Air Oil Coolers

HLA2 Series - AC Motor Driven

HLD Series - DC Motor Driven

HLH2 Series - Hydraulic Motor Driven

HLO3 Series - Offline Circulation Pump Driven

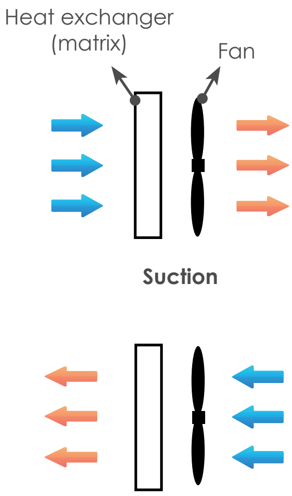
HLAX Series - Axial Motor Driven

Air Oil Coolers

What is an air oil cooler?

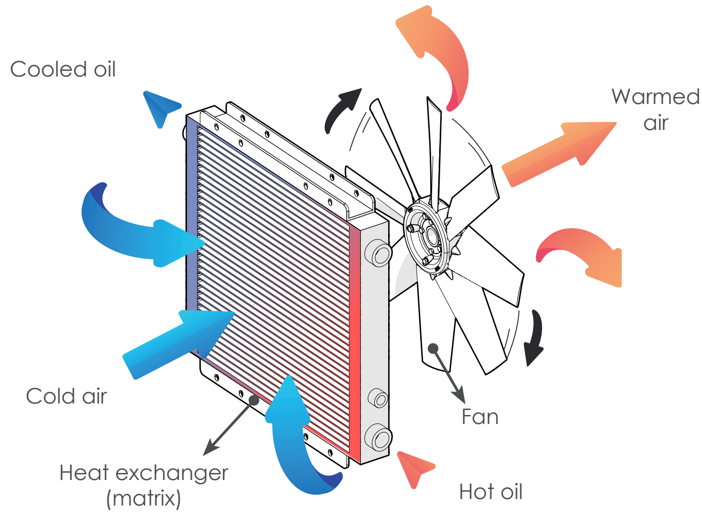
In a hydraulic system, managing the temperature of the working fluid is an important maintenance point that can affect system performance. If the temperature is too low, the viscosity increases, which can lead to damage to the hydraulic device due to increased friction. On the other hand, if the oil temperature rises above 60 °C, thermal degradation occurs, and viscosity changes as well. As a result, cylinder speed decreases, the life of the oil is shortened, and it can also affect the sealing, leading to leakage. In other words, if the temperature of the oil is not managed properly, the hydraulic system's performance can be degraded, and maintenance costs can increase.

An air-cooled cooler is a device that cools high-temperature oil to maintain proper viscosity in a hydraulic system. An air oil cooler consists of heat exchanger plates (matrix) through which high-temperature oil passes, and a fan that blows air over the matrix to cool them. Depending on the direction of the airflow over the matrix, they can be classified as suction or blow types, with the suction type generally having better cooling efficiency.



Suction

Blow



Suction-type cooling

Driving method

Depending on the method of driving the fan, the types of air oil coolers are determined, and typically include AC motors, DC motors, hydraulic motors, offline circulation pumps, and axial motor methods.

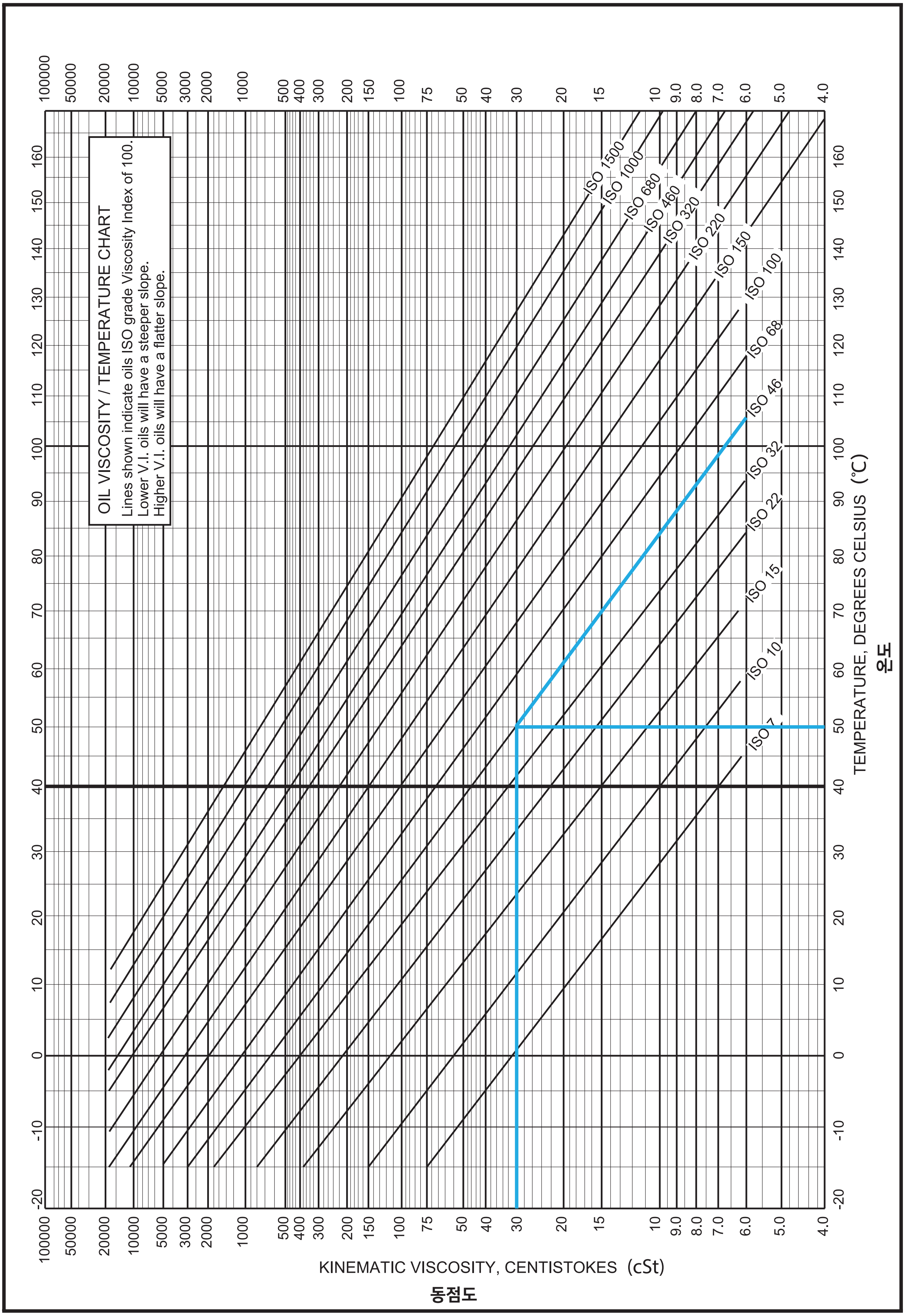
HLA2 Series
AC motor driven

HLD Series
DC motor driven

HLH2 Series
Hydraulic motor driven

HLO3 Series
Offline circulation pump driven

HLAX Series
Axial motor driven



OIL VISCOSITY / TEMPERATURE CHART
Lines shown indicate oils ISO grade Viscosity Index of 100.
Lower V.I. oils will have a steeper slope.
Higher V.I. oils will have a flatter slope.
ISO 1500
ISO 1000
ISO 680
ISO 460
ISO 320
ISO 220
ISO 150
ISO 100
ISO 68
ISO 46
ISO 32
ISO 22
ISO 15
ISO 10
ISO 7
-20 -10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160
100000 50000 20000 10000 5000 3000 2000 1000 500 400 300 200 150 100 75 50 40 30 20 15 10 9.0 8.0 7.0 6.0 5.0 4.0
KINEMATIC VISCOSITY, CENTISTOKES (cSt)
동점도
TEMPERATURE, DEGREES CELSIUS (℃)
온도

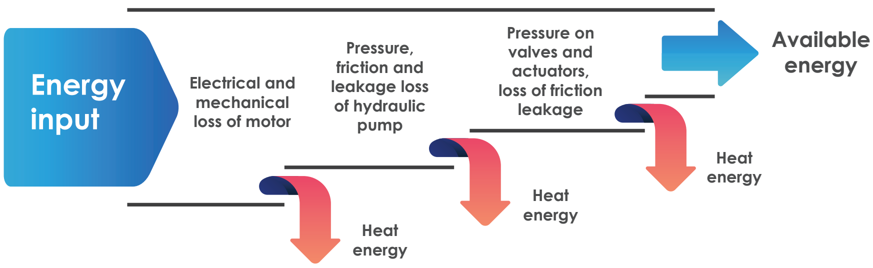
Management of oil viscosity

If the oil temperature is constant, the viscosity also remains constant, ensuring consistent valve response and cylinder speed. Please refer to the Kinematic Viscosity chart on the left page for the recommended kinematic viscosity and temperature control that should be maintained depending on the type of operating fluid used in the hydraulic system.

ISO Viscosity Grade (ISO VG)	Kinematic Viscosity @40 ℃ (cTs)		
	Minimum	Maximum	Mid-point
22	19.8	24.2	22.0
32	28.8	35.2	32.0
46	41.4	50.6	46.0
68	61.2	74.8	68.0
100	90.0	110	100
150	135	165	150
220	198	242	220
320	288	352	320
460	414	506	460
680	612	748	680

Purpose of use of cooler

In all hydraulic systems, there are various forms of energy loss, such as pressure, friction, and leakage to varying degrees. Energy is lost due to pressure drop in the lines caused by friction and flow bias, pressure drop in accessories such as valves, filters, and coolers, high throttling in pressure regulation systems, and leakage losses at sealing points. All of these losses are converted into heat that is absorbed by the oil and the housing.



The purpose of using a cooler is to maintain the heat generated by the energy loss at a constant level, thereby increasing the efficiency of the system and reducing maintenance costs. The heat generated by the loss of energy can damage the pump, hose, sealing, and bearings installed in the hydraulic system, shortening their lifespan. As mentioned earlier, the decrease in viscosity makes it difficult to control the valve and cylinder precisely, and the overall efficiency of the system decreases, resulting in a significant increase in maintenance costs.

