EBARA

HIGH EFFICIENCY CENTRIFUGAL CHILLER

Model RTBF Type Series

"Model ○○○ type series" in this catalogue is our model code.

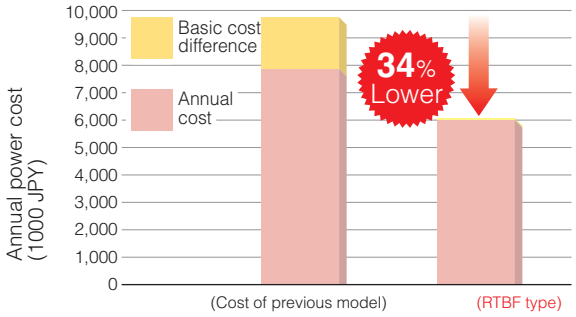
All models' COP are above 6.4 in this series! Welcome to the low-carbon society

Model RTBF Type Series High Efficiency Centrifugal Chiller

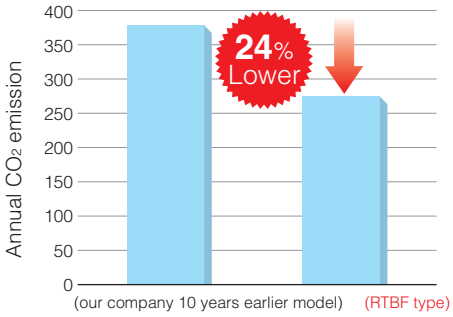
Lower Operation Expense & CO_2 Emission

Compare to our previous model, the operation expense is 34% lower! And the CO_2 emission is 24% lower

Centrifugal chiller annual power cost estimates
Commercial facility air conditioning(500USRT annual operation)
Compare with our Previous model of a decade ago



Centrifugal chiller annual CO_2 emission
Commercial facility air conditioning(500USRT annual operation)
Compare with our company 10 years earlier model

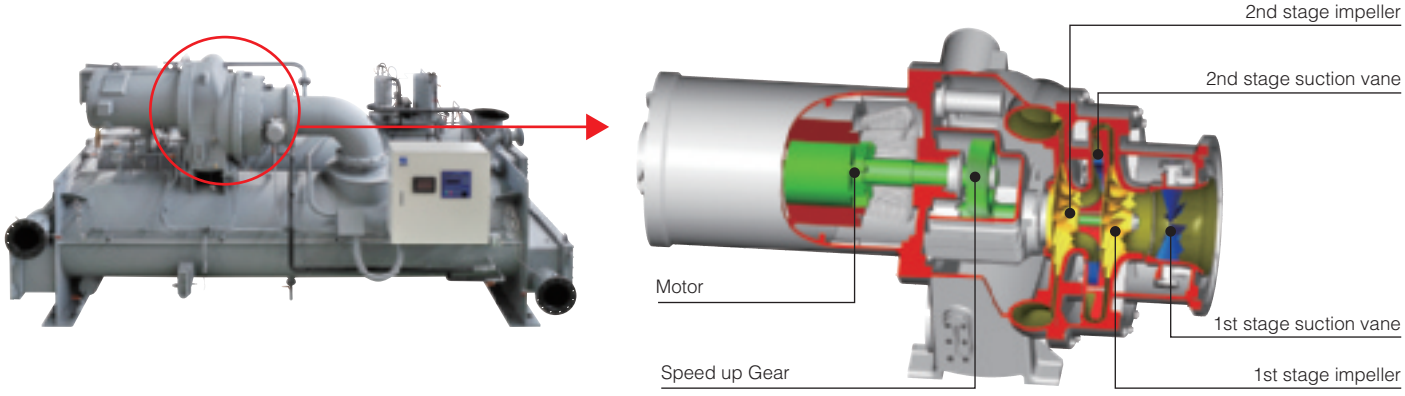


Calculation conditions

Centrifugal chiller power cost calculation is based on annual operation, 14h/d commercial facility load rate.
The power cost calculation is according to the high voltage electricity contract signed with TEPCO at Apr. 2009.
The CO_2 emission calculation is based on the unit 0.555kgCO_2/kWh. which was modified at Mar. 2006.

