

CHANGE AIR, CHANGE LIFE

MIRINE[®] Ductless HVAC System

SERVAN LTD.

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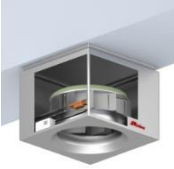



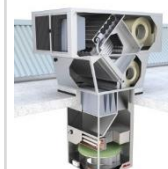
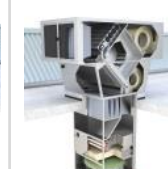
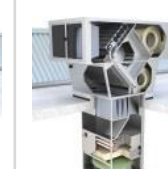
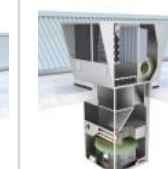

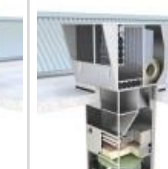
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Benefits of MIRINE®

- Ideal for any large buildings with high ceilings
- Ductless air supply
- Patented air distribution
- Decentralized system
- Energy saving operation
- No need for a separate air handling unit room

MIRINE®, meaning galaxy in Korean, is the trademark of Servan Ductless HVAC System.

Distributor	Indoor Ductless (recirculation)			Roof Ductless (Energy recovery)			Roof Ductless (mixed air)			
										
Distributor	DHF	DCF	DCF-X	RHP	RCP	RCP-X	FH	FC	FC-X	
Operation Mode										
Air distribution / Recirculation	Air distribution / Heating / Recirculation	Air distribution / Heating / Cooling / Recirculation	Air distribution / Heating / Cooling / Recirculation	Air distribution / Heating / Ventilation (fresh air) / Heat recovery / Recirculation	Air distribution / Heating / Cooling / Ventilation (fresh air) / OA cooling / Heat recovery / Recirculation	Air distribution / Heating / Cooling / Ventilation (fresh air) / OA cooling / Heat recovery / Recirculation	Air distribution / Heating / Ventilation (fresh air) / Recirculation / OA + SA Mix	Air distribution / Heating / Cooling / Ventilation (fresh air) / OA cooling / Recirculation / OA + SA Mix	Air distribution / Heating / Cooling / Ventilation (fresh air) / OA cooling / Recirculation / OA + SA Mix	Air distribution / Heating / Cooling / Ventilation (fresh air) / OA cooling / Recirculation / OA + SA Mix
Heat source										
	Hot water / Steam	Hot/Cold water / Steam	EHP / GHP / Ground heat / Outdoor unit	Hot water / Steam	Hot/Cold water / Steam	EHP / GHP / Ground heat / Outdoor unit	Hot water / Steam	Hot/Cold water / Steam	EHP / GHP / Ground heat / Outdoor unit	

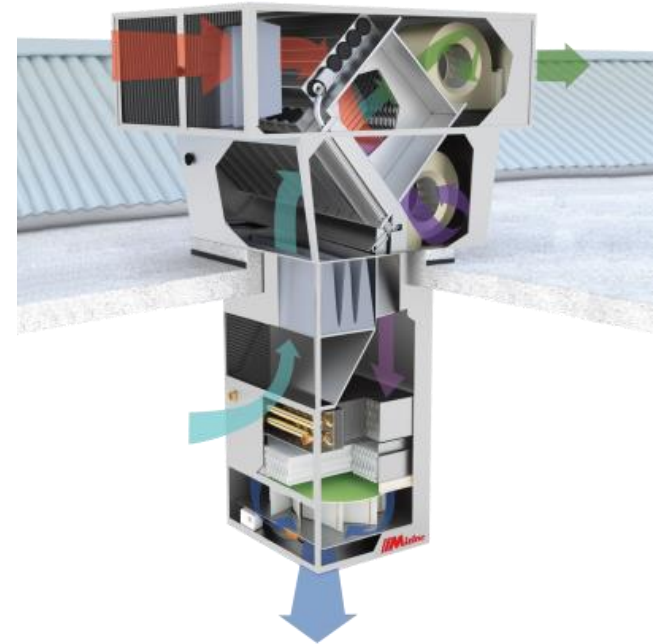
※ Please inquire about any model types that are not listed above.

MIRINE® Roof Ductless

Cooling, heating, ventilation, heat recovery, filtration.

MIRINE® Roof Ductless is an effective and eco-friendly device with the AHRI certified plate heat exchanger. It supplies fresh air and removes exhaust air.

During this heat exchange process between OA and EA, energy is recovered. The leak-tight heat exchanger also prevents air contamination, as the fresh air does not mix with the exhaust air.

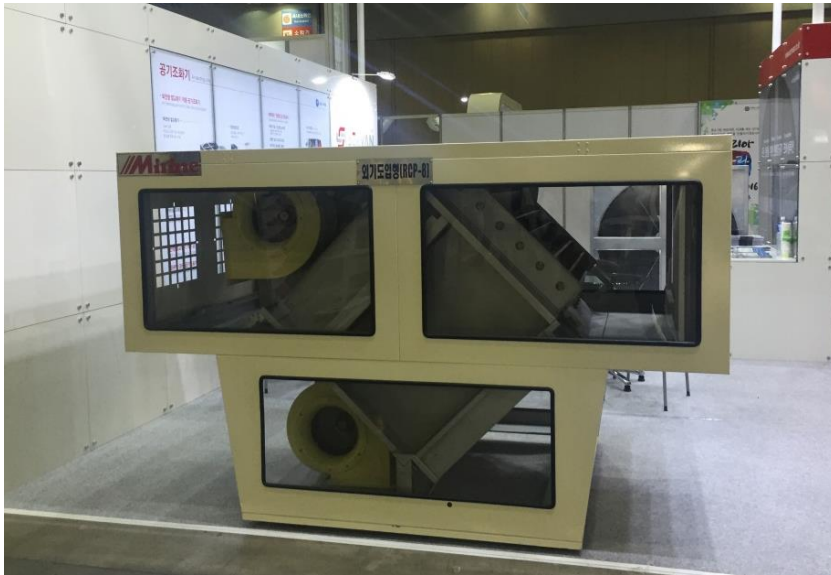


Features:

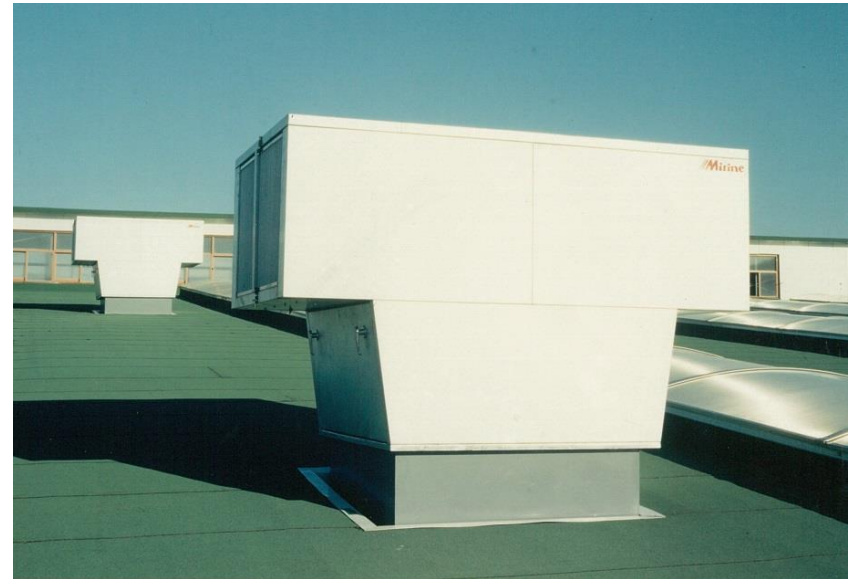
- Heating / Cooling
- Fresh air supply and extract air removal
- Energy recovery with AHRI certified heat exchanger
- Prevents air contamination
- Ductless operation
- Decentralized system -> can be combined with Indoor Ductless units
- Air distribution and filtration

MIRINE® Roof Ductless

Cooling, heating, ventilation, heat recovery, filtration.



