

Made for Motion



Cooling systems

For mobile machines and stationary hydraulics
Customised solutions or standard design



Quality signed and sealed

Certificates

Highest quality is our standard. That is why we have our products and processes certified by independent bodies.

Product certificates

Our drive components dispose of approvals from leading classification societies (DNV, GL, ABS) for maritime applications as well as ATEX and UKEX certifications for use in potentially hazardous areas.

Quality management

Being one of the first companies in the field of drive technology, KTR has been certified in accordance with ISO 9001 since 1993 already.. Our environmental management complies with ISO 14001.

Assembly instructions

Properly assembled - long service life. Correct assembly is decisive for the operativeness and service life of our products. Our detailed assembly instructions guide you step by step through the process supporting you to avoid errors. Observe all safety instructions.

Have you misplaced the assembly instructions? No problem. Download all assembly instructions from our website free of charge. After selecting the product and the preferred language, all available documents will be clearly displayed to you.



Order 24/7 – easily and transparently

Registered customers can place orders in our online shop around the clock benefitting from numerous functions. Check availabilities in real time, track your shipments and download all documents as pdf.



Your benefits

- Subassemblies configurator for complete couplings
- Tracking of shipments (track & trace)
- Download of order confirmations and invoices
- Direct reference to offers and contracts



DID YOU KNOW ...

that couplings, hydraulic components and coolers are part of our scope of supply, too?
Details are available at ktr.com.



POSSIBLE COMBINATIONS

Our brake systems can be combined with our drive components.

Perfect in Combination with our
COUPLINGS





Drive technology and
shaft connections

Brake systems

Cooling systems

Hydraulic components



**KTR worldwide – Our worldwide locations
for quality and service.**

○ Headquarter (Rheine / Germany)

● 24 subsidiaries

90 sales partners

More than 1,200 employees worldwide

KTR Systems - Solutions across industries for a global market.

As a future-oriented and innovative knowledge partner for our customers, we are actively shaping the technological future. By consciously responding to the needs of our customers and a profound understanding of their technology, we are able to develop solutions across all industries. We always strive for excellence and optimise existing approaches. And that since 1959.

PART OF EXCELLENCE

Our philosophy of "PART OF EXCELLENCE" is reflected in every single component and service we provide. With our expertise and innovation, we achieve top performance together with our customers. With over 500 employees at its headquarters in Rheine, more than 1,200 employees worldwide, 24 subsidiaries and over 90 sales partners, KTR is at home in industrial markets on every continent. **As a leading manufacturer of high-quality drive technology, brake and cooling systems as well as hydraulic components**, KTR is a reliable partner for all companies that want to keep moving. As a leading expert in these fields, we take pride in offering our versatile solutions in the following industry:



Wherever motion is essential, we have the right answer.

Drive technology and shaft connections



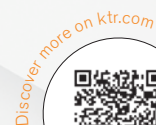
Mechanical components are and will remain essential in drive technology. The industry's demands on components grow continuously: energy efficiency, power density, ease of servicing and electrification. Our portfolio includes couplings and torque limiters, clamping sets and universal joints as well as torque measuring shafts.



Brake systems



Our hydraulic and electromechanical brake systems are globally used in various industries. Customer preference and parameters of the application decide upon the selection of the right brake.



Hydraulic components



For almost 50 years we have provided the industry with a continuously growing range of hydraulic components from our in-house development and manufacturing: accurate selection, high-quality processing, quick availability.



Cooling systems



As a customised product or standard solution, multimedum or oil/air cooler, for mobile machines or stationary hydraulics, optionally available as a marine or ATEX version, powerful and efficient.



PART OF EXCELLENCE



Energy



Construction machinery



Agriculture



Oil & Gas



Automation



Machine Tools



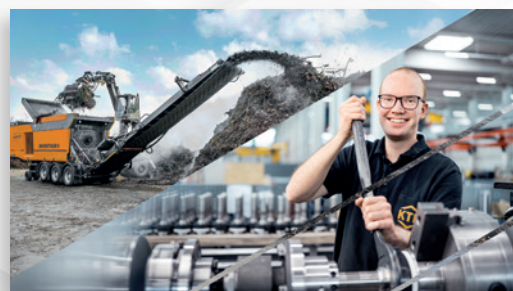
Hydraulics



Gearboxes



Transportation



Recycling

SUMMARY OF PRODUCTS/INDUSTRIES

	WIND POWER			CONSTRUCTION AND AGRICULTURAL MACHINERY			PUMPS AND COMPRESSORS			INDOOR MATERIALS HANDLING			MAINTENANCE		
	Gearless wind turbines	Wind turbines	Local power grids	Excavators	Road rollers	Crushers	Combine harvesters	Tank spreaders	Compressors	Pumps	Cooling towers	Conveying and storage	Food processing machinery	Packaging machinery	Automation
															
Cooling systems															
Cooling system type MMC															
Combined coolers type MMC															
Oil-air cooler type OAC															
Cooling system type OAC															
Cooling system type OPC															
Cooling system type OPC															
Oil-water coolers															
PHE															
TAK/TP															

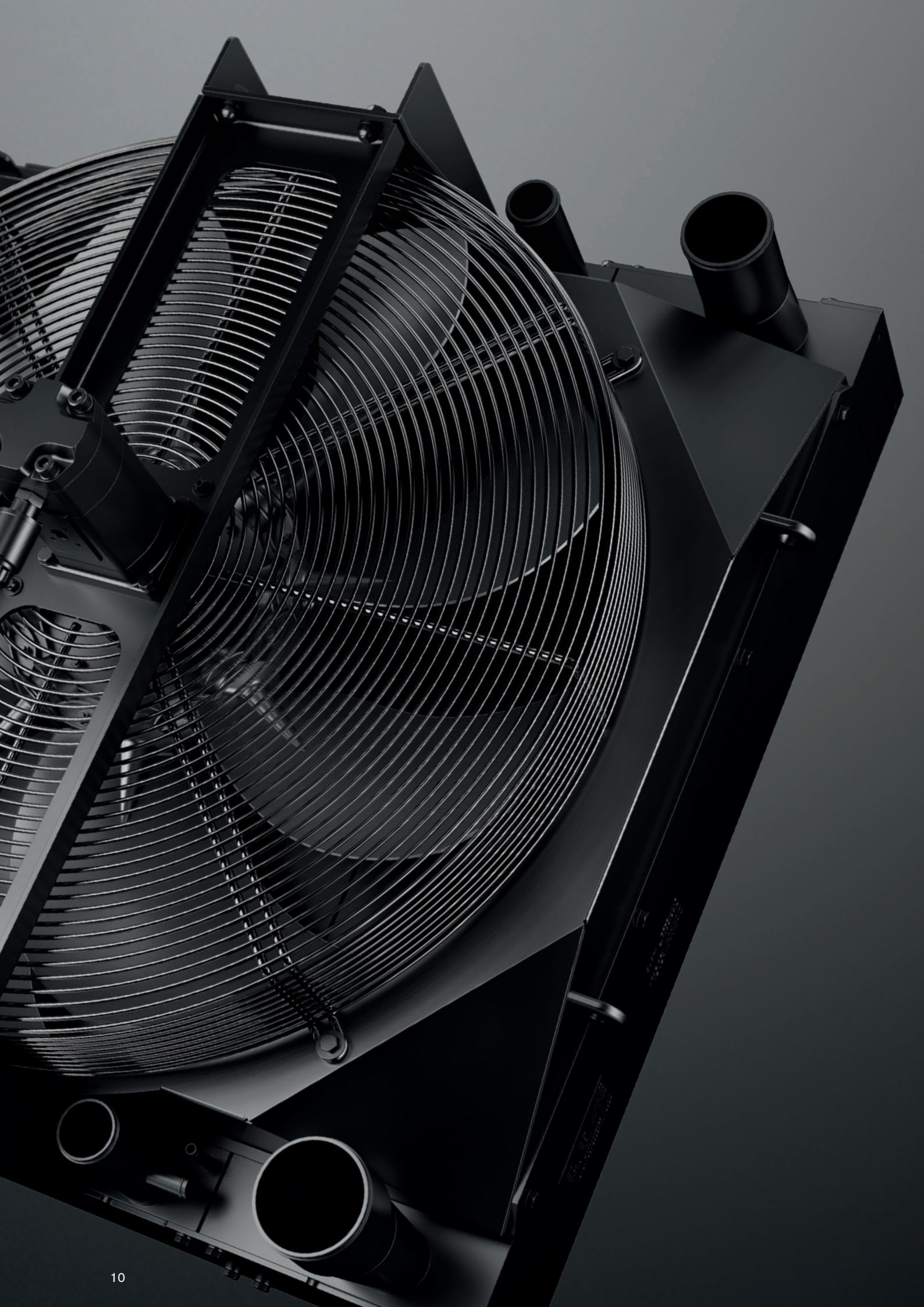


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MMC



OAC





CUSTOMISED
SOLUTIONS



Optimised delivery times, high delivery performance



Consistently high quality of products



Extensive know-how and portfolio per industry



Engineering, project management and personal advice



Tailor-made solutions: customised and application-specific



Combined coolers type MMC

Cooling systems

Overview of the MMC cooling system

Depending on the application features, our multiple-circuit coolers series MMC (Mobile Machinery Cooler) combine different media such as oil, water, fuel and air in one single cooling system. Main application ranges are engine cooling in agricultural and construction machinery, stationary I. C.-engines. Tailor-made coolers for hydraulic applications as well as cooling of compressors supplement the MMC portfolio. Every MMC cooler is a project-specific version that is calculated and developed by our engineers for the very special application.



MMC series

- Customised design
- Single-circuit and multiple-circuit coolers
- Project-specific selection
- Performance simulation for application-specific data generation
- Cooling of motors, hydraulic oil and compressed air

**CUSTOMISED
SOLUTIONS**

Other types



MMC motor system coolers



MMC hydraulic coolers



MMC compressor coolers

Applications



Construction machinery



Diesel engines



Special hydraulics



Compressors

Oil-air coolers

Cooling systems

Overview of the OAC cooling system

The oil-air coolers type OAC and OPC are compact and high-performance coolers for cooling hydraulic, gear, lubricating and motor oils as well as water glycol. Main applications are hydraulic power packs, machine tools, hydraulic presses, wind power and rail technology as well as iron and steel industry. Besides marine and ATEX versions the coolers are available in combination with thermal or pressure bypass valves.



OAC series

- Defined portfolio of oil coolers
- Single-circuit coolers
- Performance-related product selection
- Recorded in catalogue tables

**STANDARD
DESIGN**

Other types



OAC oil-air cooler
High-performance cooling
for stationary hydraulics



OAC oil-air cooler
Infinitely variable adaptation of cooling
capacity based on requirements



OPC Oil-air coolers
Bypass flow cooling
with integrated pump

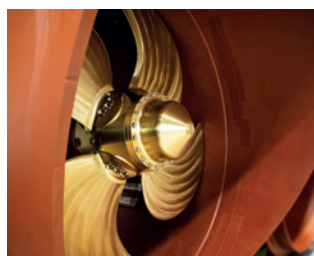
Applications



Wind energy



Stationary hydraulics



Marine



Gearbox

Combined coolers type MMC Cooling systems

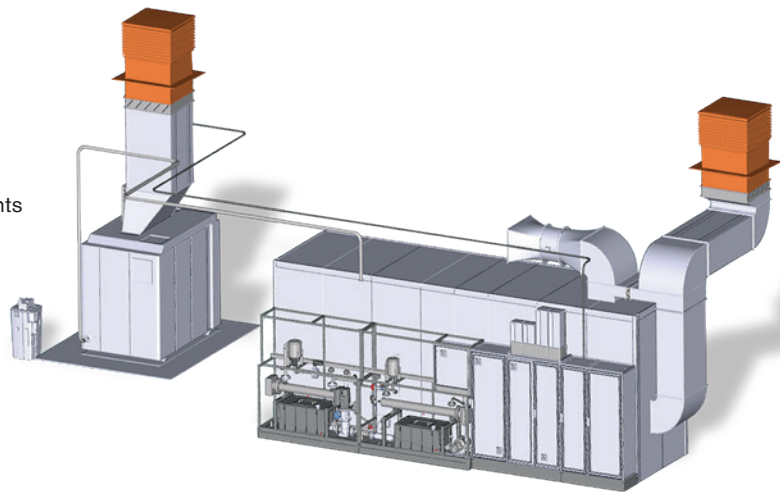
Application-specific system development



- Every cooler is a unique copy
- Competent support throughout the entire development cycle: From development of ideas through simulation to series of prototypes, start-up and series production.
- Services by R + D: Visual inspection, pressure testing, pressure threshold testing, optimum pressure testing, initial sample inspection
- 24 subsidiary companies globally for supporting your projects locally

Measuring test bench, for determining actual performance data of specifically designed heat exchangers

- cooling water circuit
- cooling of charge air
- cooling of hydraulic and gear oil
- provides validation of performance data
- supports innovative developments
- optimises application-specific developments
- allows for transfer of know-how
- ...

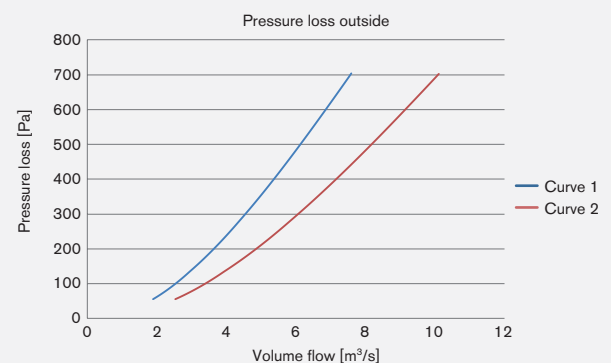
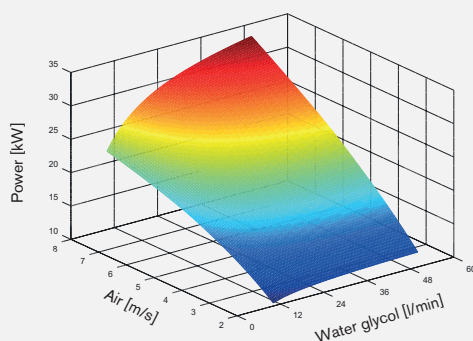
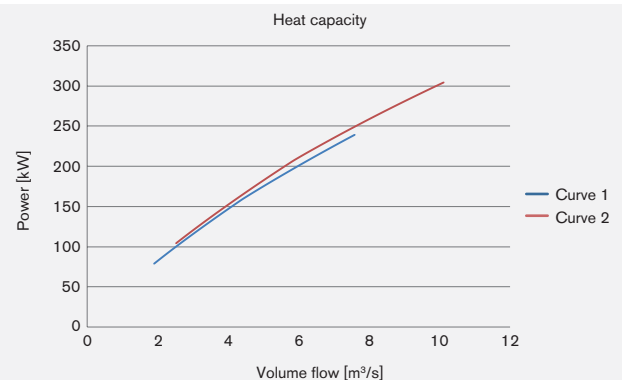


Selection

To determine an optimum cooling system for your individual application, we count on our specifically programmed selection software. The data stored are not only based on wind tunnel measurements, but also on CFD simulations. The basis for the calculation is the determination and assessment of application-specific parameters and influence factors. Our engineers support the projects with know-how and experience to the finished product in your application.

Projektdatei			
Projektname	MMC-System Customized Maschinen/Hydraulik Kältesystem		
Projektnummer	MB123-112018		
Kunde	Fahrzeugbau GmbH	Kundennummer	
Datum	2018-11-01	Autor	E.-J. Hoffmann

Eingangsdaten			
Luftleistungskoeffizient * 360C002-958R2502-112 (Wassser/Oil Luft Kühlen)			
Länge der Rohre	532 [mm]	Stöße	410 [mm]
Fluid innen (Einlass):		Fluid außen (Einlass):	
Fluid	ISO VG 46	Fluid	Air
Temperatur	82.4 [°C]	Temperatur	48 [°C]
Druck	2500 [hPa]	Druck	1013.15 [hPa]
Durchsatz	130 [l/min]	Durchsatz	5.3 [m³/s]



Combined coolers type MMC

Cooling systems

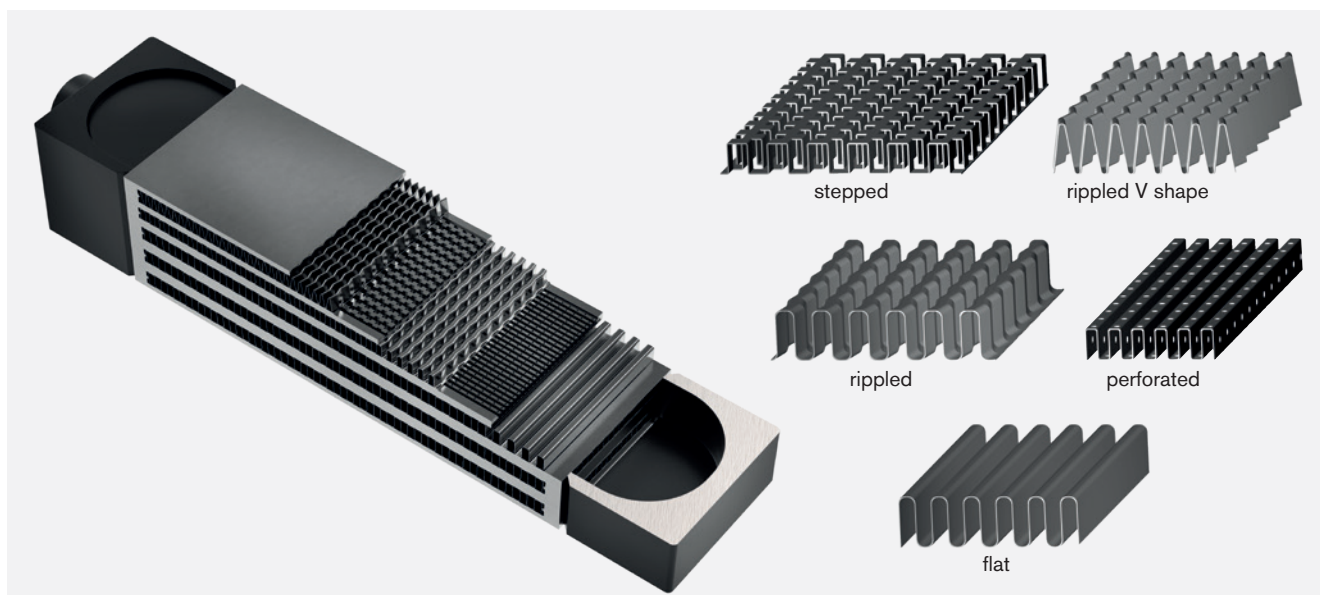
Structure

The MMC cooler is a high-performance cooler made of aluminium. It combines several cooling circuits, for example for charge air, water and oil in one single system. The design of the cooler is specifically suitable for heavy duty applications. The laminae are selected based on thermal and hydraulic parameters. The depth of the cooler cores may vary between 32 mm and 200 mm. The cooler dimensions are specifically adapted to the respective mounting space. Here sizes up to 2000 mm are feasible. The selection of the fan is based on the requirements calculated such as mass flow, noise generation, speeds, etc. When designing the drive there is the option to select between a direct fan drive, an electric motor adapted to the operating parameters or a hydro motor.



