KYOWA FRP Turbo Fan RFT Series

RFT-RB & RFT-O

Dramatically High Efficiency Achieved
Promote Energy Reduction Depending on the Application
for All Kinds of Exhaust and Air Supply

KYOWA

THAI KYOWA KAKO CO., LTD.

www. kyowa.co.th

KYOWA FRP Turbo Fan RFT Series evolves in search of new dimension of high efficiency

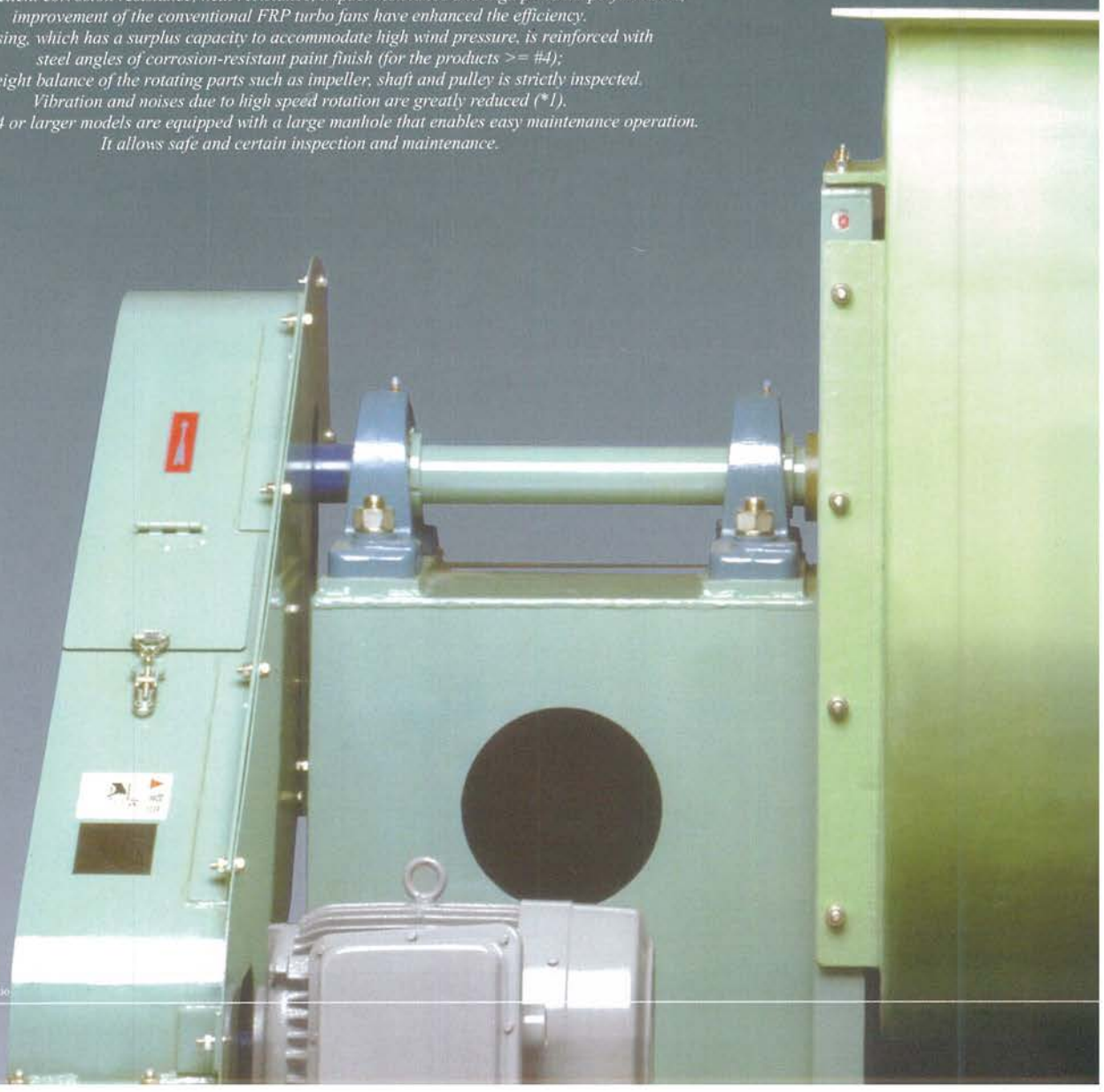
The trends in modern society are now being shifted to recycling and environment-harmonious systems to realize the coexistence of people and nature.
As for company's business activities as a whole, how to reduce environmental impact rationally is a global issue.
Among them are the concerns about the international standards ISO 14000 series and the effort for CO_2 reduction.
THAI KYOWA KAKO CO., LTD. has developed and accumulated over a half century the high-level technology and performance in the field of environmental conservation.
Based on the concept of environmental conservation, our constant research and development have given birth to high-efficiency FRP Turbo Fans, which contribute to energy saving.
The product line is our RFT series – it achieves unprecedented high efficiency that reverses common sense about the conventional FRP turbo fans.
It can reduce energy consumption while minimizing power loss and vibration. We are thus convinced that it contributes to significant CO_2 reduction.
Two models are available: RB type is belt-driven and O type is directly coupled with the motor shaft. The RFT series will continue to evolve and pioneer the new dimension of high efficiency.

Belt - Driven FRP Turbo Fan

RFT – RB Type

Efficiency Enhanced by 7% through Improvement of the Conventional FRP Turbo Fans
(compared with our ordinary product)

Besides excellent corrosion resistance, heat resistance, impact resistance and high pressure performance, improvement of the conventional FRP turbo fans have enhanced the efficiency.
The casing, which has a surplus capacity to accommodate high wind pressure, is reinforced with steel angles of corrosion-resistant paint finish (for the products >= #4);
the weight balance of the rotating parts such as impeller, shaft and pulley is strictly inspected.
*Vibration and noises due to high speed rotation are greatly reduced (*1).*
The fans of #4 or larger models are equipped with a large manhole that enables easy maintenance operation.
It allows safe and certain inspection and maintenance.



[*1]
max. -6dB (A), compared with our conventio

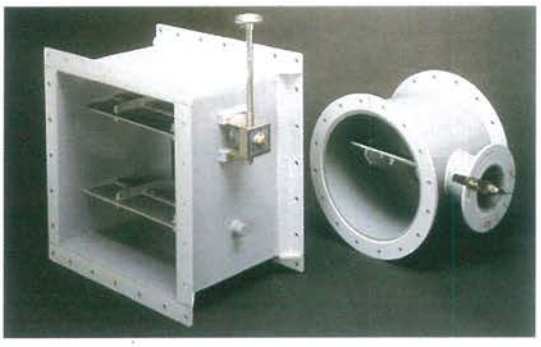
List of Chemical Resistance Properties

	Name of chemical		Concentration (%)	Withstood temperature (°C) 40 70 80	Note
Inorganic acid	Hydrochloric acid	HCl	36		
	Chloric acid	$HClO_3$	10		
			20		
	Perchloric acid	$HClO_4$	5		
			30		
	Chromic acid	H_2CrO_4	5		
			20		
			30		Special
	Hypochlorous acid	$HClO$	10		
			50		
	Hydrobromic acid	HBr	25		
			50		
	Nitric acid	HNO_3	5		
			20		
	Arsenic acid	H_3AsO_3	10		
	Hydrocyanic acid	HCN	5		
			10		
	Hydrofluoric acid	HF	5		
			15		
	Fluoboric acid	HBF_4	5		
			15		
	Boric acid	H_3BO_3	sat		
	Sulfuric acid	H_2SO_4	70		
			80		Special
			fuming	Not applicable	
	Phosphoric acid	H_3PO_4	80		
Organic acid	Acrylic acid	CH_2=CHOOH	20		Special
	Citric acid	$C_3H_4(OH)(COOH)_3$	all		
	Acetic acid	CH_3COOH	10-50		
	Picric acid	$C_6H_2(NO_2)_3OH$	20		
	Phthalic acid	$C_6H_4(CO_2H)_2$	sat		
	Benzenesulfonic acid	$C_6H_5SO_3H$	sat		
	Benzoic acid	C_6H_5COOH	sat		
	Oleic acid	$C_{17}H_{33}COOH$	-	Not applicable	Insoluble solid
	Formic acid	$HCOOH$	sat		
	Oxalic acid	$(COOH)_2$	sat		
	Maleic acid	$(CHIOOH)_2$	all		
Alkali	Ammonia	NH_3	10		
	Caustic soda (sodium hydroxide)	$NaOH$	50		
	Potassium hydroxide	KOH	50		
	Calcium hydroxide	$Ca(OH)_2$	25		
	Ammonium hydroxide	NH_4OH	5-20		
			29		
	Barium hydroxide	$Ba(OH)_2$	5		
			10		
Inorganic gas	Carbon monoxide	CO	-		
	Chlorine gas (wet)	Cl_2	-		
	Bromine	Br_2	-	Not applicable	
	Sulfur dioxide gas	SO_2	-		
	Hydrogen sulfide	H_2S	-		
	Nitrogen oxide	NO_X	-		
	Chlorine dioxide	ClO_2	15		
	Carbon dioxide	CO_2	-		

