



# HEAT EXCHANGERS

Contributing to various industries

Taisei Kogyo Co.,Ltd.

# TAISEI Low Fin Tube

~For best heat exchanger~

## TAISEI Low Fin Tube



SUS304 (φ12.7)  
STB340 (φ12.7)  
C7060T (φ12.7)  
C6872T (φ12.7)  
C1220T (φ12.7)  
C1220T (φ9)

A heat exchanger using low fin tubes is known to show high-performance in heat transmission of water and oil. Its fins produce a large heat transmission surface.

Furthermore, Taisei pursued the best performance and succeeded in producing "Taisei Low Fin Tube" which has the smallest tube diameter and the largest number of fins in the heat exchanger industry.

That is the reason for Taisei heat exchanger's incomparable high-performance and compact design. We proudly claim that our Taisei's heat exchanger is a top quality product.

### Internal production

TAISEI developed a rolling machine to create high-quality low fin tubes.

### Smallest diameter for heat exchanger (φ9~)

The smallest diameter tube increases the coefficient of heat transmission and more tubes can be installed in shell. This results in cooling surfaces larger than other equivalent heat exchangers.

### The largest number of fins in the heat exchanger industry (28 fins / inch)

More fins are available, therefore producing larger cooling surfaces.

### Various types of fin tubes

As the picture shows, we have various materials and sizes of low fin tubes.  
(φ9, φ12.7, φ15.88)

### Compact and high performance

### cost performance


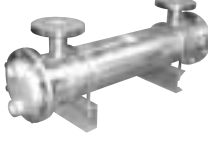

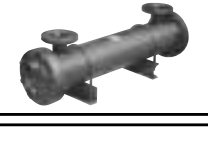
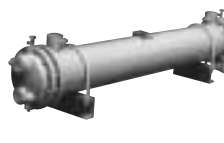
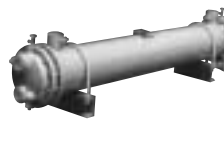

### Flexibility

### The top quality heat exchanger

**Top sales in the Japanese market**  
(shell & tube type)



# INDEX

Type	Construction	Design Pressure	Model	Cooling Surface (m <sup>2</sup> )		
				PASS	Tube	
	2PASS	Low Fin Tube	1.0 MPa	FCF	00□ 0.15~0.3	1□ 0.4~1.1
					2□ 1.3~3.5	3□ 2.5 8
					4□ 5.5 10	
	2PASS	Bare Tube (SUS304)	1.0 MPa	TCW	1□ 0.15~0.3	2□ 0.5~1.3
					3□ 1.5~3.3	
	2PASS	Low Fin Tube	1.0 MPa	FCD	1□ 0.4~1.1	2□ 1.3~3.5
					3□ 2.5~3.5	
	2PASS	Low Fin Tube	1.0 MPa	FPD	5□ 9 27	6□ 17 33
	2PASS (4PASS)	Low Fin Tube	1.0 MPa	FTC (FTS)	150A 6 11	200A 7 23
					250A 18 44	300A 31~70
	2PASS	Bare Tube	1.0 MPa	TC	125A 1~1.5	150A 2~3
					175A 4 6	200A 7 9
					250A 10 12	300A 13 20
	2PASS	Low Fin Tube	1.0 MPa	FCX	1□ 0.4~1.1	2□ 1.3~3.5
					FCW	3□ 2.5 8
				Tank Mount		2PASS

Shell & Tube

Heat Exchange (kW)	Flow Rate (L/min)	Feature · Accessory · Option		Page
		Flange Shell Side	Flange Tube Side	
~6	~100	φ9 Taisei Low Fin Tube		3
3~16	~150	φ9 Taisei Low Fin Tube		
3~44	15~240	φ9 Taisei Low Fin Tube		
9 81	50 400	φ9 Taisei Low Fin Tube		
9 91	50 400	φ9 Taisei Low Fin Tube		
Please inquire us.		ALL SUS	Tube & Plate Welded	7
		ALL SUS	Tube & Plate Welded	
		ALL SUS		
3~16	~150	φ9 Taisei Low Fin Tube	Sea Water	9
3~44	15~240	φ9 Taisei Low Fin Tube	Sea Water	
9 81	50 360	φ9 Taisei Low Fin Tube	Flange Tube Side Flange Shell Side Sea Water	
35 170	150 650	φ27 Taisei Low Fin Tube	Flange Tube Side Flange Shell Side	13
36 230	150 800	φ27 Taisei Low Fin Tube	Flange Tube Side Flange Shell Side	
20 73	50 320	φ27 Taisei Low Fin Tube	Flange Shell Side Sea Water Thermo Meter	17
32 133	100 450	φ27 Taisei Low Fin Tube	Flange Shell Side Sea Water Thermo Meter	
36~	150 650	φ27 Taisei Low Fin Tube	Flange Shell Side Sea Water Thermo Meter	19
60~	200 800	φ27 Taisei Low Fin Tube	Flange Shell Side Sea Water Thermo Meter	
5~13	30~140		Flange Shell Side Sea Water Thermo Meter	23
9~27	60~250		Flange Shell Side Sea Water Thermo Meter	
23~50	100~300		Flange Shell Side Sea Water Thermo Meter	
29~74	110~380		Flange Shell Side Sea Water Thermo Meter	
32 98	120 500		Flange Shell Side Sea Water Thermo Meter	
44 180	170 550		Flange Shell Side Sea Water Thermo Meter	
3~16	~150	φ9 Taisei Low Fin Tube		25
3~44	15~240	φ9 Taisei Low Fin Tube		29
9 81	50 350	φ9 Taisei Low Fin Tube		
3~15	~150	φ9 Taisei Low Fin Tube		33
3~38	15~240	φ9 Taisei Low Fin Tube		

φ9 Taisei Low Fin Tube φ27 Taisei Low Fin Tube Taisei creates unique Low Fin Tube. (refer to the certain page)

Tube & Plate Welded For conjointness Seal weld is used.

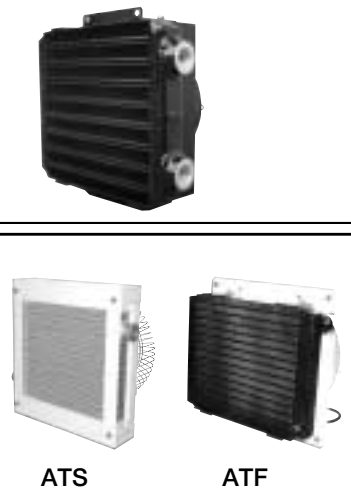
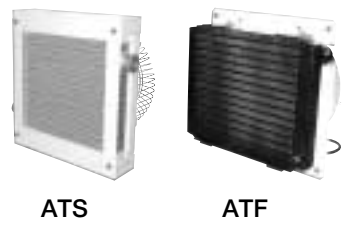
Sea Water Sea water can be used for cooling.








Thermo Meter Thermometer can be fitted on shell side.(oil side)

Flange Shell Side Flange connection can be arranged at shell side (oil side)


Flange Tube Side Flange connection can be arranged at tube side (water side)


# INDEX














































Type	Construction		Design Pressure	Model	Cooling Surface (m <sup>2</sup> )	
	PASS	Tube			0	5 10 15 20 25
 Air Cooled	2PASS	Aluminum core	1.0 MPa	ATK	1552F	1
					2032F	1
					2432F	2
	1PASS	Aluminum core	1.0 MPa	ATL	1231	0.65
					1531	
 ATS      ATF	1PASS	Aluminum core	1.0 MPa	ATS	3061	2.9
					3062	
					3561	4.5
	2PASS	Aluminum core	1.0 MPa	ATF	4061	6.8
					4062	
					5061	9.8
				6061	13.9	





- 記号
-  Voltage of fan motor is AC100V
  -  Voltage of fan motor is AC200V
  -  Voltage of fan motor is AC400V
  -  Voltage of fan motor is DC12V  
may be different shape
  -  Voltage of fan motor is DC24V  
may be different shape
  -  Other voltages available
  -  Oil motor is available

Attention: Cooling Surface means area of air side (out side)

Type	Construction		Design Pressure	Model	Cooling Surface (m <sup>2</sup> )		
	PASS	Tube			0	1.00 2.00 3.00 4.000 5.00	
 Plate	Brazing Type	1PASS	SUS316	3.1 MPa	TB	5	0.09
						8	0.18~0.64
						10	0.57~1.21
						25	1.76~3.02

 Option Bracket

Heat Exchange (kW)	Flow Rate (L/min)	Feature · Accessory · Option					Page
		0	5 10 15	0	50 100 150 200		
~0.7	~10						37
~1.1	~20						
~1.7	~20						
~1	~12						39
~3.3	~110						
~5.8	~160						41
~10.5	~230						
~15.0	~240						45
~18.4	~240						

Heat Exchange (kW)	Flow Rate (L/min)	Feature · Accessory · Option	Page
		0	
~4.4	~65		51
~16.9	~65		
~32.5	~200		
~52.3	~200		

For safety: please check caution and exclusion before installation.

※ Above table shows rough idea. Detail shows in each page.

## ■ Select oil cooler

- Select the type, model and size of cooler based on heat exchanged volume shown in graph.
- Contact Taisei and/or a distributor if your application is not covered by the selection graph. Enter your specifications on the form "Request For Quotation" and fax it to Taisei and/or your distributor. The best cooler will then be recommended.

The following is an example for selecting cooler where the oil viscosity and oil temperature are similar to the graph on the following page.

**Step 1:** Complete the equation of heat exchanged volume

$$Q = W_o \times 60 \times \rho_o \times C_o \times (T_1 - T_2) \quad \text{Reference the form RFQ for abbreviations.}$$

$$= W_w \times 60 \times \rho_w \times C_w \times (t_2 - t_1) \quad \rho: \text{Specific Gravity} \quad C: \text{Specific Heat}$$

**Step 2:** Calculate mean temperature difference

$$\theta = \frac{(T_1 - t_2) - (T_2 - t_1)}{2.3 \log \frac{(T_1 - t_2)}{(T_2 - t_1)}} \quad \text{Where } \theta \text{ is the logarithm mean temperature difference (}^\circ\text{C)}.$$

**Step 3:** Obtain estimated surface cooling area

$$A = \frac{Q}{\theta \cdot K} \quad \text{Where K is the overall heat transfer coefficient (kcal/m}^2\text{h }^\circ\text{C)}$$

Where A is the surface cooling area (m<sup>2</sup>)

K value depends upon operating conditions and construction of the cooler but the following average values can be used

Tube Diameter	K value
9 mm dia. low fin tube	350~450
12.7 mm dia. low fin tube	200~250

**Step 4:** Selecting a cooler model

Select a standard model number which has the closest surface cooling area (A) matching your application needs.

Determine surface cooling area of FCF, FCD, FCX, FCW, FCU and FPD models using the example below:

Example: For Model FCF-234, divide the last two digits by 20. For FCF-311 and above models and FPD models, divide the last two digits by 2.

$$A = 34 / 20 = 1.7 \text{m}^2$$

**Step 5:** Determine the best number of baffles.

Using the selection graph for coolers, choose the number of baffle sets (0, 1 and 2).

**Step 6:** Confirm the cooler selected matches all specifications.

Based on the cooler selected in step 5, obtain (K) with reverse calculations of step 1 through 3.

If calculated K value is close to the average K value, the cooler selection is correct.

If it is too far from the average, select another model and confirm all specifications mentioned here.

## ■ Heat transfer Tube Material

Low Fin Tube  $\phi$  9mm and  $\phi$  12.7mm

JIS Code	Description
C 1 2 2 0 T	Phosphorus Deoxidized Copper Tube
C 1 0 2 0 T	Oxygen-free Copper Tube
C7060T-0	90-10 Copper Nickel Tube
C7150T-0	70-30 Copper Nickel Tube
C6872T-0	Aluminum-Brass
S T B 3 4 0	Carbon Steel Boiler and Heat Exchanger Tube
SUS304TP	304 Stainless-steel Tube (12.7 mm dia.)
SUS316TP	316 Stainless-steel Tube (12.7 mm dia.)

## ■ Coolant Water Quality

Use coolant water that meets the specifications listed below:

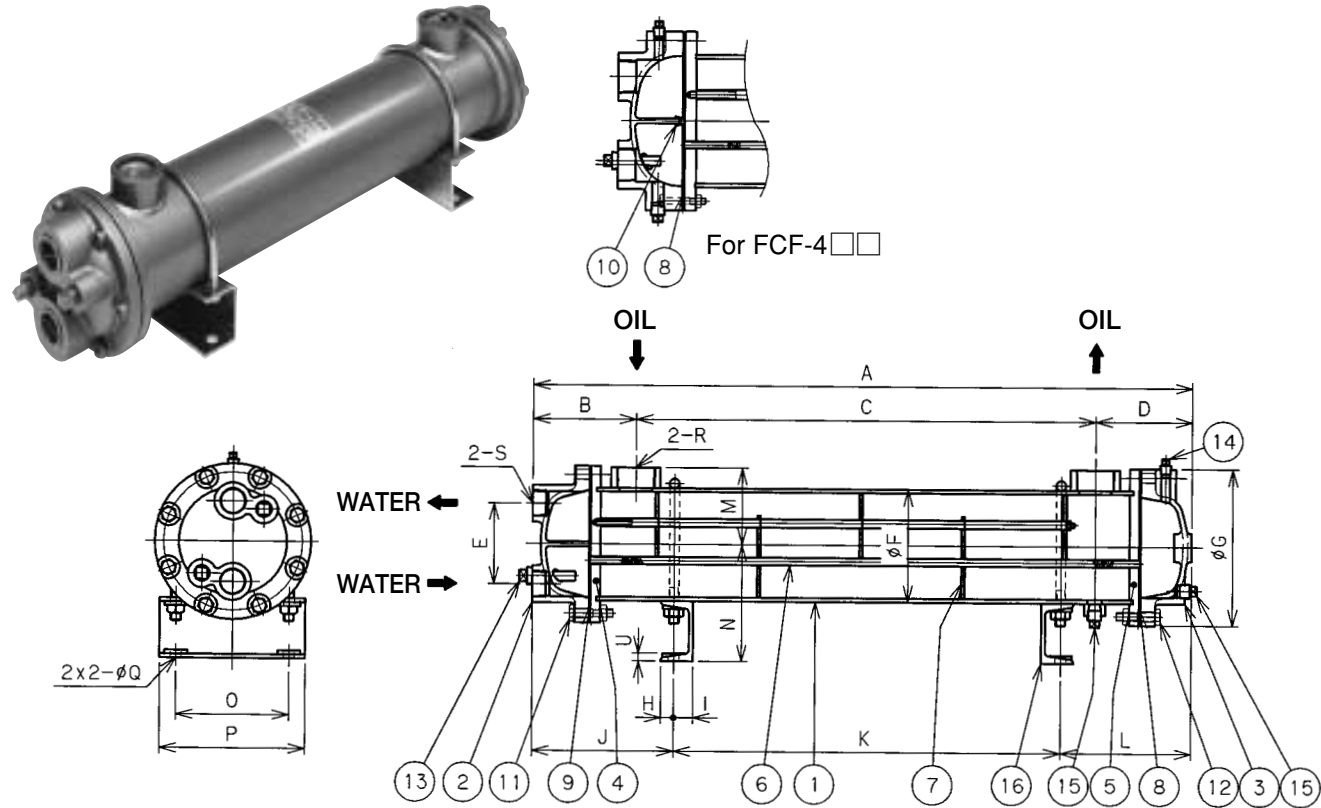
### Coolant Water Specifications per JRA-GL-02-1994

Item	Standard Value	Tendency		
		Corrosion	Scale	
Standard Items	pH [25°C]	6.5~8.2	○	○
	Conductivity [25°C] ( $\mu$ S/cm)	800 and below	○	○
	Iron Chloride (C l <sup>-</sup> /l)	200 and below	○	
	Iron Sulfate SO <sub>4</sub> <sup>2-</sup> (mgSO <sub>4</sub> <sup>2-</sup> /l)	200 and below	○	
	Acid Consumption [pH4.8] (mgCaCO <sub>3</sub> /l)	100 and below		○
	Hardness (mgCaCO <sub>3</sub> /l)	200 and below		○
Ref Items	Fe (mgFe/l)	1.0 and below	○	○
	Iron Sulfide S <sup>2-</sup> (mgS <sup>2-</sup> /l)	Not detected	○	
	Iron Ammonium NH <sub>4</sub> <sup>+</sup> (mgNH <sub>4</sub> <sup>+</sup> /l)	1.0 and below	○	
	Ionic Silica SiO <sub>2</sub> (mgSiO <sub>2</sub> /l)	50 and below		○

Notes:

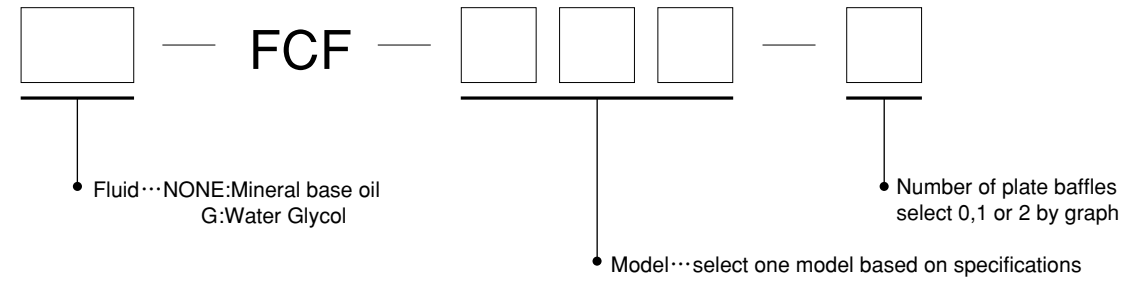
1. Use city tap water, deep-well water and industrial water as coolant water. Untreated river water, pond water and lake water could be contaminated.
2. These standard values are meant to extend cooler life and maintain cooler performance, but even if all values are within limit, corrosion may still occur.

## Construction & Dimensions



Code																		Cooling surface m <sup>2</sup>	Weight kg			
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U		
FCF-003	297	80	140	77	52	φ 63.5	φ 100	15	15	110	80	107	50	65	60	80	φ 10	Rc3/4	Rc1/2	1.6	0.15	5.5
FCF-006	477		320								260										0.3	6.3
FCF-108	347		180								105										0.4	6.5
FCF-114	527	85	360	82	52	φ 76.2	φ 110	15	15	120	285	120	60	70	80	102	φ 10	Rc 1	Rc3/4	2.3	0.7	8.5
FCF-122	757		590								515										1.1	11
FCF-226	437		240								160										1.3	14
FCF-234	547		350								270										1.7	16
FCF-242	627	101	430	96	76	φ 114.3	φ 147	20	20	140	350	137	85	90	120	148	φ 12	Rc11/4	Rc 1	3.2	2.1	17.5
FCF-256	777		580								500										2.8	22
FCF-270	947		750								670										3.5	25
FCF-350	587		340								250										2.5	34
FCF-370	817		570								480										3.5	42
FCF-390	987		740								650										4.5	47
FCF-311	1107	127	860	120	100	φ 139.8	φ 194	16	24	175	770	162	95	145	140	180	φ 13.5	Rc1 1/2	Rc 1	10	5.5	52
FCF-313	1287		1040								950										6.5	58
FCF-314	1407		1160								1070										7	63
FCF-316	1587		1340								1250										8	69
FCF-411	834		540								390										5.5	60
FCF-414	1004		710								560										7	68
FCF-416	1124	153	830	141	110	φ 165.2	φ 223	16	24	228	680	216	140	158	170	210	φ 13.5	Rc1 1/2	Rc11/4	10	8	74
FCF-418	1204		910								760										9	78
FCF-420	1304		1010								860										10	83

## Model Number



## Specifications

Type	Shell and tube, Fixed tube plate
Max. Operating Pressure	Shell side : 1.0 MPa / Tube side : 1.0 MPa
Fluids	Shell side : Mineral base oil, Water Glycol etc. Tube side : Clean fresh water. (Select other model for sea water application)
Tube Material	9mm dia. Low Fin Tube (C1220T)
Cooling area	0.15~10 m <sup>2</sup>
Features	Size: Unique low fin tube allows 20% size and weight reduction.
	Leg: U bolt legs allow free installation
	Corrosion proof: Inside of water chamber covers are coated with a tar-epoxy paint to prevent corrosion.

## Component Parts

No.	Parts name	No.	Parts name
1	Shell	9	Packing
2	Chamber cover A	10	Packing ※
3	Chamber cover B	11	Bolt/Not
4	Tube plate A	12	Bolt/Not
5	Tube plate B	13	Zinc plug
6	Fin tube	14	Vent plug
7	Baffle plate	15	Drain plug
8	Packing	16	Leg

※ For only FCF-4XX

## Spare Parts

Remarks: Please note part numbers and quantity, when placing orders.

Model	No.	Parts name	Q'ty	Size	Material
FCF-0□□	8	Packing	1	t2 × φ 74 / φ 60	None asbestos
	9	Packing(with partition)	1	t2 × φ 74 / φ 60	None asbestos
	13	Zinc plug	2	R1/4	Zn, FcMB
FCF-1□□	8	Packing	1	t2 × φ 83 / φ 72	None asbestos
	9	Packing(with partition)	1	t2 × φ 83 / φ 72	None asbestos
	13	Zinc plug	2	R3/8	Zn, FcMB
FCF-2□□	8	Packing	1	t2 × φ 120 / φ 109	None asbestos
	9	Packing(with partition)	1	t2 × φ 120 / φ 109	None asbestos
	13	Zinc plug	2	R3/8	Zn, FcMB
FCF-3□□	8	Packing	1	t2 × φ 160 / φ 134	None asbestos
	9	Packing(with partition)	1	t2 × φ 160 / φ 134	None asbestos
	13	Zinc plug	2	R1/2	Zn, FcMB
FCF-4□□	8	Packing	2	t3 × φ 188 / φ 162	None asbestos
	10	Packing	1	12 × 12 × 162	NBR
	13	Zinc plug	2	R1/2	Zn, FcMB

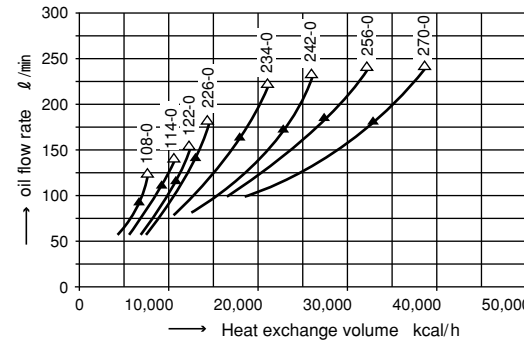
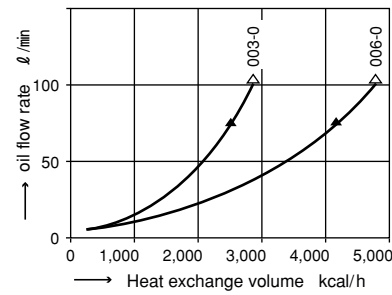
## ► Cooler selection graph

Condition

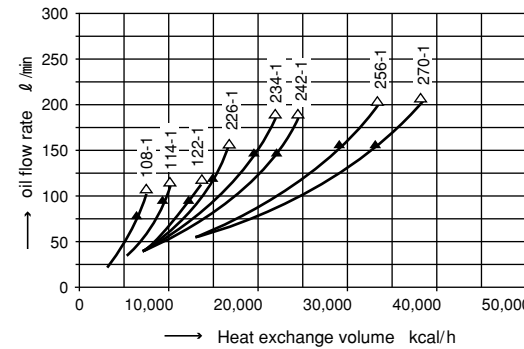
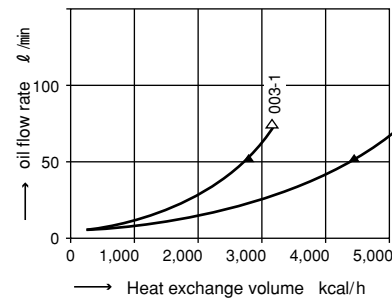
Fluid : ISO-VG46 or equivalent  
 Oil inlet temp. : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/2 of oil flow (Reference table to right)  
 Oil side pressure drop : ▲...0.1MPa △...0.15MPa  
 Water side pressure drop : 0.01~0.03MPa

Model	Water flow	Minimum	Maximum
FCF-003~006	5 ℓ/min	5 ℓ/min	18 ℓ/min
FCF-108~122	10 ℓ/min	10 ℓ/min	35 ℓ/min
FCF-226~270	20 ℓ/min	20 ℓ/min	80 ℓ/min
FCF-350~316	30 ℓ/min	30 ℓ/min	110 ℓ/min
FCF-411~420	45 ℓ/min	45 ℓ/min	170 ℓ/min

