

SAMSUNG

CHILLER

Technical Data Book

DVM Chiller for North America
(R32, 60Hz, HP)



Model : AG010/015DSV***/AA

History

Version	Modification	Date	Remark
Ver.1.0	Release R-32 DVM CHILLER for North America	24.03.07	

Nomenclature

Outdoor Unit

Model Name

AG

015

D

S

V

A

F

G

/

AA

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

Buyer

(1) Classification

AG	Chiller
AM	DVM

(2) Capacity

usRT (3 digits)

(3) Version

D	2024
---	------

(4) Product Type

S	Set
X	Outdoor Unit
N	Indoor Unit

(5) Feature 1

V	Inverter
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(6) Feature 2

A	Standard + General Temp.+ Module
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(7) Rating Voltage

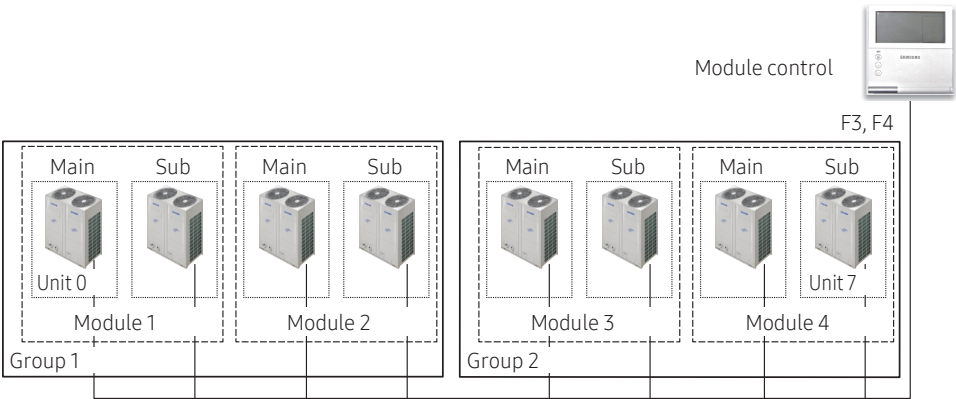
F	3Ø, 3#, 208~230V, 60Hz
H	3Ø, 3#, 380V, 60Hz
J	3Ø, 3#, 460V, 60Hz

(8) Mode

G	Heat Pump (R-32)
H	Heat Pump (R410A)

Features & Benefits

Module/group operation of DVM Chiller is to combine multiple units in modules or groups of a single water pipe system and to operate them depending on the working condition.



With combination of 16 single units of 10, 15 tons, maximum 240 tons can be covered. In this case, compared to conventional water chillers, 49% of installation space can be saved.



Samsung DVM Chiller enables users to reduce annual utility costs compared to traditional chillers, while the operational modes can be adjusted to allow for seasonal requirements.



World-class Energy Efficiency

- Secure Reliability and Energy Efficiency with Samsung inverter scroll compressor

Embedded the World-class Efficient BLDC Scroll Compressor

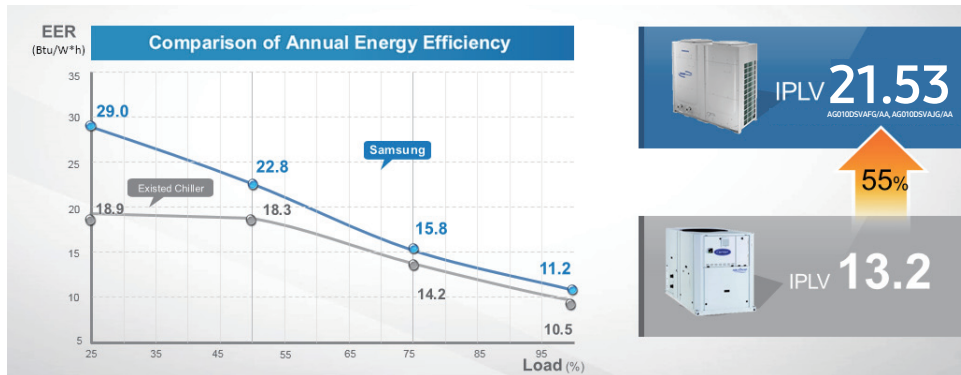
The diagram shows a Samsung DVM Chiller unit with a 'Fan Coil Unit' and an 'Air Handling Unit' connected to it. A blue circle labeled 'Hydro Equip.' is shown with arrows pointing to the water pipes. The unit is labeled 'DVM'.