Laminae structure

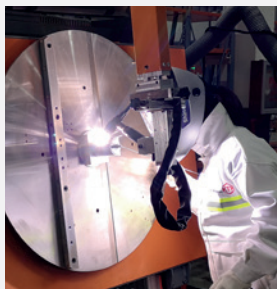
The core of our cooling systems as a proven plate and bar technology. The different shapes of the laminae structures allow for an infinite variety of types which are accurately selected and tailored for your application.



Combined coolers type MMC

Cooling systems

Manufacturing expertise in our own plant



Our new cooler production plant in Jiading located 100 kilometers southwest of Shanghai commenced operations at the end of 2018. On an effective area of about 9,000 m² we manufacture high-quality cooling systems for the global market being used as multimedial coolers in construction and agricultural machinery or as oil-air coolers in stationary hydraulics.



For that purpose we invested in a state-of-the-art machinery park. Joachim Grunwald, Product Manager of MMC combined coolers: „We are in a position to manufacture smaller quantities with a high level of automation and consequently at a constantly high quality level here.“ There is a very close cooperation between the manufacturing specialists in Jiading and the design engineers and project managers in Rheine. Since the team of engineers at KTR's headquarters in Rheine/Germany is and remains responsible for the development of the cooling systems.



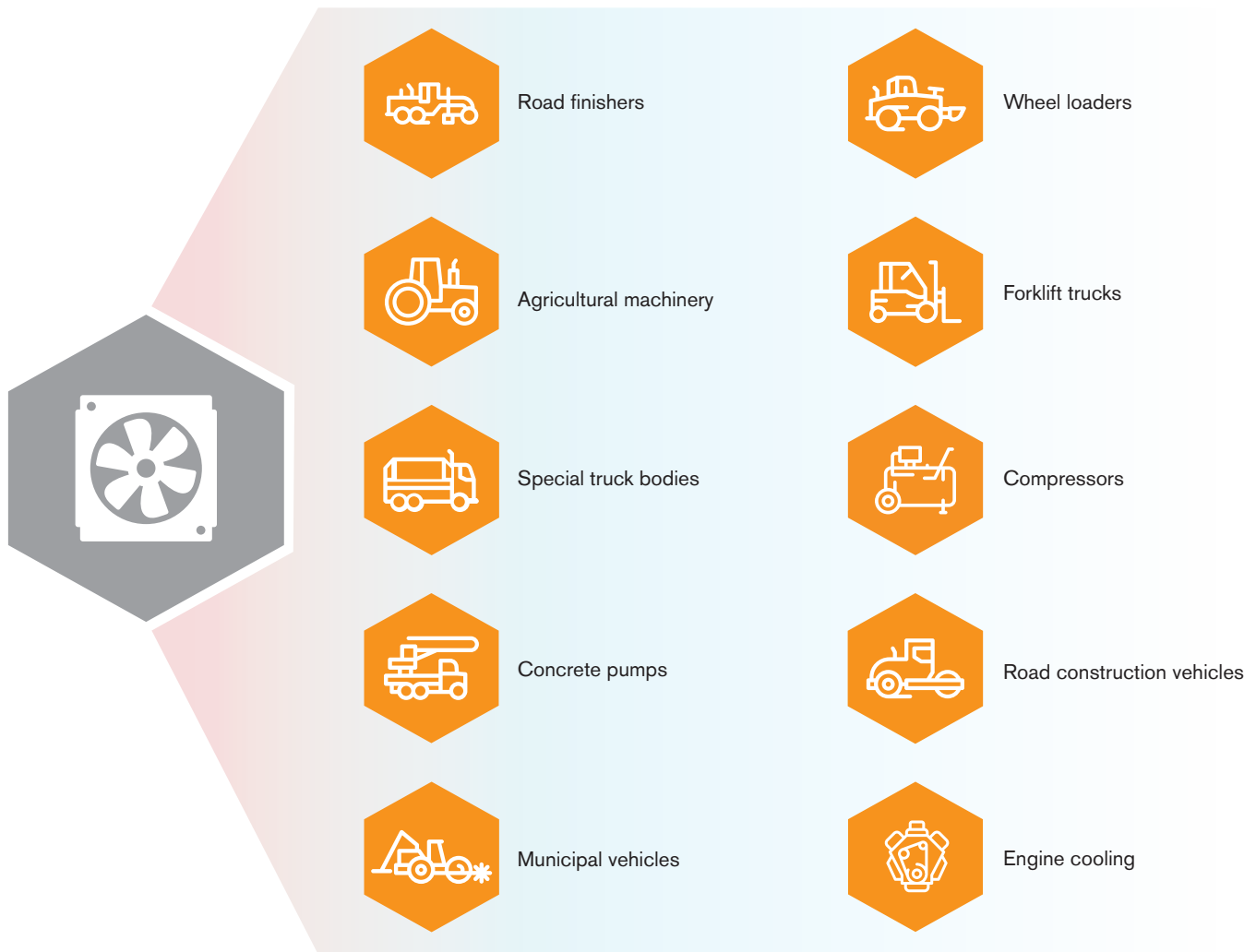
Customers' benefits at a glance

- **Higher capacity**
Availability ensured by the expansion of production capacity.
- **Optimised delivery times**
Customised delivery times by individual production planning and capacity.
- **Optimised access to quality**
State-of-the-art production lines, robotic welding systems and our qualified staff ensure a high level of quality.
- **Future-oriented engineering**
Due to the combination of project management, development, designing and production we bring together all process steps in one location.

Combined coolers type MMC

Cooling systems

Various applications



Examples of references



Weycor wheel loader AR530 by Atlas Weyhausen

The wheel loader is one of the medium size types of the portfolio equipped with a water-cooled 4-cylinder DEUTZ engine series TCD 3.6 L4 High Torque with a 3.6 litres displacement and a maximum power of 55 kW.

KTR was commissioned with the selection of the cooling system. For cooling charge air, cooling water and hydraulics a triple-circuit combined cooler type MMC is used.

Open Power Unit by Hatz

The diesel engine manufacturer located in Lower Bavaria provides all variants of the new H series as a pre-finished open power unit. The standard model, the water-cooled 4-cylinder 4H50TIC with 2 litres displacement and a maximum power of 55 kW counts on common rail technology, turbo loader and external exhaust gas recirculation.

For cooling charge air and engine cooling water, a dual-circuit combined cooler type MMC by KTR which was dimensioned in cooperation with Hatz is used. In addition the scope of delivery comprises a compact oil cooler installed at the engine side cooling the engine oil via the engine cooling water.



Online tool for oil-air coolers type OAC



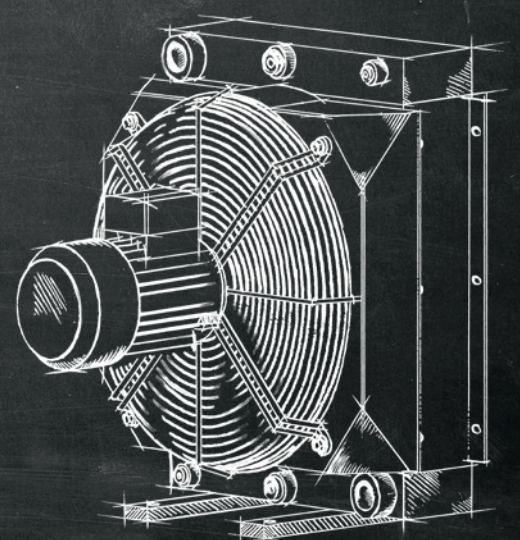
„The suitable cooler
for your application –
available within
short term.“

Christoph Bettmer, Core Business Hydraulics/Product Manager

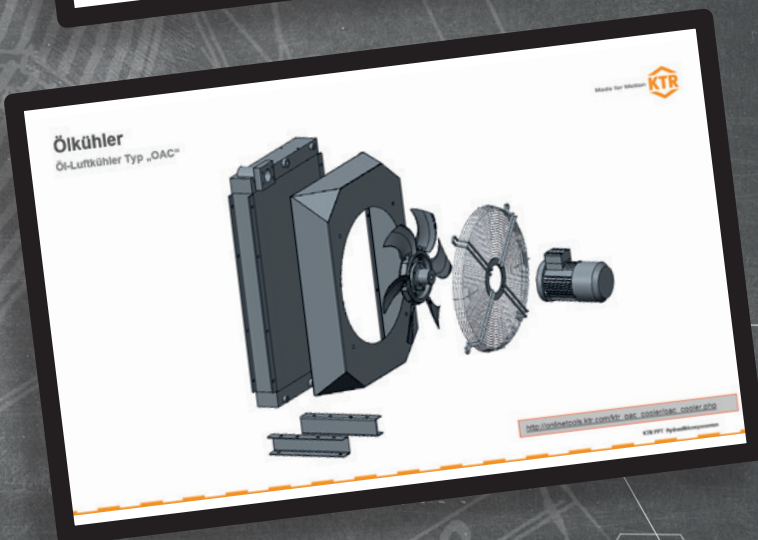
STANDARD DESIGN

Exclusively for OAC oil-air coolers.

Our online tool makes selecting easy for you: Based on the data you enter such as ambient and oil temperatures, installation height and requested fan drive the tool calculates the suitable cooler promptly. Apart from that you are provided with clear data processing and a descriptive 3D model as well as a link to our online shop.



otools.ktr.com



Oil-air cooler type OAC

Cooling systems

High-performance cooling of hydraulic and lubricating oils



A compact and high-performance cooler series comprising 14 sizes was developed for high-performance cooling of hydraulic and lubricating oils.



Assembly instructions
Oil-air cooler type OAC

Applications:

- Construction machinery
- Agricultural machinery
- Rail technology
- Machine tools
- Hydraulic power packs
- Wind power
- Hydraulic presses
- Iron and steel industry etc.

Applicable for cooling of:

- Hydraulic oil
- Gear oil
- Lubricating oil
- Water glycol (min. 40 % glycol)

Structure:

- Cooler core (plate and bar) made of aluminium with industrial lamina in black (RAL 9005)
- Fan cover made of steel in black (RAL 9005)
- Fan made of nylon PAG
- Protective grid made of steel in black (RAL 9005)
- Fan 12/24V IP68, 230/400V, 400/690V, IP55
- Fan with hydraulic drive

Marine design:

- Cooler core, frame, fan cover with double-component paint
- Electric motor with special paint and protection class IP56

ATEX design:

- Gas sector:  II 2G Ex h IIC T6...T3 Gb X
- Dust sector:  II 3D Ex h IIIC T68 °C...110 °C Gb X
- Ambient temperature -40 °C < Ta < +55 °C
- Motor and fan as an adequate ATEX design

Accessories (see page 39 et seq.):

- Thermal bypass valves
- Oil thermostat valve (OTV)
- Protective grid
- Temperature switch (TSC)
- Speed-controlled operation

The OAC coolers must be protected from direct solar radiation.

Selection system

To select the suitable cooler you need to know the following details:

Q [kW]	Heat to be dissipated
V [l/min]	Oil flow
T _{oil} [°C]	Inlet temperature of oil into cooler
T _L [°C]	Inlet temperature of ambient air into cooler

Example of calculation

Details given:

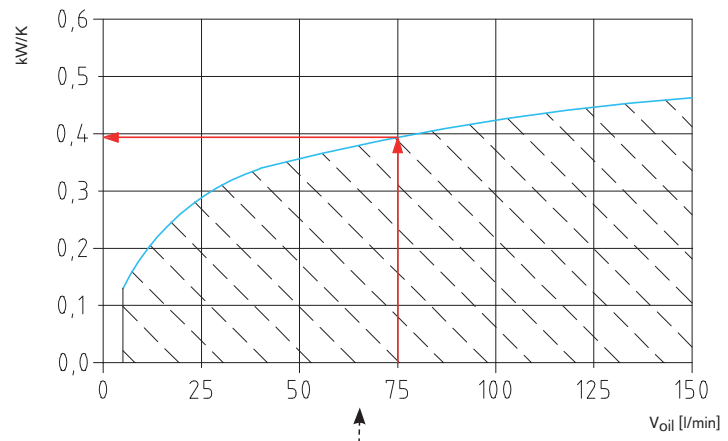
Q = 12 kW

V = 75 l/min

T_{oil} = 65 °C

T_L = 30 °C

Performance diagramme of OAC400



Calculation of specific cooling capacity

Difference of inlet temperature ETD [°C] = T_{oil} - T_L

Specific cooling capacity required P_{requ.} = Q/ETD

The specific cooling capacity required must fall below the performance curve! → 12 kW/(65 °C - 30 °C) = 0.34 kW/°C

The following was selected: OAC400

The actual cooling capacity of the cooler is 0.39 kW/°C x 35 °C = 13.65 kW

Calculation of pressure loss

The pressure loss in the curves of the different data sheets is based on a viscosity of 30 cSt.

The effective pressure loss is calculated as follows:

Pressure loss (from curve) x factor = effective pressure loss

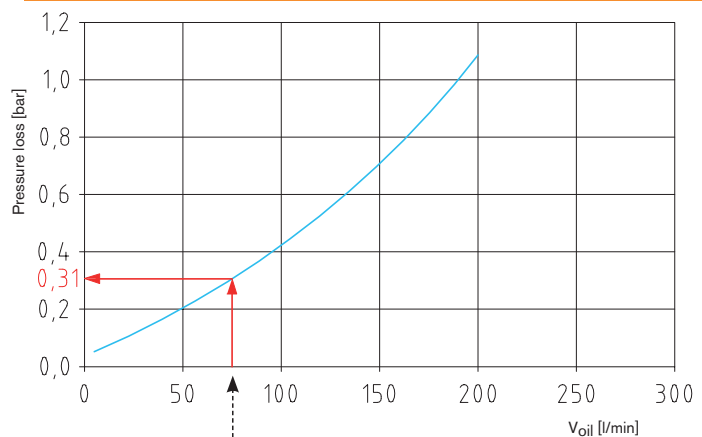
Example

V_{oil}: 75 l/min

Viscosity: 20 cSt

→ 0.31 bar x 0.75 = 0.233 bar

Pressure loss 30 cSt



Conversion factor of pressure loss

cSt	10	15	20	30	40	50	60	80	100
Factor	0.5	0.65	0.75	1	1.2	1.4	1.6	2.1	2.8

Oil-air cooler type OAC

Cooling systems

Type code of industrial cooler oil-air

OAC - 200 - M - 03 - B - 4 - A - 0 - 0							
Size of cooler	Type	Motor	Effective direction	Number of poles or displacement	Voltage	Bypass	Protective grid against stones
75	No specification = Standard	00 = Without motor	Standard = Sucking (no specification required) B = Pressing	0 = Not applicable	To be omitted if not applicable	0 = Without bypass	0 = No
100		01 = Direct current 12V		2 = Number of poles	A = 230/400V 50 Hz 460V 60 Hz	TB6 = Thermal bypass (6 bars/50 °C)	1 = Yes
200		02 = Direct current 24V		4 = Number of poles	B = 400/690V 50 Hz		2 = Protective grid against stones incl. air filter
250	M = Marine (seawater resistance)						
300	03 = AC current	6 = Number of poles		C = 230V 50/60 Hz (single-phase)	DB6 = Pressure bypass (2, 4, 6 bars)		
400	04 = Hydraulics	8 = Number of poles					
500	ExG = ATEX (gas-protected area)	6 = Displacement cm3/revolution				D = 230/400V 50/60 Hz Compact fan (OAC300/400)	
600		09 = Special		8 = Displacement cm3/revolution			
700	ExD = ATEX (dust-protected area)			11 = Displacement cm3/revolution	E = 380V 50Hz, 440V 60Hz F = 415V 50Hz, 480V 60Hz		
800	M-ExG = Marine & ATEX (gas)			14 = Displacement cm3/revolution			
850				19 = Displacement cm3/revolution			
850 HP	M-ExD = Marine & ATEX (dust)				Other data on request		
900							
1000	ECO2 = Speed-controlled operation						
2000							

Technical data of cooling elements				
Type of cooler ³⁾	Max. volume flow [l/min]	Volume of cooling element	Perm. pressure [bar]	
			Static	Dynamic
OAC75	40	0.68		
OAC100	50	0.9		
OAC200	100	1.9		
OAC250		2.6		
OAC300	120	3		
OAC400		4	26	14
OAC500	200	5.7		
OAC600	250	8.7		
OAC700		10		
OAC800	350	17.7		
OAC850		15.5		
OAC900	450	28.6		
OAC1000	530	32.7	21	14
OAC2000	700	54.8		

Bigger volume flows on request

Oil-air cooler type OAC

Cooling systems

Technical data

12V and 24V fan drive									
Type of cooler ³⁾	Voltage [V]	Drive [kW]	Speed [rpm]	Amperage [A]		Protection class	Fan Ø [mm]	Weight [kg]	Noise ¹⁾ [dB(A)]
				Start-up	Standard				
OAC75-01	12	0.09	3950	13.8	5.7	IP68	190	5	55
OAC75-02	24	0.06	3625	5.9	2.4	IP68	190	5	54
OAC100-01	12	0.09	3950	13.8	5.7	IP68	190	6	55
OAC100-02	24	0.06	3625	5.9	2.4	IP68	190	6	54
OAC200-01	12	0.10	2838	16.7	6.4	IP68	280	11	62
OAC200-02	24	0.11	2925	14.1	3.9	IP68	280	11	63
OAC250-01	12	0.10	2838	16.7	6.4	IP68	280	13	62
OAC250-02	24	0.11	2925	14.1	3.9	IP68	280	13	63
OAC300-01	12	0.22	3080	23.9	13.7	IP68	350	16	65
OAC300-02	24	0.23	2730	23.3	7.0	IP68	350	16	63
OAC400-01	12	0.22	3080	23.9	13.7	IP68	350	22	65
OAC400-02	24	0.23	2730	23.3	7.0	IP68	350	22	63
OAC500-01	12	0.24	2600	24.0	13.2	IP68	385	30	59
OAC500-02	24	0.24	2700	24.8	7.8	IP68	385	30	60
OAC600-01	12	2 x 0.10	2838	2 x 16.7	2 x 6.4	IP68	280	43	65
OAC600-02	24	2 x 0.11	2925	2 x 14.1	2 x 3.9	IP68	280	43	66
OAC700-01	12	2 x 0.24	2600	2 x 25	2 x 13.2	IP68	385	53	62
OAC700-02	24	2 x 0.24	2700	2 x 24.2	2 x 7.8	IP68	385	53	63
OAC800-01	12	2 x 0.24	2600	2 x 25	2 x 13.2	IP68	385	81	62
OAC800-02	24	2 x 0.24	2700	2 x 24.2	2 x 7.8	IP68	385	81	63

