

BOXFAN

2023 Air-to-Air heat exchanger



BOXFAN realizes highly efficient heat exchange by its uniquely designed radiation fin

Moisture and dust are shut out!

Reduces temperature in the panel to outside temperature

Air-to-Air heat exchanger

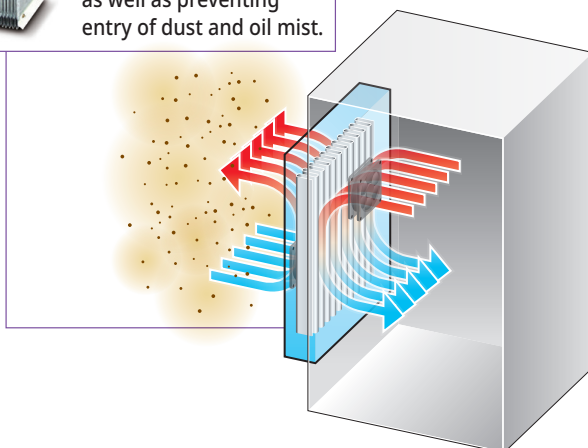
BOXFAN

Heated air inside the enclosure and cool outside air flow in mutually opposite directions along the BOXFAN's specially designed fin and efficient heat exchange takes place.



Radiation fin

Radiation fin functions to lower the temperature in the enclosure close to the temperature of outside air as well as preventing entry of dust and oil mist.



At harsh environment

Blocks dust, oil mist and moisture!
Best suited for thermal management of CNC control panels, robots and measuring devices working in a harsh environment where powder dusts from metal processing or grinding works are suspended in the air.



Metal working factory



Welding shop



Meets global standards

All standard series and OC-153H-A100/A200 of compact type are UL-listed. CE-marked models are also available.



Available from broad range of lineup

Standard type - Internal mounting

OC-17-A100/A200
 OC-12-A100/A200
 OC-15-A100/A200
 OC-28-A100/A200
 OC-31-A100/A200
 OC-30-A100/A200
 OC-20-A100/A200
 OC-37-A100/A200
 OC-40-A100/A200

Standard type - External mounting

OC-17S-A100/A200
 OC-12S-A100/A200
 OC-15S-A100/A200
 OC-28S-A100/A200
 OC-31S-A100/A200
 OC-30S-A100/A200
 OC-20S-A100/A200
 OC-37S-A100/A200
 OC-40S-A100/A200

CE-marked - Internal mounting

OC-12-A200-CE
 OC-28-A200-CE
 OC-37-A200-CE

CE-marked - External mounting

OC-12S-A200-CE
 OC-28S-A200-CE
 OC-37S-A200-CE

Compact type

OC-153H-A100/A200
 OC-201L
 OC-0810HIL/0820HIL

Thermostat

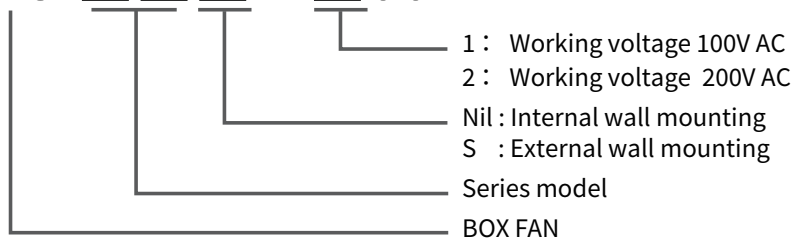
OTH-05/OTH-03

Standard Series

UL-listed standard models for wide application

How to see model

OC-□□□-A□00



Specifications

Connection	Model	Rated capacity WK(※1)		Weight	Rated voltage (※2)	Current consumption		Power consumption		No. of fan motors
		50Hz	60Hz			50Hz	60Hz	50Hz	60Hz	
Screw terminal block Internal lateral mounting ex. OC-15-A100	OC-17-A100	8	10	6.2kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
	OC-17-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-12-A100	10	12	5.8kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
	OC-12-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-15-A100	10	12	6.1kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
	OC-15-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-28-A100	16	20	10.7kg	Single phase 100-120VAC	1.00A	0.90A	88W	84W	4
	OC-28-A200				Single phase 200-230VAC	0.50A	0.45A			
	OC-31-A100	16	20	11.0kg	Single phase 100-120VAC	1.00A	0.90A	88W	84W	4
	OC-31-A200				Single phase 200-230VAC	0.50A	0.45A			
	OC-30-A100	25	30	12.5kg	Single phase 100-120VAC	1.40A	1.20A	100W	90W	2
	OC-30-A200				Single phase 200-230VAC	0.70A	0.60A			
	OC-20-A100	34	43	14.4kg	Single phase 100-120VAC	1.40A	1.20A	100W	90W	2
	OC-20-A200				Single phase 200-230VAC	0.70A	0.60A			
	OC-37-A100	35	42	16.1kg	Single phase 100-120VAC	2.80A	2.40A	200W	180W	4
	OC-37-A200				Single phase 200-230VAC	1.40A	1.20A			
OC-40-A100	60	80	27.6kg	Single phase 100-120VAC	2.80A	2.40A	200W	180W	4	
OC-40-A200				Single phase 200-230VAC	1.40A	1.20A				

(※1) Rated capacity means nominal cooling capacity when temperature difference between inside and outside the enclosure is 20K.