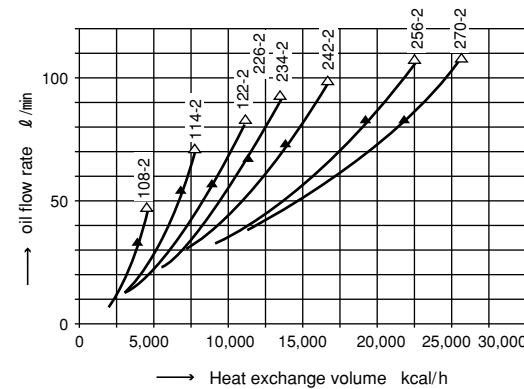
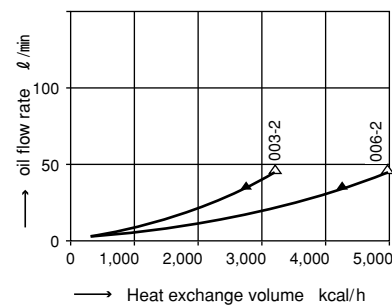
### FCF-003~270-0 type



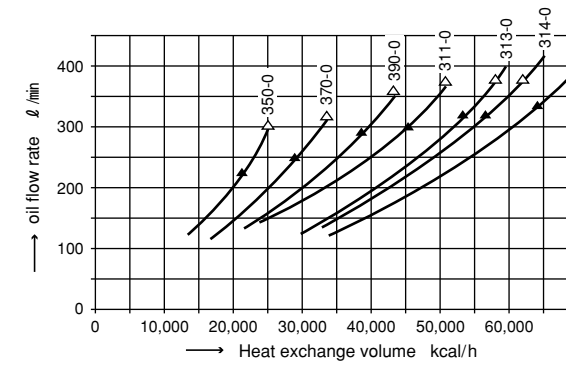
### FCF-003~270-1 type



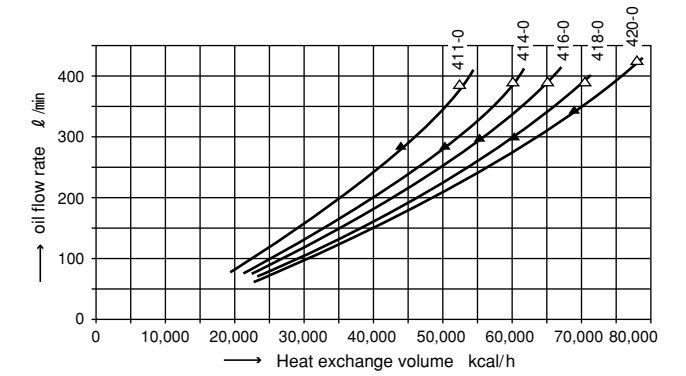
### FCF-003~270-2 type



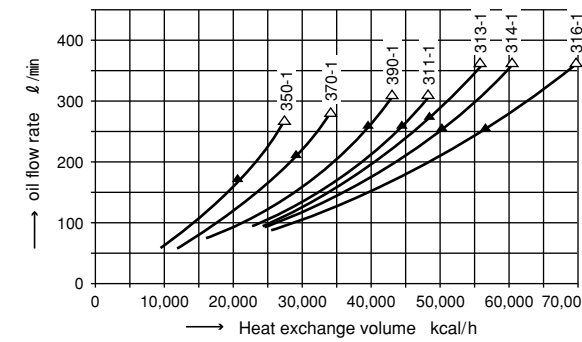
### FCF-350~316-0 type



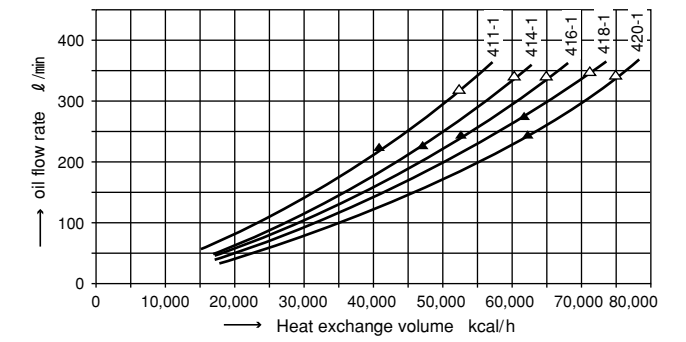
### FCF-411~420-0 type



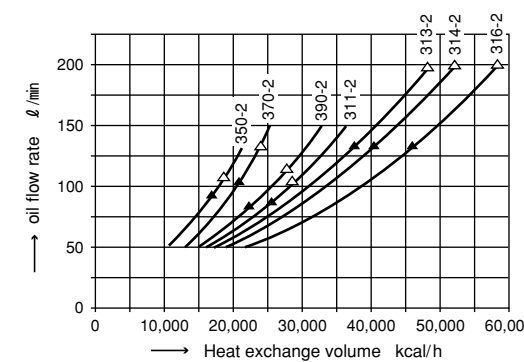
### FCF-350~316-1 type



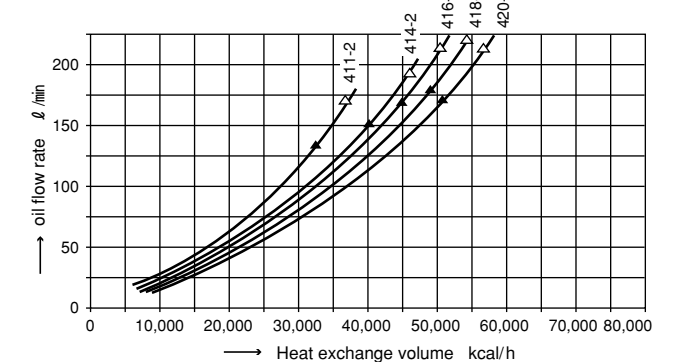
### FCF-411~420-1 type

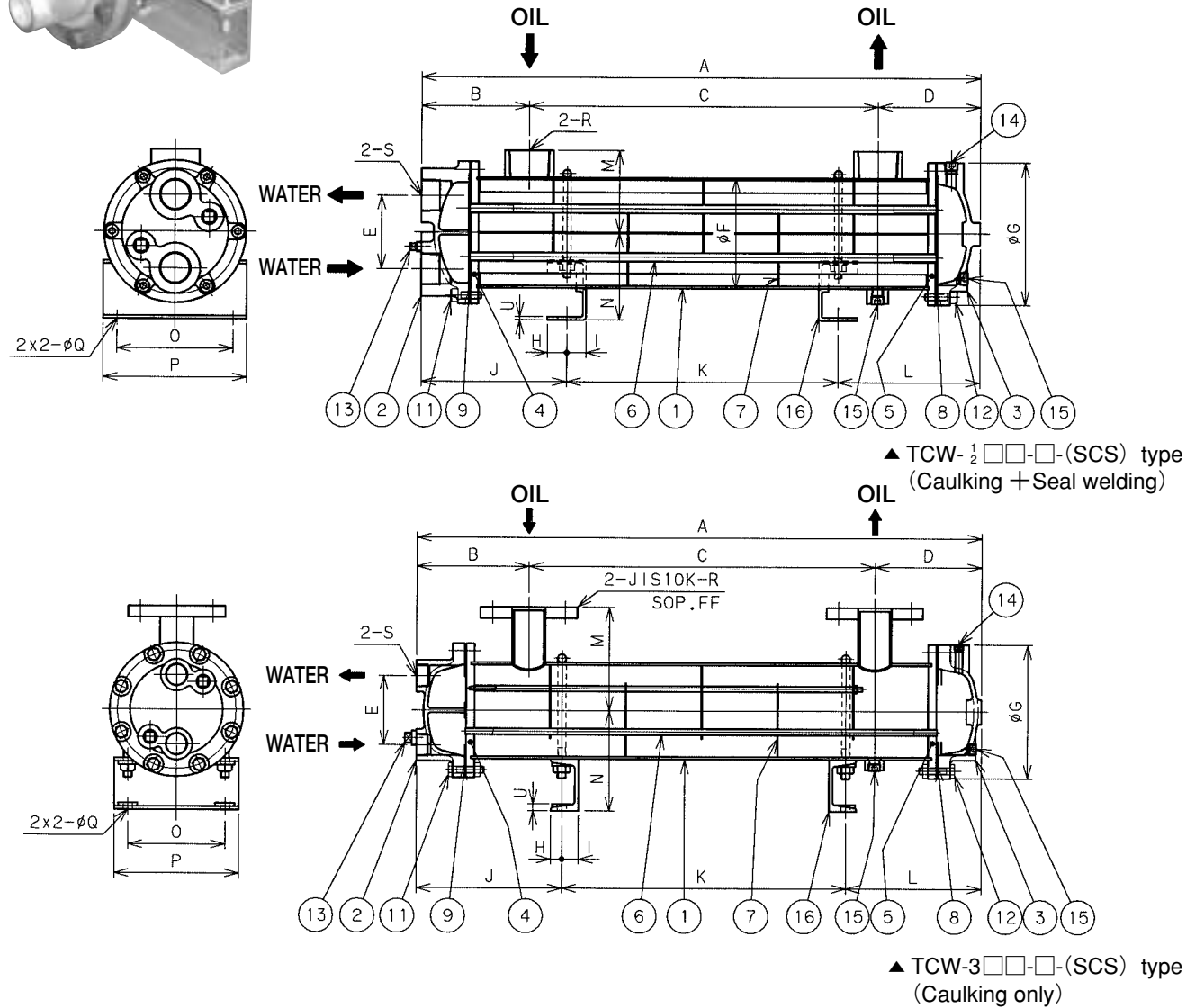
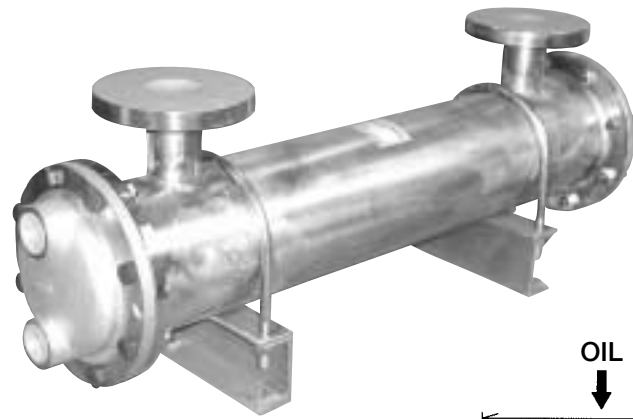


### FCF-350~316-2 type



### FCF-411~420-2 type

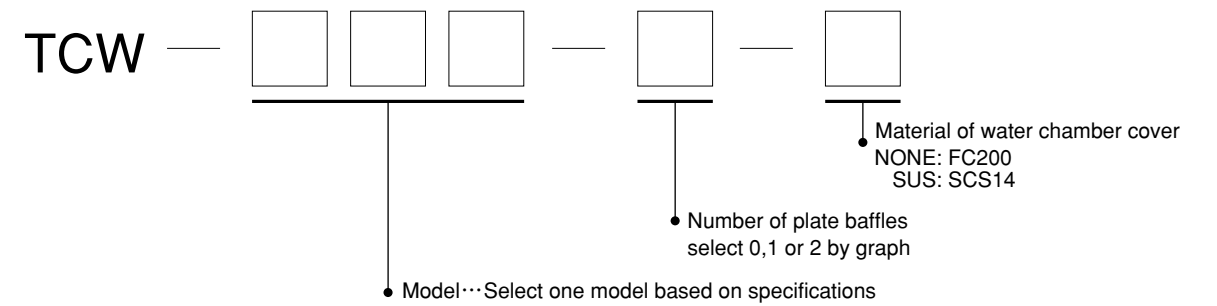




Code type	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	Cooling surface m <sup>2</sup>	Weight kg
TCW-103	347 (324)	90 (81)	170 (150)	87 (73)	52	φ76.3	φ110	15	15	130 (121)	85 (75)	132 (118)	60	70	80	102	φ10	Rc1	Rc3/4	2.3	0.15	5.5
TCW-106	527 (504)		350 (320)								265 (240)										0.3	7.5
TCW-210	437 (407)		220 (200)								140 (125)										0.5	11.5
TCW-214	547 (517)	111 (101)	330 (300)	106 (96)	76	φ114.3	φ147	20	20	150 (140)	147 (135)	85	90	120	148	φ12	Rc11/4	Rc1		3.2	0.7	12.5
TCW-220	777 (747)		560 (520)								480 (450)										1.0	16.5
TCW-226	947 (917)		730 (680)								650 (600)										1.3	18
TCW-330	817 (772)		500 (460)								410 (380)										1.5	33
TCW-338	987 (942)	162 (152)	670 (630)	155 (145)	100	φ139.8	φ194	16	24	210 (190)	580 (540)	197 (180)	95	145	140	180	φ13.5	40A	Rc1	10	1.9	37.5
TCW-352	1287 (1242)		970 (920)								880 (830)										2.6	45
TCW-366	1587 (1542)		1270 (1220)								1180 (1130)										3.3	58

( ) In case water chamber is made by SCS.

### Model Number



### Specifications

Type	Shell and tube, Fixed tube plate
Max. Operating pressure	Shell side : 1.0 MPa / Tube side : 1.0MPa
Max. Temp.	100°C (Temp. difference of two fluid must be 80°C)
Fluids	Shell side : Water, Oil (any fluid not causing corrosion on SUS 304 material) Tube side : Fresh water, Warm water
Tube Material	9mm dia. (SUS 304)
Cooling Area	0.15m <sup>2</sup> ~ 3.3m <sup>2</sup>

### Component Parts

No.	Parts name
1	Shell
2	Chamber cover A
3	Chamber cover B
4	Tube plate A
5	Tube plate B
6	Bare tube
7	Baffle plate
8	Packing
9	Packing
—	—
11	Bolt/Nut
12	Bolt/Nut
13	Plug
14	Vent plug
15	Drain plug
16	Leg

\*SCS type does not contain

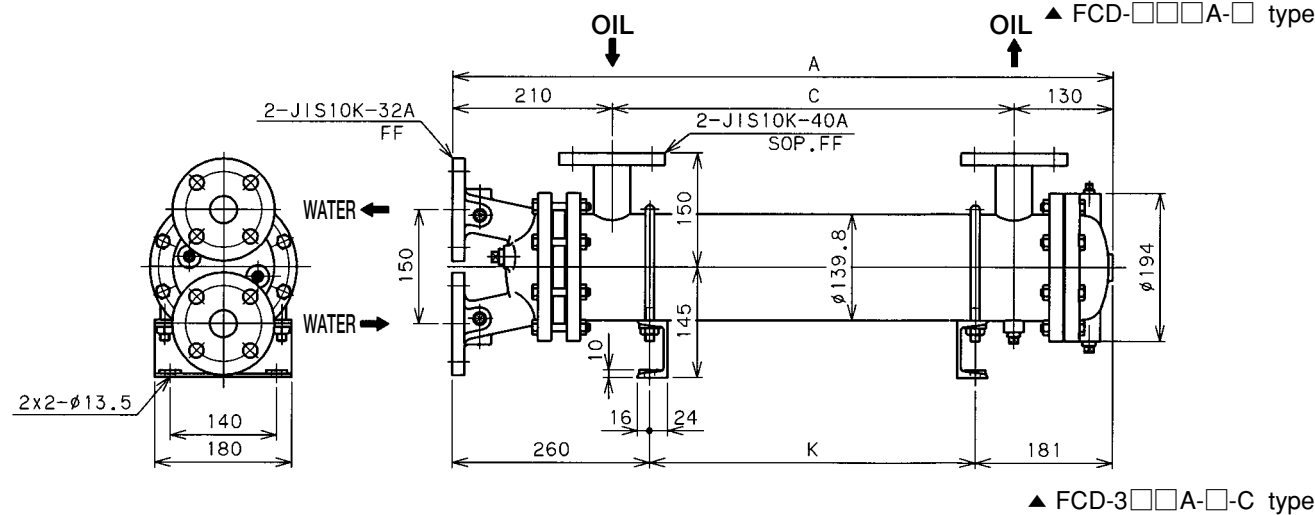
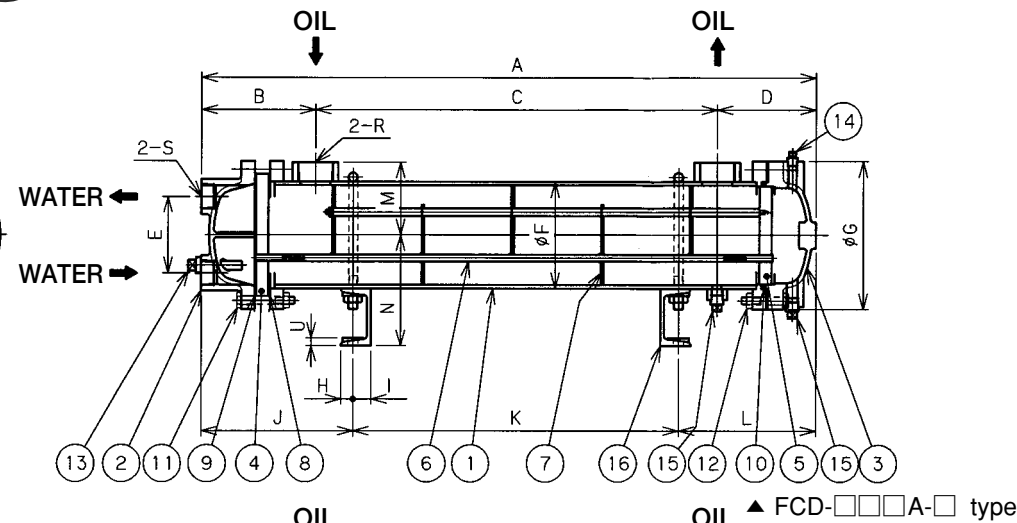
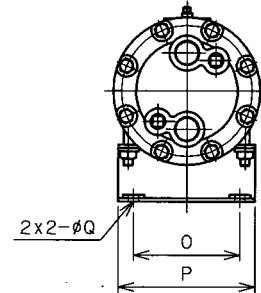
### Spare Parts

Remarks: Please note part numbers and quantity, when placing orders.

Model	No.	Parts name	Q'ty	Size	Material
TCW-1□□□	8	Packing	1	t2×φ83/φ72	None asbestos
	9	Packing (with partition)	1	t2×φ83/φ72	None asbestos
TCW-2□□□	8	Packing	1	t2×φ120/φ109	None asbestos
	9	Packing (with partition)	1	t2×φ120/φ109	None asbestos
TCW-3□□□	8	Packing	1	t2×φ160/φ134	None asbestos
	9	Packing (with partition)	1	t2×φ160/φ134	None asbestos

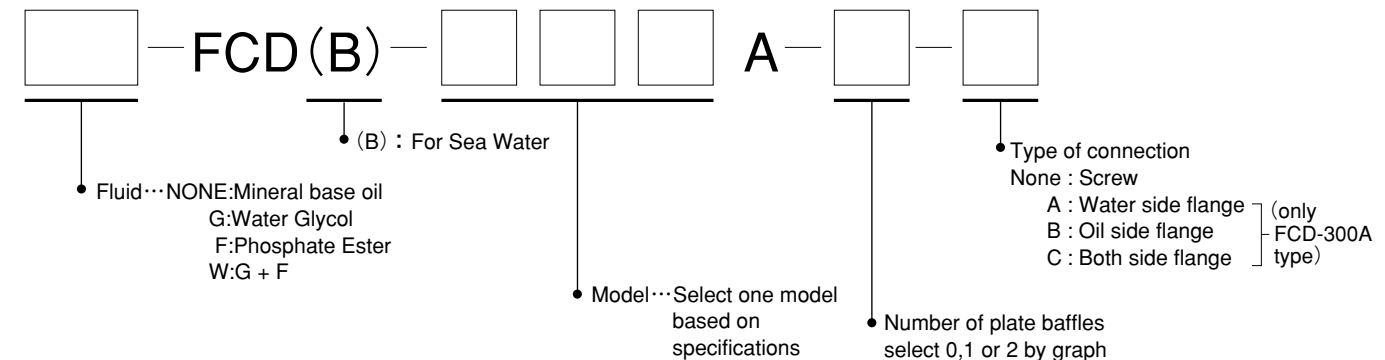


## Construction & Dimensions



Code	Model																			Cooling surface	Weight	
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	m <sup>2</sup>	kg
FCD-108A	345		148								75										0.4	7.5
FCD-114A	525	104	328	93	52	φ76.3	φ110	15	15	140	255	130	60	70	80	102	φ10	Rc1	Rc3/4	2.3	0.7	10
FCD-122A	755		558								485										1.1	13
FCD-226A	435		208								120										1.3	15
FCD-234A	545		318								230										1.7	19
FCD-242A	625	120	398	107	76	φ114.3	φ147	20	20	165	310	150	85	90	120	148	φ12	Rc11/4	Rc1	3.2	2.1	22
FCD-256A	775		548								460										2.8	25
FCD-270A	945		718								630										3.5	31
FCD-350A	581		301								200										2.5	40
FCD-370A	811		531								430										3.5	55
FCD-390A	981	150	701	130	100	φ139.8	φ194	16	24	200	600	181	95	145	140	180	φ13.5	Rc11/2	Rc1	10	4.5	68
FCD-311A	1101		821								720										5.5	85

## Model Number



## Specifications

Type	Shell & tube, Floating tube plate
Max.operating Pressure	Shell Side : 1.0MPa / Tube Side : 1.0 MPa
Fluids	Sell side : Mineral based oil, Water Glycol and Phosphate Ester etc. Tube side : Fresh water / sea water
Tube material	9mm dia. Low Fin Tube
Cooling area	0.4~5.5m <sup>2</sup>
Features	Space: Unique low fin tubes allows 20% size and weight reduction.
	Leg: U bolt type legs allow free installation
	Corrosion Proof: Inside of water chamber covers are coated with a tar-epoxy paint to prevent corrosion

## Component Parts

No.	Parts name	No.	Parts name
1	Shell	9	Packing
2	Chamber cover A	10	Packing
3	Chamber cover B	11	Bolt/Nut
4	Tube plate A	12	Bolt/Nut
5	Tube plate B	13	Zinc plug
6	Fin tube	14	Vent plug
7	Baffle plate	15	Drain plug
8	Packing	16	Leg

## Spare Parts

Remarks: Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid.

Model	No.	Parts name	Q'ty	Size	Material
FCD-1□□	8	Packing	1	t2×φ83/φ72	None asbestos
	9	Packing (with partition)	1	t2×φ83/φ72	None asbestos
	10	Packing	1	t3×φ79.2/φ71	NBR, (FKM*)
	13	Zinc plug	2	R3/8	Zn, FcMB
FCD-2□□	8	Packing	1	t2×φ120/φ109	None asbestos
	9	Packing (with partition)	1	t2×φ120/φ109	None asbestos
	10	Packing	1	t3×φ115.2/φ107	NBR, (FKM*)
	13	Zinc plug	2	R3/8	Zn, FcMB
FCD-3□□	8	Packing	1	t2×φ160/φ134	None asbestos
	9	Packing (with partition)	1	t2×φ160/φ134	None asbestos
	10	Packing	1	t4.5×φ140.2/φ128	NBR, (FKM*)
	13	Zinc plug	2	R1/2	Zn, FcMB

\* FKM Packings are used for fluid "F" and "W" type.