Selection of Cooler

The selection of a cooler is to achieve the goal by using a cooler with a cooling capacity equal to or greater than the heat energy converted from the input energy, as shown in the figure above. Therefore, to select a cooler, it is necessary to first accurately understand the heat load factors generated in the system. Machinery and hydraulic systems are used to generate and transmit power, but mechanical efficiency, friction, pressure, and other power losses generate heat. If this heat energy is defined as P_H the formula for calculating it can be expressed as follows:

When the specific heat unit is (kJ/kg°C)

$$P_H = (T_2 - T_1) \times SG \times SH \times Q / 60 \ [kW]$$

When the specific heat unit is (Kcal/kg°C)

$$P_H = (T_2 - T_1) \times SG \times SH \times Q / 60 \ [Kcal/h]$$

$$P_H = \frac{(T_2 - T_1) \times SG \times SH \times Q / 60}{860} \ [kW]$$

P_H	System heat dissipation (kW)
T_1	Oil temperature before system operation (°C)
T_2	Oil temperature after system operation (°C)
Q	Flow rate of oil(l/min)
SG	Specific gravity of the oil (kg/l)
SH	Specific heat of oil

To maintain a certain temperature in the system, the cooling heat exchange amount **P_C** of the cooler must be equal to or greater than the heat generated by the system **P_H** under the maximum temperature conditions of the flow rate flowing into the cooler and the surrounding environment. The cooling heat exchange amount of the cooler is defined by the calculation formula of the inlet and outlet temperatures of the cooler, the ambient air temperature, the flow rate, and the fluid properties, as shown below.

When the specific heat unit is (kJ/kg°C)

$$P_C = (T_{in} - T_{out}) \times SG \times SH \times Q_C / 60 \ [kW]$$

When the specific heat unit is (Kcal/kg°C)

$$P_C = (T_{in} - T_{out}) \times SG \times SH \times Q_C / 60 \ [Kcal/h]$$

$$P_C = \frac{(T_{in} - T_{out}) \times SG \times SH \times Q_C / 60}{860} \ [kW]$$

P_H	Cooler heat dissipation (kW)
T_{in}	Cooler inlet oil temperature (°C)
T_{out}	Cooler outlet oil temperature (°C)
Q	Flow rate of oil(l/min)
SG	Specific gravity of the oil (kg/l)
SH	Specific heat of oil

ETD(Entrance Temperature Difference) refers to the difference between the cooler's maximum ambient temperature and the oil temperature at the cooler inlet. In other words, it is expressed as follows:

$$ETD = T_{inmax} - T_{ambientmax}$$

T_{inmax}	Cooler inlet max. oil temperature (°C)
$T_{ambientmax}$	Cooler max. ambient temperature (°C)

For example, if the oil temperature at the cooler inlet is 60°C and the maximum ambient temperature is 20°C, the ETD is 40°C. By dividing the cooling heat exchange amount PC defined above by the ETD, we define the cooling capacity (kW/°C). In this product selection guide, the cooling capacity is used as a unit to allow users to select the product.

$$\text{Cooling Capacity} = P_C / ETD \ (kW/°C)$$

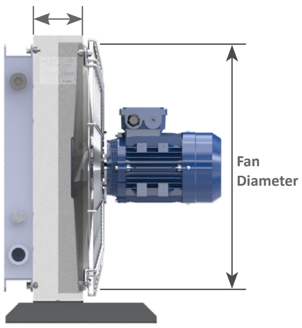
HydroLync Design Theory

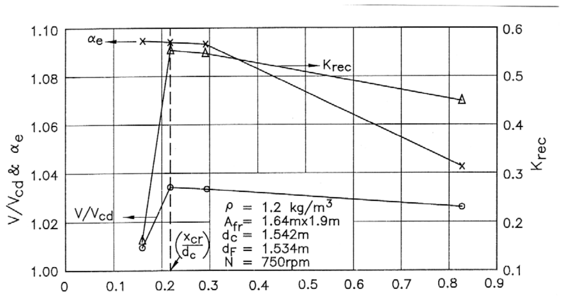
HydroLync's product design is based on thoroughly proven scientific research and incorporates design concepts derived from that research. We strive to continuously create stable and optimized products by using CFD (Computational Fluid Dynamics) simulations to review both production efficiency and durability.

Fan Positioning

The main components of an air oil cooler are the heat exchanger, fan, and the driving mechanism that drives the fan. When designing the product, the shape and angle of the fan blade, as well as the distance between the heat exchanger and the fan, are important factors for maximizing the cooler's performance.

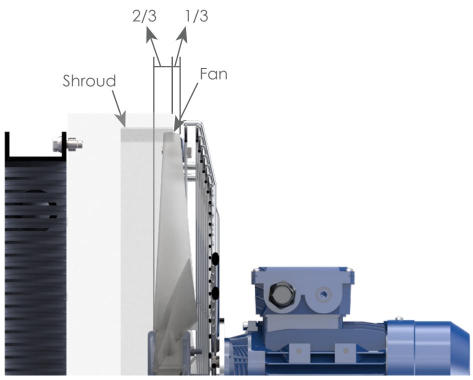
Distance between matrix and fan

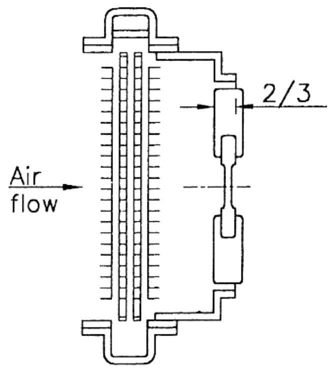




The performance of heat exchange on the position of the fan

The performance graph shows how heat exchange performance varies depending on the position of the fan. HydroLync's air oil cooler is positioned according to these calculations to optimize performance.

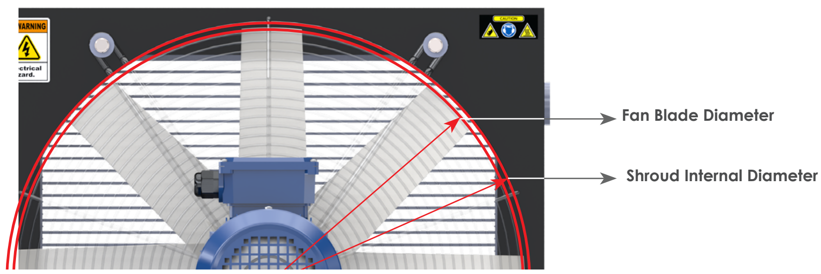




Tip Clearance

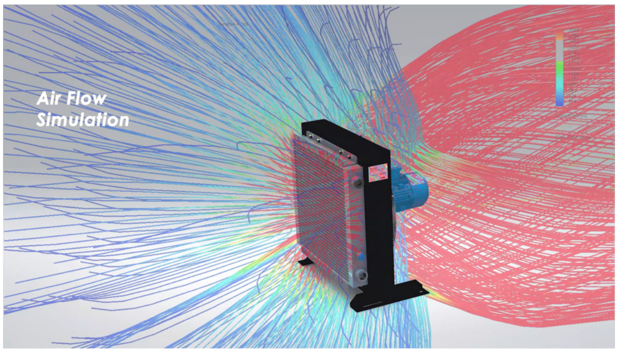
The distance between the surrounding surface and the blade tip of the fan called "tip clearance" around the fan called Shroud has a significant impact on the performance of the cooler. The design of the hydroLync applies the API (American Petroleum Institute) Standard 661, which states that the maximum airflow is achieved when the tip clearance is 0.5-1% of the fan blade diameter, and the theory that the fan blade should be located 1/3 outside of the shroud for optimal performance, as stated in the Military Vehicle Power Plant Cooling Handbook: AMCP 706-361 used by the US military.

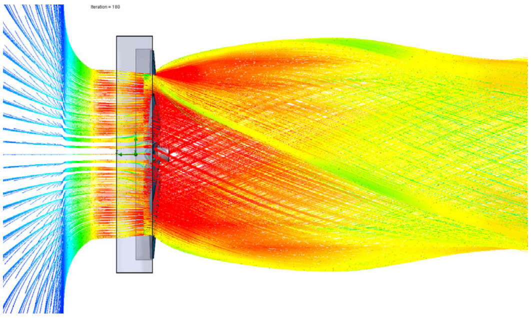
Tip Clearance = Shroud Internal Diameter - Fan Blade Diameter



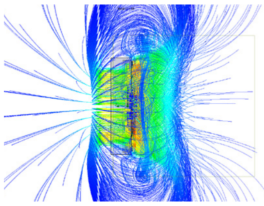
Simulation Analysis

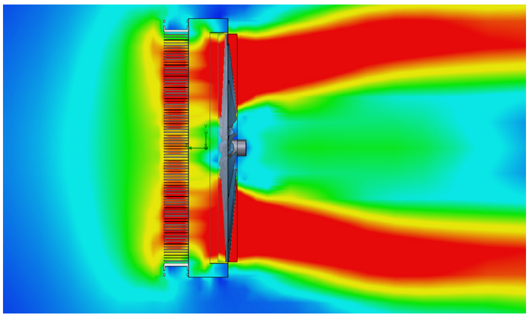
The use of CFD (Computation Fluid Dynamics) analysis has significantly reduced development costs by predicting the state of products under various conditions before applying them to mass production, and has greatly improved the productivity of developing new products. In an air oil cooler, the fan generates airflow, which passes through the oil flowing over the matrix, extracting heat and cooling it down. Therefore, the airflow is determined by the position of the fan, the shape of the blades, and their angles, which are directly linked to the performance of the cooler. During the product development phase, CFD simulation can be used to determine if the ideal performance is possible before creating a prototype. Any necessary improvements can be made immediately and reflected in the development process, allowing for a very rapid development process.



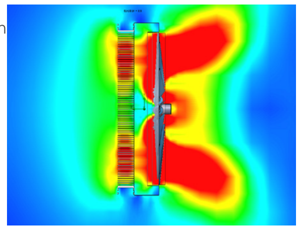


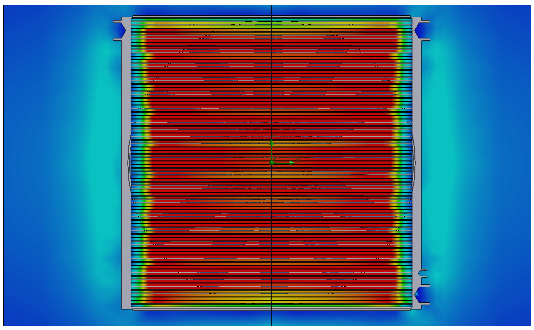
The ideal airflow shape formed by the rotation of the fan blades should be streamlined, as shown on the left side of the image. The shape shown below is the result of incorrect positioning of the fan and blade settings, resulting in significant turbulence in the airflow, which leads to increased power consumption and decreased cooling performance.