Newly Developed High Efficiency Compressor

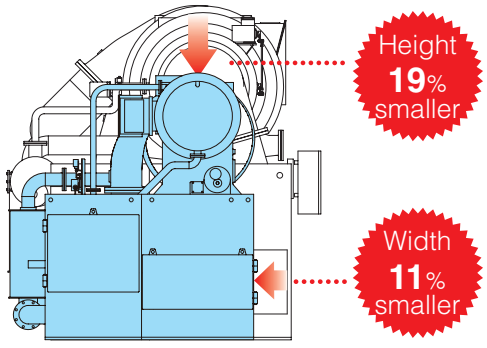
Compressor compact design by using 2-stage compression and speed-up Gear. Using changeable 2-stage suction vanes for better partial load performance. A simple motor structure with few piping for a better quality.



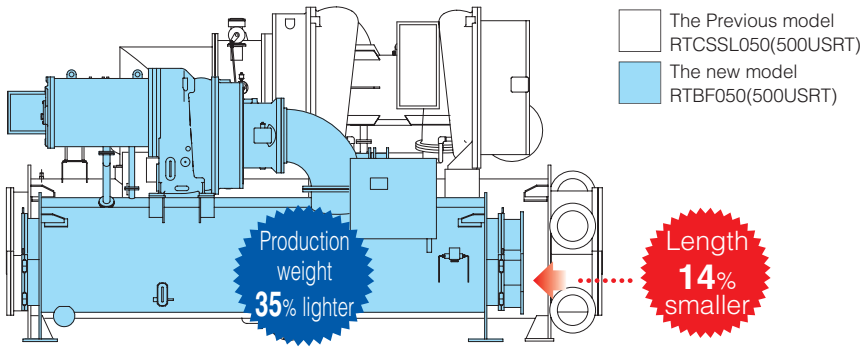
Very Compact Design Compare to The Previous Model

To achieve a small & light-weight design by doing many tests on shape of parts, material & manufacturing process.

The outline dimension compare to the Previous model



Side view



Front view

This is our standard model in future.

The simple structure, compact and high efficiency chiller.

Using New Refrigerant HFC245fa

Excellent refrigerating cycle performance to make a high efficiency

A smaller theoretical flow rate than HCFC 123

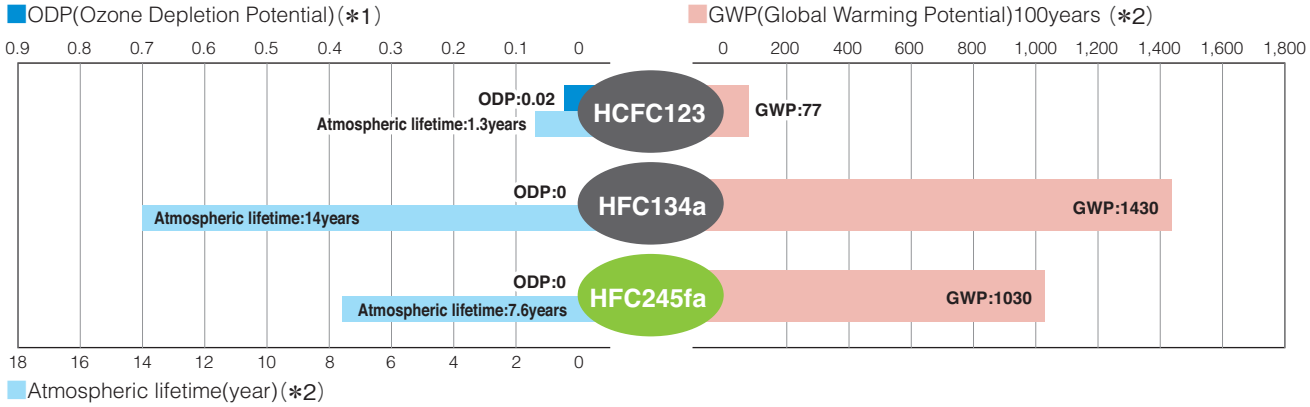
Compare to HCFC123, the required HFC245fa theoretical flow rate is smaller under the same cooling capacity, thus we can make a smaller compressor.