Applied Flash Injection Technology

The diagram shows a 'Flash Injection (2-stage Compression Cycle)' with a red box highlighting the injection point. Below it, a bar chart compares 'Conventional Vapor Injection' and 'Flash Injection' at -4°F Ambient Temperature, showing a 75% improvement in heating capacity.

Features & Benefits

- IPLV 21.53
 - IPLV is much higher than that of competitors



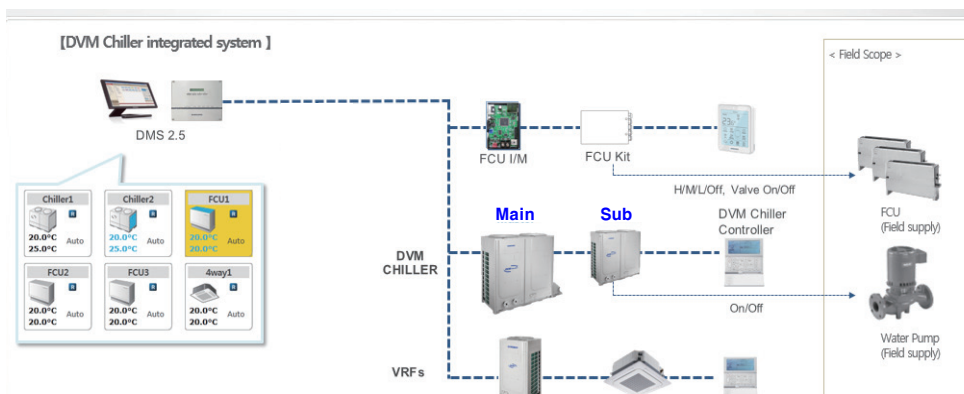
Easy Installation & Small Space

- Flexible Combination and Expansion of System Capacity



Integrated Control

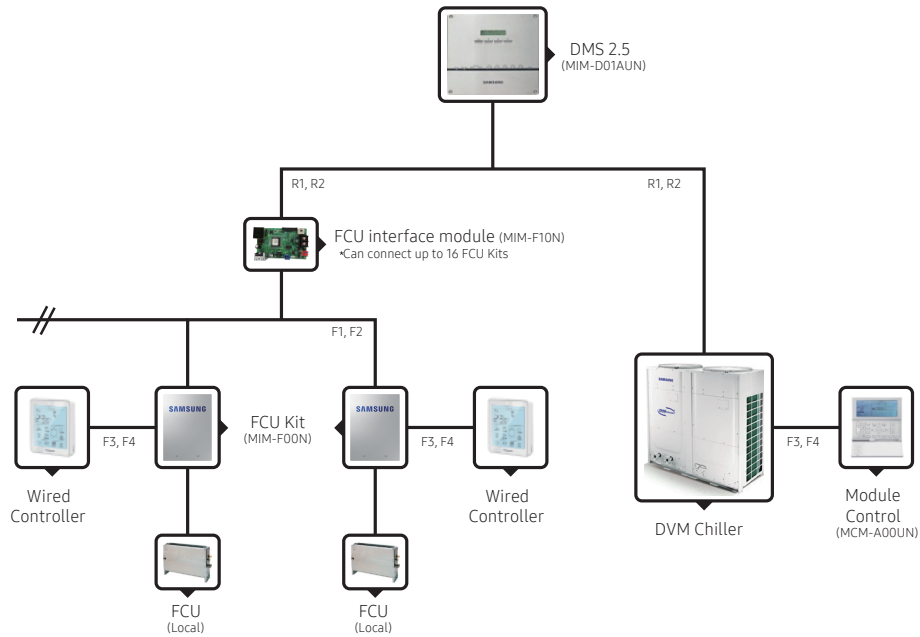
- DVM Chiller provides the integrated control system same as the VRF