RCP-8 upper unit on display during
KOPPEX 2016, KOREA

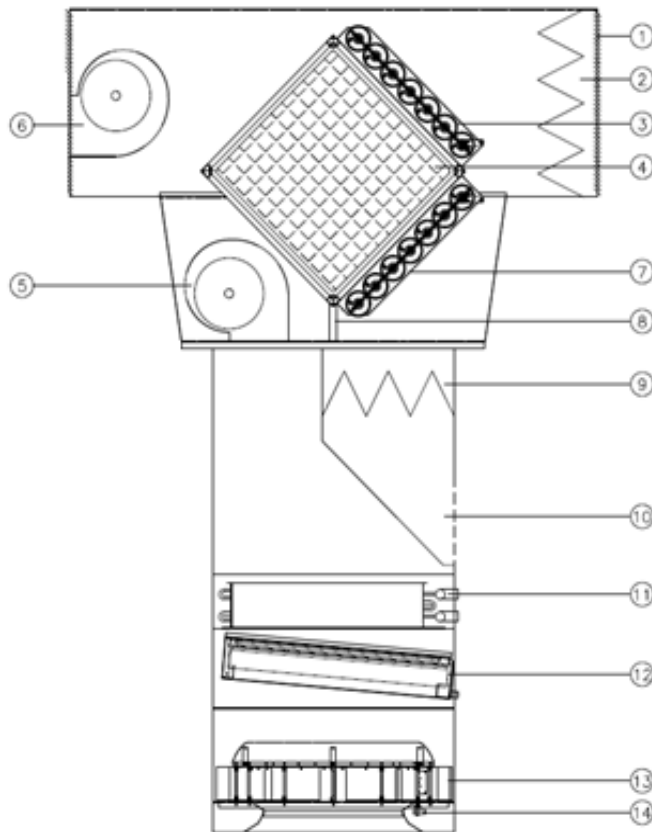


RCP-8 installed at Samsung
Electronics Factory in Gwangju, KOREA

MIRINE® Roof Ductless

Cooling, heating, ventilation, heat recovery, filtration.

Components



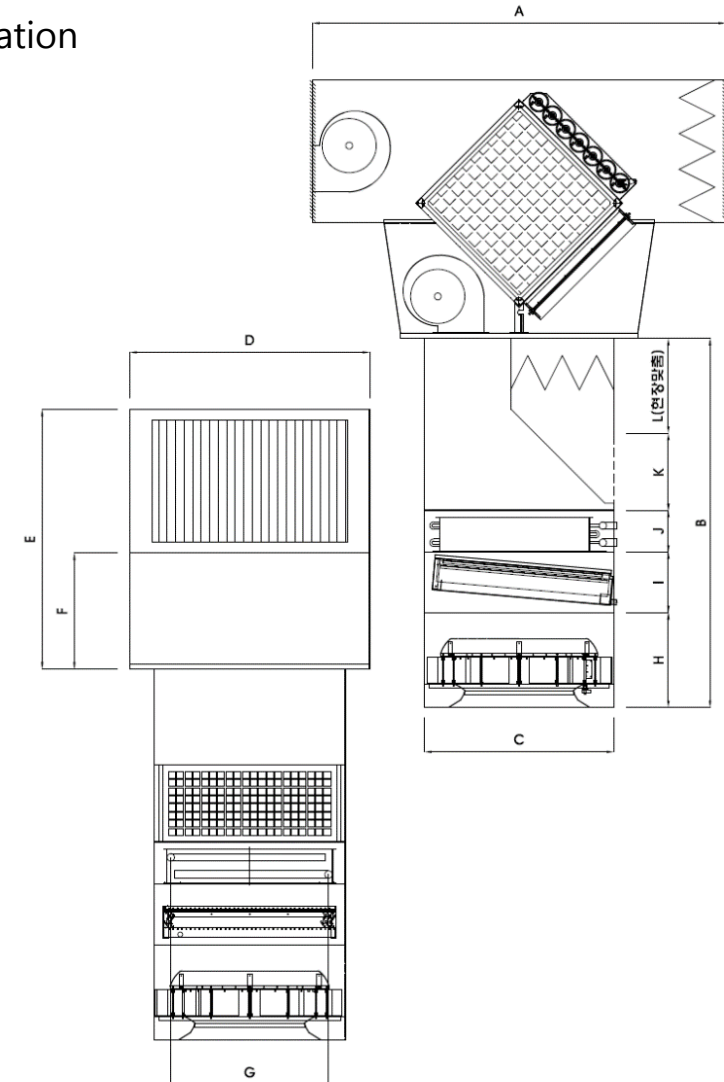
1	OA GRILL Functions as an access door and blocks rain from entering during the supply of outdoor air
2	OA FILTER Bag filter
3	OA DAMPER Air foil damper, gear blade
4	HEAT EXCHANGER exchanges heat between the indoor air(EA) and the outdoor air being supplied inside(OA)
5	SUPPLY AIR FAN & MOTOR
6	EA FAN & MOTOR
7	EA DAMPER / BYPASS DAMPER
8	RECIRCULATION DAMPER
9	RA FILTER Bag filter
10	RA GRILL
11	COIL Water, steam, or D.X. coil applicable
12	ELIMINATOR Removes condensate formed during cooling
13	DISTRIBUTOR
14	ACTUATOR(optional) Automatic control of air distribution **Operating range : 0~10VDC, Power : 24VAC±20%, 50~60Hz

MIRINE® Roof Ductless

RCP(water coil) Cooling, heating, ventilation, heat recovery, filtration

Size and specifications

Model		RCP-5	RCP-8	RCP-11
Air flow(CMH)		5,000	8,000	11,000
Power option		3 phase 380/440V 60Hz		
Motor power(Kw)		1.9x2	3.0x2	3.0x2
Weight(kg)		570	760	
Coil inlet/outlet diameter		40A	50A	50A
Drain pan outlet diameter		25A	25A	25A
Length (mm)	A	2,100	2,400	
	B	1,966	2,127	
	C	800	1,100	
	D	1,080	1,380	
	E	1,390	1,509	
	F	600	679	
	G	600	908	
	H	550	550	
	I	326	352	
	J	237	242	
	K	385	450	
	L	468	533	