(※2) These units are designed for 100VAC or 200VAC single phase voltage supplies.

For different voltage specifications, please consult us.



Specifications

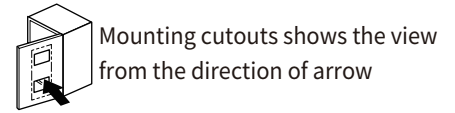
Connection	Model	Rated capacity W/ (※1)		Weight	Rated voltage (※2)	Current consumption		Power consumption		No. of fan motors
		50Hz	60Hz			50Hz	60Hz	50Hz	60Hz	
Screw terminal block External Lateral Mounting ex. OC-15S-A100 	OC-17S-A100	8	10	6.2kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
	OC-17S-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-12S-A100	10	12	5.8kg	Single phase 100-120VAC	0.5A	0.45A	44W	42W	2
	OC-12S-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-15S-A100	10	12	6.1kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
	OC-15S-A200				Single phase 200-230VAC	0.25A	0.23A			
	OC-28S-A100	16	20	10.7kg	Single phase 100-120VAC	1.00A	0.90A	88W	84W	4
	OC-28S-A200				Single phase 200-230VAC	0.50A	0.45A			
	OC-31S-A100	16	20	11.0kg	Single phase 100-120VAC	1.00A	0.90A	88W	84W	4
	OC-31S-A200				Single phase 200-230VAC	0.50A	0.45A			
	OC-30S-A100	25	30	12.5kg	Single phase 100-120VAC	1.40A	1.20A	100W	90W	2
	OC-30S-A200				Single phase 200-230VAC	0.70A	0.60A			
	OC-20S-A100	34	43	14.5kg	Single phase 100-120VAC	1.40A	1.20A	100W	90W	2
	OC-20S-A200				Single phase 200-230VAC	0.70A	0.60A			
	OC-37S-A100	35	42	16.1kg	Single phase 100-120VAC	2.80A	2.40A	200W	180W	4
	OC-37S-A200				Single phase 200-230VAC	1.40A	1.20A			
OC-40S-A100	60	80	28.3kg	Single phase 100-120VAC	2.80A	2.40A	200W	180W	4	
OC-40S-A200				Single phase 200-230VAC	1.40A	1.20A				

(※1) Rated capacity means nominal cooling capacity when temperature difference between cabinet and out air is 20K.

(※2) Please use it with single phase AC100, AC200V.

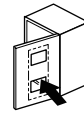
For different voltage specifications, please consult us.

Standard Series



Internal lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-17-A100 OC-17-A200</p> <p>Rated capacity (W/K) 8/10 (50/60Hz)</p> <p>●Accessories Filter guard (FFG-120) .. 1 Fin guard (OG-17FIN) 1 Filter (OF-S1)</p>		
<p>OC-12-A100 OC-12-A200</p> <p>Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>●Accessories Filter guard (FFG-120) .. 1 Fin guard (OG-12FIN) 1 Filter (OF-S1)</p>		
<p>OC-15-A100 OC-15-A200</p> <p>Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>●Accessories Filter guard (FFG-120) .. 1 Fin guard (OG-15FIN) 1 Filter (OF-S1)</p>		
<p>OC-28-A100 OC-28-A200</p> <p>Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>●Accessories Filter guard (FFG-120) .. 2 Fin guard (OG-28FIN) 1 Filter (OF-S1)</p>		
<p>OC-31-A100 OC-31-A200</p> <p>Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>●Accessories Filter guard (FFG-120) .. 2 Fin guard (OG-31FIN) 1 Filter (OF-S1)</p>		

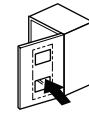


Mounting cutouts shows the view from the direction of arrow

Internal lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-30-A100 OC-30-A200 Rated capacity (W/K) 25/30 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) .. 1 Fin guard (OG-30FIN) 1 Filter (OF-S2)1</p>		
<p>OC-20-A100 OC-20-A200 Rated capacity (W/K) 34/43 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) .. 1 Fin guard (OG-20H FIN).... 1 Filter (OF-S2)1</p>		
<p>OC-37-A100 OC-37-A200 Rated capacity (W/K) 35/42 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ..2 Fin guard (OG-37FIN) 1 Filter (OF-S2)2</p>		
<p>OC-40-A100 OC-40-A200 Rated capacity (W/K) 60/80 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ..2 Fin guard (OG-40H FIN).... 2 Filter (OF-S2)2</p>		

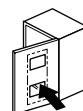
Standard Series



Mounting cutouts shows the view from the direction of arrow

External lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-17S-A100 OC-17S-A200 Rated capacity (W/K) 8/10 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1</p>		
<p>OC-12S-A100 OC-12S-A200 Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1</p>		
<p>OC-15S-A100 OC-15S-A200 Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1</p>		
<p>OC-28S-A100 OC-28S-A200 Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1</p>		
<p>OC-31S-A100 OC-31S-A200 Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1</p>		



