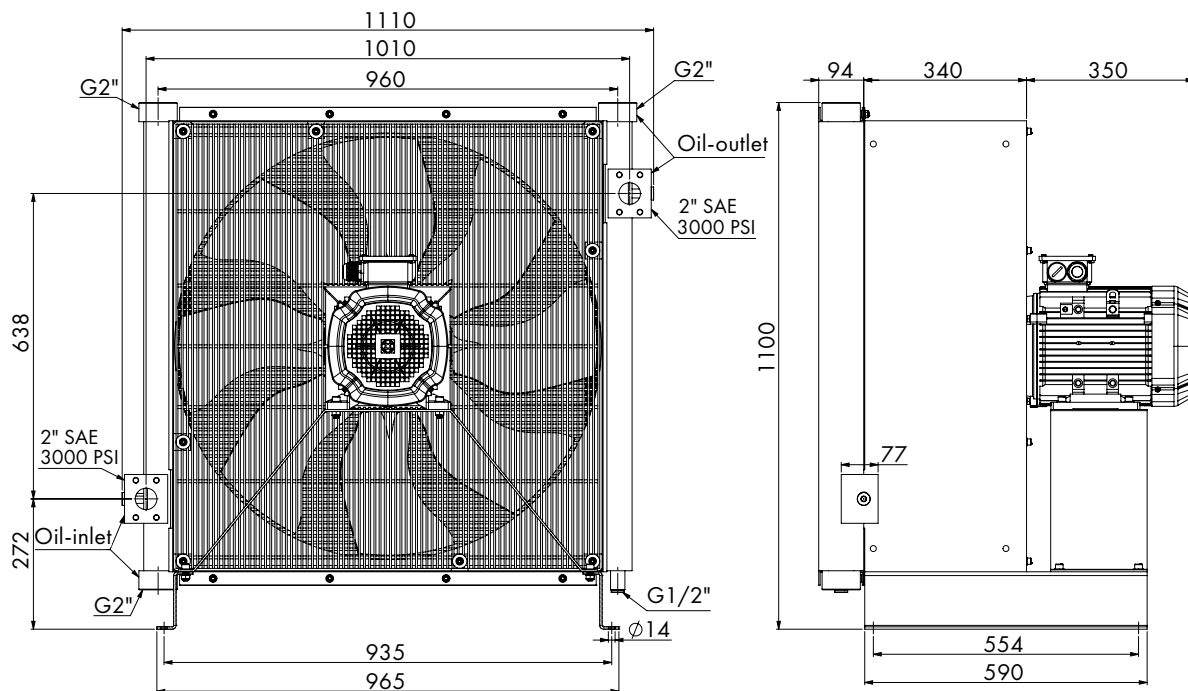
Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-71-400-6	1.1	2.55	1000	2.15	63	91

ACI-81



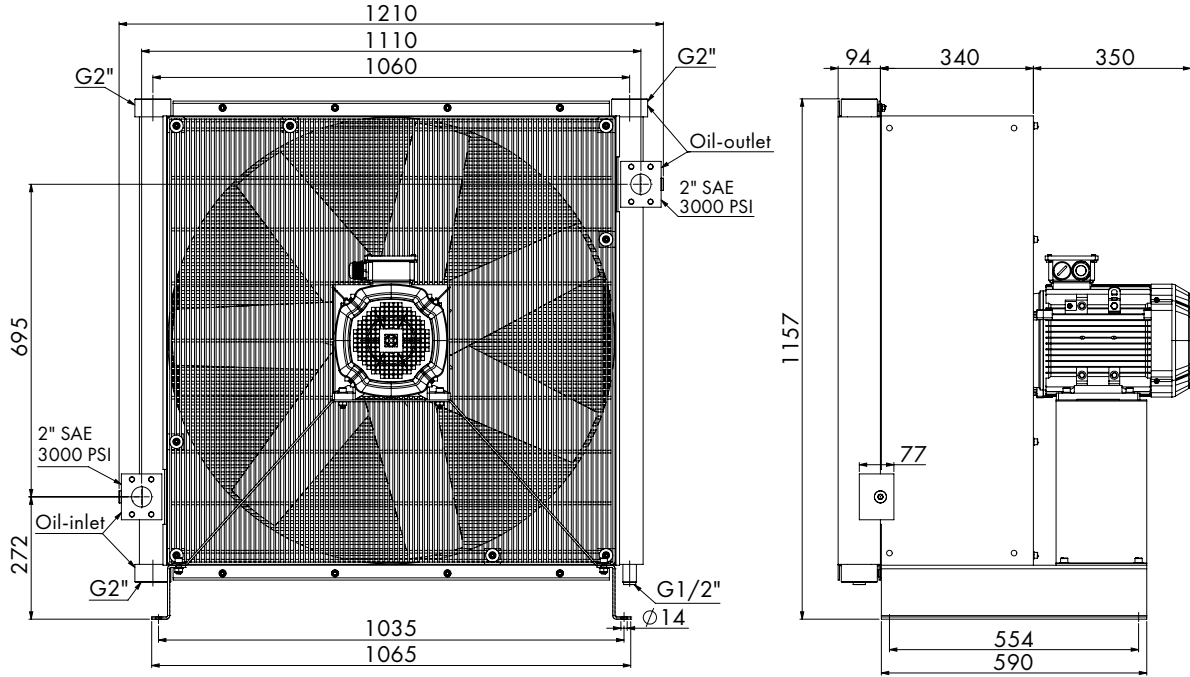
Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-81-400-6	1.5	3.77	1000	3.37	67	110

ACI-91



Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-91-400-6	3	7.1	1000	4.31	71	137

ACI-101



Cooler type	Motor power [kW]	Power consumption [A]	Rotation [1/min]	Air flow [m ³ /s]	Noise level [dB(A)]	Empty weight [kg]
ACI-101-400-6	3	7.1	1000	5.3	71	157

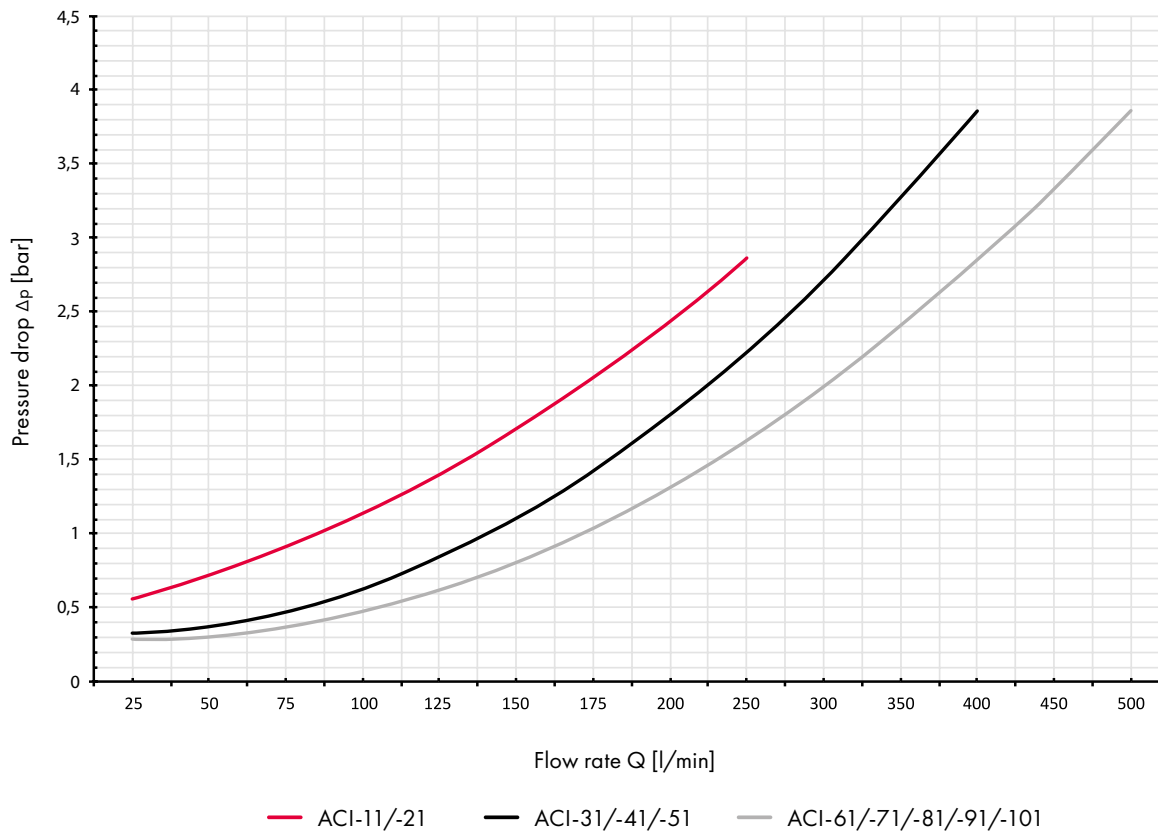
ORDERING CODE ACI

ACI - 31 - 400 - 4 - 0 - 0 - 0 - 0

<p>Cooler series ACI = cooler for industrial application</p>	<p>Cooler size 1 2 3 4 5 6 7 8 9 10</p>	<p>Versions 1 = 1-pass 2 = 2-pass</p>	<p>Input voltage 400 = 400 Volt AC</p>	<p>Additional options** 0 = without 1 = internal bypass-valve</p>	<p>Mounting options 0 = standard: feet mounted 1 = horizontally mounted with special bracket</p>	<p>Air flow direction 0 = suction air flow 1 = blowing air flow</p>	<p>Mounting position of cooler block 0 = standard 1 = turned 90° clockwise* 2 = turned 180° clockwise</p>	<p>Engine revolution 2 = 2 pole / 3,000 min⁻¹ 4 = 4 pole / 1,500 min⁻¹ 6 = 6 pole / 1,000 min⁻¹ 8 = 8 pole / 750 min⁻¹</p>
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* possible with ACI-71/-81/-91/-101 ** additional options on request

PRESSURE DROP



CONVERSION FACTORS VISCOSITY

The correction factor has to be used for the calculation of the pressure drop for other viscosities:

$$\Delta p_{\text{Oil}} = \Delta p_{46\text{cSt}} \times f$$

$\Delta p_{46\text{cSt}}$ as indicated in the graph.

Viscosity	Factor
ISO VG 22	0.7
ISO VG 32	0.8
ISO VG 46	1
ISO VG 68	1.2
ISO VG 100	1.5
ISO VG 150	1.7
ISO VG 220	2
ISO VG 320	2.5
ISO VG 460	2.9

CALCULATION OF COOLER SELECTION

EXAMPLE 1:

Cooling capacity known

Cooling capacity $P = 65 \text{ kW}$
Oil inlet temperature $T_{\text{Oil}} = 70^\circ\text{C}$
Ambient temperature $T_{\text{Air}} = 20^\circ\text{C}$
Oil flow $Q_{\text{Oil}} = 300 \text{ l/min}$

$$\begin{aligned}\text{Specific cooling capacity: } & \frac{P}{T_{\text{Oil}} - T_{\text{Air}}} \\ & = \frac{65 \text{ kW}}{70^\circ\text{C} - 20^\circ\text{C}} \\ & = 1300 \text{ W/K}\end{aligned}$$

SELECTION OF COOLER TYPE:

ACI-61-400-4

CALCULATION OF TEMPERATURE DIFFERENCE:

$$\begin{aligned}\Delta T_{\text{Oil}} & = \frac{36 \times P}{Q_{\text{Oil}}} \\ & = \frac{36 \times 65 \text{ kW}}{300 \text{ l/min}} \\ & = 7.8 \text{ K}\end{aligned}$$

EXAMPLE 2:

Cooling capacity unknown

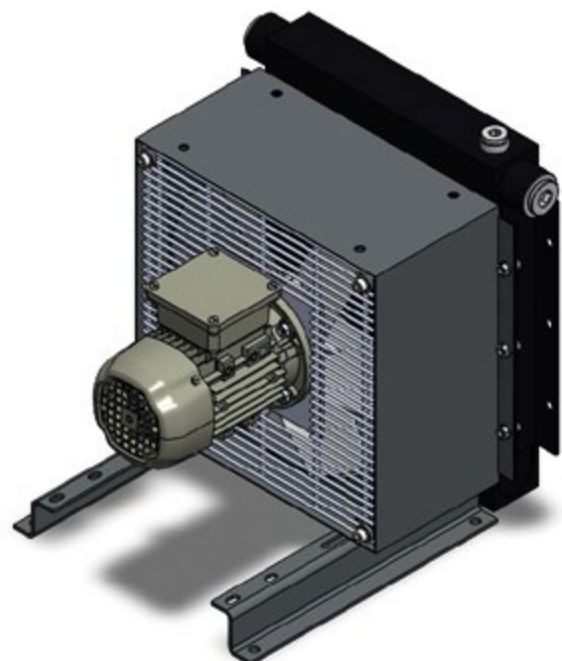
The heattransfer to the oil is approx. 30% of the motor power (diesel/electric motor)

Motor power $P_{\text{Motor}} = 45 \text{ kW}$
Cooling capacity $P = 13.5 \text{ kW}$
Oil inlet temperature $T_{\text{Oil}} = 50^\circ\text{C}$
Ambient temperature $T_{\text{Air}} = 20^\circ\text{C}$
Oil flow $Q_{\text{Oil}} = 200 \text{ l/min}$

$$\begin{aligned}\text{Specific cooling capacity: } & \frac{P}{T_{\text{Oil}} - T_{\text{Air}}} \\ & = \frac{13.5 \text{ kW}}{50^\circ\text{C} - 20^\circ\text{C}} \\ & = 450 \text{ W/K}\end{aligned}$$

SELECTION OF COOLER TYPE:

ACI-31-400-4



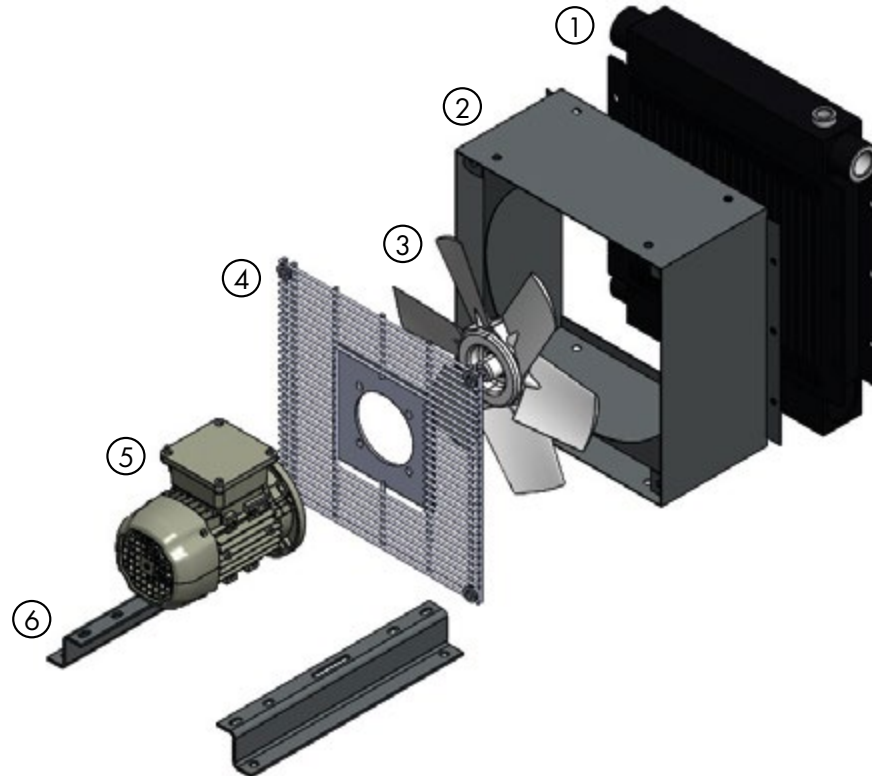
INSTALLATION INSTRUCTIONS

If possible, the heat exchanger should be integrated into the system with suitable hydraulic hoses. In the case of rigid piping, compensators are one way of eliminating introduction of forces via the piping.

Pressure peaks in the system can lead to fatigue failure of the heat exchanger, even if they are below the permissible operating pressure. The frequency of the peaks is the influencing variable.