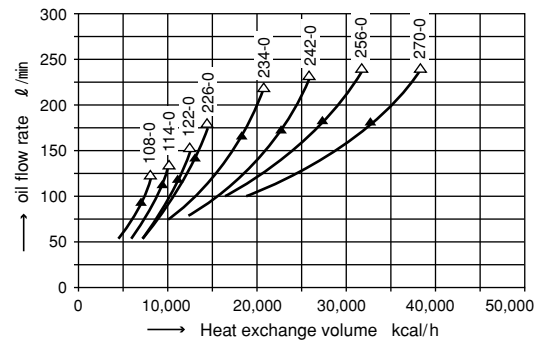
## ► Cooler selection graph

Condition

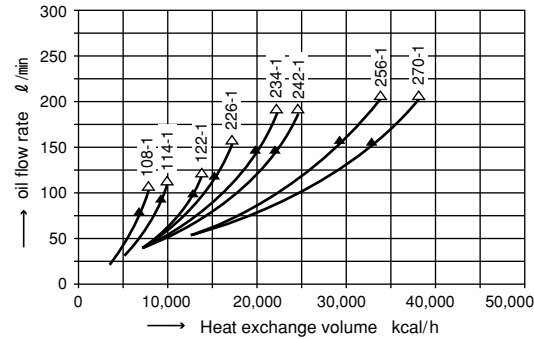
Fluid : ISO-VG46 or equivalent  
 Oil inlet temp : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/2 of oil flow (reference table to right)  
 Oil side pressure drop : ▲···0.1MPa △···0.15MPa  
 Water side pressure drop : 0.01~0.03MPa

Model	Water flow	Minimum	Maximum
FCD-108A~122A	10 ℓ/min	10 ℓ/min	35 ℓ/min
FCD-226A~270A	20 ℓ/min	20 ℓ/min	80 ℓ/min
FCD-350A~311A	30 ℓ/min	30 ℓ/min	110 ℓ/min

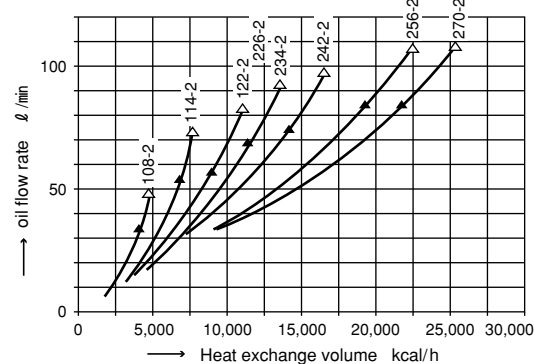
### FCD-108A~270A-0 type



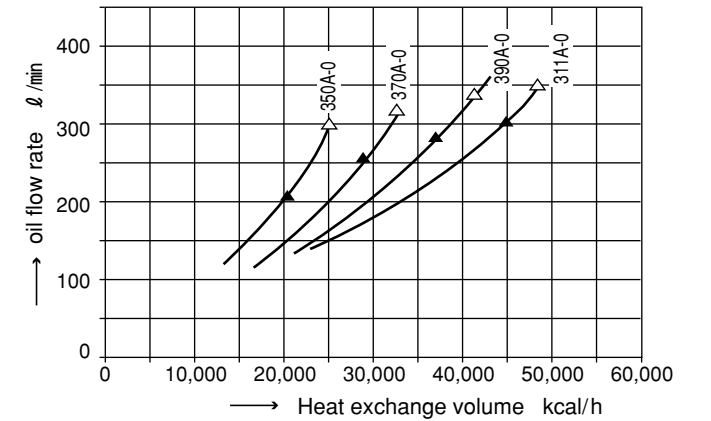
### FCD-108A~270A-1 type



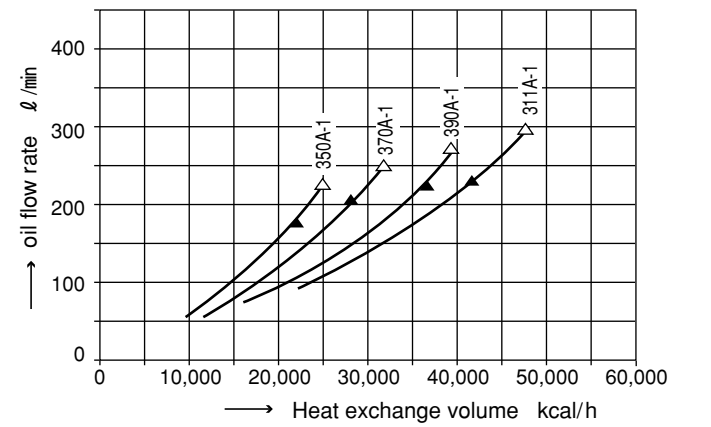
### FCD-108A~270A-2 type



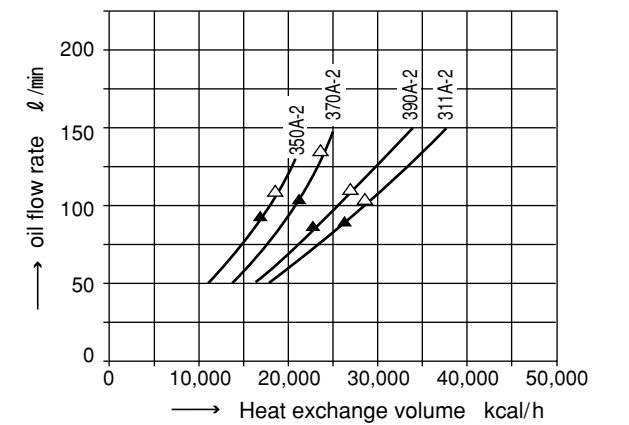
### FCD-350A~311A-0 type



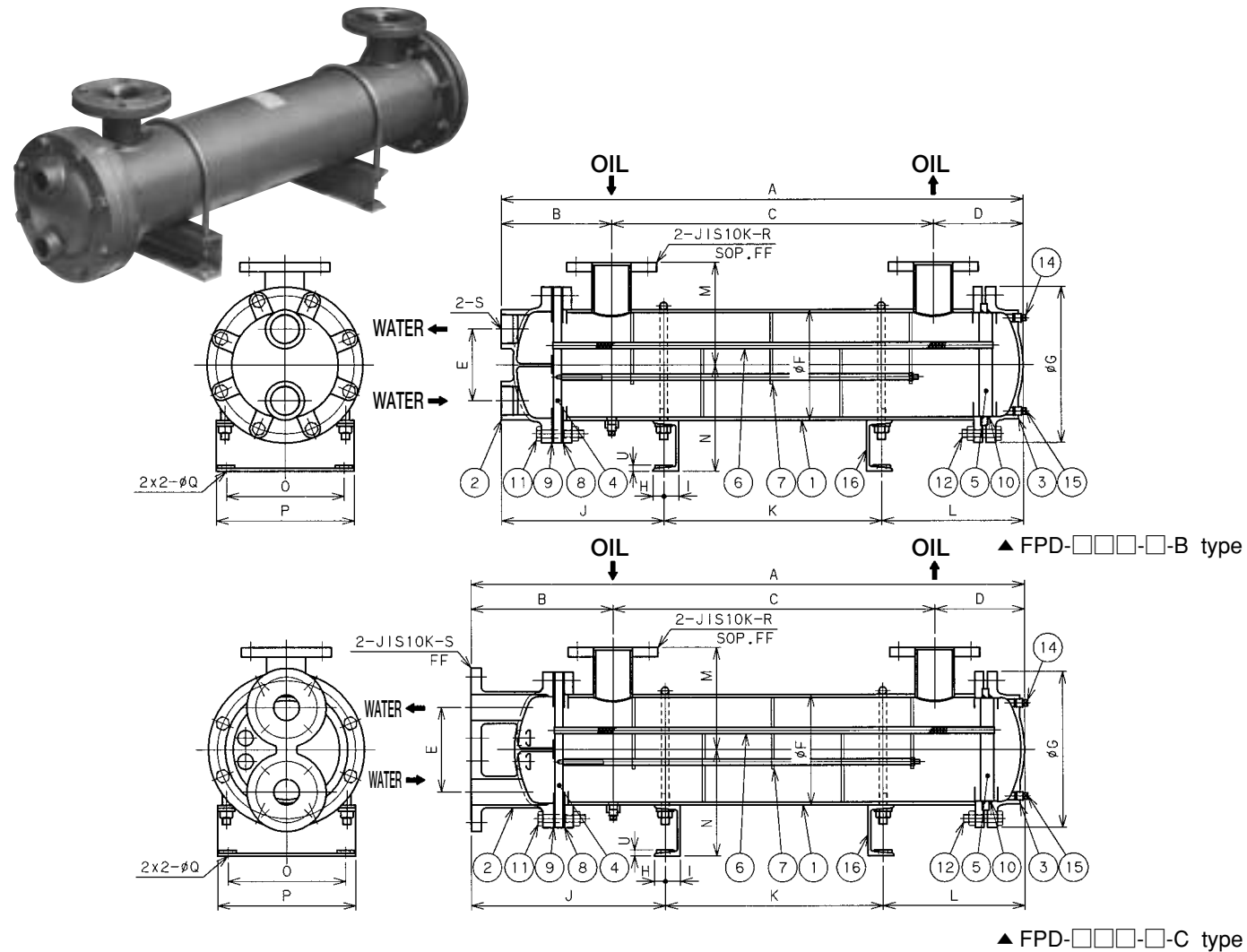
### FCD-350A~311A-1 type



### FCD-350A~311A-2 type



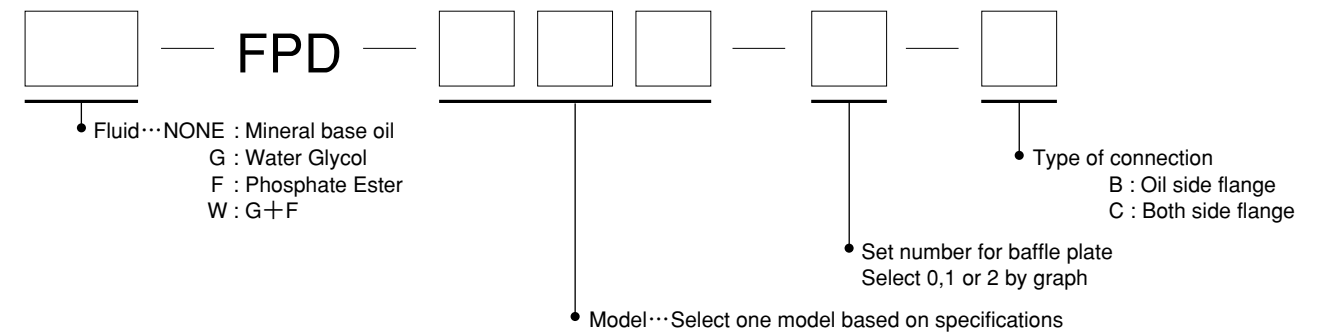
### Construction & Dimensions



Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	Cooling surface m <sup>2</sup>	Weight kg
FPD-518	867 (917)		477								275										9	111
FPD-522	1017 (1067)		627								425										11	121
FPD-526	1167 (1217)		777								575										13	132
FPD-531	1337 (1387)		947								745										15.5	144
FPD-535	1497 (1547)	215 (265)	1107	175	140 (200)	φ216.3	φ305	21	29	316 (366)	905	276	200	208	230	270	φ18	65A	Rc2 (50A)	12	17.5	156
FPD-540	1657 (1707)		1267								1065										20	173
FPD-544	1827 (1877)		1437								1235										22	185
FPD-549	2007 (2057)		1617								1415										24.5	198
FPD-554	2177 (2227)		1787								1585										27	209
FPD-634	1091		596								416										17	194
FPD-644	1327		832								652										22	221
FPD-652	1497	302	1002	193	190	φ267.4	φ355	21	29	392	822	283	230	234	280	320	φ22	80A	65A	12	26	241
FPD-658	1657		1162								982										29	260
FPD-666	1827		1332								1152										33	280

( ) In case water side is flange rating.  
Only water side flange is available for FPD-6□□□

### Model Number



### Specifications

Type	Shell & tube, Floating tube plate	
Max.operating pressure	Shell Side : 1.0MPa / Tube side : 1.0 MPa	
Max.temp.	80°C	
Fluid	Shell Side : Mineral based oil. Water Glycol and Phosphate Ester etc. Tube Side : Fresh water (not available sea water)	
Tube material	12.7mm dia. Low fin tube	
Cooling area	9m <sup>2</sup> ~33m <sup>2</sup>	
Features	Leg	U bolt type legs allow free installation
	Corrosion Proof	Inside of water chamber cover is coated with a tar-epoxy paint to prevent corrosion

### Component Parts

No.	Parts name	No.	Parts name
1	Shell	9	Packing
2	Chamber cover A	10	O ring
3	Chamber cover B	11	Bolt/Nut
4	Tube plate A	12	Bolt/Nut
5	Tube plate B	—	—
6	Fin tube	14	Vent plug
7	Baffle plate	15	Drain plug
8	Packing	16	Leg

### Spare Parts

Remarks : Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid

Model	No.	Parts name	Q'ty	Size	Material
FPD-5□□□	8	Packing	1	t3 × φ 305 / φ 208	None asbestos
	9	Packing(with partition)	1	t3 × φ 305 / φ 208	None asbestos
	10	O ring	2	G-200	NBR, (FKM*)
FPD-6□□□	8	Packing	1	t3 × φ 355 / φ 258	None asbestos
	9	Packing(with partition)	1	t3 × φ 355 / φ 258	None asbestos
	10	O ring	2	G-250	NBR, (FKM*)

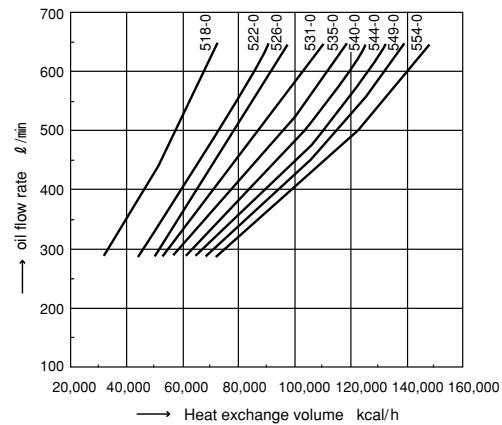
\* FKM Packings are used for fluid "F" and "W" type.

## ► Cooler selection graph

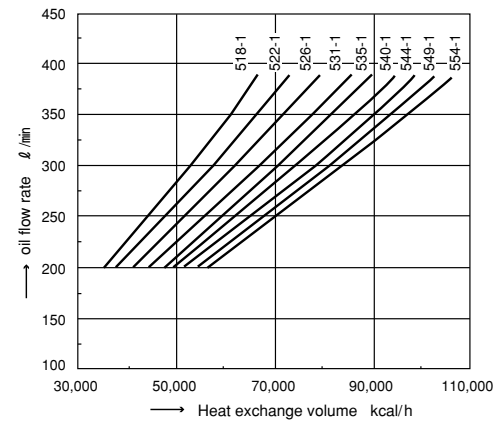
### Condition

Fluid : ISO-VG46 or equivalent  
 Oil inlet temp. : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/2 of oil flow(reference table to right)  
 Oil side pressure drop : 0.02~0.1MPa  
 Water side pressure drop : 0.1~0.06MPa

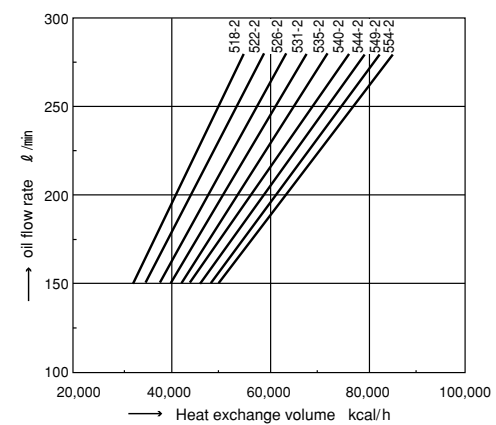
### FPD-518~540-0 type



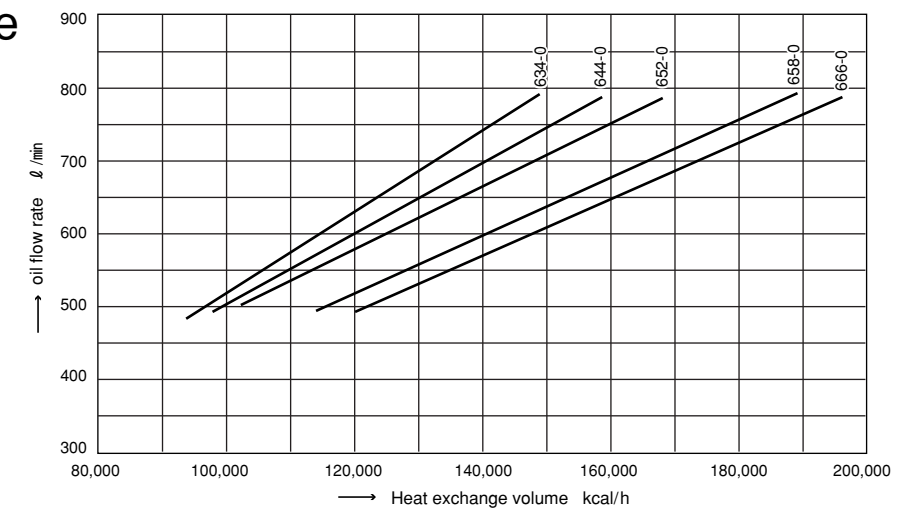
### FPD-518~540-1 type



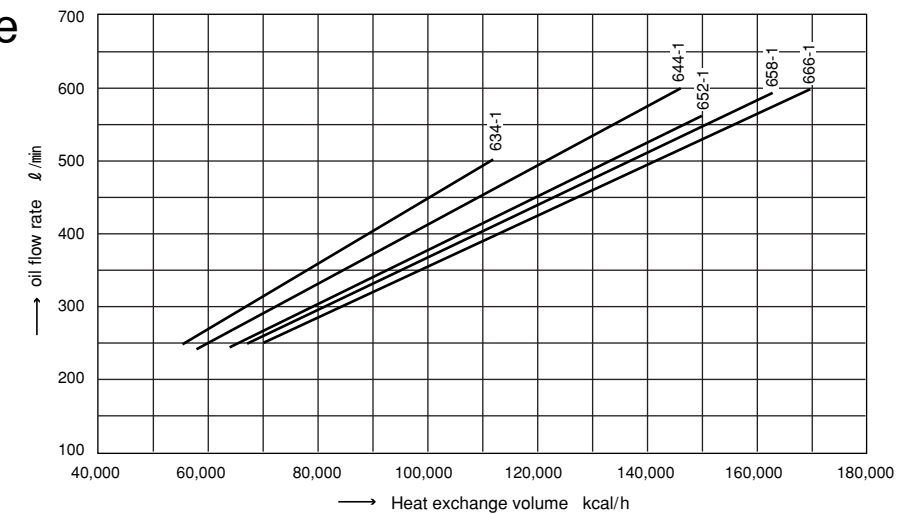
### FPD-518~540-2 type



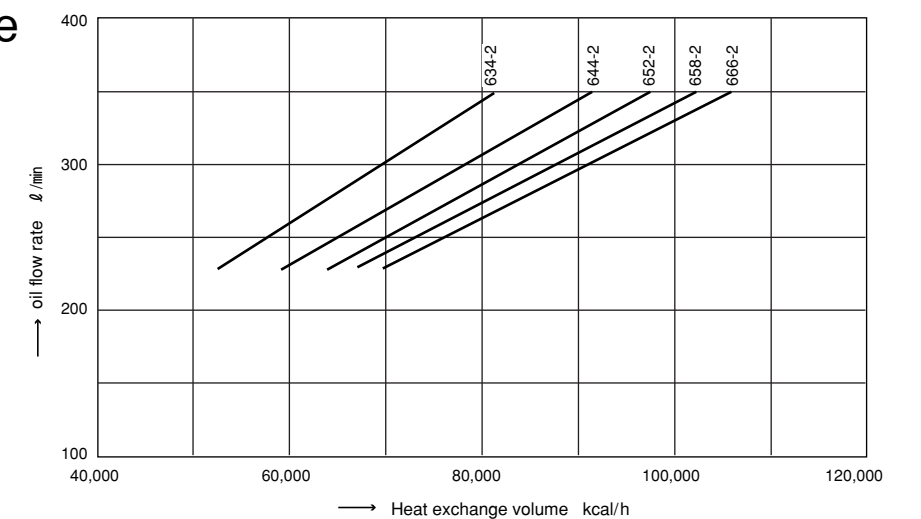
### FPD-634~666-0 type



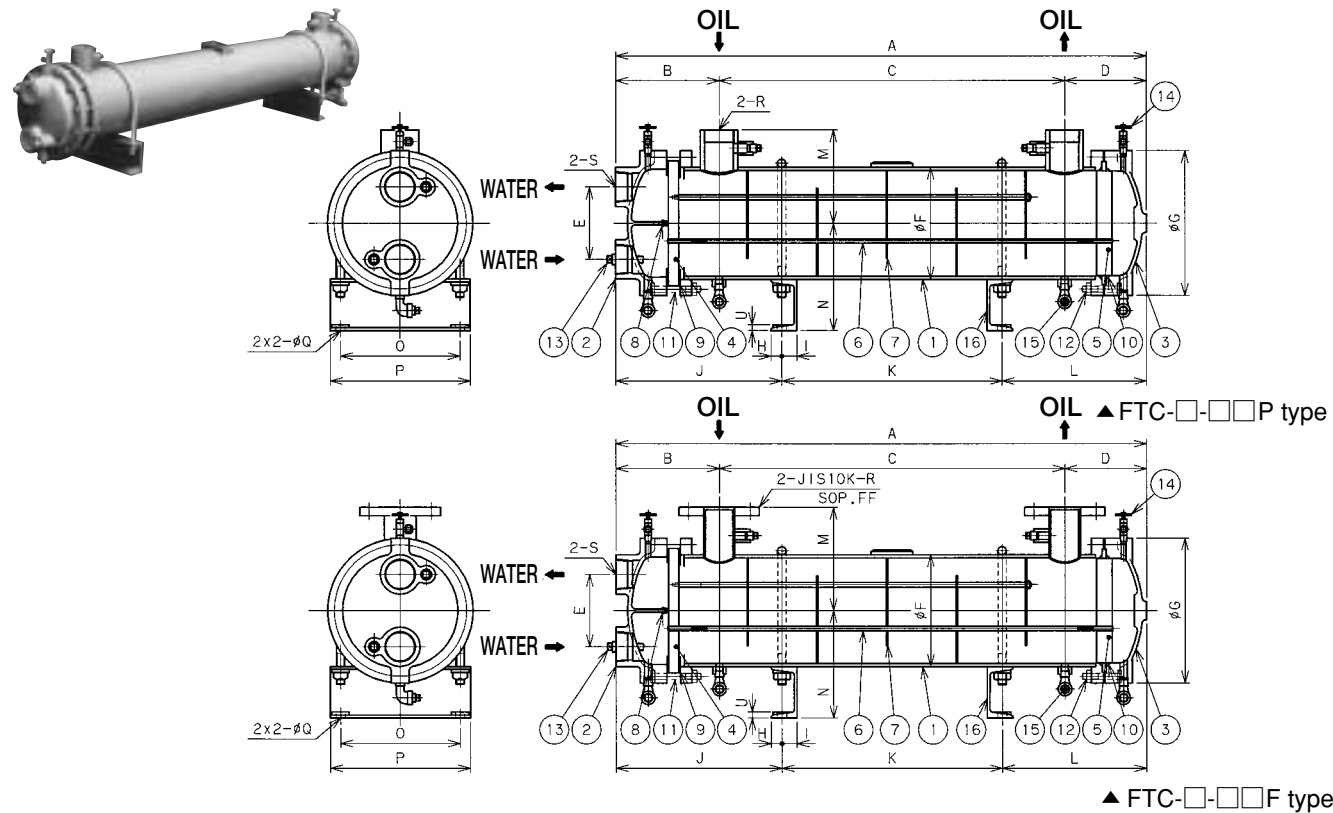
### FPD-634~666-1 type



### FPD-634~666-2 type



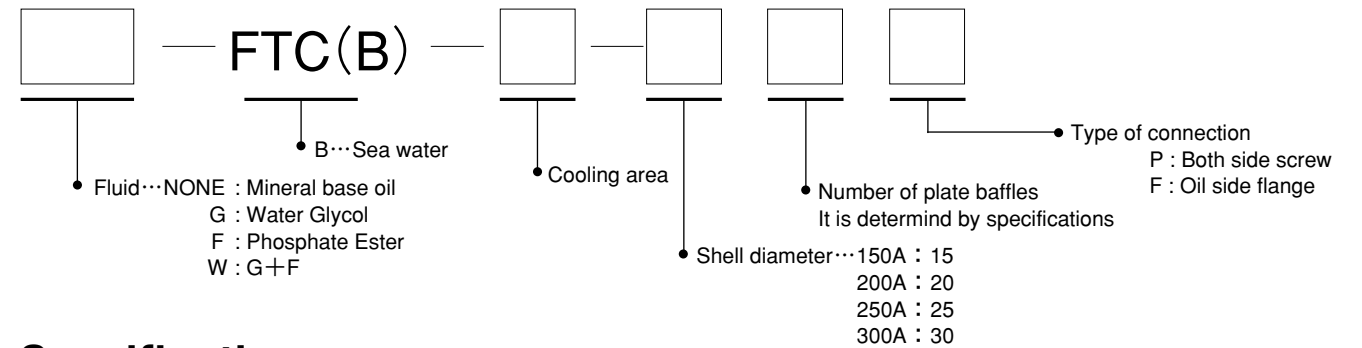
## Construction & Dimensions



Code	Model																			Cooling surface	Weight	
Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	m <sup>2</sup>	kg
FTC-6-15 **	1229		915								765										6	85
FTC-7-15 **	1313		999								849										7	90
FTC-8-15 **	1473	174	1159	140	110	φ165.2	φ223	16	24	249	1009	215	140	158	170	210	φ13.5	Rc11/2 (40A)	Rc11/4	10	8	96
FTC-9-15 **	1633		1319								1169										9	105
FTC-10-15 **	1803		1489								1339										10	110
FTC-11-15 **	1983		1669								1519										11	118
FTC-7-20 **	873		517								275										7	118
FTC-9-20 **	1023		667								425										9	129
FTC-10-20 **	1173		817								575										10	140
FTC-12-20 **	1343		987								745										12	152
FTC-14-20 **	1503	199	1147	157	140	φ216.3	φ280	21	29	320	905	278	180	208	230	270	φ18	Rc2 (50A)	Rc2	12	14	164
FTC-16-20 **	1663		1307								1065										16	175
FTC-18-20 **	1833		1477								1235										18	188
FTC-20-20 **	2013		1657								1415										20	200
FTC-22-20 **	2183		1827								1585										22	213
FTC-18-25 **	1264		900								650										18	223
FTC-21-25 **	1434		1070								820										21	242
FTC-24-25 **	1594		1230								980										24	260
FTC-27-25 **	1764		1400								1150										27	279
FTC-30-25 **	1934	204	1570	160	180	φ267.4	φ355	21	29	329	1320	285	200	234	280	320	φ22	Rc2 (50A)	Rc21/2	12	30	297
FTC-34-25 **	2154		1790								1540										34	322
FTC-37-25 **	2324		1960								1710										37	340
FTC-41-25 **	2544		2180								1930										41	366
FTC-44-25 **	2714		2350								2100										44	384
FTC-31-30 **	1378		964								694										31	340
FTC-35-30 **	1538		1124								854										35	380
FTC-40-30 **	1698		1284								1014										40	390
FTC-44-30 **	1868		1454								1184										44	426
FTC-49-30 **	2048	229	1634	185	200	φ318.5	φ410	28	37	364	1364	320	230	284	330	390	φ22	Rc21/2 (65A)	Rc3	12	49	450
FTC-54-30 **	2218		1804								1534										54	470
FTC-61-30 **	2454		2040								1770										61	505
FTC-66-30 **	2634		2220								1950										66	535
FTC-71-30 **	2814		2400								2130										71	565