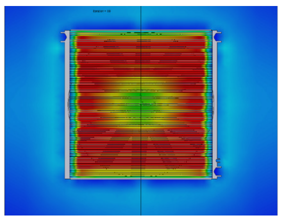


A fast airflow helps to quickly dissipate heat from the matrix, resulting in improved cooling performance. By setting the fan in an ideal position, the airflow can be formed as quickly as possible over the entire surface of the matrix. On the other hand, incorrect settings result in uneven airflow over the matrix, leading to decreased cooling performance.



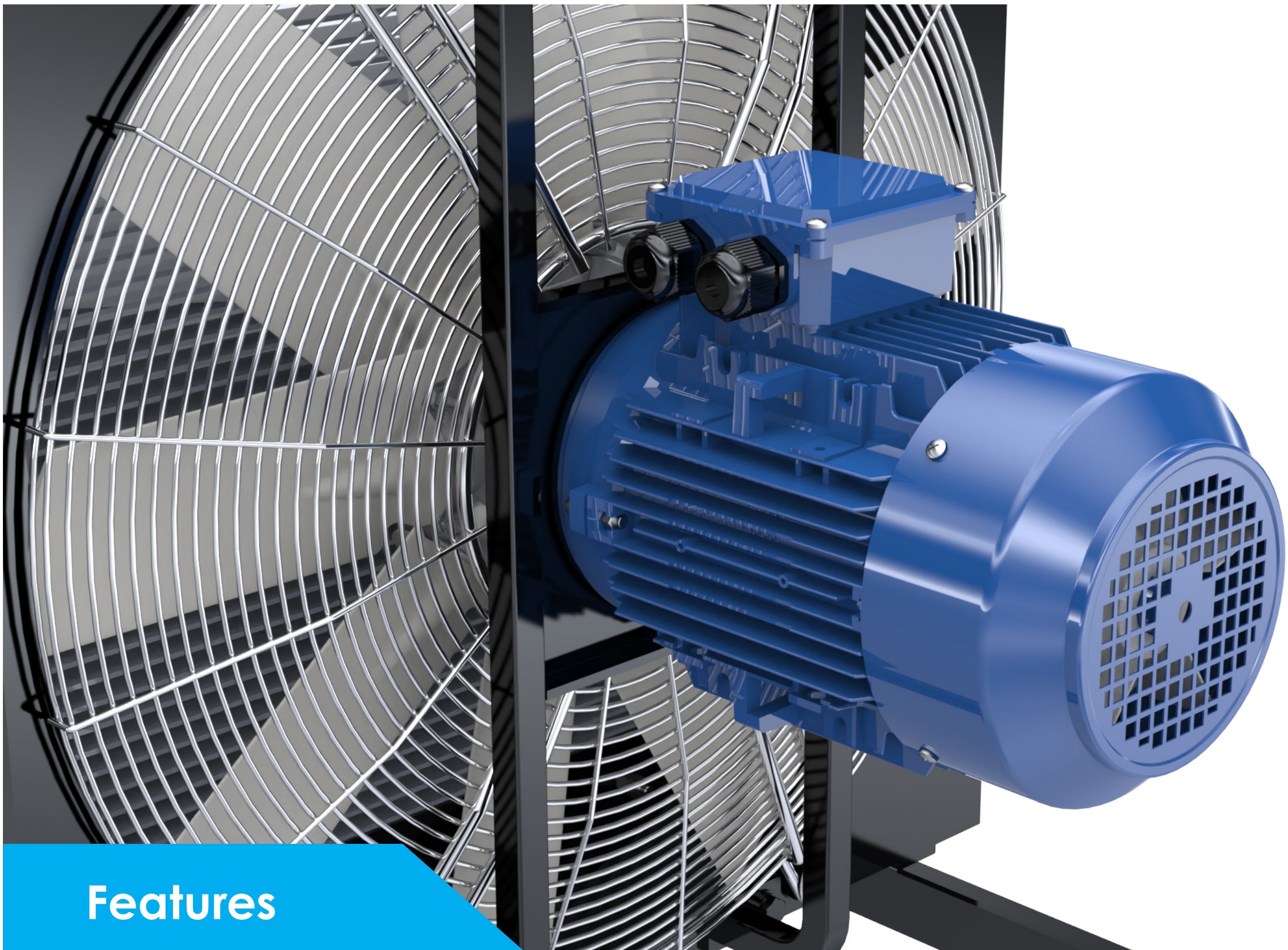


When the fan is not ideally positioned, a dead zone can occur where little or no airflow is formed over some areas of the matrix. The ideal state is to minimize the dead zone over the entire surface, as shown on the left side of the image. However, if the fan position is incorrectly set, a dead zone can occur as shown below, leading to decreased cooling performance of the cooler.

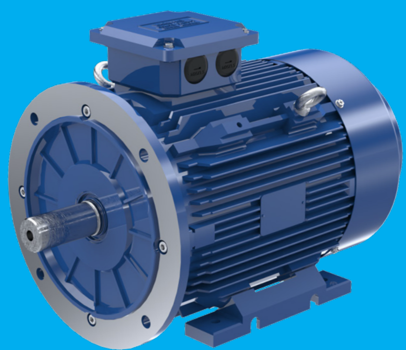


HLA2 Series

AC Motor Driven



Features



- Applied HydroLync design theory based on scientific research
- IE3 certified AC motors
- Compact and slimmer design
- Service-friendly design

Air Oil Coolers

Quick Overview

HydroLync's HLA2 Series products offer a wide range of specifications. You can quickly check the cooling performance, heat dissipation, and maximum flow rate of each model with ISO VG 46 oil at ETD 40°C.

No.	Model-Motor Poles_Cooling Performance(KW/℃) (Heat Dissipation KW, Kcal/h) / Max. Flow rate(LPM)
1	HLA2 015-2 _ 0.048KW/℃ (1.92KW, 1,651Kcal/h) / Max.40LPM
2	HLA2 03-2 _ 0.085KW/℃ (3.4KW, 2,924Kcal/h) / Max.100LPM
3	HLA2 04-2 _ 0.12KW/℃ (4.8KW, 4,128Kcal/h) / Max.100LPM
4	HLA2 07-4 _ 0.15KW/℃ (6.0KW, 5,160Kcal/h) / Max.125LPM
5	HLA2 11-4 _ 0.38KW/℃ (15.2KW, 13,072Kcal/h) / Max.150LPM
6	HLA2 16-6 _ 0.44KW/℃ (17.8KW, 15,308Kcal/h) / Max.200LPM
7	HLA2 16-4 _ 0.60KW/℃ (24KW, 20,640Kcal/h) / Max.200LPM
8	HLA2 23-6 _ 0.61KW/℃ (24.2KW, 20,812Kcal/h) / Max.200LPM
9	HLA2 23-4 _ 0.80KW/℃ (32KW, 27,520Kcal/h) / Max.200LPM
10	HLA2 33-6 _ 0.85KW/℃ (34KW, 29,240Kcal/h) / Max.300LPM
11	HLA2 33-4 _ 1.10KW/℃ (44KW, 37,840Kcal/h) / Max.300LPM
12	HLA2 35-6 _ 1.20KW/℃ (48KW, 41,280Kcal/h) / Max.350LPM
13	HLA2 35-4 _ 1.30KW/℃ (52KW, 44,720Kcal/h) / Max.350LPM
14	HLA2 56-6 _ 1.45KW/℃ (58KW, 49,880Kcal/h) / Max.300LPM
15	HLA2 58-6 _ 1.70KW/℃ (68KW, 58,480Kcal/h) / Max.400LPM
16	HLA2 76-6 _ 1.95KW/℃ (78KW, 67,080Kcal/h) / Max.400LPM
17	HLA2 78-6 _ 2.25KW/℃ (90KW, 77,400Kcal/h) / Max.500LPM
18	HLA2 110-6 _ 2.37KW/℃ (94.8KW, 81,528Kcal/h) / Max.500LPM
19	HLA2 112-6 _ 3.30KW/℃ (132KW, 113,520Kcal/h) / Max.500LPM
20	HLA2 113-6 _ 4.20KW/℃ (168KW, 144,480Kcal/h) / Max.500LPM
21	HLA2 200-4 _ 7.30KW/℃ (292KW, 251,120Kcal/h) / Max.1,000LPM

[Remark] Ns=120•f/p
Ns: RPM for AC motor
f: Frequency
p: Pole

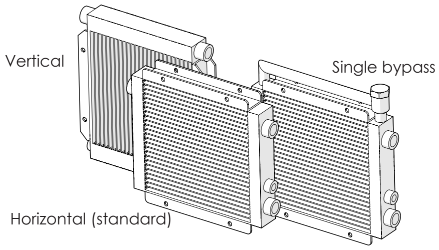
* Based On ETD 40℃ / ISO VG 46 *

Ordering code

Example: HLA2 [ ] [07] - [4] - [220/380V 60Hz] - [W50] - [D] - [ ]

1 2 3 4 5 6 7

1	Matrix types
	Horizontal (Standard)
V	Vertical
SB	Single Bypass

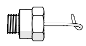
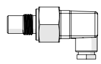


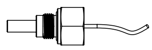
2	Matrix size	
Code	**Size**	**Port**
015	176x175x45	G3/8"
02	148x245x45	PT3/8"
03	248x216x63	G1"
04	272x244x63	G1"
07	335x322x63	G1"
11	405x390x63	G1"
16	464x458x63	G1"
23	545x540x63	G1"
33	640x648x63	G1"
35	640x648x83	G1 1/2"
56	802x826x63	G1 1/4"
58	802x826x83	G2"
76	940x1019x63	G1 1/2"
78	940x1019x83	G2"
110	1120x1190x63	G2"
112	1120x1190x83	G2"
113	1120x1190x113	G2"
200	1500x1580x98	SAE 3"

3	Motor Poles	
Poles	**Hertz**	**Max. RPM**
2	50Hz	2,400
	60Hz	3,000
	Applicable	HLA2 015 ~ 04
4	50Hz	1,500
	60Hz	1,720
	Applicable	HLA2 07 ~ 35
6	50Hz	950
	60Hz	1,150
	Applicable	HLA2 16 ~ 200

4	Voltage and hertz	
Phase	**Voltage /hertz**	**Applicable models**
Single	**110V 50/60Hz**	HLA2 015 ~ 04
Single	**220V 50/60Hz**	HLA2 015 ~ 04
Three	**380V 50/60Hz**	HLA2 03 ~ 04
Three	**220/380V 50/60Hz**	HLA2 07 ~ 200
Three	**240/420V 50Hz**	HLA2 07 ~ 200
Three	**280/480V 60Hz**	HLA2 07 ~ 200
Three	**440V 60Hz**	HLA2 03 ~ 200
Three	**460V 60Hz**	HLA2 015 ~ 04