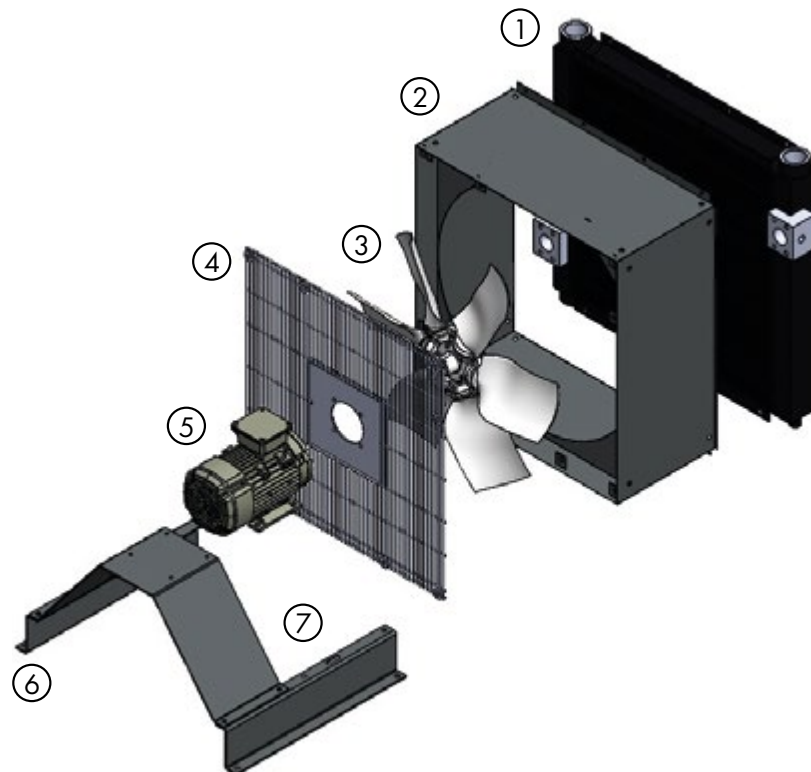
ACI-11 TO ACI-61

- 1 Cooler block
- 2 Fan housing
- 3 Axial fan
- 4 Protection grid
- 5 Electric engine
- 6 Mounting brackets



ACI-71 TO ACI-101

- 1 Cooler block
- 2 Fan housing
- 3 Axial fan
- 4 Protection grid
- 5 Electric engine
- 6 Mounting brackets
- 7 Support of electric engine



PARTIAL FLOW COOLER UNIT FOR INDUSTRIAL USE

SERIES ACIP

PRODUCT DESCRIPTION

The new cooler system ACIP is optimised for a wide range of hydraulic applications. An integrated motor pump unit makes it possible to cool the oil efficiently and continuously in a separate circuit. The cooling process is working independently from the operation condition of the main hydraulic power unit.



PRODUCT FEATURES

- Oil-air cooler ACI with motor & pump in one unit
 - Drive motor 230/400 V, 50 Hz, 1450 min⁻¹
 - Gear pump, operating pressure: 4 bar
 - Bellhousing and coupling
- Continuous cooling process
- Permissible viscosity range: 10 - 300 mm²/s
- Max. operating temperature 90°C
- Max. suction height 1 m

BENEFITS

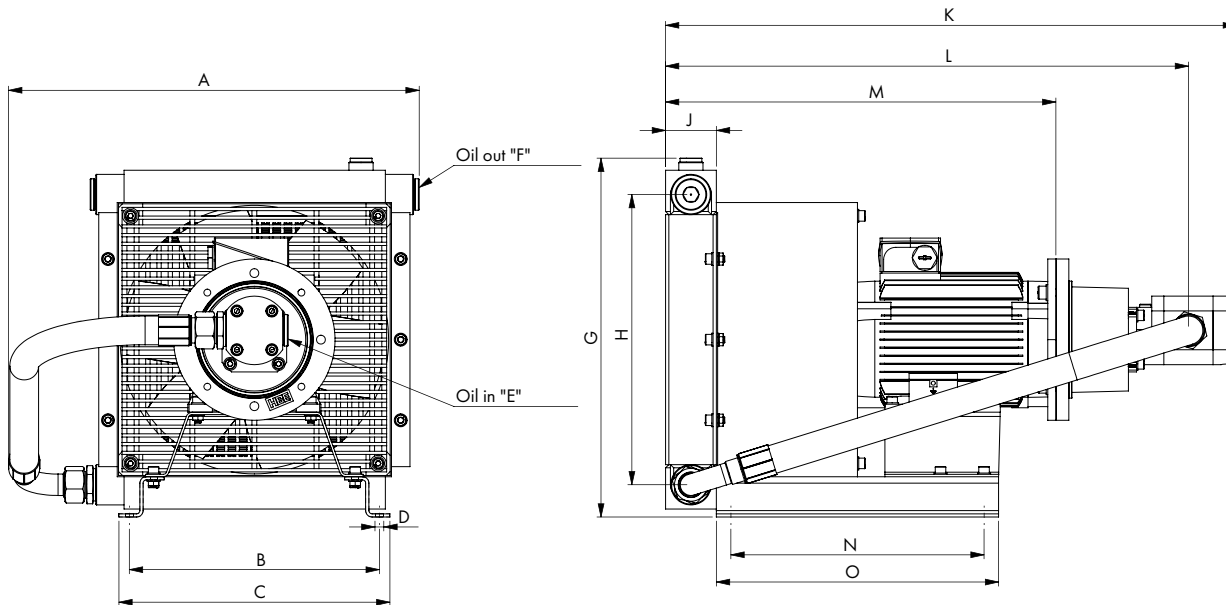
- Easy to retrofit in existing systems
- Extension of oil life due to permanent cooling
- Extended service life of seals and hydraulic components
- High flexibility in the choice of the pump
- Short delivery times by intelligent warehousing

ORDERING CODE

ACIP - 11 - 19 - 1,1 - 4 - 01	
Cooler series ACIP = Partial flow cooler	Series 00 = Without pump / without hose** 01 = External gear
Cooler size 11 21 31 41 51 61	Fan speed 4 = 4 pole / 1500 min ⁻¹ 6 = 6 pole / 1000 min ⁻¹
Displacement* 19 = 19 cm ³ 32 = 32 cm ³ 50 = 50 cm ³	Power 1,1 = 1.1 kW 1,5 = 1.5 kW 2,2 = 2.2 kW

* additional on request ** Option for customer to install a compatible own pump
 Attention: new selection of bellhousing and coupling required

DIMENSIONS



Cooler size	A	B	C	D	E	F	G	H	J	K	L	M	N	O
ACIP-11-19-1,1-4	510	310	336	Ø 11	G1"	G1"	445	360	63	711	652	487	314	350
ACIP-11-32-1,5-4										735	647	507		
ACIP-21-19-1,1-4									94	742	683	518		
ACIP-21-32-1,5-4										766	678	538		
ACIP-31-19-1,1-4	590	450	476	Ø 11	G1"	G1"	565	460	63	741	682	517	314	350
ACIP-31-32-1,5-4										765	677	537		
ACIP-41-19-1,1-4									94	772	713	548		
ACIP-41-32-1,5-4										796	708	568		
ACIP-51-32-2,2-4	675	620	646		G1"	G1 1/2"	726	610	63	859	810	621	314	350
ACIP-51-50-2,2-4					G1 1/2"					883	822	621		
ACIP-61-32-2,2-4					94				890	841	652			
ACIP-61-50-2,2-4									G1 1/2"	914	853	652		

TECHNICAL DATA

Cooler size	Oil flow		Cooling capacity		Power	Electricity	Weight
	[cc/rev]	[l/min]	[kW/K]	[kW (ΔT = 40K)]	[kW]	[A]	[kg]
ACIP-11-19-1,1-4	19	27	0.16	6	1.1	2.5	37
ACIP-11-32-1,5-4	32	45	0.17	7	1.5	3.3	42
ACIP-21-19-1,1-4	19	27	0.20	8	1.1	2.5	40
ACIP-21-32-1,5-4	32	45	0.22	9	1.5	3.3	45
ACIP-31-19-1,1-4	19	27	0.37	15	1.1	2.5	46
ACIP-31-32-1,5-4	32	45	0.40	16	1.5	3.3	51
ACIP-41-19-1,1-4	19	27	0.42	17	1.1	2.5	52
ACIP-41-32-1,5-4	32	45	0.46	18	1.5	3.3	57
ACIP-51-32-2,2-4	32	45	0.69	28	2.2	4.5	89
ACIP-51-50-2,2-4	50	70	0.77	31	2.2	4.5	90
ACIP-61-32-2,2-4	32	45	0.80	32	2.2	4.5	98
ACIP-61-50-2,2-4	50	70	0.90	36	2.2	4.5	99

OIL-AIR COOLER FOR MOBILE APPLICATIONS

SERIES ACM

PRODUCT DESCRIPTION

The new ACM oil-air cooler series is an optimised heat exchanger for a wide range of hydraulic applications. The 12/24V DC drive enables the use in mobile hydraulic power units, e.g. in agriculture/ forestry, in construction and mining machinery and in the loading and transport sector.



PRODUCT FEATURES

- Compact fans with 12/24V DC drive
- Protection class IP68
- Operating pressure: max. 15 bar
- Operating temperature: max. 120°C
- Displacement: 10 - 300 l/min
- Cooling capacity: 3 - 50kW (referring to $\Delta T=40K$)

BENEFITS

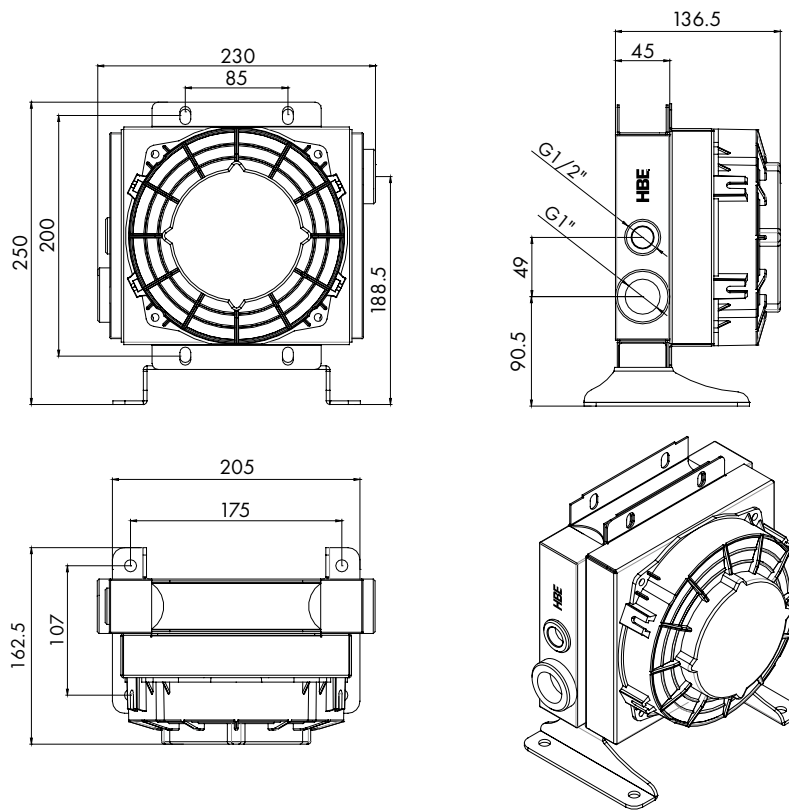
- Different sizes and cooling capacities depending on the application
- Internal bypass valve
- Short delivery times by intelligent warehousing

ORDERING CODE ACM

ACM - 12 - 12 - 0 - 0				
Cooler series ACM = cooler for mobile applications				Thermostat* 0 = without 1 = 50°C 2 = 60°C 3 = 70°C
	Cooler size 12 13 14 15 16 17 18 19 20		Air flow direction 0 = suction 1 = blowing	
			Input voltage motor 12 = 12 Volt 24 = 24 Volt	

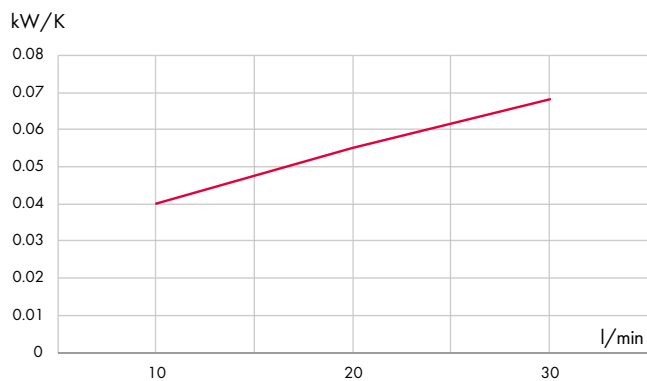
* additional on request

ACM-12-12/24

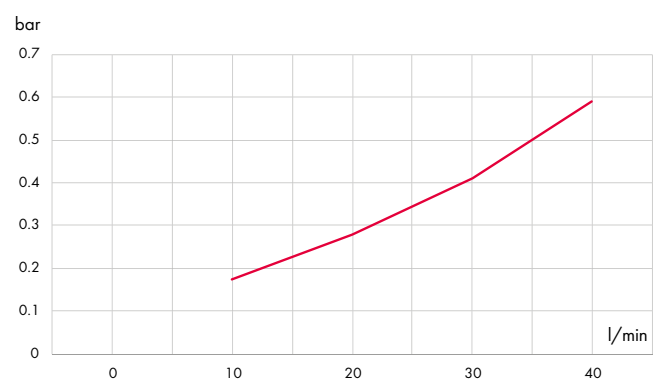


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
10-40	3	12/24 DC	130	560	Ø167	4400	68	0.7	3.7

COOLING CAPACITY

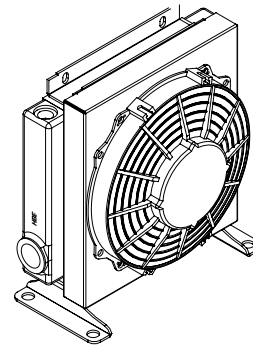
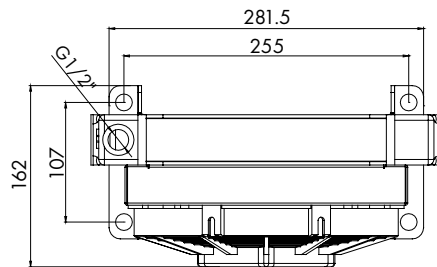
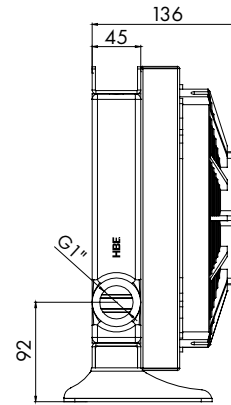
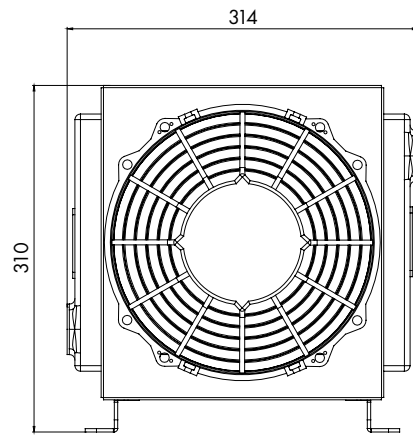


PRESSURE DROP



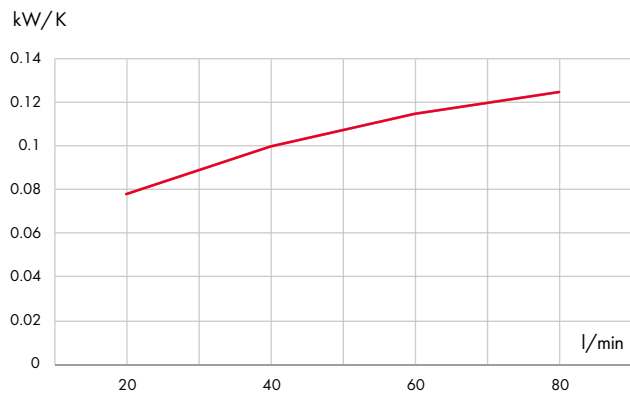
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-13-12/24