( ) In case oil side is flange rating

## Model Number



## Specifications

Type	Floating tube plate Two pass Shell & Tube
Max.operating pressure	Shell side 1.0MPa / Tube side 1.0MPa
Fluid	Shell side : Mineral based oil, Water Glycol and Phosphate Ester etc. Tube side : Fresh water, Industrial water and Sea water
Tube material	12.7mm dia. Low fin tube (C1220T)
Cooling area	6~71 m <sup>2</sup>
Features	Tube : There are variety of tube materials. Other than sea water maybe acceptable. Leg : U bolt type legs allow free installation Corrosion Proof : Inside of water chamber covers are coated with a tar-epoxy paint to prevent corrosion

## Component Parts

No.	Parts name	No.	Parts name	No.	Parts name
1	Shell	7	Baffle plate	13	Zinc plug
2	Chamber cover A	8	Packing	14	Vent
3	Chamber cover B	9	Packing	15	Drain plug
4	Tube plate A	10	O ring	16	Leg
5	Tube plate B	11	Bolt/Nut		
6	Fin tube	12	Bolt/Nut		

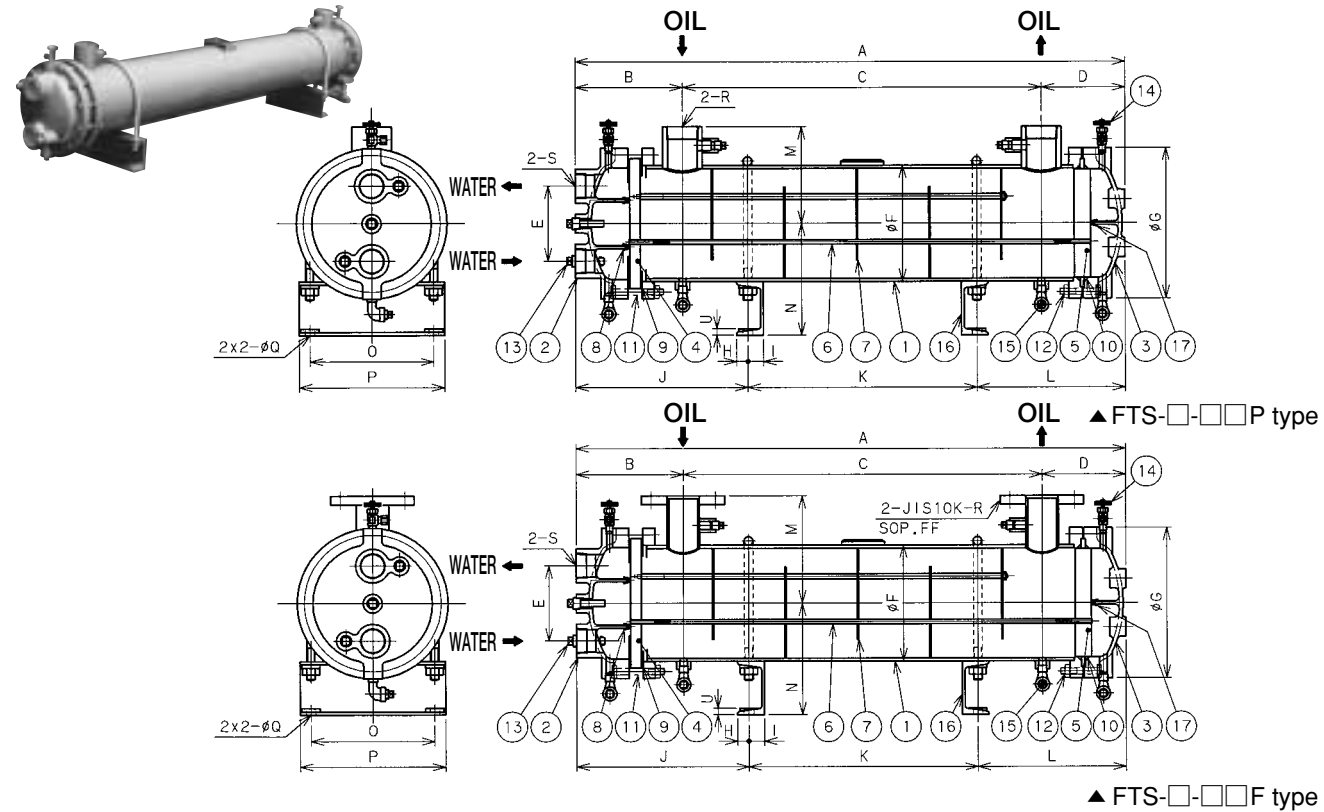
## Spare Parts

Remarks : Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid.

Model	No.	Parts name	Q'ty	Size	Material
FTC-6-15 **	8	Packing	1	12×12×162	NBR
	9	Packing	2	t3× φ 188 / φ 162	None asbestos
	10	O ring	2	G-150	NBR,(FKM*)
FTC-11-15 **	13	Zinc plug	2	R1/2	Zn, FcMB
FTC-7-20 **	8	Packing	1	12×12×208	NBR
	9	Packing	2	t3× φ 241 / φ 208	None asbestos
	10	O ring	2	G-200	NBR,(FKM*)
FTC-22-20 **	13	Zinc plug	2	R1/2	Zn, FcMB
FTC-18-25 **	8	Packing	1	12×12×258	NBR
	9	Packing	2	t3× φ 302 / φ 258	None asbestos
	10	O ring	2	G-250	NBR,(FKM*)
FTC-44-25 **	13	Zinc plug	2	R1/2	Zn, FcMB
FTC-31-30 **	8	Packing	1	12×12×308	NBR
	9	Packing	2	t3× φ 357 / φ 308	None asbestos
	10	O ring	2	G-300	NBR,(FKM*)
FTC-71-30 **	13	Zinc plug	2	R1	Zn, FcMB

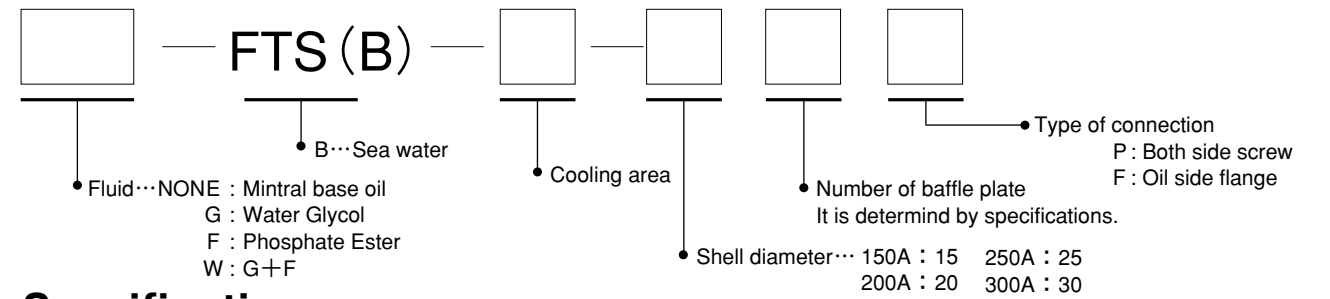
\* FKM Packings are used for fluid "F" and "W" type.

### Construction & Dimensions



Code Model	A B C D E F G H I J K L M N O P Q R S U																	Cooling surface m <sup>2</sup>	Weight kg			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q			R	S	U
FTS-6-15 **	1229		915								765										6	85
FTS-7-15 **	1313		999								849										7	90
FTS-8-15 **	1473	174	1159	140	110	φ165.2	φ223	16	24	249	1009	215	140	158	170	210	φ13.5	Rc11/2 (40A)	Rc1	10	8	96
FTS-9-15 **	1633		1319								1169										9	105
FTS-10-15 **	1803		1489								1339										10	110
FTS-11-15 **	1983		1669								1519										11	118
FTS-7-20 **	873		517								275										7	118
FTS-9-20 **	1023		667								425										9	129
FTS-10-20 **	1173		817								575										10	140
FTS-12-20 **	1343		987								745										12	152
FTS-14-20 **	1503	199	1147	155	140	φ216.3	φ280	21	29	320	905	278	180	208	230	270	φ18	Rc2 (50A)	Rc1/2	12	14	164
FTS-16-20 **	1663		1307								1065										16	175
FTS-18-20 **	1833		1477								1235										18	188
FTS-20-20 **	2013		1657								1415										20	200
FTS-22-20 **	2183		1827								1585										22	213
FTS-18-25 **	1264		900								650										18	223
FTS-21-25 **	1434		1070								820										21	242
FTS-24-25 **	1594		1230								980										24	260
FTS-27-25 **	1764		1400								1150										27	279
FTS-30-25 **	1934	204	1570	160	180	φ267.4	φ355	21	29	329	1320	285	200	234	280	320	φ22	Rc2 (50A)	Rc2	12	30	297
FTS-34-25 **	2154		1790								1540										34	322
FTS-37-25 **	2324		1960								1710										37	340
FTS-41-25 **	2544		2180								1930										41	366
FTS-44-25 **	2714		2350								2100										44	384
FTS-31-30 **	1378		964								694										31	340
FTS-35-30 **	1538		1124								854										35	380
FTS-40-30 **	1698		1284								1014										40	390
FTS-44-30 **	1868		1454								1184										44	426
FTS-49-30 **	2048	229	1634	185	200	φ318.5	φ410	28	37	364	1364	320	230	284	330	390	φ22	Rc21/2 (65A)	Rc2	12	49	450
FTS-54-30 **	2218		1804								1534										54	470
FTS-61-30 **	2454		2040								1770										61	505
FTS-66-30 **	2634		2220								1950										66	535
FTS-71-30 **	2814		2400								2130										71	565

### Model Number



### Specifications

Type	Floating tube plate 4 pass Shell & tube	
Max. operating pressure	Shell side 1.0MPa / Tube side 1.0MPa	
Fluid	Shell side : Mineral based oil, Water Glycol and Phosphate Ester etc. Tube side : Fresh water, Industrial water and Sea water	
Tube material	12mm dia. Low fin tube (C1220T)	
Cooling area	6~71 m <sup>2</sup>	
Features	Tube	There are variety of tube materials. Other than sea water maybe acceptable.
	Leg	U bolt type legs allow free installation
	Corrosion Proof	Inside of chamber cover is coated with a tar-epoxy paint to prevent corrosion.

### Component Parts

No.	Parts name	No.	Parts name	No.	Parts name
1	Shell	7	Baffle plate	13	Zin plug
2	Chamber cover A	8	Packing	14	Vent
3	Chamber cover B	9	Packing	15	Drain plug
4	Tube plate A	10	O ring	16	Leg
5	Tube plate B	11	Bolt/Nut	17	Packing
6	Fin tube	12	Bolt/Nut		

### Spare Parts

Remarks : Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid.

Model	No.	Parts name	Q'ty	Size	Material
FTS-6-15 **	8	Packing	2	12×12×152	NBR
	9	Packing	2	t3×φ188/φ162	None Asbestos
{	10	O ring	2	G-150	NBR,(FKM*)
	13	Zinc plug	2	R1/2	Zn, FcMB
FTS-11-15 **	17	Packing	1	12×12×152	NBR
	8	Packing	2	12×12×191	NBR
FTS-7-20 **	9	Packing	2	t3×φ241/φ208	None Asbestos
	10	O ring	2	G-200	NBR,(FKM*)
FTS-22-20 **	13	Zinc plug	2	R1/2	Zn, FcMB
	17	Packing	1	12×12×202	NBR
FTS-18-25 **	8	Packing	2	12×12×233	NBR
	9	Packing	2	t3×φ302/φ258	None Asbestos
{	10	O ring	2	G-250	NBR,(FKM*)
	13	Zinc plug	2	R1/2	Zn, FcMB
FTS-44-25 **	17	Packing	1	12×12×251	NBR
	8	Packing	2	12×12×287	NBR
FTS-31-30 **	9	Packing	2	t3×φ357/φ308	None Asbestos
	10	O ring	2	G-300	NBR,(FKM*)
FTS-71-30 **	13	Zinc plug	2	R 1	Zn, FcMB
	17	Packing	1	12×12×302	NBR

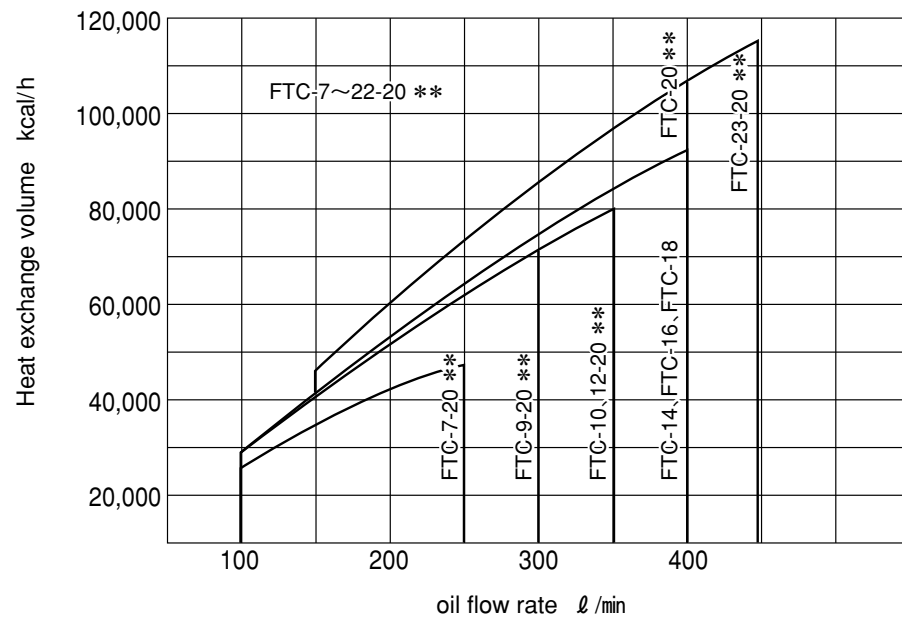
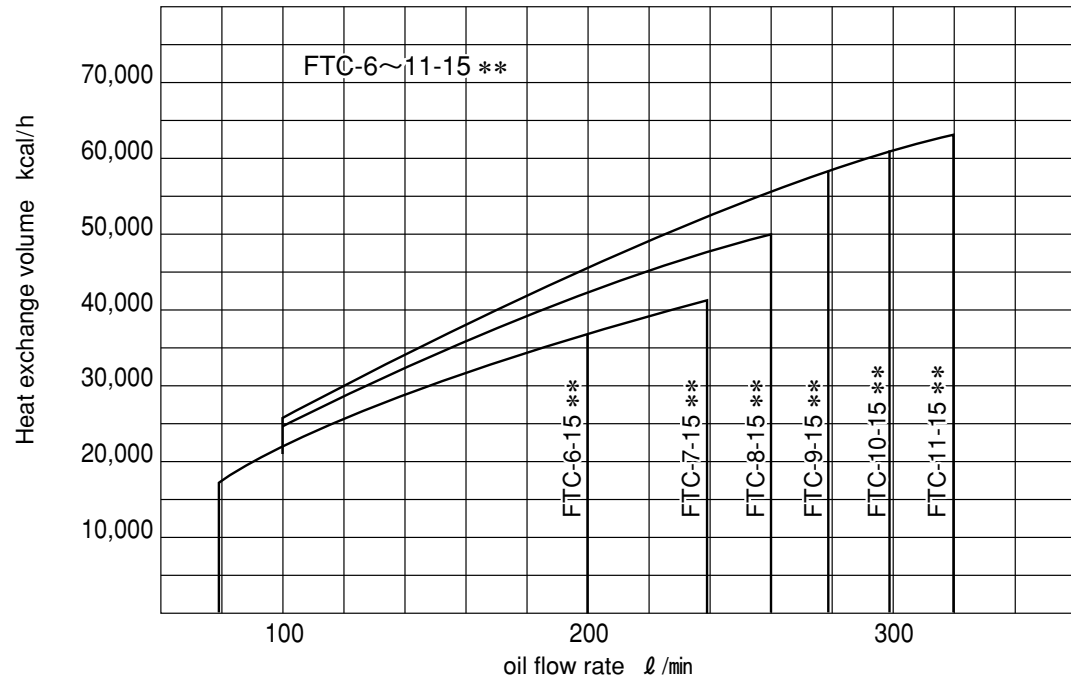
\* FKM Packings are used for fluid "F" and "W" type.

## ► Cooler selection graph

Condition

Fluid : ISO-VG46 or equivalent  
 Oil inlet temp. : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/2 of oil flow (reference table to right)

Model	Water flow	Minimum	Maximum
FTC-6~11-15**	50 l/min	50 l/min	200 l/min
FTC-7~22-20**	80 l/min	80 l/min	360 l/min
FTC-18~44-25**	120 l/min	120 l/min	600 l/min
FTC-31~71-30**	160 l/min	160 l/min	900 l/min



● On the graph, oil side pressure drops at  $\begin{matrix} a \\ b \end{matrix}$  are, a : 0.03 MPa  
 b : 0.1 MPa

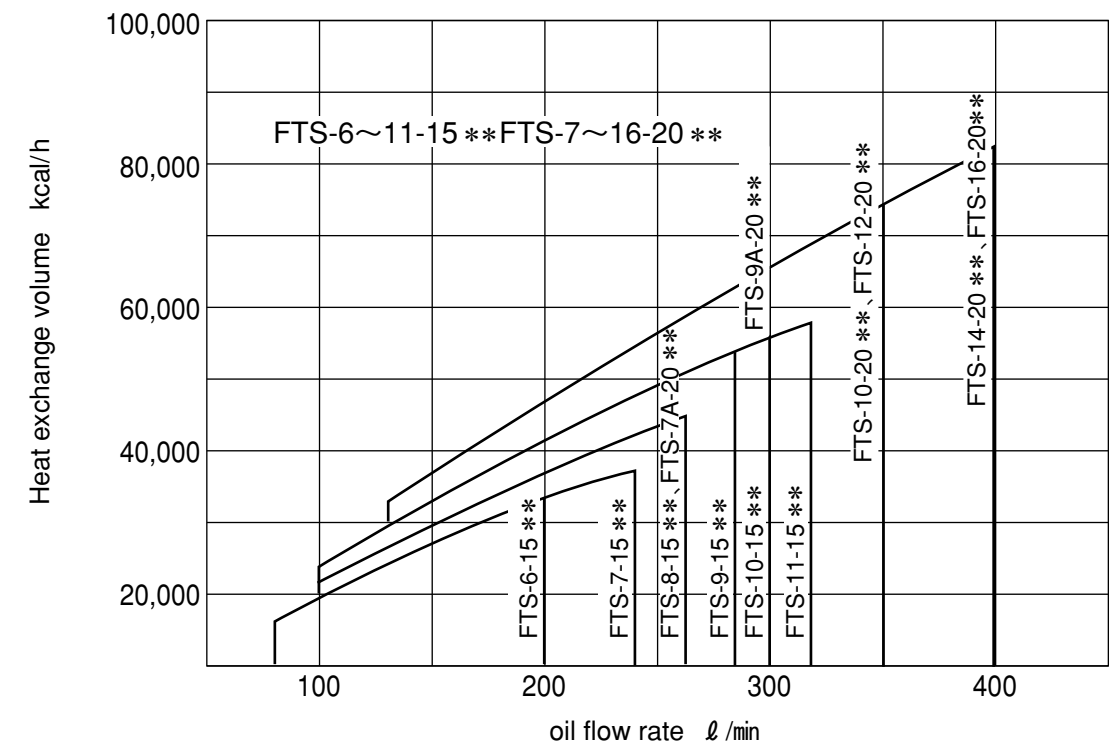
- Water flow must be within the limit table above. In cases where 1/2 of oil flow is lower than the minimum limit, use the water flow rate in the table.
- If your specifications differ from graph above, contact Taisei Kogyo.
- FTC is a two-pass cooler. If water supply is limited, consider four-pass coolers, FTS.

## ► Cooler selection graph

Condition

Fluid : ISO-VG46 or equivalent  
 Oil inlet temp. : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/3 of oil flow (reference table to right)

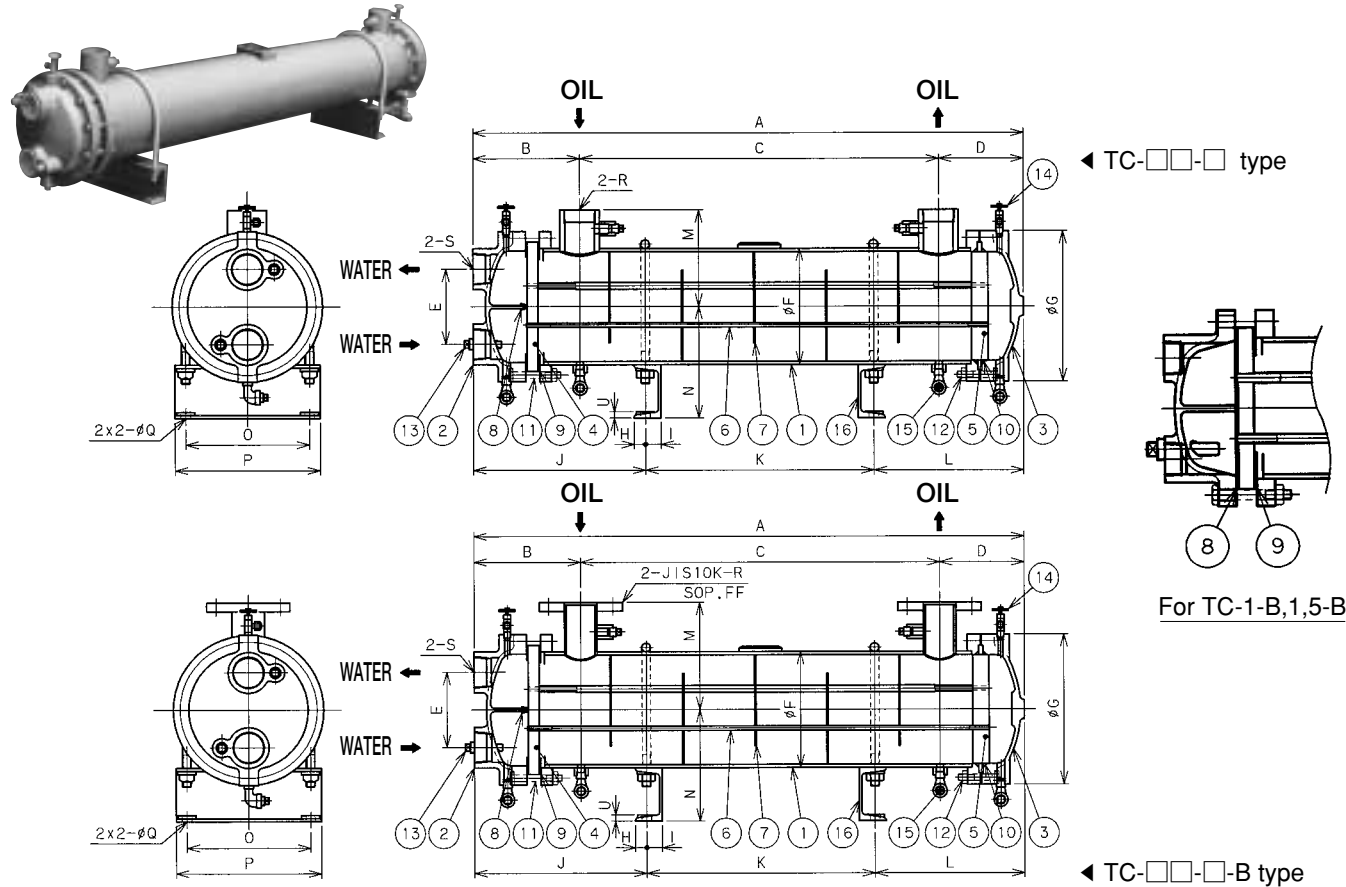
Model	Water flow	Minimum	Maximum
FTS-6~11-15**	30 l/min	30 l/min	100 l/min
FTS-7~22-20**	60 l/min	60 l/min	180 l/min
FTS-18~44-25**	80 l/min	80 l/min	300 l/min
FTS-31~71-30**	100 l/min	100 l/min	450 l/min



● On the graph, oil side pressure drops at  $\begin{matrix} a \\ b \end{matrix}$  are, a : 0.03 MPa  
 b : 0.1 MPa

- Water flow must be within the limit table above. In cases where 1/3 of oil flow is lower than the minimum limit, use the water flow rate in the table.
- If your specifications differ from graph above, contact Taisei Kogyo.