	Name of chemical		Concentration (%)	Withstood temperature (°C) 40 70 80	Note
Inorganic salts and other inorganic	Sodium nitrite	$NaNO_2$	sat		
	Sodium sulfite	Na_2SO_3	sat		
	Aluminum chloride	$AlCl_3$	sat		
	Ammonium chloride	NH_4Cl	sat		
	Ferric chloride	$FeCl_3$	sat		
	Sodium chloride	$NaCl$	sat		
	Nickel chloride	$NiCl_2$	sat		
	Magnesium chloride	$MgCl_2$	sat		
	Sodium chlorate	$NaClO_3$	50		
	Hydrogen peroxide	H_2O_2	10		
			30		
	Potassium permanganate	$KMnO_4$	sat		
	Calcium hypochlorite	$Ca(ClO)_2$	sat		
	Sodium hypochlorite	$NaClO$	15		
	Copper cyanide	$CuCN$	-	Not applicable	
	Potassium dichromate	$K_2Cr_2O_7$	sat		
	Ammonium nitrate	NH_4NO_3	all		
	Ferric nitrate	$Fe(NO_3)_3$	sat		
	Sodium nitrate	$NaNO_3$	sat		
	Ammonium carbonate	$(NH_4)_2CO_3$	25		
			50		
	Sodium carbonate	Na_2CO_3	10		
			35		
	Magnesium carbonate	$MgCO_3$	sat		
	Sodium sulfide	Na_2S	sat		
	Ammonium sulfate	$(NH_4)_2SO_4$	20		
	Ferric sulfate	$Fe_2(SO_4)_3$	sat		
	Copper sulfate	$CuSO_4$	sat		
	Sodium sulfate	Na_2SO_4	sat		
	Magnesium sulfate	$MgSO_4$	sat		
Organic solvents and other organic	Acetone	CH_3COCH_3	10		Special
	Ethyl alcohol	C_2H_5OH	100		Special
	Ethyl ether	$(C_2H_5)_2O$	-	Not applicable	
	Ethylene glycol	CH_2OHCH_2Cl	all		
	Gasoline		100		
	Xylene	$C_6H_4(CH_3)_2$	100		Special
	Chloroform	$CHCl_3$	-	Not applicable	
	Ethyl acetate	$CH_3COOC_2H_5$	-	Not applicable	
	Carbon tetrachloride	CCl_4	100		
	Dioxane	$C_4H_8C_2$	-	Not applicable	
	Tetrachlorethylene	CCl_2=CCl_2	100		Special
	Trichlorethylene	$ClCH$=CCl_2	-	Not applicable	
	Toluene	$C_6H_5CH_3$	100		Special
	Naphtha		100		
	Naphthaline	$C_{10}H_8$	100		
	Nitrobenzene	$C_6H_5NO_2$	100		Special
	Phenol	C_6H_5OH	100		
	Butyl alcohol	$CH_3(CH_2)_3OH$	100		
	Heptane	$CH_3(CH_2)_5CH_3$	100		
	Benzene	C_6H_6	100		Special
	Methyl alcohol	CH_3OH	100		
	Methyl ethyl ketone (MEK)	CH_3COC_2H	-	Not applicable	
	Formaldehyde	$HCHO$	37		
Oil	Linseed oil		100		

*all: the whole range for materials easy to dissolve in water. *sat: the concentration range up to saturation for materials less soluble in water. *Special: applicable by using special resin.

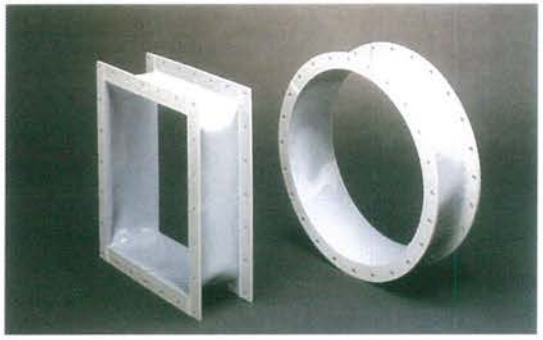
Special Accessories



Volume Damper

The round handle and wing nut of the volume damper focus on ease of use and handling.

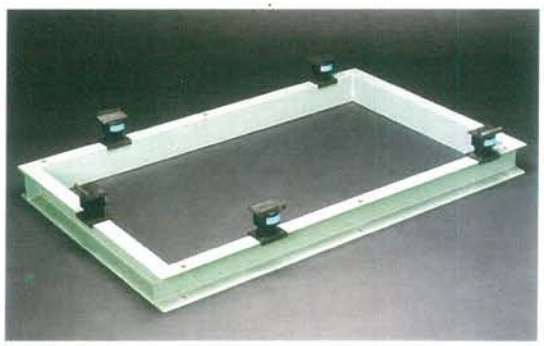
Material: PVC
Left: volume damper for outlet
Right: volume damper for inlet



Vibration-Proof Duct

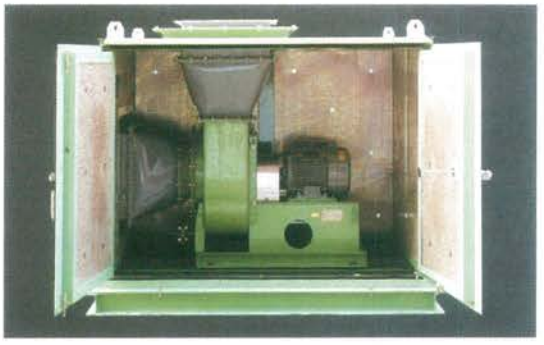
Super-flexible PVC is adopted as a durable material that is more flexible than conventional flexible PVC. It will not be hardened even after long-term use.

Material: super-flexible PVC
Pressure resistance: 500 mmH_2O
Left: vibration-proof duct for outlet
Right: vibration-proof duct for inlet



Spring Vibration-Proof Bed

The metal coil springs are used as a vibration-proof material. The product provides a vibration insulating efficiency of more than 90%.



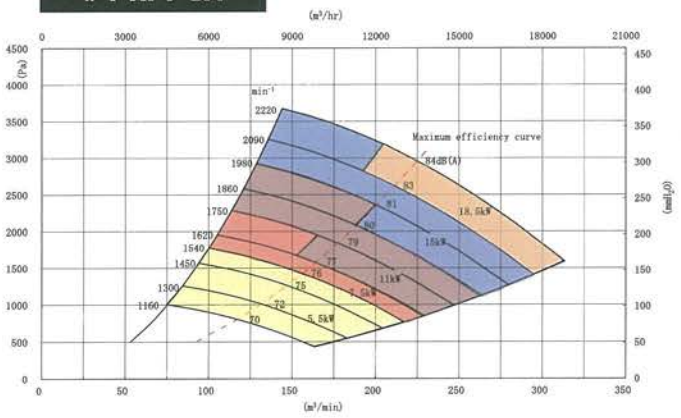
Soundproof Box

The structure has rigid and high noise insulation features. Glass wool is used inside as a noise-absorbing material.

