



Made for Motion



Cooling systems

Oil/air coolers

Oil/water coolers

Combined coolers

FUTURE WITH A SYSTEM.

KTR have consistently continued to extend their expertise in building systems over the past few decades. Today we are a leading manufacturer providing solutions with highest quality standards in the fields of drive technology, brake and cooling systems as well as hydraulic components to our global business partners.

So what would be more obvious than adapting our company name to this development? KTR Kupplungstechnik GmbH has become KTR Systems GmbH.

The change of name takes account of the growing diversity of our performance range demonstrating the global markets and our customers that we are prepared to take over just more responsibility in machines and plants.

COOLING SYSTEMS BY KTR: ALWAYS AT THE PERFECT TEMPERATURE.

Wherever someone is working, heat is produced. And wherever KTR products are used, people are often working hard. That is why KTR has thought about heat dissipation. And has finally implemented the results of these thoughts - in

terms of high-performance and efficient cooling systems which are used both in mobile and stationary hydraulics.

**With our cooling systems
your plant will never take
a break from the heat
again.“**

Joachim Grunwald, Product Manager Cooling Systems





Cooling with a system – and with care

When the going gets hot, you must show a cool reaction. This is not only a wisdom for life, but also our design engineers' dictum which is mainly applied if the development of reliable cooling systems is concerned. No matter whether construction machines or hydraulic power packs, wind energy plants or elevator construction, rail technology or steel and iron industry are concerned: Wherever heavy-duty jobs have to be performed, heat has to be dissipated quickly and efficiently. This is the only way to preserve the performance capacity of the drive, extend its operating times and finally its service life.

In order to succeed in achieving a temperature compensation, we provide for highly efficient cooling systems for different media such as oil, air, coolants or fuel. And since a company having the slogan "Made for Motion" does not maintain the status quo, our design engineers continue to find new options to develop these systems.

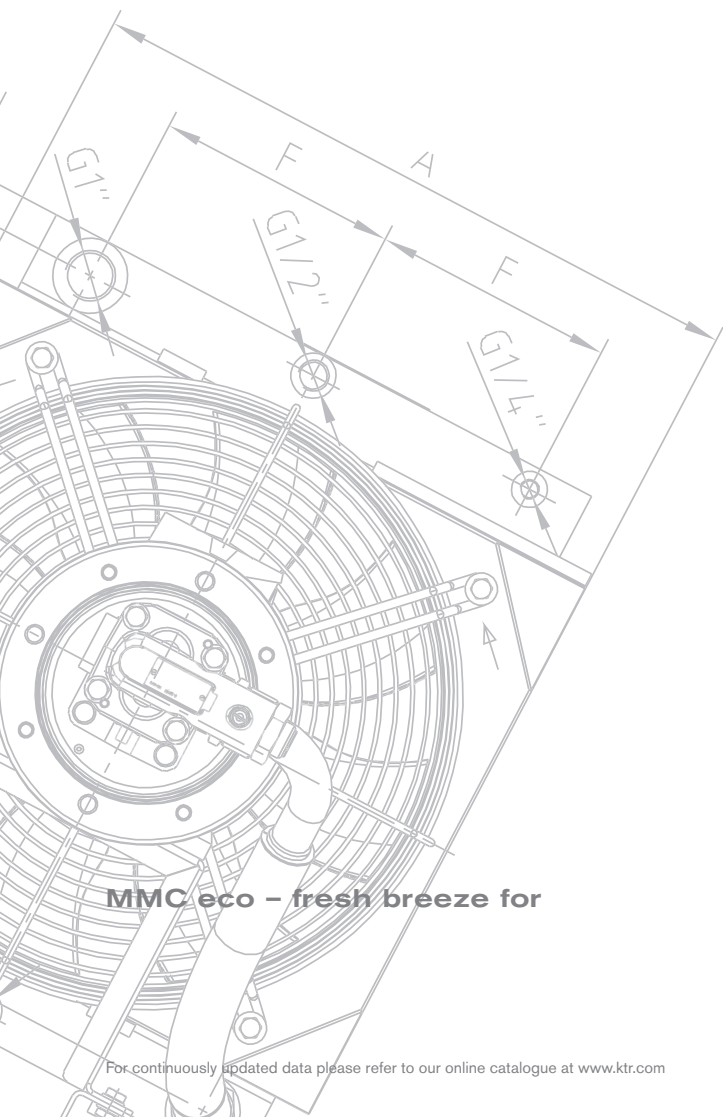
Wind energy plants

One example is the new high-performance cooler MMC eco for wind energy plants. As signified by the suffix eco, it allows for particularly energy-efficient cooling: It generates only as much cooling air as necessary. This is done by acting very carefully. A sensor measures the temperature of the medium and transmits it to a control unit. This unit tells the fan how much it has to operate - or how little. This is a sophisticated way of communication improving the degree of efficiency of the wind energy plant and reducing the operating expenses. By the way, the compact design is just as sophisticated: The high-performance cooler MMC eco generates much wind in a tight space so that it can comfortably be installed in narrow nacelles.

OAC eco – intelligent cooling for hydraulic systems

Sometimes less is more - the same applies with hydraulics. With the new OAC eco KTR is the first supplier having launched a cooling system with infinitely variable speed control for stationary drives onto the market. Like with its „big brother“ MMC eco the control unit has everything under control and defines the cooling capacity as needed. In this way the service life of the cooling system is increased while the life cycle costs and noise emissions of the overall plant are reduced.

Anyway, the OAC eco has a lot more to offer: a self-cleaning mode. At the touch of a button the torsional direction of the fan changes during 60 seconds, while the air pressure which is generated simply wipes away dust and dirt. This is a top performance which will finally pay off by the efficiency of the machine.



MMC eco – fresh breeze for



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Oil/water coolers

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OAC



PIK



PHE



TAK-T



Oil/air coolers type OAC

Cooling systems

High-performance cooling of applications with hydraulic and lubricating oils



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

Applications

- Construction machines
- Agricultural machines
- 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 grease
- 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 V/24 V IP68, 230V/400V, 400V/690V, IP55
- Fan with hydraulic drive

Marine design:

- Refrigerating grid coated via KTL immersion process
- Frame, fan cover, protection grid coated by KTL
- Electric motor with special painting and protection IP56

ATEX design:

- Electric motor in ATEX design  II 2 G Exell T3
- Special fan

Accessories, protective grid, TSC

- Thermal bypass valves, oil temperature valves OTV, see page 26/27

The OAC coolers should 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

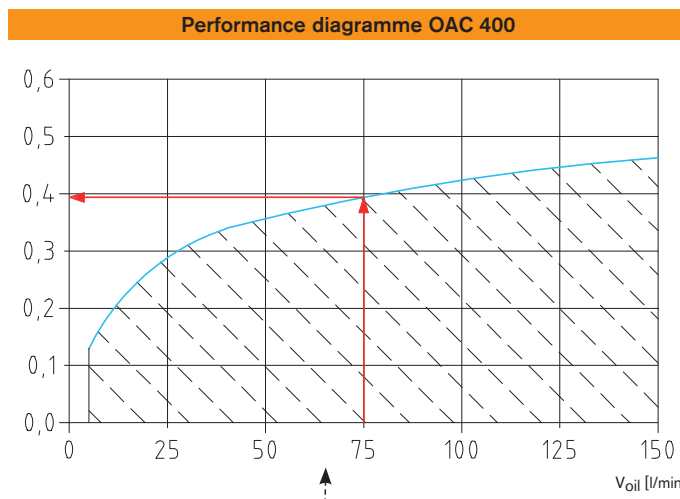
Details given:

Q = 12 kW

V = 75 l/min

T_{oil} = 65 °C

T_L = 30 °C



Calculation of specific cooling capacity

Inlet temperature difference 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: OAC 400

The actual cooling effect 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:

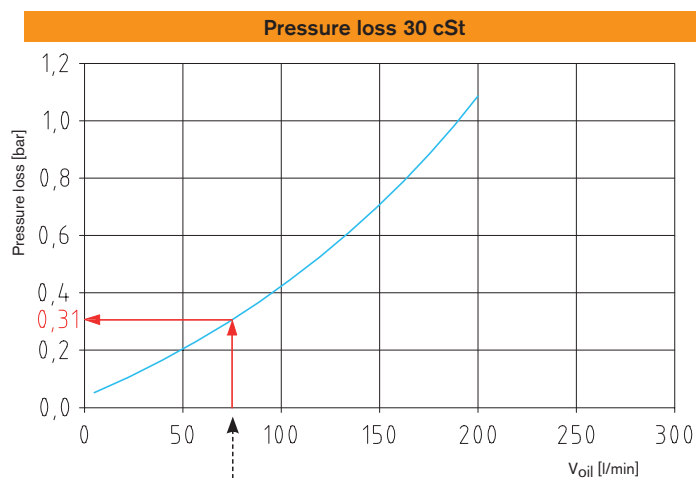
Pressure loss (from curve) x factor = effective pressure loss

Example

V_{oil}: 75 l/min

Viscosity: 20 cSt

→ 0,31 bar x 0,75 = 0,233 bar



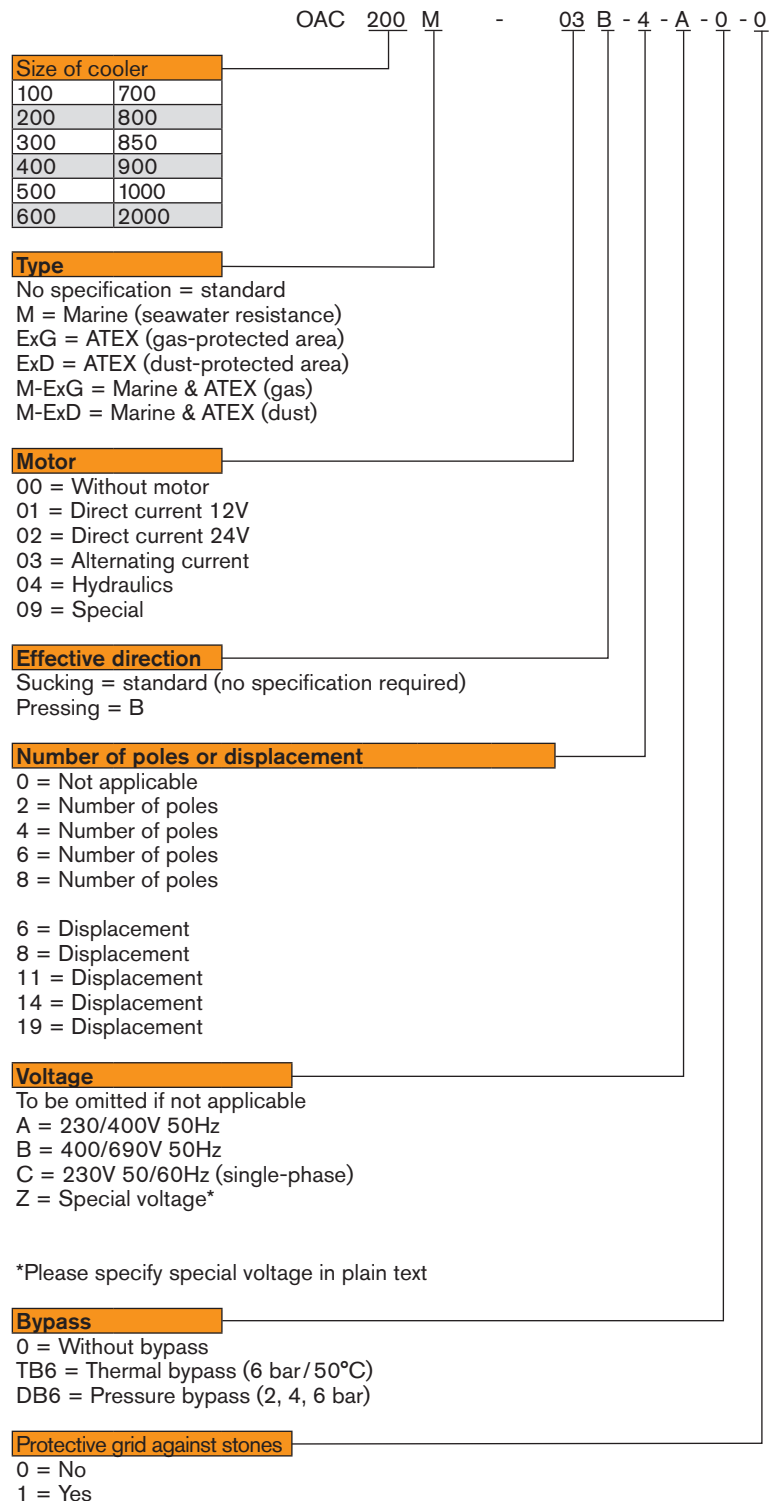
Conversion factor pressure loss

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 coolers type OAC

Cooling systems

Type code of industrial coolers oil/air



Oil/air coolers type OAC

Cooling systems

Technical data

12V and 24V fan drive										
Cooler type ¹⁾	Voltage [V]	Drive [kW]	Speed [rpm]	Amperage [A]	Protection	Fan Ø [mm]	Perm. pressure [bar]		Max. volume flow [l/min]	Mass [kg]
							Static	Dynamic		
OAC 100-01	12	0,09	3950	7,2	IP68	190			50	6
OAC 100-02	24	0,06	3625	2,6	IP68	190				6
OAC 200-01	12	0,10	2838	8,2	IP68	280			100	11
OAC 200-02	24	0,11	2925	4,4	IP68	280				11
OAC 300-01	12	0,22	3080	18,4	IP68	350			160	16
OAC 300-02	24	0,23	2730	9,4	IP68	350				16
OAC 400-01	12	0,22	3080	18,4	IP68	350				22
OAC 400-02	24	0,23	2730	9,4	IP68	350	26	14	200	22
OAC 500-01	12	0,24	2600	20,2	IP68	385				30
OAC 500-02	24	0,24	2700	9,8	IP68	385				30
OAC 600-01	12	2x0,10	2838	2x8,2	IP68	280			250	43
OAC 600-02	24	2x0,11	2925	2x4,4	IP68	280				43
OAC 700-01	12	2x0,24	2600	2x20,2	IP68	385				53
OAC 700-02	24	2x0,24	2700	2x9,8	IP68	385			350	53
OAC 800-01	12	2x0,24	2600	2x20,2	IP68	385				81
OAC 800-02	24	2x0,24	2700	2x9,8	IP68	385				81

Oil/air cooler type OAC eco							
Cooler type ¹⁾	Voltage [V]	Drive [kW]	Speed n [rpm]	Max. volume flow [l/min]	Current [A]	Protection	Fan Ø [mm]
OAC 300 eco				160			
OAC 400 eco	24	0,38	3400	200	14,5	IP 65	305
OAC 500 eco				200			
OAC 600 eco		0,34	2570	250	13		380

NEW

230V/400V with 50Hz; 460V with 60Hz fan drive														
Cooler type ²⁾	Driving power [kW]		Speed [RPM]		Amperage [A]		Protection		Fan	Noise	Perm. pressure [bar]		Max. volume flow	Mass
	50Hz	60Hz	50Hz	60Hz	50Hz	60Hz	Standard	Marine	ø-mm	[dbA]	Static	Dynamic	[l/min]	[kg]
OAC 100-03 C	0,07	0,08	2500	2700	0,29	0,33	IP54	–	250	64			50	16
OAC 200-03 C	0,12	0,16	2450	2650	0,55	0,72	IP54	–	250	69			100	16
OAC 200-03	0,18	0,21	1350	1650	0,58	0,57	IP55	IP56	280	66			100	16
OAC 300-03	0,37	0,43	1370	1670	1,04	1,02	IP55	IP56	380	76			160	24
OAC 300-03 D	0,14	0,17	1400	1600	0,35	0,32	IP44	-	350	72	26	14	160	21
OAC 400-03	0,37	0,43	1370	1670	1,04	1,02	IP55	IP56	380	76			200	29
OAC 500-03	0,37	0,43	1370	1670	1,04	1,02	IP55	IP56	380	78			200	37
OAC 600-03	0,75	0,86	1440	1740	1,79	1,72	IP55	IP56	520	78			250	57
OAC 700-03	0,75	0,86	1440	1740	1,79	1,72	IP55	IP56	520	78			350	70
OAC 800-03	1,5	1,75	1435	1730	3,3	3,3	IP55	IP56	630	78			350	97
OAC 850-03	2,2	2,55	965	1165	5,2	4,75	IP55	IP56	750	79			350	130
OAC 900-03	2,2	-	965	-	5,2	-	IP55	IP56	900	85			450	173
OAC 1000-03-6	2,2	-	965	-	5,2	-	IP55	IP56	900	87	21	14	700	187
OAC 1000-03-4	7,5kW	-	1465	-	14,3	-	IP55	IP56	900	97			700	212
OAC 2000-03-6	7,5kW	-	980	-	16	-	IP55	IP56	1000	92			700	357
OAC 2000-03-4	18,5kW	-	1470	-	35	-	IP55	IP56	1000	100			700	429