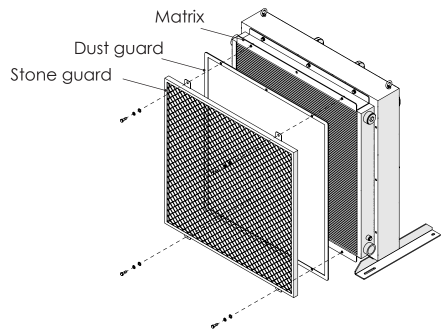
5	Thermal switch	
Code	**Temperature**	**Working range**
	None	
W/D	**30**	ON 35±5℃ / OFF 25±5℃
W/D	**40**	ON 45±5℃ / OFF 35±5℃
W/D	**50**	ON 55±5℃ / OFF 45±5℃
W/D	**60**	ON 65±5℃ / OFF55±5℃
W/D	**70**	ON 75±5℃ / OFF 65±5℃
DTM	**Sensor**	-55°C to +125°C

***W: Wire type**  ***D: DIN plug type** 

***DTM: Digital Thermometer** 

***Note:** This can only be used with products equipped with iAMC.

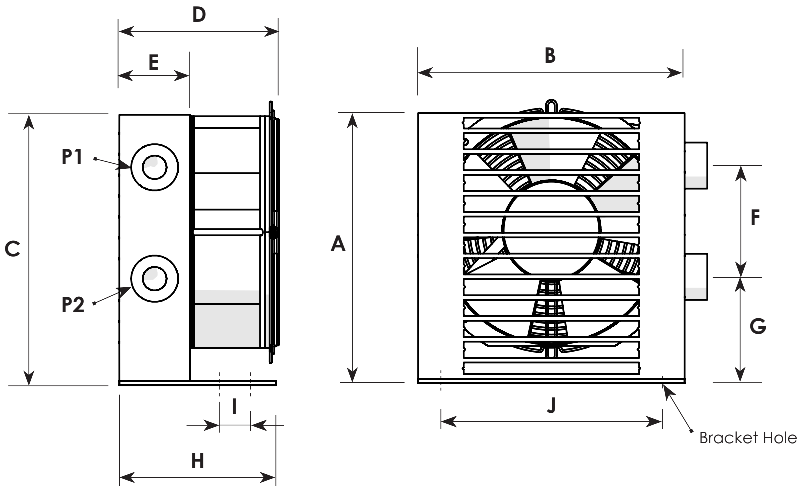
6	Matrix protection accessories
	None (standard)
D	Dust Guard
S	Stone Guard
A	Dust Guard + Stone Guard



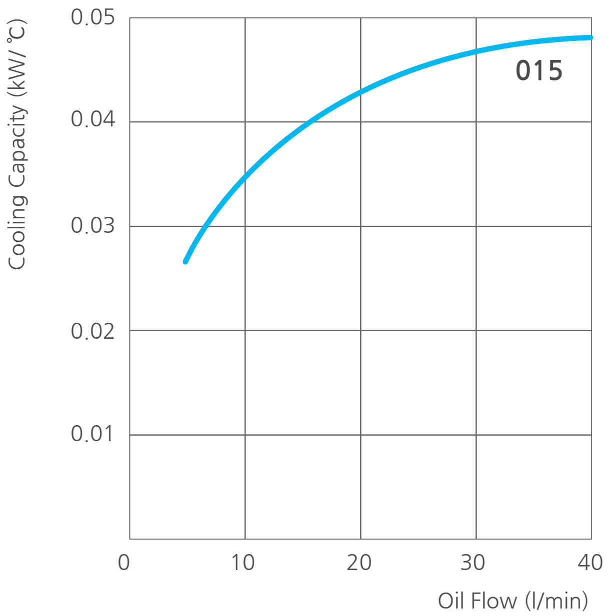
7	Production type
	Standard
C	Customization

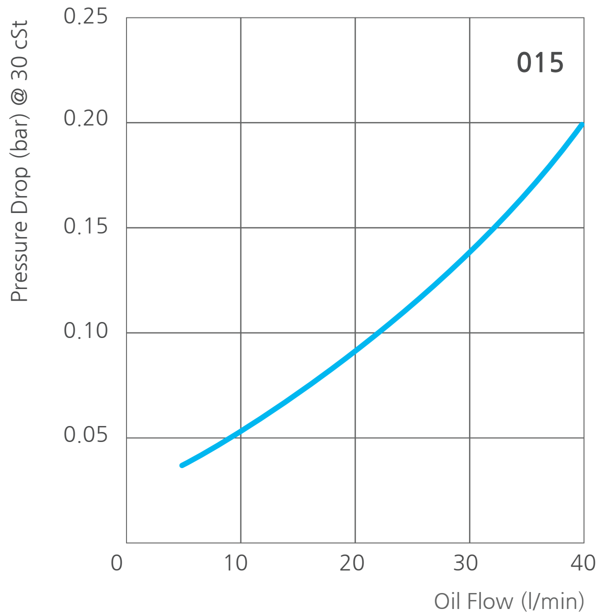
Air Oil Coolers

HLA2 015-2 Single phase



AC MOTOR	HLA2 Model	A	B	C	D	E	F	G	H	I	J	K	P1, 2	Bracket Hole
Single Phase	**015**	175	176	175	100	45	72	69	100	30	138	-	PT3/8"	4xø6





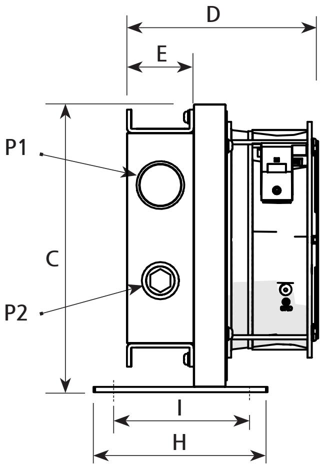
Flow rate: Max. 40 l/min (< ΔP=1.2 bar)
Working Pressure: Max. 14 bar
Insulation grade: B (130 ℃ 266 ℉)
Noise: < 50dB(A)

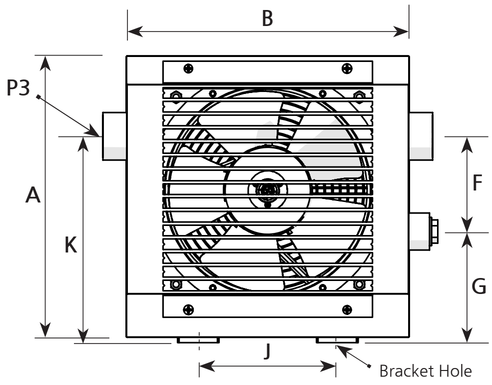
AC motor : Single phase 110V @50/60Hz 38/35W
Single phase 220V @50/60Hz 32/31W
Weight: 2.6 Kg

The cooling capacity curve is based on the oil temperature and the ambient air temperature entering the cooler. An oil temperature of +60℃ (T_{inlet}) and an ambient air temperature of +20℃ ($T_{ambientmax}$) provide a temperature difference (ETD) of +40℃. To obtain the total cooling capacity, multiply the cooling performance (kW/℃) by ETD (℃) as follows:

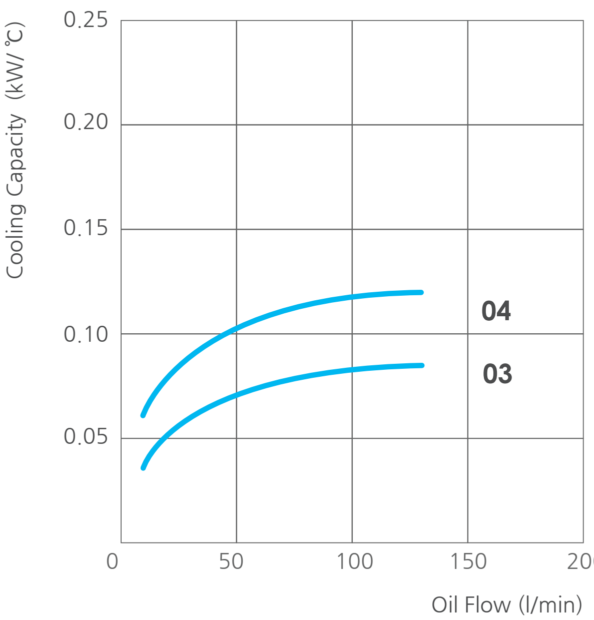
$ETD = T_{inlet} - T_{ambientmax}$ Cooling performance (kW/℃) x ETD (℃) = Cooling capacity (kW)

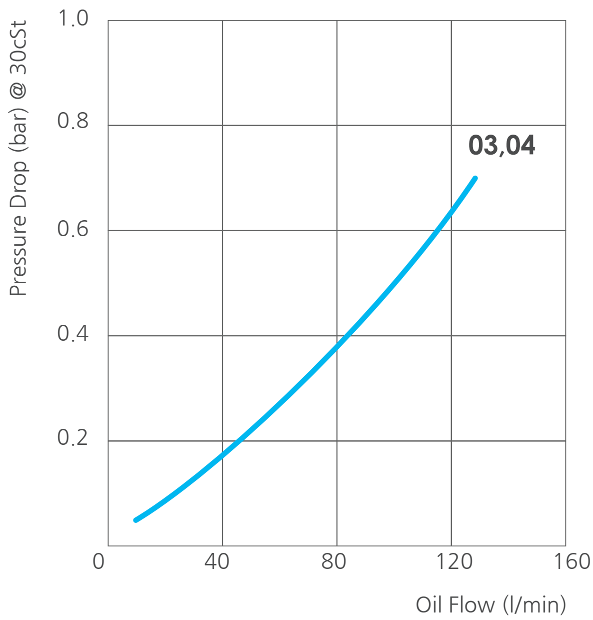
HLA2 03, 04 Single and Three phase





AC Motor	HLA2 Model	A	B	C	D	E	F	G	H	I	J	K	P1, 3	P2	Bracket Hole
Single Phase	**03-2**	253	259	258	160	63	89.5	71	164	133	134	160.5	G1"	G1/2"	4x(ø10x19)
Three Phase	**03-2**	253	259	258	180	63	89.5	71	164	133	134	160.5	G1"	G1/2"	4x(ø10x19)
Single Phase	**04-2**	266	273	271	160	63	90	105	164	133	134	195	G1"	G1/2"	4x(ø10x19)
Three Phase	**04-2**	266	273	271	180	63	90	105	164	133	134	195	G1"	G1/2"	4x(ø10x19)





Flow rate: Max. 130 l/min (< ΔP=1.0 bar)

Working pressure: Max. 14 bar

Insulation grade: B (130 ℃ 266 ℉)

Noise: < 63 dB(A)