³⁾ Max. medium temperature: 110 °C (higher temperatures on request)/Max. ambient temperature: 60 °C Ambient temperature: 60 °C

Other motors on request

230/400V with 50 Hz; 460V with 60 Hz fan drive									
Type of cooler ²⁾	Driving power [kW]		Speed [rpm]		Protection class		Fan Ø [mm]	Weight [kg]	Noise ¹⁾ [dB(A)]
	50 Hz	60 Hz	50 Hz	60 Hz	Standard	Marine			
OAC75-03 C	0.07	0.08	2500	2700	IP54	–	200	6	64
OAC100-03 C	0.07	0.08	2500	2700	IP54	–	200	8	64
OAC200-03 C	0.12	0.16	2450	2650	IP54	–	250	12	69
OAC200-03	0.18	0.21	1350	1650	IP55	IP56	280	16	66
OAC250-03	0.18	0.21	1350	1650	IP55	IP56	280	20	66
OAC300-03-4	0.37	0.43	1370	1670	IP55	IP56	380	24	76
OAC300-03-6	0.18	0.21	850	1020	IP55	IP56	380	24	63
OAC300-03 D	0.14	0.17	1400	1600	IP44	–	350	21	72
OAC400-03-4	0.37	0.43	1370	1670	IP55	IP56	380	29	76
OAC400-03-6	0.18	0.21	850	1020	IP55	IP56	380	29	63
OAC400-03 D	0.14	0.17	1400	1600	IP44	–	350	26	72
OAC500-03-4	0.37	0.43	1370	1670	IP55	IP56	380	37	78
OAC500-03-6	0.18	0.21	850	1020	IP55	IP56	380	37	63
OAC600-03-4	0.75	0.86	1440	1740	IP55	IP56	520	57	78
OAC600-03-6	0.55	0.63	935	1135	IP55	IP56	520	57	70
OAC700-03-4	0.75	0.86	1440	1740	IP55	IP56	520	70	78
OAC700-03-6	0.55	0.63	935	1135	IP55	IP56	520	70	70
OAC800-03-4	1.5	1.75	1435	1730	IP55	IP56	630	97	87
OAC800-03-6	1.1	1.3	955	1146	IP55	IP56	630	97	81
OAC850-03-6	2.2	2.55	965	1165	IP55	IP56	750	130	79
OAC850HP-03-6	2.2	2.55	965	1165	IP55	IP56	750	130	85
OAC900-03-6	2.2	–	965	–	IP55	IP56	900	173	85
OAC900-03-4	7.5	–	1465	–	IP55	IP56	900	205	97
OAC1000-03-8	1.5	–	700	–	IP55	IP56	900	154	81
OAC1000-03-6	2.2	–	965	–	IP55	IP56	900	187	87
OAC1000-03-4	7.5	–	1465	–	IP55	IP56	900	212	97
OAC2000-03-8	4	–	720	–	IP55	IP56	1000	329	86
OAC2000-03-6	7.5	–	980	–	IP55	IP56	1000	357	92
OAC2000-03-4	18.5	–	1470	–	IP55	IP56	1000	429	100

¹⁾ Measurement based on 50 Hz operation

²⁾ Max. medium temperature: 110 °C (higher temperatures on request)/Max. ambient temperature: 40 °C

Hydraulic fan drive							
Type of cooler ³⁾	Displacement [ccm]	Speed [rpm]	Fan Ø [mm]	Noise [dB(A)]	Weight [kg]	Motor	
						Volume flow [l/min]	Pressure [bar]
OAC200-04-06	6.3	1500	280	66	15	10	4
OAC250-04-06	6.3		280	66	15	10	4
OAC300-04-06	6.3		380	75	21	10	18
OAC300-04-08	7.9		380	75	21	13	15
OAC400-04-06	6.3		380	74	25	10	18
OAC400-04-08	7.9		380	74	25	13	15
OAC500-04-06	6.3		380	74	34	10	18
OAC500-04-08	7.9		380	74	34	13	15
OAC600-04-08	7.9		520	78	50	13	27
OAC600-04-11	10.9		520	78	50	20	17
OAC700-04-08	7.9	1000	520	78	60	13	27
OAC700-04-11	10.9		520	78	60	20	17
OAC800-04-11	10.9		630	78	88	18	34
OAC800-04-14	13.9		630	78	88	22	27
OAC850-04-14	13.9		750	79	110	15	45
OAC900-04-19	18.8		900	85	155	20	82
OAC900-04-19	18.8		900	95	155	46	132
OAC1000-04-19	18.8		900	85	188	20	82
OAC1000-04-19	18.8		900	97	188	46	132
OAC2000-04-44	44.1	1000	1000	92	295	48	87
OAC2000-04-44	44.1	1500	1000	100	295	107	126

³⁾ Max. medium temperature: 110 °C (higher temperatures on request)/Max. ambient temperature: 60 °C Ambient temperature: 60 °C

Other motors on request

Oil-air cooler type OAC

Cooling systems

Diagrammes of performance and pressure loss

Performance diagramme of oil

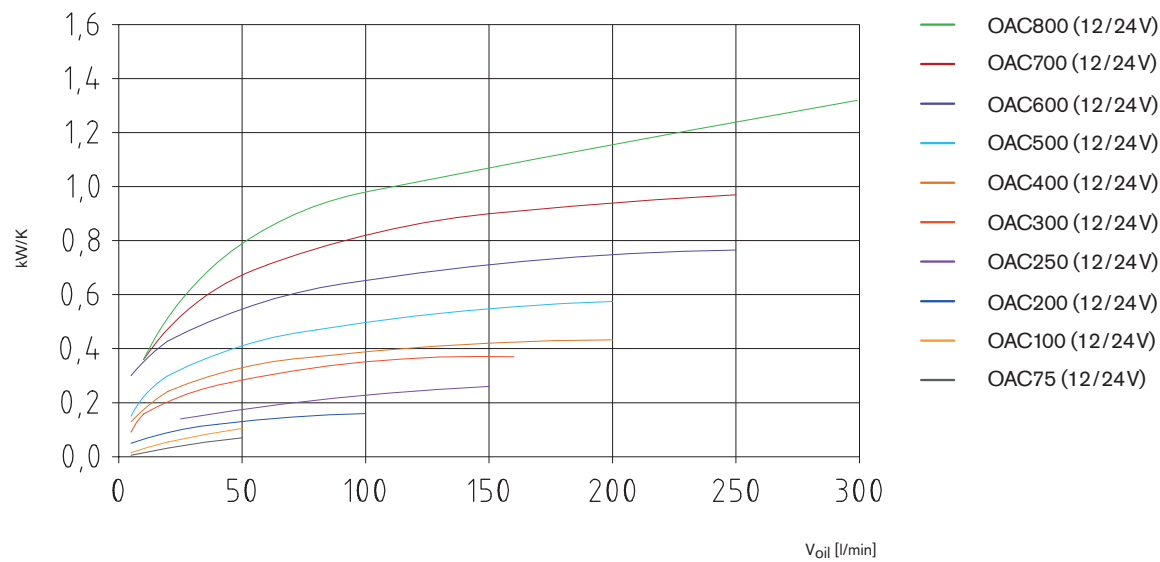
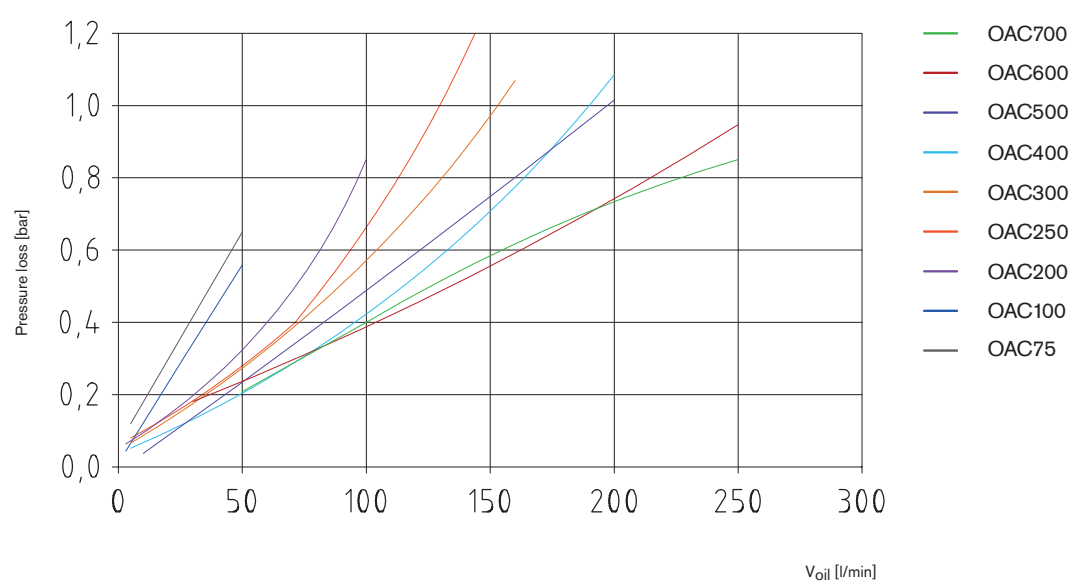
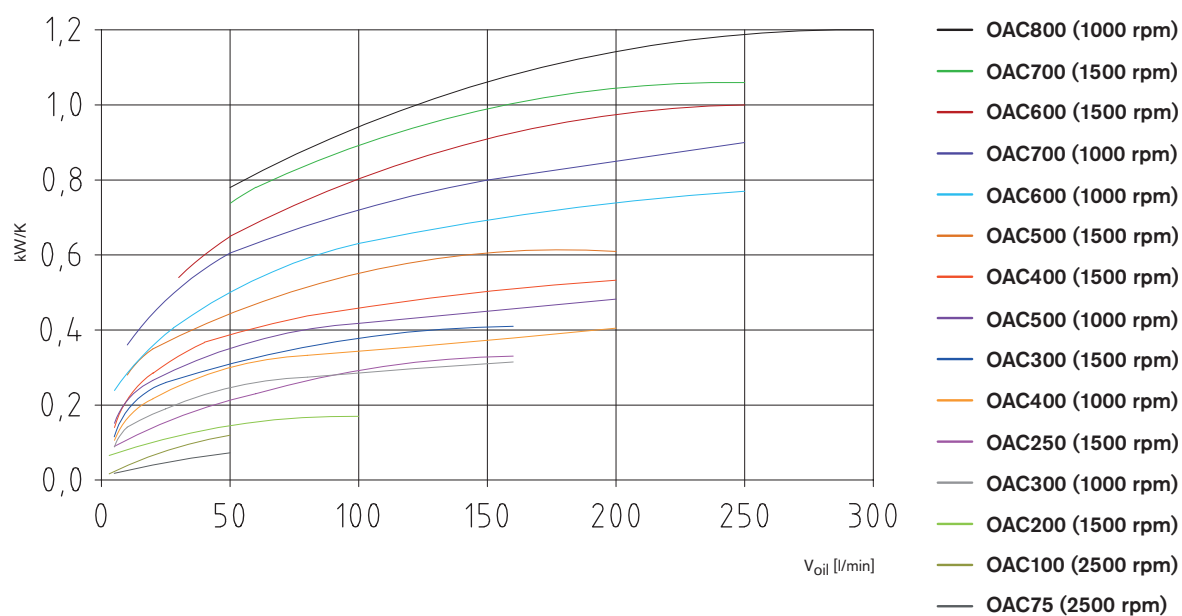


Diagramme of pressure loss

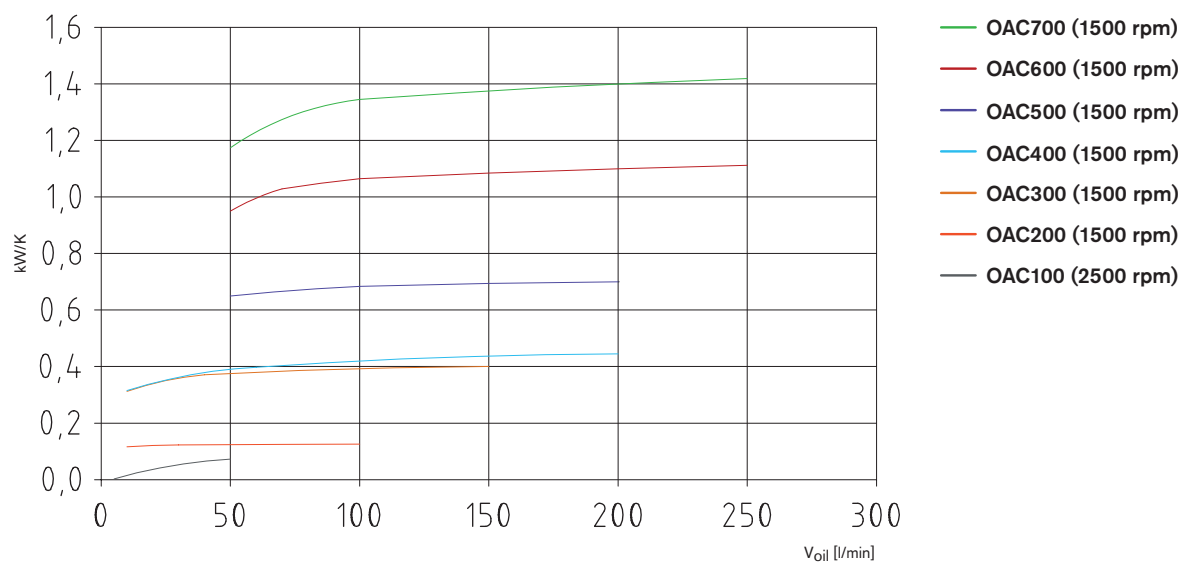


Conversion factor of pressure loss									
cSt	10	15	20	30	40	50	60	80	100
Factor	0.5	0.65	0.75	1	1.2	1.4	1.6	2.1	2.8

Performance diagramme of oil



Performance diagramme of water/glycol (50/50)



Oil-air cooler type OAC

Cooling systems

Diagrammes of performance and pressure loss

Performance diagramme of oil

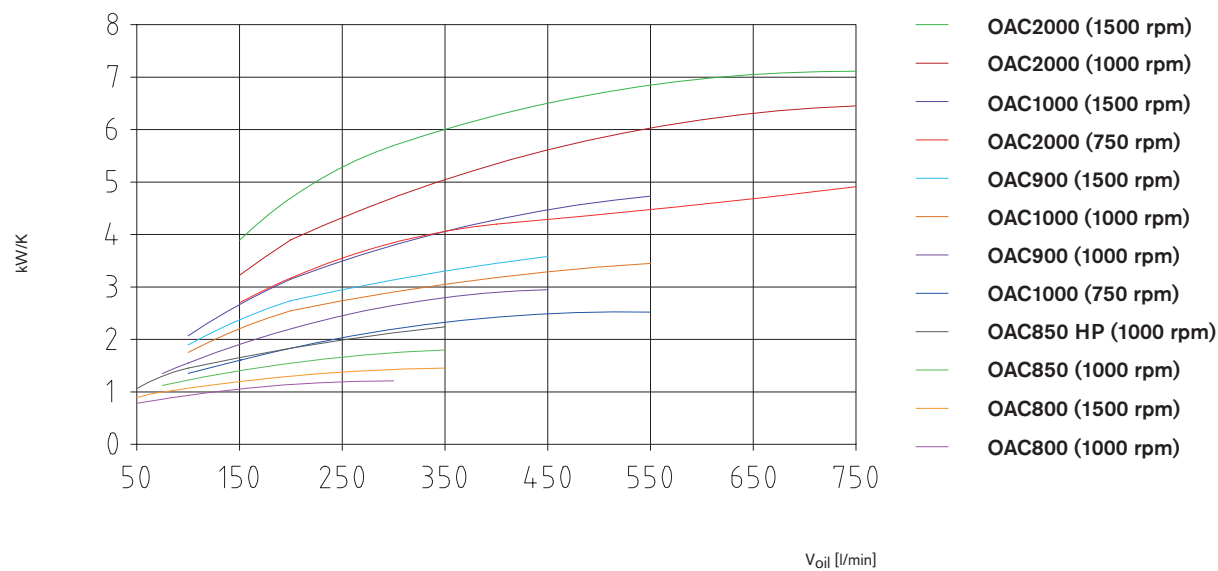
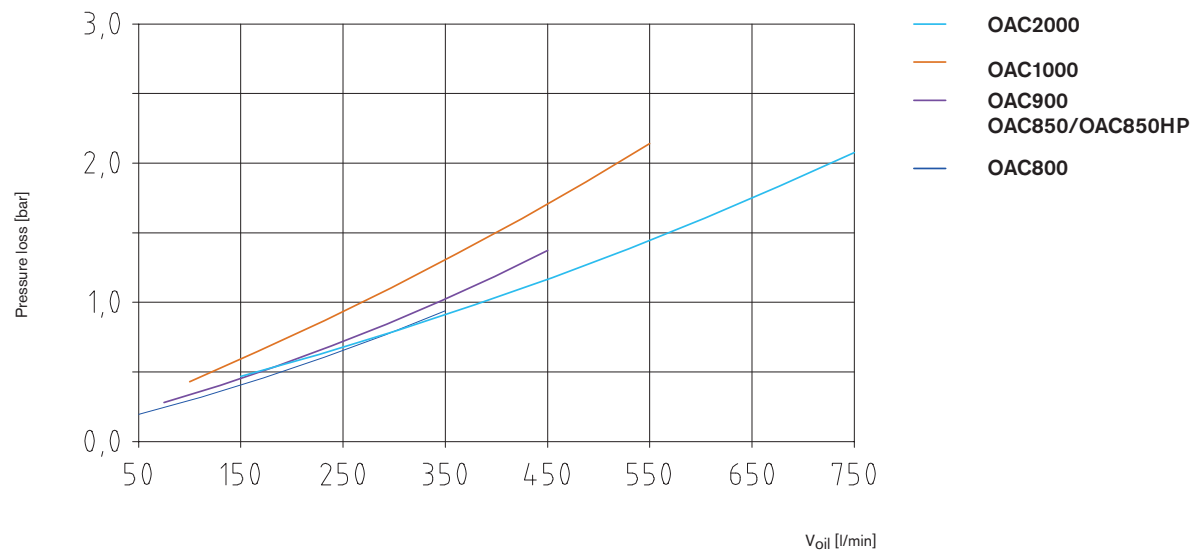