Features & Benefits

Control structure - Case 1

- DMS control - DVM Chiller & FCU kit (Samsung)
 - FCU kit : It needs to connect FCU interface module.
 - DVM Chiller : It can connect to DMS directly (R1R2)

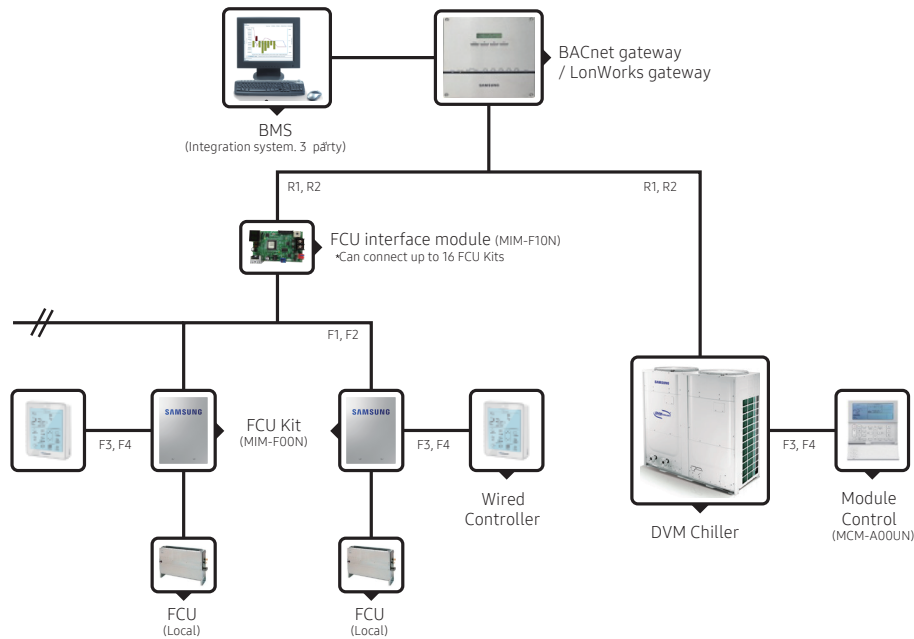


- DMS control & monitoring
 - FCU : On/OFF, Setting temperature, Fan speed
 - Chiller: On/OFF, Setting water temperature, Schedule
 - FCU On/Off & Chiller On/Off Interlock → Control logic setting is required.