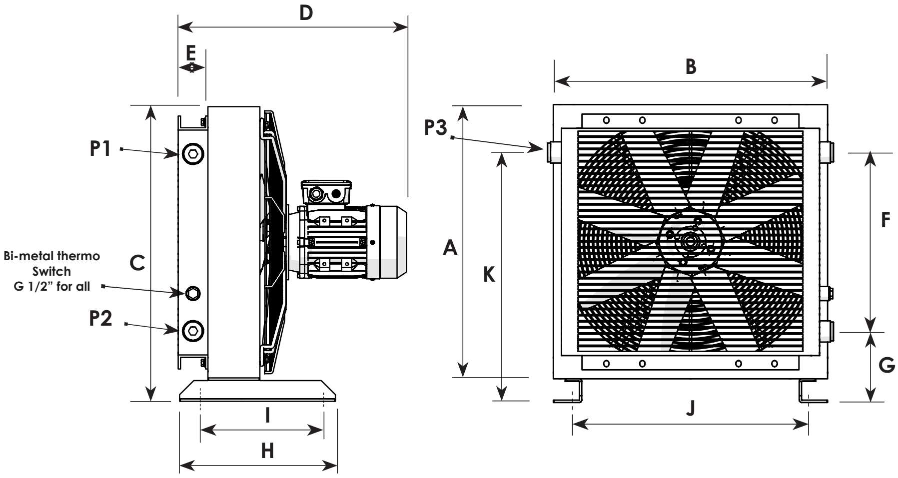
AC motor : Single 110V @50/60Hz 40/48W
Single 220V @50/60Hz 40/53W
Three 380V @50/60Hz 49/64W
Three 440V @50/60Hz 49/64W

Weight: 03-2 5.7 Kg / 04-2 6.3 Kg

The cooling capacity curve is based on the oil temperature and the ambient air temperature entering the cooler. An oil temperature of +60℃ (T_{inlet}) and an ambient air temperature of +20℃ ($T_{ambientmax}$) provide a temperature difference (ETD) of +40℃. To obtain the total cooling capacity, multiply the cooling performance (kW/℃) by ETD (℃) as follows:

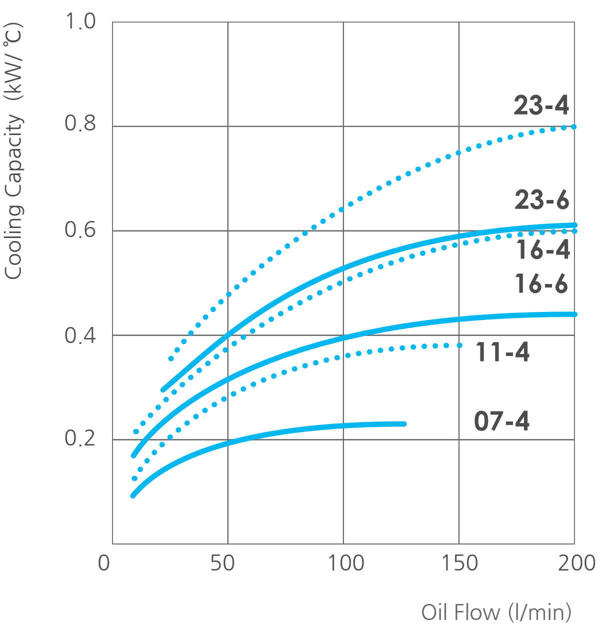
$ETD = T_{inlet} - T_{ambientmax}$ Cooling performance (kW/℃) x ETD (℃) = Cooling capacity (kW)

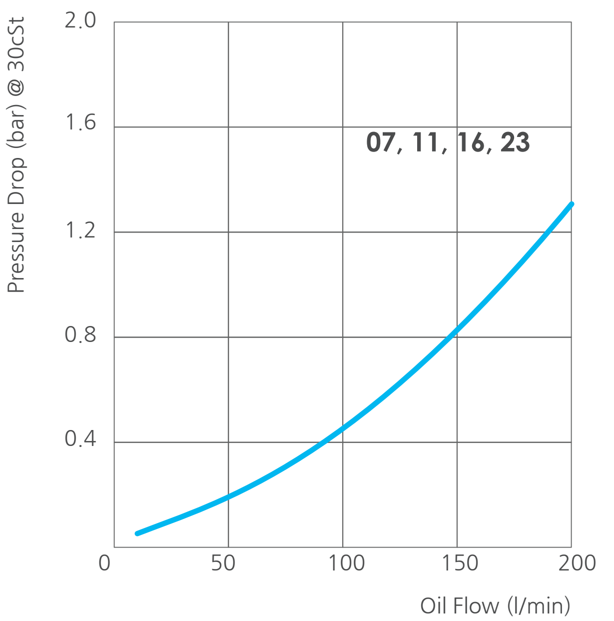
HLA2 07~23 Three phase



HLA2 Model	A	B	C	D	E	F	G	H	I	J	K	P1,2,3	Slot Hole	Weight Kg	Noise (dB)
07-4	365	365	407.5	397.5	63	160	145	270	(145)	297	305	G1"	ø10x90 ø10x19	19	65
11-4	440	440	480	412.7	63	228	146	280	(170)	390	374	G1"	ø10x90 ø10x19	23	67
16-4	496	496	536	422.5	63	296	142.5	305	(195)	436	483.5	G1"	ø10x90 ø10x19	29	70
16-6	496	496	536	421.1	63	296	142.5	305	(195)	436	483.5	G1"	ø10x90 ø10x19	28	60
23-4	579	579	629	473.5	63	378	150	330	(220)	520	528	G1"	ø10x90 ø10x19	39	76
23-6	579	579	629	436.1	63	378	150	330	(220)	520	528	G1"	ø10x90 ø10x19	34	64

* Noise level in 1m distance

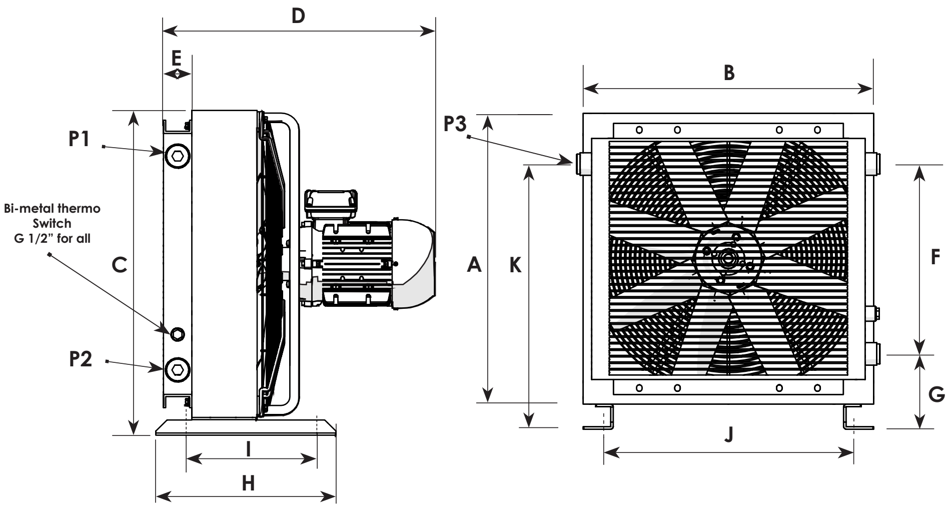




The cooling capacity curve is based on the oil temperature and the ambient air temperature entering the cooler. An oil temperature of +60℃ (T_{inlet}) and an ambient air temperature of +20℃ ($T_{ambientmax}$) provide a temperature difference (ETD) of +40℃. To obtain the total cooling capacity, multiply the cooling performance (kW/℃) by ETD (℃) as follows:

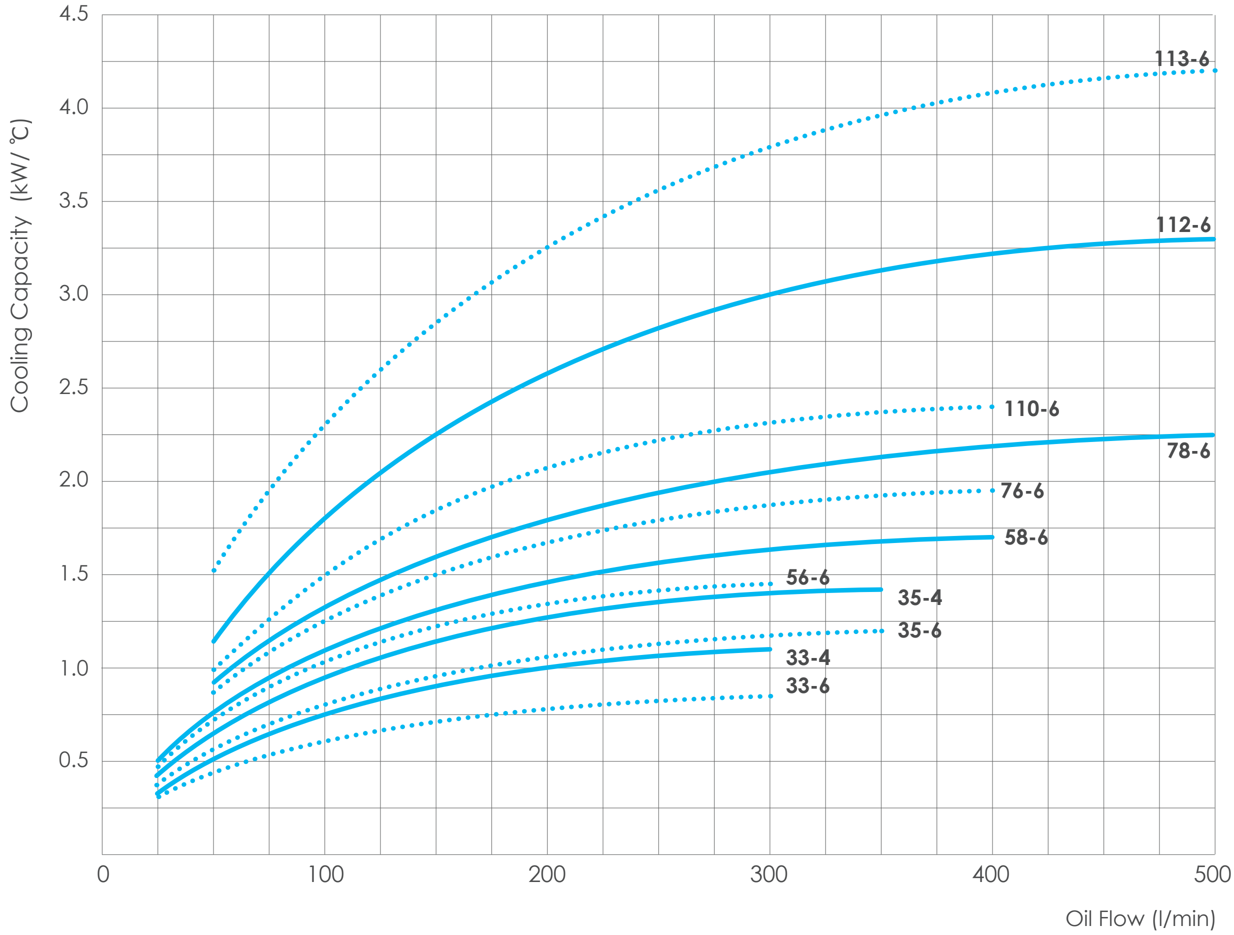
$ETD = T_{inlet} - T_{ambientmax}$ Cooling performance (kW/℃) x ETD (℃) = Cooling capacity (kW)