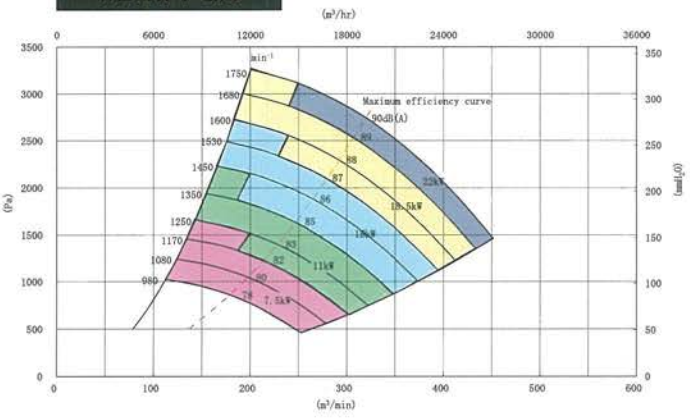
Material: SS400 + glass wool

Selection table

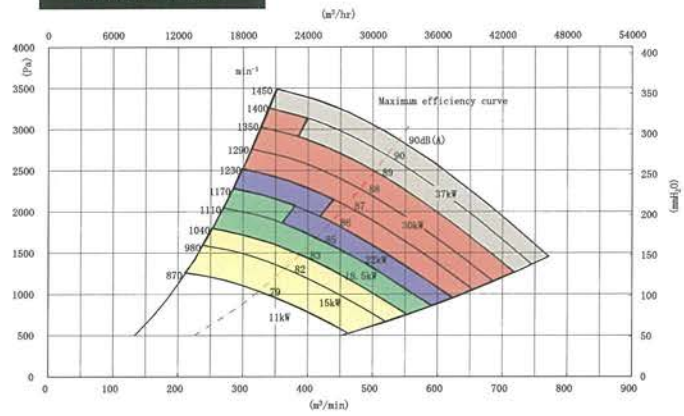
#4 RFT-0A



#5 RFT-0A



#6 RFT-0A



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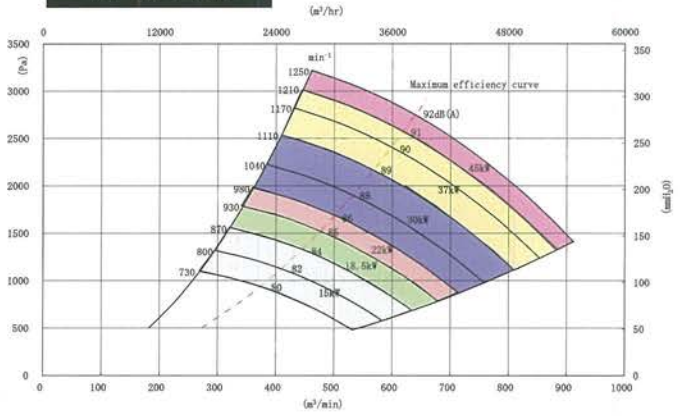

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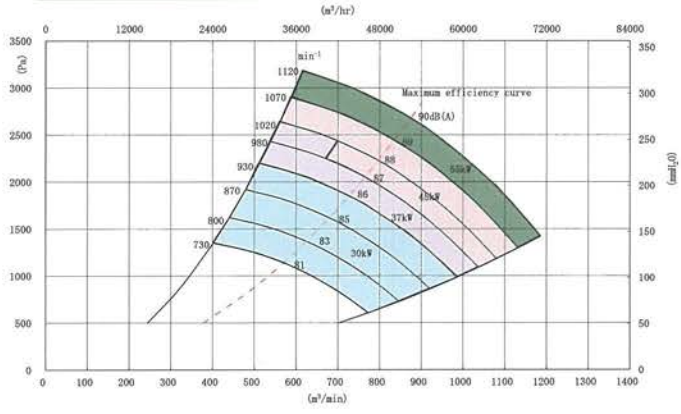
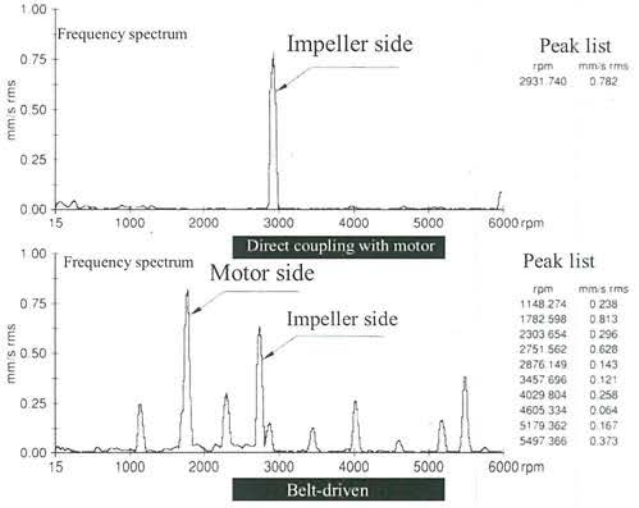


Vibration test

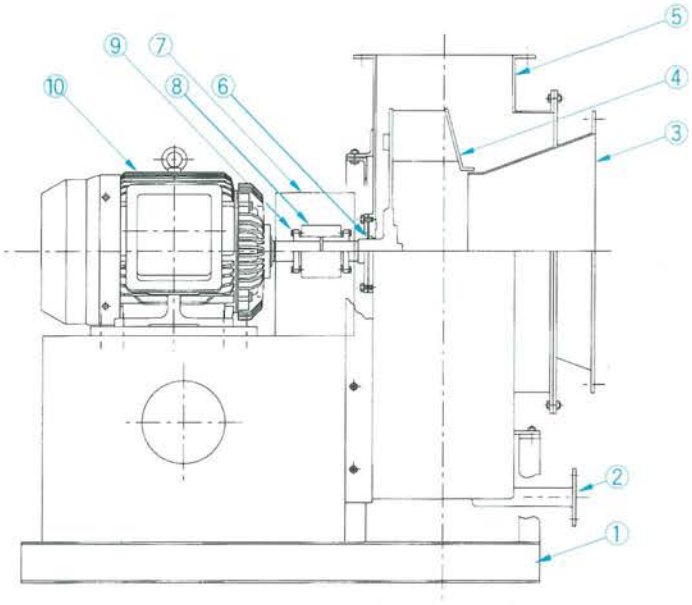
Frequency spectrums of a conventional belt-driven fan and a FRT-O type are compared.
Trouble-shooting will be easy because the cause of vibration is restricted to the impeller only.



RFT-0A

Cross-section diagrams

#4 RFT-O Cross-section



RFT-O Type / Standard Specifications:

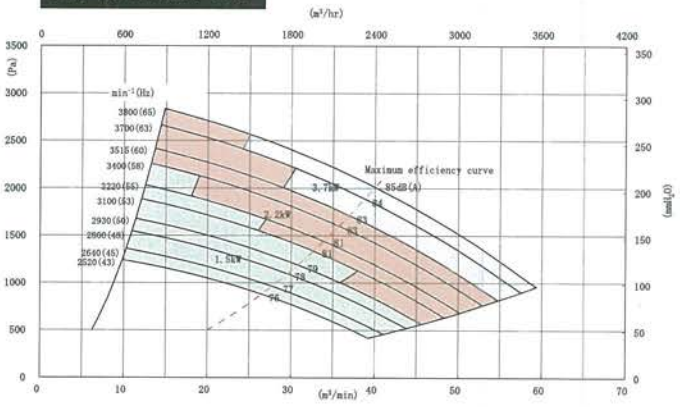
Models	8 models (#1 ½, #2, #3, #4, #5, #6, #7, #8)
Performance	Air flow: 10 m^3/min - 1200 m^3/min Static pressure: 500Pa - 3300Pa
Electric motor	Totally-enclosed fan-cooled type, 1.5kw-55 kw
Inlet gas permissive temperature	-10°C-70°C
Materials	Impeller vanes/FRP (glass-fiber reinforced vinyl ester resin) Casing/FRP (glass-fiber reinforced vinyl ester resin) Main shaft/S25C Frame/SS400 Coupling/SS400 (#3-#9)
Bearing	Motor bearing
Shaft seal device	Teflon sheet plate
Inspection port	Large rectangular inspection opening(#4-#8)
Coloring	Casing, inlet/ JPMA (Japan Paint Manufacturers Association) Color Chip No. U39-60D Munsell color notation:10GY 6/2 Frame, coupling guard/ JPMA Color Chip No. U39-60D Munsell color notation:10GY 6/2 Paint: phthalic resin paint
Standard accessories	Coupling guard, foundation bolts
Special accessories	Companion flange, vibration-proof duct, vibration-proof bed spring vibration-proof bed, volume damper silencer, soundproof box, etc.