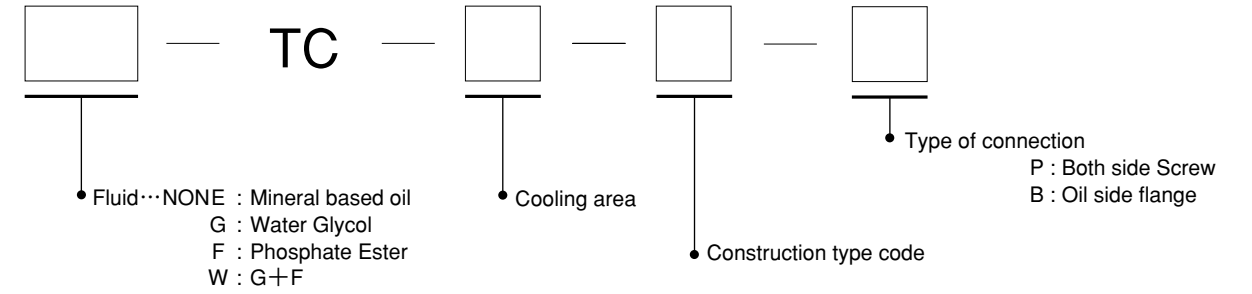
## Construction & Dimensions



Code Model	Dimensions (mm)																	Cooling surface m <sup>2</sup>	Weight kg			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q			R	S	U
TC-1-C	635		340	135	100	φ139.8	φ194	16	24	237	190	210	130 (150)	145	140	180	13.5	Rc11/4	Rc1	10	1	37
TC-1.5-C	865	160	570								420										1.5	43
TC-2-B	834		520								370										2	62
TC-2.5-B	994	174	680	140	110	φ165.2	φ223	16	24	249	530	215	140 (160)	158	170	210	13.5	Rc11/2 (40A)	Rc11/4	10	2.5	68
TC-3-B	1154		840								690										3	73
TC-4-B	1050		720								520										4	85
TC-5-B	1260	182	930	148	130	φ190.7	φ254	21	29	282	730	245	160 (180)	195	200	240	18	Rc11/2 (40A)	Rc11/2	12	5	95
TC-6-B	1470		1140								940										6	110
TC-7-B	1306		950								710										7	115
TC-8-B	1461	199	1105	157	140	φ216.3	φ280	21	29	319	865	275	180 (200)	208	230	270	18	Rc2 (50A)	Rc2	12	8	125
TC-9-B	1616		1260								1020										9	135
TC-10-N	1574		1210								960										10	218
TC-11-N	1709	204	1345	160	180	φ267.4	φ355	21	29	329	1095	285	200 (230)	234	280	320	22	Rc2 (50A)	Rc21/2	12	11	230
TC-12-N	1844		1480								1230										12	240
TC-13-N	1394		980								710										13	302
TC-14-N	1479		1065								795										14	313
TC-15-N	1564		1150								880										15	324
TC-16-N	1649	229	1235	185	200	φ318.5	φ410	28	37	364	965	320	230 (260)	284	330	390	22	Rc21/2 (65A)	Rc3	12	16	334
TC-17-N	1735		1320								1050										17	346
TC-18-N	1819		1405								1135										18	356
TC-19-N	1904		1490								1220										19	368
TC-20-N	1989		1575								1305										20	378

( ) In case oil side is flange rating

## Model Number



## Component Parts

No.	Parts name	No.	Parts name	No.	Parts name
1	Shell	7	Baffle plate	13	Zinc plug
2	Chamber cover A	8	Packing	14	Vent
3	Chamber cover B	9	Packing	15	Drain plug
4	Tube plate A	10	O ring	16	Leg
5	Tube plate B	11	Bolt/Nut		
6	Bare tube	12	Bolt/Nut		

## Spare Parts

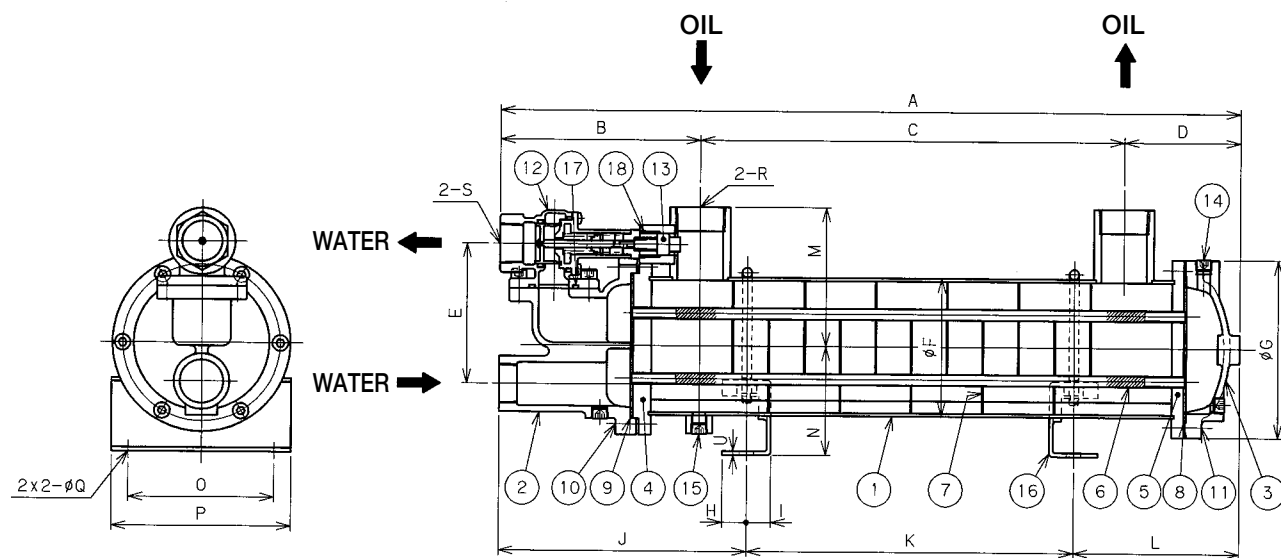
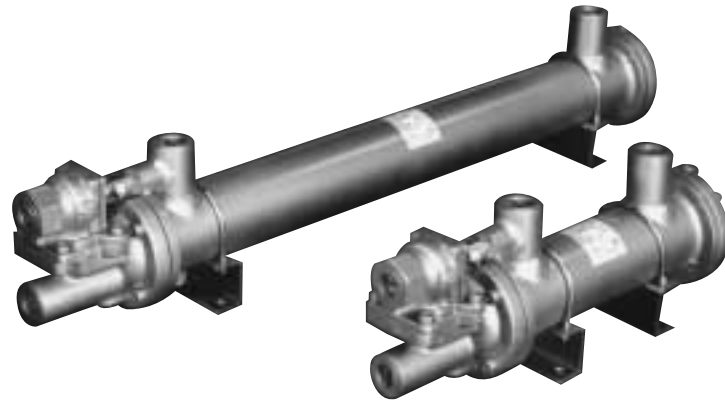
Remarks : Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid.

Model	No.	Parts name	Q'ty	Size	Material
TC-1-B	8	Packing	1	t2 × φ 160 / φ 134	None asbestos
	9	Packing (with partition)	1	t2 × φ 160 / φ 134	None asbestos
	10	O ring	2	G-125	NBR, (FKM*)
TC-1.5-B	13	Zinc plug	2	R1/2	Zn, FcMB
	8	Packing	1	12 × 12 × 162	NBR
TC-2-B	9	Packing	2	t3 × φ 188 / φ 162	None asbestos
	10	O ring	2	G-150	NBR, (FKM*)
TC-3-B	13	Zinc plug	2	R1/2	Zn, FcMB
	8	Packing	1	12 × 12 × 184	NBR
TC-4-B	9	Packing	2	t3 × φ 216 / φ 184	None asbestos
	10	O ring	2	G-175	NBR, (FKM*)
	13	Zinc plug	2	R1/2	Zn, FcMB
TC-6-B	8	Packing	1	12 × 12 × 208	NBR
	9	Packing	2	t3 × φ 241 / φ 208	None asbestos
	10	O ring	2	G-200	NBR, (FKM*)
TC-7-B	13	Zinc plug	2	R1/2	Zn, FcMB
	8	Packing	1	12 × 12 × 258	NBR
TC-9-B	9	Packing	2	t3 × φ 302 / φ 258	None asbestos
	10	O ring	2	G-250	NBR, (FKM*)
	13	Zinc plug	2	R1/2	Zn, FcMB
TC-10-N	8	Packing	1	12 × 12 × 308	NBR
	9	Packing	2	t3 × φ 357 / φ 308	None asbestos
	10	O ring	2	G-300	NBR, (FKM*)
TC-13-N	13	Zinc plug	2	R 1	Zn, FcMB

\* FKM Packings are used for fluid "F" and "W" type.

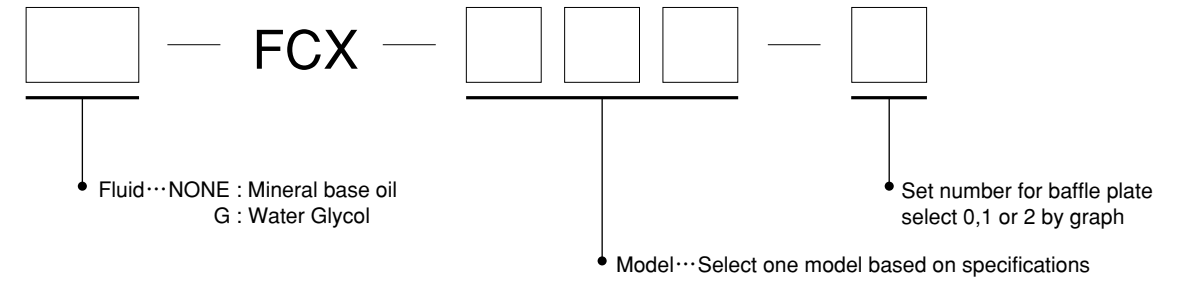


## Construction & Dimensions



Code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	U	Cooling surface m <sup>2</sup>	Weight kg
FCX-108	422		180								70										0.4	9
FCX-114	602	160	360	82	83	φ76.3	φ110	15	15	215	250	137	90	70	80	102	φ10	Rc1	Rc3/4	2.3	0.7	10.5
FCX-122	832		590								480										1.1	13
FCX-226	501		240								160										1.3	17
FCX-234	611		350								270										1.7	19
FCX-242	691	165	430	96	116	φ114.3	φ147	20	20	204	350	137	115	90	120	148	φ12	Rc1 1/4	Rc1	3.2	2.1	20.5
FCX-256	841		580								500										2.8	25
FCX-270	1011		750								670										3.5	28

## Model Number



## Specifications

Type	Fixed tube plate Shell & tube	
Max. operating pressure	Shell side 1.0MPa / Tube side 0.5MPa	
Fluid	Shell side : Mineral based oil, Water Glycol etc. Tube side : Fresh water, Industrial water. (except sea water)	
Tube material	9mm dia. Low fin tube	
Cooling area	0.4~3.5m <sup>2</sup>	
Oil control temp.	Adjustable between 35°C~55°C	
Features	Size	Unique low fin tube allows 20% size and weight reduction
	Leg	U bolt type legs allow free installation
	Corrosion Proof	Inside of chamber cover is coated with a tar-epoxy paint to prevent corrosion.

## Component Parts

No.	Parts name	No.	Parts name
1	Shell	10	Bolt/Nut
2	Chamber cover A	11	Bolt/Nut
3	Chamber cover B	12	Thermo valve
4	Tube plate A	13	Thermo sensor
5	Tube plate B	14	Vent plug
6	Fin tube	15	Drain plug
7	Baffle plate	16	Leg
8	Packing	17	O ring
9	Packing	18	O ring

## Spare Parts

Remarks : Please note part numbers and quantity, when placing orders.

Model	No.	Parts name	Q'ty	Size	Material
FCX-1□□	8	Packing	1	t2×φ83/φ72	None asbestos
	9	Packing (with partition)	1	t2×φ83/φ72	None asbestos
	17	O ring	1	P-34	NBR
	18	O ring	1	P-18	NBR
FCX-2□□	8	Packing	1	t2×φ120/φ109	None asbestos
	9	Packing (with partition)	1	t2×φ120/φ109	None asbestos
	17	O ring	1	P-34	NBR
	18	O ring	1	P-18	NBR

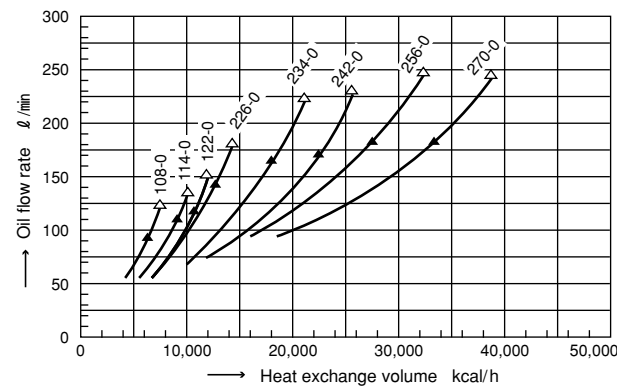
## ▶ Cooler selection graph

Condition

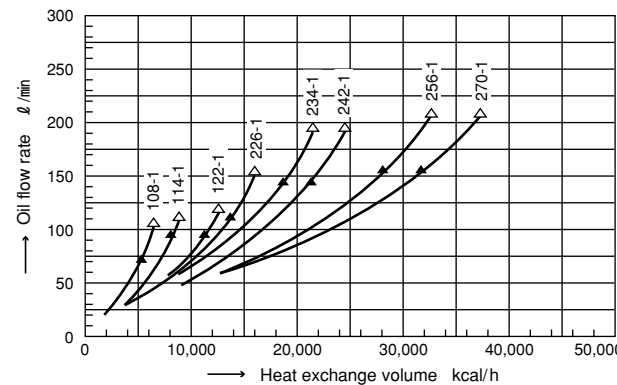
- Fluid : ISO-VG46 or equivalent
- Oil inlet temp. : 55°C
- Water inlet temp. : 30°C
- Water flow rate : 1/2 of oil flow (reference table to right)
- Oil side pressure drop : ▲···0.1MPa
- Water side pressure drop : △···0.15MPa
- drop : 0.01~0.03MPa

Model	Water flow	Minimum	Maximum
FCX-108~122		10 l/min	35 l/min
FCX-226~270		20 l/min	80 l/min

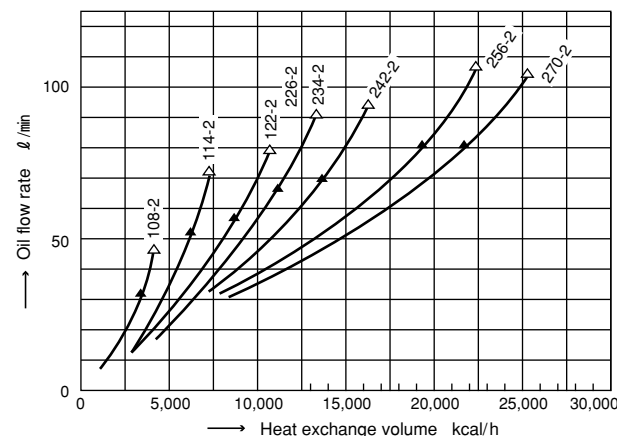
### FCX-108~270-0 type



### FCX-108~270-1 type



### FCX-108~270-2 type

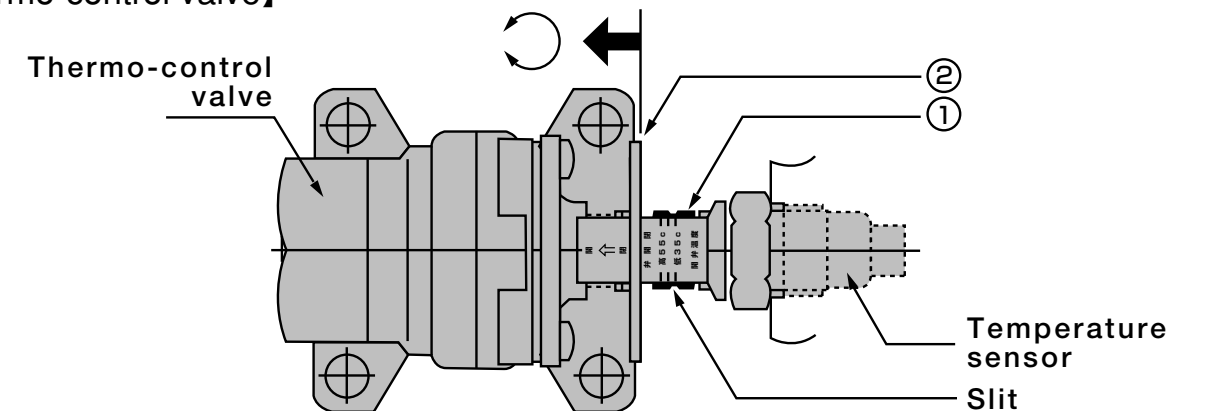


## ▶ Supplementary Items

### 【Cooler Selection】

- This model is a fixed tube plate cooler, so that tube bundle can not be removed.
- Select model number with oil flow and heat exchange volume shown in the graph. If specification is not within the range of graph, consult Taisei for further assistance.
- Consult Taisei if your specification is among these listed conditions:
  - (1) Very high viscosity - for low fin tube, use viscosity below 150 cSt.
  - (2) Cutting fluid, has a tendency to cause rusting.
  - (3) Low quality of water.
  - (4) Fluid is not oil.

### 【thermo-control valve】

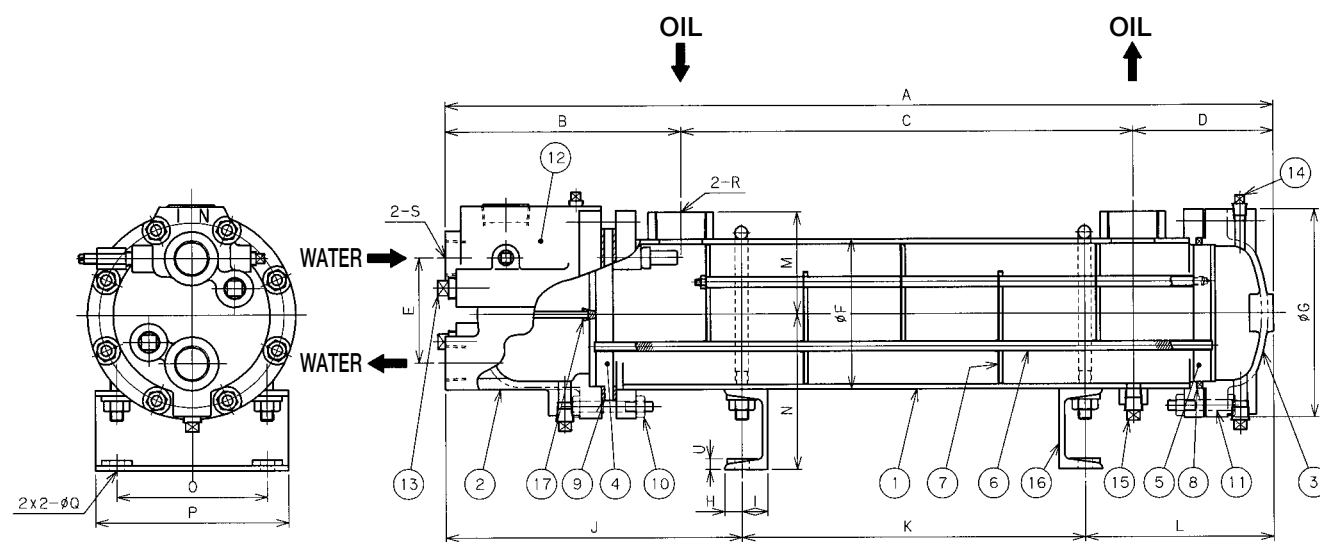
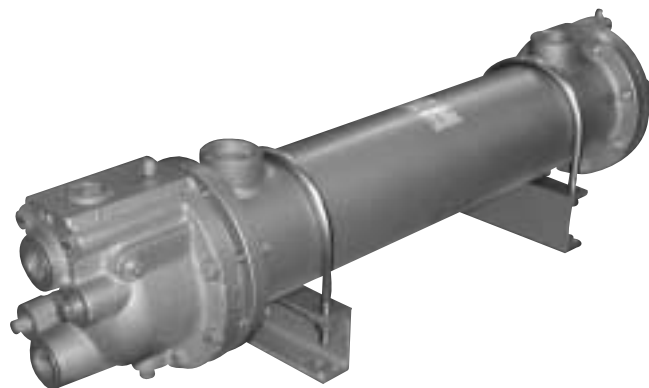


- Adjustable temperature setting  
Set the desired temperature by turning the temperature adjustment ring ① (the factory setting is 35°C).
- If the control valve does not operate  
If the control valve does not operate or requires a setting below 35°C, pull the emergency lever toward the valve, rotate a couple of times and leave it. The valve will open to allow water flow.
- Water leakage  
The standard leakage of the valve seat is less than 30 cc/min with a water supply pressure of 0.15MPa. Please note that this thermo-control valve is not a check valve. Use shut-off valve when the cooler is not in use.

### 【Maintenance】

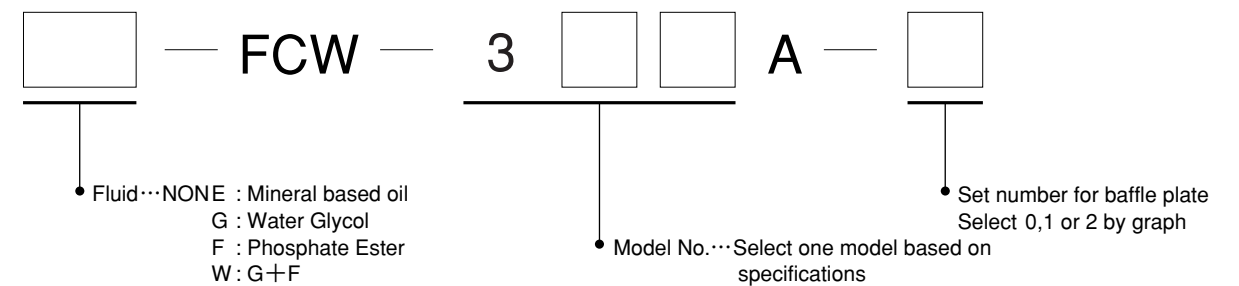
- In winter conditions, drain the cooling water during shutdown periods to avoid freeze fractures.
- Prevent foreign material from entering into the cooling water.
- Clean the cooler every 6 months or at least once a year.
- Thermo-control valve is not a shut-off valve. Small leakage will occur through the valve.  
Shut off main water supply line when the machine is not in use.

## Construction & Dimensions



Code Model	Dimensions																	Cooling surface m <sup>2</sup>	Weight kg			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q			R	S	U
FCW-350A	650	219	301	130	98	φ139.8	φ194	16	24	275	200	175	95	145	140	180	φ13.5	Rc11/2	Rc1	10	2.5	43
FCW-370A	880		430								3.5										58	
FCW-390A	1050		701								600										4.5	71
FCW-311A	1170		821								720										5.5	88

## Model Number



## Specifications

Type	Floating tube plate Shell & tube	
Max. operating pressure	Shell side : 1.0 MPa / Tube side : 0.7 MPa	
Fluid	Shell side : Mineral based oil, Water Glycol, Phosphate Ester etc. Tube side : Fresh water, Industrial water (except sea water)	
Tube material	9mm dia. Low fin tube (C1220T)	
Cooling area	2.5~5.5m <sup>2</sup>	
Oil control temp	51 °C at ex-works. Adjustable to 40 °C and 45 °C	
Features	Size	Unique low fin tube allows 20% size and weight reduction
	Leg	U bolt type legs allow free installation
	Corrosion Proof	Inside of water chamber cover is coated with a tar-epoxy paint to prevent corrosion.

## Component Parts

No.	Parts name	No.	Parts name
1	Shell	10	Bolt/Nut
2	Chamber cover A	11	Bolt/Nut
3	Chamber cover B	12	Temp. sensor
4	Tube plate A	13	Zinc plug
5	Tube plate B	14	Vent plug
6	Fin tube	15	Drain plug
7	Baffle plate	16	Leg
8	Packing	17	Packing
9	Packing		

## Spare Parts

Remarks : Please note part numbers and quantity, when placing orders. Material of part depends upon the type of fluid.

Model	No.	Parts name	Q'ty	Size	Material
FCW-3□□	8	Packing	2	t4.5 × φ 140.2 / φ 128	NBR, (FKM*)
	9	Packing	1	t3 × φ 160 / φ 134	None asbestos
	13	Zinc plug	2	R3/8	Zn, FcMB
	17	Packing	1	12 × 12 × 134	NBR

\* FKM Packings are used for fluid "F" and "W" type.