Fan with hydraulic drive								
Cooler type ¹⁾	Displacement [ccm]	Speed [RPM]	Fan - ø [mm]	Noise [dbA]	Perm. pressure [bar]		Max. volume flow [l/min]	Mass [kg]
					Static	Dynamic		
OAC 200-04-06	6,30		280	66			100	15
OAC 300-04-06	6,30		380	75				21
OAC 300-04-08	7,90		380	75			160	21
OAC 300-04-11	10,90		380	75				21
OAC 400-04-06	6,30		380	74				25
OAC 400-04-08	7,90		380	74			200	25
OAC 400-04-11	10,9		380	74				25
OAC 500-04-06	6,3		380	74				34
OAC 500-04-08	7,9		380	74			200	34
OAC 500-04-11	10,9	1500	380	74	26	14		34
OAC 600-04-06	6,3		520	78				50
OAC 600-04-08	7,9		520	78			250	50
OAC 600-04-11	10,9		520	78				50
OAC 700-04-06	6,3		520	78				60
OAC 700-04-08	7,9		520	78			250	60
OAC 700-04-11	10,9		520	78				60
OAC 800-04-11	10,9		630	78				88
OAC 800-04-14	13,9		630	78			350	88
OAC 850-04-11	10,9		750	79				110
OAC 850-04-14	13,9	1000	750	79			350	110
OAC 900-04-14	13,9		900	85				155
OAC 900-04-19	18,8		900	85			450	155
OAC 900-04-19	28,2	1500	900	95	21	14		155
OAC 1000-04-19	18,8	1000	900	85				188
OAC 1000-04-19	28,2	1500	900	97			530	188
OAC 2000-04-44	44,1	1000	1000	92				295
OAC 2000-04-44	66,2	1500	1000	100			700	295

¹⁾ Max. media temperature: 110 °C (higher temperatures on request) / Max. ambient temperature: 60 °C

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

Oil/air cooler type OAC eco

Cooling systems

Reducing noise and saving energy



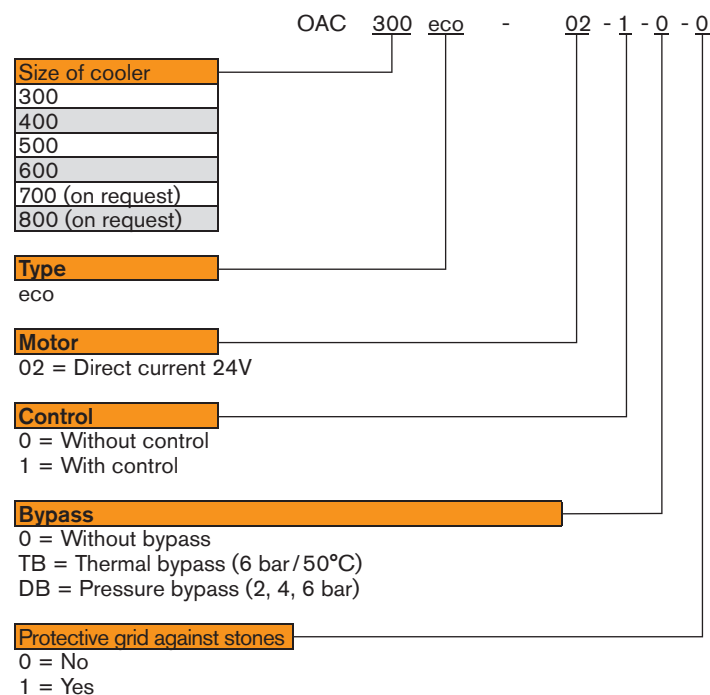
- Energy consumption optimised to requirements
- Variable speed fan motor
- Infinitely variable adaptation of cooling capacity oriented to requirements
- Operating voltage 24V
- Protective class IP65
- Up to 25 kW cooling capacity with ΔT : 40°K
- CE certification
- High-performance cooler core made of aluminium for a maximum static operating pressure of 10 bar
- Three temperature curves pre-set
- Cleaning operation & program change at the touch of a button during operation
- Oil inlet temperature is permanently displayed

Structure

- Cooler core made of aluminium
- Fan cover made of steel
- Fan made of nylon incl. protective grid
- Motor 24V, IP65
- Temperature Fan Speed Control (TFSC)
- Temperature sensor

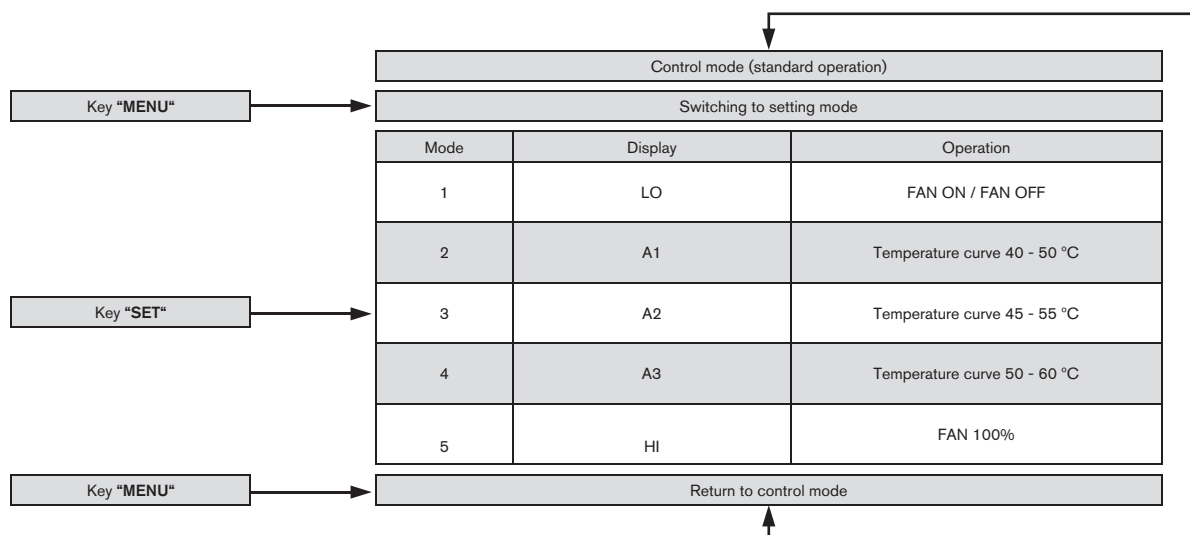
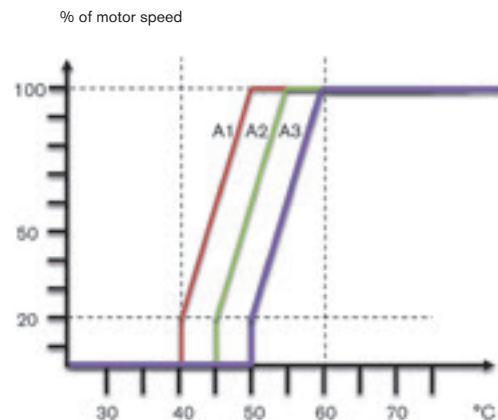
The OAC eco series is based on the previous standard, reduces noise which is generated and the energy consumption without accepting any loss in performance.

Type code

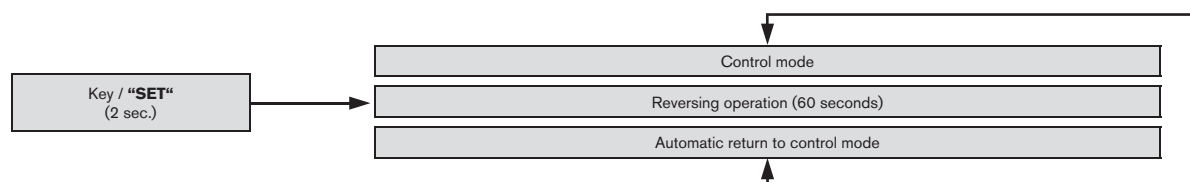


Operation

The control module TFSC is part of the cooler series eco controlling the speed of the motor. For that purpose the temperature value of the sensor is directly assigned to the motor speed. For various loads three temperature curves defined by the manufacturer are available (mode 2, 3, 4). In addition the fan can be permanently switched on or off, mode 1 and 5.



TSFC is operated via three buttons. The device is switched on or off via „ON/OFF“, while it is started in the control mode which is set as a standard by the manufacturer (mode 2). Via „MENU“ you can switch between control mode and setting mode (mode 1, 2, 3, 4, 5). With the control mode the current temperature of the sensor is displayed, with the setting mode the operating mode selected is displayed. The key „SET“ serves for changing the parameters 1-5.



Pressing the SET key may call the cleaning operation in addition. Here the fan rotates with full speed during 60 seconds in opposite direction. In the meantime the display counts back the remaining time in seconds. On completion the device restarts in the control mode. The cleaning operation can be interrupted by pressing the key „MENU“ at any time.

Oil/air coolers type OAC

Cooling systems

Diagrammes of performance and pressure loss

Performance diagramme

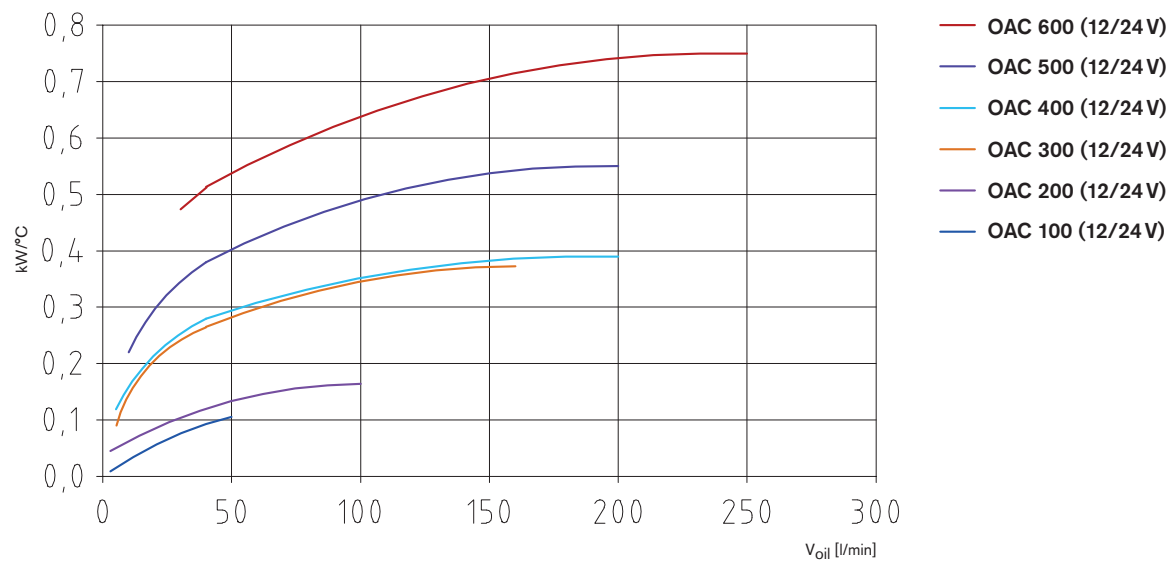
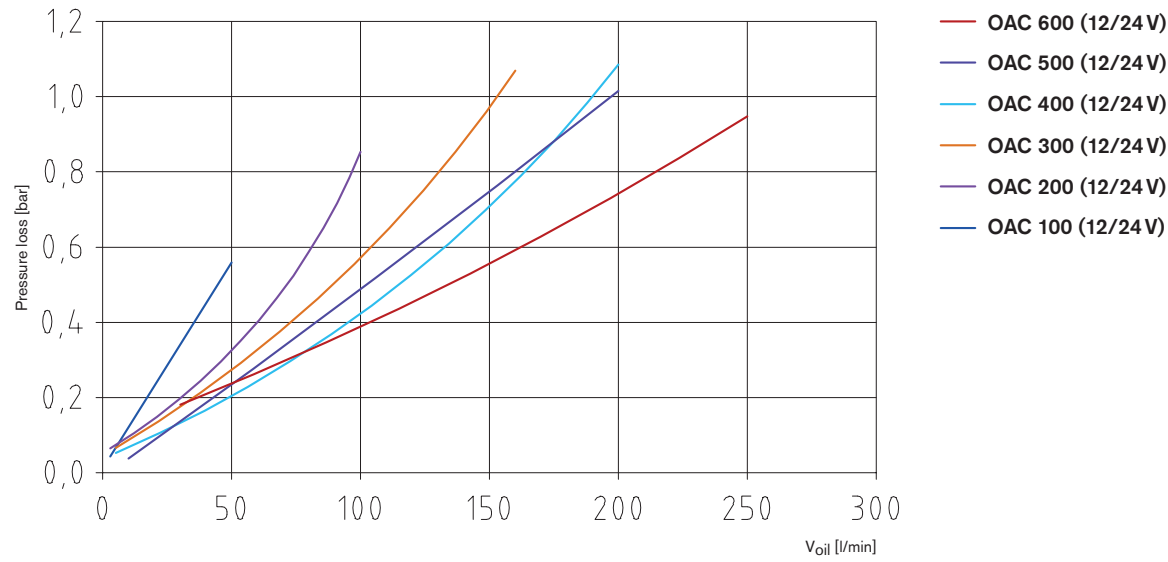