Diagramme of pressure loss

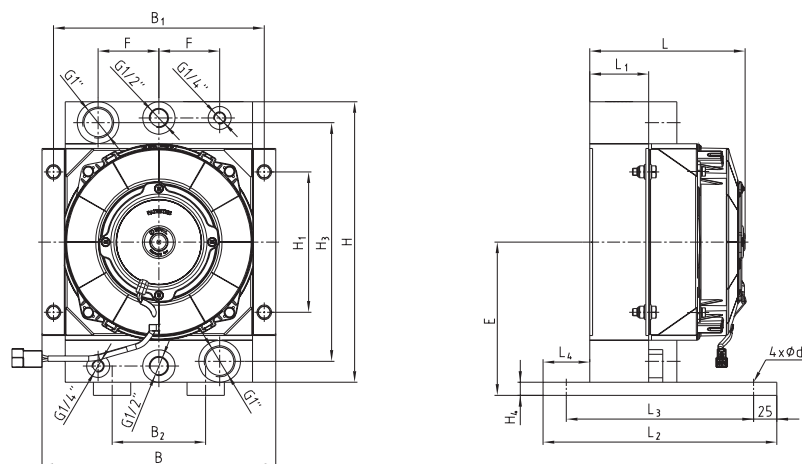


Conversion factor of pressure loss									
cSt	10	15	20	30	40	50	60	80	100
Factor	0.5	0.65	0.75	1	1.2	1.4	1.6	2.1	2.8

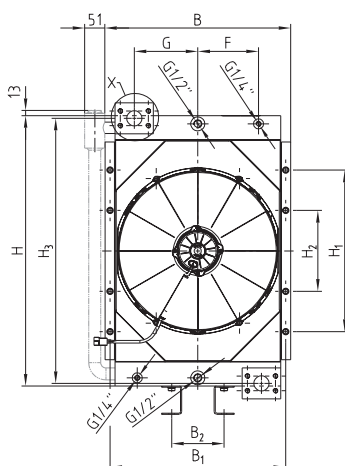
Oil-air cooler type OAC

Cooling systems

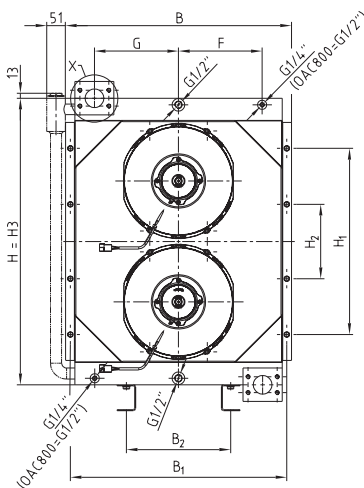
Dimensions of OAC100 - 800 (12/24V)



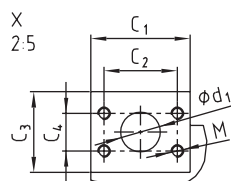
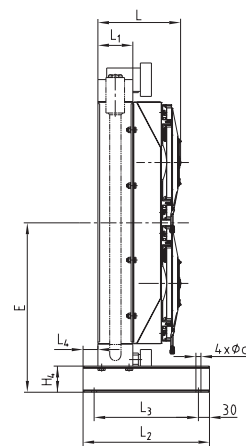
OAC100 - OAC400 12/24V



OAC500 12/24V



OAC600 - OAC800 12/24V

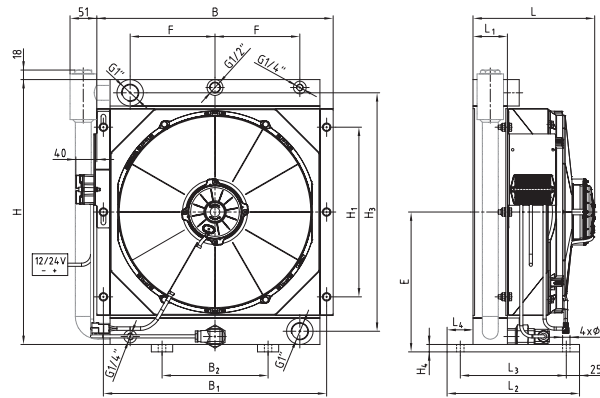


Oil-air cooler type OAC 12/24V																									
Type of cooler	Dimensions [mm]																								
	L	L ₁	L ₂	L ₃	L ₄	B	B1	B2	H	H ₁	H ₂	H ₃	H ₄	H ₅	d	d ₁	C1	C2	C3	C4	SAE flange	M	F	G	E
OAC100-01 OAC100-02	167	64	280	200	50	250	225	100	300	150	-	255	14	-	14	-	-	-	-	-	-	-	75	-	164
OAC200-01 OAC200-02	167	64	280	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	-	115	-	219
OAC250-01 OAC250-02	197	95	280	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	-	115	-	219
OAC300-01 OAC300-02	230	65	280	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	160	-	264
OAC400-01 OAC400-02	260	94	280	230	55.5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	160	-	264
OAC500-01 OAC500-02	259	94	340	280	40	460	435	130	670	400	200	657	70	-	13.5	38	95	69.9	77	35.7	1½"	M 12	150	157.5	405
OAC600-01 OAC600-02	223	94	340	280	40	607	582	280	770	500	200	770	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	455
OAC700-01 OAC700-02	242	94	340	280	40	607	582	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	530
OAC800-01 OAC800-02	388	140	450	390	40	701	676	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	272	273	530

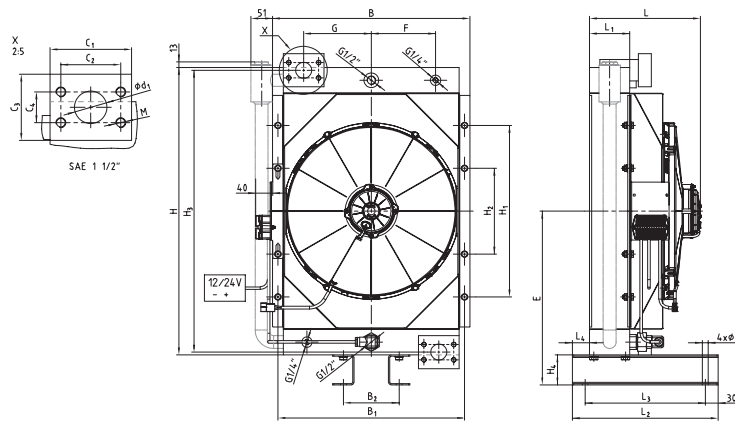
Oil-air cooler type OAC

Cooling systems

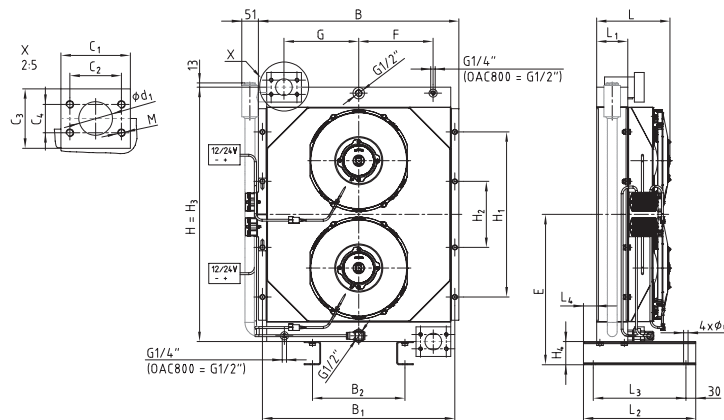
Dimensions of OAC 300 - 800 (12/24V) speed-controlled



OAC300 - 400 12/24V



OAC500 12/24V



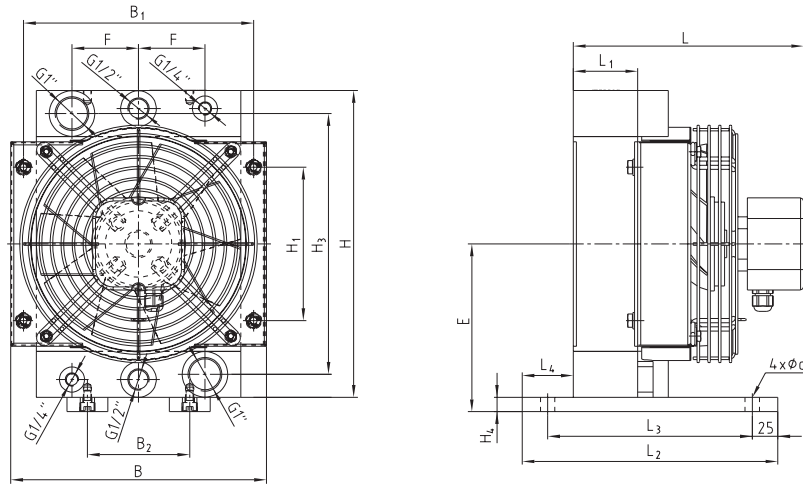
OAC600 - 800 12/24V

Oil-air cooler type OAC 12/24V speed-controlled																										
Type of cooler	Dimensions [mm]																									
	L	L ₁	L ₂	L ₃	L ₄	B	B1	B2	H	H ₁	H ₂	H ₃	H ₄	H ₅	d	d ₁	C1	C2	C3	C4	SAE flange	M	F	G	E	
OAC300-01	230	65	280	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	-	-	
OAC300-02	230	65	280	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	-	-	
OAC400-01	260	94	280	230	55.5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	-	-	
OAC400-02	260	94	280	230	55.5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	-	-	
OAC500-01	259	94	340	280	40	460	435	130	670	400	200	657	70	-	13.5	38	95	69.9	77	35.7	1½"	M 12	150	157.5	405	
OAC500-02	259	94	340	280	40	460	435	130	670	400	200	657	70	-	13.5	38	95	69.9	77	35.7	1½"	M 12	150	157.5	405	
OAC600-01	223	94	340	280	40	607	582	280	770	500	200	770	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	455	
OAC600-02	223	94	340	280	40	607	582	280	770	500	200	770	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	455	
OAC700-01	242	94	340	280	40	607	582	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	530	
OAC700-02	242	94	340	280	40	607	582	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	225	226	530	
OAC800-01	388	140	450	390	40	701	676	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	272	273	530	
OAC800-02	388	140	450	390	40	701	676	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M 12	272	273	530	

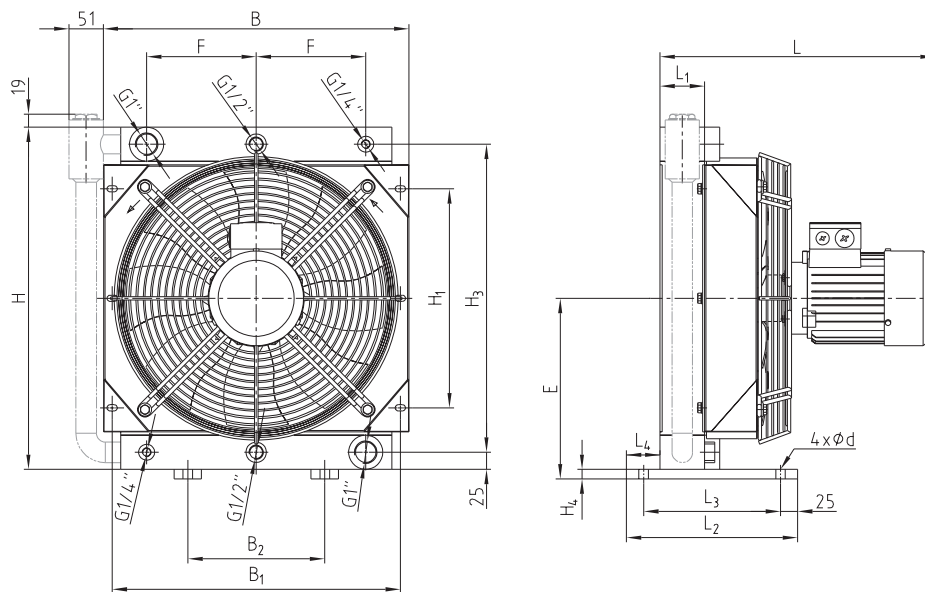
Oil-air cooler type OAC

Cooling systems

Dimensions of OAC100 - 400 (230/400V)



OAC100 - OAC400 230/400V (compact fan)



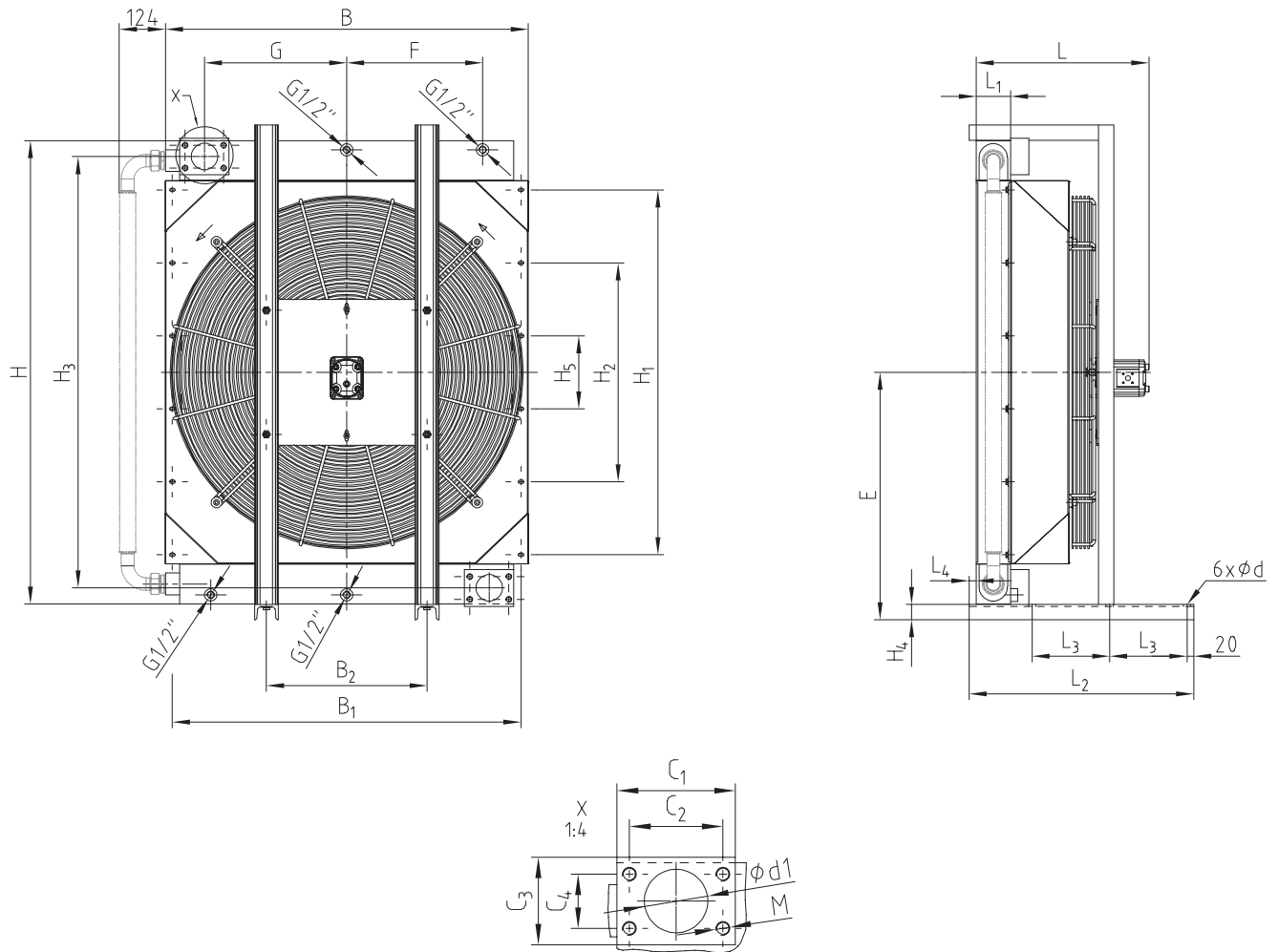
OAC200 - OAC400 230/400V

Oil-air cooler type OAC 230/400V																								
Type of cooler	Dimensions [mm]																							
	L	L ₁	L ₂	L ₃	L ₄	B	B ₁	B ₂	H	H ₁	H ₂	H ₃	H ₄	H ₅	d	d ₁	C1	C2	C3	C4	M	F	G	E
OAC100-03 C	216	64	280	200	50	250	225	100	300	150	-	255	14	-	14	-	-	-	-	-	-	75	-	164
OAC200-03 C	279	64	280	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	-	219
OAC200-03	360	64	280	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	-	219
OAC250-03	390	95	280	230	56	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	-	219
OAC300-03-D	268	65	280	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264
OAC300-03	402	65	280	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264
OAC400-03-D	298	94	280	230	56	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264
OAC400-03	432	94	280	230	56	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264

Oil-air cooler type OAC

Cooling systems

Dimensions of OAC850 - 2000 (hydraulic)



OAC850 - OAC2000

Oil-air cooler type OAC hydraulic																									
Type of cooler	Dimensions [mm]																								
	L	L ₁	L ₂	L ₃	L ₄	B	B ₁	B ₂	H	H ₁	H ₂	H ₃	H ₄	H ₅	d	d ₁	C ₁	C ₂	C ₃	C ₄	SAE flange	M	F	G	E
OAC850-04	475	94	500	180	-	870	835	350	960	690	230	910	42	-	14	51	105	77.8	90	42.9	2"	M 12	350	340	523
OAC900-04	475	95	615	210	19.5	995	955	440	1270	1000	600	1182	42	200	14	73	135	106.5	100	62		M 16	372.5	390	678
OAC1000-04	505	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106.5	100	62	3"	M 16	372.5	390	678
OAC2000-04	620	140	750	210	-	1286	1246	525	1420	1000	600	1332	45	200	14	73	135	106.5	100	62		M 16	532	532	756

Oil-air cooler / cooling-pumping unit type OPC/OPC2

Cooling systems

Bypass flow cooling with integrated pump



The OPC oil cooler unit is a system specifically developed for cooling in the bypass flow as an independent unit. The unit consists of a cooler, fan, electric motor, pump and may be supplemented by a filter on request of the customer.