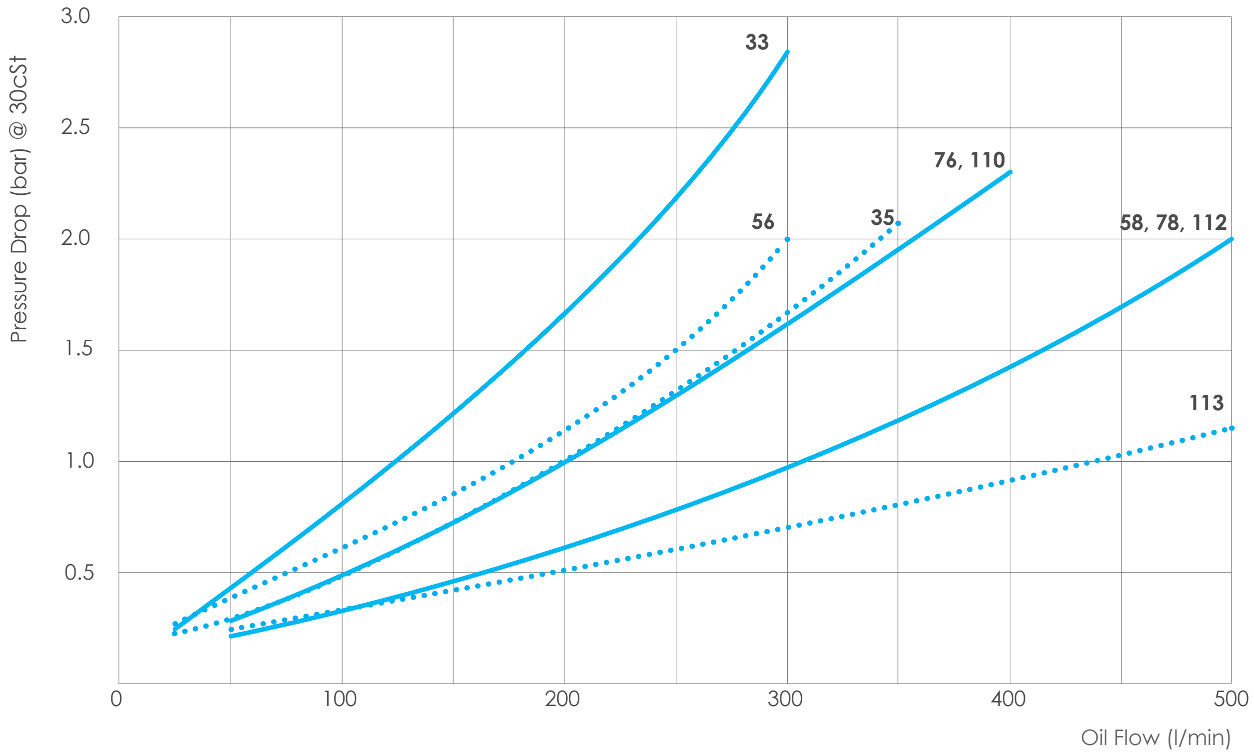
HLA2 33~200 Three phase



HLA2 Model	A	B	C	D	E	F	G	H	I	J	K	P1,2,3	Slot Hole	Weight Kg	Noise (dB)
33-4	692	692	742	602	63	482	157	400	(270)	620	639	G1 1/4"	ø12x92 ø12x21	64	84
33-6	692	692	742	539	63	482	157	400	(270)	620	639	G1 1/4"	ø12x92 ø12x21	49	74
35-4	692	692	742	622	83	482	157	400	(270)	620	639	G1 1/2"	ø12x92 ø12x21	70	85
35-6	692	692	742	559	83	482	157	400	(270)	620	639	G1 1/2"	ø12x92 ø12x21	55	76
56-6	868	868	928	619	63	664	163	430	(320)	796	827	G1 1/4"	ø12x92 ø12x21	73	81
58-6	868	868	928	639	83	664	163	430	(320)	796	827	G2"	ø12x92 ø12x21	89	82
76-6	1022	1022	1092	642	63	821	176	455	(325)	972	997	G1 1/2"	ø14x94 ø14x23	126	86
78-6	1022	1022	1092	662	83	821	176	455	(325)	972	997	G2"	ø14x94 ø14x23	135	87
110-6	1205	1185	1285	738	63	985	192	665	(550)	1115	1177	G2"	ø14x94 ø14x23	205	90
112-6	1205	1185	1285	758	83	985	192	665	(550)	1115	1177	G2"	ø14x94 ø14x23	224	91
113-6	1205	1185	1285	788	113	985	192	665	(550)	1115	1177	G2"	ø14x94 ø14x23	250	92
200-4	1610	1510	1690	939	100	1285	169	820	(680)	1440	1574	G2"	ø18x118 ø18x27	385	92

