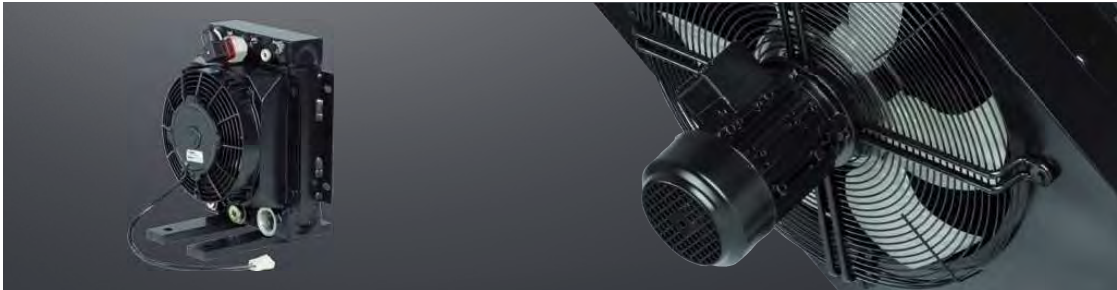


## Oil/air cooler type OAC Cooling systems

### High-performance cooling of 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.

#### Application:

- 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 oil
- Water glycol (min. 40 % glycol)


#### Structure:

- Cooler core (plate and bar) made of aluminium with industrial laminae 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:

- Electric motor in ATEX design  II 2 G Exell T3
- Special fan for potentially explosive atmospheres: II 2G c IIB+H2 T X, II 3D c T X
- Special fan (stainless steel) for potentially explosive atmospheres: II 2G c IIC T X

#### Accessories (see page 41 et seqq.):

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

The OAC coolers have to be protected from direct solar radiation.

### Selection system

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

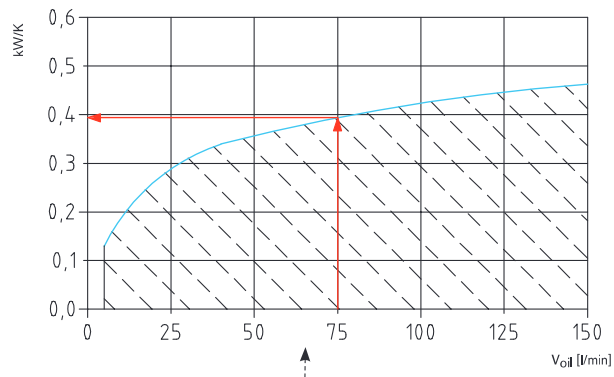
Q [kW]	Heat to be dissipated
V [l/min]	Oil flow
T <sub>oil</sub> [°C]	Inlet temperature of oil into cooler
T <sub>L</sub> [°C]	Inlet temperature of ambient air into cooler

### Example of calculation

Details given:

Q = 12 kW
V = 75 l/min
T <sub>oil</sub> = 65 °C
T <sub>L</sub> = 30 °C

Performance diagramme of OAC400



Calculation of specific cooling capacity

Difference of inlet temperature ETD [°C] = T<sub>oil</sub> - T<sub>L</sub>

Specific cooling capacity required P<sub>requ.</sub> = 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

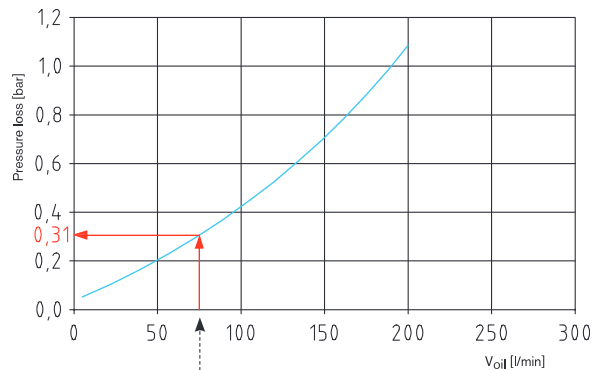
#### Example

V<sub>oil</sub>: 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	Engine	Effective direction	Number of poles or displacement	Voltage	Bypass	Protective grid against stones
100	No specification = Standard	00 = Without engine	Standard = Sucking (no specification required)	0 = Not applicable	To be omitted if not applicable	0 = Without bypass	0 = No
200		01 = Direct current 12V		2 = Number of poles	A = 230/400V 50 Hz	TB6 = Thermal bypass (6 bars/50 °C)	1 = Yes
300	M = Marine (seawater resistance)	02 = Direct current 24V	B = Pressing	4 = Number of poles	B = 400/690V 50 Hz		
400		03 = AC current		6 = Number of poles		DB6 = Pressure bypass (2, 4, 6 bars)	
500	ExG = ATEX (gas-protected area)	04 = Hydraulics		8 = Number of poles	C = 230V 50/60 Hz (single-phase)		
600		09 = Special		6 = Displacement	D = 230/400V 50/60 Hz Compact fan (OAC300/400)	DB4F = Pressure bypass (4 bars)	
700	ExD = ATEX (dust-protected area)			8 = Displacement			
800				11 = Displacement			
850	M-ExG = Marine & ATEX (gas)			14 = Displacement	Z = Special voltage*		
900				19 = Displacement	* Special voltage in plain language		
1000	M-ExD = Marine & ATEX (dust)						
2000							