Mounting cutouts shows the view from the direction of arrow

External lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-30S-A100 OC-30S-A200 Rated capacity (W/K) 25/30 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ... 1</p>		
<p>OC-20S-A100 OC-20S-A200 Rated capacity (W/K) 34/43 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ... 1</p>		
<p>OC-37S-A100 OC-37S-A200 Rated capacity (W/K) 35/42 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ... 2</p>		
<p>OC-40S-A100 OC-40S-A200 Rated capacity (W/K) 60/80 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-150) ... 2</p>		

CE-marked Series

Specifications

	Connection	Model	Rated capacity W/K (※1)		Weight	Rated voltage (※2)	Current consump.		Power consump.		No. of fan motors
			50Hz	60Hz			50Hz	60Hz	50Hz	60Hz	
External lateral mounting	Screw terminal block	OC-12-A200-CE	10	12	5.8kg	Single phase 200-230VAC	0.20-0.24A	0.18-0.21A	44W	42W	2
		OC-28-A200-CE	16	20	10.7kg	Single phase 200-230VAC	0.40-0.48A	0.36-0.42A	88W	84W	4
		OC-37-A200-CE	35	42	16.1kg	Single phase 200-230VAC	1.12-1.41A	1.14-1.21A	200W	180W	4
Internal lateral mounting		OC-12S-A200-CE	10	12	5.8kg	Single phase 200-230VAC	0.20-0.24A	0.18-0.21A	44W	42W	2
		OC-28S-A200-CE	16	20	10.7kg	Single phase 200-230VAC	0.40-0.48A	0.36-0.42A	88W	84W	4
		OC-37S-A200-CE	35	42	16.1kg	Single phase 200-230VAC	1.12-1.41A	1.14-1.21A	200W	180W	4

(*1) Rated capacity means nominal cooling capacity when temperature difference between enclosure interior and outer air is 20K.

(*2) Use only within the range of 200 to 230VAC, single phase.

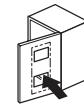


Mounting cutouts shows the view from the direction of arrow

Internal lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-12-A200-CE</p> <p>Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>● Accessories Filter guard1 (FFG-120) Fin guard1 (OG-12 FIN) Filter1 (OF-S1)</p>		
<p>OC-28-A200-CE</p> <p>Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>● Accessories Filter guard2 (FFG-120) Fin guard1 (OG-28 FIN) Filter2 (OF-S1)</p>		

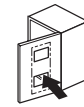
Internal lateral mounting



Mounting cutouts shows the view from the direction of arrow

Specifications	Outline drawing	Mounting cutout
<p>OC-37-A200-CE</p> <p>Rated capacity (W/K) 35/42 (50/60Hz)</p> <p>● Accessories Filter guard2 (FFG-150) Fin guard1 (OG-37 FIN) Filter2 (OF-S2)</p>		

External lateral mounting



Mounting cutouts shows the view from the direction of arrow

Specifications	Outline drawing	Mounting cutout
<p>OC-12S-A200-CE</p> <p>Rated capacity (W/K) 10/12 (50/60Hz)</p> <p>● Accessories Filter guard1 (FFG-120)</p>		
<p>OC-28S-A200-CE</p> <p>Rated capacity (W/K) 16/20 (50/60Hz)</p> <p>● Accessories Filter guard..... 2 (FFG-120)</p>		
<p>OC-37S-A200-CE</p> <p>Rated capacity (W/K) 35/42 (50/60Hz)</p> <p>● Accessories Filter guard 2 (FFG-150)</p>		

Compact Series

Specifications

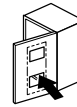
	Connection	Model	Rated capacity W/K(※1)		Weight	Rated voltage (※2)	Current consumption		Power consumption		No. of fan motors
			50Hz	60Hz			50Hz	60Hz	50Hz	60Hz	
Internal lateral mounting	Screw terminal block	OC-153H-A100	9	11	4.2kg	Single phase 100-120VAC	0.50A	0.45A	44W	42W	2
		OC-153H-A200				Single phase 200-230VAC	0.25A	0.23A			
	Power cord	OC-201L	6.5		3.5kg	24VDC	0.52A		12.5W		4
Semi-recessed lateral mounting	Power cord	OC-0810HIL	6.5	8	3.0kg	Single phase 100VAC	0.44A	0.36A	28W	22W	2
		OC-0820HIL				Single phase 200VAC	0.22A	0.18A			

(*1) Rated capacity means nominal cooling capacity when temperature difference between enclosure interior and outer air is 20K.

(*2) OC-153H-A※※ models are designed for 100VAC or 200VAC single phase voltage supplies.

For different voltage specifications, please consult us.

For other models, voltage fluctuation range should be +/-10% from the rating.