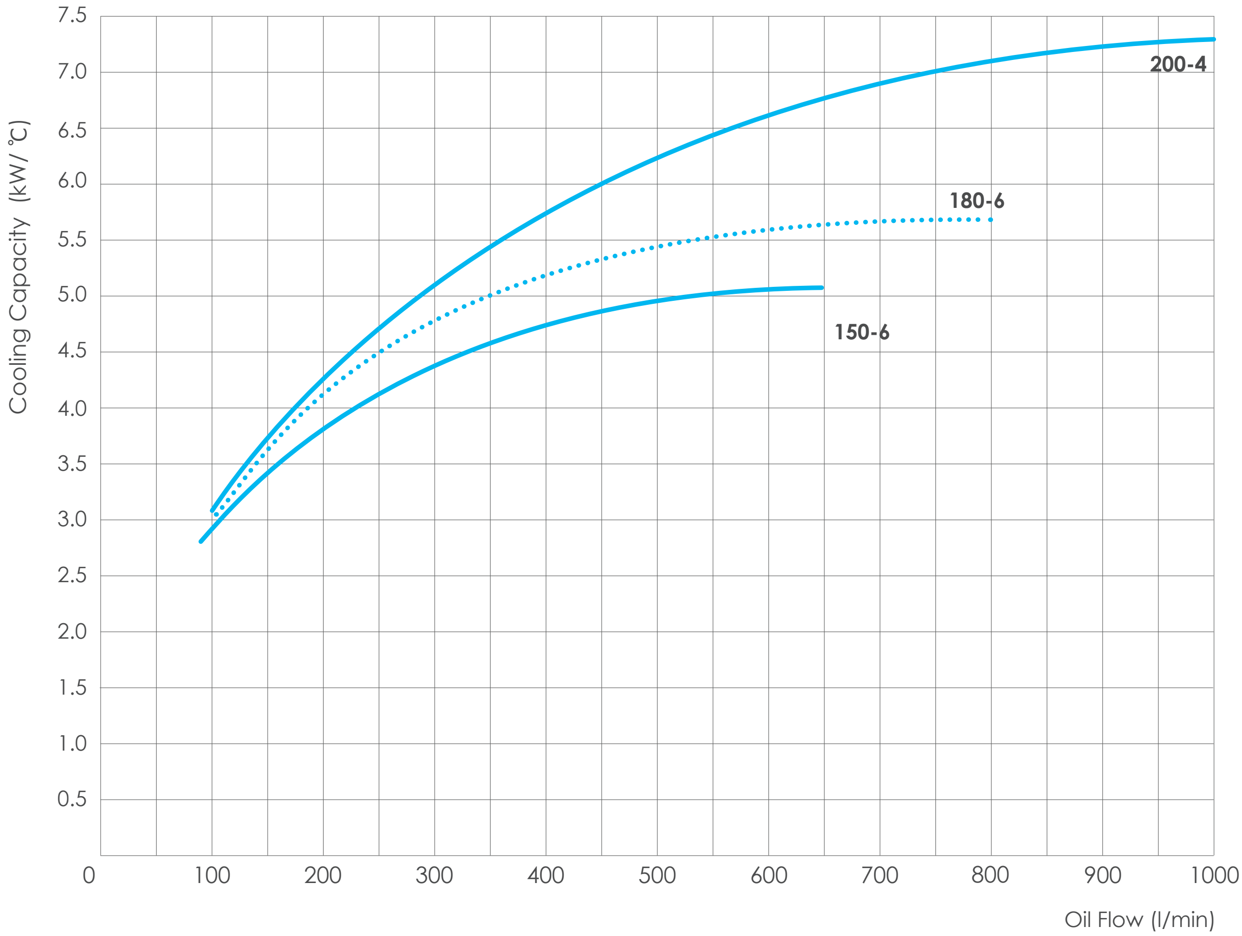
* Noise level in 1m distance

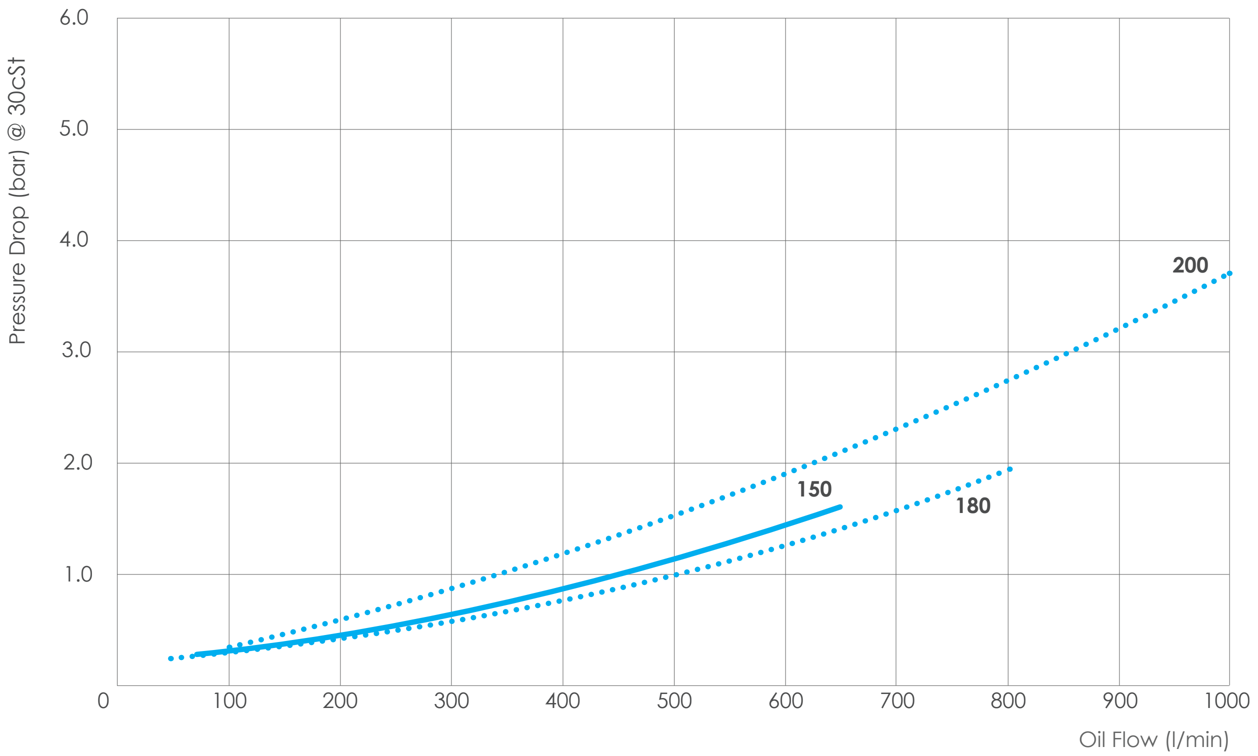




The cooling capacity curve is based on the oil temperature and the ambient air temperature entering the cooler. An oil temperature of +60℃ (T_{inlet}) and an ambient air temperature of +20℃ ($T_{ambientmax}$) provide a temperature difference (ETD) of +40℃. To obtain the total cooling capacity, multiply the cooling performance (kW/℃) by ETD (℃) as follows:

ETD = T_{inlet} - $T_{ambientmax}$ Cooling performance (kW/℃) x ETD (℃) = Cooling capacity (kW)



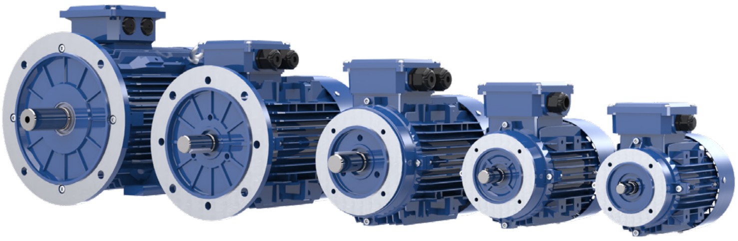


The cooling capacity curve is based on the oil temperature and the ambient air temperature entering the cooler. An oil temperature of +60℃ (T_{inlet}) and an ambient air temperature of +20℃ ($T_{ambientmax}$) provide a temperature difference (ETD) of +40℃. To obtain the total cooling capacity, multiply the cooling performance (kW/℃) by ETD (℃) as follows:

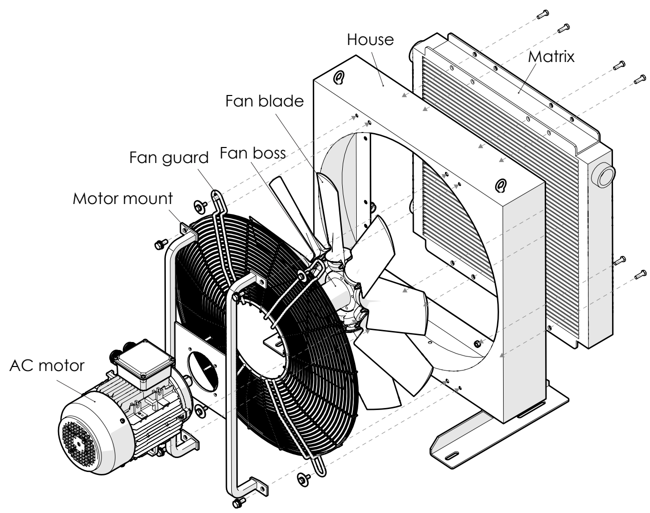
ETD = T_{inlet} - $T_{ambientmax}$ Cooling performance (kW/℃) x ETD (℃) = Cooling capacity (kW)

AC motor specifications

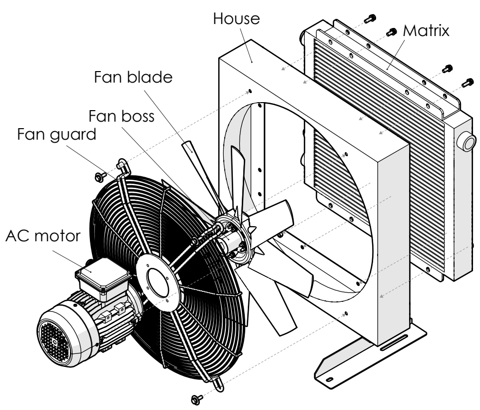
HLA2 Model	Poles	Phase	Frame	Freq. (Hz)	Volt	Power (KW)	RPM	Weight (Kg)
07	4	3	71S	60	220/380	0.25	1670	5.0
07	4	3	71S	60	440	0.25	1670	5.0
07	4	3	71S	50	240/420	0.25	1395	5.0
11	4	3	71S	60	220/380	0.25	1670	5.0
11	4	3	71S	60	440	0.25	1670	5.0
11	4	3	71S	50	240/420	0.25	1395	5.0
16	4	3	71S	60	220/380	0.37	1670	6.4
16	4	3	71S	60	440	0.37	1670	6.4
16	4	3	71S	50	240/420	0.37	1395	6.4
16	6	3	71S	60	220/380	0.18	1070	5.5
16	6	3	71S	60	440	0.18	1070	5.5
16	6	3	71S	50	240/420	0.18	893	5.5
23	4	3	80	60	220/380	0.75	1700	11.6
23	4	3	80	60	440	0.75	1730	11.6
23	4	3	80	50	240/420	0.75	1430	11.6
23	6	3	71S	60	220/380	0.18	1070	5.5
23	6	3	71S	60	440	0.18	1070	5.5
23	6	3	71S	50	240/420	0.18	893	5.5
33, 35	4	3	100L	60	220/380	2.20	1800	30.5
33, 35	4	3	100L	60	440	2.20	1800	30.5
33, 35	4	3	100L	50	240/420	2.20	1500	30.5
33, 35	6	3	80	60	220/380	0.55	1104	9.6
33, 35	6	3	80	60	440	0.55	1104	9.6
33, 35	6	3	80	50	240/420	0.55	920	9.6
56, 58	4	3	112M	60	220/380	3.70	1730	35
56, 58	4	3	112M	60	440	3.70	1750	35
56, 58	4	3	112M	50	240/420	3.70	1460	35
56, 58	6	3	100L	60	220/380	1.50	1200	28.5
56, 58	6	3	100L	60	440	1.50	1200	28.5
56, 58	6	3	100L	50	230/400	1.50	1000	28.5
76, 78	6	3	112M	60	220/380	2.20	1200	35
76, 78	6	3	112M	60	440	2.20	1200	35
76, 78	6	3	112M	50	240/420	2.20	1000	35
110, 112, 113, 180	6	3	132M	60	220/380	5.50	1200	72
110, 112, 113, 180	6	3	132M	60	440	5.50	1200	72
110, 112, 113, 180	6	3	132M	50	240/420	5.50	1000	72
200	6	3	160L	60	220/380	11	1800	140
200	6	3	160L	60	440	11	1800	140
200	6	3	160L	50	240/420	11	1500	140



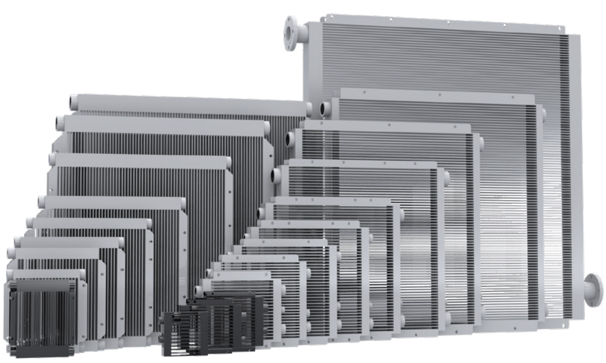
Specifications



Model 33~113



Model 07~23



Aluminum matrix

Hydrolync provides various aluminum matrices, and customers can choose between horizontal and vertical types to meet their requirements.

- Material: 3003/4004/5052
- Test pressure: 21 bar
- Test standard: ISO/DIS 10771-1
- Max. Working pressure: 14 bar
- Max. Working temperature: 120 ℃
- Paint: Epoxy / Polyester powder coatings - coating thickness 60 μm
- Paint color:
  Applied model:015~04 RAL 9005 / black
  Applied model:07~200 RAL 9006 / silver

Fan

- Fan blade material:
  Glass Reinforced Poly-amide (**PAG**)
  Working temperature: -40 ~ 120 ℃
- Fan boss material: Aluminum

House

- Material: steel
- Paint: powder coating
- Color: black, white (option)

Three phase AC motor

- IE3 certified motor (standard)
- Color: RAL 5010
- Insulation grade: F
- Ingress protection rating: IP55

Fan guard

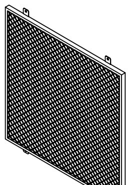
- Material: steel
- Surface treatment: zinc plating

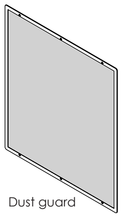
Air Oil Coolers

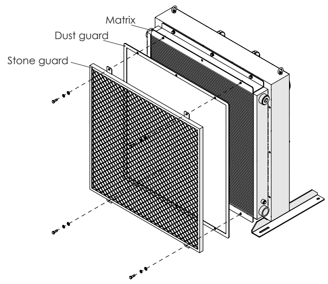
Accessories

Matrix protection

Coolers installed in harsh environments with dust, oil, and other contaminants can cause damage to the surface of the heat exchange fins by rocks bouncing off or decrease the heat exchange performance by accumulating oil and dust on the fins. In such cases, if the surface is damaged or covered in oil, it is necessary to replace the heat exchange fins as cleaning them is impossible. To minimize such losses, Stone Guards or Dust Guards can be installed on the heat exchange fins to protect them and reduce maintenance costs. It is important to note that regular cleaning of the Dust Guard is necessary to maintain its performance, and failure to do so may result in decreased ventilation and overload to the motor.