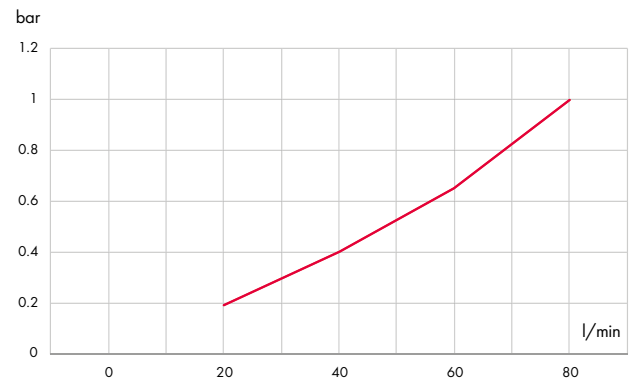


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
20-80	6.5	12/24 DC	130	1060	Ø 225	3400	68	1.4	5.3

COOLING CAPACITY

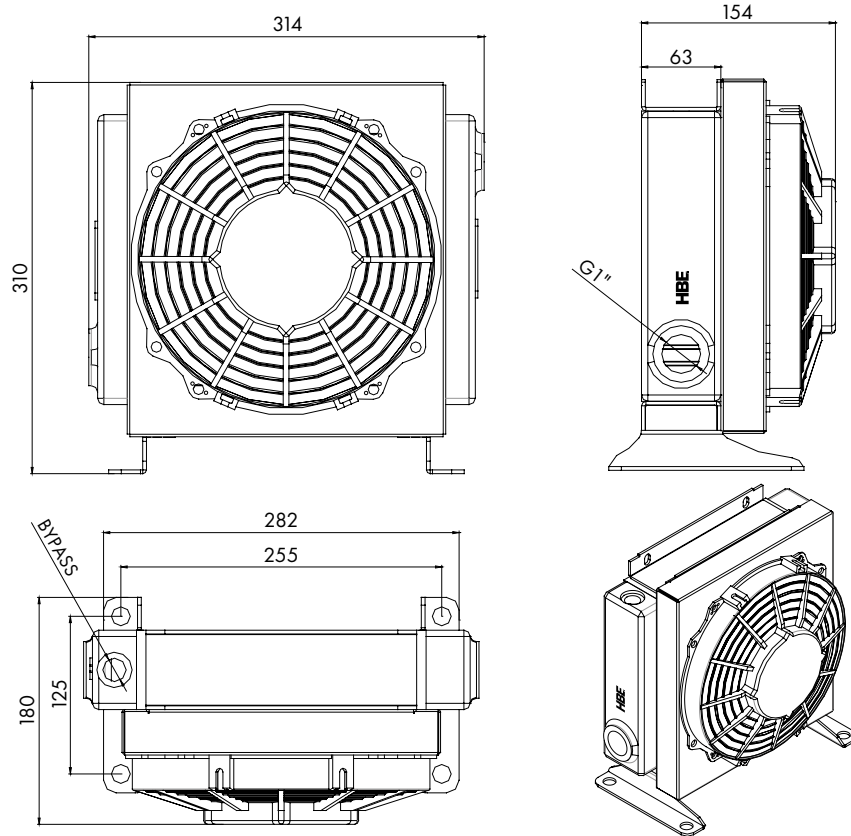


PRESSURE DROP



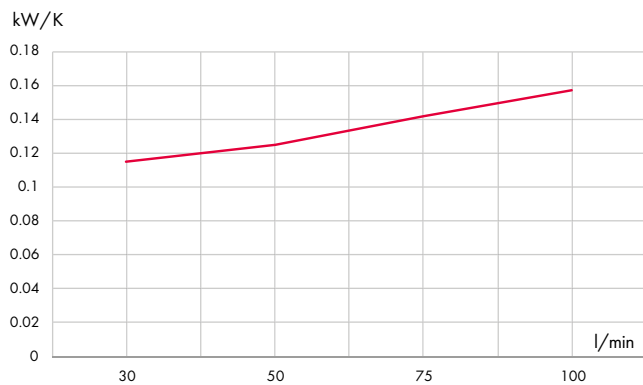
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-14-12/24

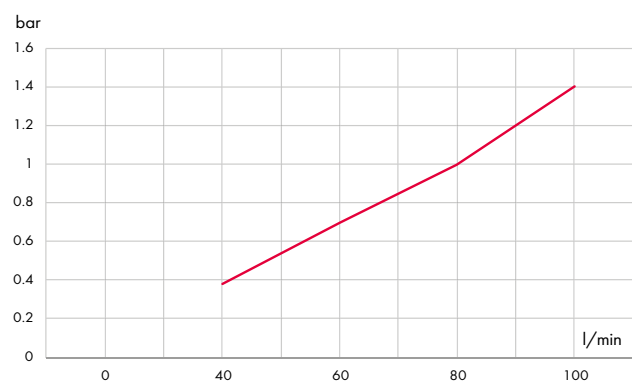


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
40-100	10	12/24 DC	130	1060	Ø 225	3400	68	1.7	6.3

COOLING CAPACITY

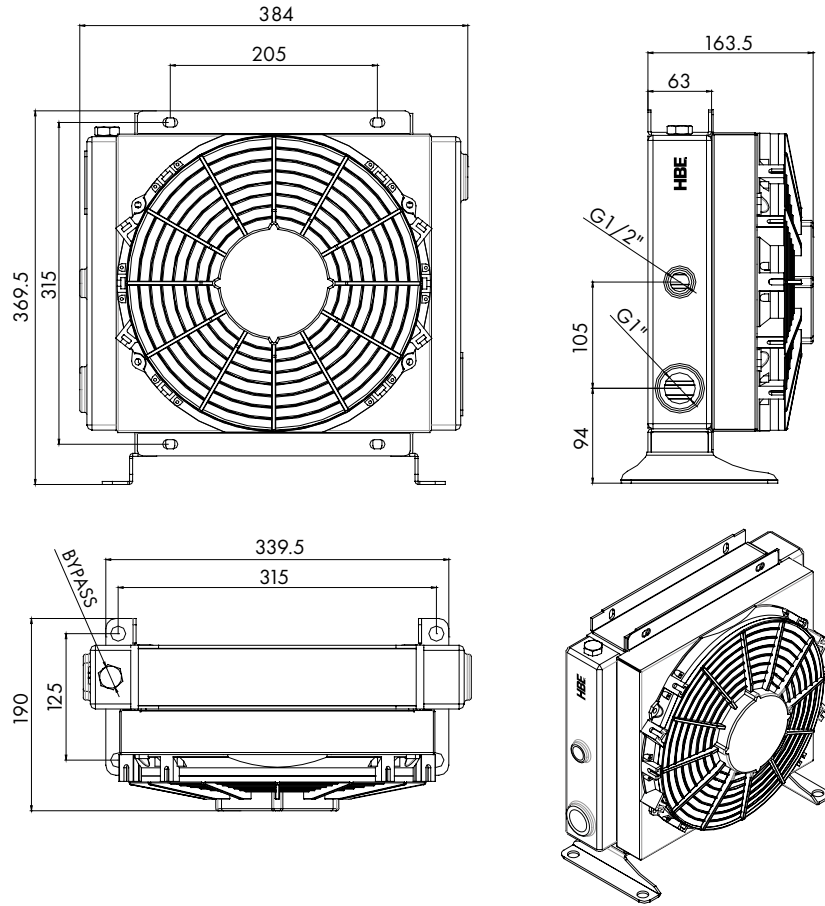


PRESSURE DROP



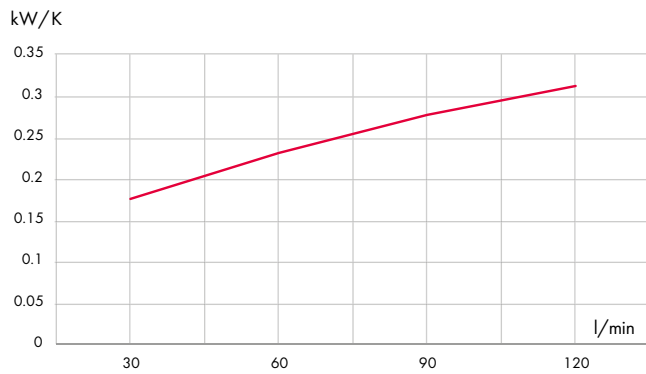
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-15-12/24

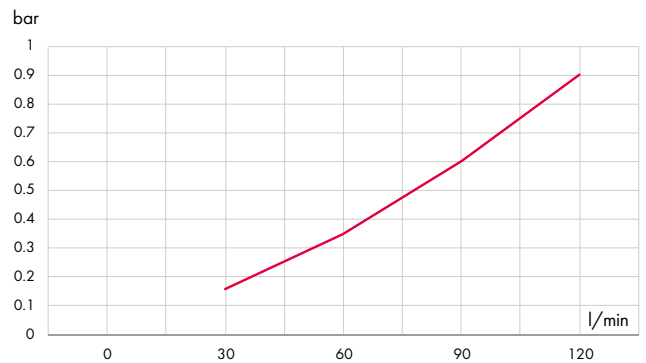


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
60-120	14	12/24 DC	130	1400	Ø 280	2640	68	2.3	8

COOLING CAPACITY

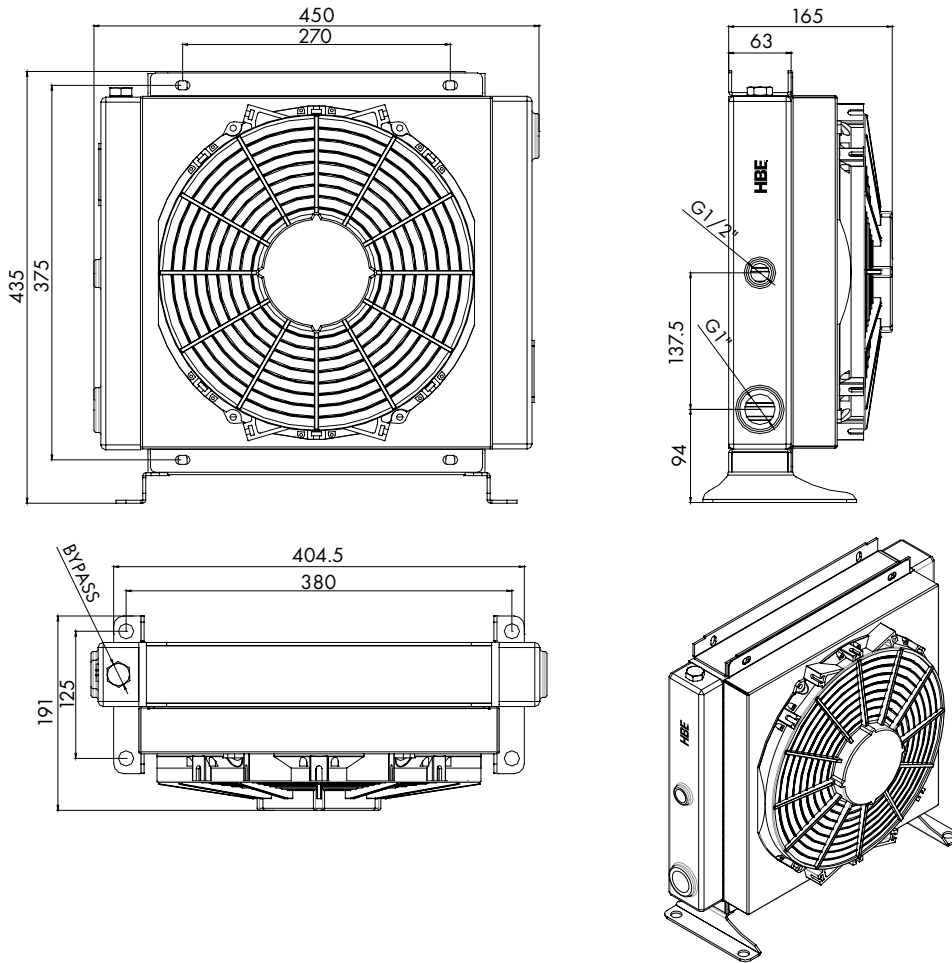


PRESSURE DROP



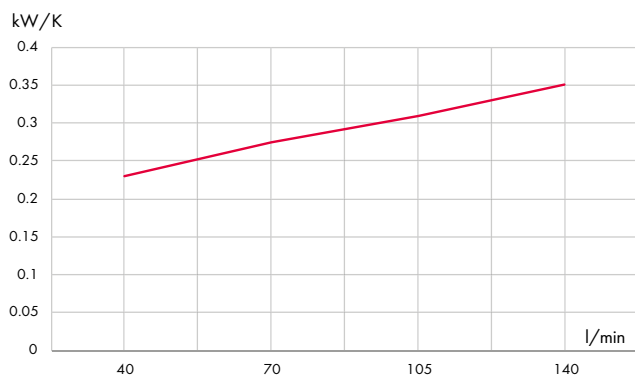
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-16-12/24

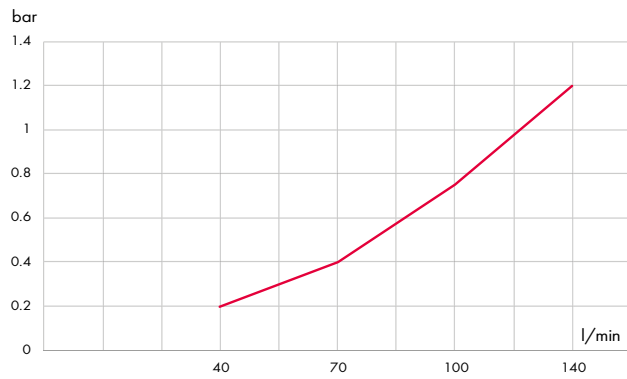


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
80-140	25	12/24 DC	130	1710	Ø 305	2570	68	4	12.5

COOLING CAPACITY

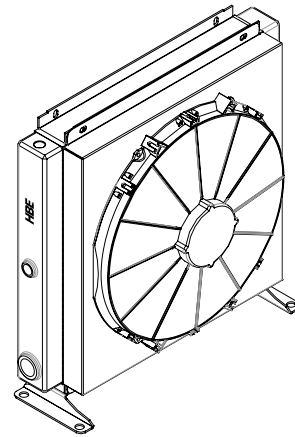
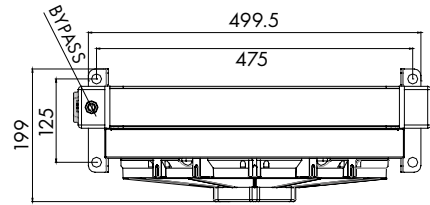
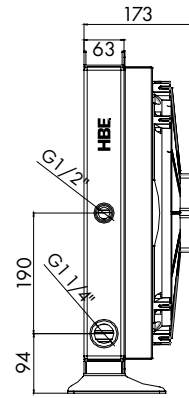
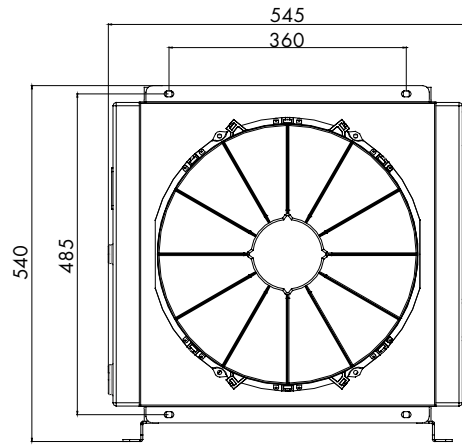


PRESSURE DROP



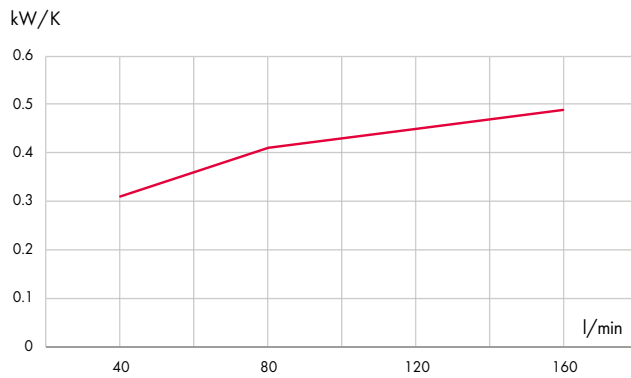
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-17-12/24