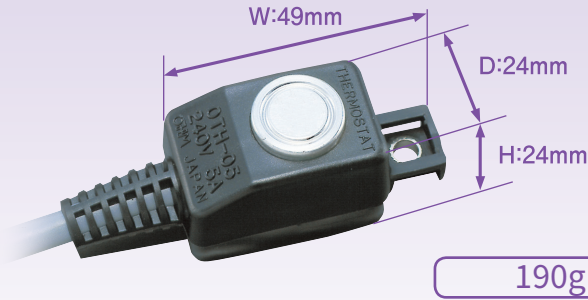


Mounting cutouts shows the view from the direction of arrow

Internal lateral mounting

Specifications	Outline drawing	Mounting cutout
<p>OC-153H-A100 OC-153H-A200</p> <p>Rated capacity (W/K)</p> <p>9/11 (50/60Hz)</p> <p>● Accessories Filter guard (FFG-120) ... 1 Fin guard (OG-153HFIN)..... 2 Filter (OF-S1) 1</p>		
<p>OC-201L</p> <p>Rated capacity (W/K)</p> <p>6.5 (50/60Hz)</p>		
<p>OC-0810HIL OC-0820HIL</p> <p>Rated capacity (W/K)</p> <p>6.5/8 (50/60Hz)</p> <p>● Accessories Filter(OF-08HIL) 1</p>		

Thermostat OTH-05

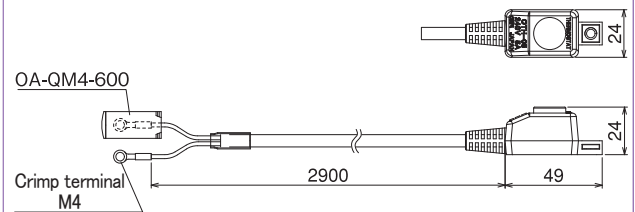


Specifications

Model	OTH-05
Output contact rating	240VAC 5A (cosφ=1)
Temperature setting range	OPEN (OFF) 29±3°C
	CLOSE (ON) 37±4°C
Contact rating	approx. 5A resistance load
Dimensions	W49×H24×D24 mm (excl. cable)
Weight	190g (incl. cable)

- ◆ For energy saving
- ◆ Durable in oily atmosphere
- ◆ Fixed temperature setting
- ◆ Bimetallic

Outline drawing



Installation:
Fix with a banding band
or M4 screw

Thermostat OTH-03

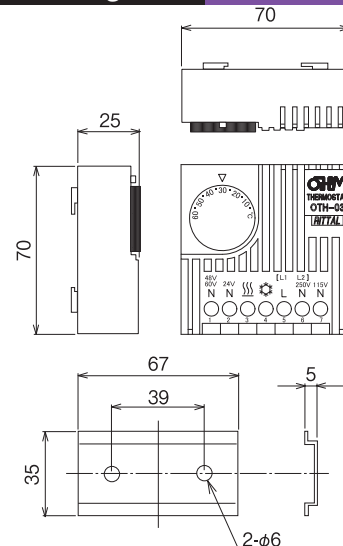


Specifications

Model	OTH-03
Output contact rating	250/115/60/48/24VAC 60/48/24VDC
Temperature setting range	+5 to +60°C (variable)
Contact rating	AC10A DC=30W resistance load between terminals 5 and 3 (for heater)
	AC5A DC=30W resistance load between terminals 5 and 4 (for heat exchanger)
Dimensions	W70×H70×D25 mm
Weight	105g

- ◆ For energy saving
- ◆ Durable in oily atmosphere
- ◆ Fixed temperature setting
- ◆ Bimetallic



Outline drawing



Installation:
Mount to DIN rail using the enclosed DIN rail clip,
or mount to the wall directly