A better performance than HFC134a

Compare to HFC134a, the HFC245fa is a refrigerant that has higher theoretical cycle performance & energy efficiency.

Minor environmental burden

The HFC245fa's ODP(Ozone Depletion Potential) is zero.
Moreover, compare to HFC134a, the HFC245fa has smaller GWP(Global Warming Potential), shorter atmospheric lifetime & smaller impact to the environment.



∗1 Refer to ozone layer protection law, etc ∗2 Refer to IPCC 4th Evaluation Report (2007)

A low pressure refrigerant, easy operation & management.

HFC245fa is a refrigerant that no need to apply the high pressure gas regulation(Japan).

『●』=Need 『−』=No need

Item		Remarks	Specified material	Substitute		
			HCFC123	HFC134a		HFC245fa
High pressure gas safety regulation		applicable liquid gas	−	● combination type	● specified equip.	−
Operation certificate		operation certified person	−	−	−	−
Installation	Install license Install declare	apply & declare by customer	−	●	●	−
	check	factory check	−	●	●	−
Operation management	maintenance check	check by government every 3 years	−	●	−	−
	self check	every year	−	●	●	−
Declaration of hazard prevention regulation			−	●	−	−
Standard of the machine room		ventilation, safety valve exhaust pipe are required. safety distance	− (∗3)	●	●	− (∗3)

∗3 Appropriate settings are made by following the Guideline on Centrifugal Chillers issued by the Japan Refrigeration and Air Conditioning Industry Association (JRAIA).

High safety

HFC245fa is noncombustible.
And low toxic, the admissible concentration is 300ppm.

Minor environment burden & easy to use, it's the refrigerant HFC245fa.