Diagramme of pressure loss



Conversion factor 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

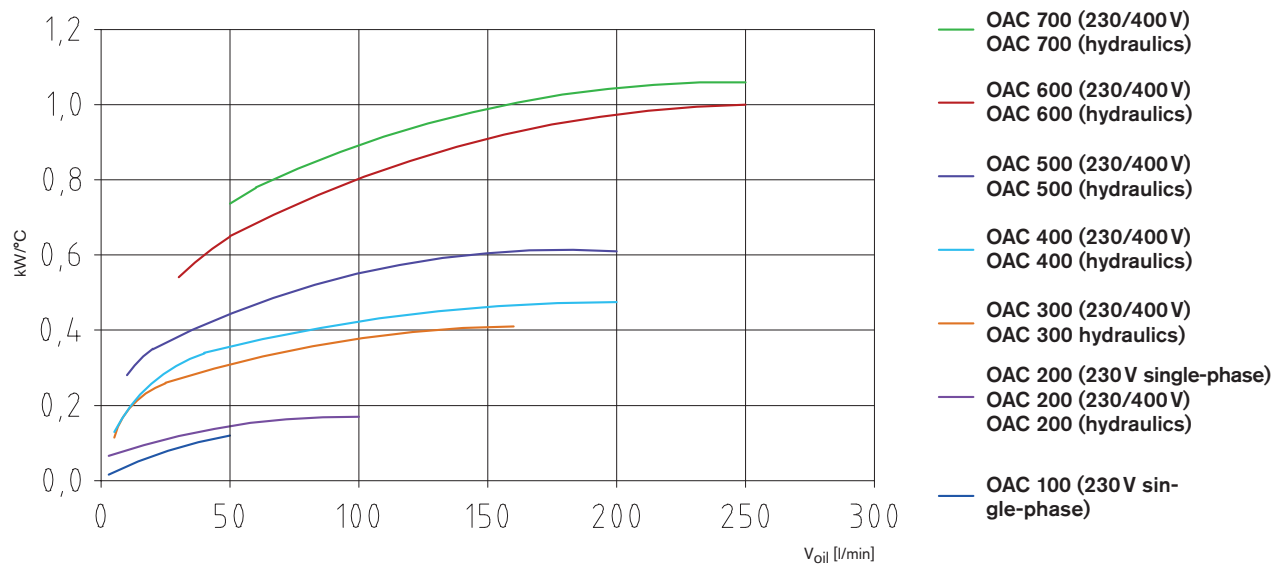
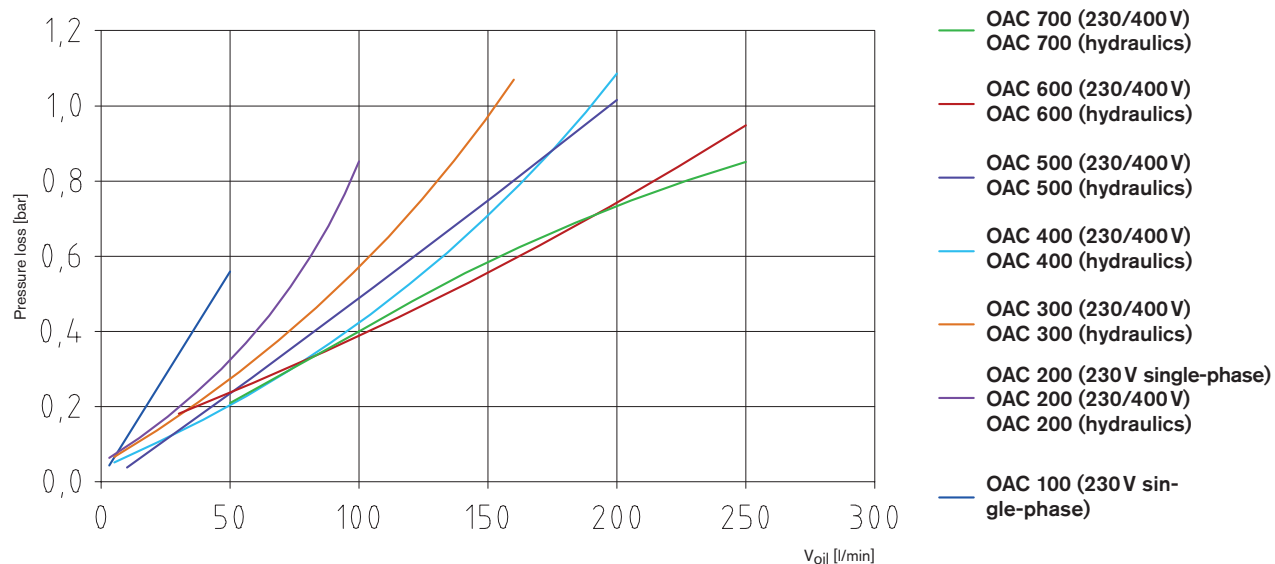


Diagramme of pressure loss



Conversion factor 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 coolers type OAC

Cooling systems

Diagramme of performance and pressure loss

Performance diagramme

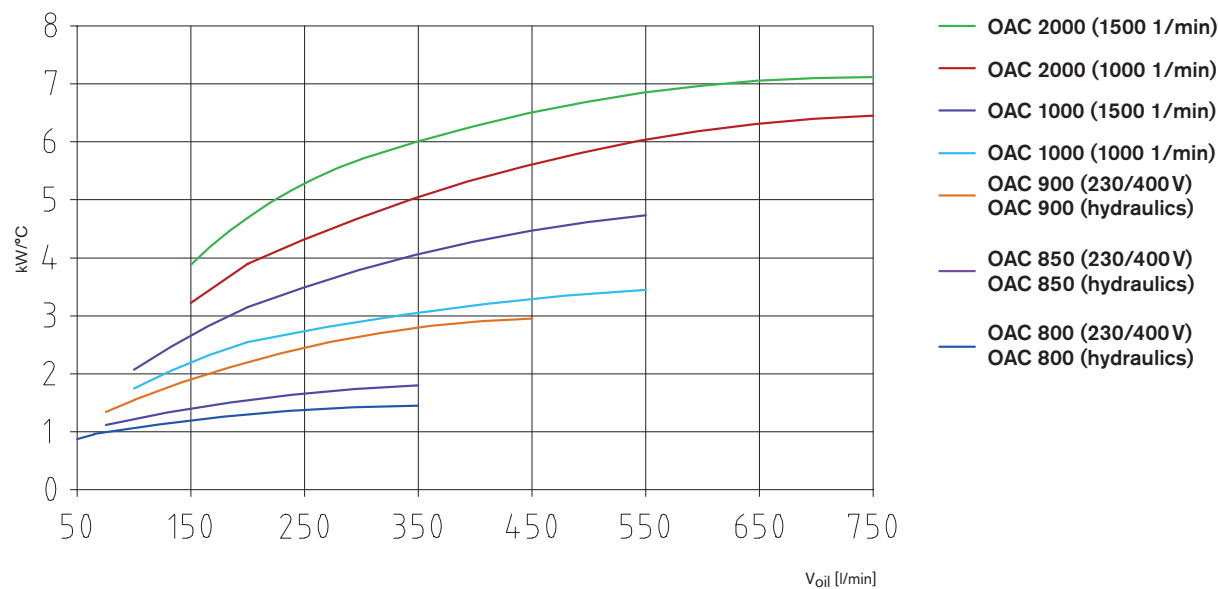
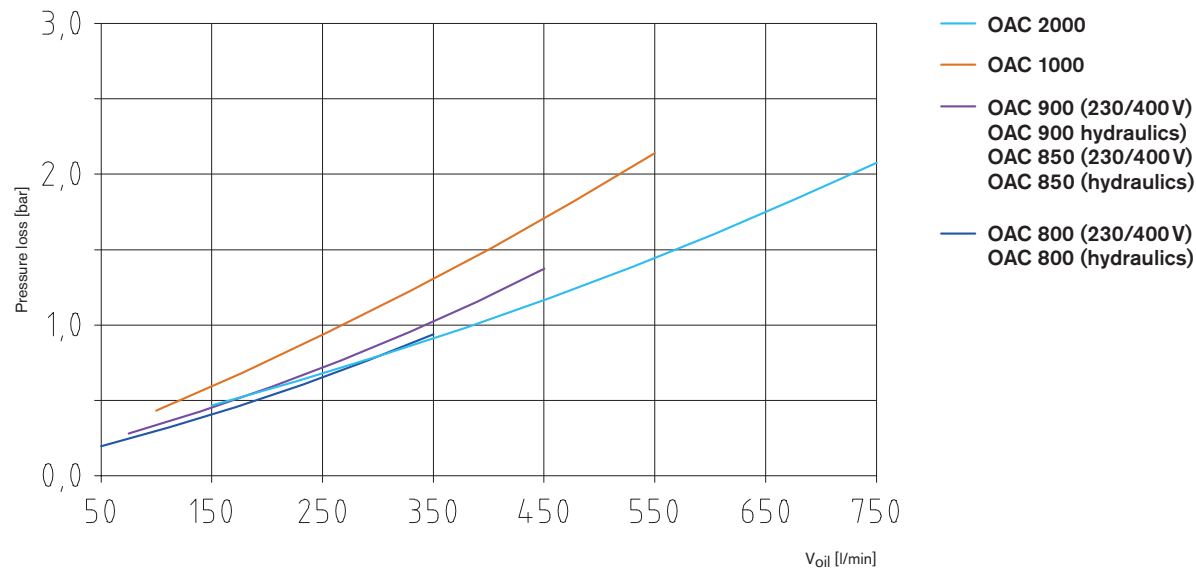


Diagramme of pressure loss

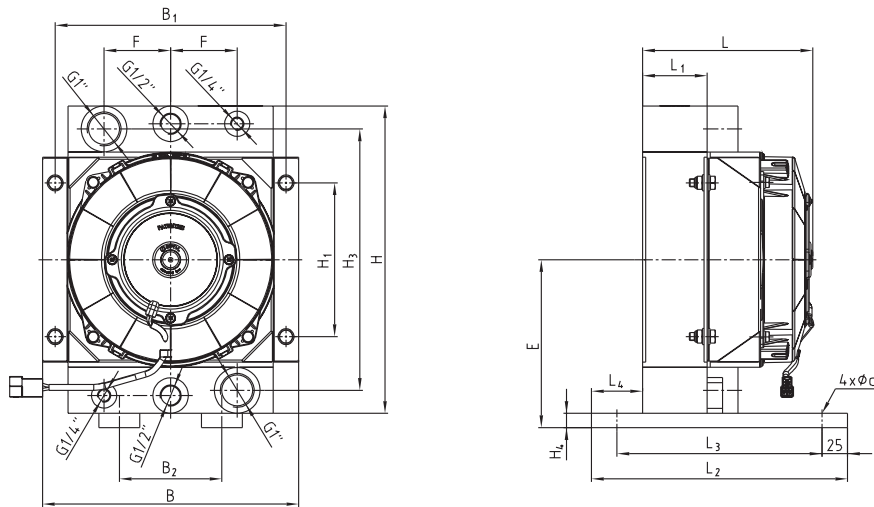


Conversion factor pressure loss									
cSt	10	15	20	30	40	50	60	80	100
Factor	0,5	0,65	0,75	1	1,2	1,4	1,6	2,1	2,8

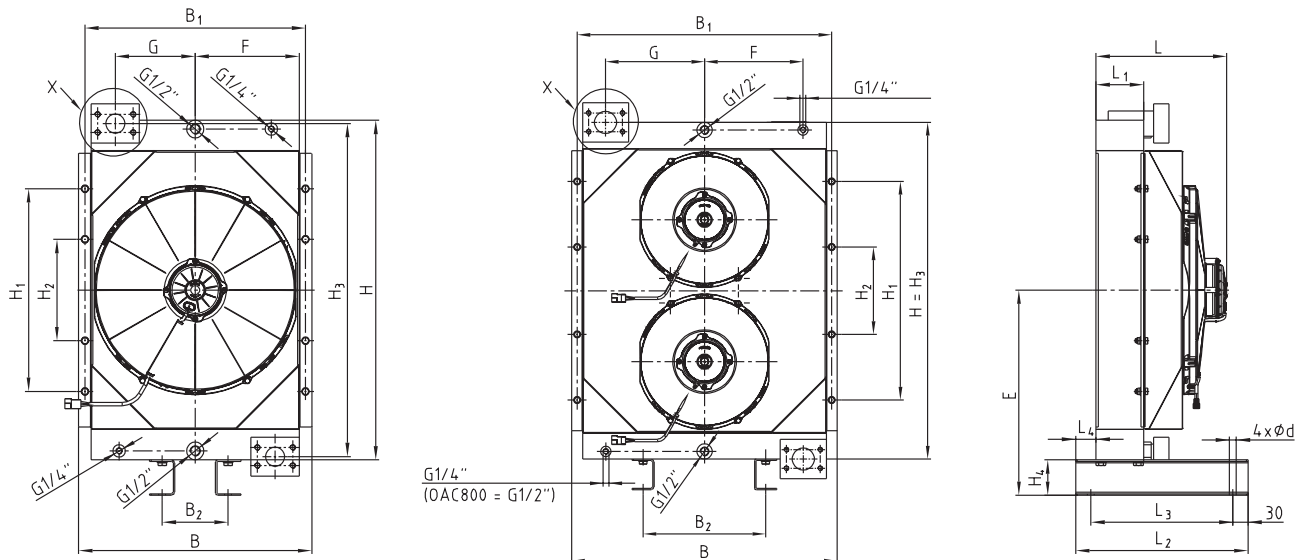
Oil/air coolers type OAC

Cooling systems

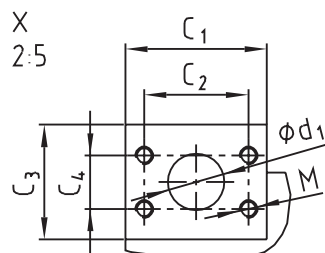
Dimensions of OAC 100 - 600 (12/24V)



OAC 100 - OAC 400 12V/24V



OAC 500/600 12V/24V

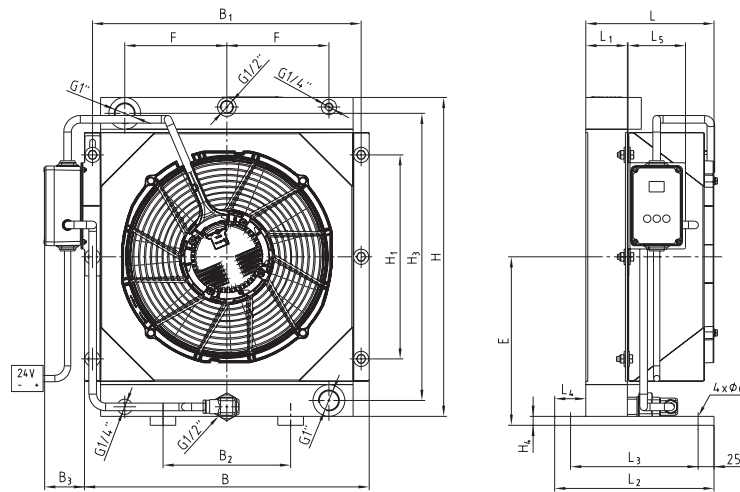


Oil/air cooler type OAC 12V/24V																							
Cooler type	Dimensions [mm]																						
	L	L1	L2	L3	L4	B	B1	B2	H	H1	H2	H3	H4	H5	d	d1	C1	C2	C3	C4	SAE flange	M	F
OAC 100-01	167	65	250	200	50	250	225	100	300	150	-	255	14	-	14	-	-	-	-	-	-	65	164
OAC 100-02	167	65	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	219
OAC 200-01	230	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	264
OAC 200-02	230	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	264
OAC 300-01	260	95	280	230	55,5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	264
OAC 300-02	260	95	280	230	55,5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	264
OAC 400-01	259	95	340	280	40	460	435	130	670	400	200	657	70	-	13,5	38	95	69,9	77	35,7	1 1/2"	M12	150
OAC 400-02	259	95	340	280	40	460	435	130	670	400	200	657	70	-	13,5	38	95	69,9	77	35,7	1 1/2"	M12	150
OAC 500-01	222	95	340	280	40	607	582	280	770	500	200	770	70	-	13,5	51	105	77,8	90	42,9	2"	M12	225
OAC 500-02	222	95	340	280	40	607	582	280	770	500	200	770	70	-	13,5	51	105	77,8	90	42,9	2"	M12	225
OAC 600-01																							
OAC 600-02																							

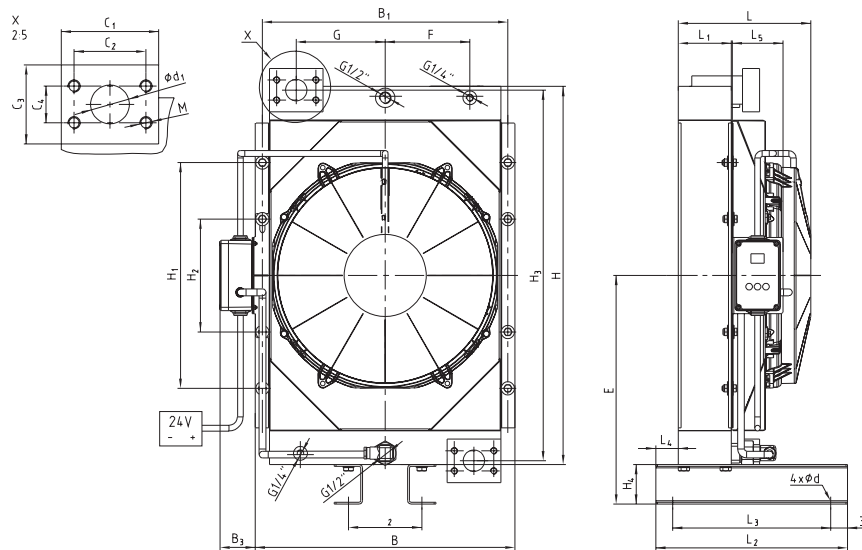
Oil/air coolers type OAC eco

Cooling systems

Dimensions of OAC eco 300 - 600 (24V)