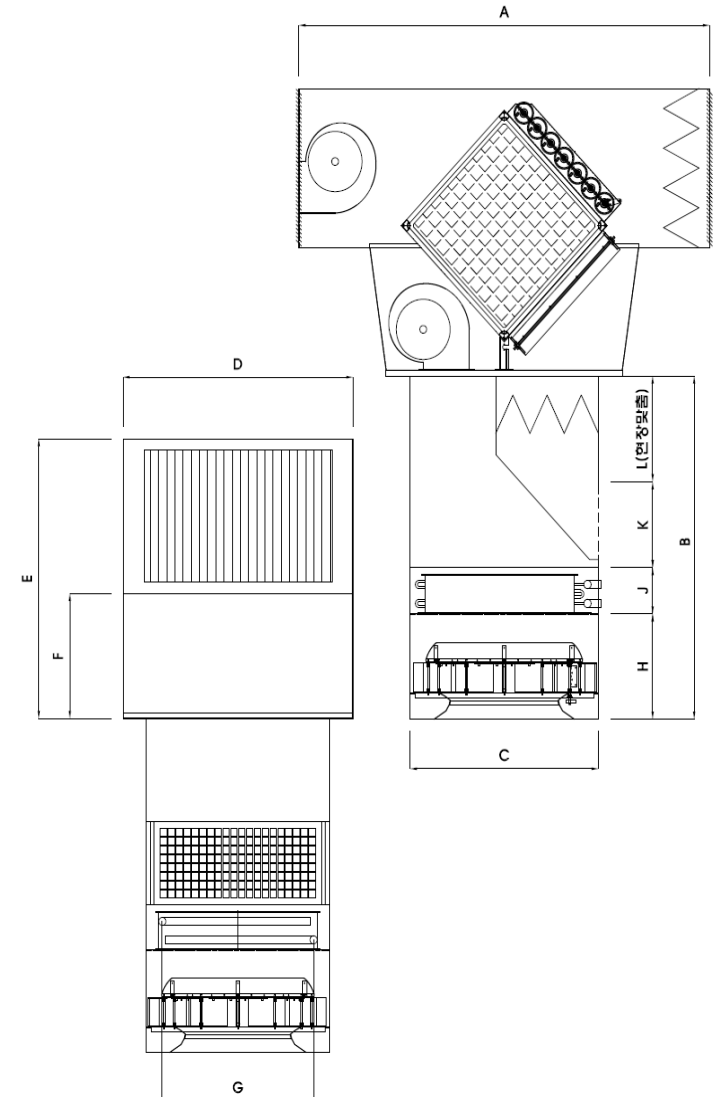


MIRINE® Roof Ductless

RHP(water coil) Heating, ventilation, heat recovery, filtration

Size and specifications

Model		RHP-5	RHP-8	RHP-11
Air flow(CMH)		5,000	8,000	11,000
Power option		3 phase 380/440V 60Hz		
Motor power(Kw)		1.9x2	3.0x2	3.0x2
Weight(kg)		550	740	
Coil inlet/outlet diameter		40A	50A	50A
Drain pan outlet diameter		25A	25A	25A
Length (mm)	A	2,100	2,400	
	B	1,703	1,833	
	C	800	1,100	
	D	1,080	1,380	
	E	1,390	1,509	
	F	600	679	
	G	600	908	
	H	550	550	
	J	300	300	
	K	385	450	
L	468	533		

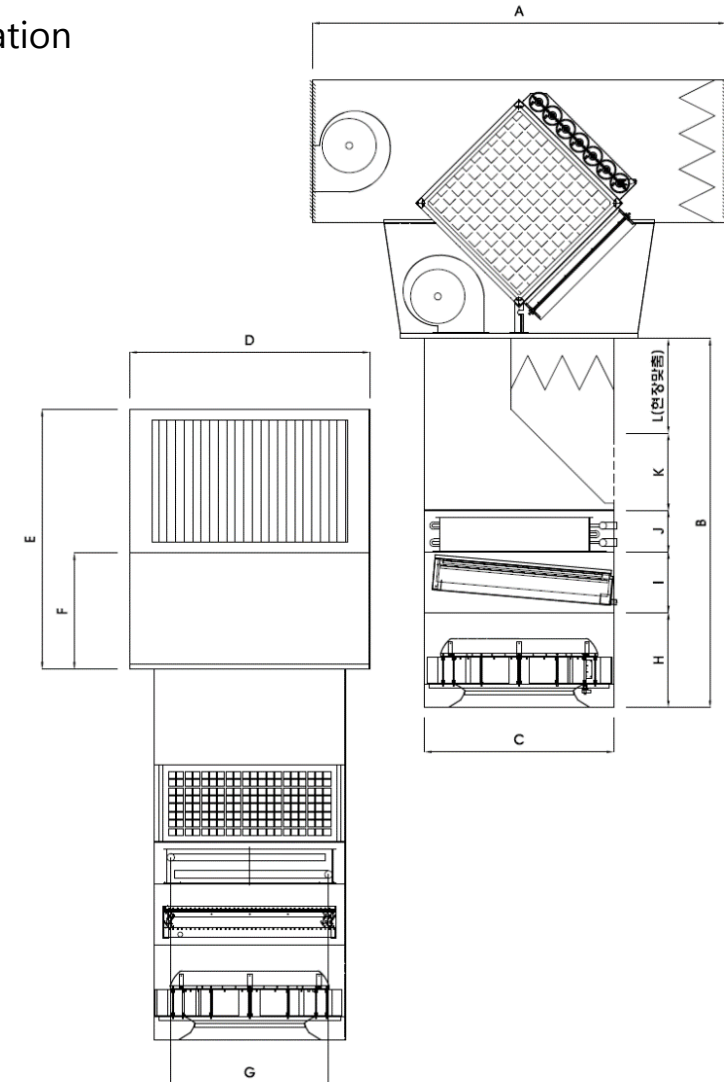


MIRINE® Roof Ductless

RCP-X(DX coil) Cooling, heating, ventilation, heat recovery, filtration

Size and specifications

Model		RCP-5X	RCP-8X	RCP-11X
Air flow(CMH)		5,000	8,000	11,000
Power option		3 phase 380/440V 60Hz		
Motor power(Kw)		1.9x2	3.0x2	3.0x2
Weight(kg)		630	850	
Coil inlet/outlet diameter		Outdoor units, liquid/gas pipe diameter		
Drain pan outlet diameter		25A	25A	25A
Length (mm)	A	2,100	2,400	
	B	2,111	2,267	
	C	800	1,100	
	D	1,080	1,380	
	E	1,390	1,509	
	F	600	679	
	G	600	908	
	H	550	550	
	I	326	352	
	J	382	382	
	K	385	450	
	L	468	533	