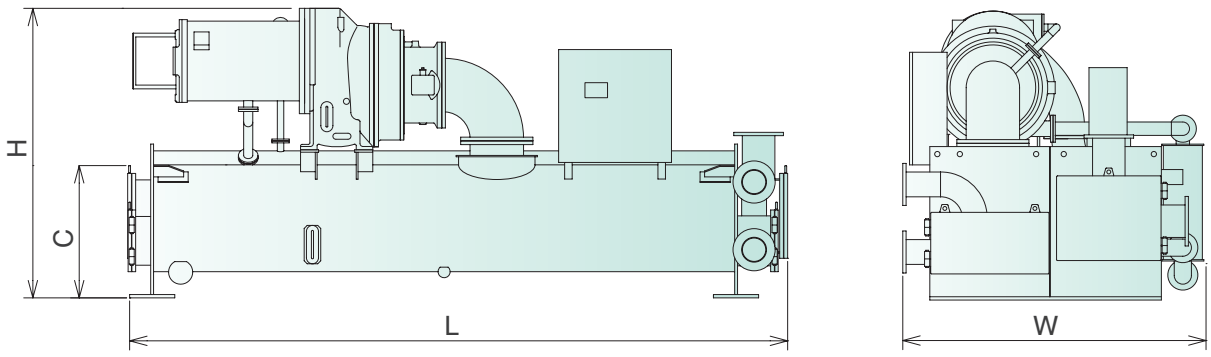
Specifications

■Chilled Water 12-7 degC　Cooling Water 32-37 degC

Model		—	RTBF022	RTBF025	RTBF027	RTBF030	RTBF036S	RTBF040	RTBF044	RTBF050
Cooling Capacity		kW	774	879	949	1,055	1,266	1,407	1,547	1,758
		{USRT}	220	250	270	300	360	400	440	500
COP		—								
Chilled Water	Flow Rate	ℓ / min	2,220	2,520	2,720	3,020	3,630	4,030	4,430	5,030
	Pressure Drop	kPa	48	49	51	54	45	47	48	51
	Pipe Connection Size	A	150	150	150	150	200	200	200	200
	No. of Pass	—	2	2	2	2	2	2	2	2
Cooling Water	Flow Rate	ℓ / min	2,620	2,970	3,200	3,550	4,270	4,740	5,200	5,910
	Pressure Drop	kPa	54	53	53	54	55	56	56	56
	Pipe Connection Size	A	200	200	200	200	250	250	250	250
	No. of Pass	—	2	2	2	2	2	2	2	2
Motor	Rated Output	kW	120	135	145	160	190	210	230	260
	Voltage	V	400V・3000V・6000V							
	Start method	—	400V・3000V・6000V							
Control & Aux. Powe	Voltage	V	200V							
	Power Capacity	kVA	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0
	Oil pump	kW	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Ref. Pump	kW	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.4
	Oil heater	kW	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Dimension	Length	mm	4,470	4,470	4,470	4,470	4,570	4,640	4,640	4,640
	Width	mm	2,065	2,065	2,065	2,065	2,510	2,510	2,510	2,510
	Height	mm	1,950	1,950	1,950	1,950	2,235	2,400	2,400	2,400
Mass	Running Mass	t	7.2	7.4	7.5	7.7	10.7	11.9	12.1	12.5
	Shipping Mass	t	6.1	6.2	6.3	6.4	8.8	9.9	10.1	10.3
Chilled Water Retain		ℓ	320	350	370	400	570	610	640	700
Cooling Water Retain		ℓ	360	380	390	420	580	610	640	680

Notes: 1) Indoor and non-hazard area application. 2) Chilled water and cooling water are in accordance with the water Quality Guide lines.(JRA-GL-02-1994) 3) Capacity control range is 20~100%
4) The fouling factor of both chilled water and cooling water is 0.000086m²K/W　5) The max. operation pressure is 0.69MPa