#4 RFT-O

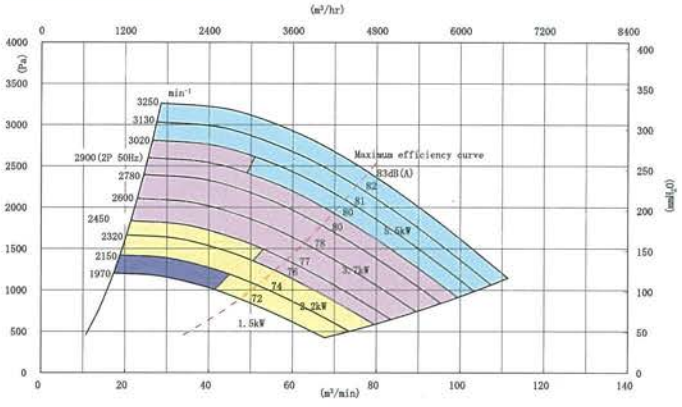
No.	Item	Material	Quantity	Note
1	Frame	SS400	1	[-100×50×5
2	Drain	FRP	1	Corresponds to 40^A JIS10 kg/cm^2
3	Inlet	FRP	1	
4	Impeller	FRP	1	
5	Casing	FRP	1	
6	Ground	PTFE	1	
7	Coupling guard	1	1	Pillow type
8	Coupling	SS400	1	
9	Pushing	FC200	1 set	
10	Motor		1	

*Drain is not equipped with RL and LR.

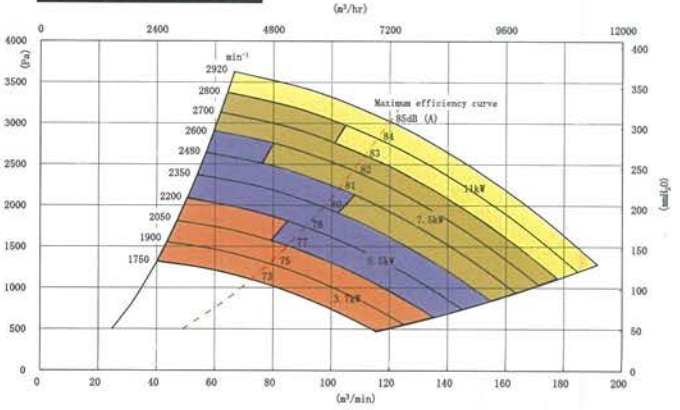
#1 1/2 RFT-0A



#2 RFT-0A

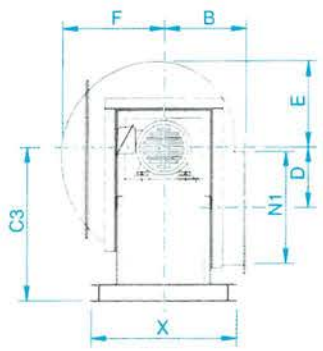


#3 RFT-0A

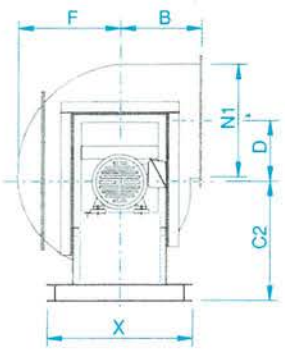


RFT-0A

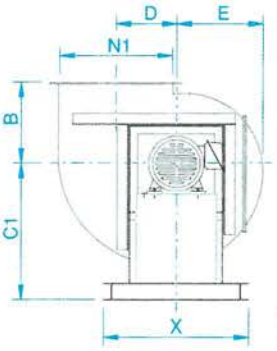
Dimensional drawings



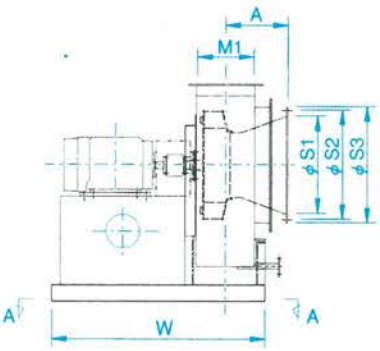
LR

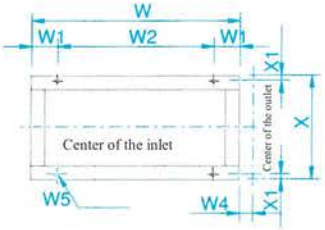


RR



RH

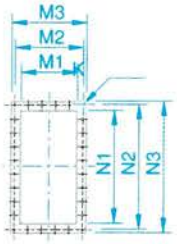




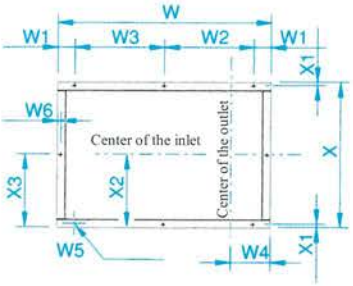
A-A Arrow view

only for #1 ½ RFT-O

Inlet



Outlet



A-A Arrow view

	Main unit								Inlet				Outlet						
	A	B	C1	C2	C3	D	E	F	S1	S2	S3	L	M1	M2	M3	N1	N2	N3	K
#1 ½ RFT-O	180	250	400	400	400	170	240	260	230	290	320	8-Ø10	150	210	240	210	270	300	12-Ø10
#2 RFT-O	250	300	480	480	520	235	295	335	320	374	410	12-Ø10	220	272	310	270	324	360	16-Ø10
#3 RFT-O	250	420	650	600	700	275	410	480	465	520	550	20-Ø12	260	320	350	538	600	630	24-Ø12
#4 RFT-O	365	475	800	700	900	355	505	595	570	640	680	24-Ø15	330	400	440	660	730	770	28-Ø15
#5 RFT-O	410	600	1000	850	1100	450	640	760	720	790	830	32-Ø15	420	490	530	840	910	950	36-Ø15
#6 RFT-O	460	750	1200	1050	1350	565	800	945	900	980	1030	36-Ø15	520	600	650	1040	1120	1170	44-Ø15
#7 RFT-O	510	840	1350	1200	1500	635	895	1060	1000	1080	1130	40-Ø15	580	660	710	1160	1240	1290	48-Ø15
#8 RFT-O	565	940	1400	1250	1650	709	998	1181	1120	1200	1250	52-Ø15	650	730	780	1300	1380	1430	52-Ø15

	Base											Main unit weight (kg)
	W	W1	W2	W3	W4	W5	W6	X	X1	X2	X3	
#1 ½ RFT-O	600	75	450	-	39	4-Ø13	-	300	15	150	-	60
#2 RFT-O	900	75	750	-	160	4-Ø13	-	400	18	200	-	100
#3 RFT-O	1100	100	900	-	195	4-Ø18	-	700	20	350	-	200
#4 RFT-O	1250	100	525	525	234	6-Ø18	-	850	20	425	-	300
#5 RFT-O	1450	100	625	625	294	6-Ø22		1100	30	550	-	500
#6 RFT-O	1650	100	725	725	343	6-Ø22	-	1400	30	700	-	750
#7 RFT-O	1750	100	775	775	372	6-Ø22	-	1600	30	800	-	850
#8 RFT-O	2100	100	950	950	420	8-Ø22	30	2000	30	RH800 RR 900 LR	1000	1400

*The main unit weight does not include the motor weight.