OPC



OPC 2

Assembly instructions

Oil-air cooler / cooling-pumping unit type OPC/OPC2

Applications:

- Machine tools
- Elevators
- Test benches
- Add-on coolers
- Bypass flow cooling

Applicable for cooling of:

- Hydraulic oil
- Gear oil
- Lubricating oil
- Water glycol (min. 50 % glycol)

Structure:

- Cooler core (plate and bar) made of aluminium with industrial lamina in black (RAL 9005)
- Fan cover made of steel in black (RAL 9005)
- Fan made of nylon PAG
- Protective grid made of steel in black (RAL 9005)
- Electric motor 230/400V, IP55
- Bellhousing and coupling
- Gear feed pump with pressure relief valve 0 - 15 bars, recommended setting 5 bars,
 - max. medium temperature 90 °C (higher temperature on request),
 - low-noise pump, also for high viscosities
- Filter with visual maintenance display, as an option

Marine design:

- Cooler core, frame, fan cover with double-component paint
- Electric motor with special paint and protection class IP56

ATEX design:

NEW

- Gas sector:  II 2G Ex h IIC T6...T3 Gb X
- Dust sector:  II 3D Ex h IIIC T68 °C...110 °C Gb X
- Ambient temperature -40 °C < Ta < +55 °C
- Motor and fan as an adequate ATEX design
- OPC2 now also available with ATEX certification

Accessories (see page 39 et seq.):

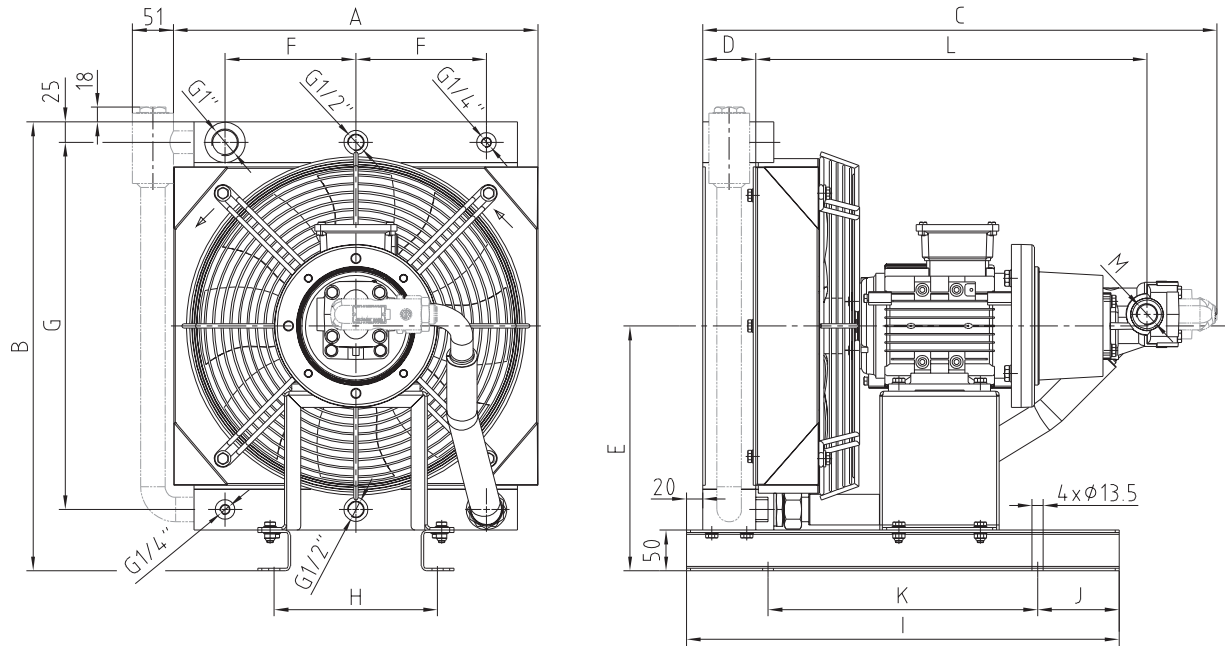
- Thermal bypass valves
- Oil thermostat valve (OTV)
- Protective grid
- Temperature switch (TSC)

The OPC coolers must be protected from direct solar radiation.

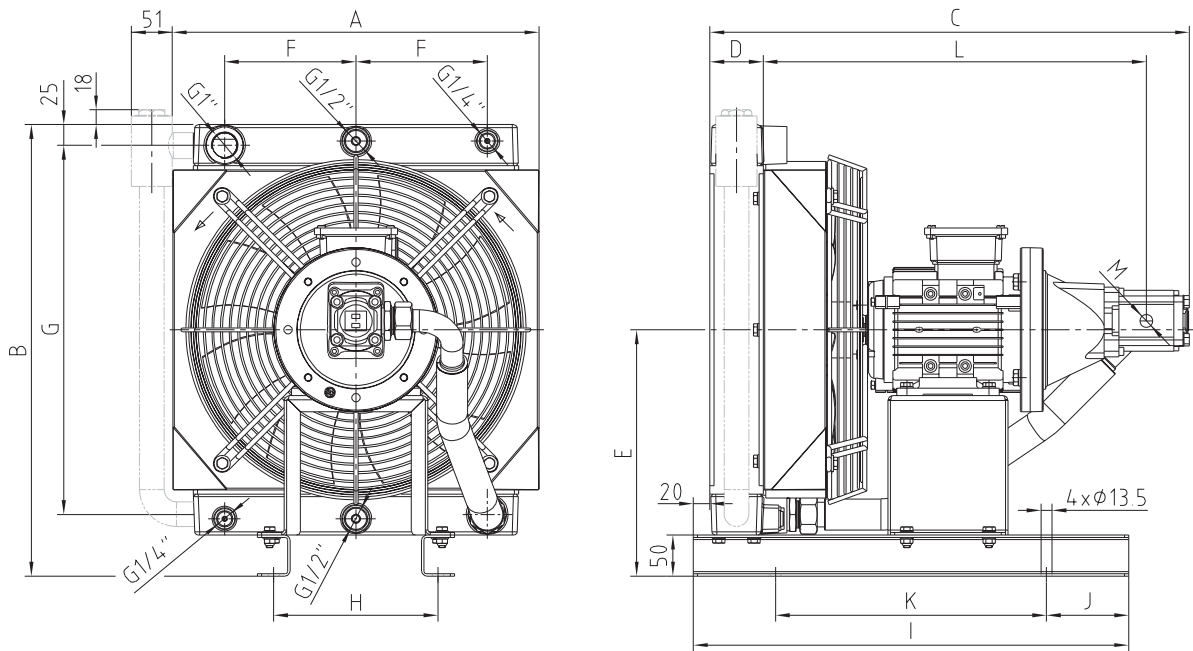
Oil-air cooler / cooling-pumping unit type OPC

Cooling systems

Dimensions of OPC200 - 400 (230/400V)



OPC200 - OPC400 for hydraulic applications (ISO VG32-68)



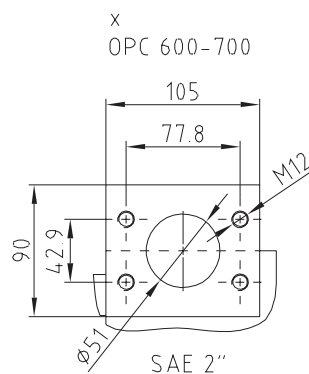
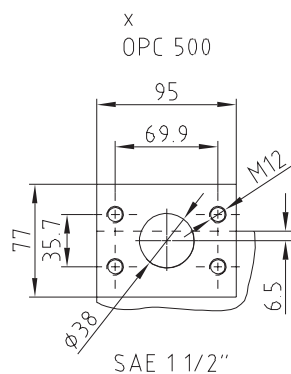
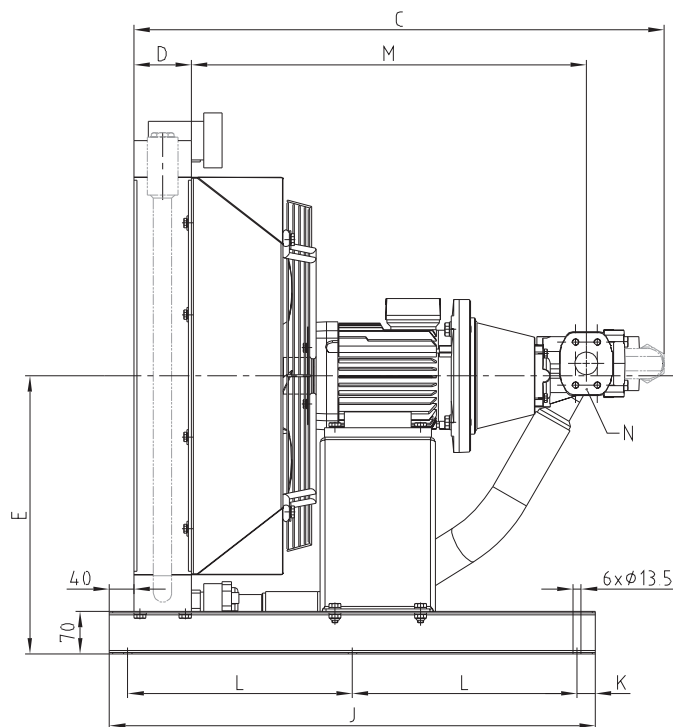
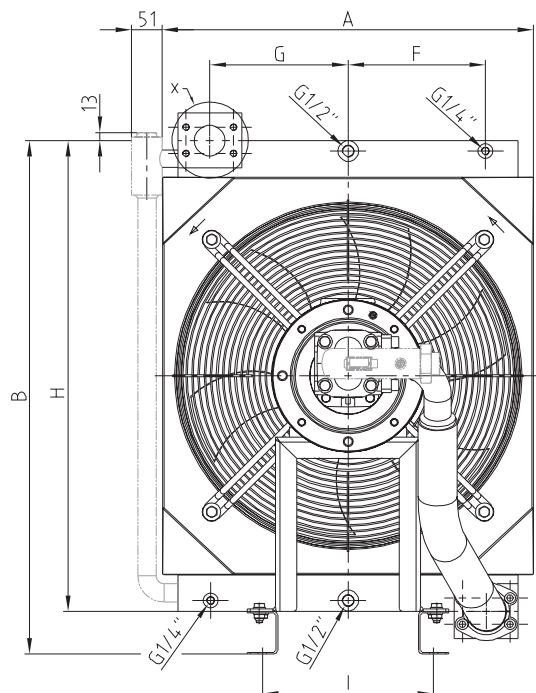
Technical data																		
Type of cooler	Voltage	Current [A]	Speed [rpm]	l/min	kW/°C	Dimensions [mm]												
						A	B	C	D	E	F	G	H	I	J	K	L	M
OPC200-I4-0.75kW	230/400V 50 Hz	1.8	1400	5.7	0.07	350	460	547									436	G 3/4"
OPC200-I8-0.75kW				11.5	0.09													
OPC200-4D-0.75kW				5.5	0.07			572	64	255	115	360	174	530	100	330	426	G 3/4"
OPC200-12D-0.75kW				16.7	0.09	350	460											
OPC200-16D-0.75kW				21.4	0.10			596									435	G 1"
OPC300-I8-0.75kW				11.5	0.18												467	G 3/4"
OPC300-I14-0.75kW				20.1	0.23												476	G 1"
OPC300-4D-0.75kW				5.5	0.12			615	65					530	100	330	464	G 3/4"
OPC300-12D-0.75kW				16.7	0.23													
OPC300-16D-0.75kW				21.4	0.25	446	550	638		300	160	450	200				473	G 1"
OPC400-I14-0.75kW				20.1	0.26			622									476	G 1"
OPC400-12D-0.75kW				16.7	0.24				94					550	75	400	474	SAE
OPC400-16D-0.75kW				21.4	0.27			668										

■ = hydraulics application

Oil-air cooler / cooling-pumping unit type OPC

Cooling systems

Dimensions of OPC500 - 600 (230/400V)



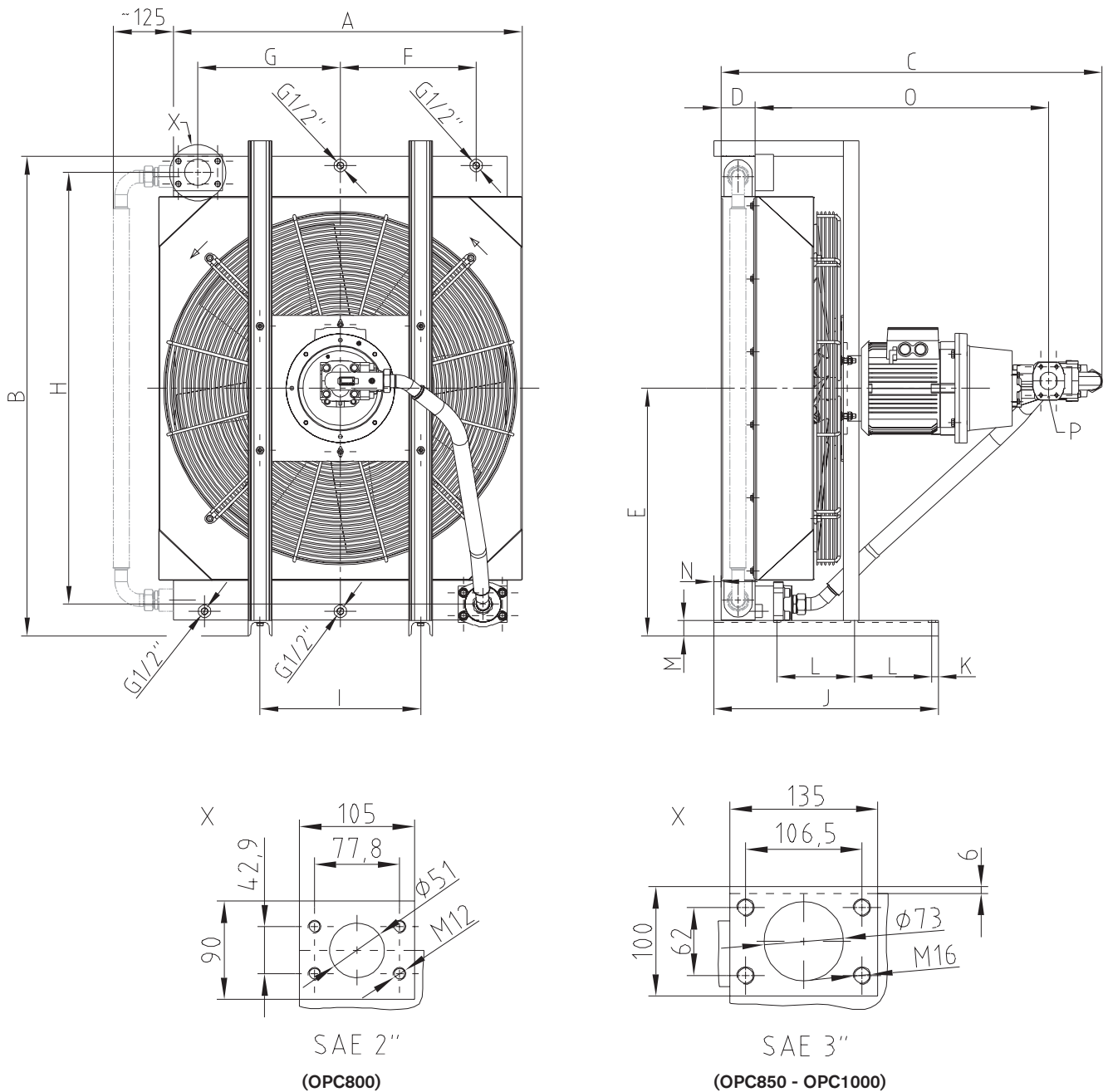
OPC500 - OPC600

Technical data																			
Type of cooler	Voltage	Current [A]	Speed [rpm]	l/min	kW/°C	Dimensions [mm]													
						A	B	C	D	E	F	G	H	I	J	K	L	M	N
OPC500-16D-2.2kW	230/400V 50 Hz	4.9	1410	21.4	0.35	460	740	740	94	405	150	157.5	657	130	720	30	330.0	547	G 1"
OPC500-25D-2.2kW				33.4	0.40														
OPC500-32D-2.2kW				44.0	0.42													568	SAE 1 1/2"
OPC500-40D-2.2kW				53.5	0.45			790											
OPC600-16D-2.2kW				21.4	0.47	607	840	819	94	455	225	226.0	770	280	795	30	367.5	626	G 1"
OPC600-25D-2.2kW				33.4	0.56														
OPC600-32D-2.2kW				44.0	0.61													647	SAE 1 1/2"
OPC600-40D-2.2kW				53.5	0.66			868											

Oil-air coolers/ cooling-pumping unit type OPC

Cooling systems

Dimensions of OPC800 - 1000 (400/690V)



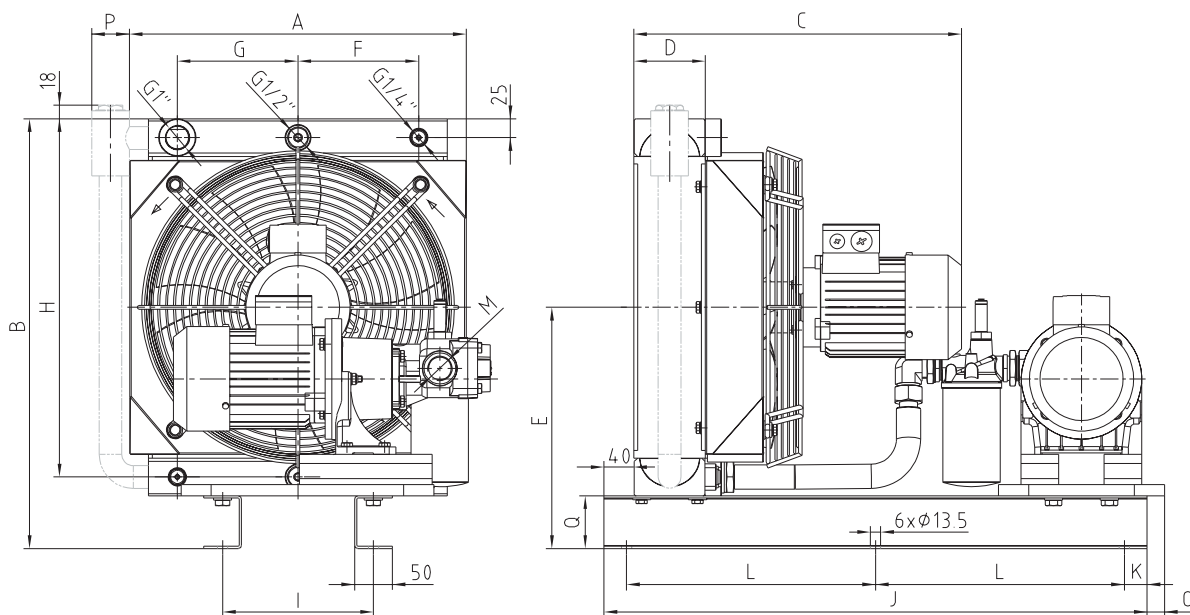
OPC800 - OPC1000 (400/690V)