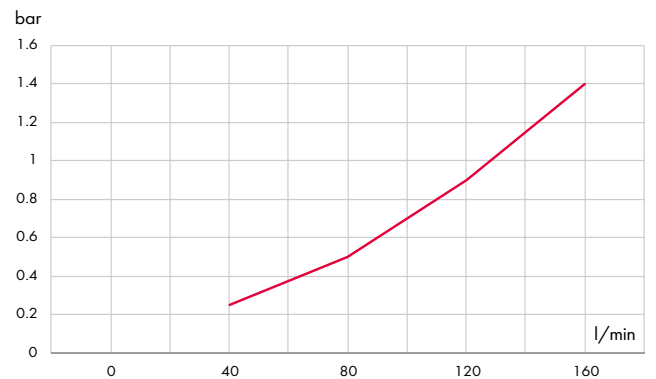


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
100-160	30	12/24 DC	130	2630	Ø 385	2900	68	5.7	18

COOLING CAPACITY

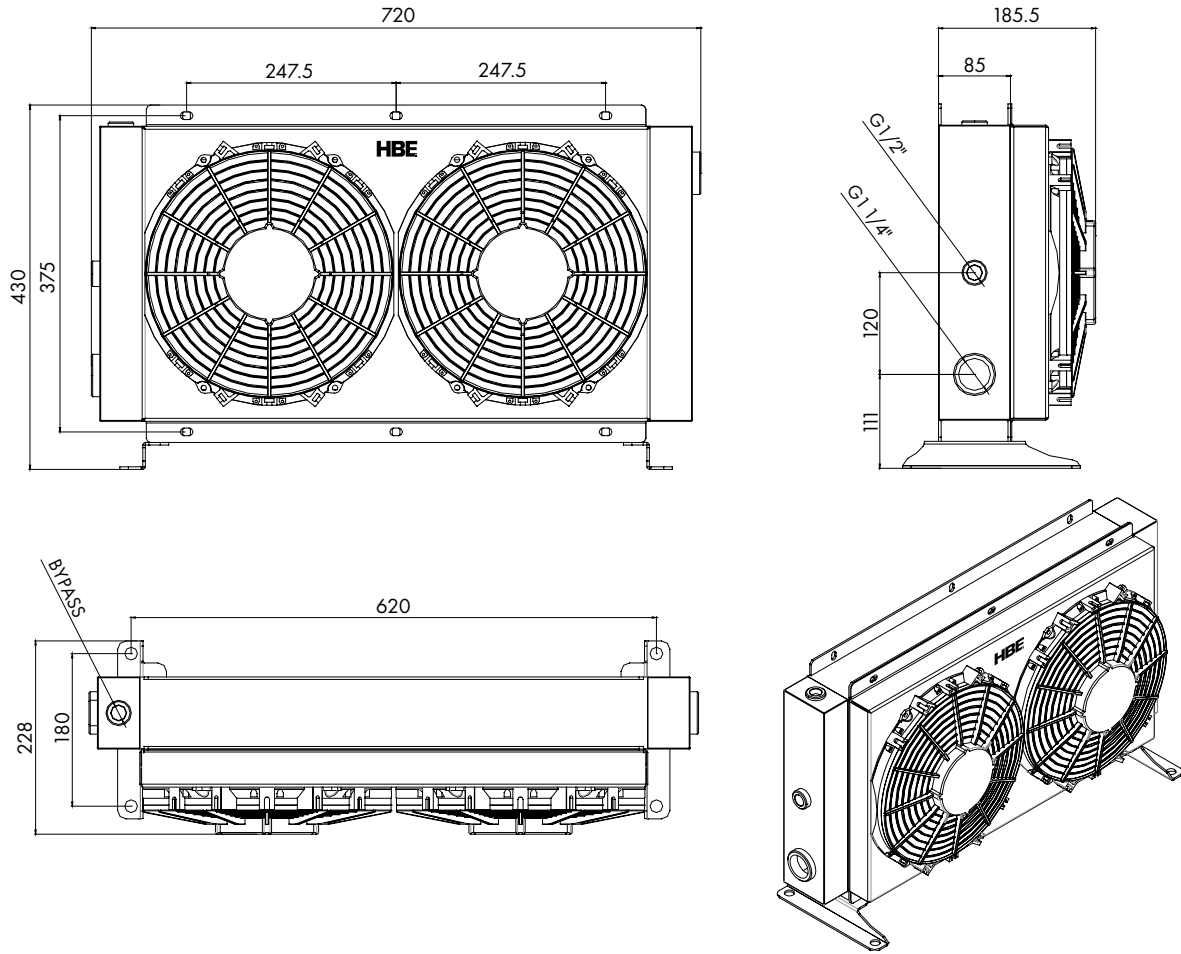


PRESSURE DROP



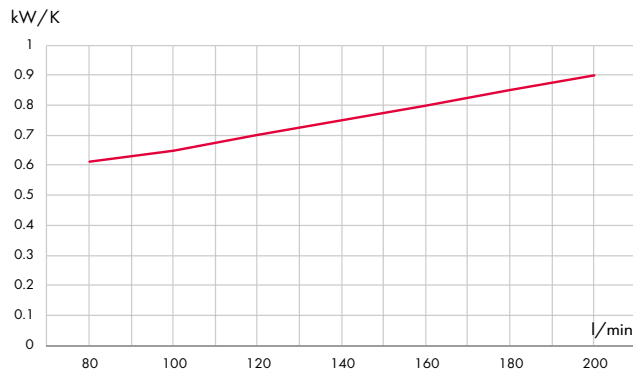
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-18-12/24

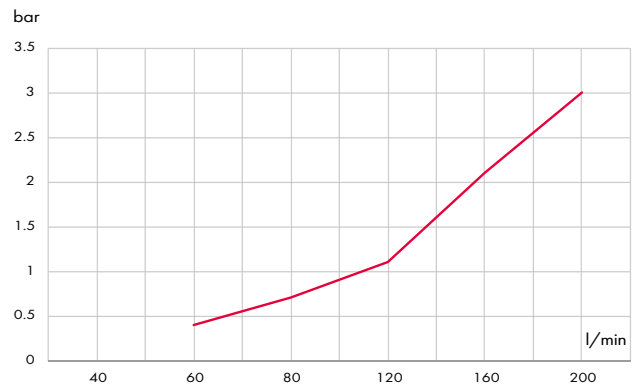


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
20-200	35	12/24 DC	260	2800	Ø 280x2	2680	68	7.5	23

COOLING CAPACITY

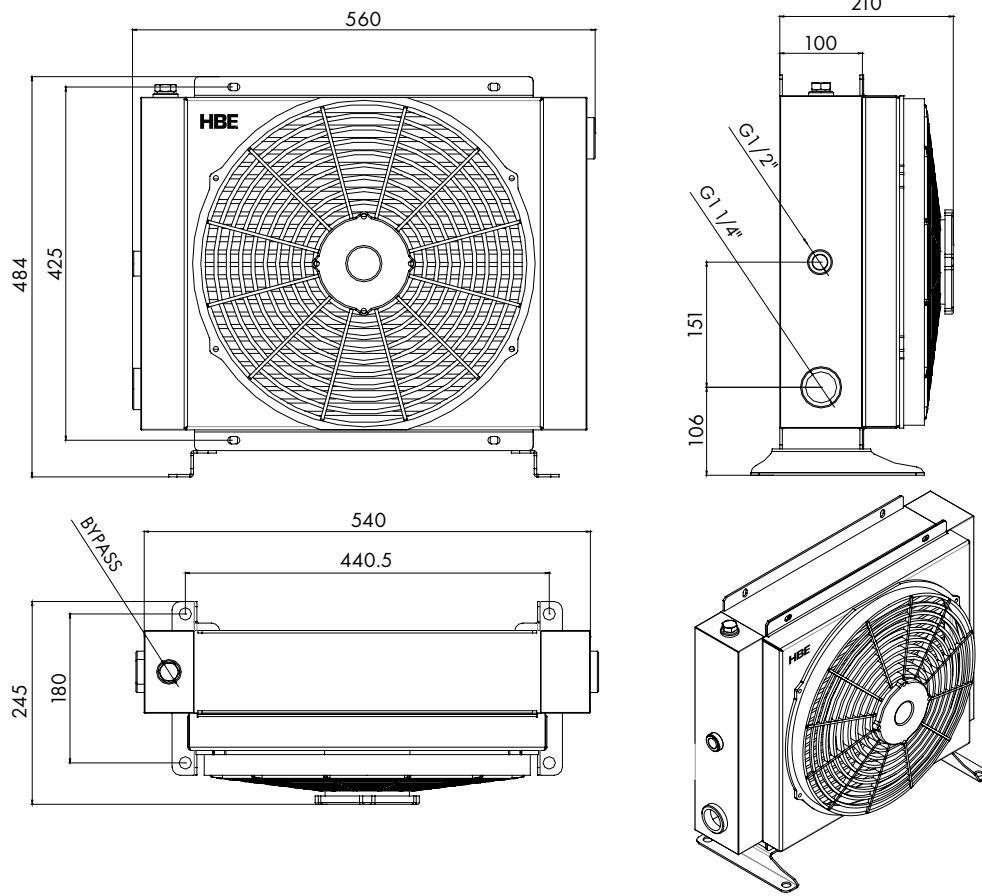


PRESSURE DROP



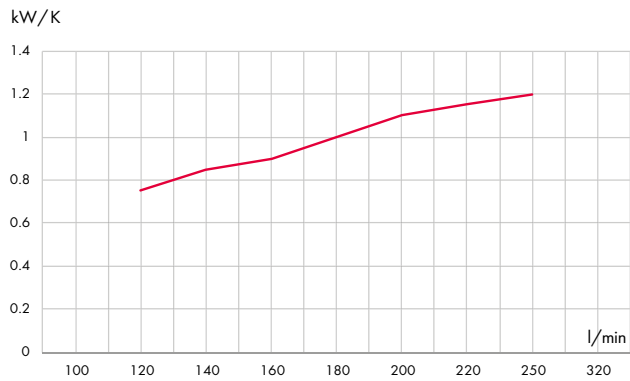
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-19-12/24

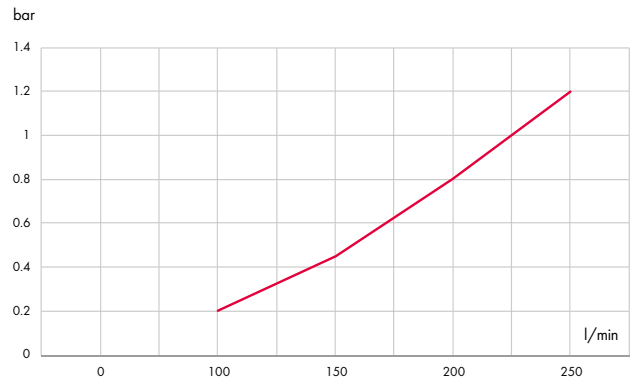


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
150-250	40	12/24 DC	130	2630	Ø 385	2900	68	9	26

COOLING CAPACITY

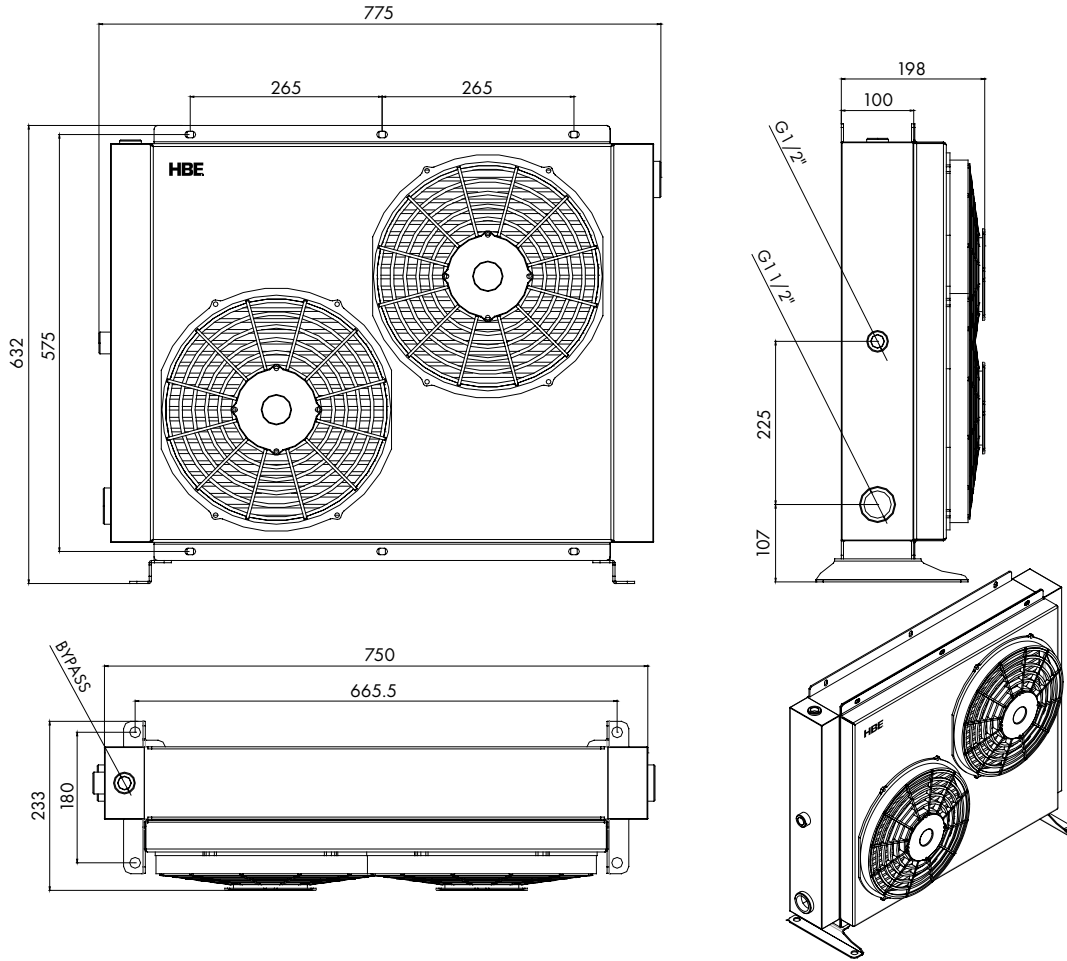


PRESSURE DROP



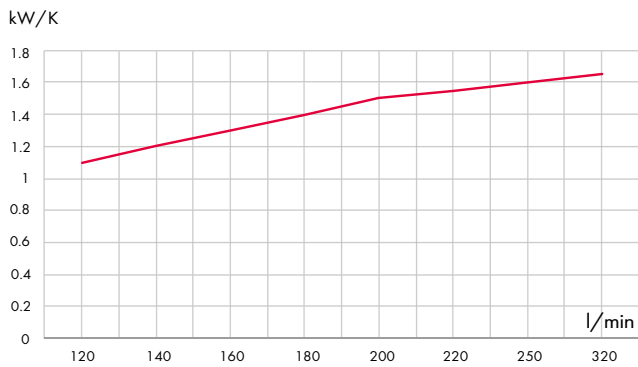
Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

ACM-20-12/24

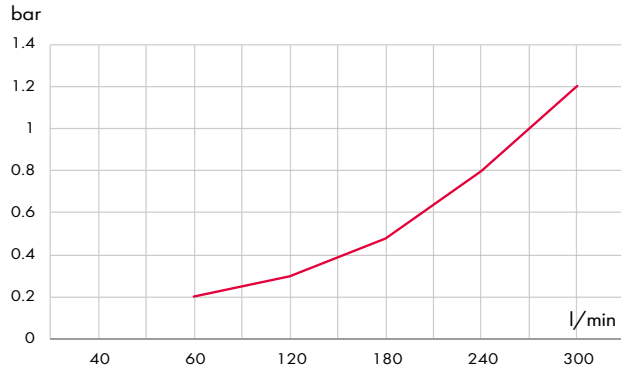


Oil flow min-max [l/min]	Max cooling capacity [kW]	Voltage [V]	Power [W]	Air [m ³ /h]	Ø Fan [mm]	Fan Speed [1/min]	Electric protection [IP]	Capacity [l]	Weight [kg]
180-300	50	12/24 DC	260	3420	Ø 305x2	2570	68	14	39

COOLING CAPACITY



PRESSURE DROP



Viscosity [cSt]	10	15	20	30	40	50	60	80	100	200	300
Conversion factor	0.5	0.65	0.77	1	1.2	1.4	1.6	1.9	2.1	3.3	4.3

DOC® BRAZED PLATE HEAT EXCHANGER

PRODUCT FEATURES

- High operating pressures
- High operating temperatures
- Compact connection blocks, brazed on the plate heat exchanger
- Cooling capacity of 5 to 360 kW
- Suitable for most industrial hydraulic applications
- Sturdy design due to brazed contact points between the plates
- This allows best possible resistance against high operating pressures
- 32 bar for DOC® 16, 30 and 60, 16 bar for DOC® 20 and 110
- Brazed design allows temperatures of up to 225°C
- Sturdy connection blocks allow high fastening torques for assembling

OPERATING PRINCIPLE

The heating surface consists of thin corrugated brazed stainless steel plates. Channels are formed between the plates; which are connected in a way so that the two media flow through the channels in counter-current flow.