## Oil/air cooler type OAC

### Cooling systems

#### Technical data

12V and 24V fan drive										
Type of cooler <sup>1)</sup>	Voltage [V]	Drive [kW]	Speed [rpm]	Amperage [A]	Protection class	Fan Ø [mm]	Perm. pressure [bar]		Max. volume flow [l/min]	Weight [kg]
							Static	Dynamic		
OAC100-01	12	0.09	3950	7.2	IP68	190			50	6
OAC100-02	24	0.06	3625	2.6	IP68	190			50	6
OAC200-01	12	0.10	2838	8.2	IP68	280			100	11
OAC200-02	24	0.11	2925	4.4	IP68	280			100	11
OAC250-01	12	0.10	2838	8.2	IP68	280			120	13
OAC250-02	24	0.11	2925	4.4	IP68	280			120	13
OAC300-01	24	0.11	2925	4.4	IP68	350			120	16
OAC300-02	24	0.23	2730	9.4	IP68	350			120	16
OAC400-01	12	0.22	3080	18.4	IP68	350	26	14	200	22
OAC400-02	24	0.23	2730	9.4	IP68	350			200	22
OAC500-01	12	0.24	2600	20.2	IP68	385			200	30
OAC500-02	24	0.24	2700	9.8	IP68	385			200	30
OAC600-01	12	2 x 0.10	2838	2x8.2	IP68	280			250	43
OAC600-02	24	2 x 0.11	2925	2x4.4	IP68	280			250	43
OAC700-01	12	2 x 0.24	2600	2x20.2	IP68	385			350	53
OAC700-02	24	2 x 0.24	2700	2x9.8	IP68	385			350	53
OAC800-01	12	2 x 0.24	2600	2x20.2	IP68	385			350	81
OAC800-02	24	2 x 0.24	2700	2x9.8	IP68	385			350	81

230/400V with 50 Hz; 460V with 60 Hz fan drive														
Type of cooler <sup>2)</sup>	Driving power [kW]		Speed [rpm]		Amperage [A]		Protection class		Fan Ø [mm]	Noise [dB(A)]	Perm. pressure [bar]		Max. volume flow [l/min]	Weight [kg]
	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	Standard	Marine			Static	Dynamic		
OAC100-03 C	0.07	0.08	2500	2700	0.29	0.33	IP54	-	200	64			50	16
OAC200-03 C	0.12	0.16	2450	2650	0.55	0.72	IP54	-	250	69			100	16
OAC200-03	0.18	0.21	1350	1650	0.58	0.57	IP55	IP56	280	66			100	16
OAC250-03	0.18	0.21	1350	1650	0.58	0.57	IP55	IP56	280	66			120	20
OAC300-03	0.37	0.43	1370	1670	1.04	1.02	IP55	IP56	380	76			160	24
OAC300-03 D	0.14	0.17	1400	1600	0.35	0.32	IP44	-	350	72	26	14	160	21
OAC400-03	0.37	0.43	1370	1670	1.04	1.02	IP55	IP56	380	76			200	29
OAC400-03 D	0.14	0.17	1400	1600	0.35	0.32	IP44	-	350	72			200	26
OAC500-03	0.37	0.43	1370	1670	1.04	1.02	IP55	IP56	380	78			200	37
OAC600-03	0.75	0.86	1440	1740	1.79	1.72	IP55	IP56	520	78			250	57
OAC700-03	0.75	0.86	1440	1740	1.79	1.72	IP55	IP56	520	78			350	70
OAC800-03	1.5	1.75	1435	1730	3.3	3.3	IP55	IP56	630	78			350	97
OAC850-03	2.2	2.55	965	1165	5.2	4.75	IP55	IP56	750	79			350	130
OAC900-03-6	2.2	-	965	-	5.2	-	IP55	IP56	900	85			450	173
OAC900-03-4	7.5	-	1465	-	14.3	-	IP55	IP56	900	97			450	205
OAC1000-03-8	1.5	-	900	-	4.65	-	IP55	IP56	900	81			530	154
OAC1000-03-6	2.2	-	965	-	5.2	-	IP55	IP56	900	87	21	14	530	187
OAC1000-03-4	7.5	-	1465	-	14.3	-	IP55	IP56	900	97			530	212
OAC2000-03-8	4	-	720	-	10.9	-	IP55	IP56	1000	86			700	329
OAC2000-03-6	7.5	-	980	-	16	-	IP55	IP56	1000	92			700	357
OAC2000-03-4	18.5	-	1470	-	35	-	IP55	IP56	1000	100			700	429