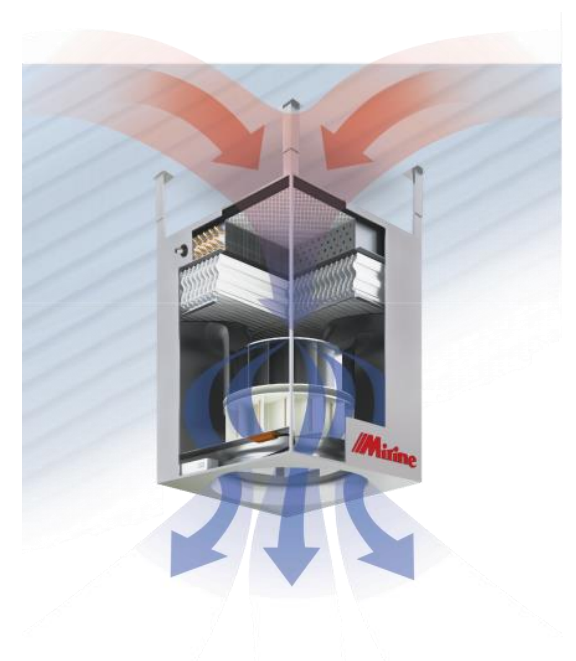


MIRINE® Indoor Ductless

Cooling, heating, air distribution, recirculation

MIRINE® Indoor Ductless is air recirculation or supply air unit that provides heating and cooling for large industrial buildings.

Servan selects the most suitable unit based on operation mode, heat source, and Air flow, from the broad range of models, depending on each application's requirements.



Features:

- Heating (with connection to boiler system)
- Cooling (with connection to water chiller)
- Air recirculation, distribution, filtration
- Duct-less system maximizes space and hygiene
- Decentralized zone operation

Technical data:

- Vertical reach distance: 19.0m max.
- Dispersion range(horizontal) : 15.0m max.
- Air flow rate : 5,000 / 8,000 / 11,000 m³/h
- Heating capacity up to 165kW
- Cooling capacity up to 108kW

MIRINE® Indoor Ductless

Cooling, heating, air distribution, recirculation



DCF-5 upper unit on display during
KOPPEX 2016, KOREA

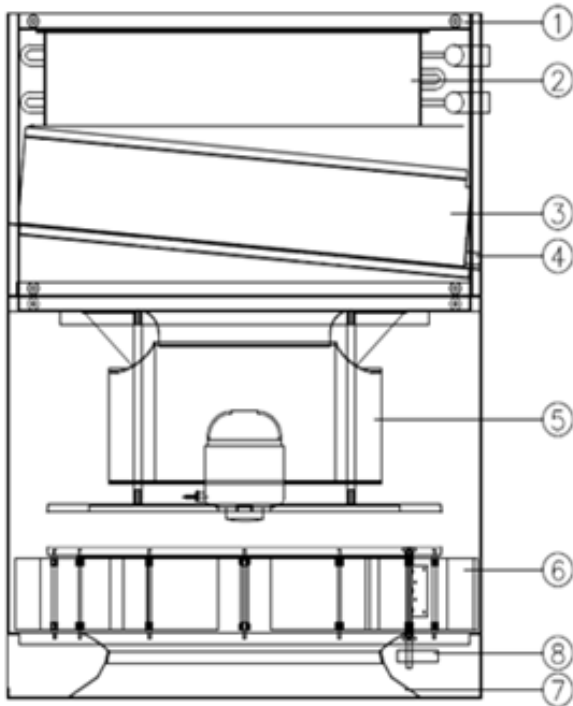


DCF-11 installed at Korea National University
Tiger Dome, Seoul

MIRINE® Indoor Ductless

Cooling, heating, air distribution, recirculation

Components

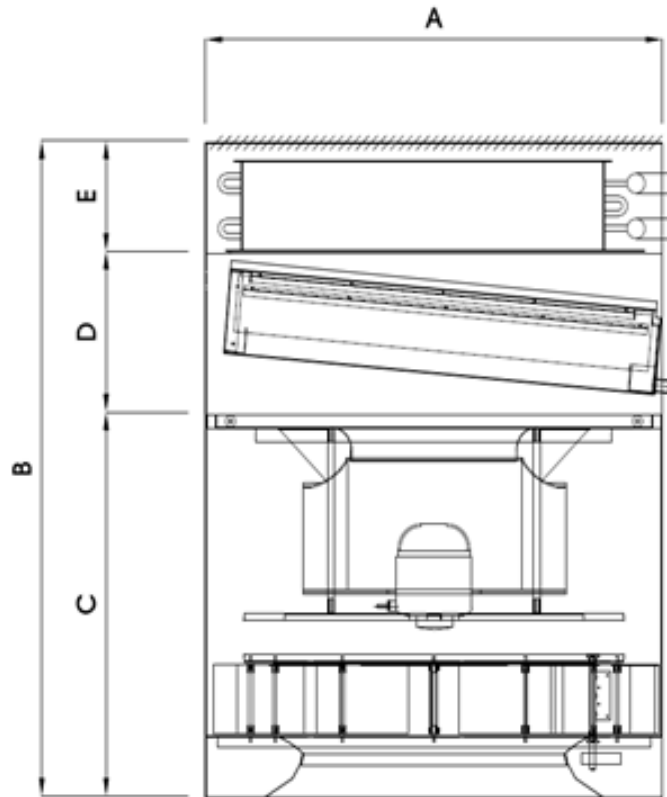


1	FILTER Pre-filter(replacement-friendly)
2	COIL Water, steam, or D.X. coil applicable
3	ELIMINATOR Removes condensate formed during cooling
4	DRAIN PAN
5	FAN & MOTOR ZIEHL-ABEGGT units (direct-coupled motor)
6	GUIDE VANE Provides optimal supply air by adjusting the discharged air angle
7	NOZZLE Airflow spreading effect
8	ACTUATOR (optional) Automatic control of air distribution **Operating range : 0~10VDC, Power : 24VAC±20%, 50~60Hz

MIRINE® Indoor Ductless

DCF(water coil) Cooling, heating, air distribution, recirculation

Size and specifications



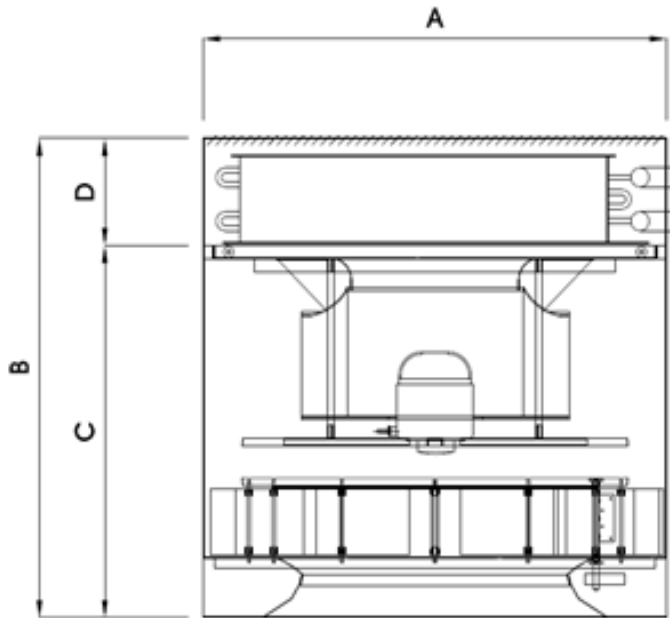
Model		DCF-5	DCF-8	DCF-11
Air flow(CMH)		5,000	8,000	11,000
Motor power(Kw)		0.56	1.6	1.6
Weight(kg)		200	270	270
Coil inlet/outlet diameter		40A	50A	50A
Drain pan outlet diameter		25A	25A	25A
Length (mm)	A	800	1,100	
	B	1,313	1,434	
	C	750	840	
	D	326	352	
	E	237	242	