Features & Benefits

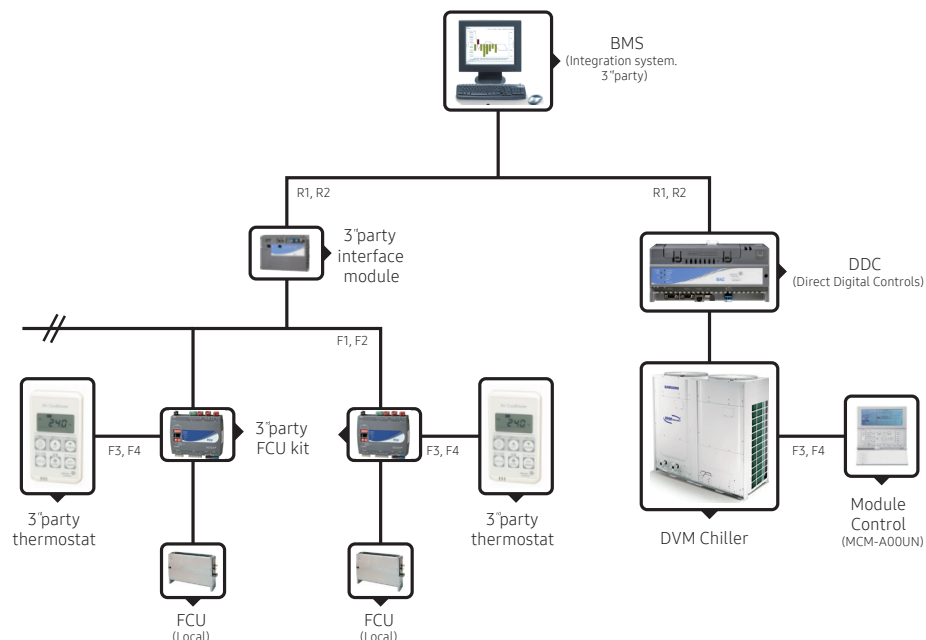
Control structure - Case 2

- 3rd party BMS control (1) - Using Samsung control system
 - Use BACnet (MIM-B17BUN), LonWorks gateway (MIM-B18BUN)



Control structure - Case 3

- 3rd party BMS control (2) - Not using Samsung control system
 - 3rd party DDC can control and monitor DVM Chiller using the external input/output of DVM Chiller.



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1. Line up

External appearance

Capacity (usRT)	10	15
Model (Image)		
208~230V	AG010DSVAFG/AA	AG015DSVAFG/AA
460V	AG010DSVAJG/AA	AG015DSVAJG/AA

1. Line up

Modulation guide

HP	usRT	Standard			High Efficiency		
		AG010DSV***	AG015DSV***	Recommended pipe size [A]	AG010DSV***	AG015DSV***	Recommended pipe size [A]
12	10	1		2"			
18	15		1	2"			
24	20	2		2"			
36	30		2	2 1/2"	3		2 1/2"
48	40	4		2 1/2"			
54	45		3	3"			
60	50	5		3"			
72	60		4	3"	6		3"
84	70	7		3 1/2"			
90	75		5	3 1/2"			
96	80	8		4"			
108	90		6	4"	9		4"
120	100	10		4"			
126	105		7	4"			
132	110	11		4"			
144	120		8	4"	12		4"
156	130	13		4"			
162	135		9	4"			
168	140	14		5"			
180	150		10	5"	15		5"
192	160	16		5"			
198	165		11	5"			
216	180		12	5"			
234	195		13	5"			
252	210		14	5"			
270	225		15	5"			
288	240		16	5"			

NOTE

- Total capacity of modulated units = Σ capacity of each chiller unit.
- Total power input of modulated units = Σ power input of each chiller unit.
- 'Standard' is compact combination type than 'High efficiency' for smaller installation space.

2. Specification

DVM Chiller (R-32)