OAC 300 - OAC 400 eco



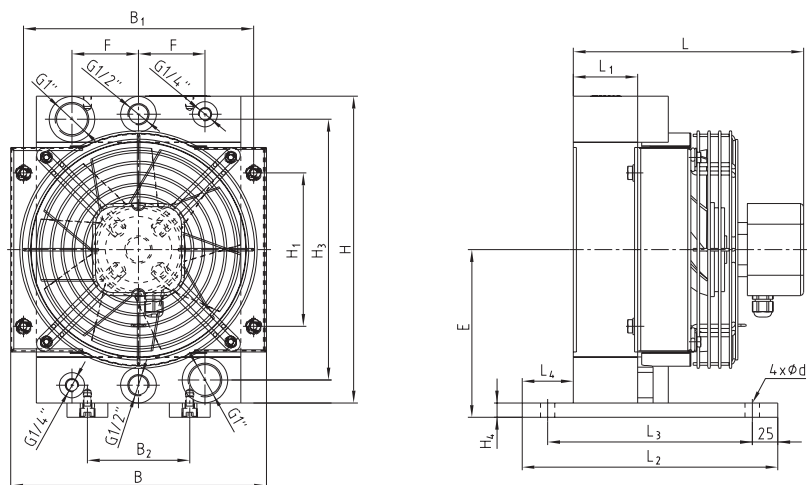
OAC 500 - OAC 600 eco

Oil/air cooler type OAC eco																											
Cooler type	Dimensions [mm]																										
	L	L ₁	L ₂	L ₃	L ₄	L ₅	B	B ₁	B ₂	B ₃	H	H ₁	H ₂	H ₃	H ₄	d	d ₁	C ₁	C ₂	C ₃	C ₄	SAE flange	M	F	G	E	
OAC 300 eco -02	201	65	250	200	49	90	446	421	200	63	500	320	-	450	14	14	-	-	-	-	-	-	-	-	160	-	264
OAC 400 eco -02	231	95	280	230	55,5	90	446	421	200	63	500	320	-	450	14	14	-	-	-	-	-	-	-	-	160	-	264
OAC 500 eco -02	234,7	94	340	280	40	90	460	435	130	63	670	400	200	657	70	13,5	38	95	69,9	77	35,7	1½"	M12	150	157	405	
OAC 600 eco -02	294,7	94	340	280	40	90	607	582	280	63	770	500	200	770	70	13,5	51	105	77,8	90	42,9	2"	M12	225	226	455	

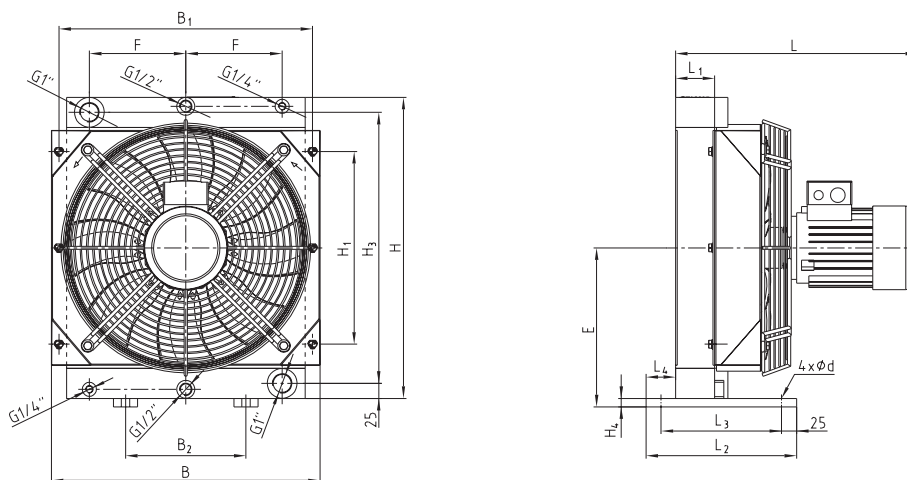
Oil/air coolers type OAC

Cooling systems

Dimensions of OAC 100-400 (230/400V)



OAC 100 - OAC 200 230V (single-phase)



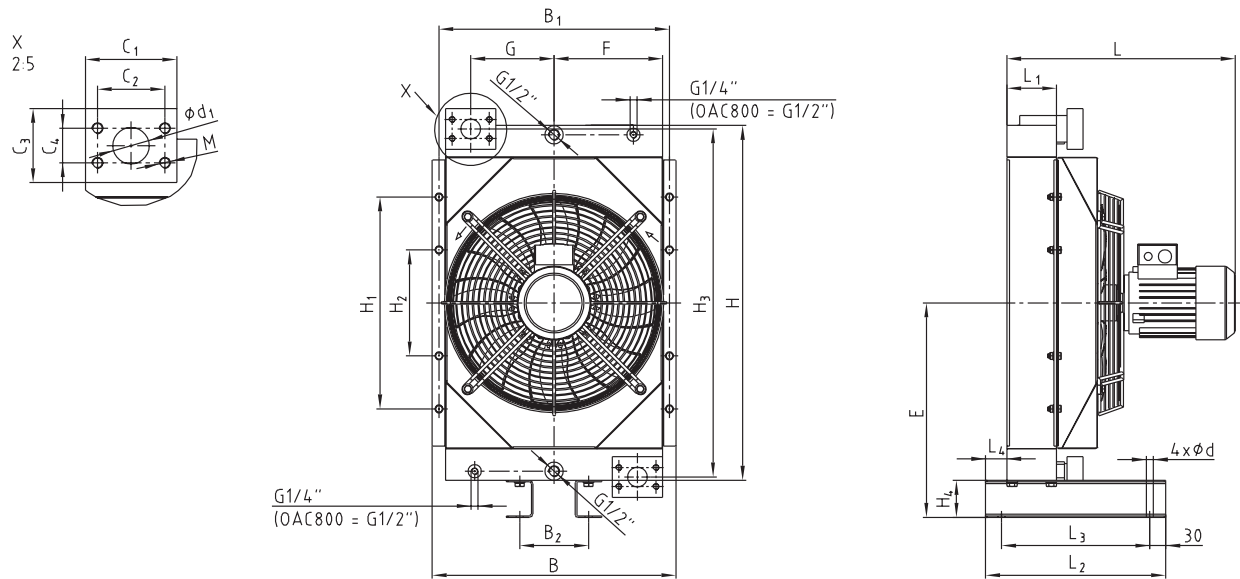
OAC 200 - OAC 400 230V/400V

Oil/air cooler type OAC 230V/400V																								
Cooler type	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	M	F	G	E
OAC 100-03-C	225	63	250	200	50	250	225	100	200	150	-	255	14	-	14	-	-	-	-	-	-	65	-	164
OAC 200-03-C	273	63	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	-	219
OAC 200-03	334	65	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	115	-	219
OAC 300-03	404	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264
OAC 400-03	434	95	280	230	55,5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	160	-	264

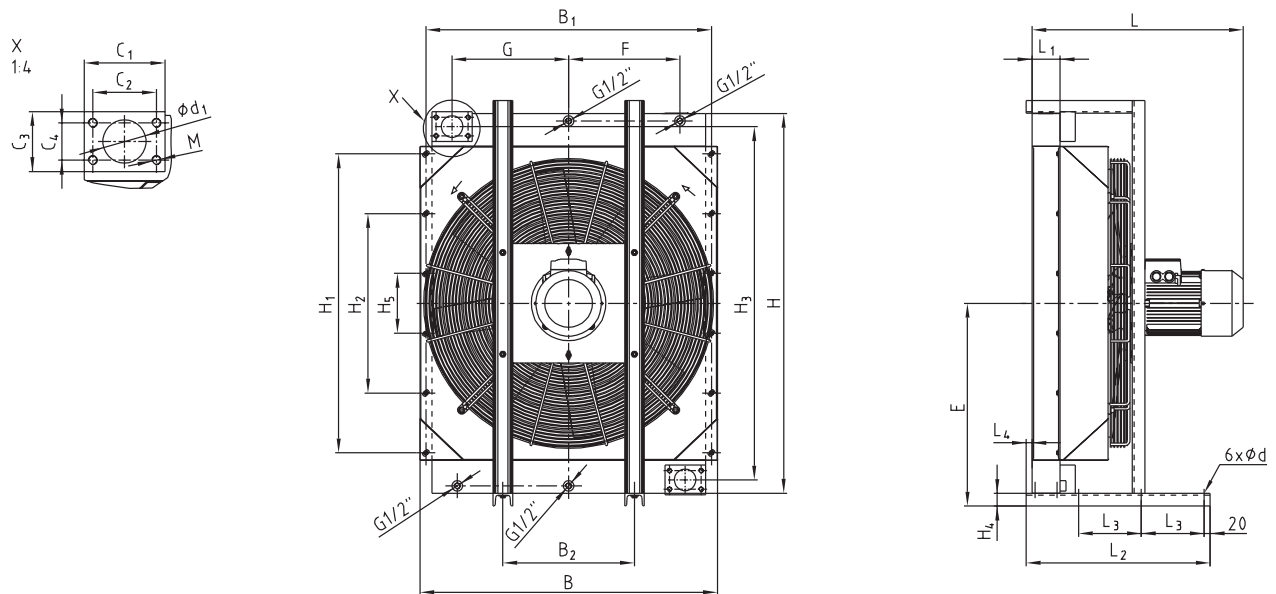
Oil/air coolers type OAC

Cooling systems

Dimensions of OAC 500-2000 (230/400/690V)



OAC 500 - OAC 800 230V/400V



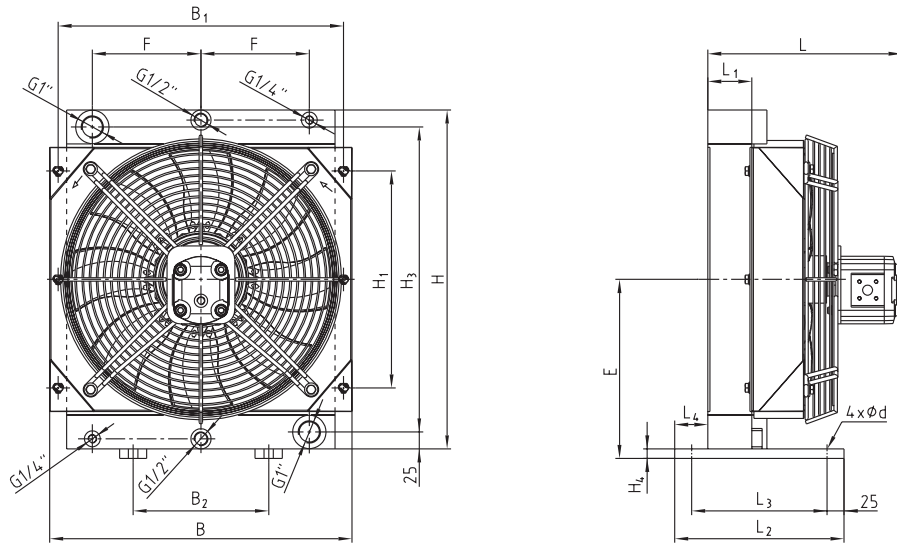
OAC 850 - OAC 2000 230V/400V (400V/690V)

Oil/air cooler type OAC 230V/400V																										
Cooler type	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	
OAC 500-03	431	95	340	280	40	460	435	130	670	400	200	657	70	-	13,5	38	95	69,9	77	35,7	1½"	M12	150	157,5	405	
OAC 600-03	532	95	340	280	40	607	582	280	770	500	200	770	70	-	13,5	51	105	77,8	90	42,9	2"	M12	225	226	455	
OAC 700-03	542	95	340	280	40	608	582	280	920	700	300	920	70	-	13,5	51	105	77,8	90	42,9		M12	225	226	530	
OAC 800-03	665	140	450	390	40	701	676	280	920	700	300	920	70	-	13,5	51	105	77,8	90	42,9		M12	272	273	530	
OAC 850-03	667	95	500	180	-	870	835	350	960	690	230	910	42	-	14	51	105	77,8	90	42,9		M12	350	340	523	
OAC 900-03	670	95	590	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62	3"	M16	372,5	390	678	
OAC 1000-03-06	690	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62		M16	372,5	390	678	
OAC 1000-03-04	729	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62		M16	372,5	390	678	
OAC 2000-03-06	900	140	750	210	-	1286	1246	525	1420	1000	600	1332	45	200	14	73	135	106,5	100	62		M16	532	532	756	
OAC 2000-03-04	980	140	750	210	-	1286	1246	525	1420	1000	600	1332	45	200	14	73	135	106,5	100	62	M16	532	532	756		

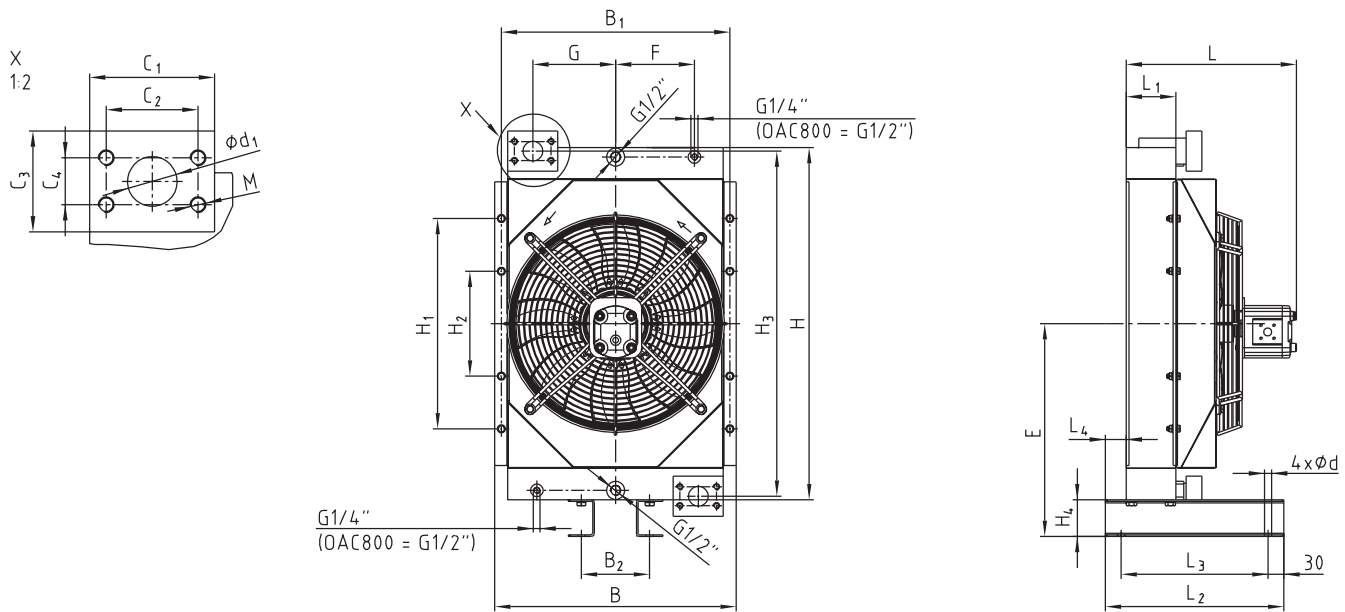
Oil/air coolers type OAC

Cooling systems

Dimensions of OAC 200-800 (hydraulic)