Table of motor weight (kg)				
Power output (kw)	2-pole	4-pole	6-pole	8-pole
0.75	10.5	10.5	20	26
1.5	19	20	26	44
2.2	20	26	44	61
3.7	44	44	61	71
5.5	56	61	71	114
7.5	61	71	114	132
11	103	114	132	180
15	114	132	180	210
18.5	132	165	170	250
22	180	180	210	275
30	210	210	250	330
37	250	250	275	460
45	275	275	330	500
55	320	330	460	680
75	450	460	500	730

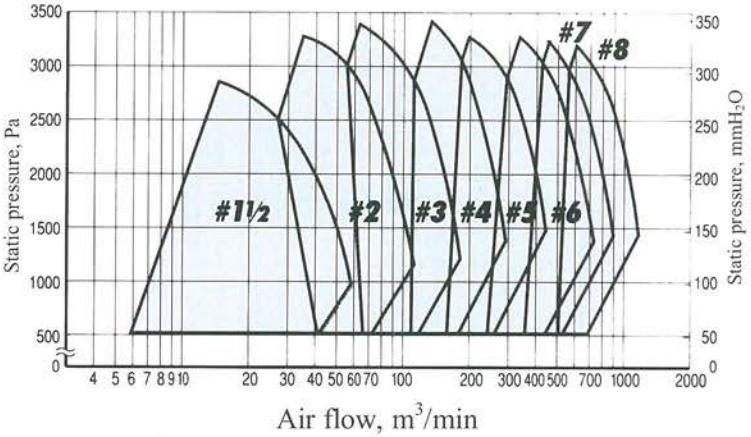
RFT-O Type

FRP Turbo Fan Directly Coupled with the Motor Shaft

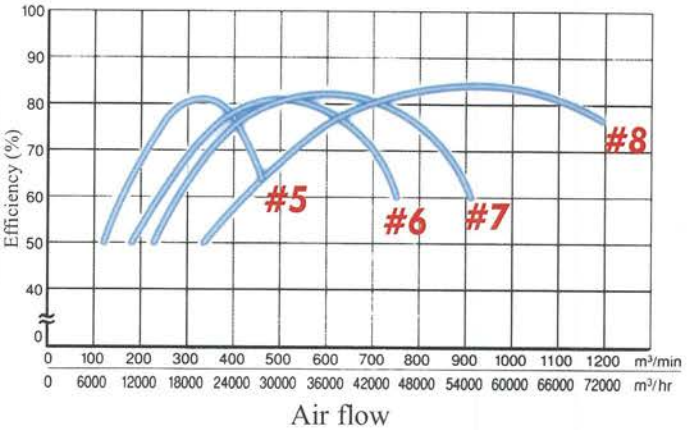
Direct Coupling & Motor Slide Mechanism

Adoption of direct coupling enables relatively easy junction and separation of the motor shaft and the impeller. The heavy motor component can be moved by sliding it lightly by hand. The motor bearing can also be replaced easily and safely.

■ RFT-O type selection diagram

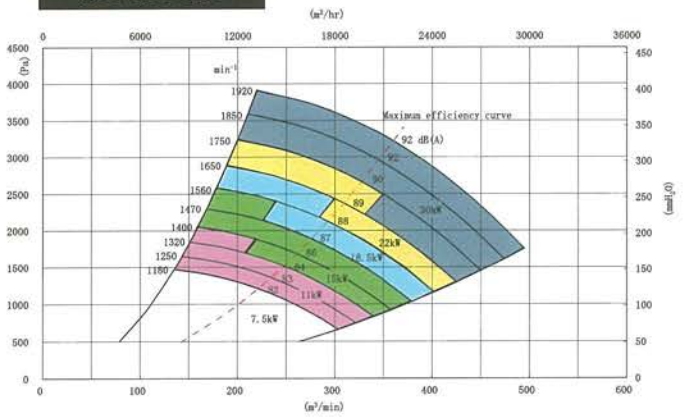


■ RFT-O type efficiency curve

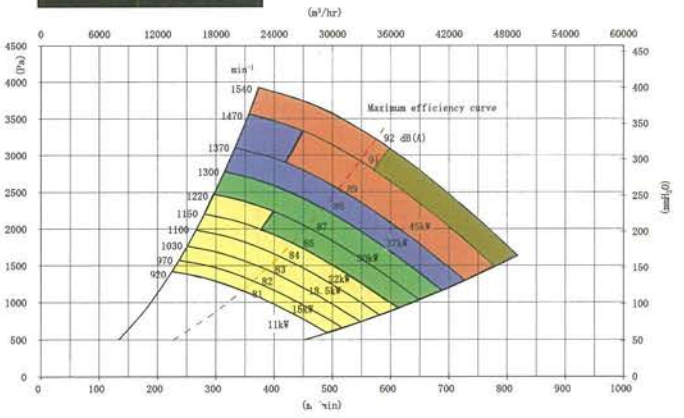


Selection table

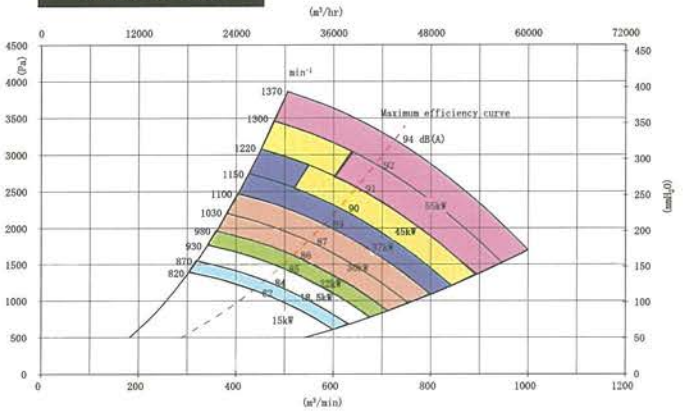
#5 RFT-RB



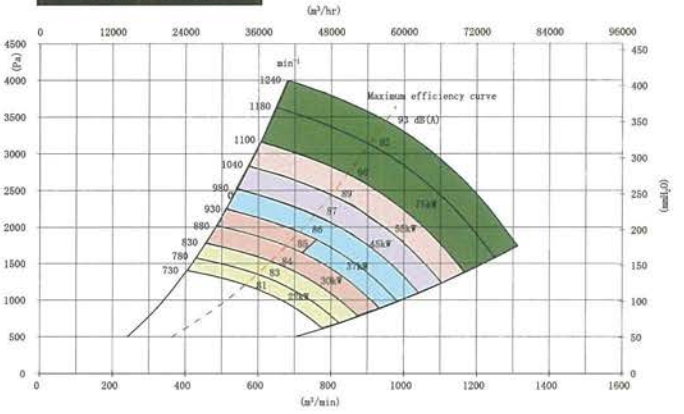
#6 RFT-RB



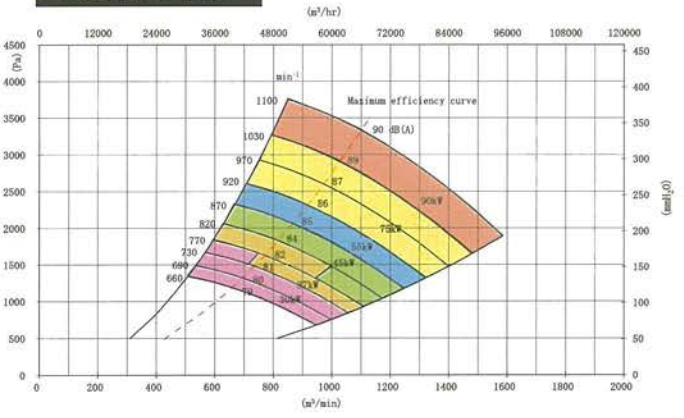
#7 RFT-RB



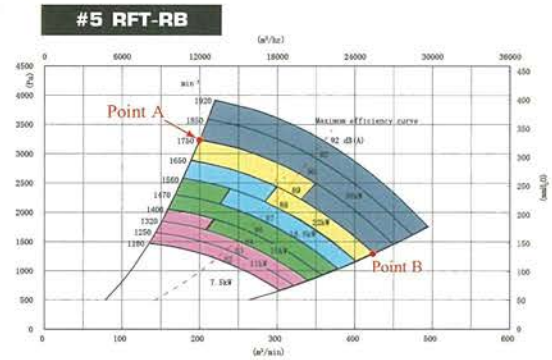
#8 RFT-RB



#9 RFT-RB



■ How to find the noise level



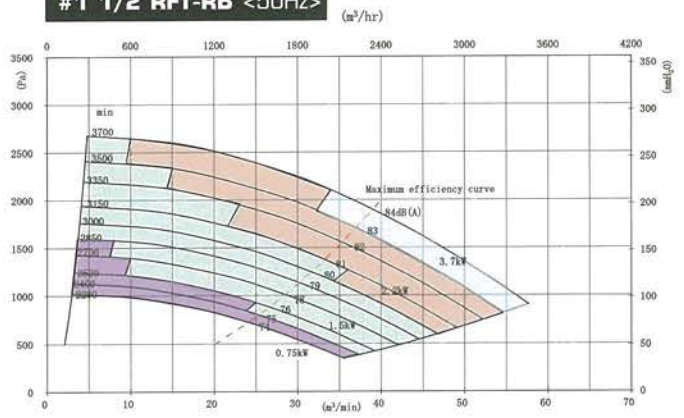
The black dot on the maximum efficiency curve shows the noise level (A scale) around the fan. The level will be *ca.* -2 phon at the left end and +3 phon at the right end of each performance curve.