Fan with hydraulic drive										
Type of cooler <sup>1)</sup>	Displacement [ccm]	Speed [rpm]	Fan Ø [mm]	Noise [dB(A)]	Perm. pressure [bar]		Max. volume flow [l/min]	Weight [kg]	Volume flow [l/min]	Pressure [bar]
					Static	Dynamic				
OAC200-04-06	6.3		280	66			100	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			160	21	13	15
OAC300-04-11	10.9		380	75				21	18	11
OAC400-04-06	6.3		380	74				25	10	18
OAC400-04-08	7.9		380	74			200	25	13	15
OAC400-04-11	10.9		380	74				25	18	11
OAC500-04-06	6.3	1500	380	74				34	10	18
OAC500-04-08	7.9		380	74			200	34	13	15
OAC500-04-11	10.9		380	74	26	14		34	18	11
OAC600-04-06	6.3		520	78				50	11	30
OAC600-04-08	7.9		520	78			250	50	13	27
OAC600-04-11	10.9		520	78				50	20	17
OAC700-04-06	6.3		520	78				60	11	30
OAC700-04-08	7.9		520	78			250	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			350	88	22	27
OAC850-04-11	10.9		750	79				110	12	58
OAC850-04-14	13.9		750	79			350	110	15	45
OAC900-04-14	13.9	1000	900	85				155	15	111
OAC900-04-19	18.8		900	85			450	155	20	82
OAC900-04-19	18.8	1500	900	95	21	14		155	46	132
OAC1000-04-19	18.8	1000	900	85				188	20	82
OAC1000-04-19	18.8	1500	900	97			530	188	46	132
OAC2000-04-44	44.1	1000	1000	92				295	48	87
OAC2000-04-44	44.1	1500	1000	100			700	295	107	126

<sup>1)</sup> Max. medium temperature: 110 °C (higher temperatures on request)/Max. ambient temperature: 60 °C