OAC 200 - OAC 400 hydraulic



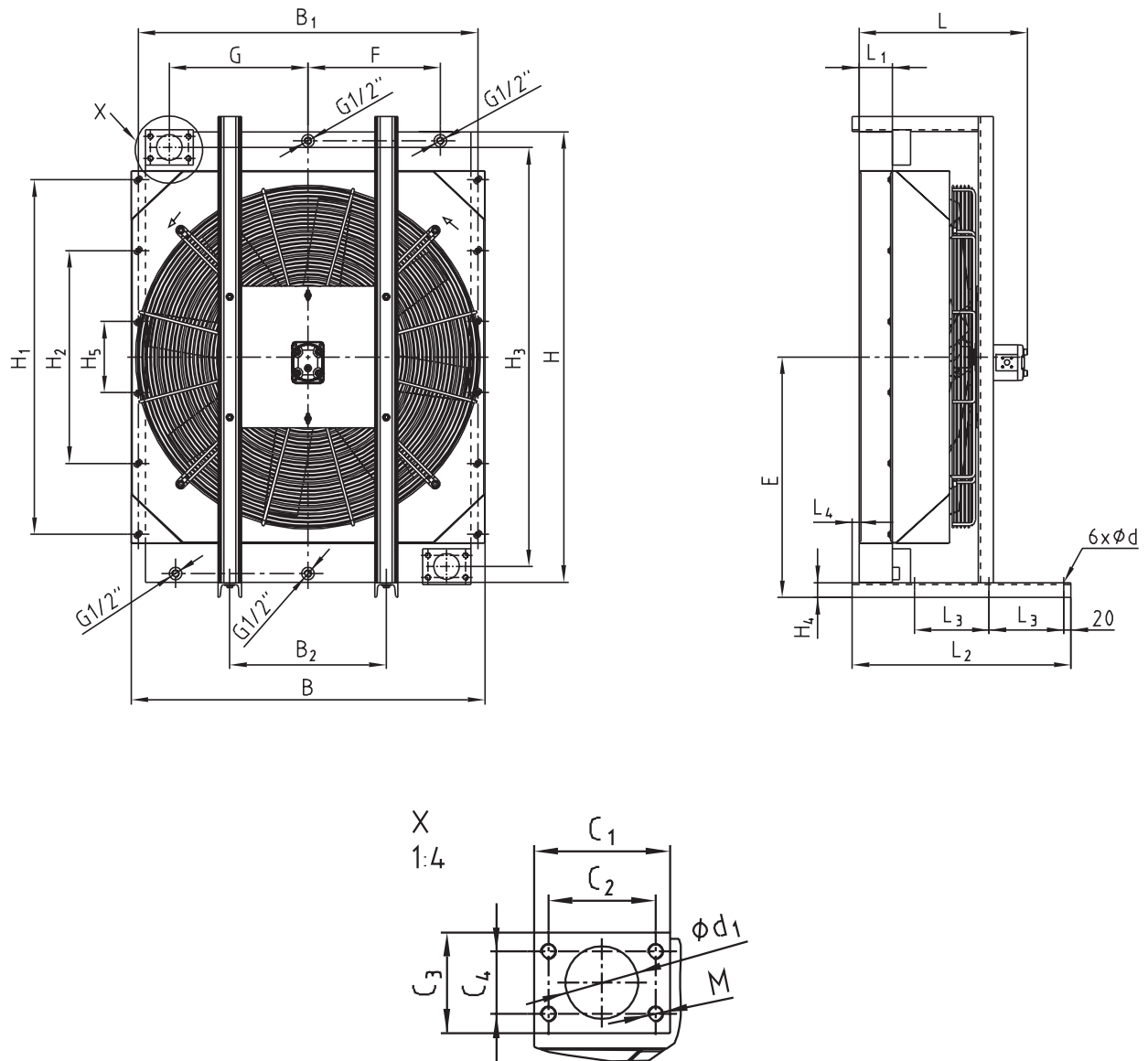
OAC 500 - OAC 800 hydraulic

Oil/air cooler type OAC hydraulic																									
Cooler type	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
OAC 200-04	245	65	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	-	115	-	219
OAC 300-04	295	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	160	-	264
OAC 400-04	325	95	280	230	55,5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	160	-	264
OAC 500-04	323	95	340	280	40	460	435	130	670	400	200	657	70	-	13,5	38	95	69,9	77	35,7	1½"	M12	150	157,5	405
OAC 600-04	400	95	340	280	40	607	582	280	770	500	200	770	70	-	13,5	51	105	77,8	90	42,9		M12	225	226	455
OAC 700-04	411	95	340	280	40	608	582	280	920	700	300	920	70	-	13,5	51	105	77,8	90	42,9	2"	M12	225	226	530
OAC 800-04	546	140	450	390	40	701	676	280	920	700	300	920	70	-	13,5	51	105	77,8	90	42,9		M12	272	273	530

Oil/air coolers type OAC

Cooling systems

Dimensions of OAC 850 - 2000 (hydraulic)



OAC 850 - OAC 2000 hydraulic

Oil/air cooler type OAC hydraulic																									
Cooler type	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
OAC 850-04	475	95	590	210	-	870	835	350	960	690	230	910	42	-	14	51	105	77,8	90	42,9	2"	M12	350	340	523
OAC 900-04	475	95	615	210	19,5	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62		M16	372,5	390	678
OAC 1000-04	505	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62		M16	372,5	390	678
OAC 2000-04	620	140	750	210	-	1286	1246	525	1420	1000	600	1332	45	200	14	73	135	106,5	100	62		M16	532	532	756

Oil/air coolers / cooling-pumping unit OPC

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.

Applications

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

Applicable for cooling of:

- Hydraulic oil
- Gear oil
- Lubricating grease
- 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)
- Electric motor 230 V/400 V, IP55
- Bellhousing and coupling
- Gear feed pump with pressure relief valve 0-15 bar, recommended setting 5 bar, max. media temp. 80 °C (higher temperature on request)
- Filter with visual maintenance display, as an option

Marine design:

- Cooler core with CDP coating
- Frame, protective grid, cover with CDP coating
- Electric motor with special painting and protection IP56

ATEX design:

- Electric motor in ATEX design  II 2 G Exell T3
- Special fan

Accessories, protective grid, TSC

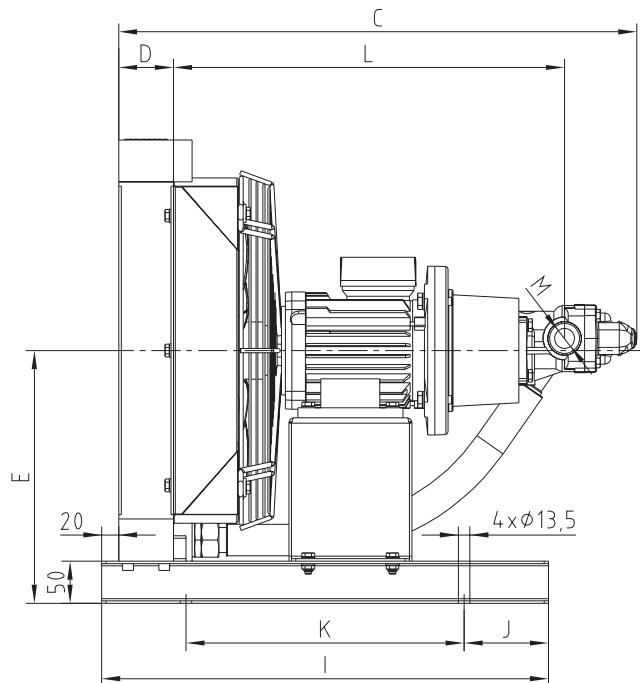
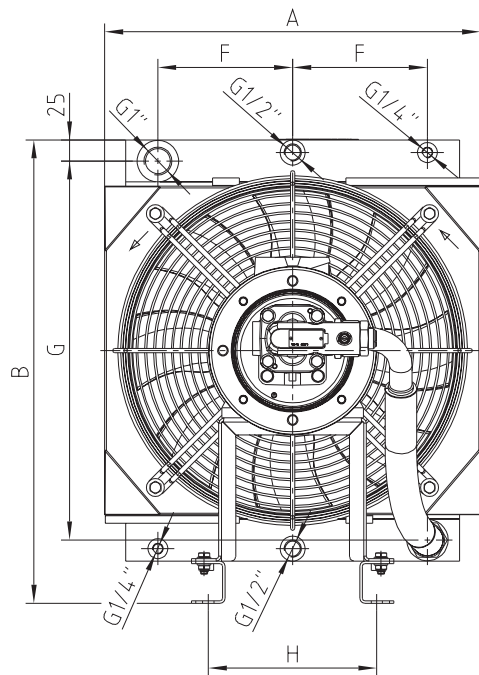
- Thermal bypass valves, oil temperature valves OTV, see page 26/27

The OAC coolers should be protected from direct solar radiation.

Oil/air coolers / cooling-pumping unit OPC

Cooling systems

Dimensions of OPC 200-400 (230/400V)



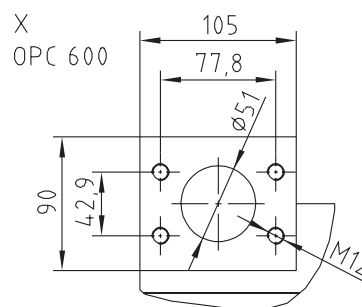
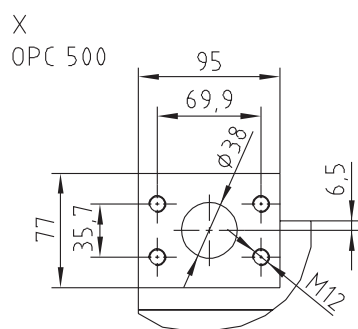
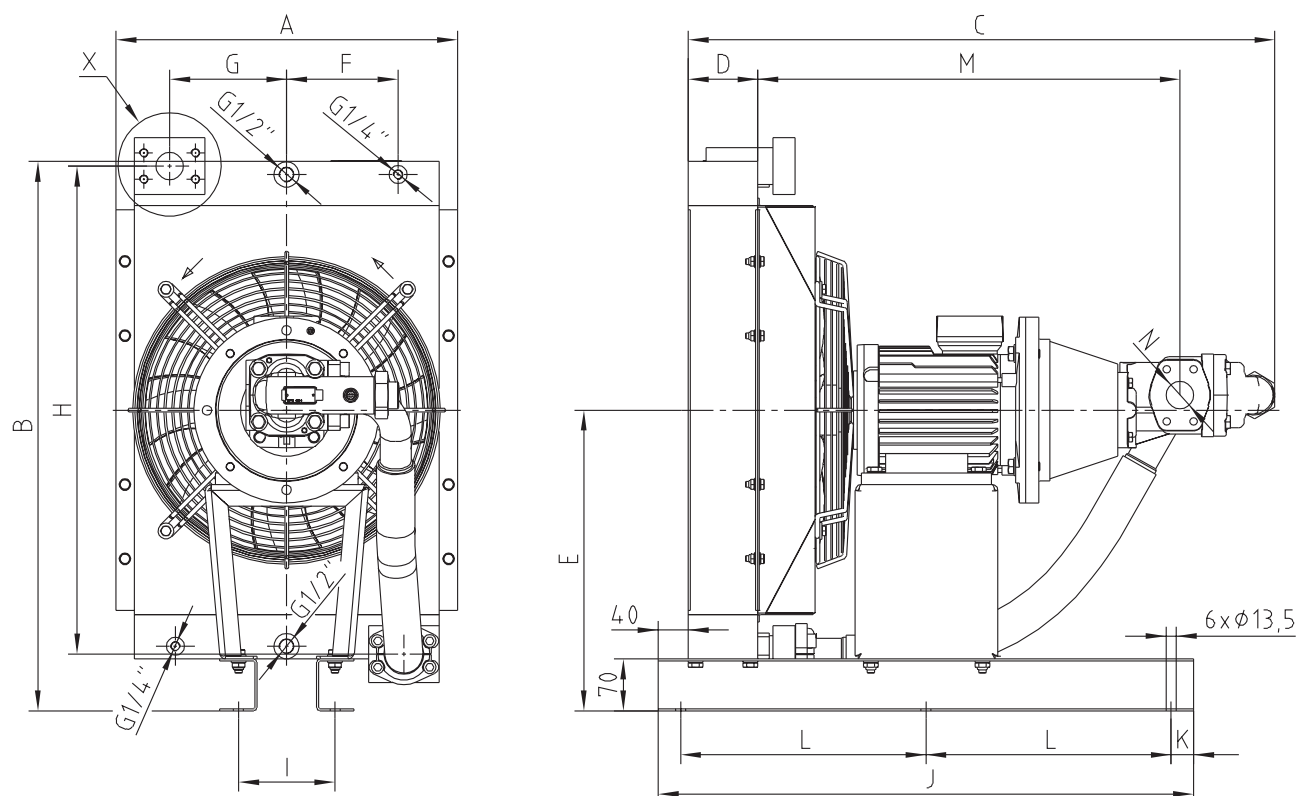
OPC 200- OPC 400

Technical data																						
Cooler type	Voltage	Current [A]	Speed [rpm]	l/min	kW/°C													Weight [kg]				
						A	B	C	D	E	F	G	H	I	J	K	L		M			
OPC 200-4D-0,75kW	230/400V 50Hz	1,8	1400	5,5	0,07	350	460	572	65	255	115	360	174	530	100	330	426	G 3/4"	35			
OPC 200-12D-0,75kW				16,7	0,09			596									435	G 1"				
OPC 200-16D-0,75kW				21,4	0,10			615									464	G 3/4"				
OPC 300-4D-0,75kW				5,5	0,12	446	550	638	65	300	160	450	200	530	100	330	464	G 3/4"	42			
OPC 300-12D-0,75kW				16,7	0,23			638									473	G 1"				
OPC 300-16D-0,75kW				21,4	0,25			668									474	SAE 1 1/2				
OPC 400-4D-0,75kW							5,5	0,13	446	550	645	95	300	160	450	200	550	75	400	465	G 3/4"	46
OPC 400-12D-0,75kW							16,7	0,24			668									474	SAE 1 1/2	
OPC 400-16D-0,75kW							21,4	0,27			720									474	SAE 1 1/2	
OPC 400-32D-0,75kW							42,7	0,34			720									474	SAE 1 1/2	

Oil/air coolers / Cooling-pumping unit OPC

Cooling systems

Dimensions of OPC 500-600 (230/400V)



OPC 500- OPC 600

Technical data																				
Cooler type	Voltage	Current [A]	Speed [rpm]	l/min	kW/°C														Weight [kg]	
						A	B	C	D	E	F	G	H	I	J	K	L	M	N	
OPC 500-16D-2,2kW	230/400V 50Hz	4,9	1410	21,5	0,35	460	740	740	95	405	150	157,5	657	130	720	30	330,0	547	G 1"	75
OPC 500-25D-2,2kW				33,4	0,40			568										SAE 1 1/2"	77	
OPC 500-32D-2,2kW				42,7	0,42															
OPC 500-40D-2,2kW				53,5	0,45	607	840	819	95	455	225	226,0	770	280	795	30	367,5	626	G 1"	96
OPC 600-16D-2,2kW				21,5	0,47													647	SAE 1 1/2"	98
OPC 600-25D-2,2kW				33,4	0,56															
OPC 600-32D-2,2kW				42,7	0,61															
OPC 600-40D-2,2kW				53,5	0,66			868												

Oil/air coolers / cooling-pumping unit type OPC

Cooling systems

Type code of industrial coolers oil/air

OPC 200 M 4D - 0,75 kW - A - F10 - 0 - 0

Size of cooler	
100	
200	
300	
400	
500	
600	
700	
800	
900	
1000	

Type
 No specification = standard
 M = Marine (seawater resistance)
 ExG = ATEX (gas-protected area)
 ExD = ATEX (dust-protected area)
 M-ExG = Marine & ATEX (gas)
 M-ExD = Marine & ATEX (dust)