M/C Outline Drawing

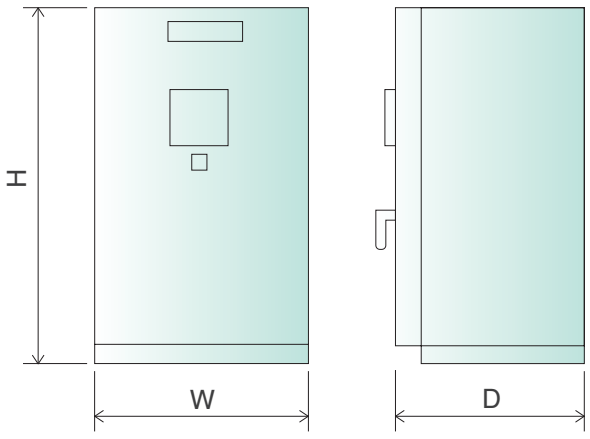


Chilled Water 12-7 degC Cooling Water 32-37 degC

Model		—	RTBF053	RTBF060S	RTBF065	RTBF070	RTBF075	RTBF080	RTBF085	RTBF090
Cooling Capacity		kW	1,864	2,110	2,286	2,461	2,637	2,813	2,989	3,165
		{USRT}	530	600	650	700	750	800	850	900
COP		—								
Chilled Water	Flow Rate	ℓ / min	5,340	6,040	6,550	7,050	7,560	8,060	8,560	9,060
	Pressure Drop	kPa	49	54	57	60	62	65	72	73
	Pipe Connection Size	A	250	250	250	250	250	250	300	300
	No. of Pass	—	2	2	2	2	2	2	2	2
Cooling Water	Flow Rate	ℓ / min	6,260	7,100	7,680	8,260	8,840	9,430	10,000	10,590
	Pressure Drop	kPa	69	74	66	67	69	71	96	98
	Pipe Connection Size	A	250	250	300	300	300	300	300	300
	No. of Pass	—	2	2	2	2	2	2	2	2
Motor	Rated Output	kW	275	315	340	360	385	410	425	455
	Voltage	V	400V•3000V•6000V							
	Start method	—	400V•3000V•6000V							
Control & Aux. Powe	Voltage	V	200V							
	Power Capacity	kVA	6.8	6.8	7.5	7.5	7.5	7.5	7.5	7.5
	Oil pump	kW	0.2	0.2	0.55	0.55	0.55	0.55	5.5	0.55
	Ref. Pump	kW	0.4	0.4	0.75	0.75	0.75	0.75	0.75	0.75
	Oil heater	kW	1.8	1.8	2.0	2.0	2.0	2.0	2.0	2.0
Dimension	Length	mm	4,635	4,635	4,960	4,960	4,960	4,960	5,630	5,630
	Width	mm	2,650	2,650	3,010	3,010	3,010	3,010	3,010	3,010
	Height	mm	2,460	2,460	2,790	2,790	2,790	2,790	2,790	2,790
Mass	Running Mass	t	12.8	12.9	16.1	16.4	16.7	17.0	18.4	18.7
	Shipping Mass	t	10.5	10.7	13.6	13.8	14.0	14.2	15.2	15.4
Chilled Water Retain		ℓ	840	890	1,020	1,060	1,110	1,150	1,250	1,300
Cooling Water Retain		ℓ	710	780	1,000	1,030	1,070	1,100	1,160	1,200

Notes: 1) Indoor and non-hazard area application. 2) Chilled water and cooling water are in accordance with the water Quality Guide lines.(JRA-GL-02-1994) 3) Capacity control range is 20~100%
4) The fouling factor of both chilled water and cooling water is 0.000086m²K/W 5) The max. operation pressure is 0.69MPa

Power Panel(option) Outline Drawing



Unit:mm

Voltage	Rated output	W	D	H	Start method
400V	90-230kW	750	1,000	2,150	open star-delta
	235-460kW	900	1,100	2,350	
3000V	90-460kW	750	1,400	2,350	reactor(option)
6000V	90-460kW	750	1,400	2,350	reactor

Notes:Reference for Japan Market

Specifications

Chilled Water 12-7 degC　Cooling Water 32-37 degC

Model		—	RTBF100	RTBF115	RTBF125	RTBF135	RTBF150
Cooling Capacity		kW	3,516	4,044	4,395	4,747	5,274
		{USRT}	1,000	1,150	1,250	1,350	1,500
COP		—	6.3	6.4	6.4	6.4	6.4
Chilled Water	Flow Rate	ℓ / min	10,070	11,580	12,590	13,590	15,100
	Pressure Drop	kPa	75	75	75	75	75
	Pipe Connection Size	A	350	350	400	400	400
	No. of Pass	—	2	2	2	2	2
Cooling Water	Flow Rate	ℓ / min	11,800	13,520	14,700	15,900	17,650
	Pressure Drop	kPa	92	92	92	92	98
	Pipe Connection Size	A	400	400	400	400	400
	No. of Pass	—	2	2	2	2	2
Motor	Rated Output	kW	505	575	620	670	755
	Voltage	V	3000V•6000V				
	Start method	—	3000V (Open Star-Delta) • 6000V (Reactor)				
Control & Aux. Power	Voltage	V	200V				
	Power Capacity	kVA	8.8	8.8	8.8	8.8	8.8
	Oil pump	kW	1.1	1.1	1.1	1.1	1.1
	Ref. Pump	kW	0.75	0.75	0.75	0.75	0.75
	Oil heater	kW	2.4	2.4	2.4	2.4	2.4
Dimension	Length	mm	5,610	5,610	5,670	5,670	5,670
	Width	mm	3,400	3,400	3,400	3,400	3,520
	Height	mm	3,230	3,230	3,370	3,370	3,430
Mass	Running Mass	t	26.0	26.5	28.5	29.0	30.5
	Shipping Mass	t	21.5	22.0	23.0	23.5	24.5
Chilled Water Retain		ℓ	1,550	1,650	1,950	2,000	2,200
Cooling Water Retain		ℓ	1,500	1,600	1,850	1,950	2,050