The media are kept in the unit by a brazed seal around the edge of the plates. The contact points of the plates are also brazed to withstand the pressure of the handled media.



STANDARD VERSION

The plate pack is covered by the cover plates. The connections are located in the front cover plate. The channel plates are corrugated to improve the heat transfer efficiency and to increase the mechanical strength.

STANDARD MATERIALS

Cover plates:	Stainless steel Alloy 304 (1.4301)
Connections:	Stainless steel Alloy 304 (1.4301)
Plates:	Stainless steel Alloy 316 (1.4401)
Solder:	Copper

REQUIRED DETAILS FOR QUOTATION

In order to provide you with a specific quotation, we need the following information:

- Required flow rates
- Temperature programme
- Physical characteristics of the media used
- Desired working pressure
- Maximum permitted pressure drop

For the calculation of a plate heat exchanger, you will find a questionnaire in the download section of our website.





HIGHEST COOLING CAPACITY AND LOW DEGREE OF CONTAMINATION

- Low pressure drop over the connectors
- Optimised plate design
- Compact dimensions, low water consumption and low Delta T
- Highly efficient heat transfer due to turbulent flow (high k value; $P=k \cdot A \cdot \Delta T$)
- Self cleaning effect inside the cooler due to equally distributed and highly turbulent flow

The figure only refers to DOC 16 or DOC 20.

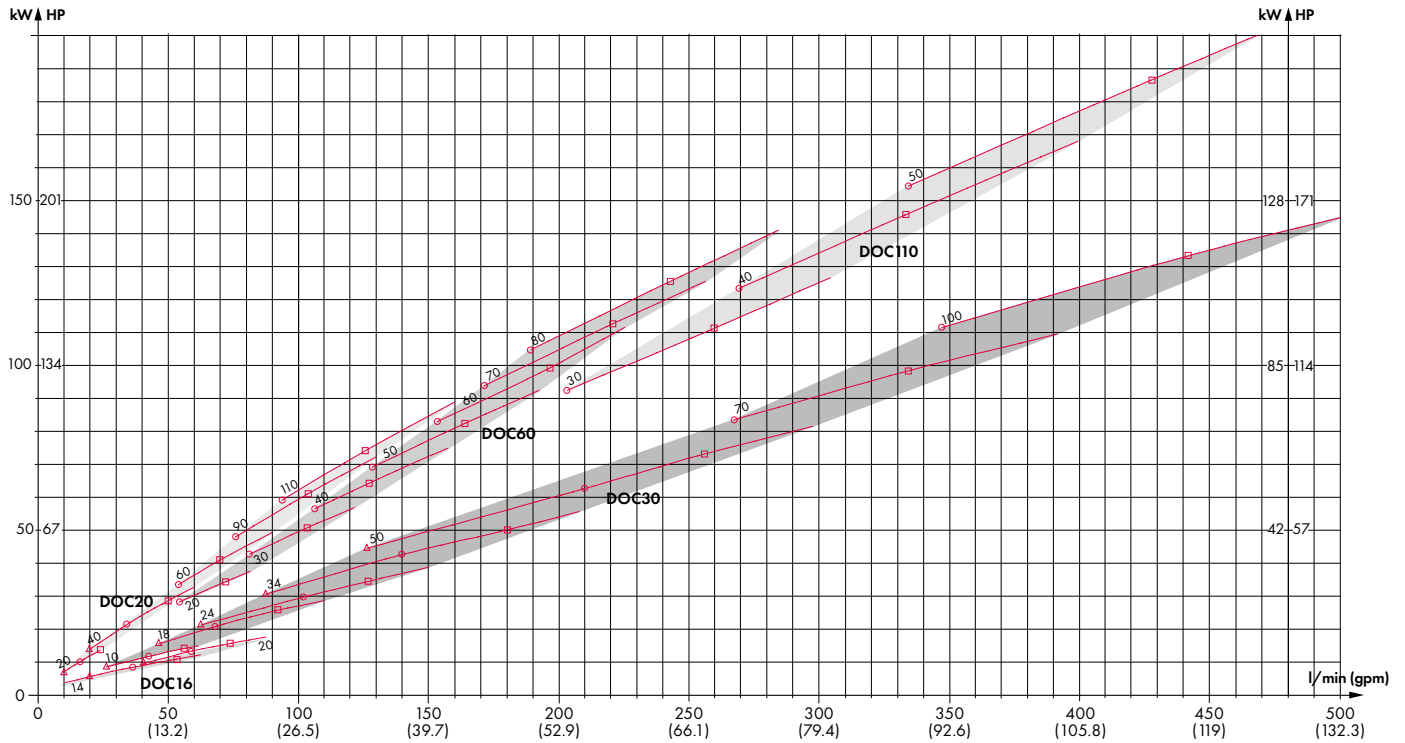
TECHNICAL DATA

	DOC®16	DOC®20	DOC®30	DOC®60	DOC®110
Max. operating temperature	225°C	225°C	225°C	225°C	225°C
Min. operating temperature	-196°C	-196°C	-196°C	-196°C	-196°C
Max. operating pressure S1-S2/S3-S4, [bar]	33/33	16/16	33/33	40/40	16/30
Min. operating pressure	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum
Volume per channel, [litre]	0.02	0.028	0.05	0.103	0.25
Cooling capacity [kW]	< 16	6 – 75	10 – 100	20 – 140	40 – 170
Standard number of plates	14, 20	20, 40, 60, 90, 110	10, 18, 24, 34, 50, 70, 100	20, 30, 40, 50, 60, 70, 80	20, 30, 40, 50

Order code			
Type	Size		Number of plates
DOC®	30	-	70

DOC® BRAZED PLATE HEAT EXCHANGER

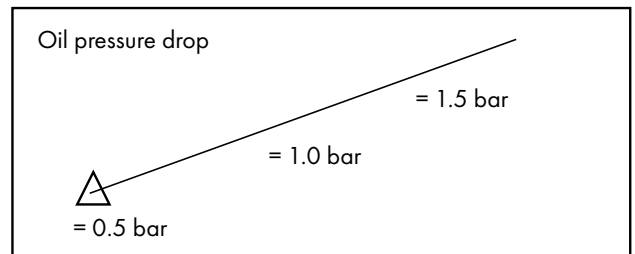
SELECTION DIAGRAM



THE DIAGRAM

- is based on an oil temperature of 60°C and water temperature of 20°C. For an oil temperature of 50°C, multiply with the correction factor of 0.7. For other water temperatures, please see the correction factors on the right side.
- is calculated for two different oil / water flow rates: 2:1 and 4:1. This means that for every litre of oil circulated through the oil cooler, a minimum of 0.5 litres (2:1) or 0.25 litres (4:1) of water must be circulated to agree with the data in the diagram.
- is based on oil (ISO VG 32). For other oils, correction factors must be used. Multiply the required cooling load by the cooling load correction factor. After selecting the oil cooler, multiply the pressure drop by the pressure drop correction factor.

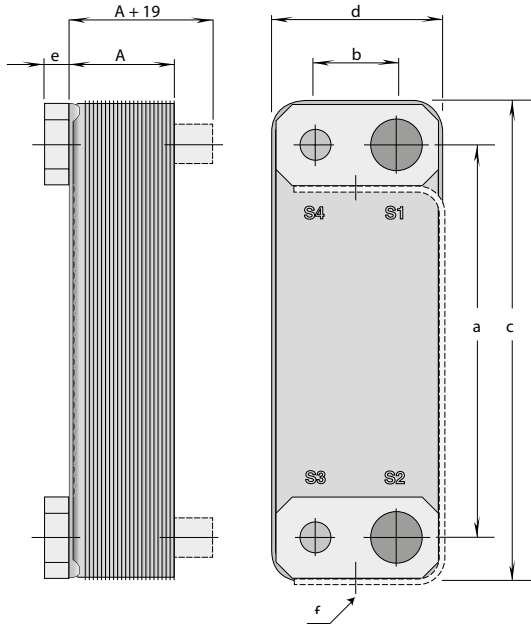
CORRECTION FACTORS



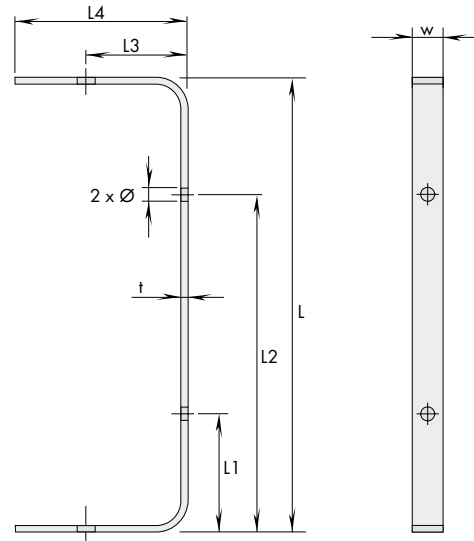
Water temperature [°C]	Correction factors
15	0.91
20	1.00
25	1.12
30	1.20
35	1.50

Viscosity class	Cooling capacity	Oil pressure drop
ISO VG 22	0.95	0.9
ISO VG 32	1.00	1.0
ISO VG 46	1.05	1.2
ISO VG 68	1.20	1.5
ISO VG 100	1.35	2.1

DIMENSIONS



DOC® Dimensioning



Support bracket

PLATE HEAT EXCHANGER DOC®

Type	Dimensions [mm]						Dry weight [kg]
	a	b	c	d	e	A	
DOC16	172	42	208	78	22	$8 + (n \times 2.25)$	$0.8 + (n \times 0.06)$
DOC20	270	46	324	94	26	$8 + (n \times 1.50)$	$1.5 + (n \times 0.08)$

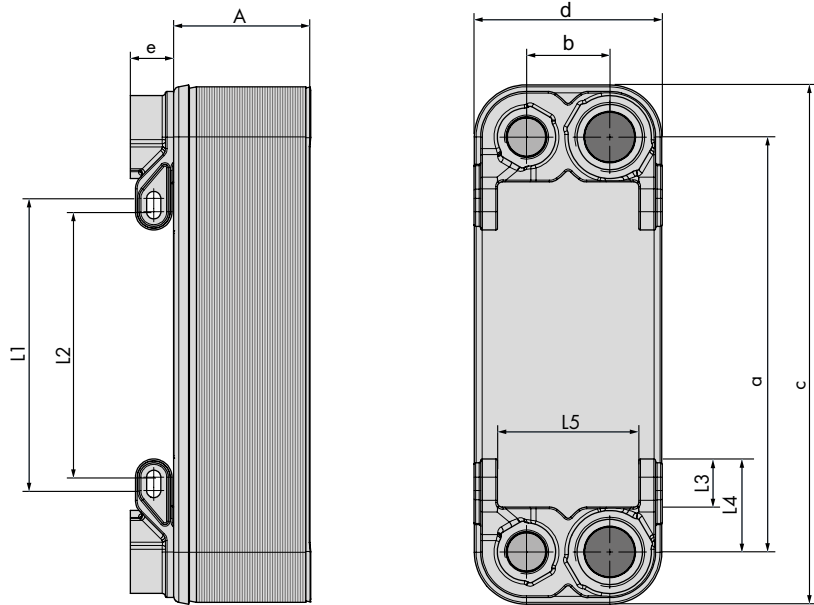
n = number of plates

SUPPORT BRACKETS

Type	Dimensions [mm]							
	L	L1	L2	L3	L4	w	t	Ø
DOC16	177	57	119	44	78	20	5	9
DOC20	275	85	189	51	94	25	6	9

DOC® BRAZED PLATE HEAT EXCHANGER

DIMENSIONS



new mounting type

Type	Dimensions [mm]											Dry weight [kg]
	a	b	c	d	e	A	L1	L2	L3	L4	L5	
DOC30	250	50	313	113	26	13 + (n x 2.31)	176	160	29	56	85	1.2 + (n x 0.18)
DOC60	466	50	527	113	26	13 + (n x 2.32)	392	376	29	56	85	2.1 + (n x 0.18)
DOC110	519	92	616	191	26	15 + (n x 2.56)	422	393	36	74	138	4.8 + (n x 0.35)

n = number of plates

CONNECTIONS

Type	S1-S2, oil	S3-S4, water	Spanner grip	F
DOC16	ISO-G 3/4"	ISO-G 3/4"	32	M8
DOC20	ISO-G 1"	ISO-G 3/4"	41	M8
DOC30	ISO-G 1 1/4"	ISO-G 3/4"	50	M8
DOC60	ISO-G 1 1/4"	ISO-G 3/4"	50	M8
DOC110	ISO-G 1 1/2"	ISO-G 1"	50	M8

OIL / WATER COOLER FOR INDUSTRIAL USE

SERIES EKM/SKM

PRODUCT DESCRIPTION

- Development of a tube bundle heat exchanger
- For a wide range of industrial applications
- Additional cooling surface due to aluminium fins for a heat exchange capacity of 1,000 kW
- EKM/SKM heat exchangers have a cooling surface of 0.43 m² to 56 m²
- Are constructed of 43 basic units, available as single, double or quadruple version



PRODUCT FEATURES

- Aluminium fins and copper nickel tubes (standard) ensure maximum level of heat exchange
- Large oil connectors for minimum flow resistance
- Heat dissipation up to 1,000 kW
- Oil flow rates of up to 1,200 l/min
- Removable end caps for easy cleaning of the tubes
- Flanges allow a 90° rotation of the heat exchanger
- Optionally available with internal bypass check valve (patented)
- High quality materials
- Max. pressure: oil 35 bar / water 16 bar

OPTION

- Sea water version
- Certification for marine applications
- Compressed air application
- Water-water application
- Stainless steel version or chemically nickel plated

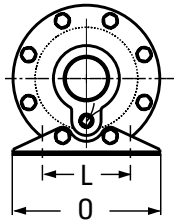
MATERIALS

- Shell, mounting bracket, baffles, tube sheet: steel
- End plates: steel
- Cooling fins, type plate: aluminium
- Tubes: copper, copper nickel
- End caps: cast iron
- Gaskets: nitrile rubber, cellulose fibre

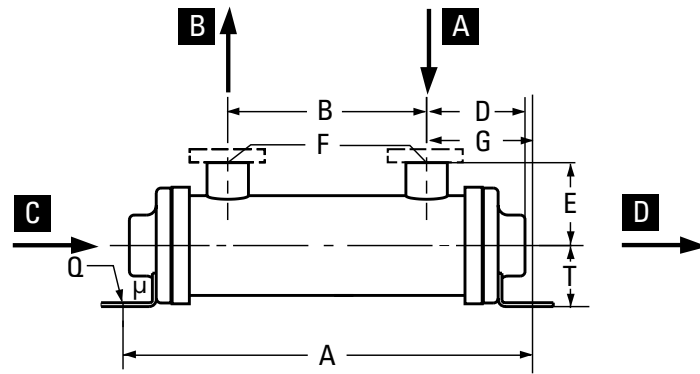
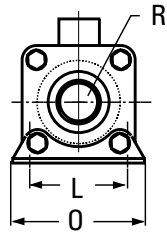
DIMENSIONS 500 - 1000