MIRINE® Indoor Ductless

DHF(water coil) Heating, air distribution, recirculation

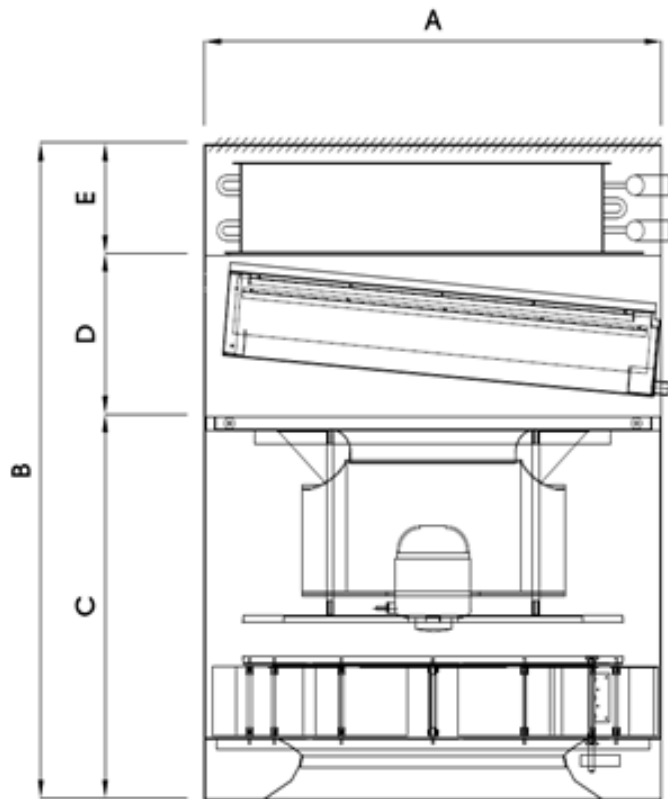
Size and specifications

Model	DHF-5	DHF-8	DHF-11
Air flow(CMH)	5,000	8,000	11,000
Motor power(Kw)	0.56	1.6	1.6
Weight(kg)	160	222	222
Coil inlet/outlet diameter	40A	50A	50A
Drain pan outlet diameter	25A	25A	25A
Length (mm)	A	800	1,100
	B	1,050	1,140
	C	750	840
	D	326	352



MIRINE® Indoor Ductless

DCF-X(DX coil) Cooling, heating, air distribution, recirculation



Size and specifications

Model		DCF-5X	DCF-8X	DCF-11X
Air flow(CMH)		5,000	8,000	11,000
Motor power(Kw)		0.56	1.6	1.6
Weight(kg)		230	300	300
Coil inlet/outlet diameter		Outdoor units, liquid/gas pipe diameter		
Drain pan outlet diameter		25A	25A	25A
Length (mm)	A	800	1,100	
	B	1,458	1,574	
	C	750	840	
	D	326	352	
	E	382	382	

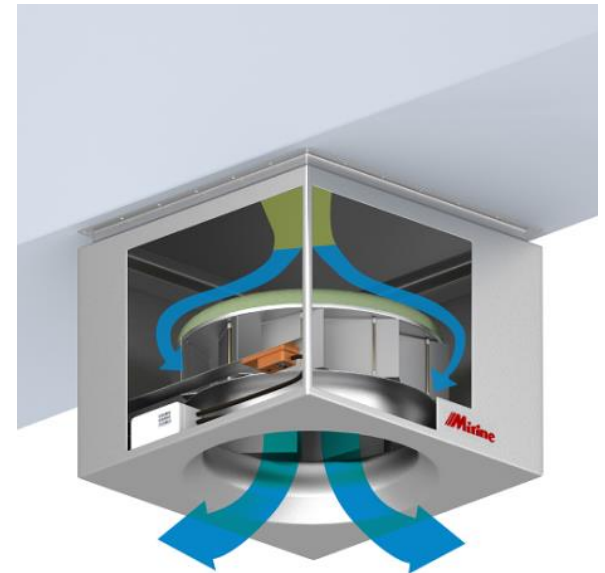
MIRINE® Distributor

Air distribution

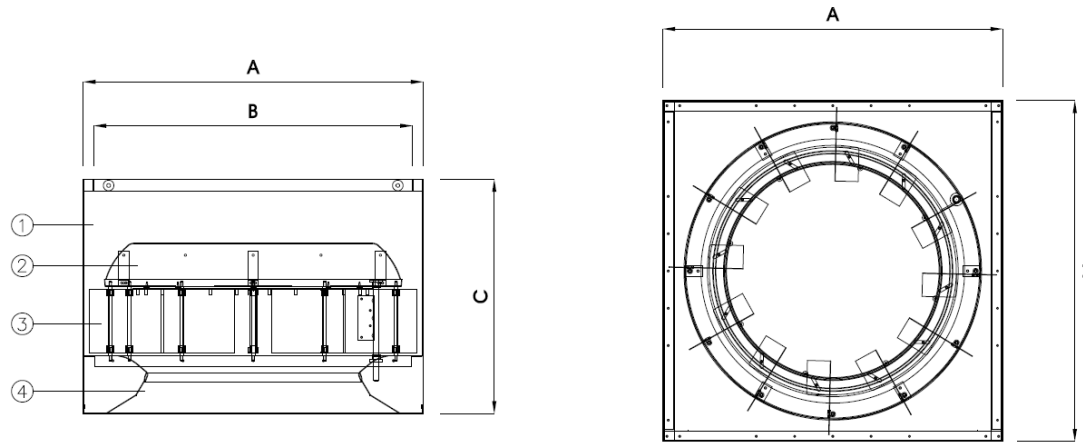
MIRINE® Distributor, installed at the terminal end of the HVAC duct, provides efficient and uniform air conditioning and ventilation by alternating the discharged air pattern according to operating condition.