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

## Oil/air cooler type OAC Cooling systems

### Diagrammes of performance and pressure loss

Performance diagramme

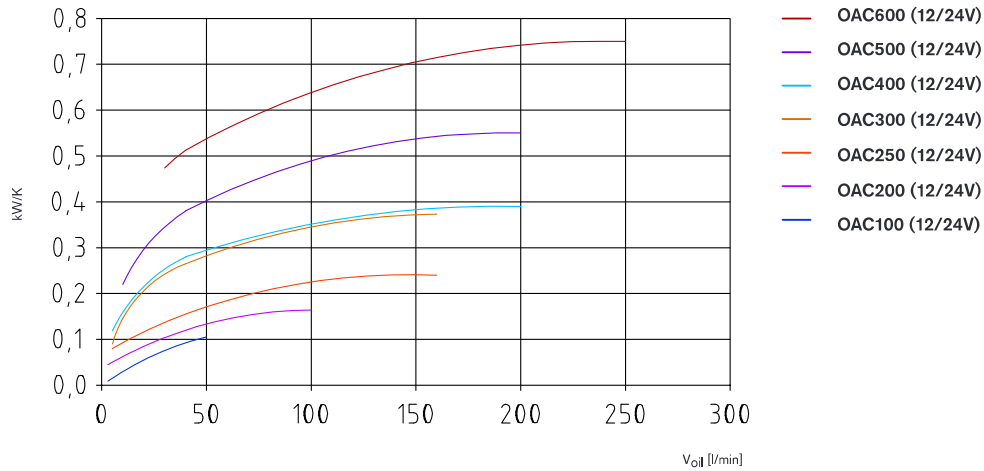
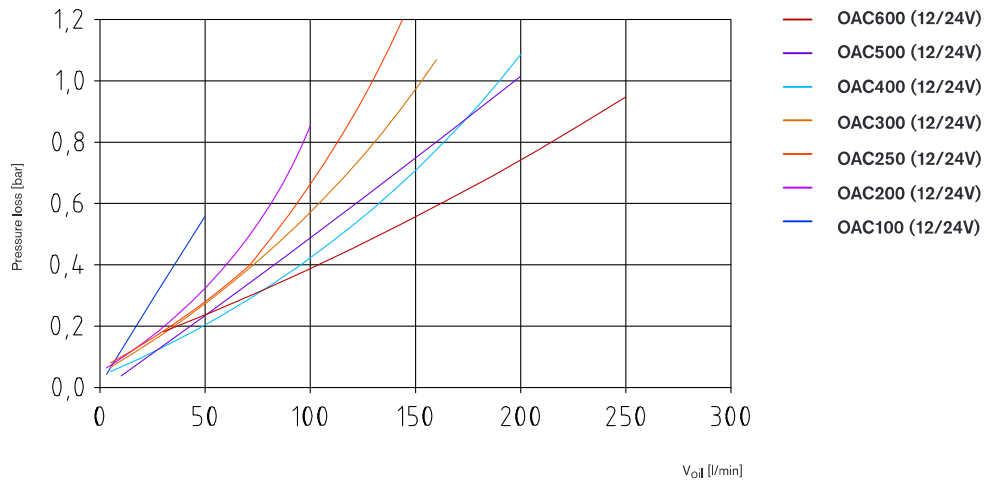
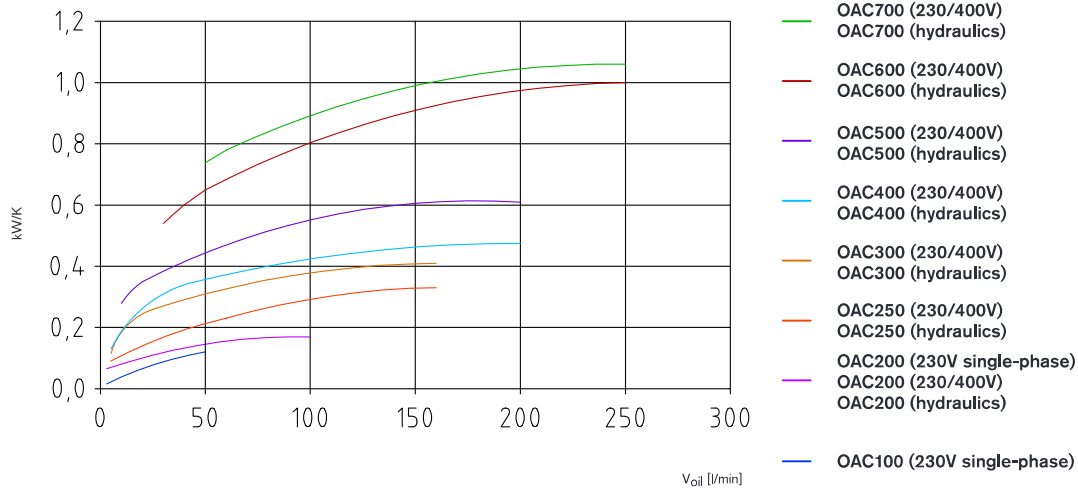
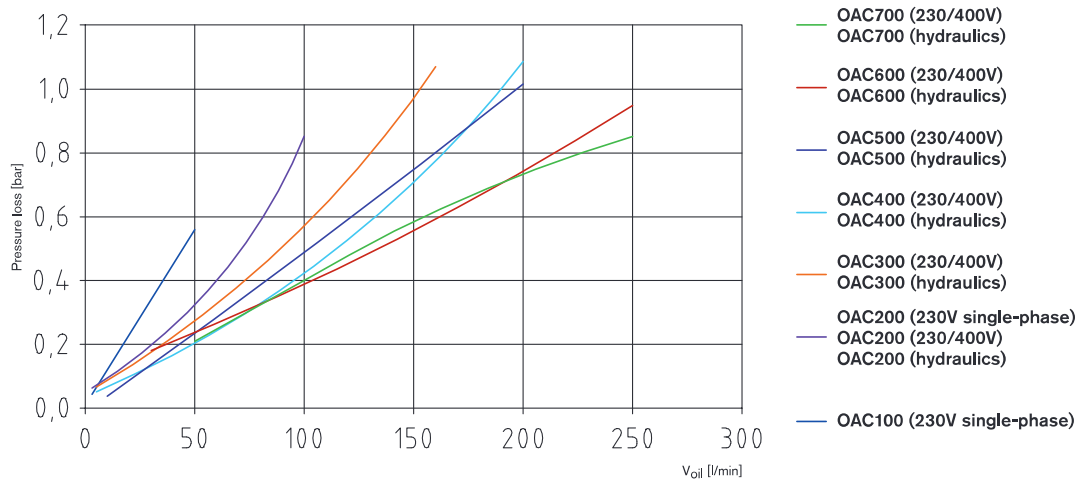