Option

Maintenance parts

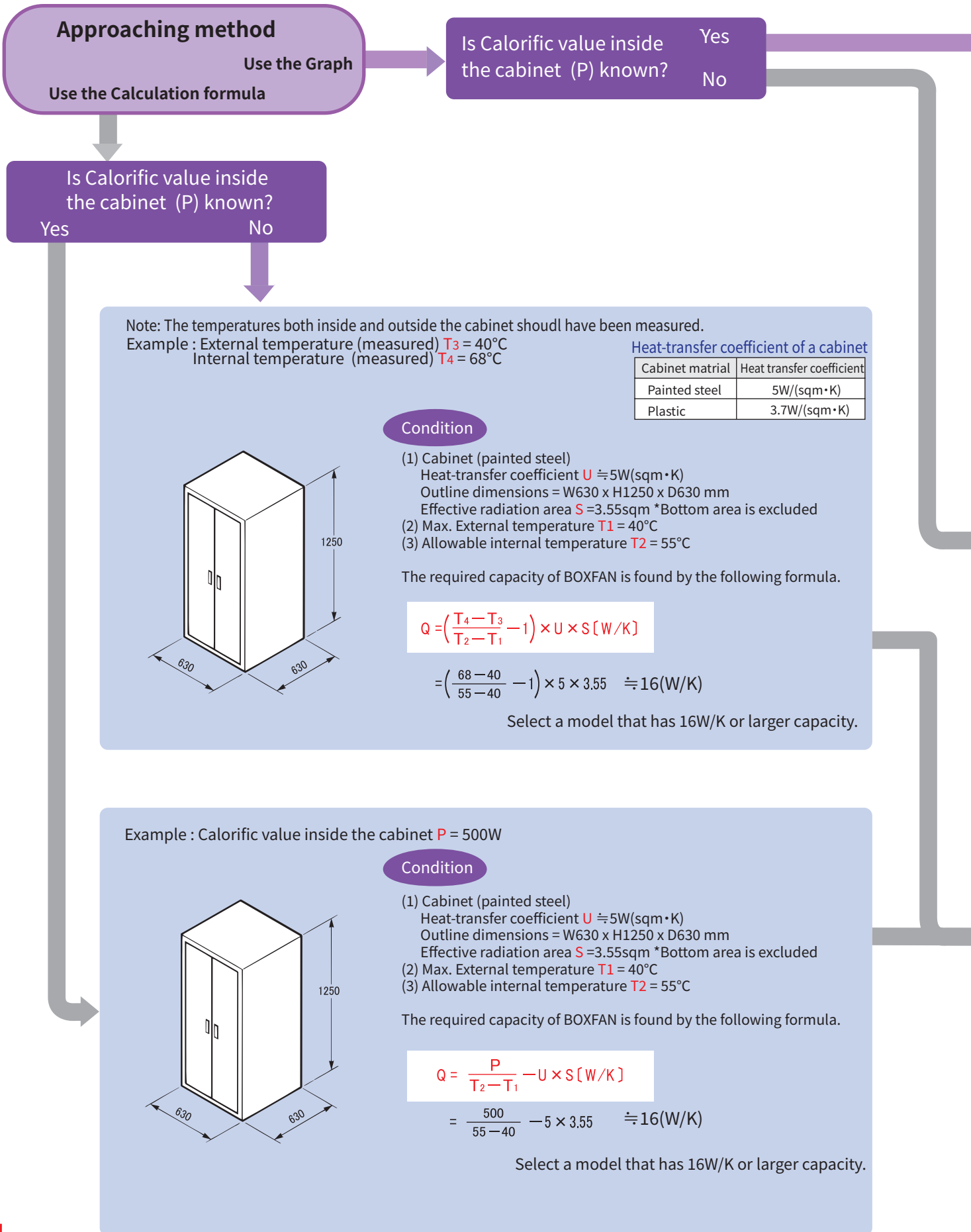
Filter guard																							
	<table border="1"> <thead> <tr> <th>Model</th> <th>Applicable models of BOXFAN</th> </tr> </thead> <tbody> <tr> <td>FFG-120</td> <td>OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE, OC-28(S)-A200-CE, OC-153H-A100/A200</td> </tr> <tr> <td>FFG-150</td> <td>OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE</td> </tr> </tbody> </table>	Model	Applicable models of BOXFAN	FFG-120	OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE, OC-28(S)-A200-CE, OC-153H-A100/A200	FFG-150	OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE																
	Model	Applicable models of BOXFAN																					
FFG-120	OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE, OC-28(S)-A200-CE, OC-153H-A100/A200																						
FFG-150	OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE																						
Fin guard																							
	<table border="1"> <thead> <tr> <th>Model</th> <th>Applicable models of BOXFAN</th> </tr> </thead> <tbody> <tr> <td>OG-17 FIN</td> <td>OC-17(S)-A100/A200</td> </tr> <tr> <td>OG-12 FIN</td> <td>OC-12(S)-A100/A200, OC-12(S)-A200-CE</td> </tr> <tr> <td>OG-15 FIN</td> <td>OC-15(S)-A100/A200</td> </tr> <tr> <td>OG-28 FIN</td> <td>OC-28(S)-A100/A200, OC-28(S)-A200-CE</td> </tr> <tr> <td>OG-31FIN</td> <td>OC-31(S)-A100/A200</td> </tr> <tr> <td>OG-30 FIN</td> <td>OC-30(S)-A100/A200</td> </tr> <tr> <td>OG-20H FIN</td> <td>OC-20(S)-A100/A200</td> </tr> <tr> <td>OG-37 FIN</td> <td>OC-37(S)-A100/A200, OC-12(S)-A200-CE</td> </tr> <tr> <td>OG-40H FIN</td> <td>OC-40(S)-A100/A200</td> </tr> <tr> <td>OG-153H FIN</td> <td>OC-153H-A100/A200</td> </tr> </tbody> </table>	Model	Applicable models of BOXFAN	OG-17 FIN	OC-17(S)-A100/A200	OG-12 FIN	OC-12(S)-A100/A200, OC-12(S)-A200-CE	OG-15 FIN	OC-15(S)-A100/A200	OG-28 FIN	OC-28(S)-A100/A200, OC-28(S)-A200-CE	OG-31FIN	OC-31(S)-A100/A200	OG-30 FIN	OC-30(S)-A100/A200	OG-20H FIN	OC-20(S)-A100/A200	OG-37 FIN	OC-37(S)-A100/A200, OC-12(S)-A200-CE	OG-40H FIN	OC-40(S)-A100/A200	OG-153H FIN	OC-153H-A100/A200
	Model	Applicable models of BOXFAN																					
	OG-17 FIN	OC-17(S)-A100/A200																					
	OG-12 FIN	OC-12(S)-A100/A200, OC-12(S)-A200-CE																					
	OG-15 FIN	OC-15(S)-A100/A200																					
	OG-28 FIN	OC-28(S)-A100/A200, OC-28(S)-A200-CE																					
	OG-31FIN	OC-31(S)-A100/A200																					
	OG-30 FIN	OC-30(S)-A100/A200																					
	OG-20H FIN	OC-20(S)-A100/A200																					
	OG-37 FIN	OC-37(S)-A100/A200, OC-12(S)-A200-CE																					
OG-40H FIN	OC-40(S)-A100/A200																						
OG-153H FIN	OC-153H-A100/A200																						
Replacement filter																							
	<table border="1"> <thead> <tr> <th>Model</th> <th>Applicable models of BOXFAN</th> </tr> </thead> <tbody> <tr> <td>OF-S1</td> <td>OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE, OC-28(S)-A200-CE, OC-153H-A100/A200</td> </tr> <tr> <td>OF-S2</td> <td>OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE</td> </tr> <tr> <td>OF-08HIL</td> <td>OC-0810HIL/OC-0820HIL</td> </tr> </tbody> </table>	Model	Applicable models of BOXFAN	OF-S1	OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE, OC-28(S)-A200-CE, OC-153H-A100/A200	OF-S2	OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE	OF-08HIL	OC-0810HIL/OC-0820HIL														
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OF-08HIL	OC-0810HIL/OC-0820HIL																						