Features

- Aids in uniform air conditioning via supply air distribution device
- Precisely designed by CFD program
- Minimized noise level (operates without a fan)
- Operation modes: heating, cooling, and isothermal
- Installed at terminal end of HVAC duct -> functions as diffuser



MIRINE® Distributor
Air distribution

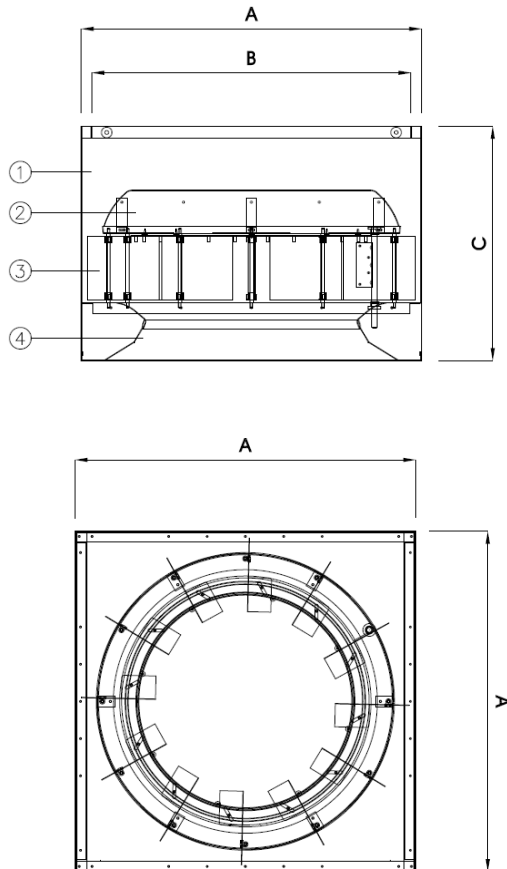


Components

1	CASING Minimizes heat loss and prevents corrosion (includes lagging for cooling)
2	ROUND DISK Airflow discharged from the duct is delivered to the guide vane
3	GUIDE VANE Sets the air distance and allows air conditioning without forming draft
4	NOZZLE Different angles in the upper and the lower part allows enlarged air current
-	ACTUATOR (optional) Automatic control of air distribution **Operating range : 0~10VDC, Power : 24VAC±20%, 50~60Hz

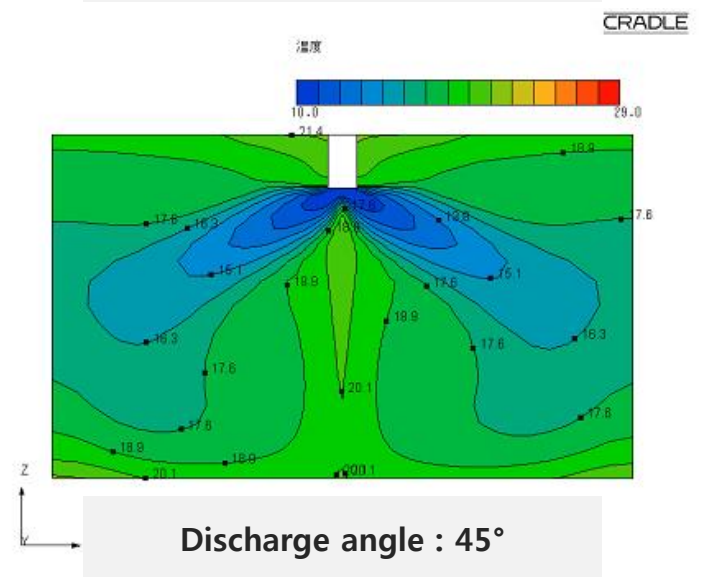
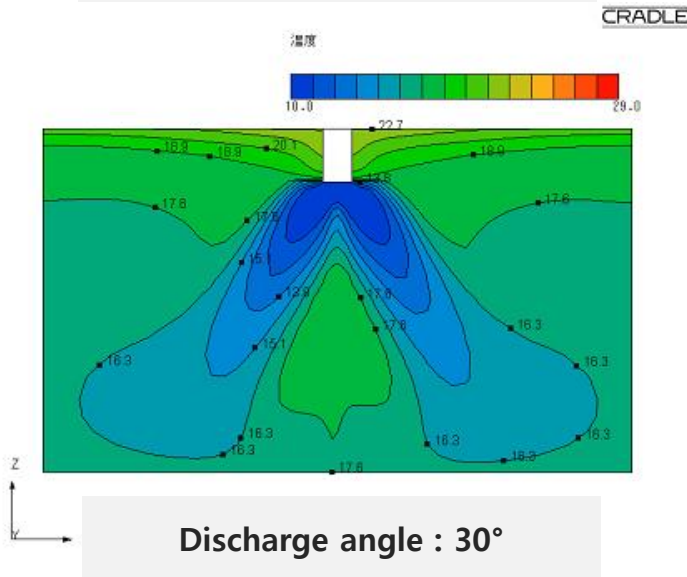
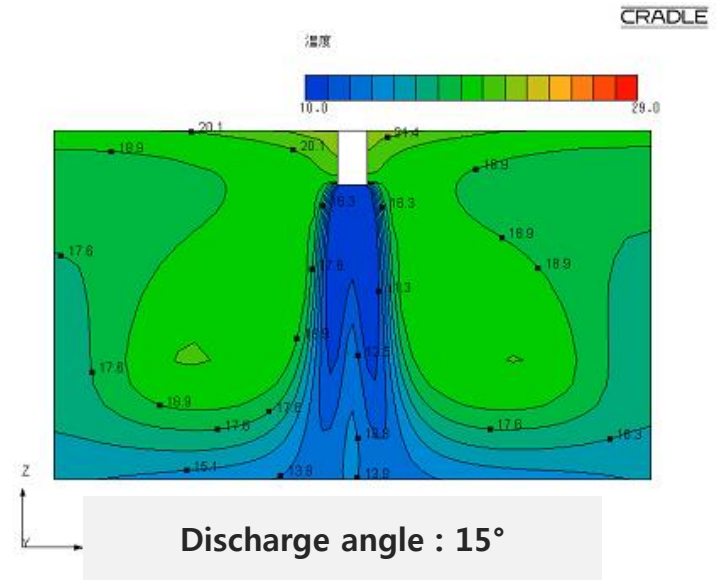
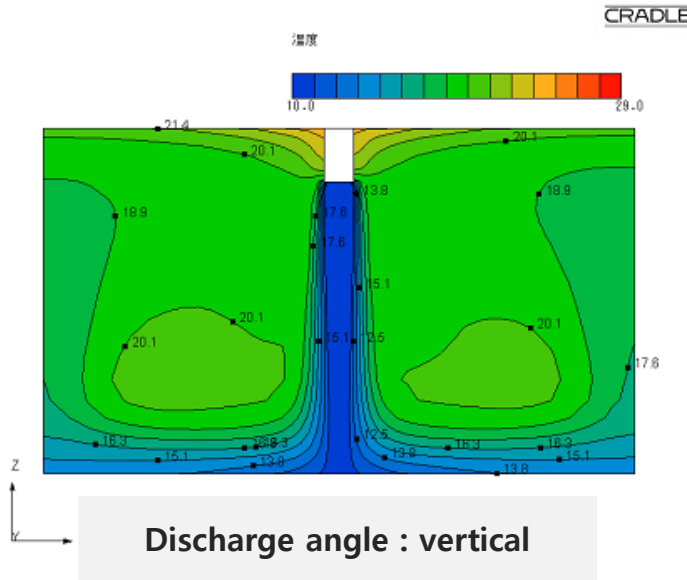
MIRINE® Distributor