Diagramme of pressure loss



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**

**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

### Diagrammes of performance and pressure loss

Performance diagramme

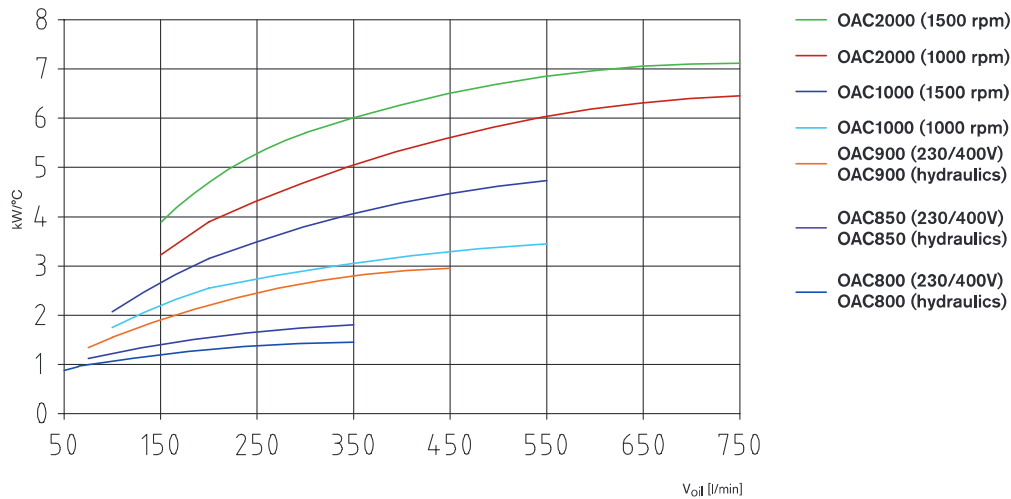
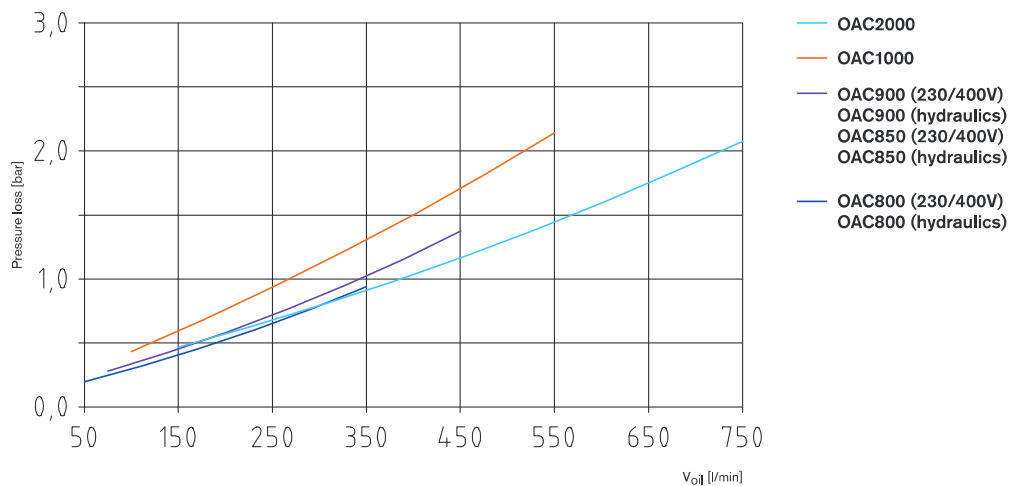


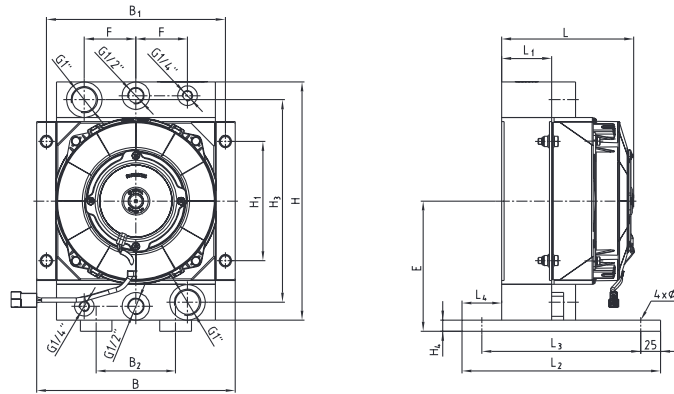
Diagramme of pressure loss



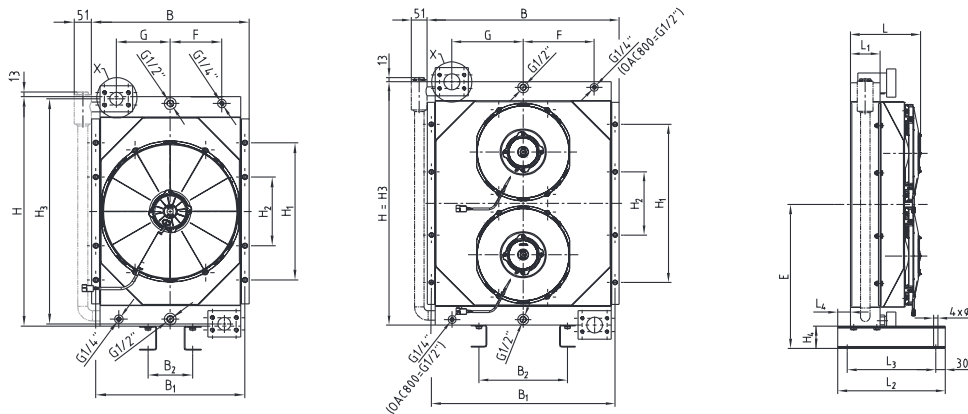
Conversion factor of pressure loss									
cSt	10	15	20	30	40	50	60	80	100
Factor	0,5	0,65	0,75	1	1,2	1,4	1,6	2,1	2,8