Option

■ Maintenance parts

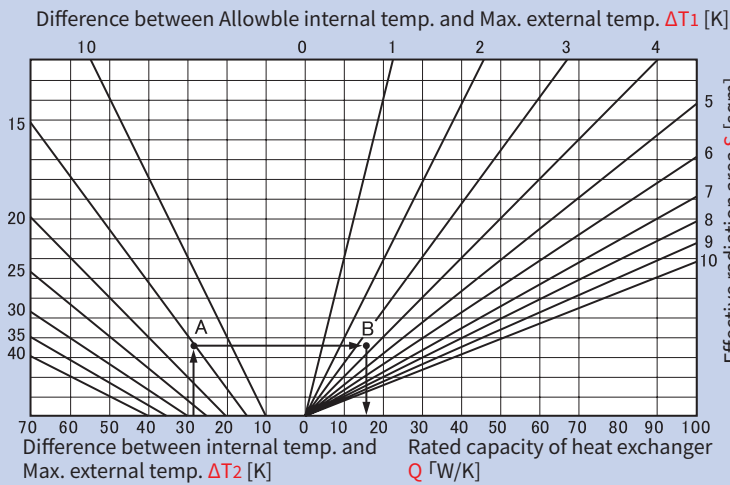
Replacement fan	
Model	Applicable models of BOXFAN
	FM-11938M-MV-00 OC-17(S)-A100/A200, OC-12(S)-A100/A200, OC-15(S)-A100/A200, OC-28(S)-A100/A200, OC-31(S)-A100/A200, OC-12(S)-A200-CE OC-28(S)-A200-CE, OC-153H-A100/A200
	FM-15055M-MV-00 OC-30(S)-A100/A200, OC-20(S)-A100/A200, OC-37(S)-A100/A200, OC-40(S)-A100/A200, OC-37(S)-A200-CE
FM-06025P-D24-00	OC-201L
FM-11925P-A100-00	OC-0810HIL
FM-11925P-A200-00	OC-0820HIL

How to select a model



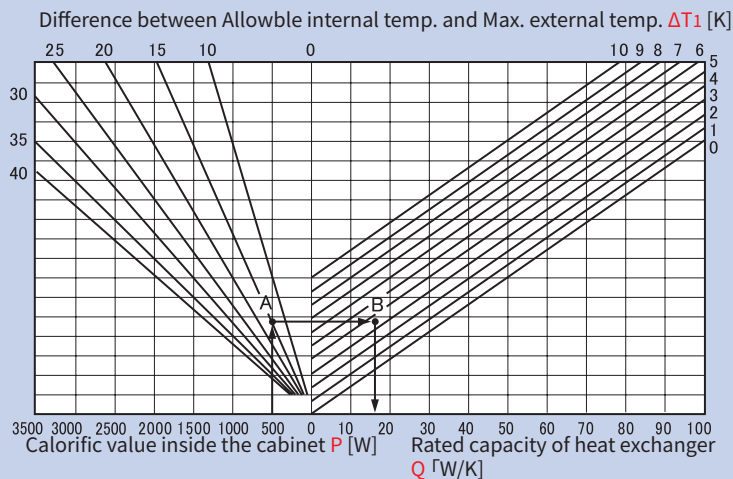
Note: The temperatures both inside and outside the cabinet should have been measured.

Example : External temperature (measured) = 40°C, Internal temperature (measured) = 68°C,
Allowable temperature inside the cabinet = 55°C



- 1) The temperature difference between inside and outside of the cabinet ΔT_2 is $68-40 = 28[K]$. ΔT_1 is the difference between Allowable internal temp. and Max. external temp., that is $55-40 = 15K$. Find the intersection point **A** of these two.
- 2) Draw a horizontal line from the point **A** to the right of the graph to find out the intersection point **B** of it with the effective radiation area **S**, 3.55sqm.
- 3) Draw a vertical line from the point **B** to find the required capacity **Q**, which is 16W/K. Select a model that has 16W/K or larger capacity.