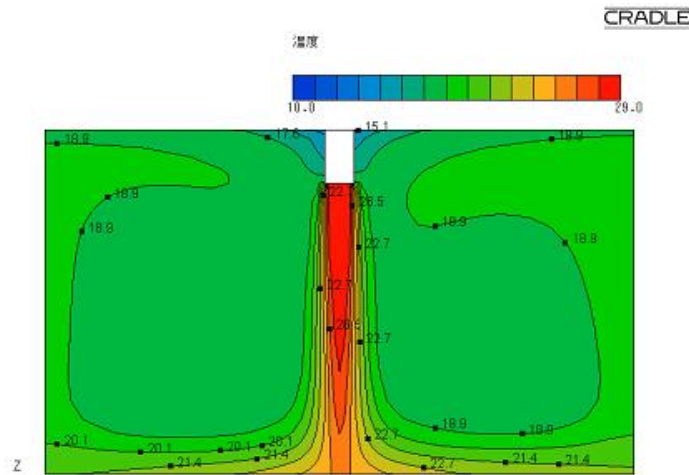
Air distribution



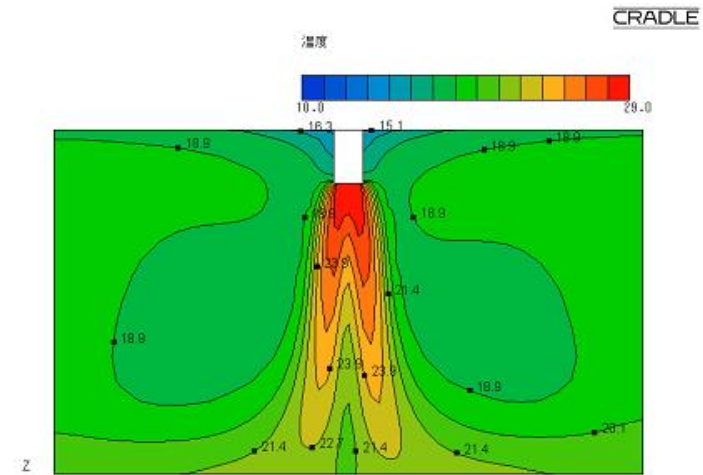
Size and specifications

Model	D-3	D-5	D-8	
Air flow(CMH)	3,000	5,000	8,000	
Weight(kg)	28	38	57	
Length (mm)	A	655	800	1100
	B	605	750	1050
	C	550	550	550

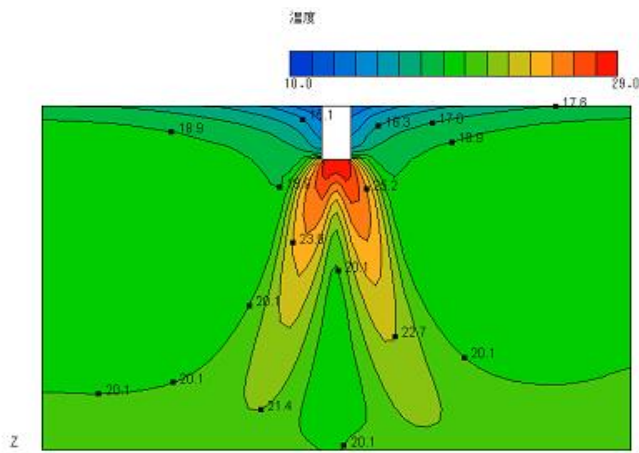




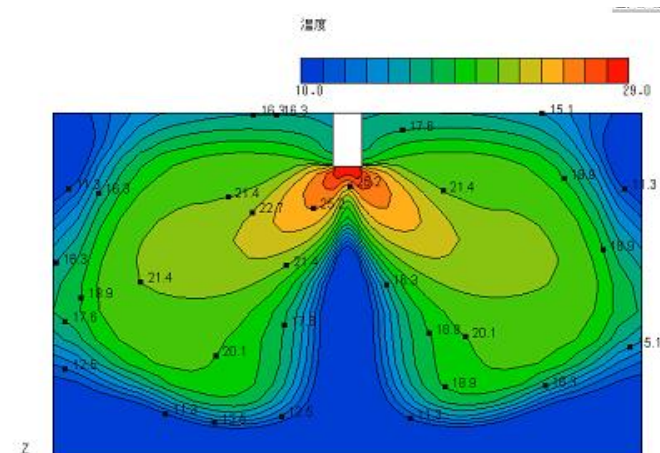
Discharge angle : vertical



Discharge angle : 15°



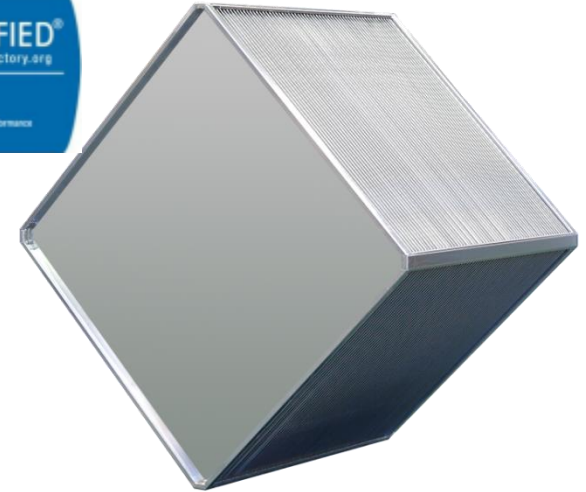
Discharge angle : 30°



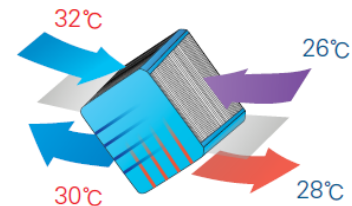
Discharge angle : 45°

Features:

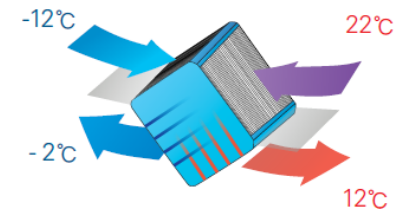
- Heat recovery efficiency of 60% or above
- All models are AHRI certified
- Plate size range: 500 – 1600mm
- Leak-tight structure – prevents cross contamination
- Saltwater resistant aluminum
- Epoxy coating for extra resistance(optional)
- Ideal for hospital, research labs, swimming pools, or any buildings that requires high level of air quality control



• Cooling operation



• Heating operation



Energy saving case:

Project name: Samsung Cancer Center, Seoul



- Number of air handling units installed: 22
- Number of AHU with plate heat exchangers: 13
- Annual energy saving: 4,906,000 kW
- Annual saving amount: 360,181 USD

** Total OA / EA type operation

MIRINE® Ductless HVAC System can be installed in any large interior buildings such as production facilities, warehouses, retail stores, sports centers, and swimming pools. In 2015, 8 Indoor Ductless units have been installed at The Russian Academy of Sciences to provide comfortable indoor climate all year round. Also, additional 13 units have been installed at the Greenhouse of Moscow Botanical Garden later in the same year, also known as the largest botanical garden in Europe, located within the Academy of Sciences.