Nominal size of pump incl. type
 e. g.: 4D

Motor output
 0,75 kW
 2,2 kW

Voltage
 A = 230/400V 50Hz or 460V 60 Hz (up to OPC600)
 B = 230/400V 50Hz (from OPC700)
 Z = Special voltage*

*Please specify special voltage in plain text

Filter
 (To be omitted if not applicable)
 F10 = Filter (permeability up to 10µ)
 F25 = Filter (permeability up to 25µ)

Bypass
 0 = Without bypass
 TB6 = Thermobypass (6 bar / 50°C)
 DB6 = Druckbypass (2, 4, 6 bar)

Protective grid against stones
 0 = No
 1 = Yes

Bypass, protective grid

Bypass operation for OAC & OPC coolers



Thermal pressure bypass

- The pressure relief valve opens with pressure peaks from 6 bar
- The bypass piping is closed from an oil temperature of 50 °C via thermocouple

Pressure bypass

- The pressure relief valve opens with pressure peaks from 6 bar

Protective grid for OAC & OPC coolers



Plain protective grid

- Wire mesh made of steel protecting against foreign particles

Protective grid with filter element

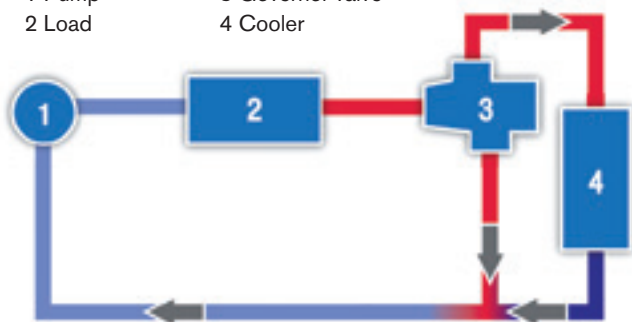
- The wire mesh is provided with a dust protection filter additionally

Oil/air coolers accessories

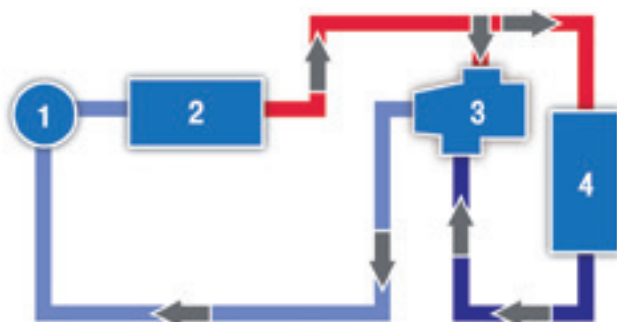
Cooling systems

Oil thermostat valve

- 1 Pump
2 Load
3 Governor valve
4 Cooler



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



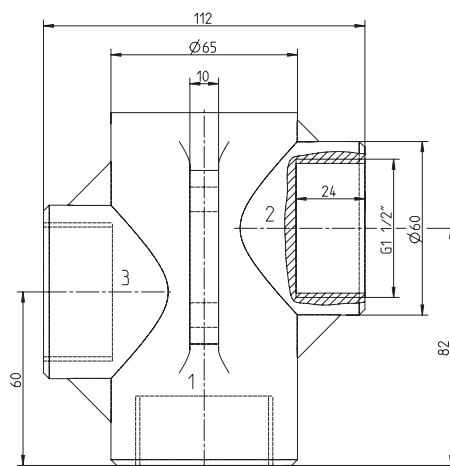
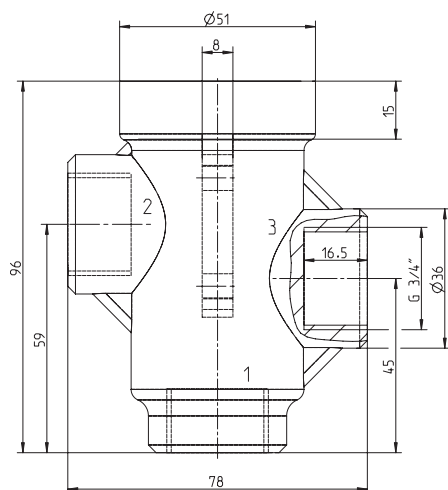
Use as a mixing valve:
Constant temperature on load inlet

Main applications of oil thermostat valves

- Agricultural machines
- Construction machines
- Compressors
- Coolers
- Special applications, e. g. wind power stations, gearboxes, hydraulics, general engineering

Particular characteristics

- Temperature figures set
- High control accuracy
- Control operation independent 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 bar

Ordering example:	1		55
	Oil thermostat valve	Size	Inlet temperature

Combined cooler type MMC

Cooling systems

Mobile combined cooler



The MMC cooler series is used on construction machines, agricultural machines and with stationary I. C.-engines. Being used as a water cooler the MMC series tempers the cooling water. Being used as an oil cooler it ensures cooling of hydraulic or gear oil, as a charge air cooler it serves for cooling of combustion air. Such kind of high-performance cooling system meets with all demands on temperature control, for example used as a fuel cooler.

It goes without saying that these cooling systems are developed individually, considering the cooling capacity required and in a close cooperation with the customer. If various media are to be cooled, the cooling elements can be arranged either "side by side" or in a series. Depending on the application the MMC coolers are provided with fans which are either driven by hydraulic fan drives, 12/24V or 230/400V electric motors, while the hydraulic systems on large machines have the benefit of higher efficiency, lower noise emission and better adaptability to individual operating conditions. Irrespective of the type of drive the latest designs of fans are used which not only operate very efficiently, but also very quietly.

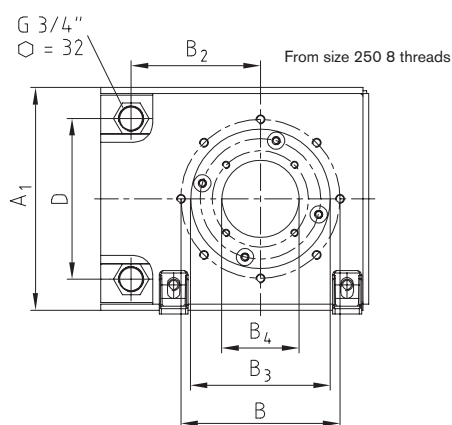
Potential applications



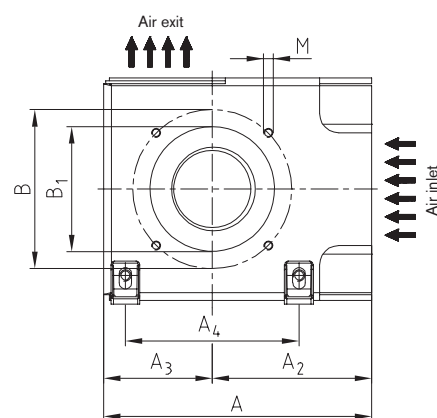
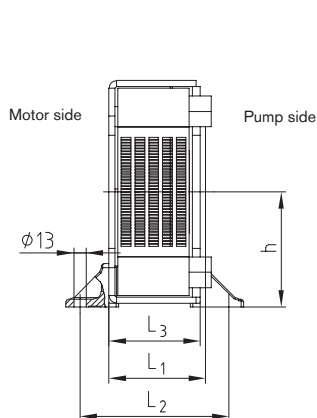
Oil/air coolers type PIK

Cooling systems

Bellhousing with integrated oil/air cooler



View pump side



View motor side

Bellhousing with integrated oil/air cooler type PIK (patent pending)																		
IEC motor		PIK oil cooler type	Dimensions [mm] *															
Size (Welle)	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	M10	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	M10	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	M10	116,5
(24 x 50)	1,5																	
100L / 100M	2,2	PIK 250/2/... **	124	175,5	115,5	308	250	180	125	220	215	180	150	190	20	192	M12	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	M12	129
132S / 132M	5,5	PIK 300/1/...	144	199,5	139,5	359	300	205	154	260	265	230	175	234	30	242	M12	154
(38x80)	7,5	PIK 300/3/...	155	199,5	139,5	359	300	205	154	260	265	230	175	234	30	242	M12	154
		PIK 300/4/...	168	199,5	139,5	359	300	205	154	260	265	230	175	234	30	242	M12	154
160M / 160L	11	PIK 350/1/...	188	243,5	183,5	405	360	230	175	310	300	250	200	260	50	292	M16	184
(42 x 110)	15	PIK 350/2/...	204	243,5	183,5	405	360	230	175	310	300	250	200	260	50	292	M16	184
180M / 180L	18,5																	
(48 x 110)	22																	

* Dimensions following the VDMA standard 24561.

** In case of an engine speed of ≥ 1900 rpm a steel fan must be used.

Assembly

With assembly and disassembly of the oil connection pipes please hold up with a hexagon tool (max. tightening torque 40 Nm). No reduction of the cross-section behind the cooler. Return flow filters should be installed in front of the cooler (dynamic pressure, danger of bursting). Tensions inside the connection pipes must be avoided! Vibration of piping must be avoided (should possibly be intercepted in front of the connection). Supply and discharge to be chosen alternatively. Please note that many hydraulic systems generate pressure peaks of far more than 12 bar in the reverse motion (danger of bursting)! Please observe our assembly instructions at www.ktr.com.

For PIK sizes 200 and 350 please 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

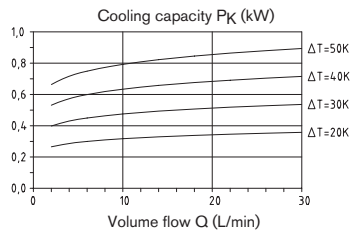
Oil/air coolers type PIK

Cooling systems

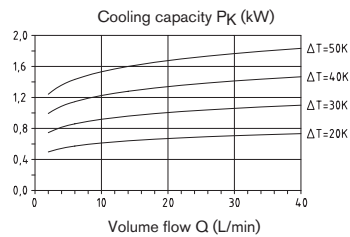
Oil/air cooler type PIK 200 - 350

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

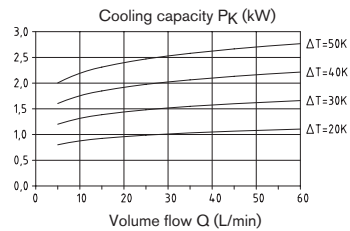
PIK 200



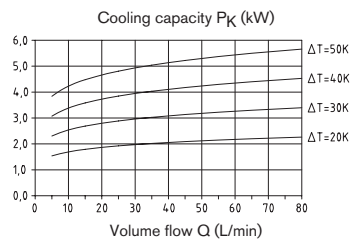
PIK 250



PIK 300



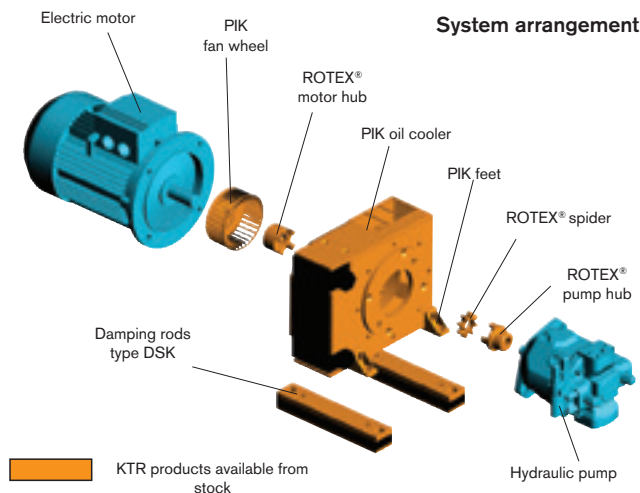
PIK 350



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

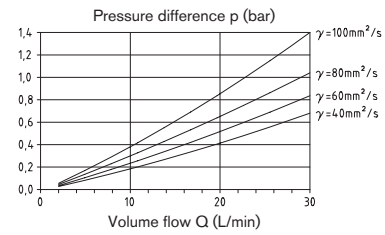
2. Operating pressure

The permissible operating pressure for the oil cooler is 12 bar with dynamic operation. Max. operating pressure with static load is 20 bar. (All figures apply for the medium pressure cooler.)

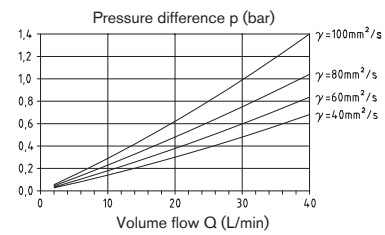


3. Pressure difference depending on oil flow and oil viscosity

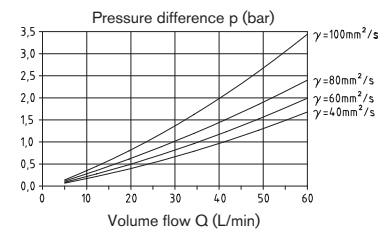
PIK 200



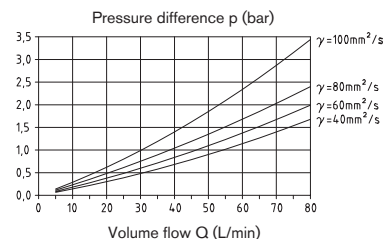
PIK 250



PIK 300



PIK 350



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

4. Fan wheel

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

Performance 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 = ca. 90 m³/h

PIK 250 = ca. 200 m³/h

PIK 300 = ca. 400 m³/h

PIK 350 = ca. 860 m³/h

5. Cooler connection

R 3/4" internal thread

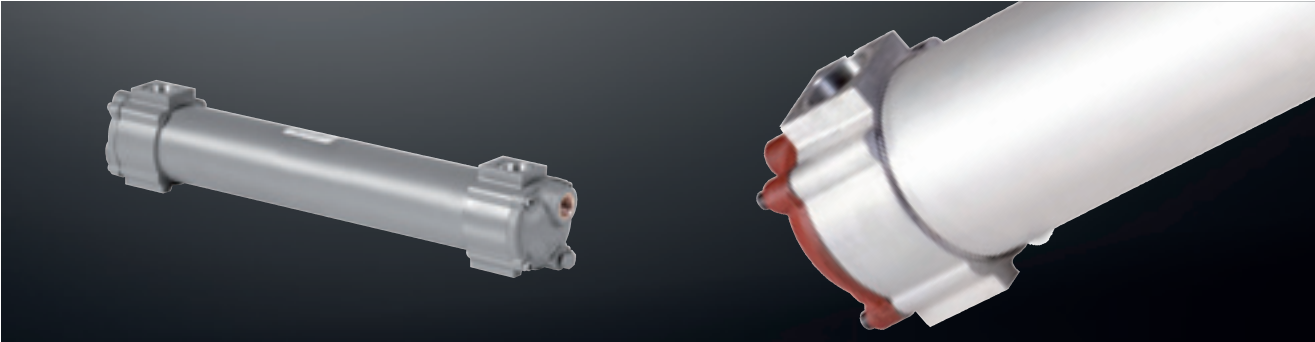
6. Oil flow

With higher flow rates than specified in the diagramme, please consult with us. Phone: +49 5971 798-0

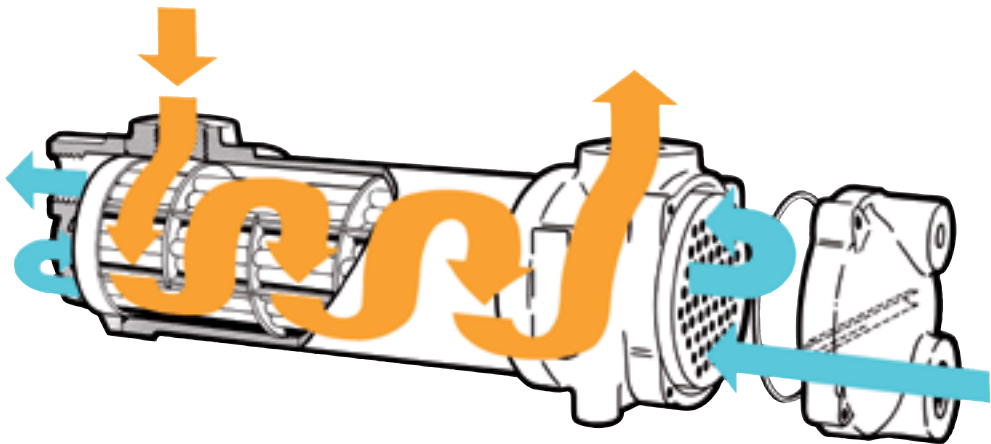
Oil/water coolers type TAK/T

Cooling systems

Cooling of lubricating oil, heat recovery



The cooler series TAK/T have been designed specifically for hydraulic systems, but they are equally suitable for cooling lubricating oils, heat transfers fluids, etc.
The tube bundle is designed such that it can expand to both sides. In this way thermal stresses are minimized. The unique tube-to-tube joint ensures a high degree of reliability. The 27 and 28 ranges have twin seals to provide protection against fluid cross-contamination.