Type					DVM Chiller		DVM Chiller		DVM Chiller		DVM Chiller		
Model Name					AG010DSVAFG/AA		AG015DSVAFG/AA		AG010DSVAJG/AA		AG015DSVAJG/AA		
Power Supply					Φ, #, V, Hz		3,3,208~230,60		3,3,208~230,60		3,3,460,60		
Mode					-		HEAT PUMP		HEAT PUMP		HEAT PUMP		
Performance	Ton					usRT		10		15		10	
	HP					HP		12		18		12	
	Capacity (Rated)	Cooling	Amb. 95°F, Entering/ Leaving Temp 55/44°F			kBtu/h		120.0		168.0		120.0	
		Heating	Dry/Wet Bulb 47/43°F	Leaving Temp. 105°F		kBtu/h		128.0		182.0		128.0	
				Leaving Temp. 120°F		kBtu/h		120.0		171.0			
			Dry/Wet Bulb 17/15°F	Leaving Temp. 105°F		kBtu/h		84.0		90.0		84.0	
Leaving Temp. 120°F		kBtu/h		80.0		85.0		80.0					
Power	Power Input	Cooling	Amb. 95°F, Entering/ Leaving Temp 55/44°F			kW		10.40		16.12		10.40	
		Heating	Dry/Wet Bulb 47/43°F	Leaving Temp. 105°F		kW		9.77		15.17		9.77	
				Leaving Temp. 120°F		kW		11.54		17.45			
			Dry/Wet Bulb 17/15°F	Leaving Temp. 105°F		kW		10.99		11.78		10.99	
	Leaving Temp. 120°F			kW		11.96		12.71		11.96			
	Current Input	Cooling	Amb. 95°F, Entering/Leav ing Temp 55/44°F			A		28.40		44.00		14.20	
		Heating	Dry/Wet Bulb 47/43°F	Leaving Temp. 105°F		A		26.70		41.40		13.40	
				Leaving Temp. 120°F		A		31.50		47.70			
			Dry/Wet Bulb 17/15°F	Leaving Temp. 105°F		A		30.00		32.20		15.00	
	Leaving Temp. 120°F			A		32.70		34.70		16.40			
	MCA					A		52.0		70.0		24.0	
	MOP					A		70.0		90.0		30.0	
	MOC (FLA #1 / FLA #2)					A		4.6 / 4.6		4.6 / 4.6		2.3 / 2.3	
The Rated Input Current of The Power Conversion Equipment					A		19.00		27.00		8.60		
Efficiency	Cooling EER				Btu/(W×h)		11.54		10.42		11.54		
	Heating COP	Dry /Wet Bulb 47/43°F	Leaving Temp. 105°F		W/W		3.84		3.52		3.84		
			Leaving Temp. 120°F		W/W		3.05		2.87				
		Dry /Wet Bulb 17/15°F	Leaving Temp. 105°F		W/W		2.24		2.24		2.24		
			Leaving Temp. 120°F		W/W		1.96		1.96		1.96		
	IPLV				Btu/(W×h)		21.53		19.75		21.53		
Compressor	Type				-		Scroll Inverter		Scroll Inverter		Scroll Inverter		
	Output				kW × n		7.167 × 2		7.167 × 2		7.167 × 2		
	Model Name				-		DS4BC5066EVASG		DS4BC5066EVASG		DS4BC7066FVASG		
	Oil		Type		-		POE		POE		POE		
Fan	Type				-		Propeller		Propeller		Propeller		
	Output x n				W		630 x 2		630 x 2		630 x 2		
	Air Flow Rate				CFM		12,855		12,855		12,855		
	External Static Pressure		Max.		inAq		0.315		0.315		0.315		
					Pa		78.5		78.5		78.5		
					mmAq		8		8		8		

2. Specification

DVM Chiller (R-32)