[Example 1] To find the noise level at Point A: a combination of an air flow of 200 m^3/min and a static pressure of 2900Pa will lead to 1650 min^{-1}; the point is on the spot of *ca.* -2dB from the maximum efficiency point, which is shown to be 88dB; the noise level will hence be *ca.* 86dB.

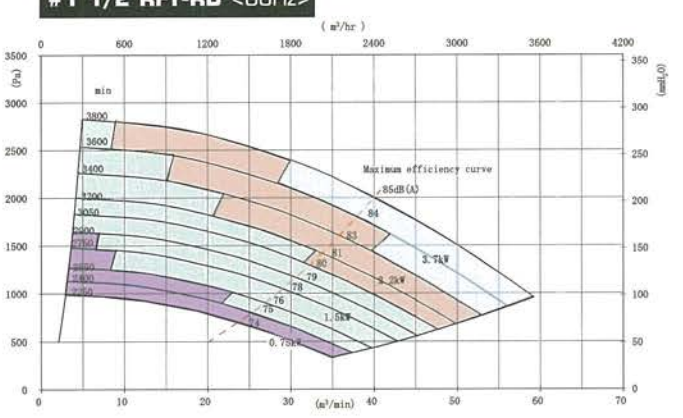
[Example 2] To find the noise level at Point B: a combination of an air flow of 400 m^3/min and a static pressure of 1200Pa will lead to 1560 min^{-1}; the point is on the spot of *ca.* +3dB from the maximum efficiency point, which is shown to be 86dB; the noise level will hence be *ca.* 89dB.