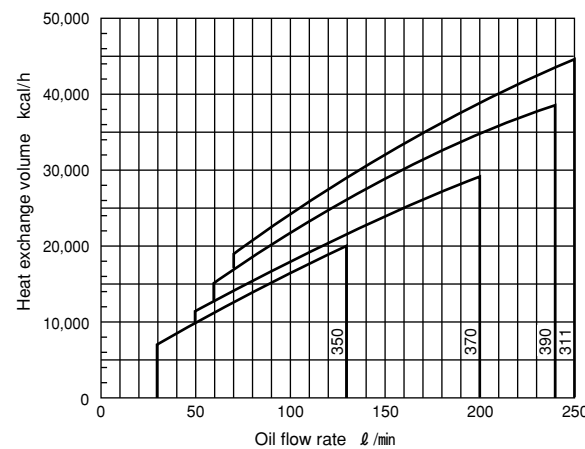
## ▶ Cooler selection graph

### Condition

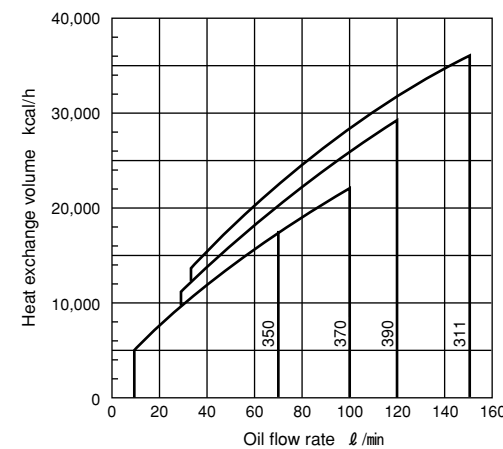
- Fluid : ISO-VG46 or equivalent
- Oil inlet temp. : 55°C
- Water inlet temp. : 30°C
- Water flow rate : Half of oil flow (reference table to right)
- Oil side pressure drop : 0.03~0.1MPa
- Water side pressure drop : 0.01~0.06MPa

Model	Water flow	Minimum	Maximum
FCW-350A~311A		30 ℓ/min	90 ℓ/min

### FCW-350A~311A-1 type



### FCW-350A~311A-2 type



- On the graph, oil side pressure drops at **a** and **b** are, **a** : 0.03 MPa  
**b** : 0.1 MPa

- Water flow must be within the limit table above. In cases where 1/2 of oil flow is lower than the minimum limit, use the water flow rate in the table.
- If your specifications differ from graph above, contact Taisei Kogyo.

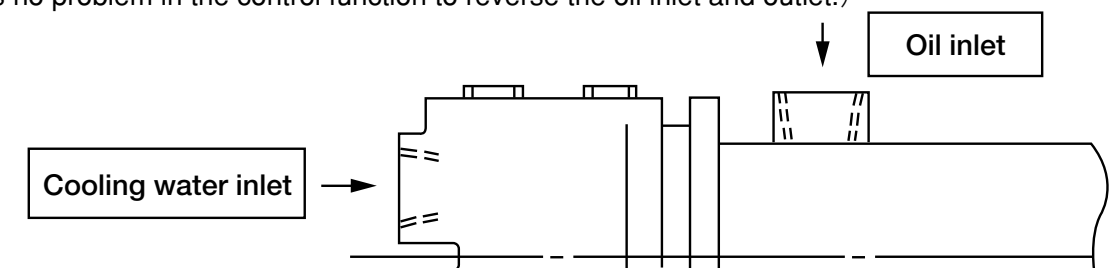
## ▶ Supplementary Items

### 【Cooler selection】

- FCW Model is a floating tube plate cooler, which allows the tube bundle to be removed.
- Select the cooler using the oil flow rate and the heat exchange volume shown in the graph.  
If your specification is not within the range of graph, consult Taisei for further assistance.
- Consult Taisei if your specification is among these listed conditions:
  - (1) Very high viscosity - for low fin tube, use viscosity below 150 cSt.
  - (2) Cutting fluid, has the tendency to cause rusting.
  - (3) Low quality of water.
  - (4) Fluid is not oil.

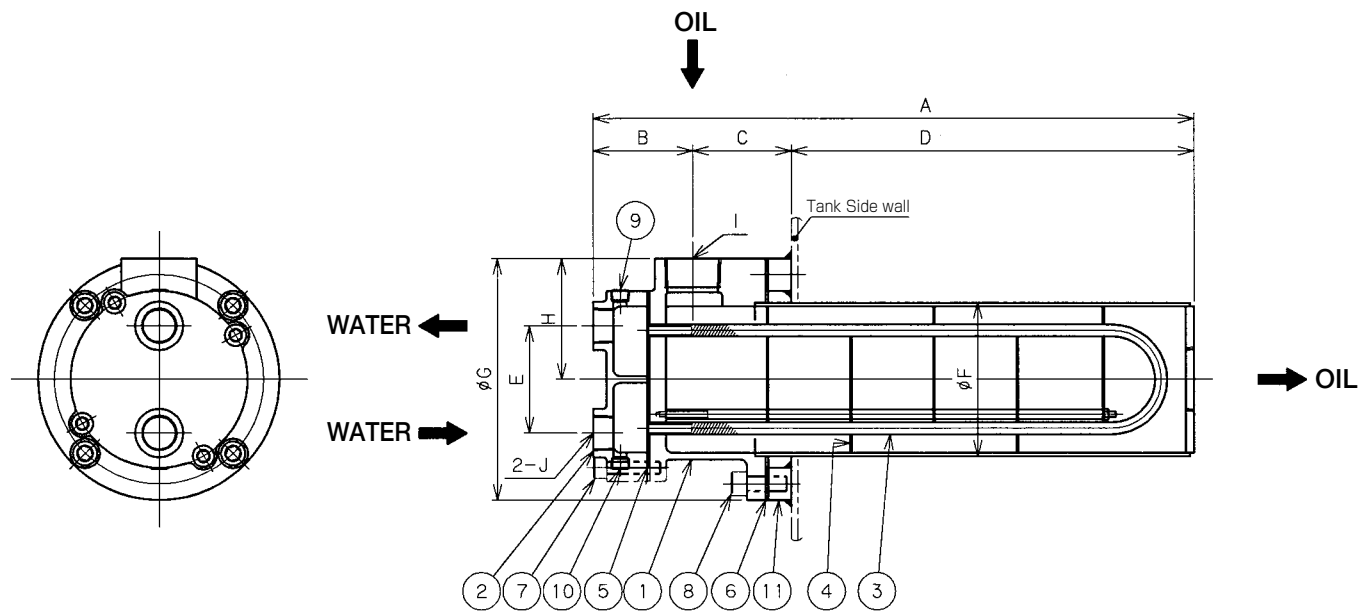
### 【Maintenance】

- In winter conditions, drain the cooling water during shutdown periods to avoid freeze fractures.
- Prevent foreign material from entering the cooling water.
- Clean the cooler every 6 months or at least once a year.
- Cannot adjust oil temperature.
- Maximum operation temperature is 80°C.
- Pressure drop of cooling water is higher than normal.
- There is a flow control valve at inlet port of cooling water, so avoid introducing foreign materials into the valve.  
If foreign material is on the surface of control valve, it will be unable to shut completely.  
To avoid this situation, check the valve seat regularly. Clean the valve seat by removing the blind plug located at the top.
- Cannot change inlet and outlet for both oil and cooling lines.
  - Wrong flow of cooling line—Auto temperature, control function does not work.
  - Wrong oil flow—Thermostatic control oil outlet temperature. Consequently oil temperature increases.  
(It is no problem in the control function to reverse the oil inlet and outlet.)



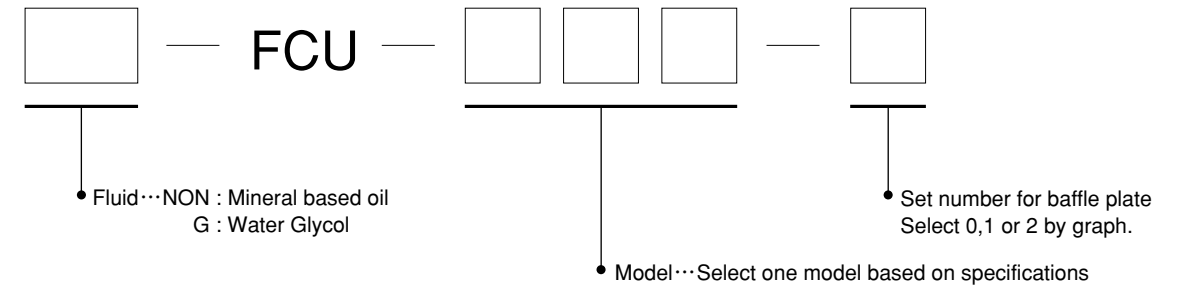
- Cannot use sea water because of corrosion.
- Besides using the auto control function, screw in the manual valve to open, and screw out to close.

### Construction & Dimensions



Code Model	Dimensions										Cooling surface m <sup>2</sup>	Weight kg
	A	B	C	D	E	F	G	H	I	J		
FCU-108	377	60	52	265	60	φ90	φ144	72	Rc3/4	Rc1/2	0.4	9
FCU-144	577			465							0.7	10
FCU-122	777			665							1.1	12
FCU-226	547	74	73	400	80	φ114.3	φ180	90	Rc11/4	Rc3/4	1.3	18
FCU-234	687			540							1.7	20
FCU-242	827			680							2.1	23
FCU-256	1057			910							2.8	27

### Model Number



### Specifications

Type	Direct tank mount U shape tube cooler	
Max. operating pressure	Shell side : 1.0 MPa	
Fluid	Shell side : Mineral base oil, Water Glycol etc. Tube : Fresh water (except sea water)	
Tube material	9mm dia. Low fin tube (C1220T)	
Cooling area	0.4~2.8m <sup>2</sup>	
Features	Size	Unique low fin tube allows 20% size and weight reduction.
	Space	Direct tank mount means less space and piping.
	Corrosion Proof	Inside of water chamber cover is coated with a tar-epoxy paint to prevent corrosion.

### Component Parts

No.	Parts name
1	Shell
2	Chamber cover A
3	Fin tube
4	Baffle plate
5	Packing
6	Packing
7	Bolt/Nut
8	Bolt/Nut
9	Vent plug
10	Drain plug
11	Flange

### Spare Parts

Remarks : Please note part numbers and quantity, when placing orders.

Model	No.	Parts name	Q'ty	Size	Material
FCU-1□□	5	Packing (with partition)	1	t2×φ104/φ85	None asbestos
	6	Packing	1	t2×φ144/φ104	None asbestos
FCU-2□□	5	Packing (with partition)	1	t2×φ132/φ109	None asbestos
	6	Packing	1	t2×φ180/φ132	None asbestos

# Shell and Tube-type Coolers

To safely use cooler, read cautionary notice and disclaimers.

Before handling this item, read the instruction manual carefully and handle cooler with care.

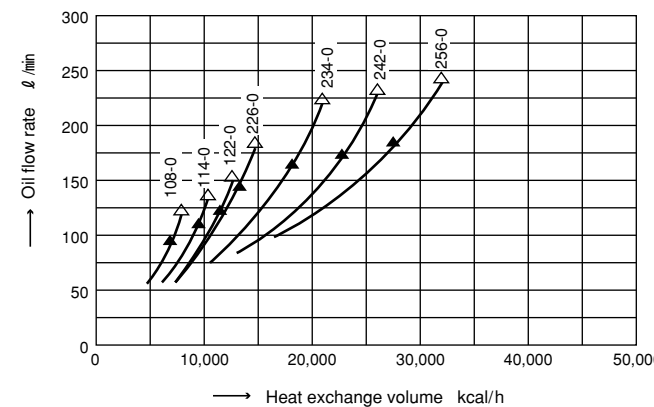
## ► Cooler selection graph

Condition

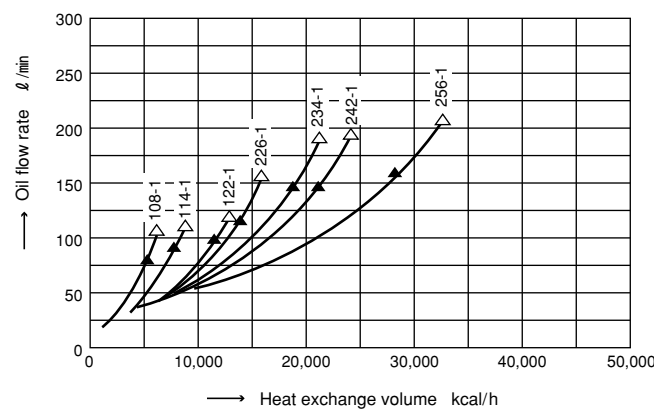
Fluid : ISO-VG46 or equivalent  
 Oil inlet temp. : 55°C  
 Water inlet temp. : 30°C  
 Water flow rate : 1/2 of oil flow (reference table to right)  
 Oil side pressure drop : ▲···0.1MPa △···0.15MPa  
 Water side pressure drop : 0.01~0.03MPa

Model	Water flow	
	Minimum	Maximum
FCU108~122	10 ℓ /min	30 ℓ /min
FCU226~256	15 ℓ /min	55 ℓ /min

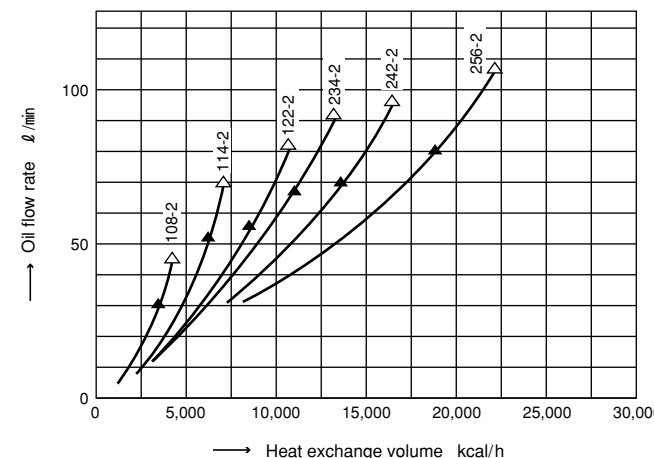
### FCU-108~256-0 type



### FCU-108~256-1 type



### FCU-108~256-2 type



## 1. Warning

⚠ Caution Do not use any other fluids except mineral-based fluids or specified fluids.

⚠ Caution Do not exceed the maximum operating pressure of the cooler.

## 2. Out of Warranty

When coolers are used for applications other than those specified in this brochure, the warranty is not applicable, even if the product is in the warranty period.

### (1) Purpose

- Do not use coolers for unintended purposes
- Examples of unacceptable applications
  - a) Heater
  - b) Beside oil(air, gases and water in shell side)

### (2) Fluids in use

Do not use any other fluids except mineral-based fluids or specified fluids.

### (3) Maximum operating pressure and temperature

Maximum operating pressure—1.0MPa(10kgf/cm<sup>2</sup>)  
 Maximum operating temperature—80°C

### (4) Cooling water

Use fresh water, deep-well water and industrial water to obtain water quality within recommended water quality shown on front page.

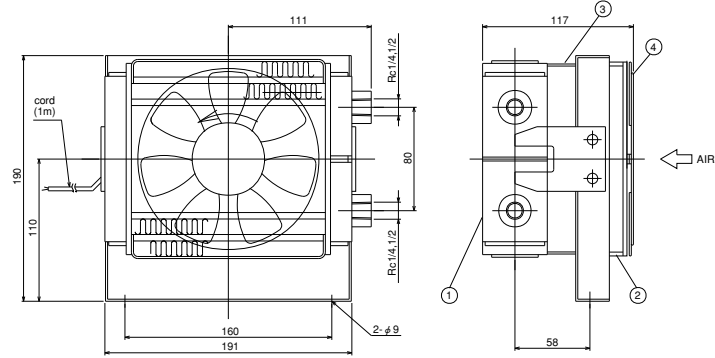
## 3. Maintenance

- (1) In cases of long cooler shutdown periods, drain water from the cooler to avoid corrosion.
- (2) In winter conditions, drain the cooling water during shutdown periods to avoid freeze fractures.
- (3) Prevent foreign material from entering into the cooling water.
- (4) Clean the cooler every 6 months or at least once a year.  
 Change gasket and packing when disassembling the cooler.

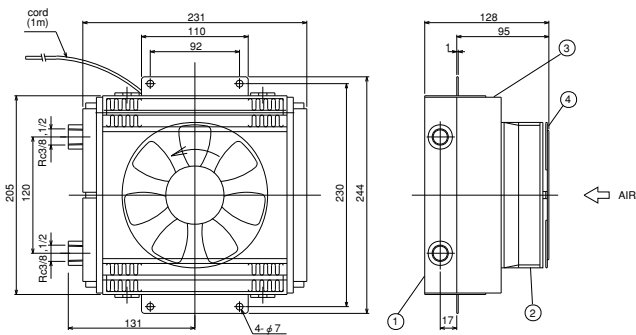
### Construction & Dimensions



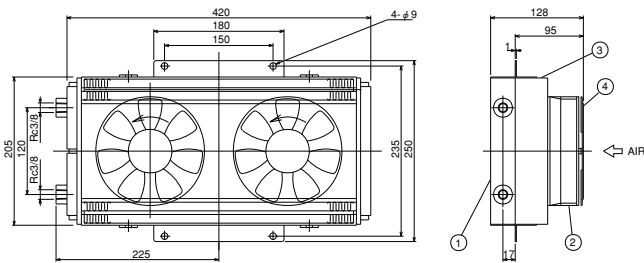
ATK-1552F



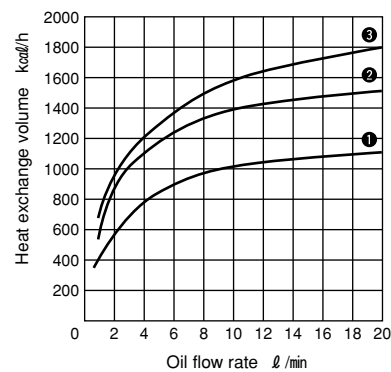
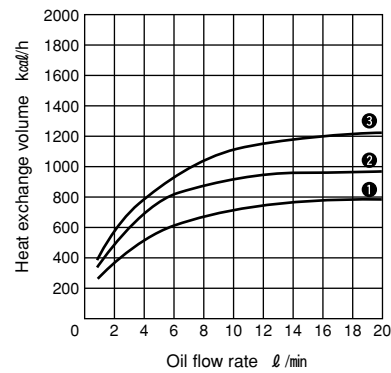
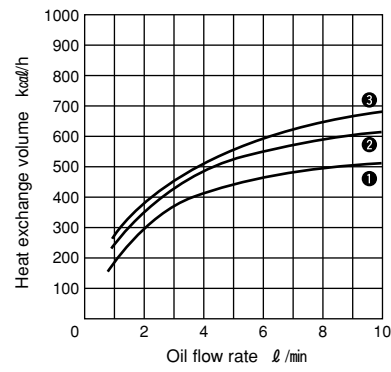
ATK-2032F



ATK-2432F



### Heat exchange volume



ISO-VG46 or equivalent (40~70°C)

- ① Room temp. +20°C
- ② Room temp. +30°C
- ③ Room temp. +35°C

### Model Number

ATK-1552F  
ATK-2032F  
ATK-2432F

PORT SIZE			ELECTRIC WIRING		VOLTAGE	
MODEL	CODE	PORT(d)	CODE	CONNECTOR	CODE	VOLTAGE
1552F	02	Rc1/4	NONE	without	1	100V 1ph※1
	04	Rc1/2	A	with	2	200V 1ph※1
2032F	03	Rc3/8			15	115V 1ph
	04	Rc1/2			22	220V 1ph
2432F	03	Rc3/8			23	230V 1ph

### Specifications

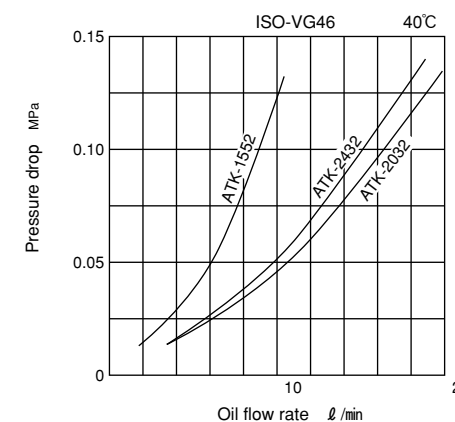
Item	Model	ATK-1552F	ATK-2032F	ATK-2432F
Fluid		Mineral based oil		
Operating pressure		1.0MPa		
Voltage		Single phase 100V or 200V 50/60Hz※1		
Power consumption		35/33W		35/33W×2
Insulation		E grade		
Lead cable		AWG22×100 <sup>L</sup>		
Sound level		65dB(A) or below		70dB(A) or below
Weight		3kg	3.1kg	4.8kg
Paint coating		Black baking finish		
Ambient Condition		Ambient temp. : -20°C~60°C / RH : 20%~85% / In house use To avoid oil mist atmosphere for electronic short circuit		

※1 100V, 200V are standard

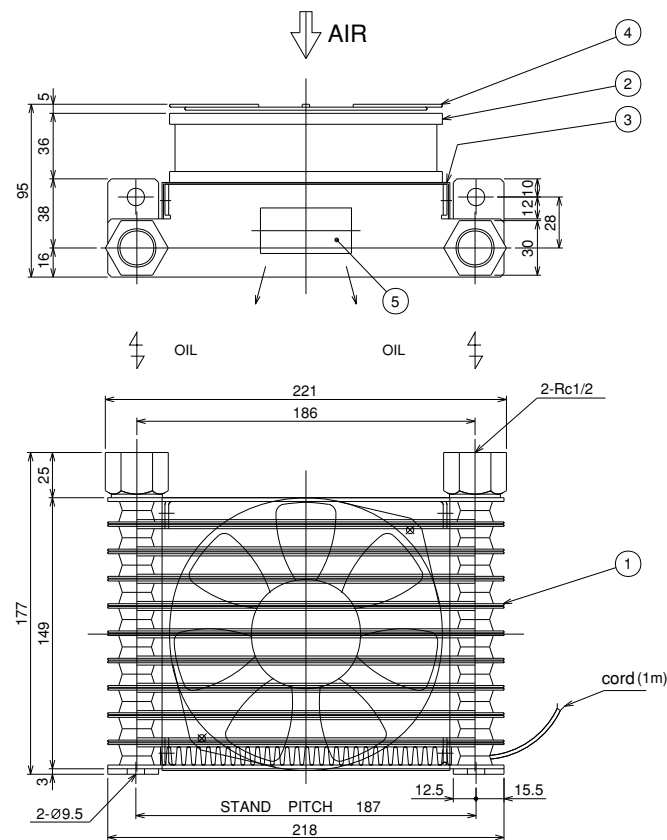
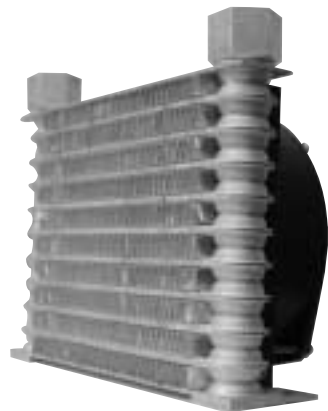
### Component Parts

No.	Parts name
1	Radiator
2	Fan motor
3	Support
4	Fan guard

### Pressure drop information



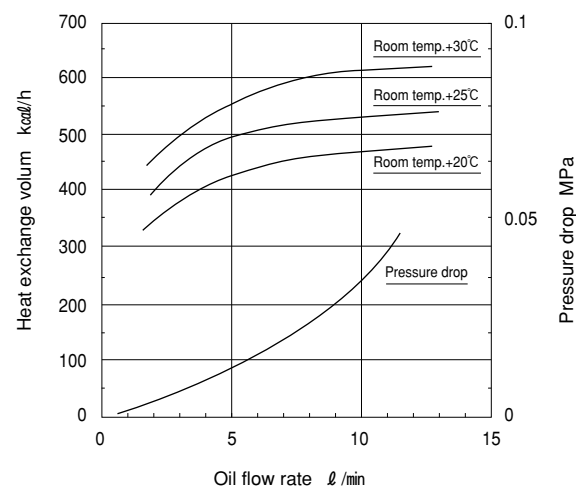
### Construction & Dimensions



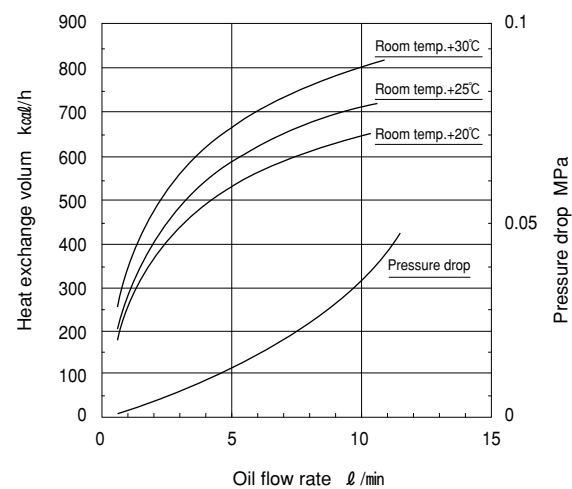
ATL-1531

### Cooler selection graph

Model : ATL-1231  
Fluid : ISO-VG32



Model : ATL-1531  
Fluid : ISO-VG32



### Model Number

ATL - 1231 — VOLTAGE  
ATL - 1531

Code	Voltage	
	1531	1231
1	100V	100V※1
2	200V	200V※1
15	115V	115V
22	220V	—
23	230V	230V

### Specifications

Fluid	Mineral based oil
Operating pressure	1.0MPa
Voltage	Single phase 100V or 200V 50/60Hz ※1
Power consumption	16/15W 50/60Hz (ATL-1231) 35/33W 50/60Hz (ATL-1531)
Lead cable	1m
Sound level	45dB(A) (ATL-1231) Less than 65dB(A) (ATL-1531)
Weight	1.6kg (ATL-1231) 1.8kg (ATL-1531)
Ambient condition	Ambient temp. : -20°C~60°C RH : 20%~85% In house use To avoid oil mist atmosphere for electronic short circuit