Notes: 1) Indoor and non-hazard area application. 2) Chilled water and cooling water are in accordance with the water Quality Guide lines.(JRA-GL-02-1994)
3) Capacity control range is 20～100% 4) The fouling factor of both chilled water and cooling water is 0.000086㎡K/W 5) The max.operation pressure is 0.69MPa

Scope of supply. Option List

Standard Scope of Supply

	Model	EBARA	Customer	Remarks
Main body	Evaporator. Condenser	○	—	
	Compressor Assembly	○	—	
	Control Panel	○	—	
	Motor Power Panel	○	—	
	Internal Piping. Wiring	○	—	
	Refrigerant. Lubricant	○	—	
Test	Factory Performance Test	○	—	
	Local Start-up & Commissioning	—	—	To be discussed
Transport	From Factory to Seaport	○	—	
	From Seaport to Foundation	—	○	
	Main Body Assembling	—	—	Inc luding Motor Power Panel Only Supervisor would be send
Electric	Power Source	—	○	Including Ground Loop *1 Refer to Below
	Auxiliary Machinery Interlock wiring	—	○	
	Wiring Between Motor Power Panel & Chiller	—	○	
	Wiring Between Control Panel & Chiller	○	—	
	Cooling Water Temp.Control	—	○	

	Model	EBARA	Customer	Remarks
Painting	Main Body	○	○	
	Control Panel	○	—	
	Motor Power Panel	—	—	optional
Subsidiary	Foundation	—	○	
	Chiled Water/Cooling Water Piping	—	○	
	Chilled Water/Cooling Water thermometer	—	○	
	Chilled Water/Cooling Water Pressure Gage	—	○	
	Chilled Water/Cooling Water Flow Meter	—	○	
	Insulation	—	○	
Maintenance	Routine Inspection	—	—	To be discussed
	Next Season Spot Inspection	—	—	To sign a Maintenance contract is Recommended
Accessories	Indication Lamp/Electric Lamp/Fuse	○	—	
	Instruction Manual	○	—	1 piece
Others	Local Power Supply/Water etc.	—	○	×××
	N_2 for Chiller Keeping	—	○	For a Long Term storge
	Disposition of Waste Material	—	○	

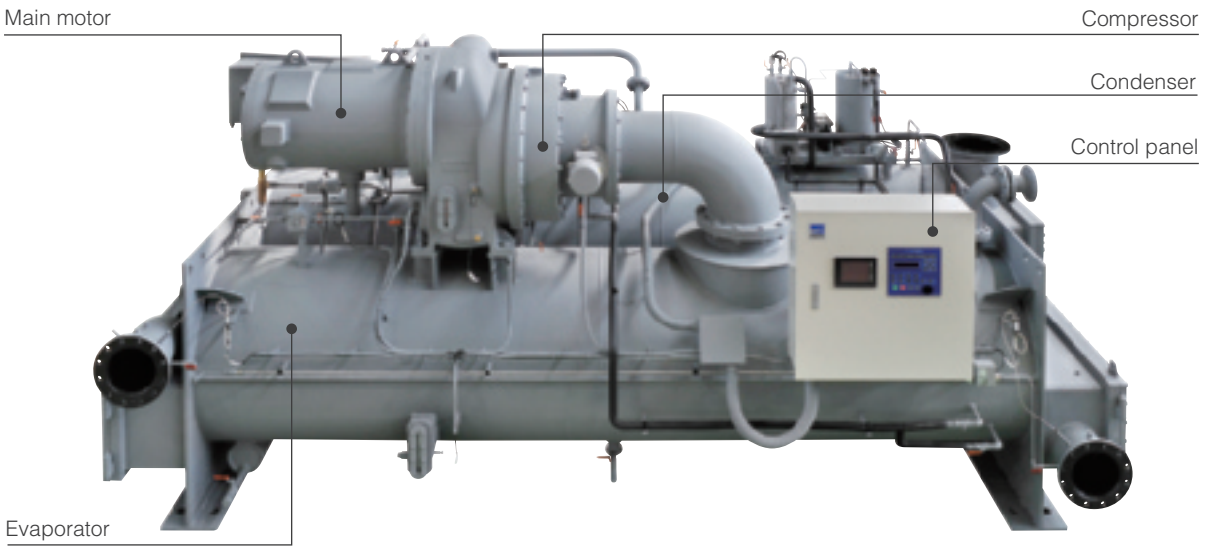
*1 The motor power panel is for the overload protection of motor during normal operation, it can not switch off when electric failure(short circuit,grounding etc.)is occured.
So please install a breaker before the motor power panel.