## Oil/air cooler type OAC Cooling systems

### Dimensions of OAC100 - 800 (12/24V)

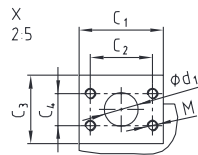


OAC100 - OAC400 12/24V



OAC500 12/24V

OAC600 - OAC800 12/24V

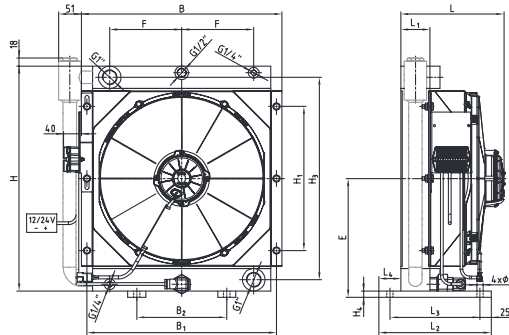


Oil/air cooler type OAC 12/24V																										
Type of cooler	Dimensions [mm]																									
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	B	B <sub>1</sub>	B <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	d	d <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	SAE flange	M	F	G	E	
OAC100-01	167	65	250	200	50	250	225	100	300	150	-	255	14	-	14	-	-	-	-	-	-	-	-	75	-	164
OAC100-02																										
OAC200-01	167	65	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	-	-	115	-	219
OAC200-02																										
OAC250-01	197	95	250	200	50	350	325	174	410	240	-	360	14	-	14	-	-	-	-	-	-	-	-	115	-	219
OAC250-02																										
OAC300-01	230	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	160	-	264
OAC300-02																										
OAC400-01	260	95	280	230	55.5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	160	-	264
OAC400-02																										
OAC500-01	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	157.5	405	
OAC500-02																										
OAC600-01	223	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	
OAC600-02																										
OAC700-01	242	95	340	280	40	607	582	280	920	700	300	920	70	-	13.5	51	105	77.8	90	42.9	2"	M12	225	226	530	
OAC700-02																										
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"	M12	272	273	530	
OAC800-02																										

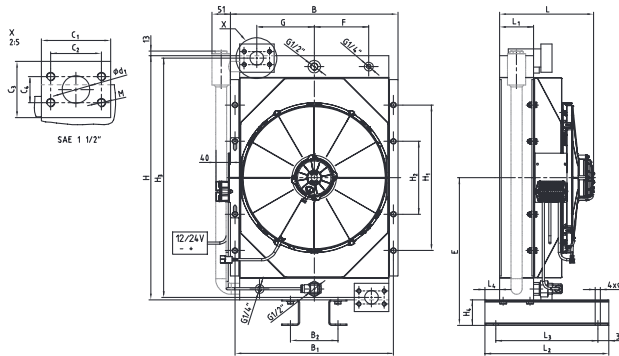


## Oil/air cooler type OAC Cooling systems

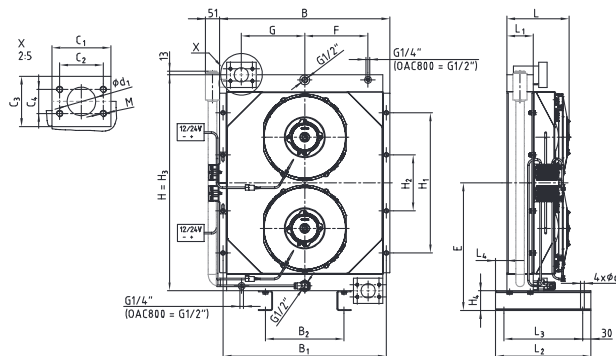
### Dimensions of OAC 300 - 800 (12/24V) speed controlled