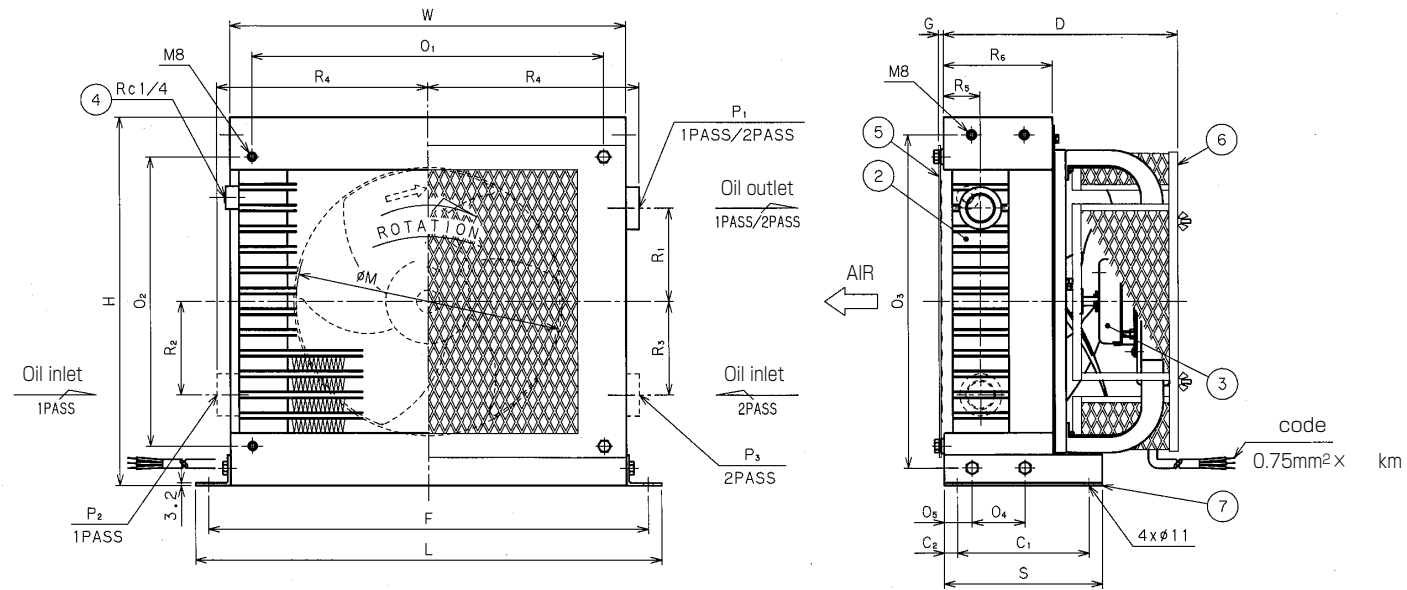
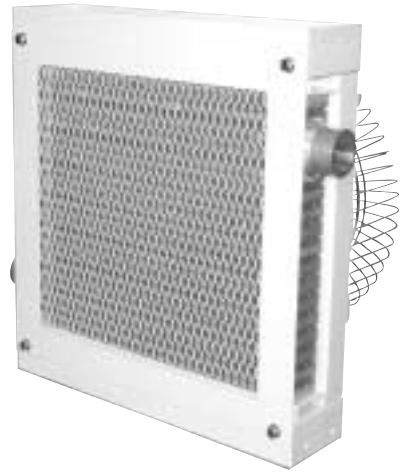
※1 100V,200V are standard

### Component Parts

No.	Parts name
1	Radiator
2	Fan motor
3	Support
4	Fan guard



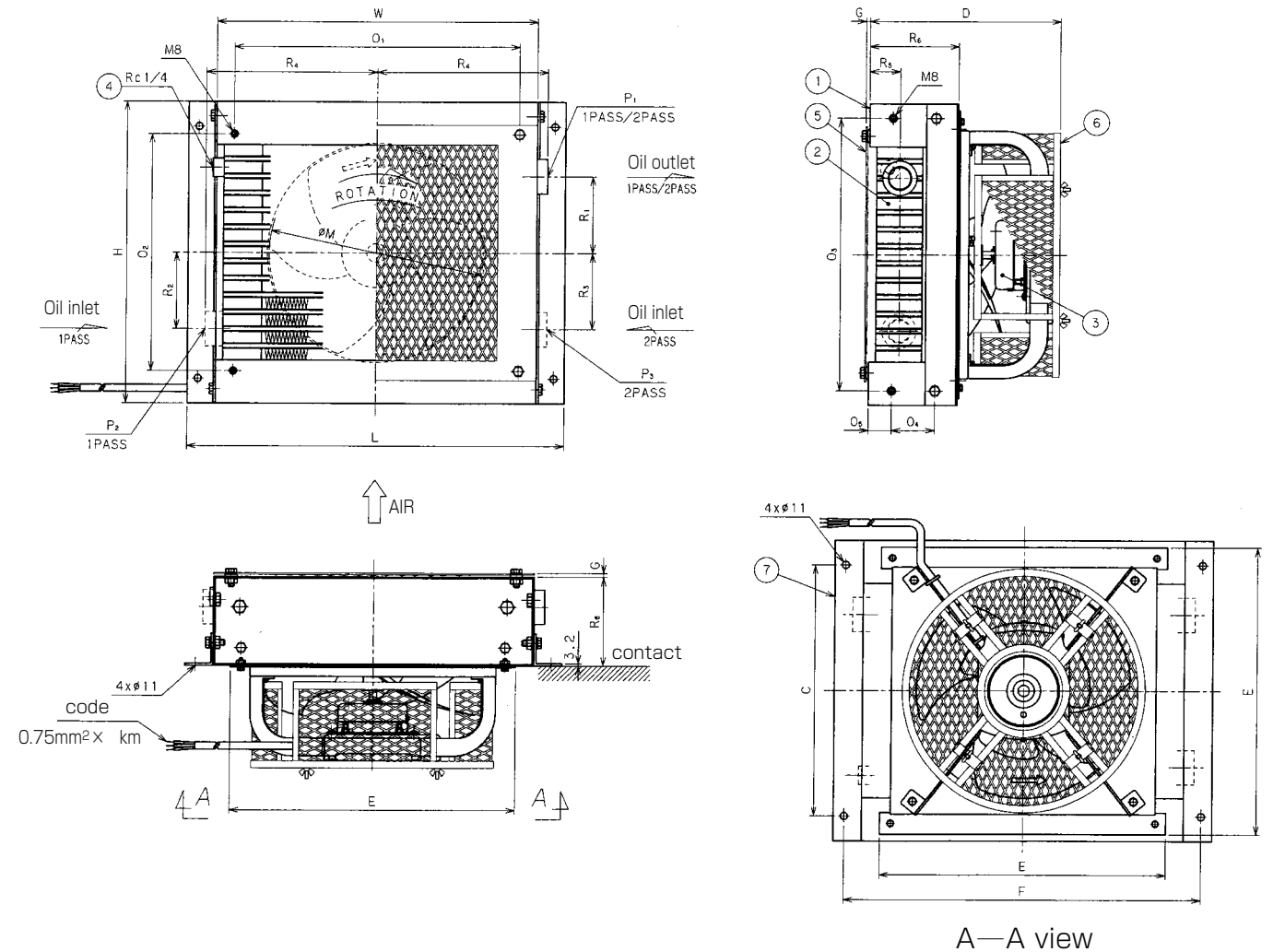
### ► Construction & dimensions for ATS-H



Model	Code	W	H	D	L	C <sub>1</sub>	C <sub>2</sub>	F	S	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>	O <sub>4</sub>	O <sub>5</sub>	G	M	K	Weight (kg)
ATS-3061-MH ***		380	372	265.2	460	100	12	430	124	Rc3/4	Rc3/4	—	70.8	70.8	—	200			330	282	332				258	1	16
ATS-3062-MH ***				(259)						—	Rc3/4	—	—	70.8	—												
ATS-3561-MH ***		450	419	266.7	530			500		Rc1	Rc1	—	106.2	106.2	—	240	42	124	400	329	379	60	32		300		21
ATS-3562-MH ***				(260.5)		150	15		180	—	Rc1	—	—	106.2	—												
ATS-4061-MH ***		510	553	253	590			560		Rc1-1/4	Rc1-1/4	—	129.8	129.8	—	284.5			460	463	513			2.3	350		28
ATS-4062-MH ***				(246.8)						—	Rc1-1/4	—	—	129.8	—												

( ) For no fan guard  
Weight is for model with fan guard and radiator guard

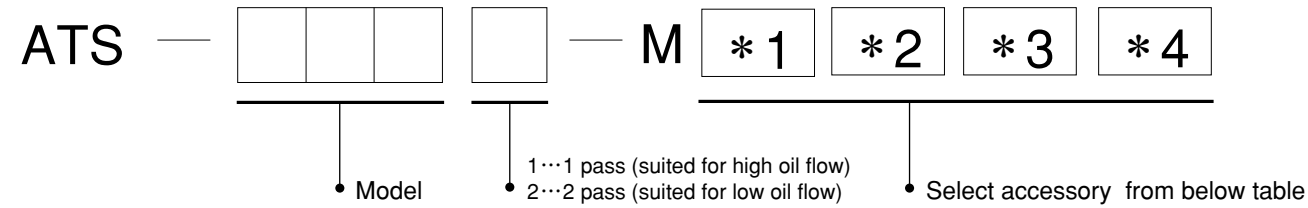
### ► Construction & dimensions for ATS-V



Model	Code	W	H	D	L	C	F	E	P <sub>1</sub>	P <sub>2</sub>	P <sub>3</sub>	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	R <sub>4</sub>	R <sub>5</sub>	R <sub>6</sub>	O <sub>1</sub>	O <sub>2</sub>	O <sub>3</sub>	O <sub>4</sub>	O <sub>5</sub>	G	M	K	Weight (kg)
ATS-3061-MV ***		380	372	265.2	460	300	430	370	Rc3/4	Rc3/4	—	70.8	70.8	—	200			330	282	332				258	1	17
ATS-3062-MV ***				(259)					—	Rc3/4	—	—	70.8	—												
ATS-3561-MV ***		450	419	266.7	530	350	500	400	Rc1	Rc1	—	106.2	106.2	—	240	42	124	400	329	379	60	32		300		22
ATS-3562-MV ***				(260.5)					—	Rc1	—	—	106.2	—												
ATS-4061-MV ***		510	553	253	590	480	560	440	Rc1-1/4	Rc1-1/4	—	129.8	129.8	—	284.5			460	463	513			2.3	350		30
ATS-4062-MV ***				(246.8)					—	Rc1-1/4	—	—	129.8	—												

( ) For no fan guard  
Weight is for model with fan guard and radiator guard.

## ▶ Model Number



Accessory table							
*1		*2		*3		*4	
H	Attachment for horizontal installation	R	With radiator guard	G	With fan guard	2	200V
V	Attachment for vertical installation	N	Without radiator guard	N	Without fan guard	4	400V
N	Without attachment						

## ▶ Specifications

Model	ATS-3061-M	ATS-3062-M	ATS-3561-M	ATS-3562-M	ATS-4061-M	ATS-4062-M
Fluid	Mineral based oil					
Operating pressure	1.0 MPa					
Rated voltage	3ph 4pin 200V 50/60Hz 3ph 4pin 380-415V 50Hz 3ph 4pin 380-440V 60Hz					
Type of fan	EF-25UTB		EF-30UTB		EF-35UTB	
Power consumption	25W		50W		100W	
Rated current	0.21 / 0.20A		0.33 / 0.29A		0.63 / 0.52A	
Starting current	0.64 / 0.59A		1.1A / 1.0A		2.5 / 2.4A	
Insulation	E grade					
Recommended beaker current (A)	0.28~0.35 50Hz 0.29~0.36 60Hz		0.64~0.80 50Hz 0.55~0.69 60Hz		0.90~1.10 50Hz 0.88~1.10 60Hz	
Sound noise (1.5m beside)	50.0 / 52.0 dB		54.5 / 58.5 dB		60.0 / 63.0 dB	
Ambient condition	Ambient temp. : -10°C~50°C / RH : less than 90% In house use					

\*A rating current is the value for a simple motor.

### ● Thermal protection (only for 200V-type).

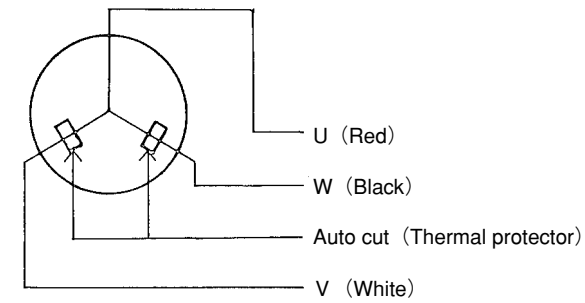
There is a thermal protector in the motor. When the motor overheats, it will stop. After the motor stops, review the procedure below.

- 1) Turn off motor (⚡ do not touch the motor before turning it off) .
- 2) Radiator should not have built up debris on it.
- 3) Look for restrictions in the airflow.
- 4) Check if the electric current is normal.
- 5) Check if ambient temperature is correct or not.

When the temperature cools down, the motor can be used.

⚡ Even if the motor stops but electricity is still supplied, do not touch air cooler.  
(There is a possibility of sudden restart.)

## ● Connection



⚡ The cooler must be correctly grounded to earth.

## ● Accessory

A protective fan guard is provided as an accessory. If you order the fan guard, add "G" at end of the model number.

It is easy to attach the fan guard on the users end even if it is ordered separately.

⚠ TAISEI recommends the use of a fan guard for your safety.

## ▶ Component Parts

No.	Parts name	No.	Parts name
1	Case	5	Radiator guard
2	Radiator	6	Fan guard
3	Fan motor	7	Bracket
4	Vent		

## ▶ Cooler selection graph

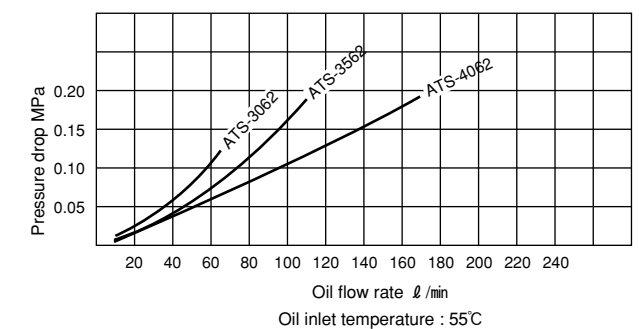
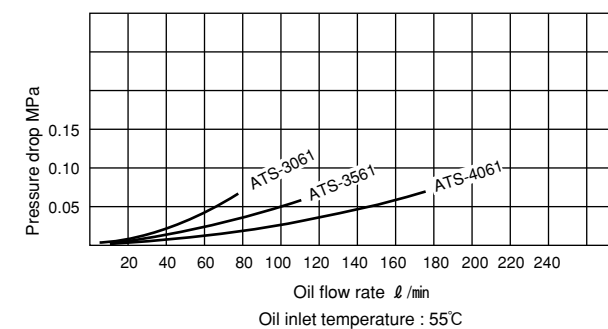
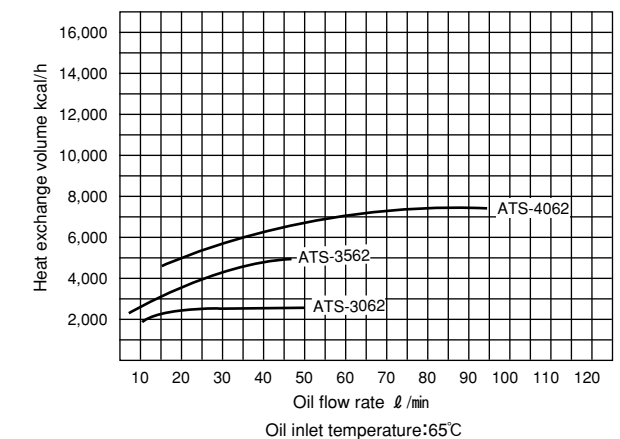
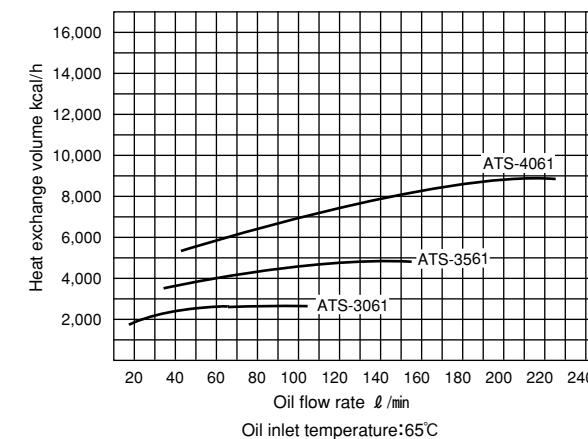
● Taisei will select the best cooler based on the information you provide regarding oil type, oil brand, oil flow, rate of heat exchange, temperature differences, oil pressure drop, power supply (voltage, frequency, type of current) etc.

Condition

Fluid : ISO-VG32 or equivalent

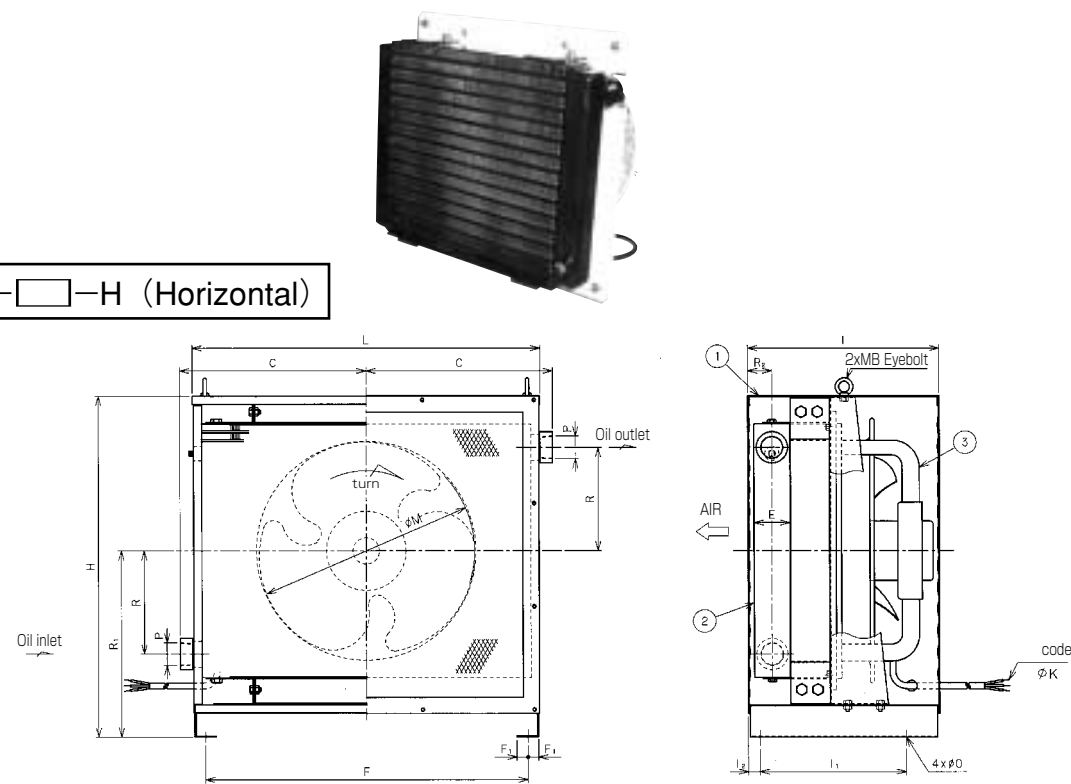
Ambient temperature : 35°C

Power supply frequency : 50Hz



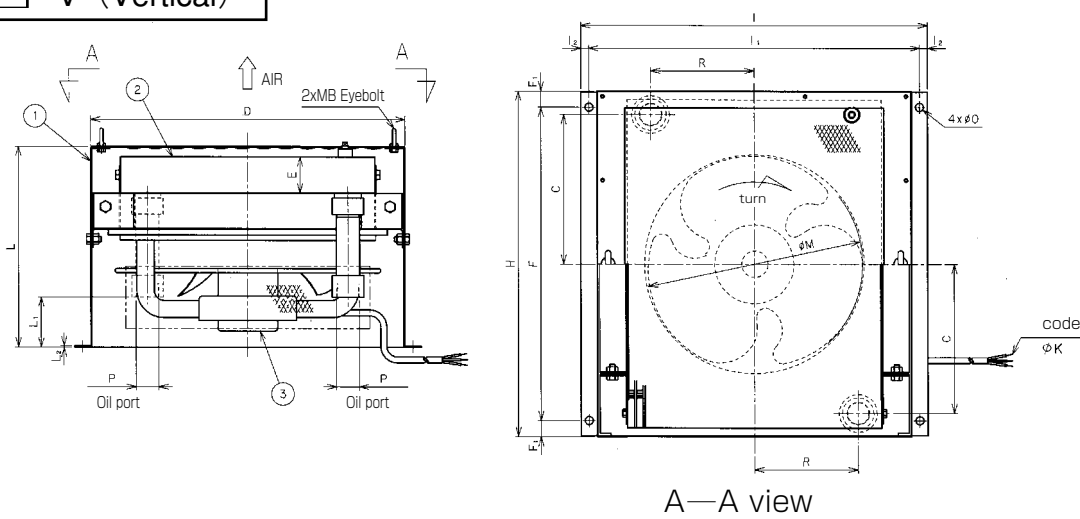
### ► Construction & dimensions for ATF-H/V (with case)

ATF-□-H (Horizontal)



Code	L	I <sub>1</sub>	I <sub>2</sub>	H	F	F <sub>1</sub>	O	R	R <sub>1</sub>	R <sub>2</sub>	C	E	P	M	K	Weight (kg)
ATF-5061-H1	642	270	21.6	631	595	20	15	191.25	345	44.6	344	66	Rc1-1/4	400	0.75	44
ATF-6061-H1	737	300		731	690			213.75	395	45.6	392.5		Rc1-1/2	500	1.25	62

ATF-□-V (Vertical)

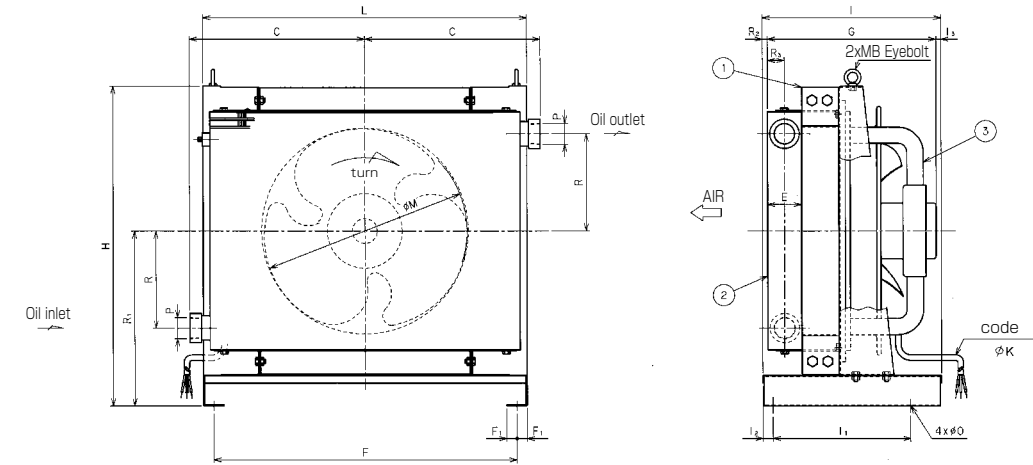


Code	L	L <sub>1</sub>	L <sub>2</sub>	I	I <sub>1</sub>	I <sub>2</sub>	H	F	F <sub>1</sub>	O	R	C	E	P	M	K	Weight (kg)
ATF-5061-V1	372	93	2.3	640	610	15	640	580	30	15	191.25	276.5	66	Rc1-1/4	400	0.75	49
ATF-6061-V1	412	65		730	700		720	650	35	15	213.75	315		Rc1-1/2	500	1.25	70

● Max. operating pressure (static) ... 1.0MPa  
 ● Max. operating temp. ... Oil side: 150°C / Air side 50°C