Materials:

These coolers are available in both industrial and marine versions.

Industrial version (standard)			
Tubes	90/10 copper/nickel		ISO: CuNi10Fe1Mn
Tubeplates	Brass		ISO: CuZn38Sn1
Housings	Aluminium	(2300 & 2500) (2700 & 2800)	ISO: AlSi1MgMn ISO: AlSi12
Headers	Cast iron		ISO: R185Gr20
Leak detection rings	Carbon Steel		ISO: Fe430A
Gaskets	Nitrile		

Marine version (standard)		
Headers	Gunmetal	ISO: GCuSn5Pb5Zn5

Marine version (Special designs for severely polluted or poor quality water)		
Tubes	70/30 copper/nickel	ISO: CuNi30Mn1Fe
Tubeplates	90/10 copper/nickel	ISO: CuNi10Fe1Mn
Headers	Gunmetal	ISO: GCuSn5Pb5Zn5

Oil/water coolers type TAK/T

Cooling systems

Cooling capacities, diagramme of performance, diagramme of pressure loss

Tube-bank coolers - cooling effect of the 20 series									
Type	Cooling effect [kW]	Oil volume [l/min]	Oil pressure loss		Water volume [l/min]	Water pressure loss		Sea water volume [l/min]	
			[kPa]	[bar]		[kPa]	[bar]	min.	max.
TAK/T-2312	3,6	40	40	0,4	8	1	0,01		
TAK/T-2322	6	50	60	0,6	8	1	0,01		
TAK/T-2332	10	65	50	0,5	13	3	0,03		
TAK/T-2342	15	80	80	0,8	16	5	0,05	20	45
TAK/T-2352	19	90	60	0,6	19	8	0,08		
TAK/T-2362	24	100	90	0,9	21	13	0,13		
TAK/T-2372	31	120	120	1,2	24	15	0,15		
TAK/T-2512	17	120	60	0,6	30	1	0,01		
TAK/T-2522	25	140	70	0,7	40	2	0,02		
TAK/T-2532	32	160	60	0,6	45	4	0,04		
TAK/T-2542	42	180	90	0,9	50	6	0,06		
TAK/T-2552	51	200	80	0,8	60	10	0,10	50	120
TAK/T-2562	68	220	100	1,0	70	17	0,17		
TAK/T-2572	85	250	80	0,8	87	30	0,30		
TAK/T-2582	110	280	110	1,1	120	65	0,65		
TAK/T-2592	135	300	170	1,7	120	75	0,75		
TAK/T-2712	92	340	50	0,5	170	18	0,18		
TAK/T-2722	124	360	100	1,0	180	23	0,23		
TAK/T-2732	140	380	80	0,8	190	29	0,29		
TAK/T-2742	175	400	120	1,2	200	37	0,37	100	210
TAK/T-2752	208	420	160	1,6	210	46	0,46		
TAK/T-2762	241	440	180	1,8	220	59	0,59		
TAK/T-2812	124	460	40	0,4	230	16	0,16		
TAK/T-2822	168	490	70	0,7	245	20	0,20		
TAK/T-2832	193	520	60	0,6	260	26	0,26		
TAK/T-2842	240	550	80	0,8	275	33	0,33	140	300
TAK/T-2852	288	580	100	1,0	290	42	0,42		
TAK/T-2862	339	610	110	1,1	305	54	0,54		

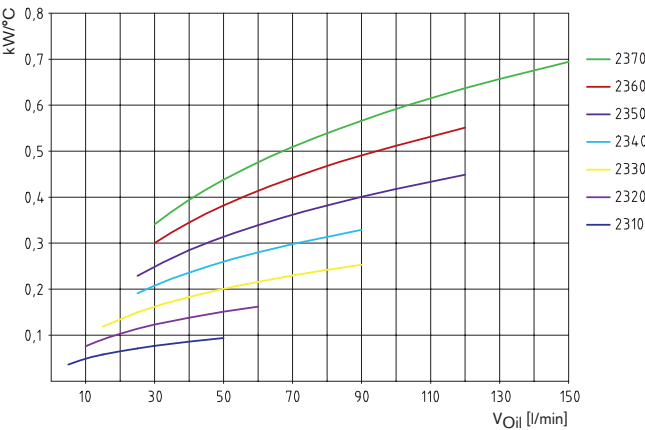
Operating conditions for the above table:

Shell circuit: VG37 oil with an inlet temperature of 60 °C

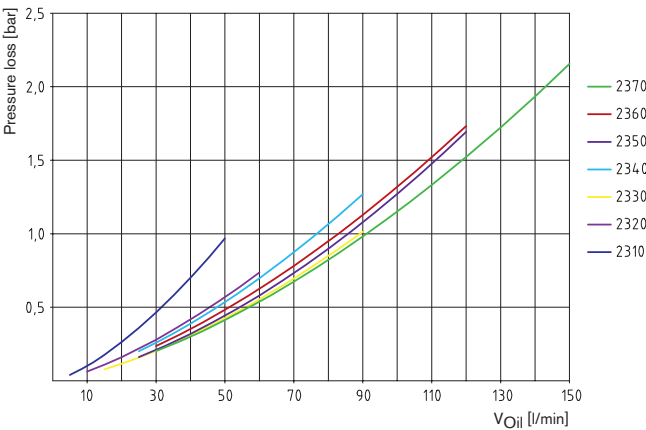
Tube circuit: Plain water with an inlet temperature of 20 °C

Please note: Different fluids have different thermal and mechanical properties. Fluids other than those indicated above will generate different performance characteristics to those shown in the table. For an accurate calculation of cooling performance please contact the KTR engineering team, phone: +49 5971 798-0 or www.ktr.com.

Power diagramme of the 23 series



Pressure loss of the 23 series

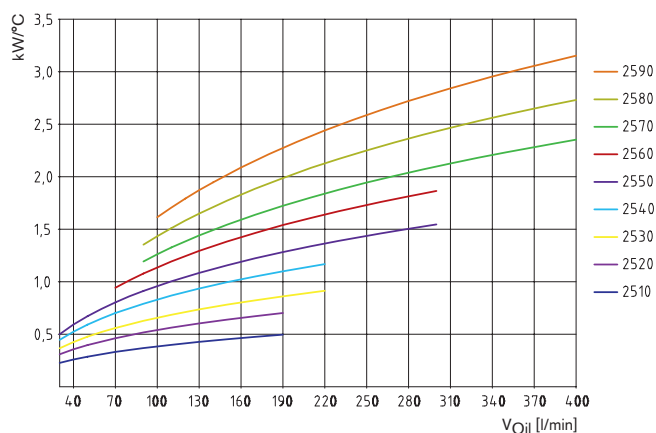


Oil/water coolers type TAK/T

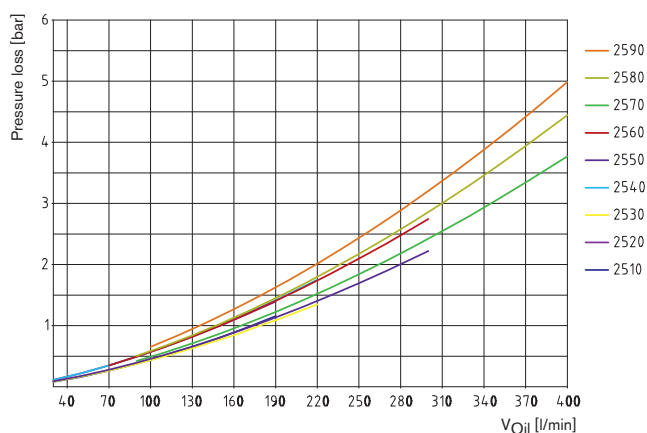
Cooling systems

Diagramme of performance, diagramme of pressure loss

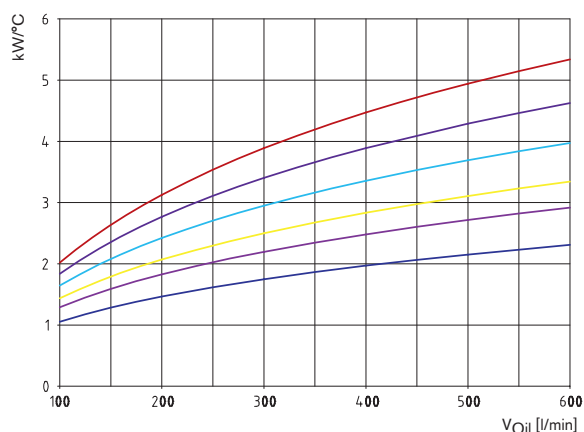
Power diagramme of the 25 series



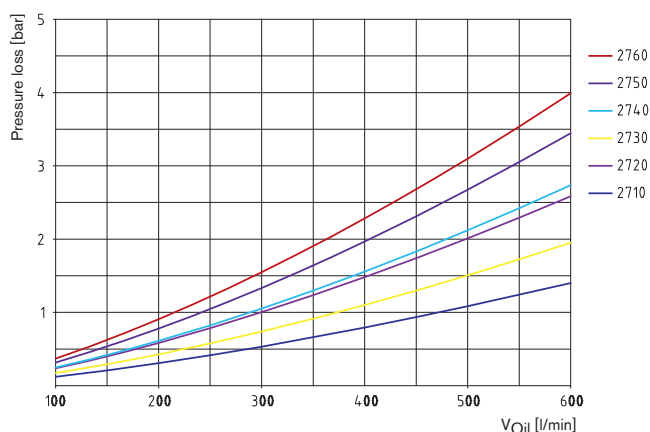
Pressure loss of the 25 series



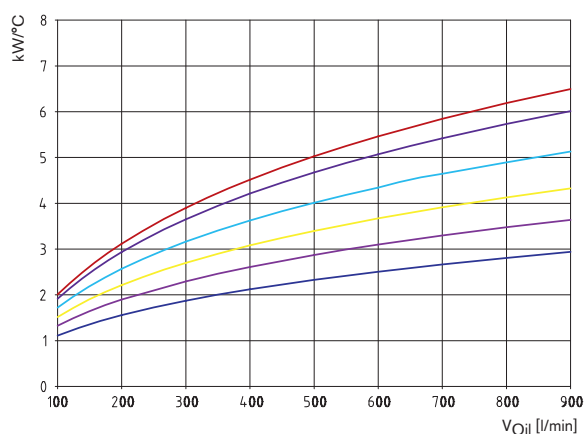
Power diagramme of the 27 series



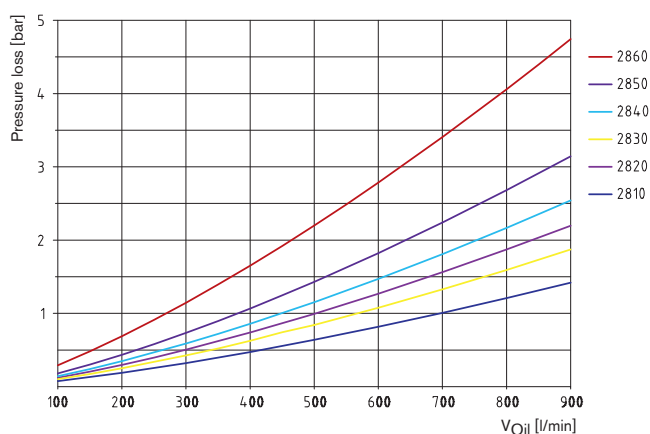
Pressure loss of the 27 series



Power diagramme of the 28 series



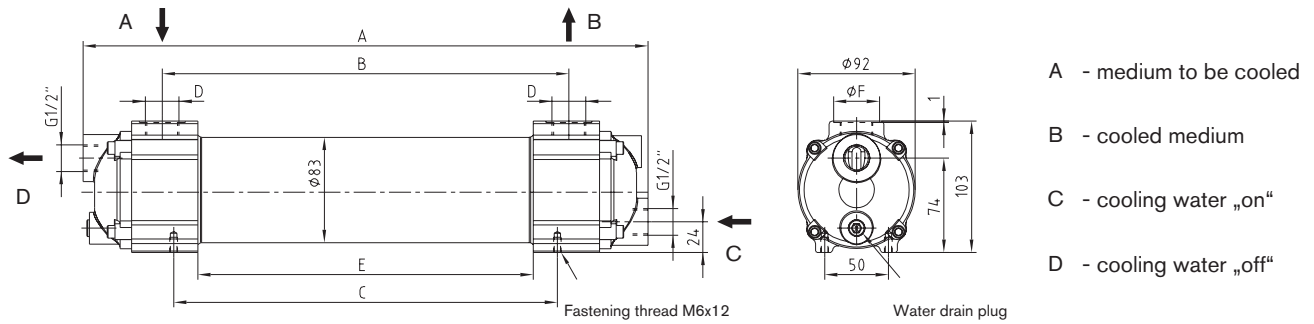
Pressure loss of the 28 series



Oil/water coolers type TAK/T

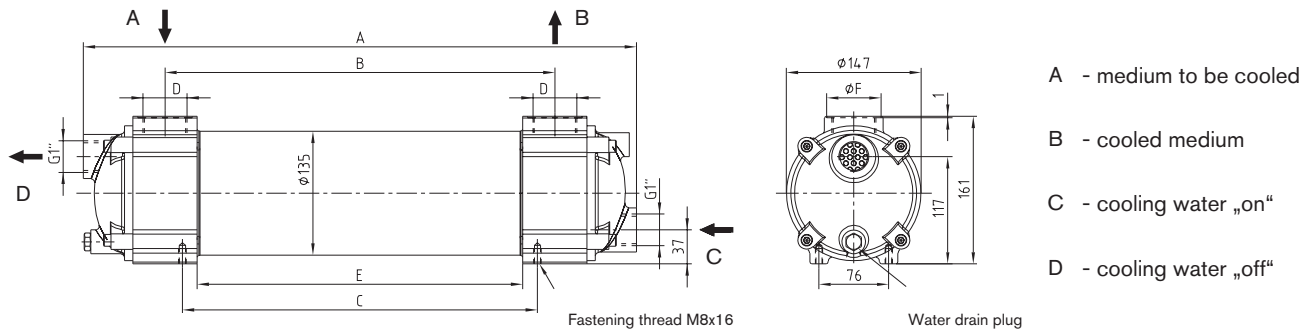
Cooling systems

Series 23 and 25



TAK/T Series 23									
Type	A [mm]	B [mm]	C [mm]	D [BSP]	E [mm]	ØF [mm]	Weight [kg]	Oil volume [l]	Water volume [l]
TAK/T 2312	175	59	117	G 1/2	-	29,1	3	0,3	0,4
TAK/T 2322	259	135	117	G 3/4	-	36	4	0,5	0,5
TAK/T 2332	345	221	203	G 3/4	-	36	5	0,7	0,6
TAK/T 2342	443	319	301	G 3/4	263	36	5	1,0	0,7
TAK/T 2352	571	447	429	G 3/4	391	36	6	1,3	0,9
TAK/T 2362	717	587	575	G1	537	-	7	1,7	1,1
TAK/T 2372	895	765	753	G1	715	-	8	2,2	1,4

Additional No. 2312 and 2332 have 3/4" BSP Ring holes are provided on the base midway between the oil port centres.
Max. perm. oil temperatur 100 °C. Max. oil pressure 30 bar. Max. water pressure 10 bar.