The Russian Academy of Sciences, officially confirmed as the highest scientific institution in Russia, was established in 1774 and includes 500 institutions and 55,000 scientific researches.



№ 30-12-15/01 дд 30.12.15
Attn: Mr. Brian Jeong
Director, International Sales
SERVAN
27, Haajjersandan 5-ro, Gijangpo-gu,
Busan, Republic of Korea



APPRECIATION LETTER

«TERMOCOM-ENGINEERING» is exclusive distributor of MIRINE decentralize vent units in Russian Federation. At present time our team is actively working on brand development and increasing the brand recognition by leading russian project organizations, engineering companies and investors, whose specialization is in building industrial and commercial objects.

In time of collaboration with SERVAN we have been assured the units has high technical characteristics, qualitative assemblage and really unique air-distribution system. We have a good feedback from our clients and are absolutely satisfied by partner relations with SERVAN.

Our team stays loyal to MIRINE brand and we are sincerely sure decentralize vent systems has a big potential for further developing and popularization on HVAC-market in Russian Federation territory.

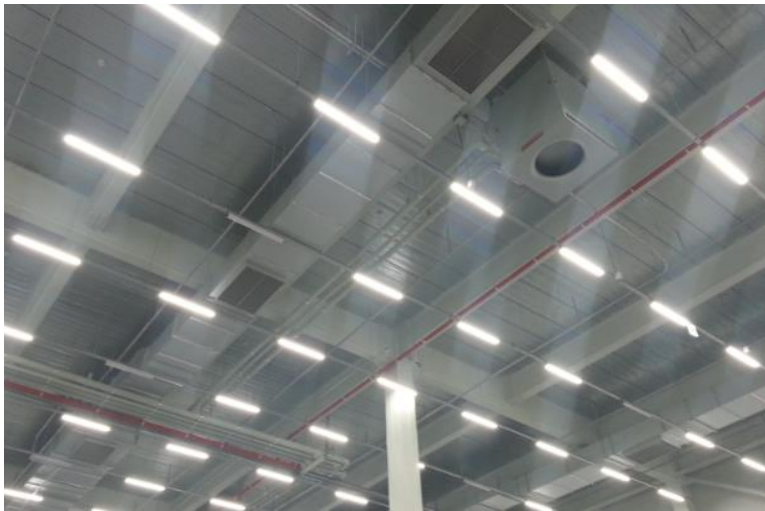
General Director
TERMOCOM - Engineering (LLC)



Appreciation letter from TERMOCOM ENG,
exclusive distributor for Russia



1



2



3

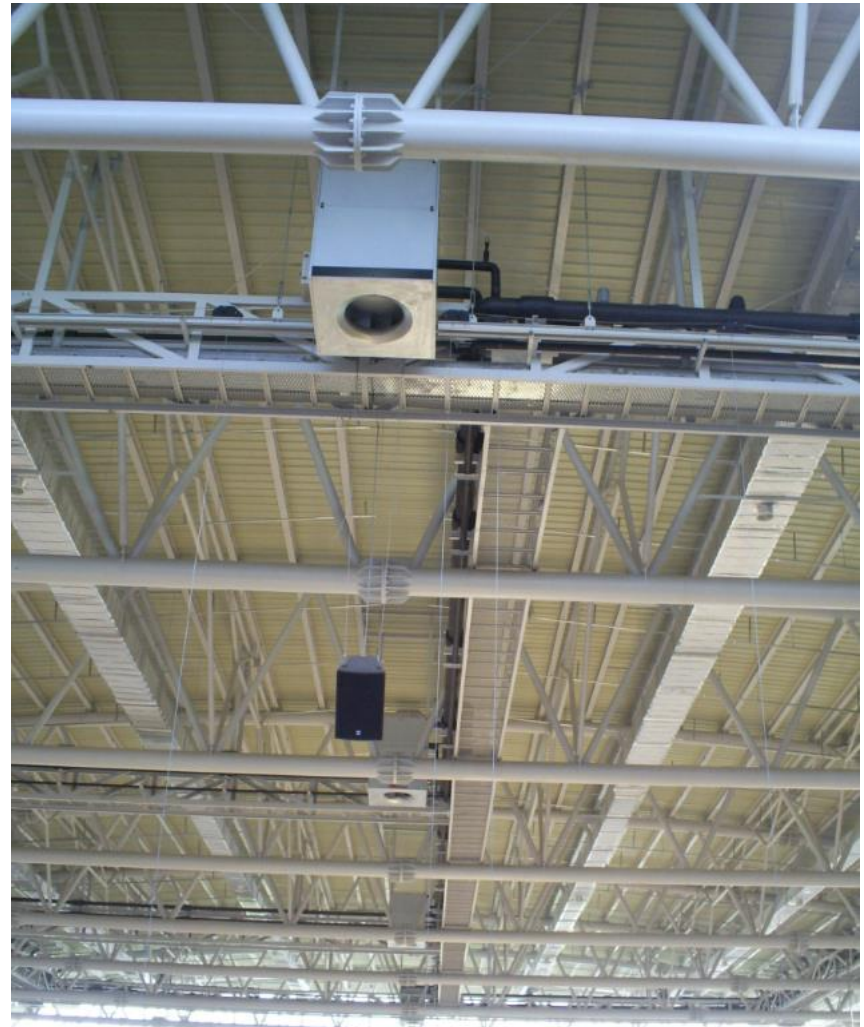
1, 2, 3 Seoul(Incheon) International Airport, Duty Free Warehouse



1



2



3

1, 3 Korea University Tiger Dom, Seoul

2 Pusan National University Gymnasium, Busan



1



2



3

1, 2 SERVAN Noksan Plant, Busan
3 SERVAN Hwajeon Plant, Busan



**Seoul(Incheon) International Airport
Duty Free Warehouse (Incheon, Korea)**
MIRINE® Indoor Ductless 106 units | 2014. 7.

- Dong-A Logistics Warehouse, Incheon
- SCANIA Technical Centre, Moscow
- Samsung Corning Advanced Glass, Asan
- SINSEGAE Yeosu Warehouse
- Samsung Electronics Gwangju Plant
- DIART Warehouse, Moscow
- Samsung Techwin Changwon Plant
- Russia Academy of Sciences, Moscow
- Renault Samsung Technical Centre, Seoul
- Hyundai Motors Jeonju Plant
- Samsung Heavy Industries R&D Center



AUCHAN Hypermarket (Vladimir, Russia)
MIRINE® Roof Ductless 20 units | 2016. 5.

- Industrial Bank of Korea Institute, Yongin
- Pusan National University Gymnasium, Busan
- Korea University Tiger Dom, Seoul
- DMC Digital Media City, Seoul
- Bashkortostan Ice Rink Arena, Russia
- Greenhouse of Moscow Botanical Garden
- Children's Sports Centre, Moscow
- Asian Game Indoor Gymnasium, Busan
- SHINSEGAE EMART (31 locations)
- ROK Army Maintenance Depot
- ROK Air Force Base, Busan

Thank you.

www.servan.co.kr