Selection table

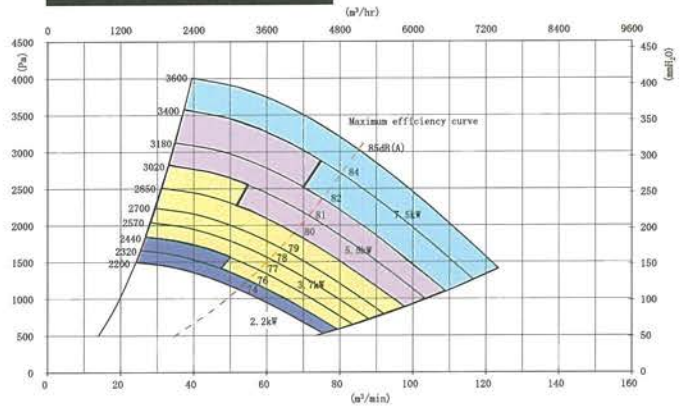
#1 1/2 RFT-RB <50Hz>



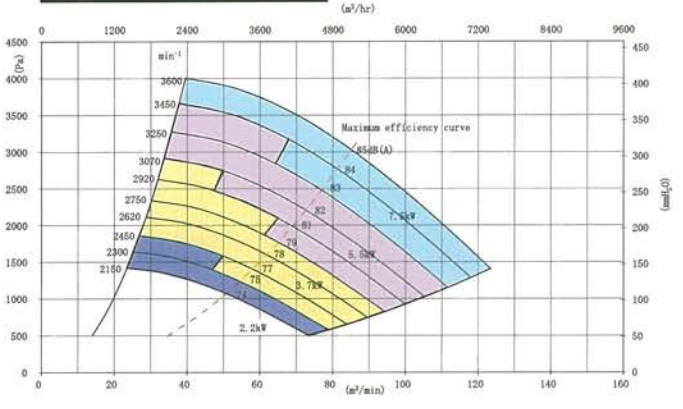
#1 1/2 RFT-RB <60Hz>



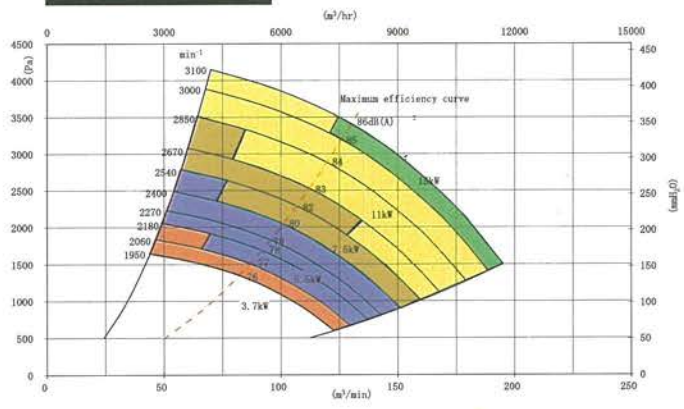
#2 RFT-RB <50Hz>



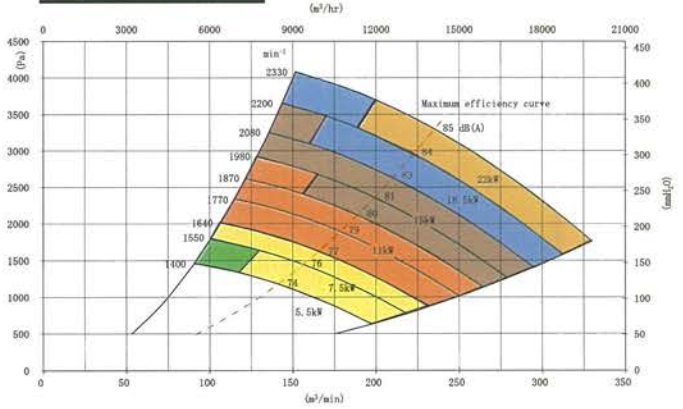
#2 RFT-RB <60Hz>



#3 RFT-RB

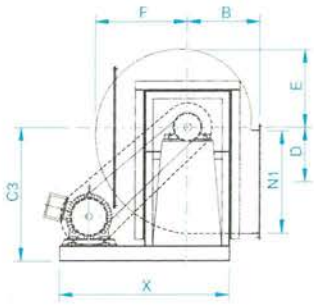


#4 RFT-RB

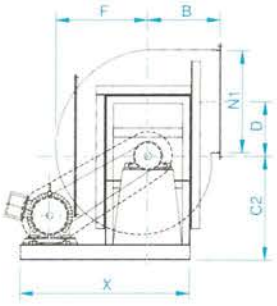


RFT-RB

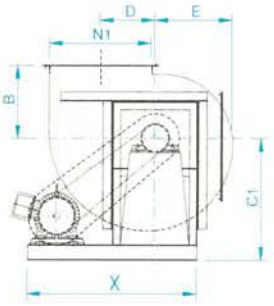
Dimensional drawings



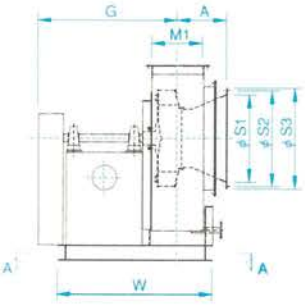
LR



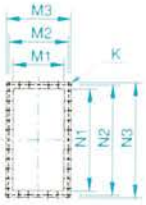
RR



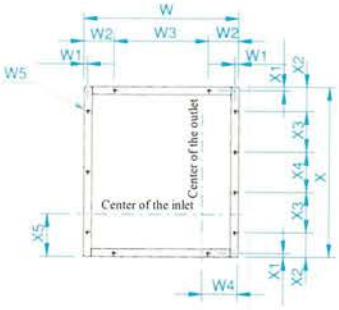
RH



Inlet



Outlet



A-A Arrow view

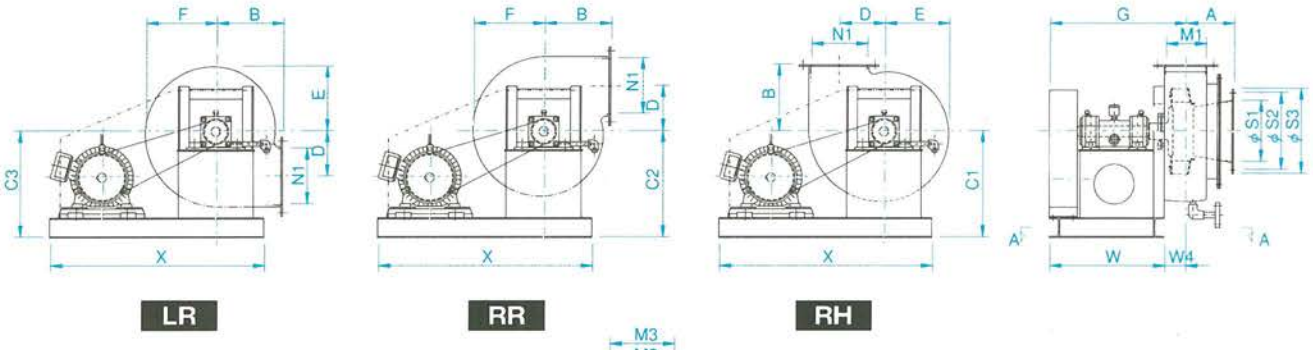
	Main unit									Inlet				Outlet						
	A	B	C1	C2	C3	D	E	F	G	S1	S2	S3	L	M1	M2	M3	N1	N2	N3	K
#3 RFT-RB	250	420	650	600	700	275	410	480	705	465	520	550	20- Ø12	260	320	350	538	600	630	24- Ø12
#4 RFT-RB	365	475	800	700	900	355	505	595	980	570	640	680	24- Ø15	330	400	440	660	730	770	28- Ø15
#5 RFT-RB	410	600	1000	850	1100	450	640	760	1150	720	790	830	32- Ø15	420	490	530	840	910	950	36- Ø15
#6 RFT-RB	460	750	1200	1050	1350	565	800	945	1420	900	980	1030	36- Ø15	520	600	650	1040	1120	1170	44- Ø15
#7 RFT-RB	510	840	1350	1200	1500	635	895	1060	1500	1000	1080	1130	40- Ø15	580	660	710	1160	1240	1290	48- Ø15
#8 RFT-RB	565	940	1400	1250	1650	709	1000	1185	1520	1120	1200	1250	52- Ø15	650	730	780	1300	1380	1430	52- Ø15
#9 RFT-RB	625	1050	1600	1400	1850	790	1120	1325	1580	1260	1360	1410	52- Ø15	730	830	880	1460	1560	1610	62- Ø15

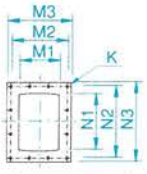
	Base												Main unit weight (kg)
	W	W1	W2	W3	W4	W5	X	X1	X2	X3	X4	X5	
#3 RFT-RB	900	20	450	-	195	6- Ø18	1150	20	150	850	-	250	230
#4 RFT-RB	1040	20	520	-	234	8- Ø18	1300	20	150	500	500	275	350
#5 RFT-RB	1280	30	640	-	294	8- Ø22	1400	30	200	500	500	350	500
#6 RFT-RB	1575	30	787.5	-	343	8- Ø22	1750	30	250	625	625	475	690
#7 RFT-RB	1650	30	400	850	372	10- Ø22	2000	30	250	750	750	550	950
#8 RFT-RB	1760	30	450	860	422	12- Ø26	2350	30	200	650	650	600	1600
#9 RFT-RB	1875	30	500	875	475	12- Ø26	2600	30	250	700	700	650	2000

*The main unit weight does not include the motor weight.
*The bearing of #3RFT-RB model is of oil bath type.

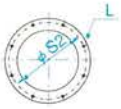
Table of motor weight (kg)				
Power output (kw)	2-pole	4-pole	6-pole	8-pole
0.75	10.5	10.5	20	26
1.5	19	20	26	44
2.2	20	26	44	61
3.7	44	44	61	71
5.5	56	61	71	114
7.5	61	71	114	132
11	103	114	132	180
15	114	132	180	210
18.5	132	165	170	250
22	180	180	210	275
30	210	210	250	330
37	250	250	275	460
45	275	275	330	500
55	320	330	460	680
75	450	460	500	730
90	480	500	680	1100

Dimensional drawings

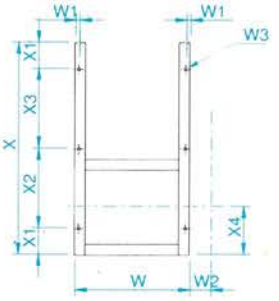




Outlet



Inlet



A-A Arrow view

	Main unit									Inlet									
	A	B	C1	C2	C3	D	E	F	G	S1	S2	S3	L	M1	M2	M3	N1	N2	N3	K
#1 ½ RFT-RB	180	250	400	400	400	170	245	265	510	230	290	320	8- Ø10	150	210	240	210	270	300	12- Ø10
#2 RFT-RB	250	300	480	480	520	235	300	340	560	320	374	410	12- Ø10	220	272	310	270	324	360	16- Ø10

	Base									Main unit
	W	W1	W2	W3	X	X1	X2	X3	X4	weight (kg)
#1 ½ RFT-RB	430	15	79	4- Ø14	800	100	600	-	180	80
#2 RFT-RB	515	15	44	6- Ø14	930	100	365	365	185	120

*The main unit weight does not include the motor weight.
*The bearing of 1 ½ and 2RFT-RB models is of oil bath type.

RFT-RB Type / Standard Specifications:

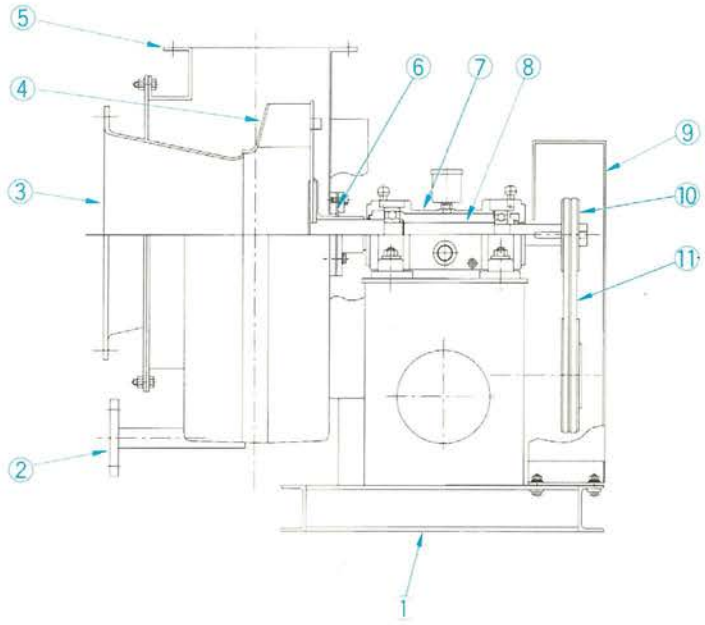
Models	9 models (#1 ½, #2, #3, #4, #5, #6, #7, #8, #9)
Performance	Air flow: 8 m^3/min - 1600 m^3/min Static pressure: 500Pa - 4100Pa
Electric motor	Totally-enclosed fan-cooled type, 0.75 kw-90 kw
Inlet gas permissive temperature	-10°C-70°C
Materials	Impeller vanes/FRP (glass-fiber reinforced vinyl ester resin) Casing/FRP (glass-fiber reinforced vinyl ester resin) Main shaft/S45C Frame/SS400 Belt guard/FRP (#1 ½, #2), SS400 (#3-#9)
Bearing unit	#1 ½ -#3/Oil bath type #4-#9/Pillow block type
Shaft seal device	Teflon sheet plate

Inspection port	Large rectangular inspection opening(#4-#9)
Coloring	Casing, inlet/ JPMA (Japan Paint Manufacturers Association) Color Chip No. U39-60D Munsell color notation:10GY 6/2 Frame, belt guard/ JPMA Color Chip No. U39-60D Munsell color notation:10GY 6/2 Paint: phthalic resin paint
Standard accessories	V pulleys, V belt, belt guard Bearing unit guard (#4-#9), foundation bolts
Special accessories	Companion flange, vibration-proof duct, vibration-proof bed spring vibration-proof bed, by-pass ground, labyrinth ground volume damper, silencer, soundproof box, etc.