Option List

Model	Standard	Option	Model	Standard	Option
Special Start-up Method	400V Open Start-delta 3000V. 6000V Reactor	400V Reactor Available Available	Water Box Direction	Marine Type	Available
			Shock-proof Device	None	Available
Phase Advanced Capcitor Condenser	None	Available	Setting up Anchor Bolt	None	Available
Power Consumption Meter	None	Available	Separate Delivery	One-piece shipment	Available
Zero-Phase Current Transformer(ZCT)	None	Available	Remote Condition Signal Output	Operation Status Signal	Available Please Contact for Details
Control Panel Power Transformer	None	Available			
Power Fuse	None	Available	Tube Auto Cleaning Device	None	Available
Hot Gas By-pass Valve	None	Available	Refrigerant Gas Density Alam	None	Available
Water Box Max Operation Pressure	0.69MPa	Above 0.69MPa Available			

Notes:Reference for Japan Market

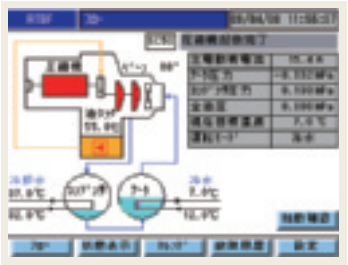
Outline



Multi-function control system to ensure a safety operation

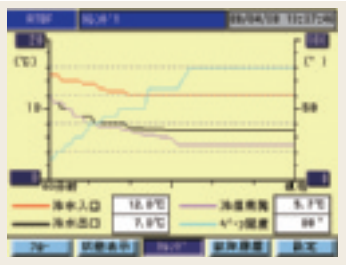
Touch screen micro control panel - various touch screen display

The touch screen display the internal flow chart, operating condition, operation history. And support the daily operation maintenance.



Display the internal flow chart & operating conditions

Condition indication



Trend display

Calender display

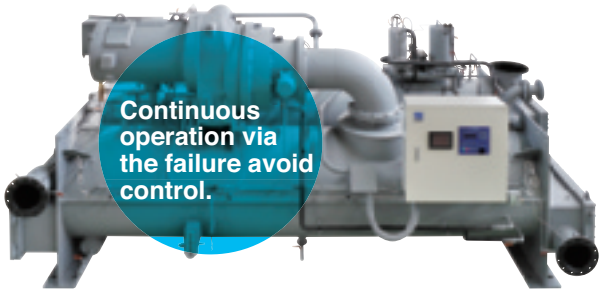
Failure avoid control to make a high operation reliability

To check the motor current, evap. pressure, cond. pressure, and avoid the stop at failure.

The risk of stop at failure

- The cooling water temp. rise during the peak time in summer
- The chilled water load and temp. change rapidly
- The main extemal factors of cause scale in the heat exchenger due to long time change.

- The main motor current exceed rating
- The evap. pressure lower than the limit
- The cond. pressure higher than the limit



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All specifications are subject to change without notice
"Model ○○○ type series" in this catalogue is our model code.

EXPORT CONTROL
Purchase acknowledges and understands that Supplier maintains its own export control and complies with all applicable export control laws and regulations including Japan's Foreign Exchange and Foreign Trade Control Law and U.S. export control laws and regulations with respect to the Products and Purchaser shall fully cooperate with implementation of such Supplier's export control.

28-071-E02