Example : Calorific value inside the cabinet $P = 500W$
Allowable temperature inside the cabinet = 55°C, Max. external temperature = 40°C



- 1) The calorific value P is 500(W). ΔT_1 is the difference between Allowable internal temp. and Max. external temp., that is $55-40 = 15K$. Find the intersection point **A** of these two.
- 2) Draw a horizontal line from the point **A** to the right of the graph to find out the intersection point **B** of it with the effective radiation area **S**, 3.55sqm.
- 3) Draw a vertical line from the point **B** to find the required capacity **Q**, which is 16W/K. Select a model that has 16W/K or larger capacity.

The required rated capacity of BOXFAN has been found out.

Select a model which capacity is not less than the result.

What is the unit W/K (watt per kelvin)?

W : Heat flow $1W = 1 J/S$

1W/K means the ability to let heat flow of 1 W out from a cabinet when the temperature difference between the cabinet interior and the external air is 1K.

Thus, 5W/K is the ability to transfer heat of 5W from inside to outside when the temperature differential between inside and outside of the cabinet is 1K.

- <Caution>
- (1) The airtightness, location of heat generators and dirt on heat radiation unit or filter can affect the performance of a heat exchanger. It is recommended to make selection with allowance for such losses.
 - (2) The internal temperature of a cabinet should not exceed 60 deg. C. with operating a heat exchanger.
 - (3) Because of its operating principle, heat exchanger's performance declines when temperature gap between inside and outside narrows.
 - (4) Each rated capacity of our heat exchangers indicates the nominal value when cabinet interior's temperature is higher than outside by 20deg. C. If temperature gap is smaller than this, the capability declines. Use of heat exchanger is not effective when such gap is less than 10 deg. C.

Carorific values of electric components

General note

- (1) Minor components
Pilot lamps, cables and other components than listed here also generate heat in a cabinet but they are omitted for the reasons that those values are small and not easily assessable.
- (2) Carorific values
The values listed here are rough standard for each component and can be variable depending on the state of load. Please use the data taking this into your account. Even the carorific value of a component is very small and therefore not mentioned here, the total value can be nonnegligible if there are many. Always try to find appropriate values at the site for calculation.
- (3) Unlisted items
For the components like PLC which are not listed here, refer to the data provided by the manufacturer. These components are often used in a cabinet but it is difficult to outline their carorific values.
- (4) Carorific values in the following table
This table shows standard values of generally used components based on our study. Actual values may differ from them depending on each specifications. See the information provided by the manufacturer.

Carorific value (Rough standard)

Note) All values are approximate and each actual value can differ from it.

1. Power supply Note: These information are adapted from "Technical data No. 001-2004 "Carorific value guideline for electric components in cabinets" by Thermal Solution Equipment for Cabinet Technical Sociation , Japan.

Components	Carorific value estimate	Remarks
Small transformer	Rated capacity up to 100VA ... 15% 300VA ... 10% 1kVA ... 7% 3kVA ... 5% 5kVA ... 4% 10kVA ... 3%	<ul style="list-style-type: none"> • Calculated as Loss = Carorific value • The smaller the capacity, the bigger the heat generation ratio.
Voltage regulator	Rated capacity up to 500VA ... 10% 1kVA ... 7% 10kVA ... 5%	<ul style="list-style-type: none"> • Calculated as Loss = Carorific value • The smaller the capacity, the bigger the heat generation ratio.
Constant-voltage power supply	Rated capacity up to 2kVA ... 15% 10kVA ... 10%	<ul style="list-style-type: none"> • Calculated as Loss = Carorific value
Uninterruptible power supply (UPS)	Rated capacity up to 1kVA ... 20% 20kVA ... 15%	<ul style="list-style-type: none"> • The smaller the capacity, the bigger the heat generation ratio. • Values are at floating charge status of storage batteries • Constant feeding by inverter
Switching regulator	20 to 30% of the rated capacity	<ul style="list-style-type: none"> • Carorific value with 100% rated output • The smaller the capacity, the bigger the heat generation ratio.
Low-voltage capacitor	0.2 to 0.3% of the rated capacity	<ul style="list-style-type: none"> • Calculated as Loss = Carorific value • Capacities should be converted to kVA for calculation (100V 60Hz 1kVA = 265.3 μ F)