Technical data																			
Type of cooler	Voltage	Current [A]	Speed [rpm]	l/min	kW/°C	Dimensions [mm]													
						A	B	C	D	E	F	G	H	I	J	K	L	M	N
OPC800-50D-4kW	400/690V 50 Hz	8.2	1460	69	1.00	701	981	1096	140	521	350	340	920	280	670		292	829	112
OPC800-80D-4kW				112	1.15			1130										845	113
OPC850-80D-5.5kW				72	1.12			1046										804	146
OPC850-125D-5.5kW		12	970	113	1.32	870	1002	1081		523			910	350	590		180	824	160
OPC900-80D-5.5kW				72	1.34			1046										804	189
OPC900-125D-5.5kW				113	1.71			1081										824	203
OPC1000-125D-5.5kW				113	1.88	995	1312	1119		678	373	390	1182	440	615		210	844	217
OPC1000-180D-5.5kW				167	2.33			1136	113									854	220

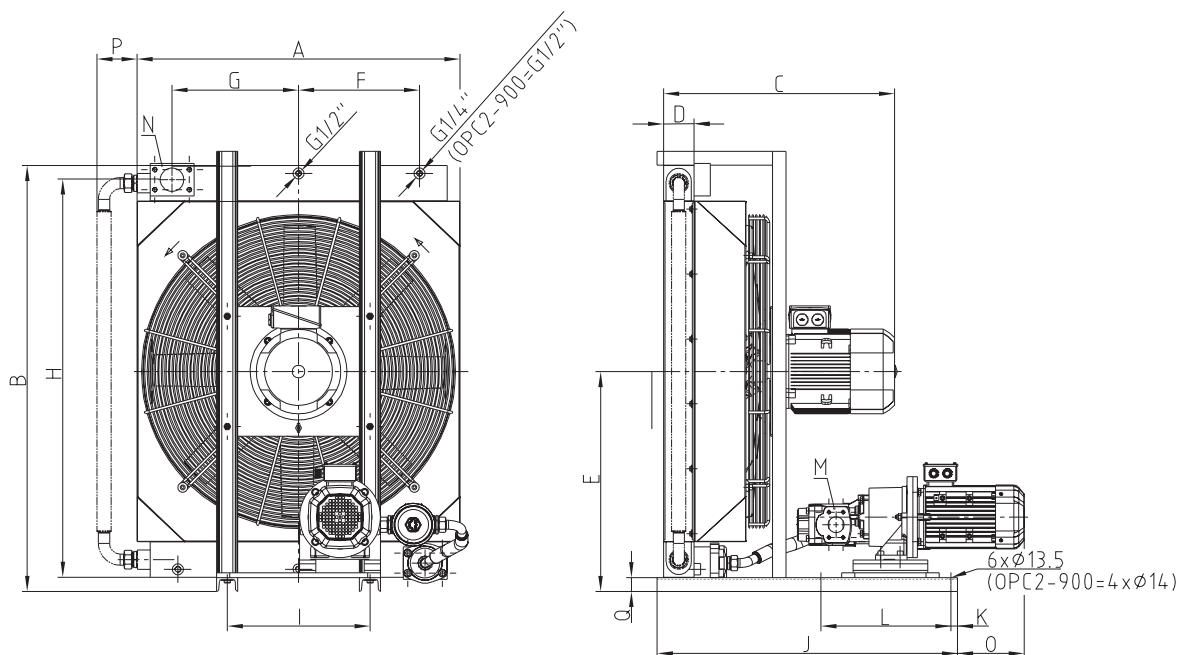
Oil-air cooler / cooling-pumping unit type OPC2

Cooling systems

Dimensions of OPC2-300 - 900 (230/400V)



OPC2-300 - OPC2-400



OPC2-500 - OPC2-900

Technical data																																																									
Type of cooler	Voltage	Motor Coolers		Motor Pump		Flow rate	kW/°C	Dimensions															Weight [kg]																																		
		Current* [A]	Speed [rpm]	Current* [A]	Speed [rpm]	[l/min]		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O		P	Q																																
OPC2-300-4	230/400V 50Hz (460V 60Hz) x basis 400V			1.03	1385	5.5	0.13	446	570	417	64	320	160	160	500	200	720	30	330	G ¾"	G 1"	23	51	70	53																																
OPC2-300-12				1.77	1420	17	0.21				94									405					150	157.5	670	130	SAE 1 ½"	SAE 1 ½"	81																										
OPC2-400-16						21.6	0.27																									460	740	448	530	225	226	920	280	795	367.5	SAE 2"	SAE 2"	340	117												
OPC2-400-32						44	0.46																																							607	990	563	94	530	225	226	920	280	795	367.5	SAE 2"
OPC2-500-32		1.77	1420	44	0.46	460	740	448	530	225	226	920	280	795	367.5	SAE 1 ½"	SAE 1 ½"	81																																							
OPC2-500-63				3.43	1445														88	0.54	607	990	563	94	530	225	226	920	280	795	367.5	SAE 2"	SAE 2"	340	117																						
OPC2-700-40				1.77	1420														53.5	0.76																607	990	563	94	530	225	226	920	280	795	367.5	SAE 2"	SAE 2"	340	117							
OPC2-700-100				4.83	1440														141	0.98																															607	990	563	94	530	225	226
OPC2-900-63		5.3	955	3.43	1445	88	1.50	995	1313	712	678	372.5	390	1270	440	925	20	400	SAE 1 ½"	SAE 3"																																					
OPC2-900-100		4.83	1440	141	1.91	995	1313														712	678	372.5	390	1270	440	925	20	400	SAE 2"	SAE 3"	206	125	42	235																						

x basis 400V

Oil-air cooler / cooling-pumping unit type OPC/OPC2

Cooling systems

Type code of industrial cooler oil-air

OPC **200** **M** - **4D** - **0.75 kW** - **A** - **F10** - **0** - **0**

Size of cooler	Type	Nominal size of pump incl. type	Motor power	Voltage	Filter	Bypass	Protective grid against stones
100	No specification = Standard	e. g.: 4D	0.75 kW	A = 230/400V 50 Hz / 460V 60 Hz	To be omitted if not applicable	0 = Without bypass	0 = No
200			2.2 kW	B = 400/690V 50 Hz	F10 = Filter (permeability up to 10µ) with visual display	TB6 = Thermal bypass (6 bars/50 °C)	1 = Yes
300	M = Marine (seawater resistance)		4 kW	C = 230V 50/60 Hz (single-phase)			F25 = Filter (permeability up to 25µ) with visual display
400			5.5 kW	D = 230/400V 50/60 Hz Compact fan (OAC300/400)			
500	ExG = ATEX (gas-protected area)		E = 380V 50Hz, 440V 60Hz				
600	ExD = ATEX (dust-protected area)			F = 415V 50Hz, 480V 60Hz			
700			M-ExG = Marine & ATEX (gas)		Other data on request		
800	M-ExD = Marine & ATEX (dust)						
900							
1000							

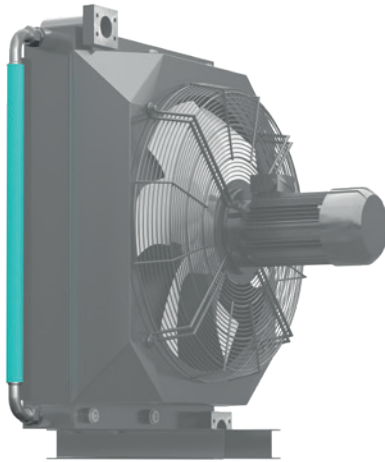
OPC2 - **400** **M** - **16** - **0.75-4** / **0.37-4** - **Z** - **F10** - **DB4** - **1**

Size of cooler	Type	Nominal size of pump incl. type	Motor power - pole number of pump	Motor power - pole number of cooler	Voltage	Filter	Bypass	Protective grid against stones							
200	No specification = Standard	e. g.: 16	e. g.: 0.75 kW	e. g.: 0.37 kW	A = 230/400V 50 Hz / 460V 60 Hz	To be omitted if not applicable	0 = Without bypass	0 = No							
300					B = 400/690V 50 Hz	F10 = Filter (permeability up to 10µ) with visual display	TB6 = Thermal bypass (6 bars/50 °C)	1 = Yes							
400	M = Marine (seawater resistance)				C = 230V 50/60 Hz (single-phase)			2 = Protective grid against stones incl. air filter							
500					D = 230/400V 50/60 Hz Compact fan (OAC300/400)	F25 = Filter (permeability up to 25µ) with visual display	DB6 = Pressure bypass (2, 4, 6 bars)								
600	ExG = ATEX (gas-protected area)														
700	ExD = ATEX (dust-protected area)				E = 380V 50Hz, 440V 60Hz										
800					F = 415V 50Hz, 480V 60Hz										
850	M-ExG = Marine & ATEX (gas)				Other data on request										
850 HP															
900	M-ExD = Marine & ATEX (dust)														
1000															
2000															

Oil-air cooler OAC / cooling-pumping unit type OPC

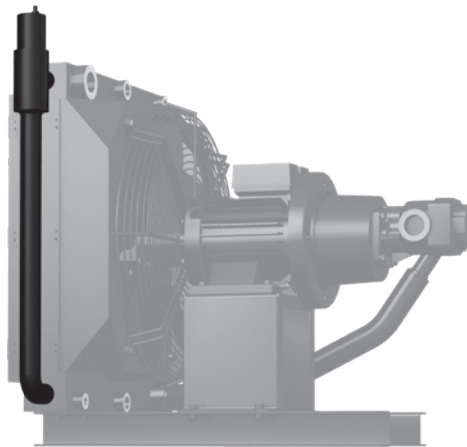
Cooling systems

Cooler accessories



Pressure bypass (DB6 & DB6F)

The pressure bypass protects the cooler core against excess pressure. A share of the volume flow is bypassed along the cooler core depending on the opening pressure.



Thermal & pressure bypass (TB6)

The thermal and pressure bypass additionally provides for faster return of the oil passing the cooler core to efficiently reach the operating temperature through the load. Safeguarding the pressure is assured in parallel.



Integrated bypass (DBI6 oder TBI6)

The integrated pressure (DBI6) or thermal & pressure bypass (TBI6) operates in the same way as mentioned above, but the bypass guide is completely integrated into the cooling element and therefore does not represent an interfering contour to the standard.

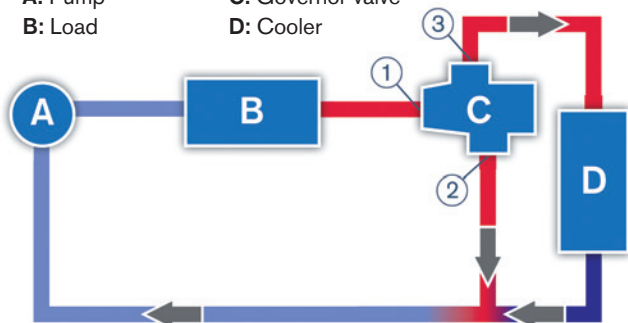
Oil-air coolers accessories

Cooling systems

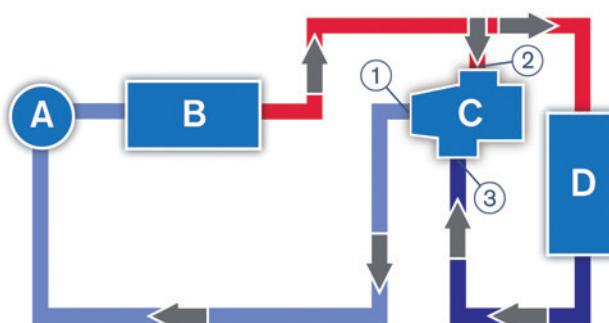
Oil thermostat valve

A: Pump
B: Load

C: Governor valve
D: Cooler



Use as a short circuit controller:
Constant temperature on load outlet



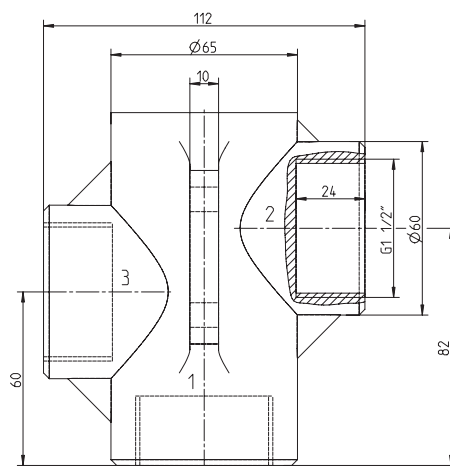
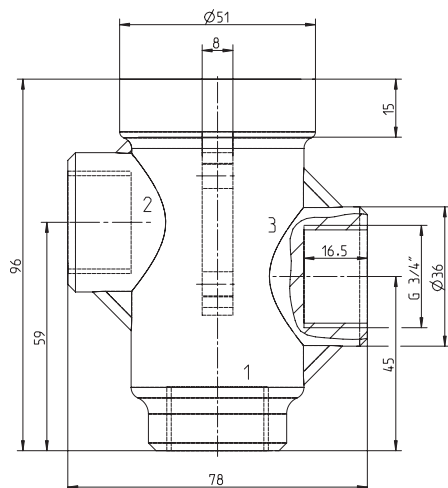
Use as a mixing valve:
Constant temperature on load inlet

Main applications of oil thermostat valves

- Agricultural machinery
- Construction machinery
- Compressors
- Coolers
- Special applications, e. g. wind turbines, gearboxes, hydraulics, mechanical engineering

Particular characteristics

- non-adjustable temperature figures
- high control accuracy
- control operation regardless of static and dynamic oil pressure
- low pressure loss
- sound design
- insensitive to vibrations
- insensitive to shocks
- operation independent of the mounting situation
- maintenance-free
- long service life



OTV Oil thermostat valve				
Description	Max. volume flow [m³/h]	Connection thread	Inlet temperature [°C]	Max. inflow to the cooler obtained with °C
OTV1-45	4	G 3/4"	45	60
OTV1-55	4	G 3/4"	55	70
OTV1-70	4	G 3/4"	70	85
OTV2-45	10	G 1 1/2"	45	60
OTV2-55	10	G 1 1/2"	55	70
OTV2-70	10	G 1 1/2"	70	85

Max. operating pressure 16 bars
15 m³ type available on request

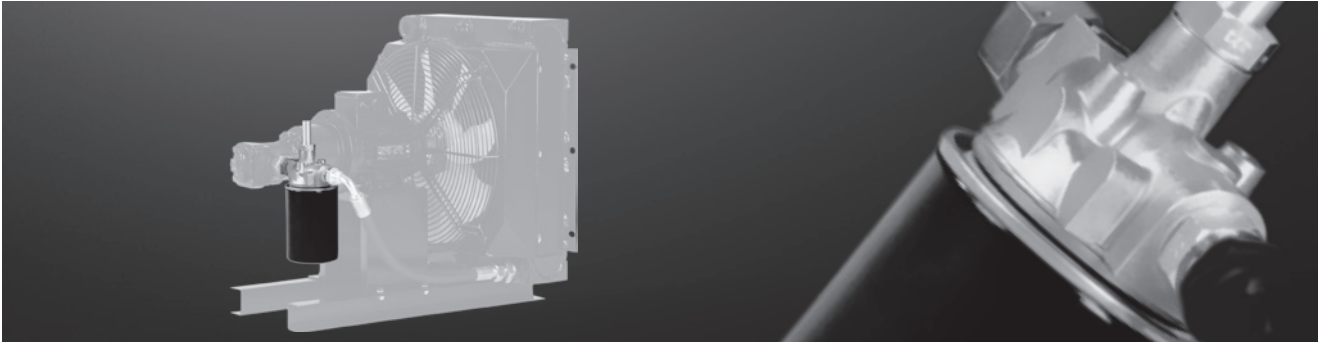
Ordering
example:

OTV	1	55
Oil thermostat valve	Size	Inlet temperature

TEMPERATURE CONTROL AND MONITORING

HYDRAULIC COMPONENTS

Cooler accessories - filters



Single or double filter with mounting cartridge and visual display for separating dirt particles.