Type					DVM Chiller	DVM Chiller	DVM Chiller	DVM Chiller
Model Name					AG010DSVAFG/AA	AG015DSVAFG/AA	AG010DSVAJG/AA	AG015DSVAJG/AA
Water Side Heat Exchanger	Type			-	Brazing Plate	Brazing Plate	Brazing Plate	Brazing Plate
	Water Flow	Minimum	Cooling	LPM (GPM)	59.8 (15.8)	63.6 (16.8)	59.8 (15.8)	63.6 (16.8)
			Heating	LPM (GPM)	59.8 (15.8)	63.6 (16.8)	59.8 (15.8)	63.6 (16.8)
		Nominal	Cooling	LPM (GPM)	90.8 (24.0)	127.2 (33.6)	90.8 (24.0)	127.2 (33.6)
			Heating	LPM (GPM)	90.8 (24.0)	127.2 (33.6)	90.8 (24.0)	127.2 (33.6)
		Maximum	Cooling	LPM (GPM)	181.7 (48.0)	254.4 (67.2)	181.7 (48.0)	254.4 (67.2)
			Heating	LPM (GPM)	181.7 (48.0)	254.4 (67.2)	181.7 (48.0)	254.4 (67.2)
	Quantity			EA	2	2	2	2
	Water circuit	Connection Type			-	50A Cut Groove	50A Cut Groove	50A Cut Groove
Nominal water pressure drop			ftAq	11.71	20.07	11.71	20.07	
			kPa (psi)	35.0 (5.08)	60.0 (8.70)	35.0 (5.08)	60.0 (8.70)	
Max. operation pressure			ftAq	335	335	335	335	
			Mpa (psi)	1 (145)	1 (145)	1 (145)	1 (145)	
Minimum water volume in the system		Cooling	ℓ	272.5	381.6	272.5	381.6	
			gal	72.0	100.8	72.0	100.8	
		Heating	ℓ	272.5	381.6	272.5	381.6	
			gal	72.0	100.8	72.0	100.8	
Refrigerant	Type			-	R32	R32	R32	R32
	Factory Charging			lbs	30.4	30.4	30.4	30.4
Sound Level	Sound Pressure Level			dB(A)	55	61	55	61
	Sound Power Level			dB(A)	77	83	77	83
External Dimension	Net Weight			lbs	959	959	959	959
	Shipping Weight			lbs	1,008	1,008	1,008	1,008
	Net Dimensions (WxHxD)			inch	70.67 x 66.73 x 30.12	70.67 x 66.73 x 30.12	70.67 x 66.73 x 30.12	70.67 x 66.73 x 30.12
	Shipping Dimensions (WxHxD)			inch	74.80 x 74.29 x 36.18	74.80 x 74.29 x 36.18	74.80 x 74.29 x 36.18	74.80 x 74.29 x 36.18
Operating Water Temp. Range	Cooling			°F	41 ~ 77	41 ~ 77	41 ~ 77	41 ~ 77
	Cooling (If using brine)			°F	14 ~ 77	14 ~ 77	14 ~ 77	14 ~ 77
	Heating			°F	77 ~ 140 ¹⁾	77 ~ 140 ¹⁾	77 ~ 140 ¹⁾	77 ~ 140 ¹⁾
Operating Amb. Temp. Range	Cooling			°F	5 ~ 118	5 ~ 118	5 ~ 118	5 ~ 118
	Heating			°F	-13 ~ 109	-13 ~ 109	-13 ~ 109	-13 ~ 109

NOTE

- Certified efficiency data in accordance with AHRI Standard 550/590.
- Specification may be changed without further notification.
- Note 1) During heating operation, the maximum leaving water temperature allowed is 55°C (131°F) when the outside temperature is below 10°C (55°F).

3. Electric Characteristics

Capacity		Model	Power Supply		Voltage Range		Nominal Running Current [A]		Current [A]		ODU Fan Motor [kW]
Ton	HP		Hz	Voltage	Min. (-10%)	Max. (+10%)	Cooling	Heating	MCA	MOP	
10	12	AG010DSVAFG/AA	60	208~230	187	253	28.4	31.5	52.0	70.0	0.630 x 2
15	18	AG015DSVAFG/AA	60	208~230	187	253	44.0	47.7	70.0	90.0	0.630 x 2
10	12	AG010DSVAJG/AA	60	460	414	506	14.2	15.8	24.0	30.0	0.630 x 2
15	18	AG015DSVAJG/AA	60	460	414	506	22.0	23.9	40.0	50.0	0.630 x 2