Stone guard


Dust guard



Attention

- To maintain the best cooling performance of the cooler, you should clean the dust guard twice a week.
- The cleaning cycle for the stone guard is about once every three months.
- If environmental pollution conditions are poor, reduce the cleaning cycle.

Thermal Switch

The temperature switch allows the cooler to control its operation and stop according to the temperature of the oil flowing through the heat exchanger.

Material: Thermostat Cell _ Bi-metal / Cell Housing _ Aluminum

Life span ≥ 100,000 times

Max. Current @ 24VAC 7.5A (Resistance load)

Type of contact : Normally open

Temperature difference ΔT : 10℃

Ingress protection rating : IP68 (Wire type), IP65(Din Plug type)

Connection : G 1/2

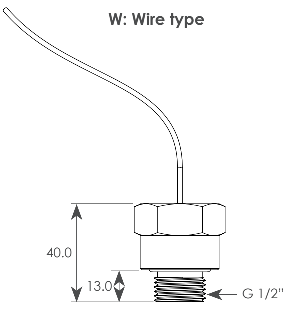
Wire length : 350mm

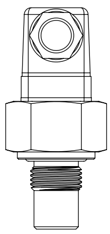

W: Wire type

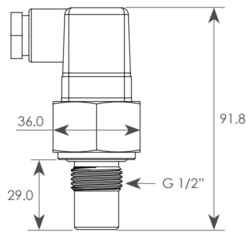

D: DIN plug type

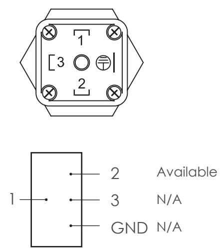
Type	Temperature	Working range
W/D	30	ON 35±5℃ / OFF 25±5℃
W/D	40	ON 45±5℃ / OFF 35±5℃
W/D	50	ON 55±5℃ / OFF 45±5℃
W/D	60	ON 65±5℃ / OFF 55±5℃
W/D	70	ON 75±5℃ / OFF 65±5℃

Selection of the thermal switch









DIN Plug wiring

Introduction of the new iAMC product

"Maximizing energy efficiency!"

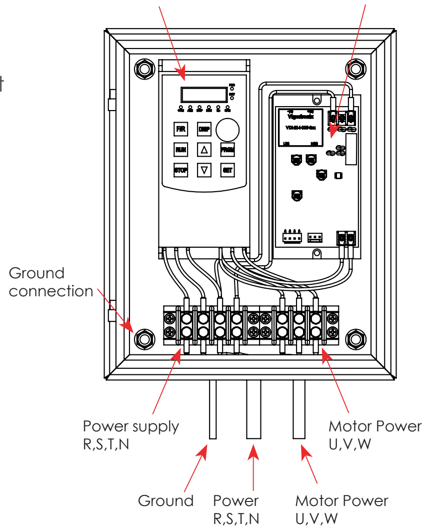
iAMC (Intelligent AC Motor Controller) for energy conservation

The iAMC is a controller developed to maximize the energy efficiency of HydroLync's HLA2 product. It operates based on the Laws of Affinity (Law 1c: Energy is proportional to the cube of shaft rotation speed), which provides the principle for saving energy by controlling the motor's speed. Reducing the motor speed by 20% results in approximately 50% energy consumption reduction, while reducing the motor speed by 60% leads to around 90% energy consumption reduction. Therefore, reducing the motor speed is the most direct and straightforward way to save energy in most motion control applications. The iAMC contributes to energy conservation and cost reduction by controlling the motor's speed, allowing for increased energy efficiency and operational savings.

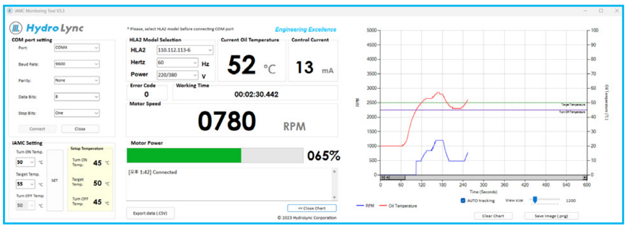
The industry with the highest energy consumption must increase energy efficiency to meet international standards by 2030 due to Net-Zero Carbon Emissions policies. HydroLync has completed the development of an intelligent control device that can meet these requirements and is currently preparing for mass production.

The iAMC is applied to models 33.35 and above, which have relatively high power consumption, aiming to achieve up to 60% energy savings through continuous research and development efforts.

The iAMC supports software with RS485 communication, allowing monitoring and configuration of operational conditions. This enables users to conveniently manage and control coolers.



RS485 Module



iAMC Software

iAMC applied HLA2 113-6-iAMC

Air Oil Coolers

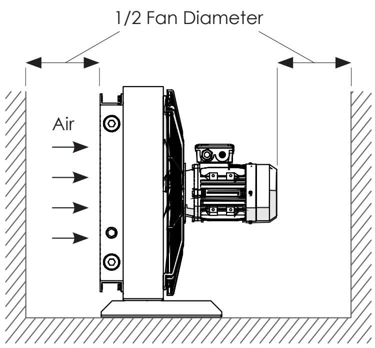
Installation and Maintenance

*Please refer to the product manual for more detailed information.

Installation

The cooler has a very sturdy structure and can be mounted on both the face and foot. When installing it on the front of a duct or ventilation shaft, use the 4 to 8 mounting holes in the U-channel of the matrix. Place the cooler so that the airflow is not restricted. The distance to the nearest wall should be at least half the diameter of the fan.

HLA2 Model	1/2 Fan Diameter
07	162.5
11	200
16	228
23	269
33, 35	325
56, 58	412
76, 78	450
110, 112, 113	530
200	625

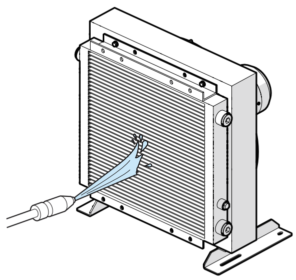


Cleaning the inside of the matrix

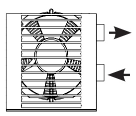
To clean the inside of the matrix, connect the cooler to a closed circuit and circulate perchloroethylene. After cleaning, flush the matrix with oil before reconnecting it to the hydraulic system.

Cleaning the outside of the matrix

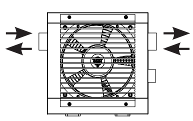
The easiest way to clean the fins is to use compressed air or wash them with water. Grease removers and high-pressure cleaning systems can also be used to remove foreign matter. When using a high-pressure cleaning system, make sure that the water stream is parallel to the fins and at least 3cm away from them. Be careful not to damage the fins with a strong water stream.



Connecting

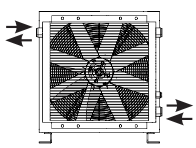


Model: 015



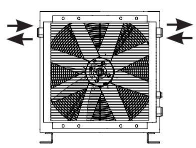
Model: 03, 04

A

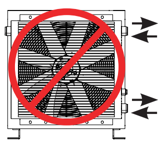


Model: 07-200

B



Model: 07-200



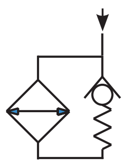
Incorrect connecting (No heat exchange)

Attention

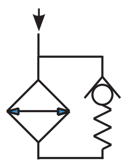
- Connect the pipes to the heat exchanger as shown in the diagram. Avoid incorrect connections that do not result in effective heat exchange.
- The air-oil cooler matrix is designed with a maximum operating pressure of 14 bar. If the cooler is installed in the return line, appropriate protective measures must be taken to prevent damage to the heat exchanger from pressure surges. Otherwise, an offline circulation pump-type cooling system (refer to HLO3 Series) may be necessary.
- Connecting the matrix with hoses is recommended. The appropriate size and type of hose will depend on the system pressure, flow rate, fluid, and temperature.

Applying Bypass

When a surge pressure occurs in the hydraulic system circuit, install a line check valve as shown in the right figure to protect the durability of the cooler matrix.



Correct



Incorrect

Calculation Examples

Example 1: If you know the heat dissipation

Heat dissipation	=	65 kW		
Max. Oil temperature	=	70°C		
Max. Ambient temperature	=	30°C		
Oil flow rate	=	250 L/min.		
Cooling capacity	=	$Q / (T_{oil} - T_{amb})$	=	65 /(70-30)
	=	**1.63** kW/°C		

Example 2: If you don't know the heat dissipation

*Typically, the heat dissipation for oil is 25-30% of the engine or motor power (for diesel engines or electric motors).

Engine/Motor	=	30 kW		
Heat dissipation	=	0.3 x 30 kW	=	9.0 kW
Max. Oil temperature	=	60°C		
Max. Ambient temperature	=	30°C		
Oil flow rate	=	35 L/min.		
Cooling capacity	=	$Q/(T_{oil} - T_{amb})$	=	9.0/(60-30)
	=	**0.30** kW/°C		

Example 3: If you don't know the heat dissipation and engine/motor power

Oil tank volume	=	220 L
Max. Oil temperature	=	60°C
Max. Ambient temperature	=	30°C
Oil flow rate	=	75 L/min.

*If the system operates without a cooling device, the oil temperature will increase by 25°C within 30 minutes.

ΔT = 25°C, Δt = 30 min. = 1800 sec.

$Q = (V_{vol} \times \rho_{oil} \times c_p \times \Delta T)/\Delta t$	=	(220 x 0.85 x 2.1 x 25)/1800
	=	5.45 kW
Cooling Capacity	=	5.45/(60-30)
	=	**0.18** kW/°C

Symbols

Q = heat dissipation [kW]

ρ_{oil} = oil density [0.85 kg/L]

c_p = specific heat capacity [2.1 kJ/kg°C)]

T_{oil} = max. oil temperature [°C]

T_{amb} = ambient temperature [°C]

V_{vol} = oil volume in the system [L]

Values

1 kcal/sec. = 4.187 kW

1 hp = 0.7358 kW

1 BTU /sec. = 1.053 kW

1 cfm = 4.72 x 10^{-4} m^3/sec.

Selection table

Company		**Date**	
Address		**Email**	
Tel/Fax			
Person in charge		**Mobile**	

The following information is necessary for accurate product selection.		
Heat dissipation		kW / HP
Flow rate		L/min
Fluid type	ISO VG	ex) ISO VG 46
Desired cooling temperature		°C
Max. Allowable pressure drop		bar
Ambient temperature		°C
AC motor	☐ 110V ☐ 220V ☐ 220/380V-60Hz ☐ 440-60Hz ☐ 230/400-50Hz	
Installation space	Height: x Width: x Depth:	
Installation height		m
Max. Pressure applied to the cooler		bar

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