1 PASS, TYPE: "O"

EKM-700&1000

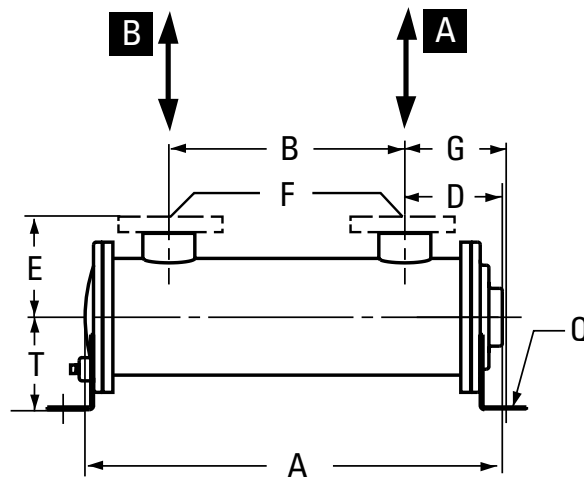
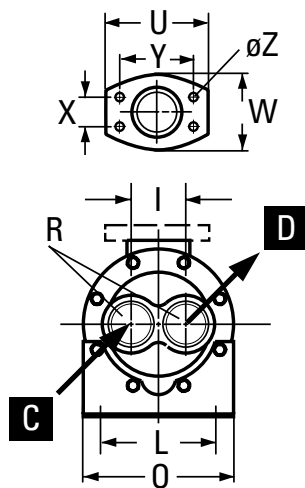


EKM-500



- A** - Medium to be cooled
- B** - Cooled medium
- C** - Cooling water "in"
- D** - Cooling water "out"

2 PASS, TYPE: "T"



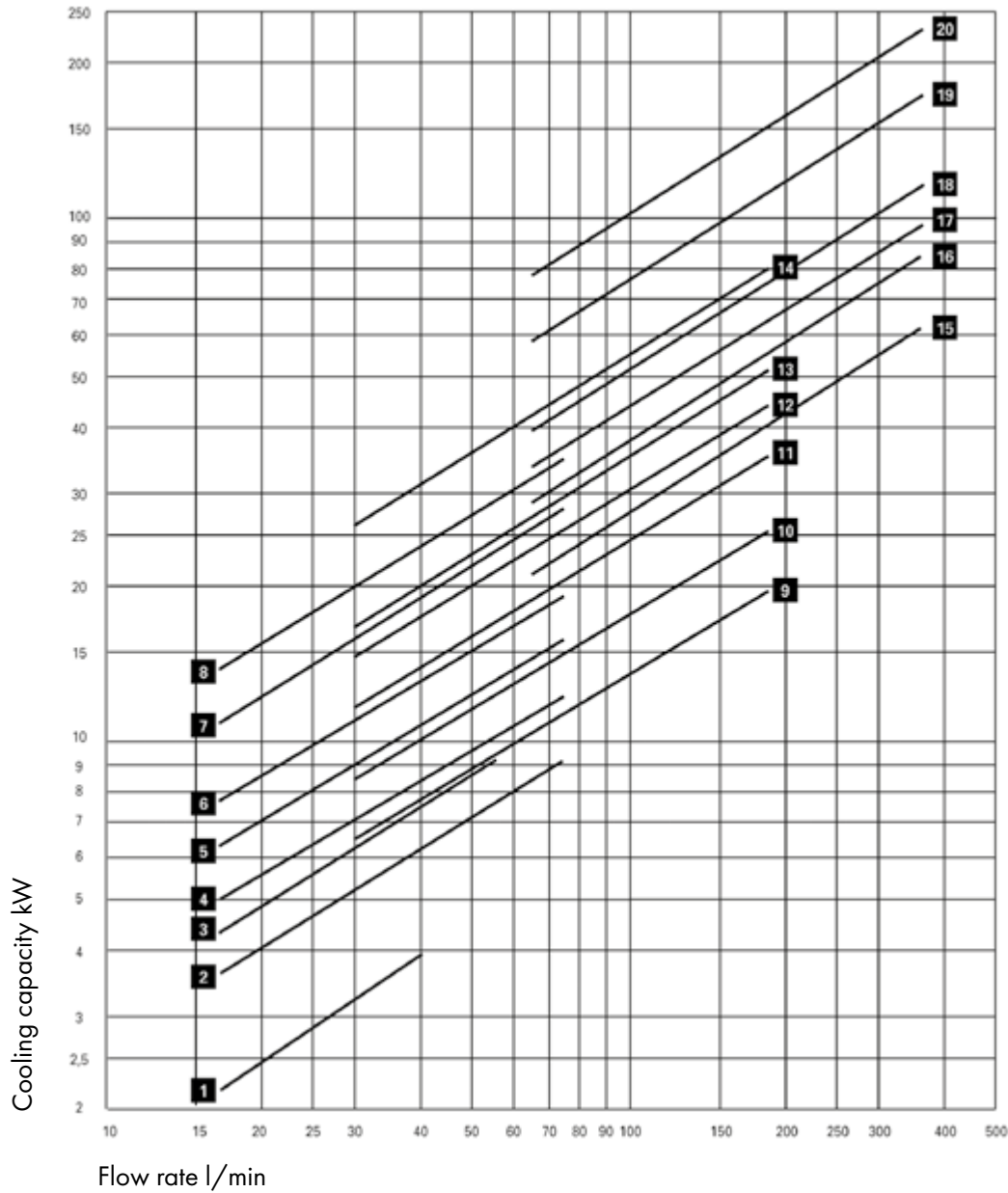
- A** - Medium to be cooled
- B** - Cooled medium
- C** - Cooling water "in"
- D** - Cooling water "out"

DIMENSIONS EKM 500 – 1000

Type	Dimensions [mm/BSPP]															Weight [kg]								
	A	B	D	E	F	G	T	Q	X	Y	R	L	O	I	m ²									
EKM-505-0	189	55	66	53	G 3/4"	66	41	Ø 9 x 16	-	-	G 3/4"	63,5	89	-	0.43	3.15								
EKM-505-T			83			67					G 3/8"			28										
EKM-508-0	265	97	82	57		83					G 3/4"			-	0.73	3.60								
EKM-508-T			83			85					G 3/8"			28										
EKM-510-0	316	148	82	83		G 3/4"					-			0.94	3.45									
EKM-510-T			83	85		G 3/8"					28													
EKM-512-0	367	199	82	83		G 3/4"					-			1.13	4.05									
EKM-512-T			83	85		G 3/8"					28													
EKM-514-0	418	250	82	83		G 3/4"					-			1.43	4.50									
EKM-514-T			83	85		G 3/8"					28													
EKM-518-0	519	351	82	83		G 3/4"					-			1.74	5.10									
EKM-518-T			83	85		G 3/8"					28													
EKM-524-0	672	504	82	83		G 3/4"					-			2.35	6.00									
EKM-524-T			83	85		G 3/8"					28													
EKM-536-0	976	808	82	83		G 3/4"					-			3.57	7.80									
EKM-536-T			83	85		G 3/8"					28													
EKM-708-0	283	76	103	73	G 1 1/2"	103	66	Ø 11 x 19	35.7	69.9	G 1 1/4"	76	127	-	1.38	7.30								
EKM-708-T			91			95					G 1"			41										
EKM-712-0	385	178	103			103					G 1 1/4"			-	2.18	8.40								
EKM-712-T			91			95					G 1"			41										
EKM-714-0	436	229	103			103					G 1 1/4"			-	2.53	8.80								
EKM-714-T			91			95					G 1"			41										
EKM-718-0	537	330	103			103					G 1 1/4"			-	3.29	10.20								
EKM-718-T			91			95					G 1"			41										
EKM-724-0	690	483	103			103					G 1 1/4"			-	4.44	11.60								
EKM-724-T			91			95					G 1"			41										
EKM-736-0	976	787	103			103					G 1 1/4"			-	6.73	15.50								
EKM-736-T			91			95					G 1"			41										
EKM-1012-0	397	157	116			92					G 1 1/2"			116	102	Ø 11 x 25	42.9	77.8	G 1 1/2"	102	165	-	4.38	15.40
EKM-1012-T			113											110					G 1 1/4"			60		
EKM-1014-0	448	208	116											116					G 1 1/2"			-	5.17	16.90
EKM-1014-T			113											110					G 1 1/4"			60		
EKM-1018-0	549	309	116	116	G 1 1/2"		-	6.73	19.80															
EKM-1018-T			113	110	G 1 1/4"		60																	
EKM-1024-0	702	462	116	116	G 1 1/2"		-	9.06	21.80															
EKM-1024-T			113	110	G 1 1/4"		60																	
EKM-1036-0	1006	766	116	116	G 1 1/2"		-	13.7	30.50															
EKM-1036-T			113	110	G 1 1/4"		60																	
EKM-1048-0	1307	1067	116	116	G 1 1/2"		-	18.4	39.80															
EKM-1048-T			113	110	G 1 1/4"		60																	

PERFORMANCE DATA EKM 500 – 1000

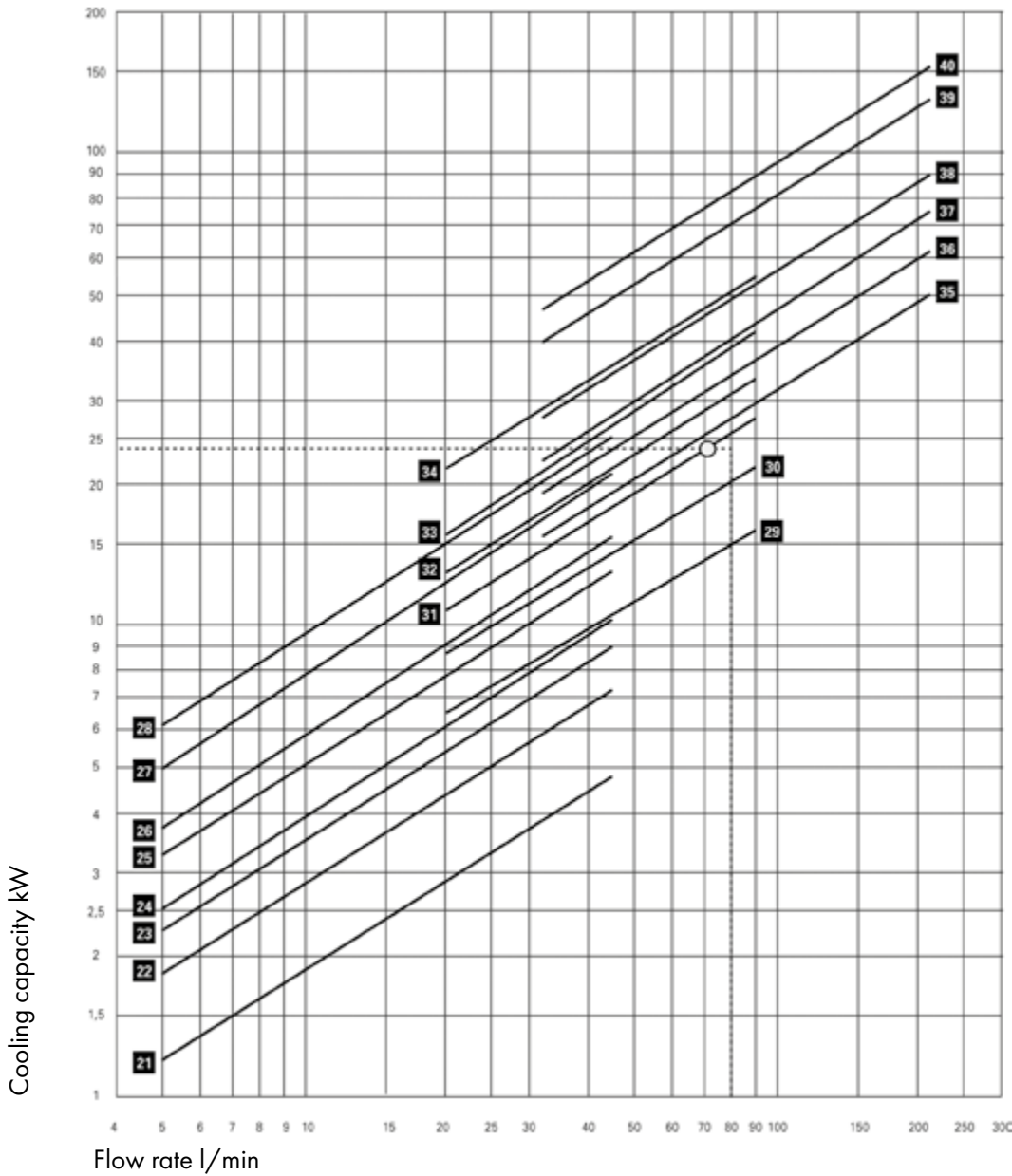
1 PASS, TYPE: "O"



The performance data shown in the diagram are limited by the flow rate and may be exceeded after consultation with the manufacturer. The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt.

1 EKM-505-O	11 EKM-714-O
2 EKM-508-O	12 EKM-718-O
3 EKM-510-O	13 EKM-724-O
4 EKM-512-O	14 EKM-736-O
5 EKM-514-O	15 EKM-1012-O
6 EKM-518-O	16 EKM-1014-O
7 EKM-524-O	17 EKM-1018-O
8 EKM-536-O	18 EKM-1024-O
9 EKM-708-O	19 EKM-1036-O
10 EKM-712-O	20 EKM-1048-O

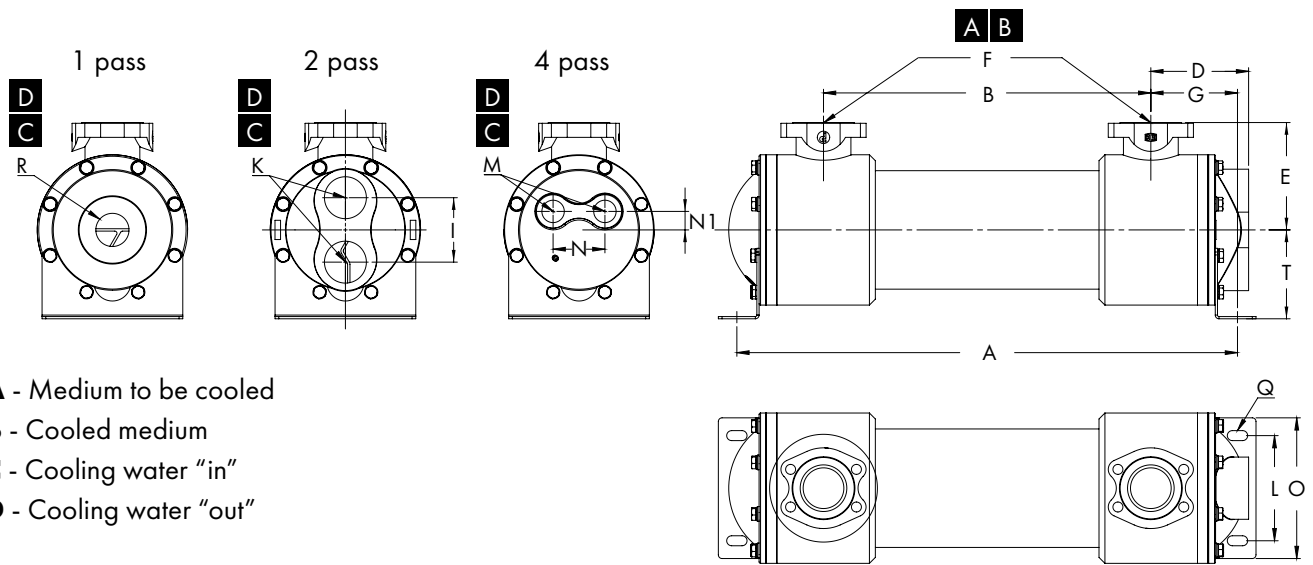
2 PASS, TYPE: "T"



The performance data shown in the diagram are limited by the flow rate and may be exceeded after consultation with the manufacturer. The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt.