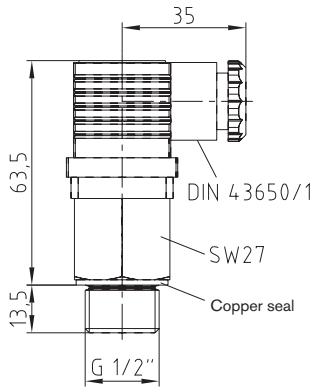
Options:

- 10 µm or 25 µm depending on volume flow, oil type and temperature
- Filter attachment for electrical signals available
- Protective coating for use with salty ambient air



Cooler accessories - temperature switch TSC

Technical data		
Switching element:	Bi metal	Switching point:
Switching operation:	NO = make contact (NC = break contact on request)	TSC 40 = 40 °C
Switching temperature:	+25 °C to +80 °C	TSC 50 = 50 °C
Material of probe:	Brass	TSC 60 = 60 °C
Max. operating pressure:	26 bars	TSC 70 = 70 °C
Ambient temperature:	-20 °C to +110 °C	
Plug:	According to DIN 43650 - 3 poles + PE, protection class IP65, cable gland PG11	



- Simple, solid design
- Electrical insert easy to disassemble
- With plug acc. to DIN 43650 straight cable outlet direction rotatable by 360°
- Copper seal
- Protection class IP65

Temperature contacts:	Max. operating voltage:	250V AC - 8 A
	Max. switching current:	12/24V DC - 5A
	Tolerance:	2 A
	Switch-back difference:	±5 K
		15 K ±3 K

Ordering example:	TSC	50
	Temperature switch	Switching point 50 °C

Oil-air cooler accessories

Cooling systems

Pump unit with low-pressure pump

PUG-4D-0.18kW-4-A-F25.3

Filtration	25.3	25 µ incl. bypass + visual display
	10.3	10 µ incl. bypass + visual display
Voltage	A	230/400V 50 Hz
	B	400/690V 50 Hz
	Z	Special voltage
Pole number of motor	4	1500 revolutions
	6	1000 revolutions
For motor power see table		
Pressure relief valve	D	integrated valve
	-	without valve
for size of pump see table (without pump on request)		
Pump unit	PUG	Gearbox
	PUH	Hydraulics (NBR)
	PUW	Without pump

Motor ¹⁾	Pump	
	Size	Volume flow [l/min]
0.37	4	5.5
	6	6.9
	8	11.0
	12	16.5
	16	22.0
0.75	20	27.5
	25	34.4
	32	44.0
1.5	40	55.0
	50	68.8
2.2	63	87.0
	80	110.0

¹⁾ 4-poles operation



Gearbox application:
Pump unit with pressure limitation
PUG-25D-0.75kW-4-A-F25.3



Pump unit with finish machined bellhousing acc. to customer's specifications
PUW-0-0,75kW-4-A-0



Stationary hydraulics
Pump unit without pressure relief valve
PUH-8-0,37kW-4-A-0

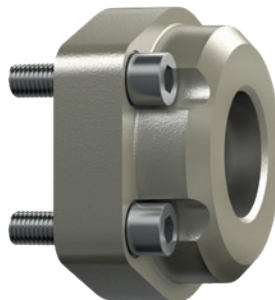
The pump units are assembled ready to fit and include a foot flange and two damping rods. Modifications on request

Accessories



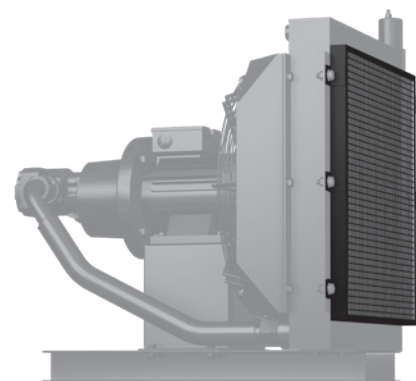
Flow rate sensor

- Incl. non-return valve & display
- Measuring range 2 - 100 l/min (other on request)
- Connection thread G1" or G1 1/2"
- Supply voltage 18 - 30 V DC
- Temperature range -10 ... 100 °C



SAE flange

- SAE 1 1/2" on G 1"
- SAE 1 1/2" on G 1 1/2"
- SAE 2" on G 1 1/2"
- SAE 2" on G 2"
- SAE 3" on G 2 1/2"
- SAE 3" on G 3"



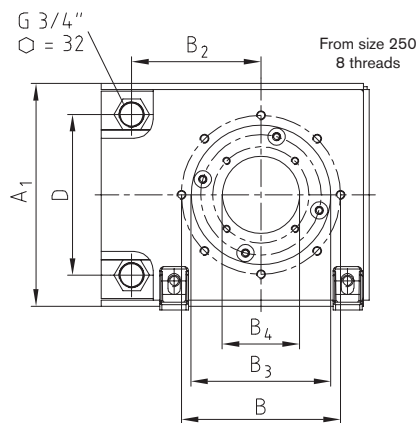
Protective grid

Protection against rough damages of cooling laminas via corrugated wire mesh (10 x 10 mm). Optionally a filter pad is available protecting against smaller particles (dust, sand). Please consider a reduction of performance depending on load.

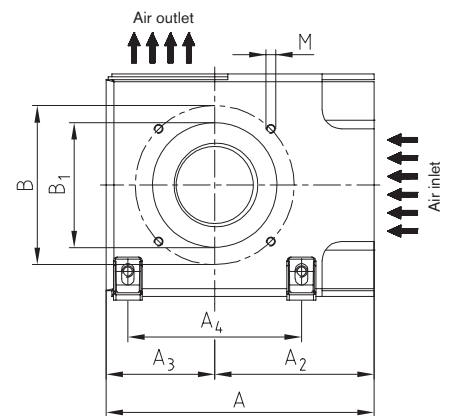
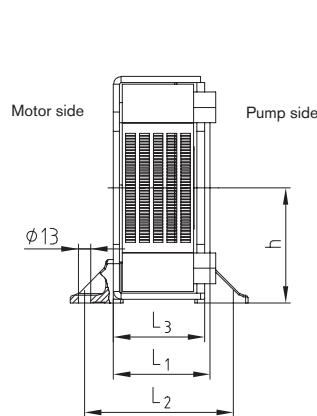
Oil-air cooler type PIK

Cooling systems

Bellhousing with integrated oil-air cooler



View pump side



View motor side

Bellhousing with integrated oil-air cooler type PIK (German utility model)																		
IEC motor		PIK oil cooler type	Dimensions [mm] *															
Size (shaft)	kW with 1500 rpm		L1	L2	L3	A	A1	A2	A3	A4	B	B1	B2	B3	Min. B4	D	M	h
80	0.55	PIK 200/1/...	100	154.5	94.5	275	225	163	112.5	180	165	130	130	145	20	167	M 10	116.5
(19 x 40)	0.75	PIK 200/2/...	110	154.5	94.5	275	225	163	112.5	180	165	130	130	145	20	167	M 10	116.5
90S/90L	1.1	PIK 200/4/...	124	154.5	94.5	275	225	163	112.5	180	165	130	130	145	20	167	M 10	116.5
(24 x 50)	1.5																	
100L/112M	2.2	PIK 250/2/... **	124	175.5	115.5	308	250	180	125	220	215	180	150	190	20	192	M 12	129
(28 x 60)	3, 4	PIK 250/4/... **	135	175.5	115.5	305	250	180	125	220	215	180	150	190	20	192	M 12	129
132S/132M	5.5	PIK 300/1/...	144	199.5	139.5	359	300	205	154	260	265	230	175	234	30	242	M 12	154
(38 x 80)	7.5	PIK 300/3/...	155	199.5	139.5	359	300	205	154	260	265	230	175	234	30	242	M 12	154
		PIK 300/4/...	168	199.5	139.5	359	300	205	154	260	265	230	175	234	30	242	M 12	154
160M/160L	11	PIK 350/1/...	188	243.5	183.5	405	360	230	175	310	300	250	200	260	50	292	M 16	184
(42 x 110)	15	PIK 350/2/...	204	243.5	183.5	405	360	230	175	310	300	250	200	260	50	292	M 16	184
180M/180L	18.5																	
(48 x 110)	22																	

* Dimensions following the VDMA standard 24561

** With a motor speed of ≥ 1900 rpm a steel fan must be used.

Assembly

With assembly and disassembly of the oil connection lines, hold up with a hexagon key (max. tightening torque 40 Nm). No reduction of the cross section behind the cooler. Return filters to be installed in front of the cooler (dynamic pressure, danger of bursting). Tensions inside the connection pipes must be avoided! Vibration of the piping must be avoided (should possibly be intercepted in front of the connector). Supply and discharge to be chosen alternatively. Please note that not a few hydraulic systems generate pressure peaks of more than 12 bars in the return flow (danger of bursting)! Please observe our assembly instructions at www.ktr.com.

For PIK sizes 200 and 350 specify the IEC motor sizes in your order.

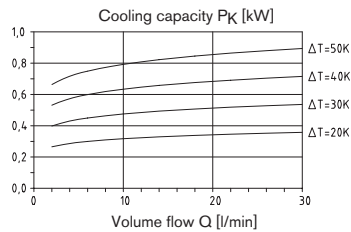
Ordering example:	PIK	300	3	5	15
	Bellhousing with integrated oil cooler	Flange diameter of IEC motor	Serial model code (code referring to length)	In-house modification code	Standard type 15 - V1 design

Oil-air cooler type PIK Cooling systems

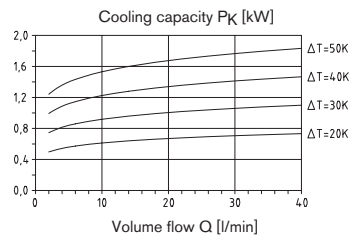
Oil-air cooler type PIK 200 - 350

1. Cooling capacity for a speed of 1500 rpm depending on the temperature difference between oil intake and air intake and oil volume

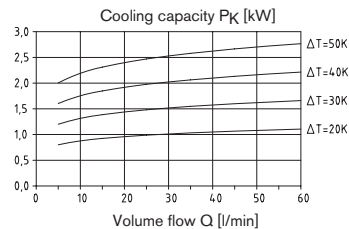
PIK 200



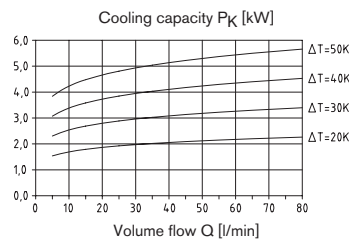
PIK 250



PIK 300



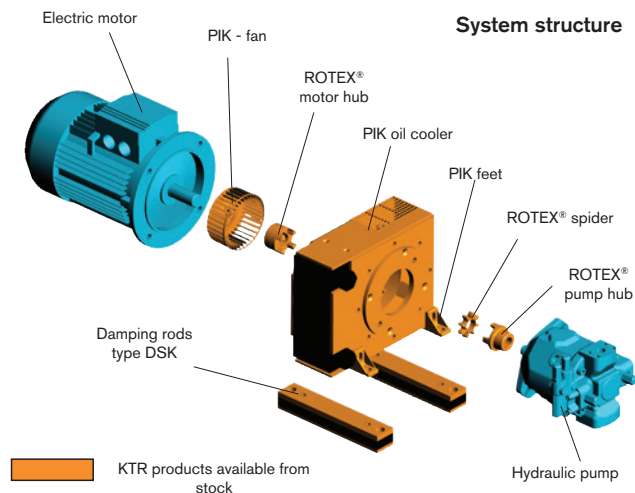
PIK 350



The diagrams shown are based on actual measurements of the PIK oil cooler performed in KTR's in-house R&D test center. With 3000 rpm the cooling capacity is increased by approx. 50 %.

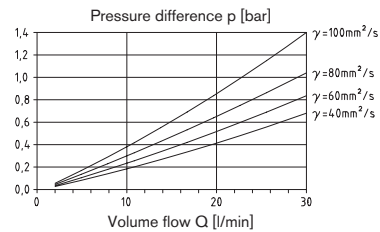
2. Operating pressure

The permissible operating pressure of the oil cooler is 12 bars dynamically. Max. operating pressure with static load of 20 bars (all values apply for the average pressure cooler).

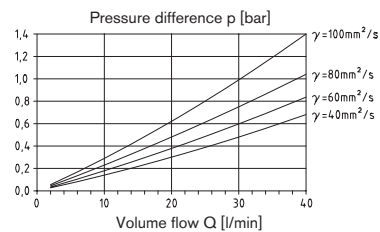


3. Pressure loss depending on oil flow and oil viscosity

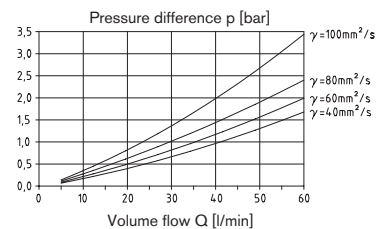
PIK 200



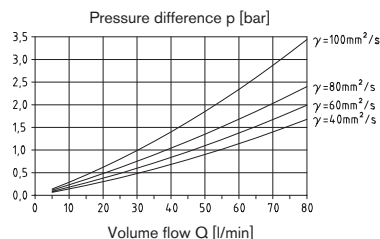
PIK 250



PIK 300



PIK 350



Viscosity measured up to 100 mm²/s.
Higher viscosity on request.

4. Fan

Torsional direction view on the pump – right – standard type.

Performance requirement of the fan with 1500 rpm

PIK 200 = 25 W

PIK 250 = 40 W

PIK 300 = 125 W

PIK 350 = 230 W

Air pressure rate in m³/h with 1500 rpm

PIK 200 = approx. 90 m³/h

PIK 250 = approx. 200 m³/h

PIK 300 = approx. 400 m³/h

PIK 350 = approx. 860 m³/h

5. Cooler connection

R 3/4" internal thread

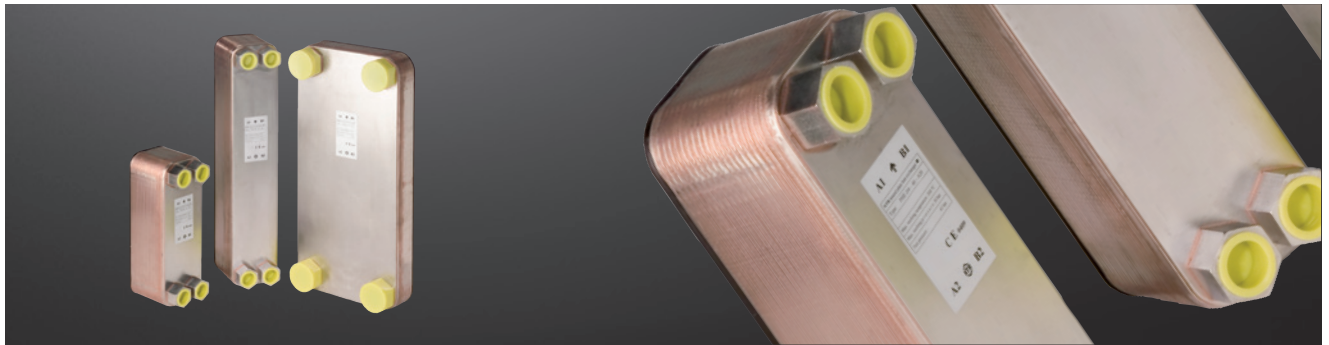
6. Oil flow

With an oil flow exceeding the figures stated in the above diagramme, consult with our engineering department. Phone: +49 5971 798-0

Oil-water cooler type PHE

Cooling systems

High power density in a tight space



Technical data

Plate heat exchanger made of stainless steel 1.4401 soldered with copper. The stamped plates generate a high power density in a tight space. Compared to a tube bundle heat exchanger, the plate heat exchanger only requires approx. 25 % - 30 % of mounting space with less weight. Applications are, as an example, machine tools, test benches, injection moulding machines, pump units, waste heat utilization, etc. It is possible to use other media like, for example, oil, water glycol, water, refrigerating agents, air, etc.

Operating temperature: -10 °C to +200 °C.

Please observe boiling point and freezing point!

Coolers	Perm. pressure	T oil inlet [°C] ISO VG 46	T water inlet [°C]	Oil flow [l/min]	Water flow [l/min]	Cooling capacity [kW]	Pressure loss	
							Oil [bar]	Water [bar]
PHE100x20	10			15	10	3.8	0.1	0
PHE100x40-HP				25	20	6.8	0.1	0
PHE200x10				25	20	7.0	0.7	0.2
PHE200x20				35	25	12.1	0.3	0.1
PHE200x40				45	30	17	0.2	0
PHE200x60				65	40	24.6	0.2	0
PHE250x30				35	20	13.7	0.8	0.1
PHE250x40				45	30	18.3	0.8	0.13
PHE300x40				50	30	24.7	0.5	0.1
PHE300x50				60	40	30.4	0.5	0.1
PHE300x60				75	50	38	0.5	0.1
PHE300x80				95	60	47.9	0.5	0.1
PHE350x20				30	20	14.3	0.8	0.12
PHE350x40	30	55	25	45	30	22.2	0.5	0.08
PHE350x50				60	40	30.9	0.5	0.09
PHE350x60				75	50	38.6	0.6	0.1
PHE350x80				95	60	48.9	0.53	0.1
PHE355x20				30	20	14.3	0.8	0.12
PHE355x40				45	30	22.2	0.5	0.08
PHE355x60				75	50	38.6	0.6	0.1
PHE400-16				40	20	17.5	0.57	0.04
PHE400-20				50	25	22	0.55	0.04
PHE400-28				75	35	32.9	0.58	0.04
PHE400-38				100	50	44.8	0.55	0.04
PHE400-60				200	100	79	0.64	0.06
PHE500x40				135	100	65.6	0.7	0.1
PHE500x60				200	120	94.6	0.7	0.1

Ordering example:

PHE	100	20
PHE = Plate heat exchanger	Size	Number of plates

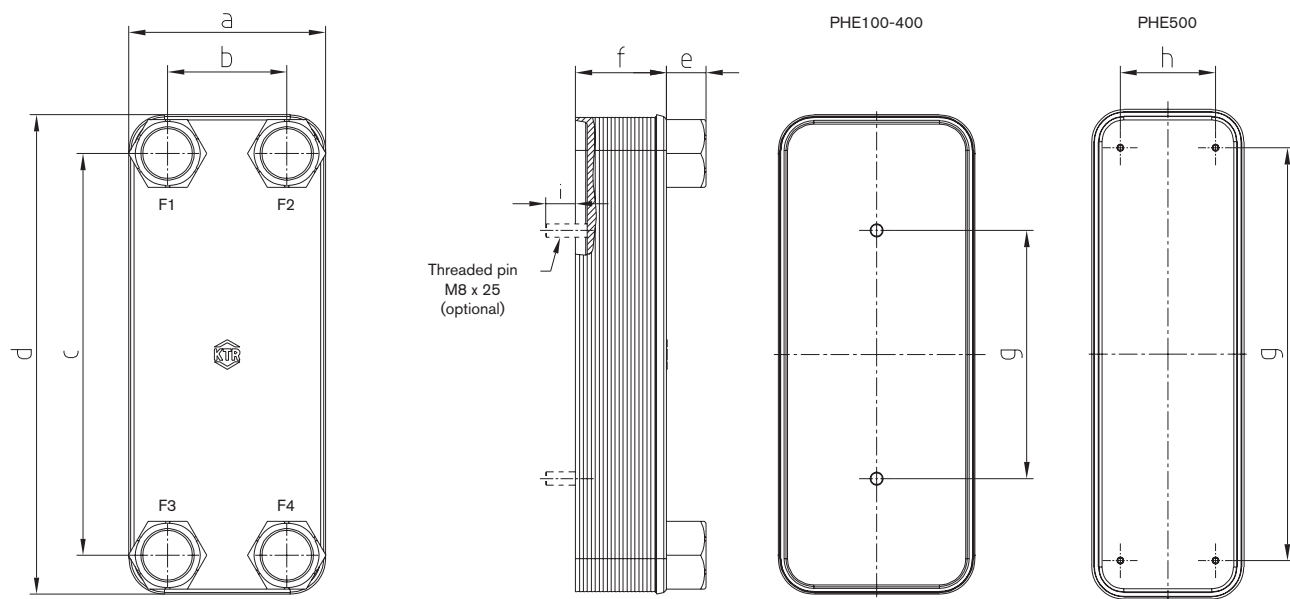
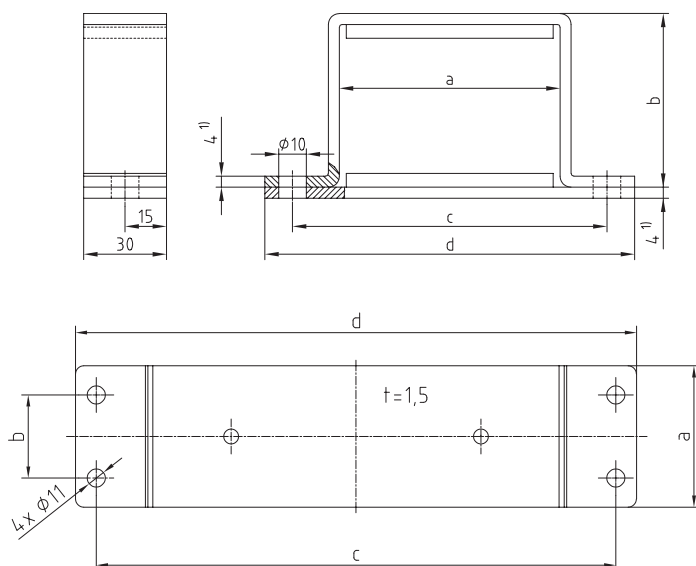