OAC300 - 400 12/24V



OAC500 12/24V

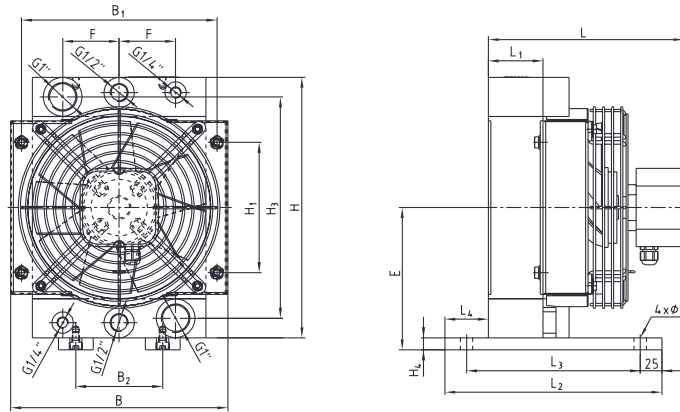


OAC600 - 800 12/24V

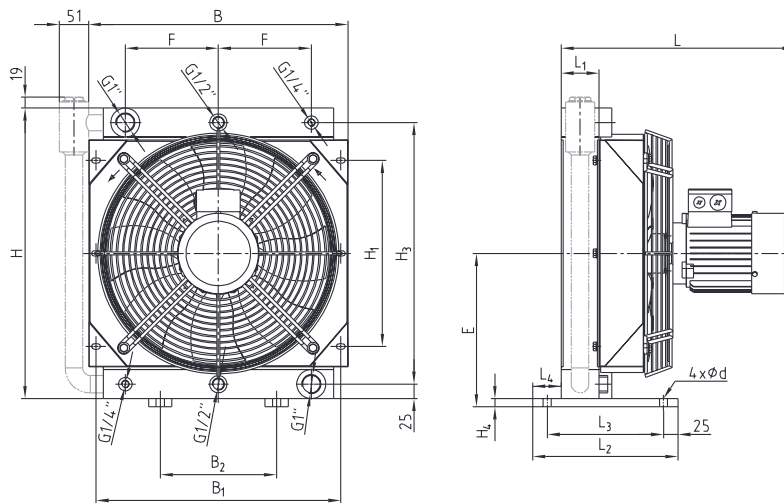
Oil/air cooler type OAC 12/24V speed controlled																											
Type of cooler	Dimensions [mm]																										
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	B	B <sub>1</sub>	B <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	d	d <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	SAE flange	M	F	G	E		
OAC300-01 OAC300-02	230	65	250	200	49	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	-	160	-	264	
OAC400-01 OAC400-02	260	95	280	230	55,5	446	421	200	500	320	-	450	14	-	14	-	-	-	-	-	-	-	160	-	264		
OAC500-01 OAC500-02	259	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		
OAC600-01 OAC600-02	223	95	340	260	40	607	582	280	770	500	200	770	70	-	13,5	51	105	77,8	90	42,9	2"	M12	225	226	455		
OAC700-01 OAC700-02	242	95	340	280	40	607	582	280	920	700	300	920	70	-	13,5	51	105	77,8	90	42,9	2"	M12	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"	M12	272	273	530		

## Oil/air cooler type OAC Cooling systems

### Dimensions of OAC100 - 400 (230/400V)



OAC100 - OAC400 230/400V (Compact fan)

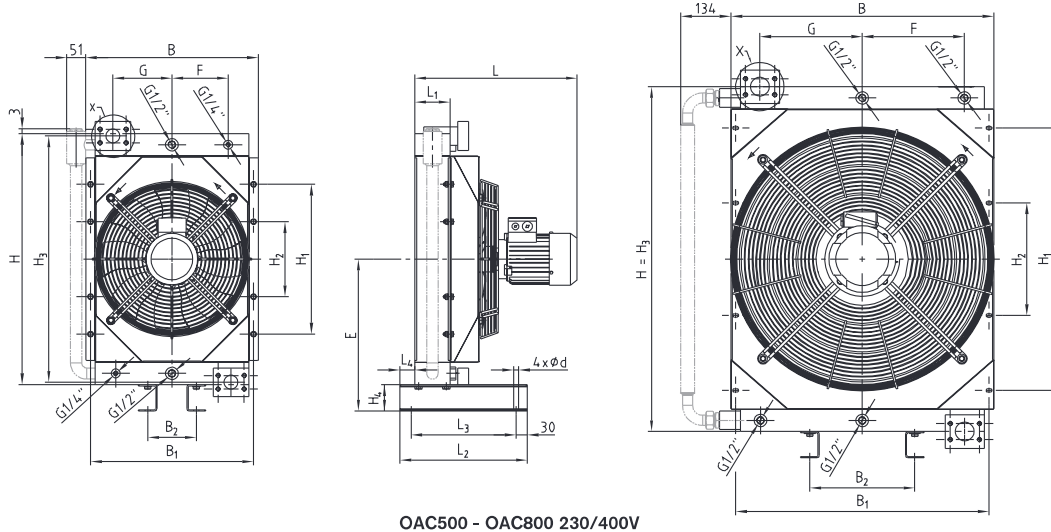


OAC200 - OAC400 230/400V

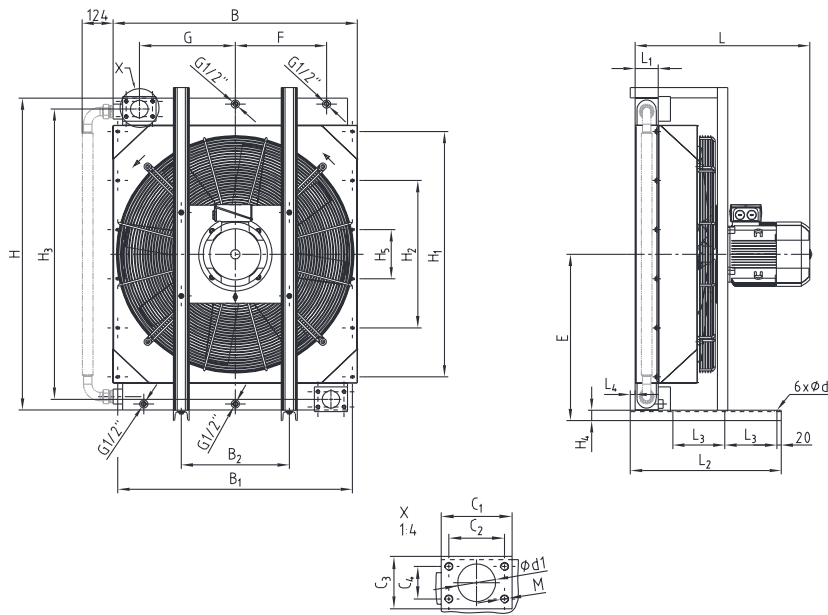
Oil/air cooler type OAC 230/400V																									
Type of cooler	Dimensions [mm]																								
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	B	B <sub>1</sub>	B <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	d	d <sub>1</sub>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