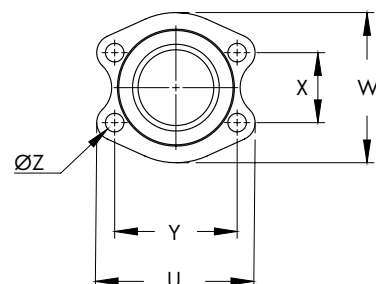
- | | |
|---------------------|----------------------|
| 21 EKM-505-T | 31 EKM-714-T |
| 22 EKM-508-T | 32 EKM-718-T |
| 23 EKM-510-T | 33 EKM-724-T |
| 24 EKM-512-T | 34 EKM-736-T |
| 25 EKM-514-T | 35 EKM-1012-T |
| 26 EKM-518-T | 36 EKM-1014-T |
| 27 EKM-524-T | 37 EKM-1018-T |
| 28 EKM-536-T | 38 EKM-1024-T |
| 29 EKM-708-T | 39 EKM-1036-T |
| 30 EKM-712-T | 40 EKM-1048-T |

DIMENSIONS SKM 1200



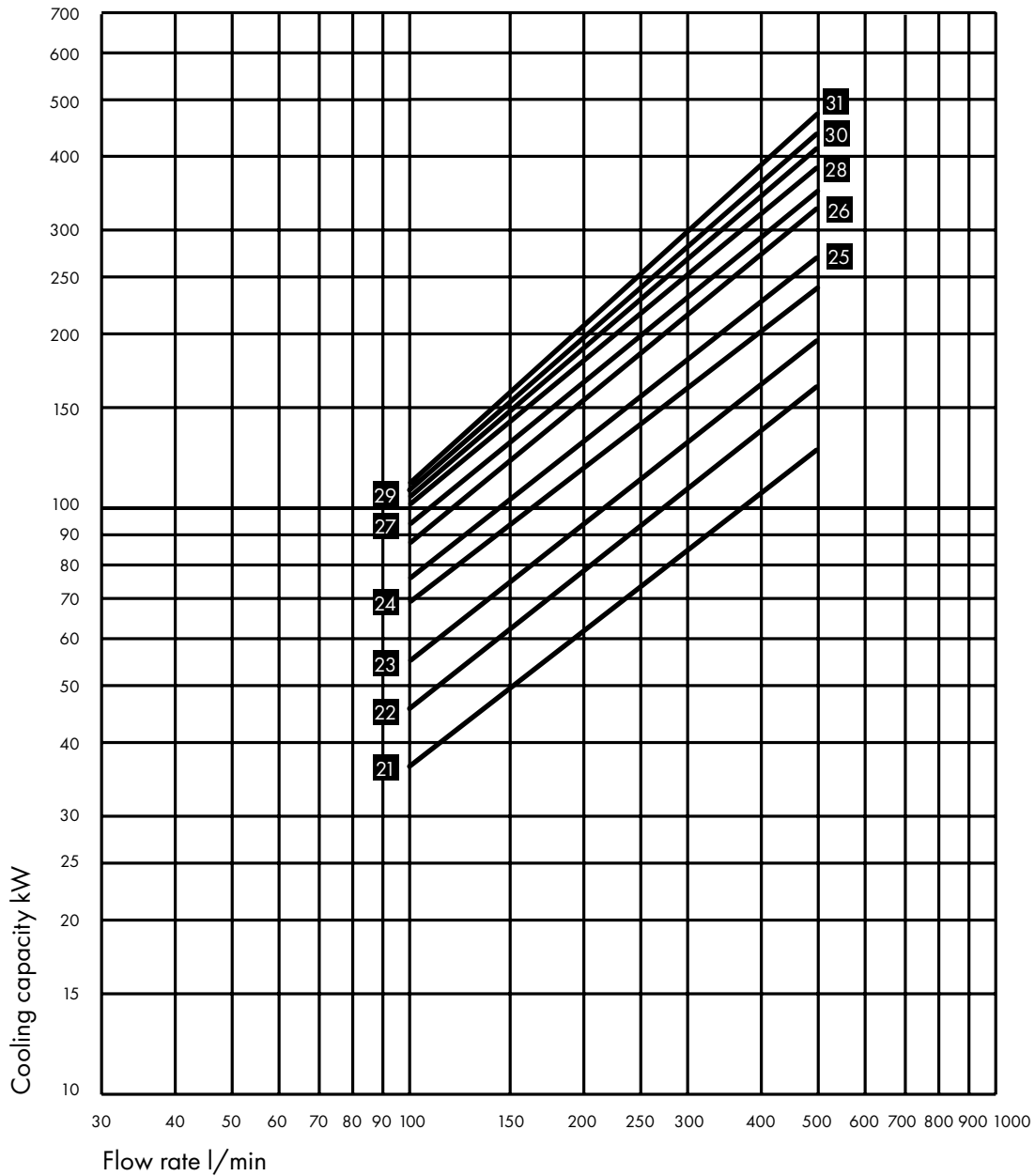
Type	Dimensions [mm/BSPP]																
	A	B	D	E	G	F	T	R	I	K	L	M	N	NI	O	Q	m ²
SKM-1218	524	290	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	6.00
SKM-1224	676	442	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	8.06
SKM-1230	829	595	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	10.19
SKM-1236	981	747	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	12.25
SKM-1242	1134	900	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	14.38
SKM-1248	1286	1052	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	16.35
SKM-1254	1438	1204	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	18.48
SKM-1260	1591	1357	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	20.52
SKM-1266	1743	1509	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	22.63
SKM-1272	1895	1661	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	24.74
SKM-1278	2048	1814	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	26.88
SKM-1284	2200	1966	132	145	117	SAE 2 1/2"	120	G 2"	87+80	G 2"	142	G 1"	70	25	190	ø 13 x 28	28.99

Type	Dimensions [mm]				
	U	Y	W	X	Z
SAE 1"	70	52.4	55.0	26.2	M10
SAE 1 1/4"	79	58.7	68.0	30.2	M10
SAE 1 1/2"	93	69.9	78.0	35.7	M12
SAE 2"	102	77.8	90.0	42.9	M12
SAE 2 1/2"	114	88.9	105.0	50.8	M12
SAE 3"	135	106.4	130.6	62.0	M16



PERFORMANCE DATA SKM 1200

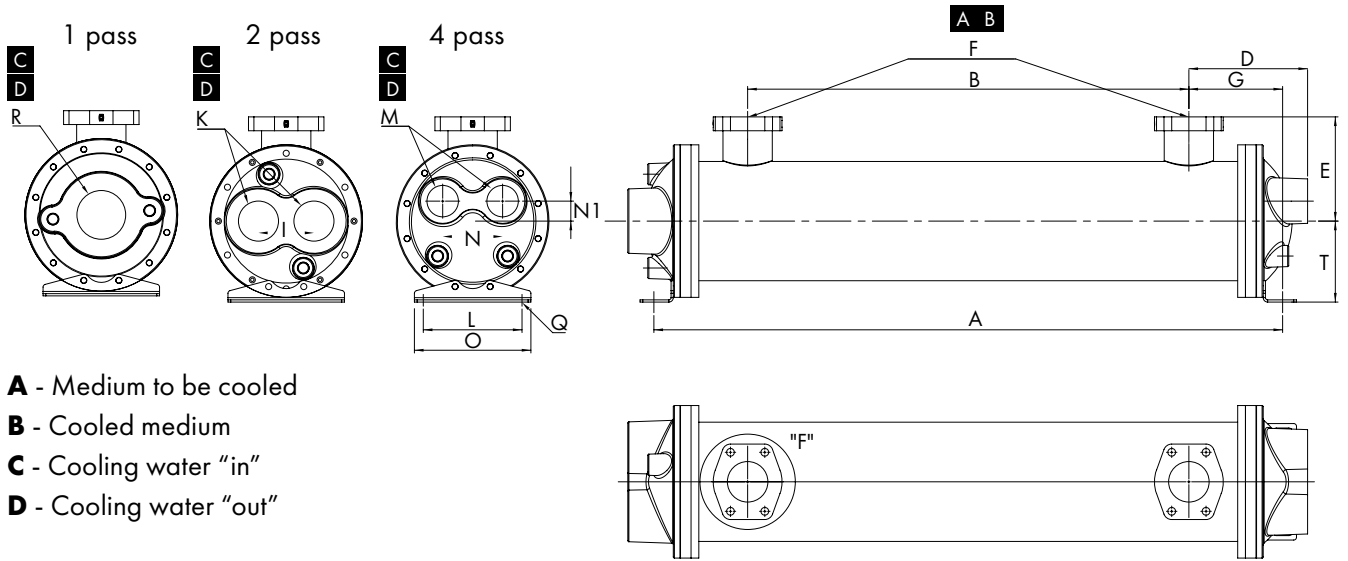
2 PASS



The performance data shown in the diagram are limited by the flow rate and may be exceeded after consultation with the manufacturer. The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt.

- 21 SKM-1218-T
- 22 SKM-1224-T
- 23 SKM-1230-T
- 24 SKM-1236-T
- 25 SKM-1242-T
- 26 SKM-1248-T
- 27 SKM-1254-T
- 28 SKM-1260-T
- 29 SKM-1266-T
- 30 SKM-1272-T
- 31 SKM-1278-T
- 32 SKM-1284-T

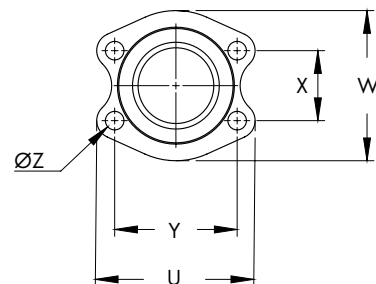
DIMENSIONS EKM 1400



- A** - Medium to be cooled
- B** - Cooled medium
- C** - Cooling water "in"
- D** - Cooling water "out"

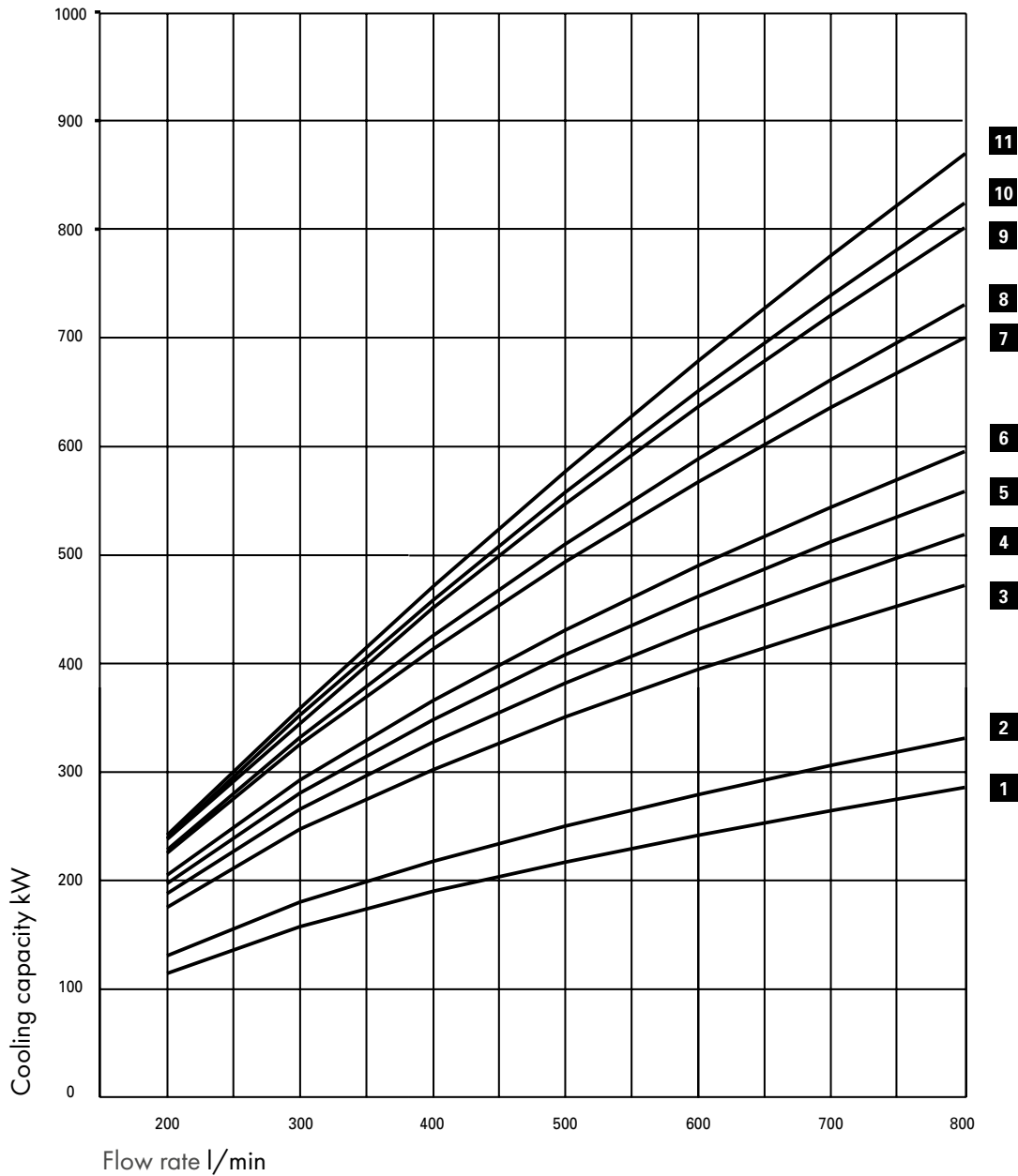
Type	Dimensions [mm/BSPP]																m ²
	A	B	D	E	G	F	T	R	I	K	L	M	N	N1	O	Q	
EKM-1424	701	410	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	15.8
EKM-1430	856	565	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	19.9
EKM-1436	1011	720	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	23.8
EKM-1442	1166	875	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	28.1
EKM-1448	1321	1030	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	31.9
EKM-1454	1476	1185	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	36.1
EKM-1460	1631	1340	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	40.1
EKM-1466	1786	1495	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	44.2
EKM-1472	1941	1650	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	48.1
EKM-1478	2096	1805	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	52.3
EKM-1484	2251	1960	157	159	146	SAE 2 1/2"	130	G 2"	94	G 2"	140	G 1 1/2"	80	36	210	ø 11 x 41	56.4

Type	Dimensions [mm]				
	U	Y	W	X	Z
SAE 1"	70	52.4	55.0	26.2	M10
SAE 1 1/4"	79	58.7	68.0	30.2	M10
SAE 1 1/2"	93	69.9	78.0	35.7	M12
SAE 2"	102	77.8	90.0	42.9	M12
SAE 2 1/2"	114	88.9	105.0	50.8	M12
SAE 3"	135	106.4	130.6	62.0	M16



PERFORMANCE DATA EKM 1400

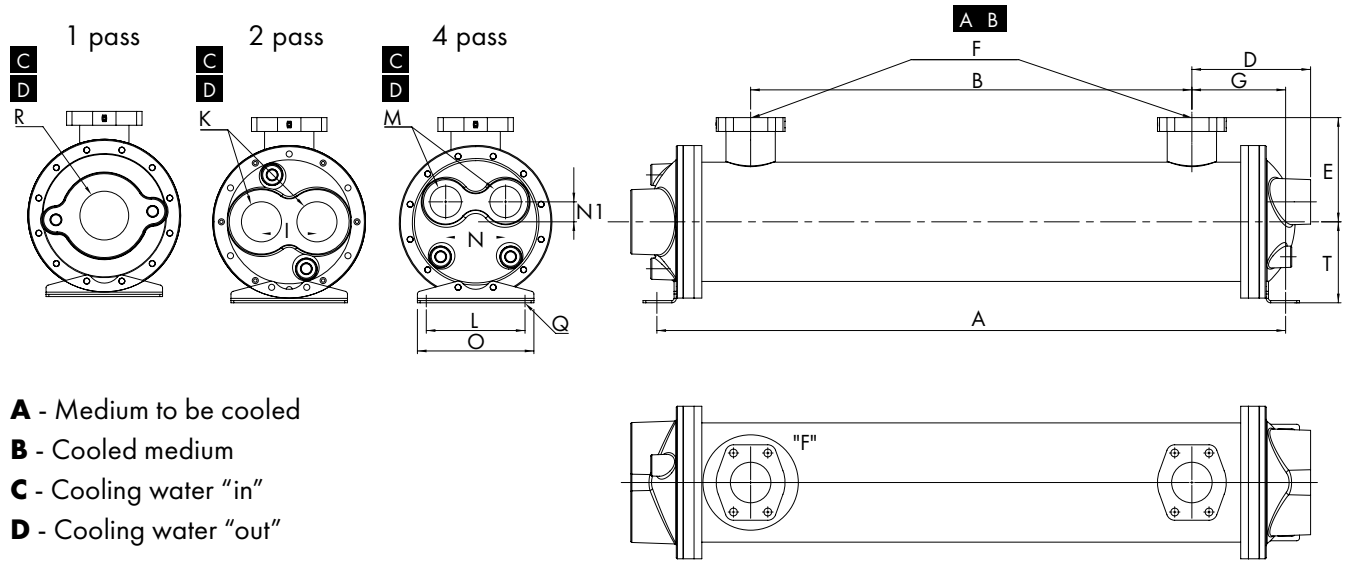
2 PASS



The performance data shown in the diagram are limited by the flow rate and may be exceeded after consultation with the manufacturer. The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt.