Plate heat exchanger											
Coolers	Thread		a	b	c	d	e	f	Threaded pin (optional)		
									g	h	Number
PHE100-20	4 x G3/4"		73	40	154	191	27	55	150		2x M8x20
PHE100-40-HP			85					199			
PHE200-10	4 x G1"		119	72	243	290	24	31			
PHE200-20								55			
PHE200-40								103			
PHE200-60								151			
PHE250-30	F1/F3: G3/4"	F2/F4: G1/2"	76	40	432	469	27	81	On request		
PHE250-40								105			
PHE300-40	4 x G1"		107	50	466	523	24	107	450		
PHE300-50								131			
PHE300-60								155			
PHE300-80								203			
PHE350-20	4 x G1"							59		-	2x M8x25
PHE350-40								107			
PHE350-50								131			
PHE350-60								155			
PHE350-80	F1/F3: G1.1/4" F2/F4: G1"		124	73	478	529	27	203	320		
PHE355-20								59			
PHE355-40								107			
PHE355-60								155			
PHE400-16	F1/F3: G1.1/2" F2/F4: G1.1/4"							53			
PHE400-20								63			
PHE400-28								83			
PHE400-38								107			
PHE400-60	4 x G1.1/2"						30	160			
PHE500-40								111			
PHE500-60								159			

Mounting bracket				
Type	a	b	c	d
BH100-20	80	59	114	134
BH100-40-HP	92	113	126	146
BH250-30	85	85	115	135
BH250-40		109		
BH200-20	125	61	155	175
BH200/300-40		109		
BH300-50		133		
BH200/300-60		157		
BH300-80	200	205	235	260
BH500-40		112		
BH500-60		160		

¹⁾ BH250-30/40 = 2mm
From size PHE 200 we recommend 2 brackets per cooler.
Mounting bracket for PHE350/355/400 on request.

Mounting plate (PHE with threaded pin)				
Type	a	b	c	d
PHE100	58	30	220	243
PHE200	85	50	312	337
PHE300/350/355	85	50	550	577
PHE400	170	120	610	650
PHE500	160	110	680	720



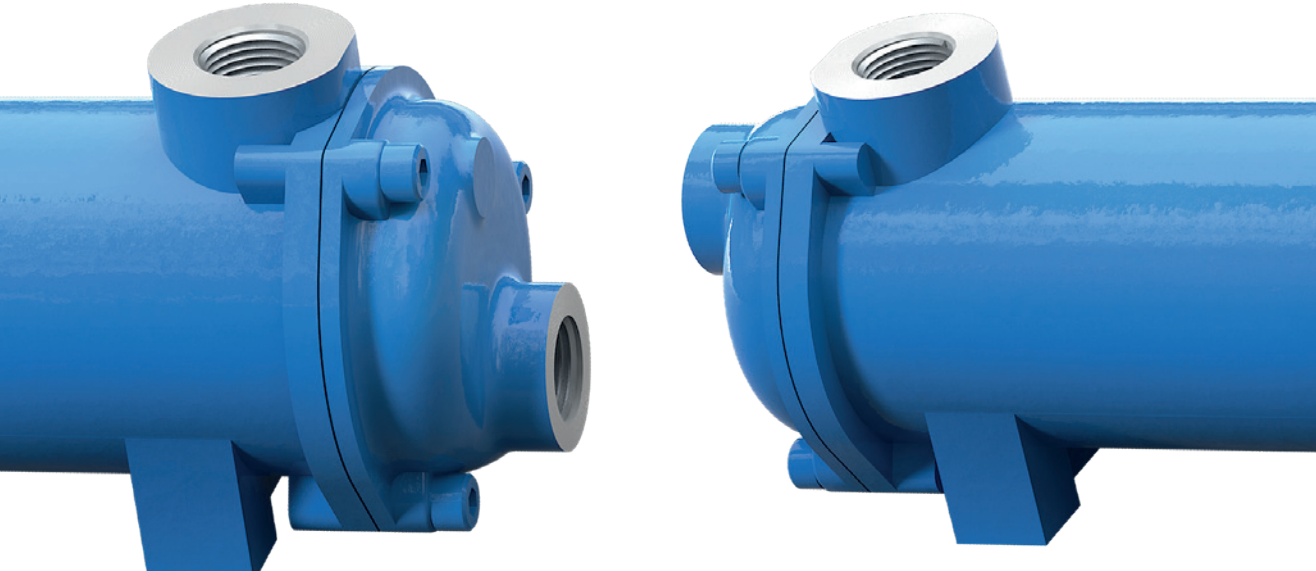
Oil-water cooler TAK/TP

Cooling systems

Cooling of lubricating oil, heat recovery



The TAK/TP cooler ranges were originally designed for hydraulic systems, but based on their design they are equally suitable for cooling lubricating oils, heat recovery, etc.
The tube bundle is designed in that it may expand to both sides. Thermal stresses are consequently minimized. The unique tube-to-tube plate joint ensures high reliability.



Materials used:

These coolers are available in both industrial and marine versions. (Tube bundles made of stainless steel on request)

Industrial version (standard)	
Tubes	Brass (EN CW614N)
Tube retainer	Brass
Housing	Aluminium
Headers	Brass (EN CW614N)
Gaskets	Nitrile

Marine version	
Tubes	90/10 copper/nickel

Oil-water cooler TAK/TP

Cooling systems

Cooling capacities, diagramme of performance, diagramme of pressure loss

Tubular heat cooler							
Coolers	Cooling capacity [kW]	Volume flow of oil [l/min]	Volume flow of water [l/min]	Pressure loss of oil [bar]	Pressure loss of water [bar]	Surface [m²]	Maximum volume flow of water/sea water [l/min]
TAK/TP-A1	3	30	15	0.1	0.02	0.13	50/35
TAK/TP-A2	6	46	23	0.19	0.05	0.22	
TAK/TP-A3	9	56	28	0.36	0.09	0.32	
TAK/TP-A4	13	64	32	0.6	0.13	0.46	
TAK/TP-A5	16	56	28	0.56	0.12	0.68	
TAK/TP-A6	18	66	40	0.65	0.33	0.95	80/50
TAK/TP-B1	8	66	33	0.16	0.02	0.33	
TAK/TP-B2	12	80	40	0.32	0.03	0.48	
TAK/TP-B3	18	104	52	0.96	0.07	0.66	
TAK/TP-B4	25	106	53	1	0.11	0.9	
TAK/TP-B5	29	98	49	1.04	0.14	1.16	140/90
TAK/TP-C1	16	100	50	0.28	0.04	0.64	
TAK/TP-C2	26	120	60	0.55	0.07	0.9	
TAK/TP-C3	36	140	70	0.74	0.13	1.23	
TAK/TP-C4	48	160	80	1.06	0.17	1.6	
TAK/TP-C5	56	140	70	0.95	0.16	2.07	190/110
TAK/TP-C6	70	160	80	0.84	0.26	3.02	
TAK/TP-D1	40	180	90	0.4	0.07	1.58	
TAK/TP-D2	52	200	100	0.55	0.09	2.14	
TAK/TP-D3	66	220	110	0.62	0.12	2.79	
TAK/TP-D4	84	240	120	0.8	0.16	3.57	340/215
TAK/TP-D5	108	260	130	1	0.19	4.48	
TAK/TP-D6	120	240	120	0.96	0.21	5.38	
TAK/TP-E1	76	320	160	0.44	0.09	3.27	
TAK/TP-E2	106	360	180	0.64	0.13	4.24	
TAK/TP-E3	134	400	200	0.9	0.2	5.45	800/500
TAK/TP-E4	175	420	210	1.1	0.25	6.82	
TAK/TP-E5	205	400	200	1.15	0.28	8.22	
TAK/TP-E6	240	360	180	1.1	0.28	10.27	
TAK/TP-F1	133	720	360	0.36	0.09	7.2	
TAK/TP-F2	180	780	390	0.5	0.13	9.14	800/500
TAK/TP-F3	250	840	420	0.62	0.17	11.81	
TAK/TP-F4	325	900	450	0.76	0.25	14.6	
TAK/TP-F5	410	960	480	1	0.32	17.3	
TAK/TP-F6	500	900	450	1.16	0.52	21.54	

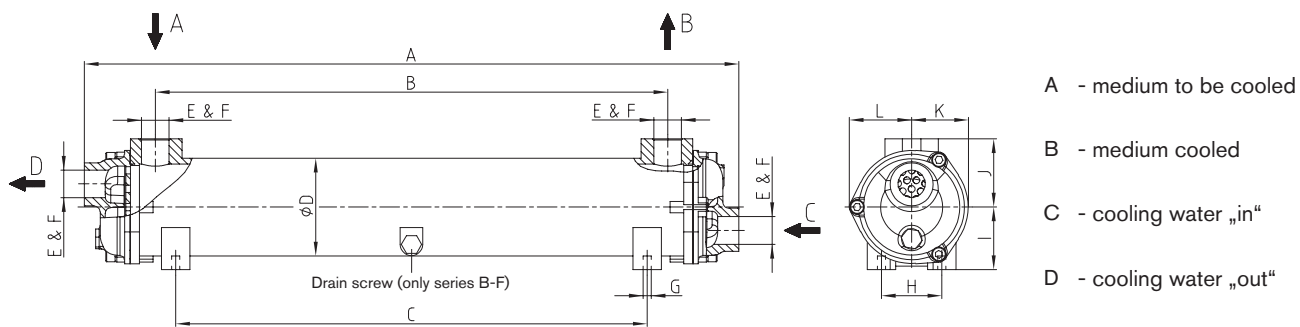
The table shows the performance assigned to the cooler with usual process data:

Oil outlet temperature: 50 °C; water inlet temperature: 25 °C, oil viscosity: 38 Cst and 50 °C. Any change of the selected parameters may result in a different selection of oil cooler.

Oil-water cooler TAK/TP

Cooling systems

Series A-F



TAK/TP series A-F												
Coolers	A	B	C	D	E & F	G	H	I	J	K	L	Weight
TAK/TP-A1	195	72	38									3
TAK/TP-A2	263	138	103									3.5
TAK/TP-A3	349	225	189									4
TAK/TP-A4	448	326	288	Ø86	G 3/4"	4xM8	53	55	60	50	55	4.7
TAK/TP-A5	576	450	415									5.5
TAK/TP-A6	731	603	557									10
TAK/TP-B1	273	123	109									5
TAK/TP-B2	355	205	191									6
TAK/TP-B3	452	302	289	Ø108	G 1"	4xM8	77	65	70	60	55	7
TAK/TP-B4	587	437	425									8.2
TAK/TP-B5	730	580	566									10
TAK/TP-C1	372	182	93									9
TAK/TP-C2	472	287	193									10
TAK/TP-C3	600	415	320									12.5
TAK/TP-C4	744	557	465	Ø130	G 1 1/4"	4xM10	78	75	80	70	80	14.5
TAK/TP-C5	922	737	643									17.5
TAK/TP-C6	1332	1146	1055									30
TAK/TP-D1	505	270	109									20
TAK/TP-D2	634	402	238									24
TAK/TP-D3	780	546	384									27
TAK/TP-D4	954	722	558	Ø162	G 1 1/2"	4xM10	119	95	100	177	-	32
TAK/TP-D5	1,160	928	764									38
TAK/TP-D6	1,364	1,132	968									45
TAK/TP-E1	675	372	239									33
TAK/TP-E2	816	513	380									39
TAK/TP-E3	998	696	560									45
TAK/TP-E4	1,204	901	766	Ø198	G 2"	4xM12	120	110	120	206	-	54
TAK/TP-E5	1,408	1,102	968									64
TAK/TP-E6	1,712	1,406	1,272									74
TAK/TP-F1	754	330	236									47
TAK/TP-F2	900	476	382									57
TAK/TP-F3	1,077	654	560									68
TAK/TP-F4	1,280	856	762	Ø278	G 3"	4xM16	180	155	170	288	-	79
TAK/TP-F5	1,484	1,060	966									91
TAK/TP-F6	1,790	1,364	1,270									105

Max. perm. oil temperature 120 °C. Max. oil pressure 14 bars. Max. water pressure 10 bars.

Ordering
example:

TAK/TP	A	1	M
Type	Series	Size	Seawater version ¹⁾

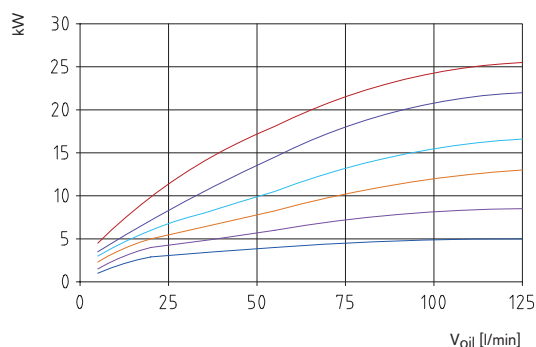
¹⁾ Code letter can be omitted with industrial design.

Oil-water cooler TAK/TP

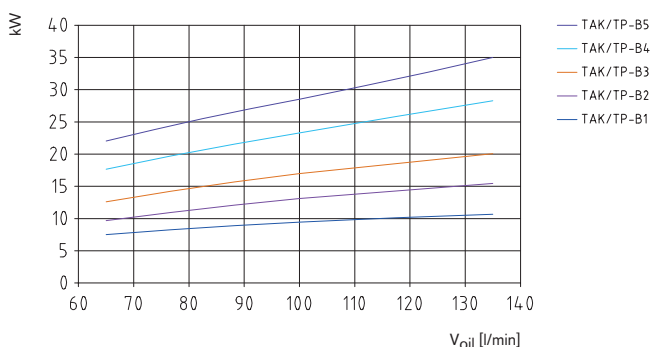
Cooling systems

Performance diagrammes

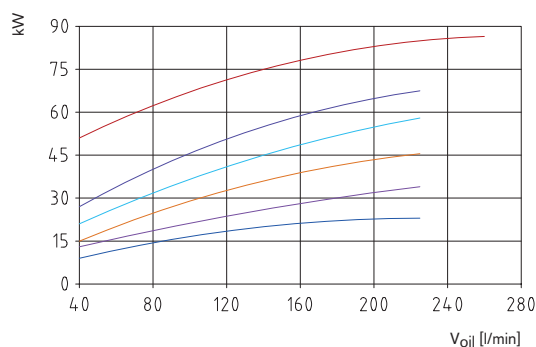
Performance diagramme of A series



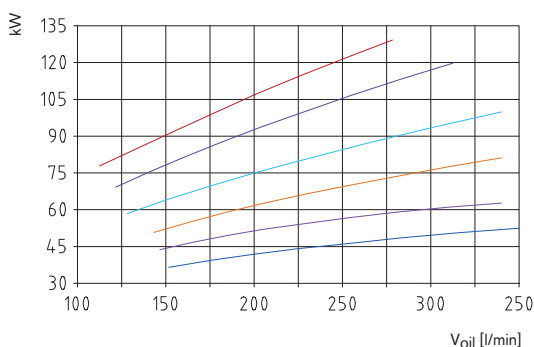
Performance diagramme of B series



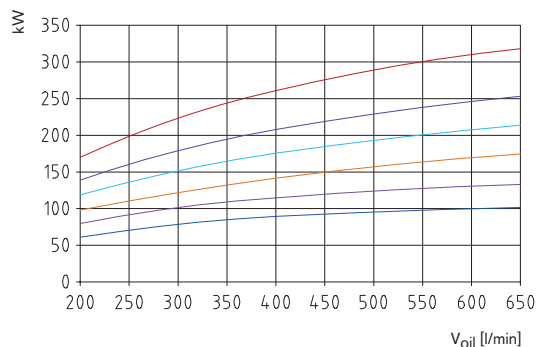
Performance diagramme of C series



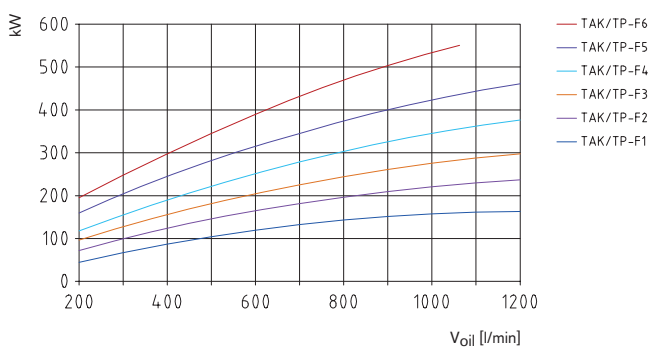
Performance diagramme of D series



Performance diagramme of E series



Performance diagramme of F series



Summary of literature

No matter if a perfect drive, a brake that takes effect, space-saving cooling or accurate hydraulics is required, if on land, by sea or at an airy height - KTR's product portfolio is just as manifold as its applications. The following catalogues and leaflets provide an overview. Available at www.ktr.com

Product catalogues



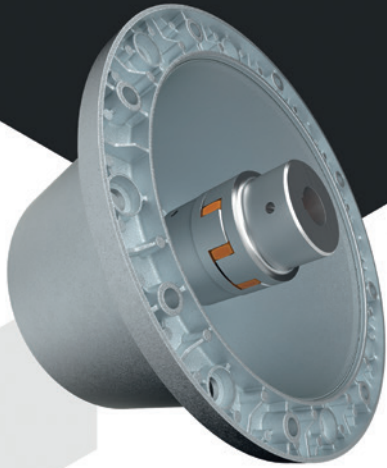
ATEX leaflet



Company leaflet



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