TAK/T Series 25									
Type	A [mm]	B [mm]	C [mm]	D [BSP]	E [mm]	ØF [mm]	Weight [kg]	Oil volume [l]	Water volume [l]
TAK/T 2512	291	129	75	G1	-	45	10	1,4	1,4
TAK/T 2522	377	199	161	G1 1/4	-	53	12	1,9	1,7
TAK/T 2532	475	297	259	G1 1/4	-	53	13	2,5	2,1
TAK/T 2542	603	425	387	G1 1/4	333	53	14	3,5	2,6
TAK/T 2552	749	571	533	G1 1/2	479	59	17	4,5	3,2
TAK/T 2562	927	749	711	G1 1/2	657	59	20	5,8	3,9
TAK/T 2572	1129	951	913	G1 1/2	859	59	23	7,3	4,8
TAK/T 2582	1381	1203	1165	G1 1/2	1111	59	27	9,0	5,8
TAK/T 2592	1727	1549	1511	G1 1/2	1457	59	32	11,5	7,2

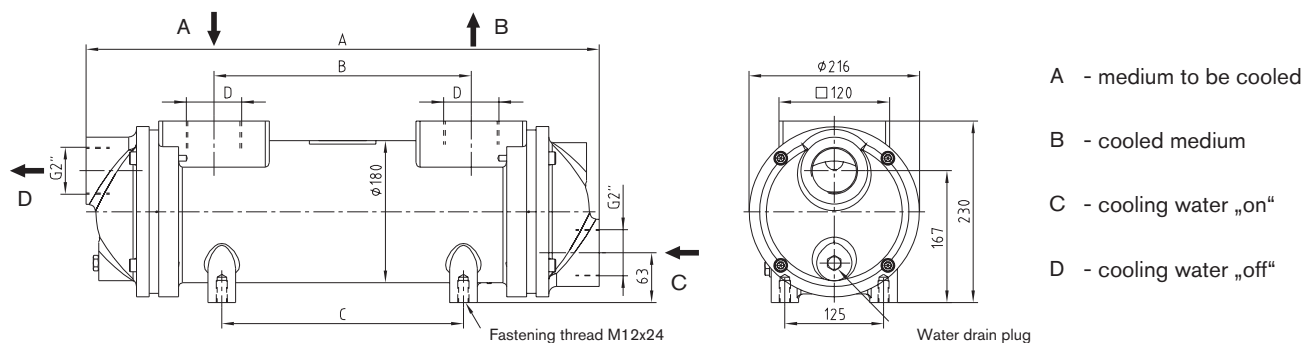
Add suffix H to part number for 1 1/2" BSP water connections (A = +14mm).
Max. perm. oil temperatur 100 °C. Max. oil pressure 30 bar. Max. water pressure 10 bar.

Ordering example:	TAK/T	231	2	SW
	Type	Series/size	2 = Industrial version (standard) 3 = Industrial version with viton gaskets, temperature > 100 °C 4 = Marine version 5 = Marine version with viton gaskets, temperature > 100 °C 6 = Special marine version for severely polluted or poor quality water 7 = Special marine version for severely polluted or poor quality water with viton seals, temp. > 100 °C	Additional details SW = seawater version

Oil/water coolers type TAK/T

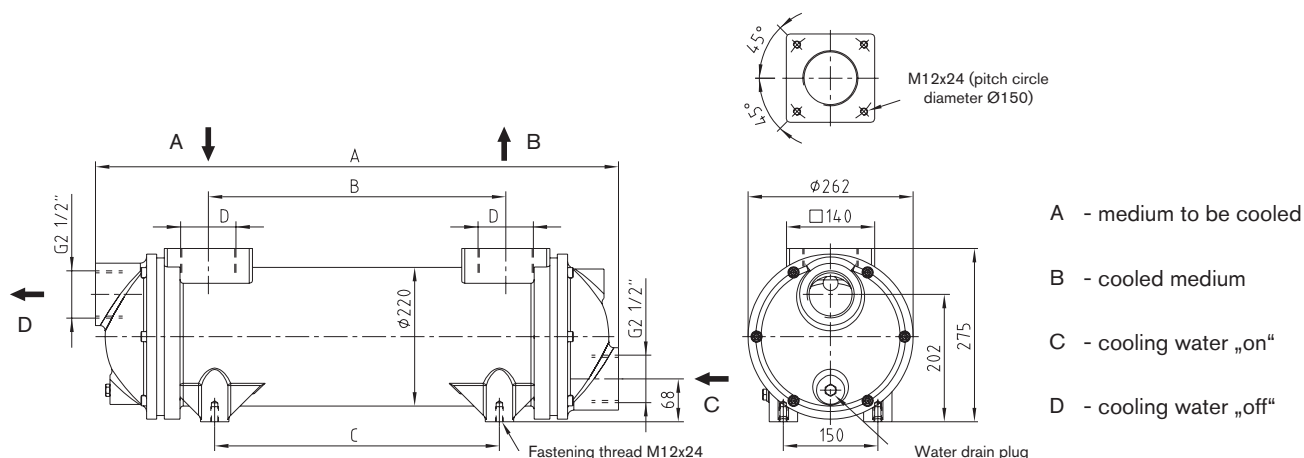
Cooling systems

Series 27 and 28



TAK/T Series 27							
Type	A [mm]	B [mm]	C [mm]	D [BSP]	Weight [kg]	Oil volume [l]	Water volume [l]
TAK/T 2712	650	326	306	G2	38	5,5	5,0
TAK/T 2722	796	472	452	G2	43	7,0	6,0
TAK/T 2732	974	650	630	G2	48	9,0	7,5
TAK/T 2742	1176	852	832	G2	55	11,0	9,0
TAK/T 2752	1428	1104	1084	G2	63	14,0	10,5
TAK/T 2762	1777	1453	1433	G2	74	17,5	13,0

Max. perm. oil temperatur 100 °C. Max. oil pressure 20 bar. Max. water pressure 10 bar.



TAK/T Series 28							
Type	A [mm]	B [mm]	C [mm]	D [BSP]	Weight [kg]	Oil volume [l]	Water volume [l]
TAK/T 2812	684	326	306	G3	48	9,0	7,5
TAK/T 2822	830	472	452	G3	54	11,5	9,0
TAK/T 2832	1008	650	630	G3	62	15,0	10,5
TAK/T 2842	1210	852	832	G3	71	18,5	13,0
TAK/T 2852	1462	1104	1084	G3	82	23,0	15,5
TAK/T 2862	1811	1453	1433	G3	97	29,5	19,0

Max. perm. oil temperatur 100 °C. Max. oil pressure 20 bar. Max. water pressure 10 bar.

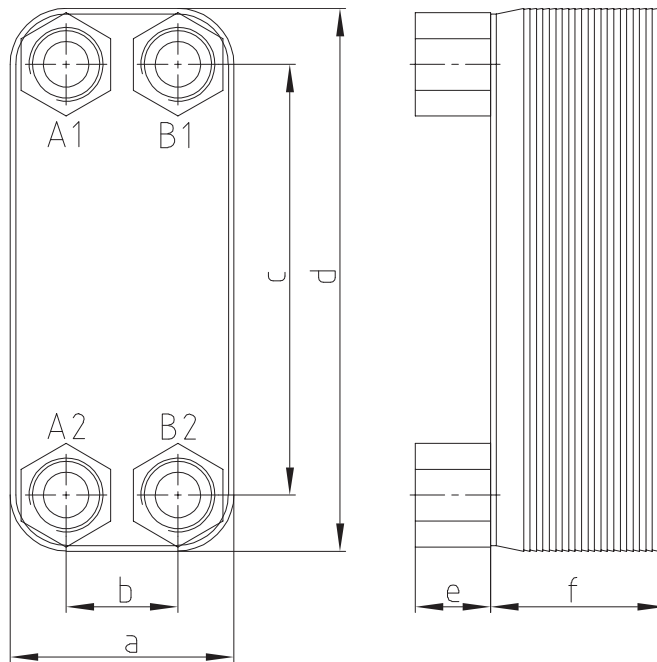
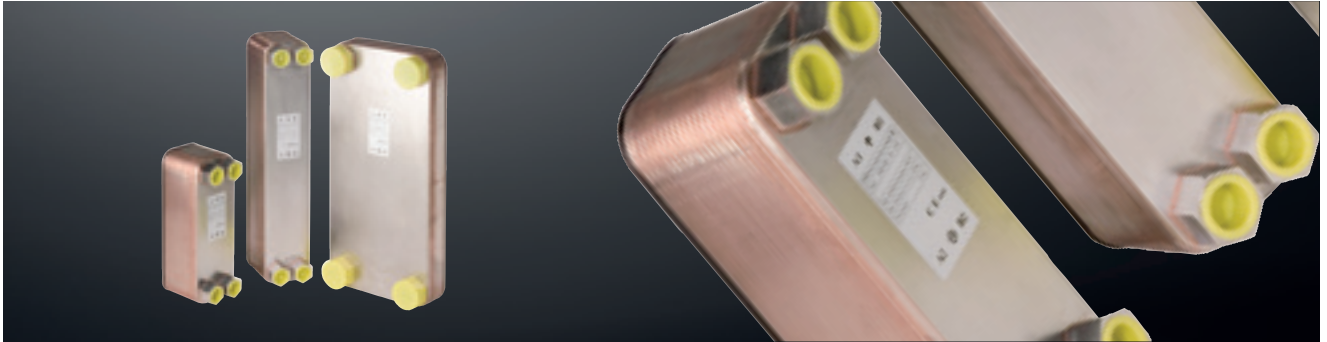
Ordering example:

TAK/T	271	2	SW
Type	Series/size	2 = Industrial version (standard) 3 = Industrial version with viton gaskets, temperature >100 °C 4 = Marine version 5 = Marine version with viton gaskets, temperature >100 °C 6 = Special marine version for severely polluted or poor quality water 7 = Special marine version for severely polluted or poor quality water with viton seals, temp. >100 °C	Additional details SW = seawater version

Oil/water coolers type PHE

Cooling systems

High power density in a tight space



Technical data

Plate heat exchanger made of stainless steel 1.4401 soldered to copper. The stamped plates produce a high power density in a tight space. Compared to a bundle of pipes heat exchanger the plate heat exchanger only requires approx. 25 % - 30 % of space with less weight. Applications are, as an example, machine tools, test benches, moulding machines, pump power packs, waste heat utilization, etc. The use of other media, for example oil, water-glycol, water, refrigerants etc. is not possible.

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

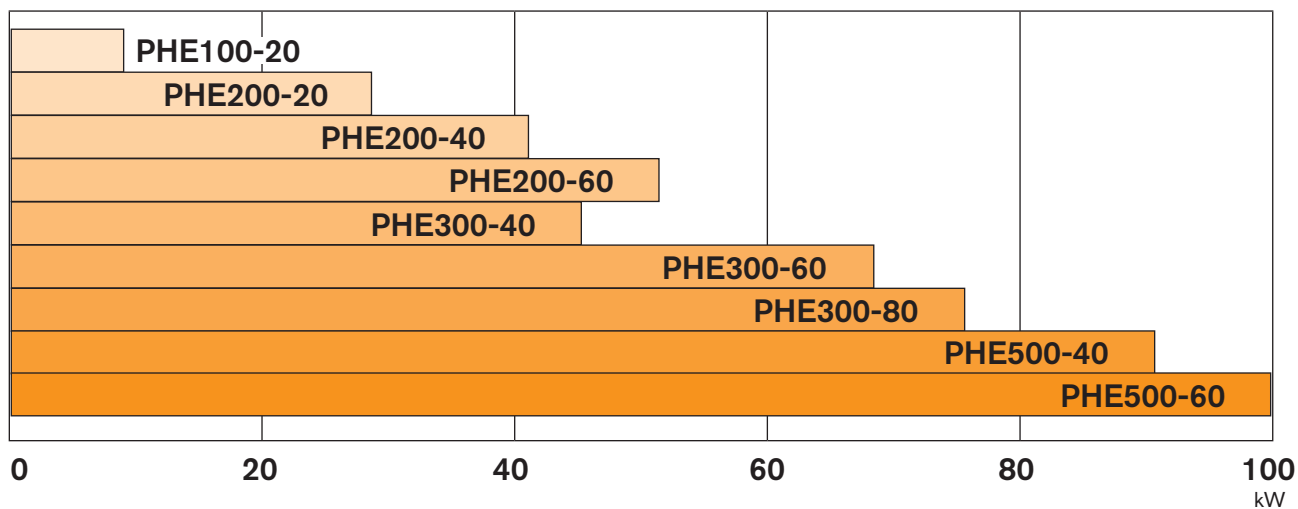
Please observe boiling point and freezing point!

Maximum permissible operating pressure: PHE 100: 10 bar / PHE 200-500: 30 bar

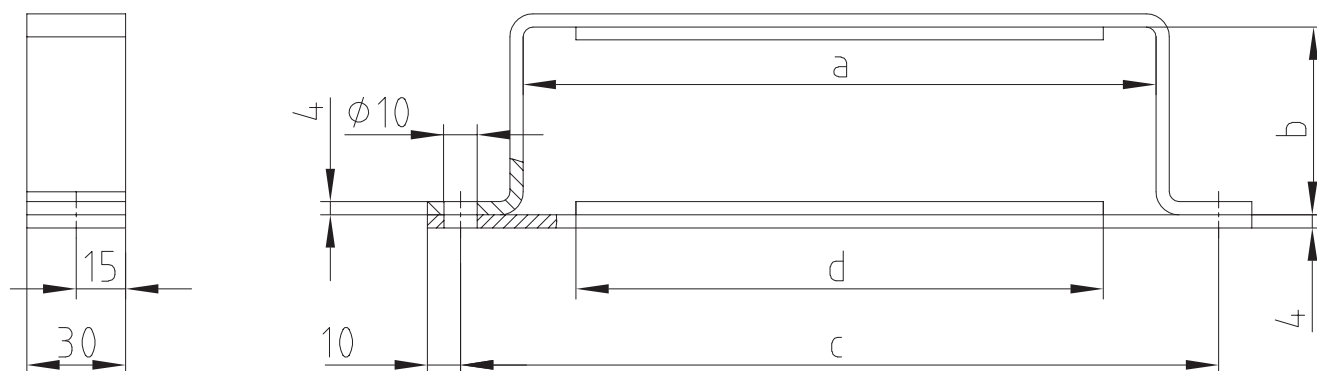
Plate heat exchanger										
Series	Type	Thread	Plates	a	b	c	d	e	f	
PHE	100	4 x 3/4"	20	73	40	154	191	24	52	
PHE	200	4 x 1"	20						55	
PHE	200	4 x 1"	40	116	72	243	286	24	103	
PHE	200	4 x 1"	60						151	
PHE	300	4 x 1"	40						103	
PHE	300	4 x 1"	60	112	50	466	526	24	151	
PHE	300	4 x 1"	80						203	
PHE	500	4 x 1 1/2"	40						103	
PHE	500	4 x 1 1/2"	60	191	92	519	616	30	151	

Ordering example:	PHE	100	20
	PHE = Plate heat exchanger	Size	Number of plates

Cooling capacity



Type	Oil temperature switched on [°C]	Water temperature switched on [°C]	Oil volume [l/min]	Water volume [l/min]	Max. volume flow [l/min]
PHE100-20			60	30	66
PHE200-20			120	60	
PHE200-40			160	80	
PHE200-60			180	100	
PHE300-40	60	20	120	60	200
PHE300-60			160	100	
PHE300-80			160	140	
PHE500-40			180	100	
PHE500-60			180	120	580



From size PHE 200 we recommend 2 supports per cooler.

Fastening device				
	a	b	c	d
BH100-20	80	56	114	75
BH200/300-20		59		
BH200/300-40		107		
BH200/300-60	120	155	150	118
BH200/300-80		207		
BH500-40		107		
BH500-60	195	155	235	193

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 for a survey. Available at www.ktr.com

Product catalogues



Industry leaflets



ATEX leaflet



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