RFT-RB

Cross-section diagrams

#2 RFT-RB Cross-section

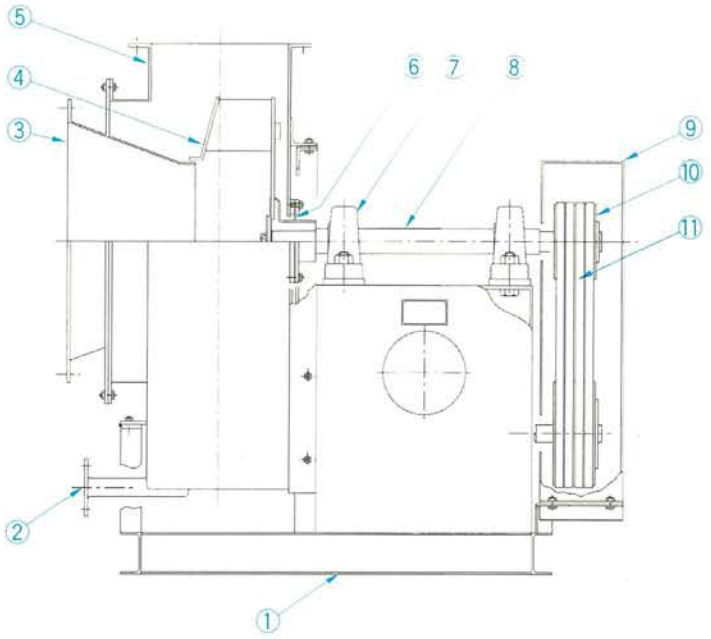


#2 RFT-RB

No.	Item	Material	Quantity	Note
1	Frame	SS400	1	[-75×40×5
2	Drain	HT-PVC	1	JIS25A
3	Inlet	FRP	1	
4	Impeller	FRP	1	
5	Casing	FRP	1	
6	Ground	PTFE	1	
7	Bearing unit		1 set	Integrated oil bath type
8	Main shaft	S45C	1	
9	Belt guard	FRP	1	
10	V pulley	FC200	2	
11	V belt		1 set	

*Drain is not equipped with RL and LR.

#6 RFT-RB Cross-section



#6 RFT-RB

No.	Item	Material	Quantity	Note
1	Frame	SS400	1	[-125×65×6
2	Drain	FRP	1	Corresponds to 40ᴬJIS10 kg/cm²
3	Inlet	FRP	1	
4	Impeller	FRP	1	
5	Casing	FRP	1	
6	Ground	PTFE	1	
7	Bearing unit		2	Pillow type
8	Main shaft	S45C	1	
9	Belt guard	SS400	1	
10	V pulley	FC200	2	
11	V belt		1 set	

*Drain is not equipped with RL and LR.

RFT-RB Type

Belt-Driven FRP Turbo Fan

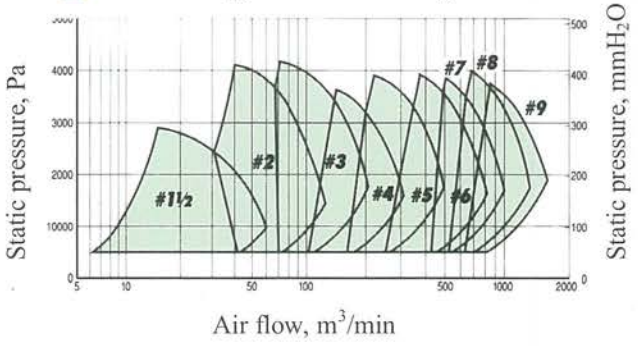
Large Manhole

For both RB and O types, the fans of #4 or larger models are equipped with a large manhole that dramatically facilitates cleaning of the impellers.
It allows safe and certain inspection and maintenance operations.

Oil Bath Bearing

The oil-lubricated bearing compatible with high-speed rotation is the standard feature for the three models of #1 ½ - #3. Long time maintenance-free operation and safety are secured.

RFT-RB Type Selection Diagram

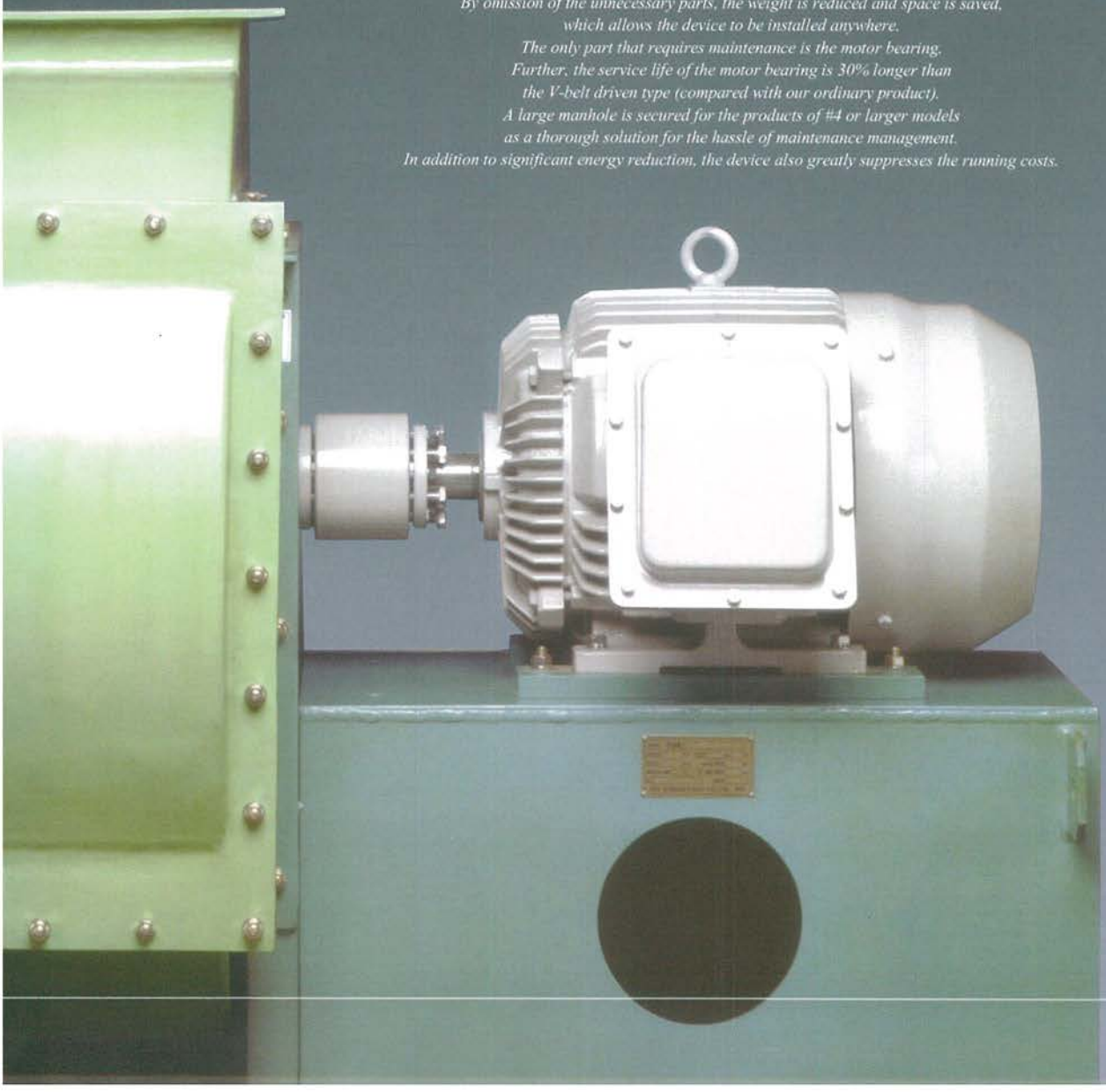


FRP Turbo Fan Directly Coupled with the Motor Shaft

RFT-0 Type

Produced by Thorough Pursuit of
Ultimate High Efficiency and Maintainability

The structure, coupled directly with the motor shaft, minimizes the energy transmission loss and revolutionary high efficiency is thus achieved.
Of course, it does not require any consumable parts such as V belt, bearings, etc.
By omission of the unnecessary parts, the weight is reduced and space is saved, which allows the device to be installed anywhere.
The only part that requires maintenance is the motor bearing.
Further, the service life of the motor bearing is 30% longer than the V-belt driven type (compared with our ordinary product).
A large manhole is secured for the products of #4 or larger models as a thorough solution for the hassle of maintenance management.
In addition to significant energy reduction, the device also greatly suppresses the running costs.



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