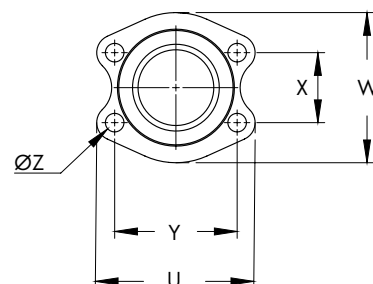
- 1 EKM-1424-T
- 2 EKM-1430-T
- 3 EKM-1436-T
- 4 EKM-1442-T
- 5 EKM-1448-T
- 6 EKM-1454-T
- 7 EKM-1460-T
- 8 EKM-1466-T
- 9 EKM-1472-T
- 10 EKM-1478-T
- 11 EKM-1484-T

DIMENSIONS EKM 1700



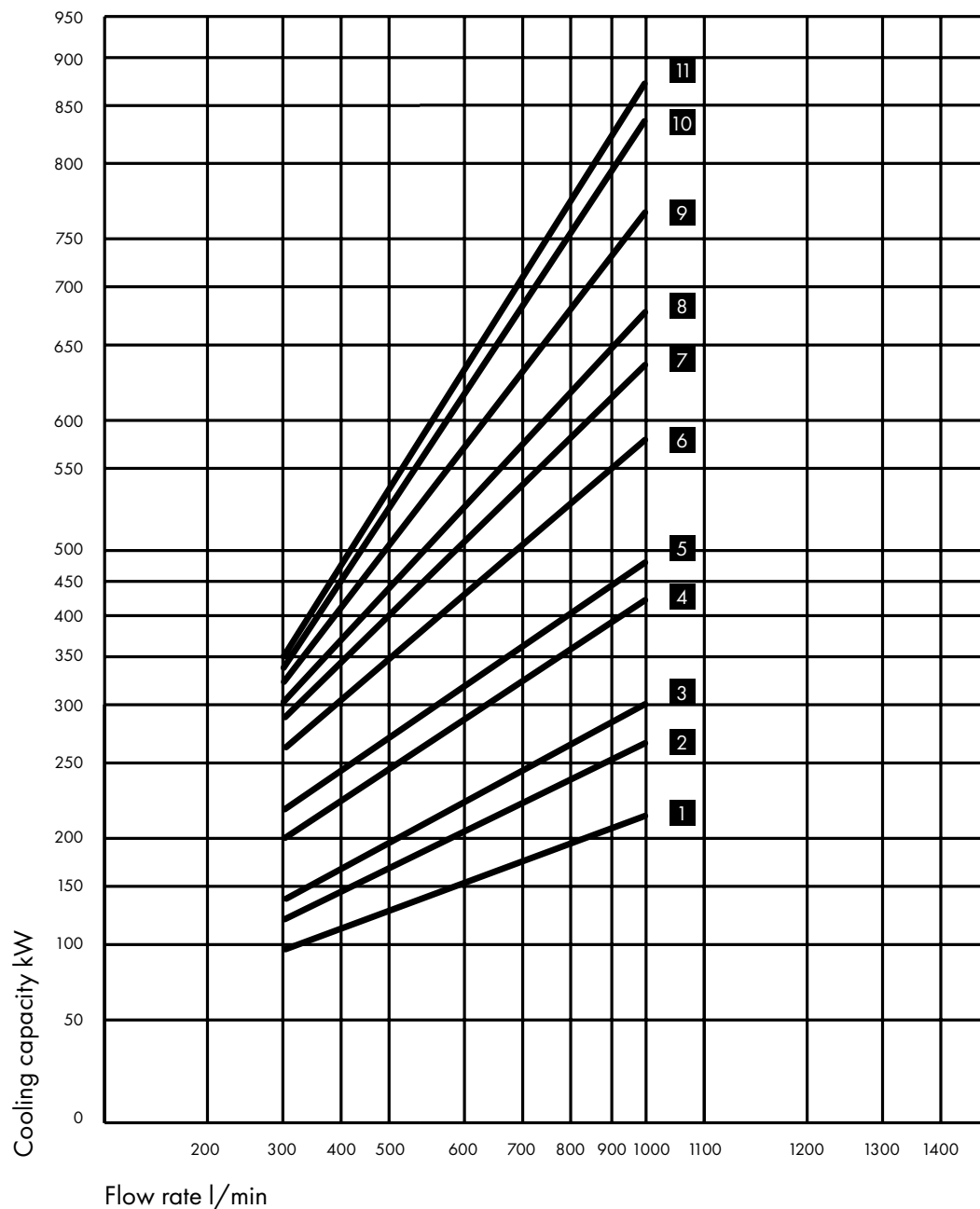
Type	Dimensions [mm/BSPP]																m ²
	A	B	D	E	G	F	T	R	I	K	L	M	N	NI	O	Q	
EKM-1724	706	368	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	14.77
EKM-1730	859	521	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	18.85
EKM-1736	1011	673	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	22.65
EKM-1742	1164	826	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	26.70
EKM-1748	1316	978	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	30.52
EKM-1754	1468	1130	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	34.55
EKM-1760	1621	1283	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	38.40
EKM-1766	1773	1435	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	42.25
EKM-1772	1936	1587	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	46.28
EKM-1778	2078	1740	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	50.12
EKM-1784	2230	1892	214	188	169	SAE 3"	146	G 3"	100	G 2 1/2"	178	G 2"	108	36	210	ø 16 x 38	54.15

Type	Dimensions [mm]				
	U	Y	W	X	Z
SAE 1"	70	52.4	55.0	26.2	M10
SAE 1 1/4"	79	58.7	68.0	30.2	M10
SAE 1 1/2"	93	69.9	78.0	35.7	M12
SAE 2"	102	77.8	90.0	42.9	M12
SAE 2 1/2"	114	88.9	105.0	50.8	M12
SAE 3"	135	106.4	130.6	62.0	M16



PERFORMANCE DATA SKM 1700

2 PASS



The performance data shown in the diagram are limited by the flow rate and may be exceeded after consultation with the manufacturer. The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt.

- 1 EKM-1718-T-CN
- 2 EKM-1724-T-CN
- 3 EKM-1730-T-CN
- 4 EKM-1736-T-CN
- 5 EKM-1742-T-CN
- 6 EKM-1748-T-CN
- 7 EKM-1754-T-CN
- 8 EKM-1760-T-CN
- 9 EKM-1766-T-CN
- 10 EKM-1778-T-CN
- 11 EKM-1784-T-CN

CALCULATION EXAMPLE EKM/SKM

For deviating oil outlet temperatures, water inlet temperatures and viscosities, the calculation has to be made as follows:

GIVEN VALUES

Heat to be dissipated (AW)	= 17 kW
Oil flow (V)	= 80 l/min
Oil outlet temperature ($t_{oil\ out}$)	= 45°C
Water inlet temperature ($t_{water\ in}$)	= 25°C
Oil type	= ISO 68
Effective heat to be dissipated	= kW eff.

1. The viscosity correction factor is calculated as follows:

Temperature difference ΔT (°C) =

$$\frac{AW\ (kW) \times 34.1}{Q\ (l/min)} = 7.2$$

Average oil temperature (°C) =

$$\frac{t_{oil\ out} + \Delta t + t_{oil\ out}}{2} = 49^\circ\ C$$

2. From oil manufacturer's data for ISO 68:

Viscosity at 49°C = 38 cSt

3. From viscosity correction table "A":

38 cSt = 1.11

AW eff. =

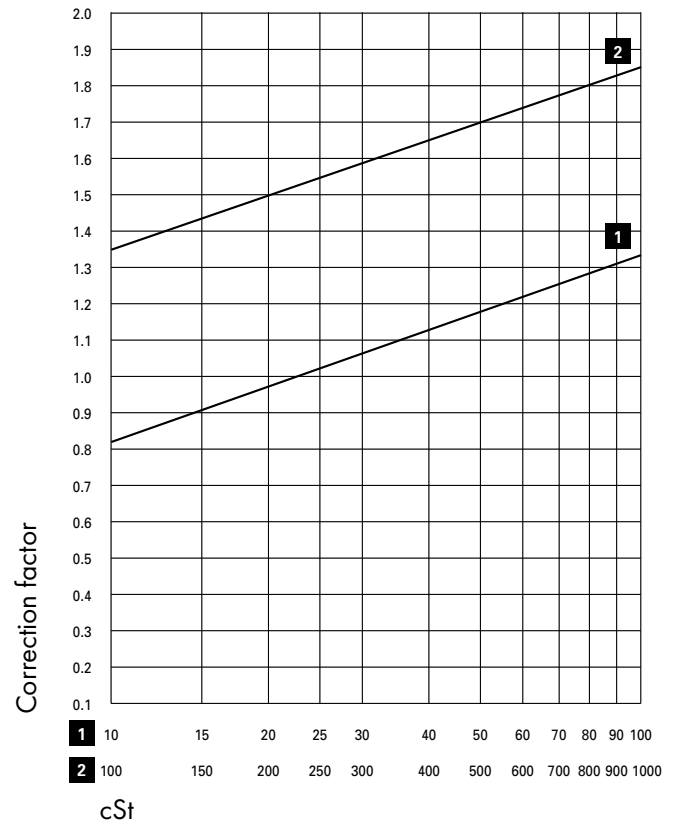
AW (kW) x 25 x viscosity (cSt) Tab. A

$$= \frac{t_{oil\ out}\ (^\circ C) - t_{water\ in}\ (^\circ C)}{20} = \frac{17 \times 25 \times 1.11}{20} = 23.6\ kW$$

From oil/water 2:1 performance diagram at an oil flow of 80 l/min and 23.6 kW, the outcome is:

Cooler no. 31 = EKM- 714 -T
-CN

COOLER SELECTION



The performance data shown is based on a water inlet temperature of 25°C and an oil outlet temperature of 50°C, together with an oil viscosity of 20.6 cSt. For different viscosities, the correction factor "A" can be read in the diagram above.

ORDER CODE EKM/SKM

SS - EKM - 1036 - 6 - O - CN - R - W - SW - G1 1/2"					
Complete cooler stainless steel 1.4301 (+ alu fins)	Type 500, 700, 1000, 1400, 1700 = E 1200 = S	Connection type NPT = - SAE with O-ring, waterside NPT = S BSPF = M SAE flange = FM	Size	Baffle setting	G1 1/2" = Oil connections
					SW = Sea water SWBZ = Sea water End cap gunmetal + zinc anode SS = End cap stainless steel 1.4301
					Tube sheet W = Brass SS = Stainless steel 1.4301
					R = Bypass valve (partly opened) RS = Bypass valve (fully opened)
					Water tubes CN = Copper / nickel CU = Copper SS = Stainless steel
					Cooling water connection system O = 1 pass T = 2 pass F = 4 pass 1200 + 1700 series only

TECHNICAL DATA EKM/SKM

CAUTION: Incorrect installation may lead to damage of the cooler.

Maximum operating pressure:

Shell = 35 bar

Tubes = 16 bar

Operating temperature:

5 – 95 °C

MAXIMUM FLOW RATE

l / min	Oil / Shell	Water / Tubes		
		O	T	F
EKM - 500	75	60	30	-
EKM - 700	225	120	60	30
EKM - 1000	330	280	140	70
SKM - 1200	650	560	280	140
EKM - 1400	850	520	260	130
EKM - 1700	1200	980	490	245

OIL / WATER COOLERS

SERIES UKC-G

PRODUCT DESCRIPTION

- Efficient cooling capacity
- Cooling surface of 0.15 m² to 0.43 m²
- Especially compact



PRODUCT FEATURES

- Application for mounting in tank or gear box
- Easy installation in existing threaded connections for tank heaters
- Cost effective, space saving solution
- End cap: G 1/2" water connections
- Cooling capacity depending on circulation of cooling tubes in the tank or gear box

DELIVERY CONTENT

- Cooler with end cap, screws and O-ring

OPTION

- Special lengths on request

TECHNICAL DATA

Maximum operating pressure: = 10 bar

Maximum operating temperature: = 95 °C

Maximum flow rate tubeside:

Copper tubes = 15 l/min

Copper nickel tubes = 25 l/min

Stainless steel tubes = 25 l/min

MATERIALS

	Standard
Thread	Brass
Tubes	Copper, copper nickel or stainless steel
Baffles	Steel
End caps	Cast iron
Gaskets	Nitrile rubber

ORDER CODE

UKC - G1,5 - 550 - CU

U-tube cooling device

Threaded connection size

G1,5" = 1.5

G 2" = 2

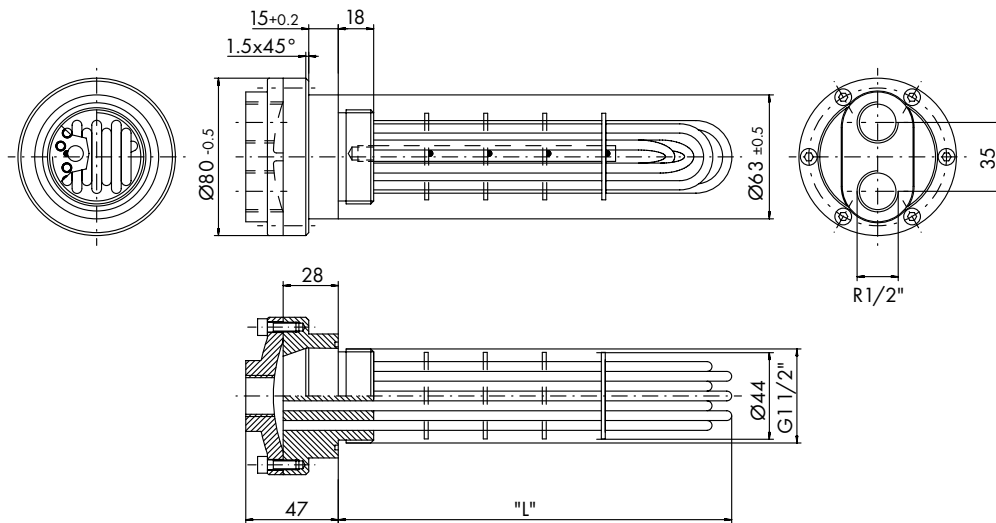
CU = Tubes Copper

CN = Tubes copper/nickel (90:10)

SS = Tubes stainless steel (1.4571)

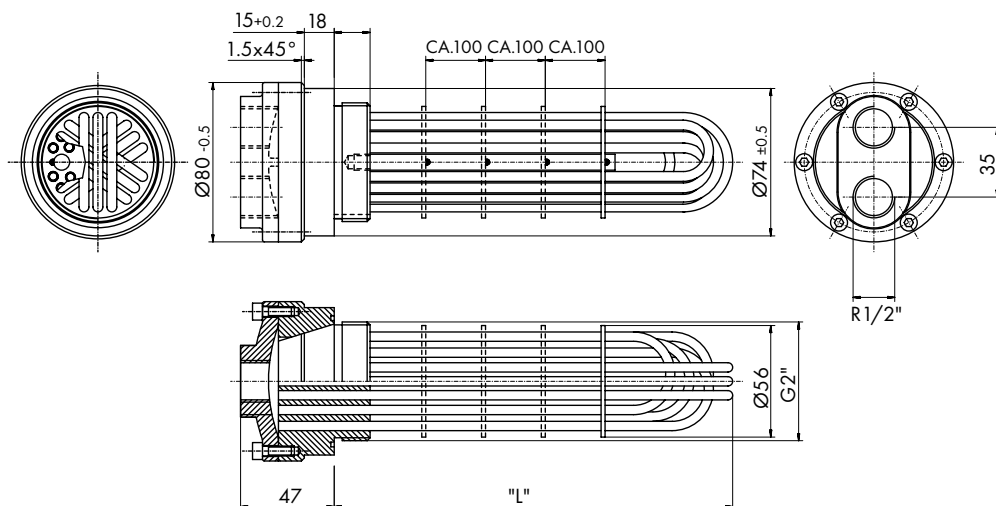
Lineardimension(see chart)

DIMENSIONS UKC-G1,5



Type	L
x 11	190
x 12	550
x 13	580
x 14	600
x 15	630
x 16	640
x 17	690
x 18	705
x 19	780
x 20	805
x 21	950
x 22	1400

DIMENSIONS UKC-G2



Type	L
xx 1	550
xx 2	840
xx 3	850
x 4	930
xx 5	940
xx 6	1030
xx 7	1070
xx 8	1085
xx 9	1170
xx 10	1190

Online catalogue



epaper.hbe-hydraulics.com/en

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