## Oil/air cooler type OAC Cooling systems

### Dimensions of OAC500 - 2000 (230/400/690V)



OAC500 - OAC800 230/400V



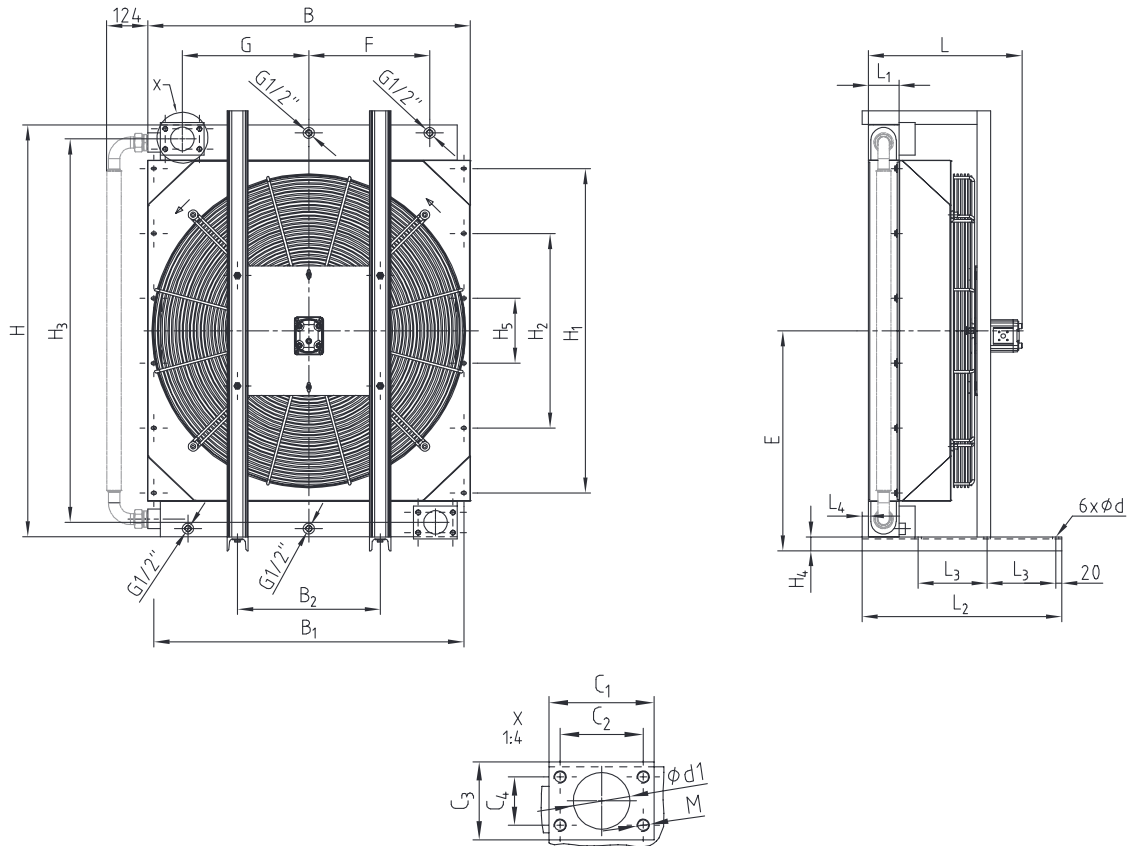
OAC850 - OAC2000 230/400V (400/690V)

Oil/air cooler type OAC 230/400V																									
Type of cooler	Dimensions [mm]																				SAE flange	M	F	G	E
	L	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	B	B <sub>1</sub>	B <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	d	d <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>					
OAC500-03	431	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	157.5	405
OAC600-03	532	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
OAC700-03	542	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
OAC800-03	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
OAC850-03	667	95	500	180	-	870	835	350	960	690	230	910	42	-	14	51	105	77.8	90	42.9		M12	350	340	523
OAC900-03	670	95	590	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106.5	100	62		M16	372.5	390	678
OAC1000-03-06	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
OAC1000-03-04	729	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106.5	100	62	3"	M16	372.5	390	678
OAC2000-03-06	900	140	750	210	-	1286	1246	525	1420	1000	600	1332	45	200	14	73	135	106.5	100	62		M16	532	532	756
OAC2000-03-04	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 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 <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	B	B <sub>1</sub>	B <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	H <sub>3</sub>	H <sub>4</sub>	H <sub>5</sub>	d	d <sub>1</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	C <sub>4</sub>	SAE flange	M	F	G	E	
OAC850-04	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	
OAC900-04	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	
OAC1000-04	505	113	615	210	-	995	955	440	1270	1000	600	1182	42	200	14	73	135	106,5	100	62	3"	M16	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		M16	532	532	756	