2. Amplifiers

Components	Carorific value estimate	Remarks																						
AC Servo amplifier	Rated capacity up to 0.1kVA ... 50% 0.5kVA ... 15% 1kVA ... 8% 3kVA ... 5% 5kVA ... 4% 11kVA ... 3.5% 22kVA ... 3%	<ul style="list-style-type: none"> • Carorific values with 100% output of the rating per unit • The smaller the capacity, the bigger the heat generation ratio. • With power supply equipped 																						
Inverter	Rated capacity up to 0.4kW ... 12.5% 0.75kW ... 11% 1.5kW ... 8% 2.2kW ... 7% 3.7kW ... 6% 7.5kW ... 6% 11kW ... 5% 22kW ... 4.5% 30kW ... 4%	<ul style="list-style-type: none"> • Carorific values with 100% rated output • The smaller the capacity, the bigger the heat generation ratio. • Carorific values at constant output of the rating 																						
Thyristor	Rated current up to <table style="display: inline-table; border: none;"> <tr> <td>1-phase</td> <td>3-phase</td> </tr> <tr> <td>25A ... 50W</td> <td>90W</td> </tr> <tr> <td>35A ... 55W</td> <td>115W</td> </tr> <tr> <td>50A ... 75W</td> <td>175W</td> </tr> <tr> <td>75A ... 90W</td> <td>250W</td> </tr> <tr> <td>100A ... 120W</td> <td>320W</td> </tr> <tr> <td>150A ... 200W</td> <td>520W</td> </tr> <tr> <td>250A ... 350W</td> <td>930W</td> </tr> <tr> <td>350A ... 400W</td> <td>1150W</td> </tr> <tr> <td>450A ... 560W</td> <td>1600W</td> </tr> <tr> <td>600A ... 700W</td> <td>2000W</td> </tr> </table>	1-phase	3-phase	25A ... 50W	90W	35A ... 55W	115W	50A ... 75W	175W	75A ... 90W	250W	100A ... 120W	320W	150A ... 200W	520W	250A ... 350W	930W	350A ... 400W	1150W	450A ... 560W	1600W	600A ... 700W	2000W	<ul style="list-style-type: none"> • Values in the right are carorific values • 3-phase types have bigger values than 1-phase types
1-phase	3-phase																							
25A ... 50W	90W																							
35A ... 55W	115W																							
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600A ... 700W	2000W																							

Technical data

3. Wiring components

Components	Carorific value estimate	Remarks
Molded case circuit breaker (MCCB)	(MCCB) Rated capacity up to 20A ... 7W 50A ... 14W 100A ... 21W 225A ... 45W 400A ...115W	<ul style="list-style-type: none"> • Carorific value with 100% rated current • Proportional to the number of poles • Values are for 3P
Earth leakage circuit breaker (ELCB)	(ELCB) (※ 1) Rated current up to 225A ...MCCB + 5W 400A ...MCCB+30W (Ground-fault electronic circuit, etc.)	<ul style="list-style-type: none"> • ELCB is unrelated to the number of poles (※ 1) Smaller components have smaller heat generation ratio.
Electromagnetic contactor	Rated capacity up to 4kW ... 7W 11kW ... 15W 22kW ... 30W 37kW ... 50W 55kW ... 90W 110kW ...200W 160kW ...340W 200kW ...460W	<ul style="list-style-type: none"> • Carorific value with 100% rated current • Values are for 3P • Values are for 220VAC
Thermal overload relay	Rated current up to 15A ... 2W /pole 30A ... 3W /pole 100A ... 7W /pole 150A ... 9W /pole 450A ...10W /pole 600A ...12W /pole	<ul style="list-style-type: none"> • Carorific vales with max. stabilized current
Electromagnetic relay	5W	• Carorific values with 100% rated current

4. Control devices

Components	Carorific value estimate	Remarks
Small relays	Miniature relay : 1W to 2W per piece Power relay : 2W to 3 W per piece	
Solid-state relay (SSC、SSR)	Load current value x 1.8W	• When voltage drop with closed circuit is 1.8V
Temperature controller	Power consumption is regarded as carorific value	
PLC	Micro sequencer : • For AC power 10 to 40 I/O points 30 to 50W 64 or more I/O points I/O points × 1W • For DC power I/O points × 0.5W Other sequencers : See the output current value of the power supply unit. In designing phase, use the max. value of the power supply unit.	

5. Information and telecommunication equipment

Components	Carorific value estimate	Remarks
PC Monitor Server Switching hub Router Media converter	Power consumption is regarded as carorific value	
Booster	Consumption current - Transmission power output	
Indicator	LED indicator : Consumption current x 0.4 LC: Power consumption is regarded as carorific value	

6. Others

Components	Carorific value estimate	Remarks
Fan motor	90mm sq.size ...10W 120 mm sq.size ...20W 140 mm sq.size ..40W 150 mm dia.size ..55W 180 mm sq.size ..55W	<ul style="list-style-type: none"> • Rated input is regared as carorific value • Values are for axial fans • Values are for AC power input • Sizes are for frames

- [Notes] (1) When using rated capacities (VA) or rated outputs (VA), multiply those values by percentage to obtain the carorific value.
(2) Actual values may differ from the above table. Check the values on the catalogs and technical information provided by the manufacturer.
(3) Wires and other small components are heating source as well. Take those values into your account.



Distributor _____



OHM ELECTRIC CO., LTD.

7000-21, Nakagawa, Hosoe, Hamana-ku, Hamamatsu, Shizuoka 431-1304, JAPAN

TEL +81-53-522-5562 FAX +81-53-523-2362

E-mail : info@ohm.co.jp

www.ohm.jp/



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- The contents of this catalog are subject to change without prior notice for product improvements.

- The contents of this catalog is as of April 2304.

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