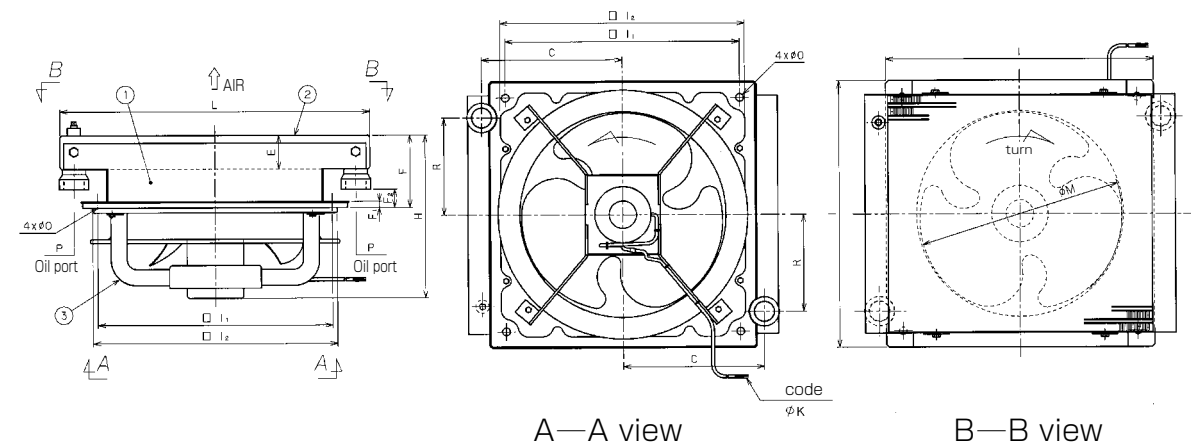
### ► Construction & dimensions for ATF-HS/VS (without case)

ATF-□-HS (Horizontal)



Code	L	I	I <sub>1</sub>	I <sub>2</sub>	I <sub>3</sub>	G	H	F	F <sub>1</sub>	O	R	R <sub>1</sub>	R <sub>2</sub>	R <sub>3</sub>	C	E	P	M	K	Weight (kg)
ATF-5061-HS1	635	350	270	21.6	10	330	630	595	20	15	191.25	345	10	33	344	66	Rc1-1/4	400	0.75	37
ATF-6061-HS1	730	390	300		13.5	365.5	730	690			213.75	395	11		392.5		Rc1-1/4	500	1.25	53

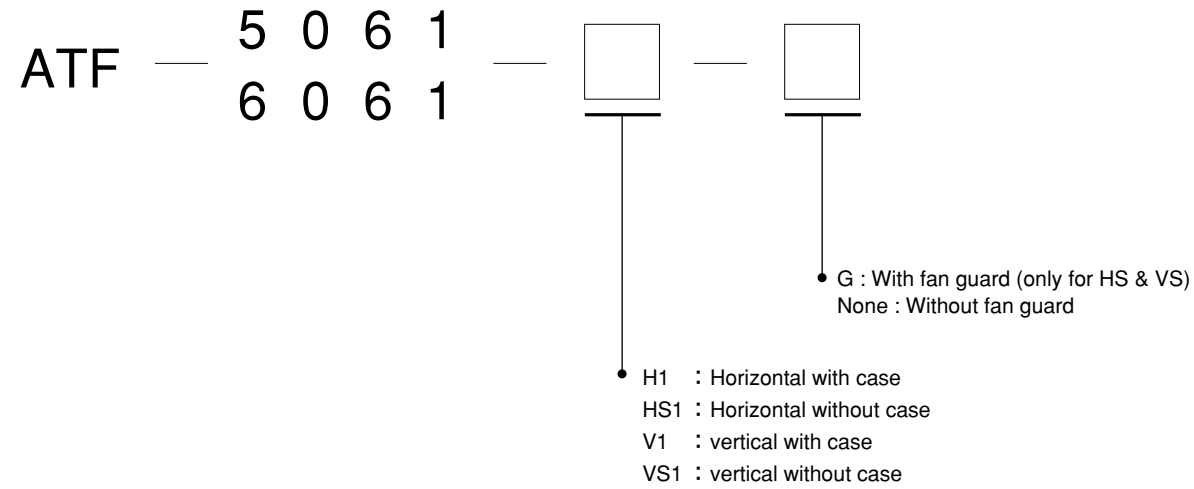
ATF-□-VS (Vertical)



Code	L	I	I <sub>1</sub>	I <sub>2</sub>	H	F	F <sub>1</sub>	F <sub>2</sub>	O	R	C	E	P	M	K	Weight (kg)
ATF-5061-VS1	608	525	460	480	319	142	12.3	36	15	191.25	276.5	66	Rc1-1/4	400	0.75	26
ATF-6061-VS1	685	625	560	580	356			26		213.75	395		Rc1-1/4	500	1.25	40

● Max. operating pressure (static) ... 1.0MPa  
 ● Max. operating temp. ... Oil side: 150°C / Air side 50°C

## ▶ Model Number



## ▶ Specifications

Model	ATF-50□□	ATF-60□□
Fluid	Mineral based oil	
Operating pressure	1.0 MPa	
Rated voltage	3ph 4pin 200V 50/60Hz 3ph 4pin 380-415V 50Hz 3ph 4pin 380-440V 60Hz	
Type of fan	EF-40UTB	EF-50UTB
Power consumption	200W	400W
Insulation	E grade	
Recommended beaker current (A)	1.5~1.9 50Hz 1.7~2.1 60Hz	3.2~4.1 50Hz 3.0~3.8 60Hz
Sound noise (1.5m beside)	67.0 / 71.5dB	74.0 / 77.0dB
Ambient condition	Ambient temp. : -10°C ~ 50°C / RH: less than 90% In house use	

\*A rating current is the value for a simple motor.

### ● Thermal protection (only for 200V-type)

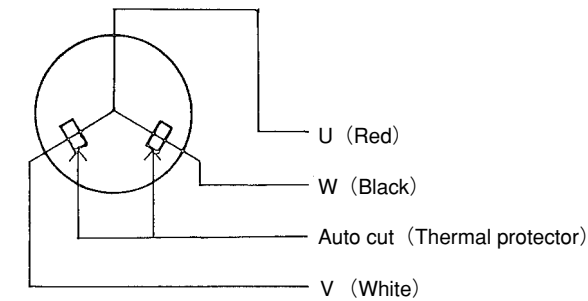
There is a thermal protector in the motor. When the motor overheats, it will stop. After the motor stops, review the procedure below.

- 1) Turn off motor (⚡ do not touch the motor before turning it off) .
- 2) Radiator should not have built up debris on it.
- 3) Look for restrictions in the airflow.
- 4) Check if the electric current is normal.
- 5) Check if ambient temperature is correct or not.

When the temperature cools down, the motor can be used.

- ⚡ Even if the motor stops but electricity is still supplied, do not touch air cooler.  
(There is a possibility of sudden restart.)

## ● Connection



⚡ The cooler must be correctly grounded to earth.

## ● Accessory

A protective fan guard is provided as an accessory. If you order the fan guard, add "G" at end of the model number.

It is easy to attach the fan guard on the users end even if it is ordered separately.

⚡ TAISEI recommends the use of a fan guard for your safety.

## ▶ Component Parts

No.	Parts name
1	Case
2	Radiator
3	Fan
4	Motor

## ▶ Cooler selection graph

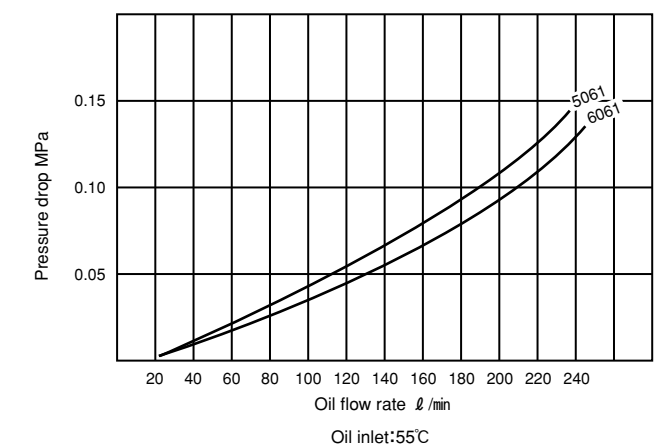
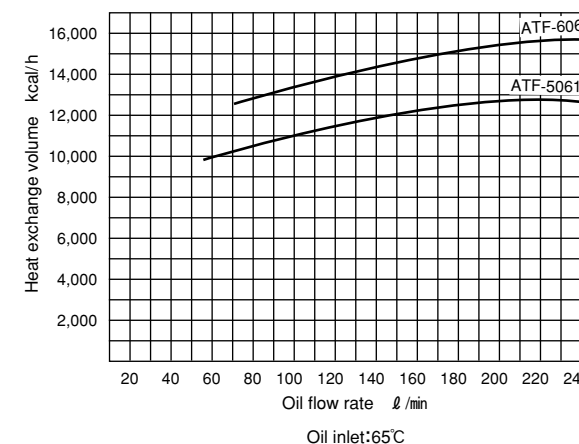
● Taisei will select the best cooler based on the information you provide regarding oil type, oil brand, oil flow, rate of heat exchange, temperature differences, oil pressure drop, power supply(voltage, frequency, type of current) etc.

Condition

Fluid : ISO-VG32 or equivalent

Ambient temperature. : 35°C


Power supply frequency : 50Hz





# Air cooled-type oil coolers

To use cooler safely, read cautionary notice and disclaimers. Before handling this item, read the instruction manual carefully and handle cooler with care.

## Warning

	<ul style="list-style-type: none"> <li>To avoid either fire and explosion, do not install coolers near flammable powders and explosive gases.</li> </ul>
	<ul style="list-style-type: none"> <li>To avoid injuries, do not put fingers or foreign materials into the fan motor.</li> </ul>
	<ul style="list-style-type: none"> <li>If cooler is stopped with the electric power still "on", do not touch cooler because without warning the motor could restart or electric shock may occur.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not make any modifications. Disassembly and repair is allowed only by authorized personnel.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not place the cooler in water or spray water onto the cooler. This may cause a short circuit or electrical shock.</li> </ul>
	<ul style="list-style-type: none"> <li>Install an earth ground to avoid shock.</li> </ul>

## Cautions

	<ul style="list-style-type: none"> <li>Use only specified electric requirements.</li> <li>Do not install coolers near exposed flames.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not install coolers in areas where there is a high humidity-more than 90 percent relative humidity.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not attempt to exceed specified pressure and temperature.</li> </ul>
	<ul style="list-style-type: none"> <li>Use only mineral-based fluids.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not attempt to use cooler for other applications.</li> </ul>
	<ul style="list-style-type: none"> <li>Obtain a fan guard to avoid any injuries.</li> </ul>
	<ul style="list-style-type: none"> <li>Install cooler on a strong foundation.</li> </ul>
	<ul style="list-style-type: none"> <li>Shut down electric breaker if cooler will not be used for a long time.</li> </ul>
	<ul style="list-style-type: none"> <li>Electric wiring is allowed only by authorized personnel.</li> </ul>
	<ul style="list-style-type: none"> <li>Clean the fan and radiator periodically.</li> </ul>
	<ul style="list-style-type: none"> <li>Do not block airflow, inlet and outlet.</li> </ul>

## 1. Installation

Install a cooler on a solid stand. Provide space for cleaning, inspection and maintenance.

Do not restrict the airflow for best performance.

Monitor the vibration as much as possible. If vibration occurs, use rubber bushings to absorb it.

## 2. Piping

ATF-H.HS.VS(except V-type) provides Rc thread on aluminum base. Use seal tape but do not overtighten as this causes pipe damage.

If there is severe piping vibration, use rubber hose or flexible hose to avoid transmitting vibration to the cooler.

## 3. Operation

After checking for smooth operation, direction of fan rotation and airflow, pour fluid into the cooler slowly.

If the fan rotation is wrong, change the electric wiring.

## 4. Inspection and maintenance

Inspection and cleaning should be performed every 6 months.

It is strongly recommended to clean the cooler before summer because ambient temperatures will be higher.

Electric power must be shutdown before inspecting or maintaining the cooler.

Make sure no pressure remains in the oil line.

## 5. Cleaning

### (1) Radiator outside

Soak radiator in warm water with a mild detergent. After rinsing off the detergent water, use compressed air to dry the radiator.

### (2) Radiator inside

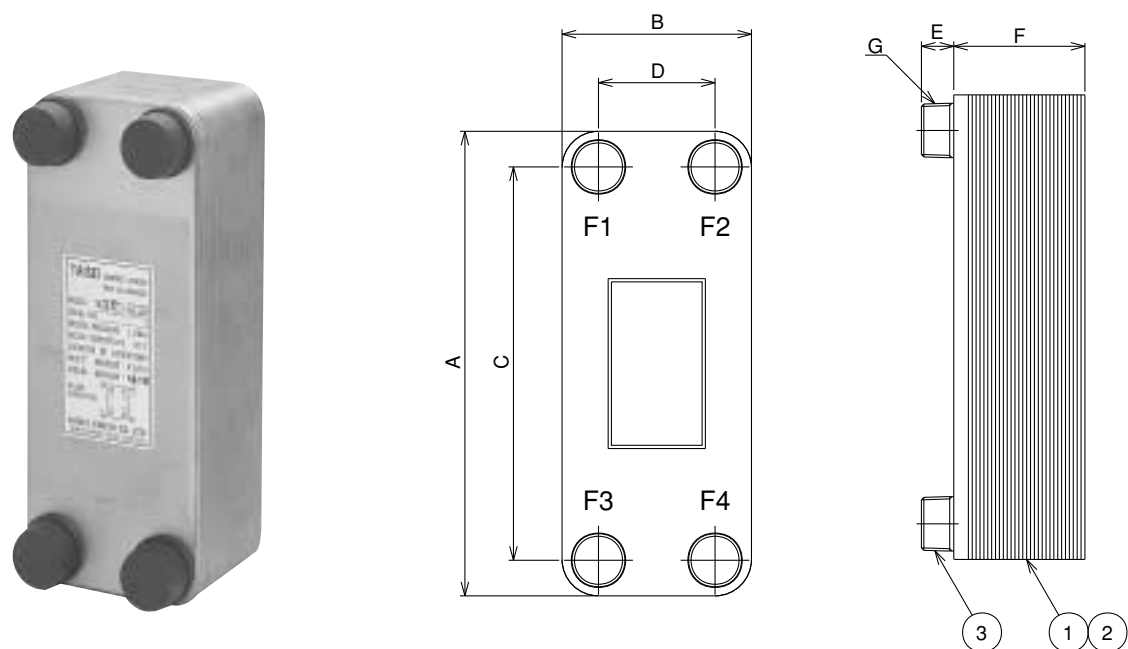
Circulate flushing oil through the radiator and use clean oil to recharge the unit.

It is recommended to clean the inside of radiator once a year.

### (3) Fin of radiator

Make sure the fins are straight. Bent fins may restrict the airflow.

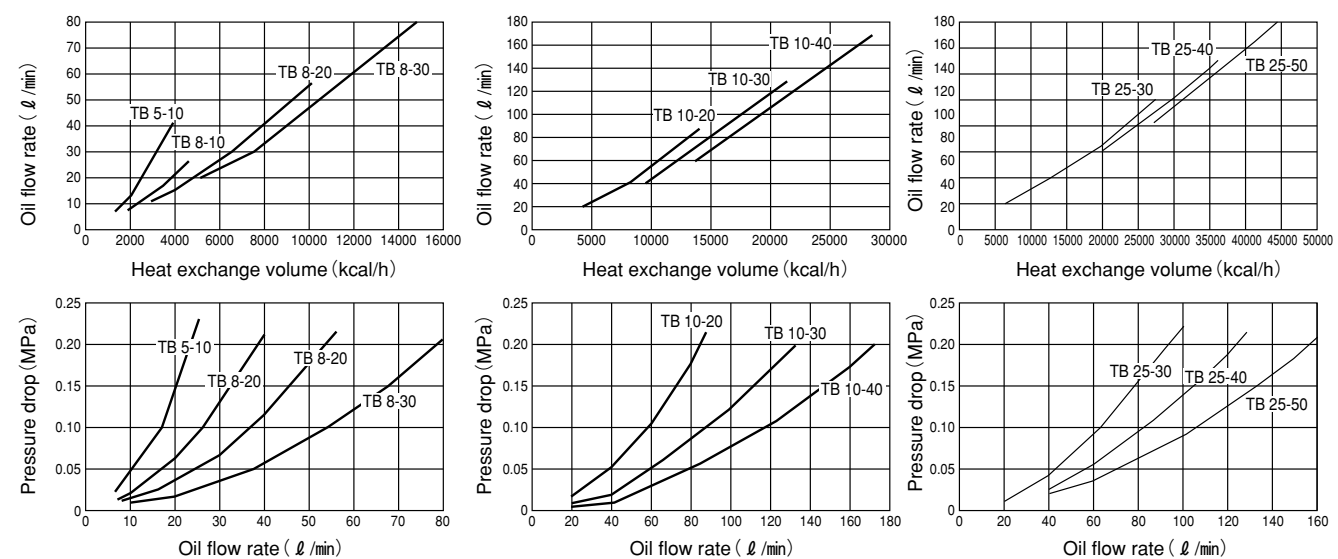
## Profile & Dimensions



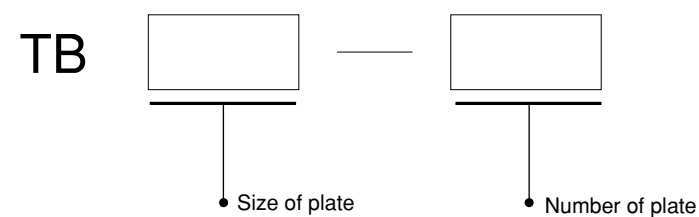
Model	A	B	C	D	E	F	G	Number of plates	Cooling surface (m <sup>2</sup> /sheet)	Capacity (ℓ/channel)	Max. flow rate (ℓ/min)	Weight (kg)
TB 5	189	72	154	40	20	9+2.3×NP	R3/4	10	0.012	0.024	65	0.6+0.044×NP
TB 8	310	72	278	40	20	9+2.3×NP	R3/4	10,20,30	0.023	0.040	65	0.9+0.070×NP
TB 10	287	117	243	72	20	9+2.4×NP	R1	20,30,40	0.032	0.060	200	1.5+0.126×NP
TB 25	524	117	479	72	20	9+2.4×NP	R1	30,40,50	0.063	0.111	200	2.5+0.234×NP

## Cooler selection graph

Condition Oil : ISO VG32 Water inlet temp. : 30°C  
 Oil inlet temp. : 55°C Water flow rate : 1/2 of oil flow



## Model Number



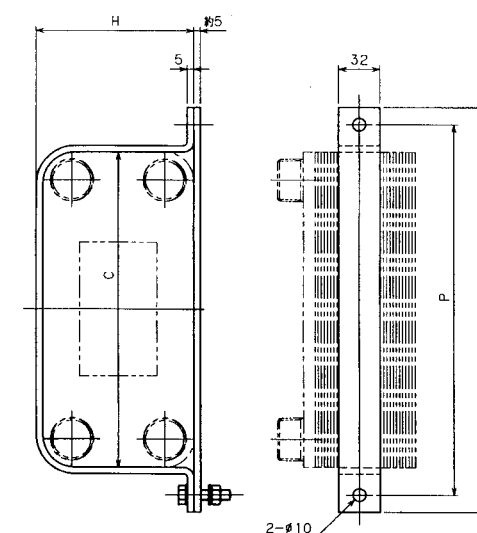
## Specifications

Max. operating Pressure	3.1MPa
Max. operating temp.	185°C
Min. Operating temp.	-195°C
Plumbing	F1/F3 : Hot fluid outlet/Hot fluid inlet F2/F4 : Cold fluid inlet/Cold fluid outlet

## Component Parts

No.	Parts name
1	Nozzle
2	Brazing material
3	Plate

## Optional bracket



Model	Applicable cooler model	A	P	C	H
BR5	TB5	252	232	192	70
BR8	TB8	373	353	313	70
BR10	TB10	350	B330	290	115
BR25	TB25	587	567	527	115

## 1. PRINCIPAL SPECIFICATIONS

Design pressure : 3.1 MPa

Fatigue pressure rating : 1.5 MPa × 107 times

Design temperature : -195~180°C

Location : Floor mounting; Indoor

## 2. PRODUCT DESCRIPTION

TB compact brazed plate heat exchanger consist of pattern-embossed plate of stainless steel. Every other plate is reversed so the ridges of the herringbone pattern intersect one another on adjacent plates forming a lattice of contact points. When these points are vacuum brazed together a compact and pressure-resistant heat exchanger is formed in which virtually all material is utilized for heat transfer. After brazing, the impressions in the plates form two separate systems of channels where the two media flow counter-current. This complex channel system causes vigorous turbulence, ensuring maximum heat transfer. The result is a highly efficient heat exchanger with heat transfer coefficients having no counterpart.

## 3. INSTALLATION

- (1) Location and ambient conditions:  
Location: Indoors, in a location that is dry, relatively dust-free, and safely distant from fires and flammable materials:  
Ambient temperature: -195~180°C
- (2) Connect all tubes, making sure that the inlet and outlet connections are made correctly.  
(Refer to. [ 8. Nozzle Location])
- (3) Shown below are installing directions.

In case of Liquid to liquid applications	Right	Right	Right	Wrong
In case of Condenser / Evaporater	Right	Wrong	Wrong	Wrong

Fig. 1 Installation

- (4) Avoid applying excessive force to the tubes when making connections.  
If subjected to excessive force, the tubes may break.

Tab.1 Max allowable torque

Model name	Allowable torque(N-m)			
	Assembly conditions		Operating conditions	
	Bending	Twisting	Bending	Twisting
TB5	30	50	20	30
TB8	30	50	20	30
TB10	50	150	40	90
TB25	50	150	40	90

- (5) Ensure that there is sufficient space around the Heat exchanger for maintenance.
- (6) This heat exchanger has no air vent ports and drain port.  
If necessary, Please set up it on the connections.

※ We have the brackets for mounting. (Refer to attached drawing.)

## 4. NOZZLE LOCATION

- (1) Liquid to Liquid applications ( non-refrigerant)  
The circuit with the highest temperature and / or pressure should be connected to the left side of the heat exchanger when the arrow is pointing upwards. In most cases the two medias are connected in counter current, e. g. primary media inlet at port F1 and outlet at port F3, and the secondary media Inlet at port F4 and outlet at port F2.

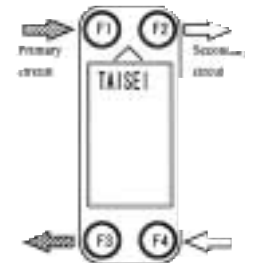


Fig. 3 Connection location: Liquid / liquid applications

- (2) Condenser  
In case of Condenser, TB Should be mounted the vertical position with the arrow on the front plate pointing upward.  
The refrigerant(gas) is connected to the upper left connection and the condensate to the lower left connection. The water / brine circuit inlet is connected to the lower right connection and the outlet to the upper right connection.

※ TB used as condenser, we recommend the one with soldering connections on the refrigerant side.

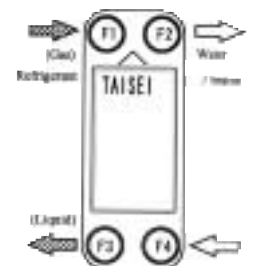


Fig. 4 Connection location: Condenser

- (3) Evaporater  
In case of Evaporater, TB Should be mounted the vertical position with the arrow on the front plate pointing upward.  
The refrigerant(liquid) is connected to the lower left connection and the gas to the upper left connection. The water / brine circuit inlet is connected to the upper right connection and the outlet to the lower right connections.

※ TB used as evaporater, we recommend the one with soldering connections on the refrigerant side.

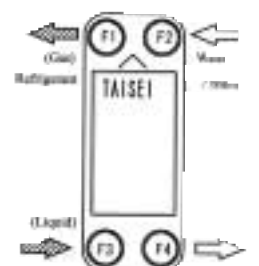


Fig. 4 Connection location: Evaporater

### ※ Soldering connections

All TB's are vacuum brazed with copper. This means that in no way the temperature may reach over 800°C under normal soldering conditions(no vacuum), because then the copper solder would change it's structure and result would be internal or external leakage at the connections.

# R.F.Q for Heat Exchanger

Date:

<b>Taisei Kogyo Co., Ltd.</b> Sales Dept. (FAX) 81-3-3936-0030		COMPANY			
		DIVISION		NAME	
		PHONE		FAX	
ITEM	UNIT	Fluid-Shell (OIL)		Fluid-Tube (WATER)	
Fluid	/	*		*	
Specific Gravity	/	$\rho_o$		$\rho_w$	
Specific Heat	kca/kg°C	$C_o$		$C_w$	
Viscosity	SUS cst				
Inlet Temp.	°C	$T_1^*$		$t_1^*$	
Outlet Temp.	°C	$T_2^*$		$t_2^*$	
Flow Rate	$\ell$ /min	$W_o^*$		$W_w^*$	No indication, Use Taisei Standard
Pressure Drop	MPa	$\Delta P_s$	No indication 0.1	$\Delta P_t$	
Heat Exchange Volume	kca $\ell$ /h	$Q^*$			
Fauling Factor	m <sup>2</sup> h°C/kca $\ell$	$\gamma_o$	No indication 0	$\gamma_i$	No indication 0
Operating Pressure	MPa	*		*	
Inlet/Outlet port	/	Rc <input style="width: 40px;" type="text"/>	Model (FTC,FTS,TC,TSC) JIS10K- <input style="width: 40px;" type="text"/> A	Rc <input style="width: 40px;" type="text"/>	
Model	• indicated		• Manufacture's Option		
Remarks					

Note: \* Required information

No indication of heat exchange volume, please indicate in/out temperature. (T1, T2)



# HEAT EXCHANGERS

Contributing to various industries



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