NOTE

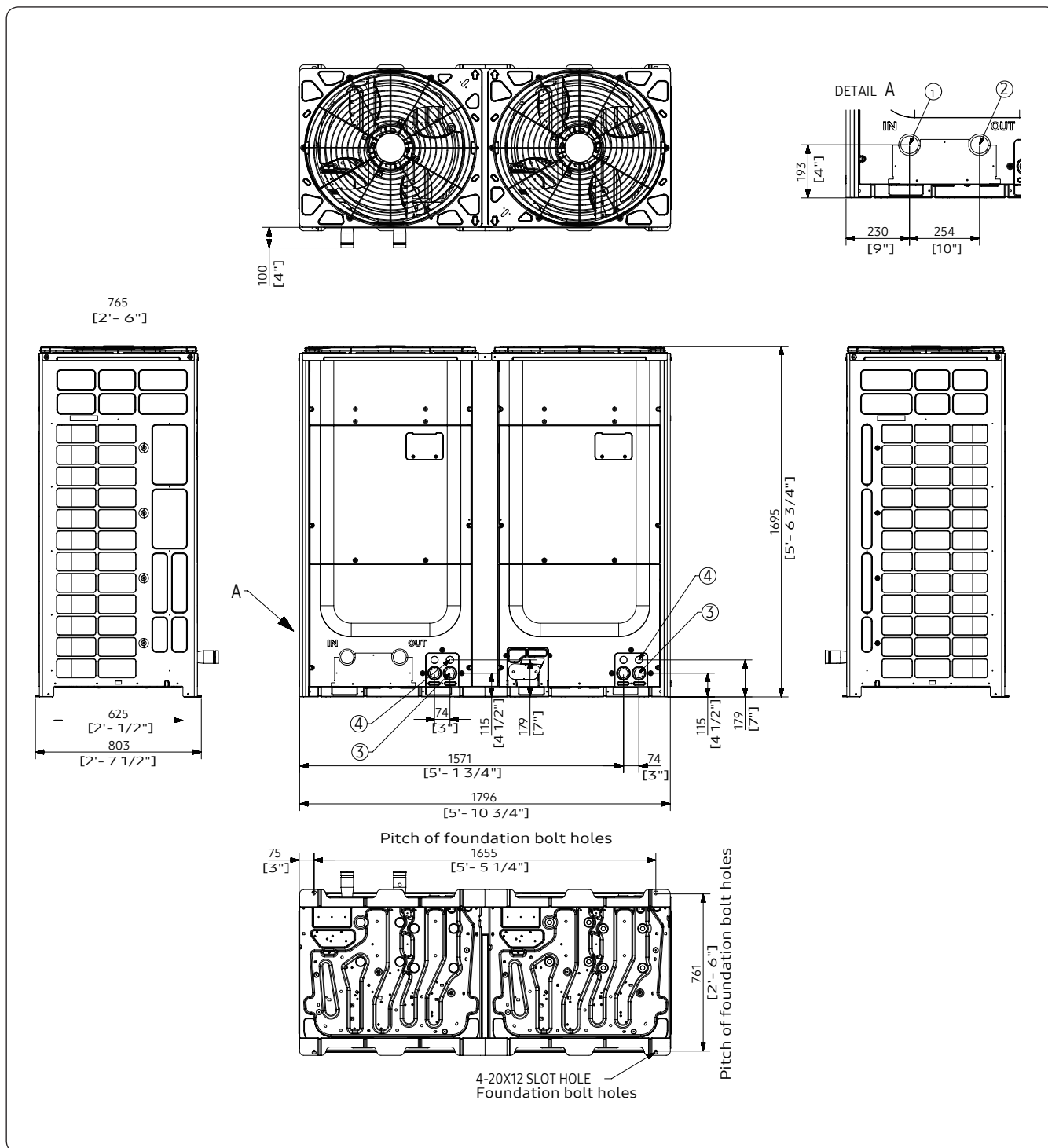
- MCA : Minimum circuit amperes
- MOP : Maximum Over current Protective Device
- Select wire size based on the value of MCA

4. Dimensional Drawing

DVM Chiller (R-32)

• AG010/015DSV***/AA

Unit: mm (inches)



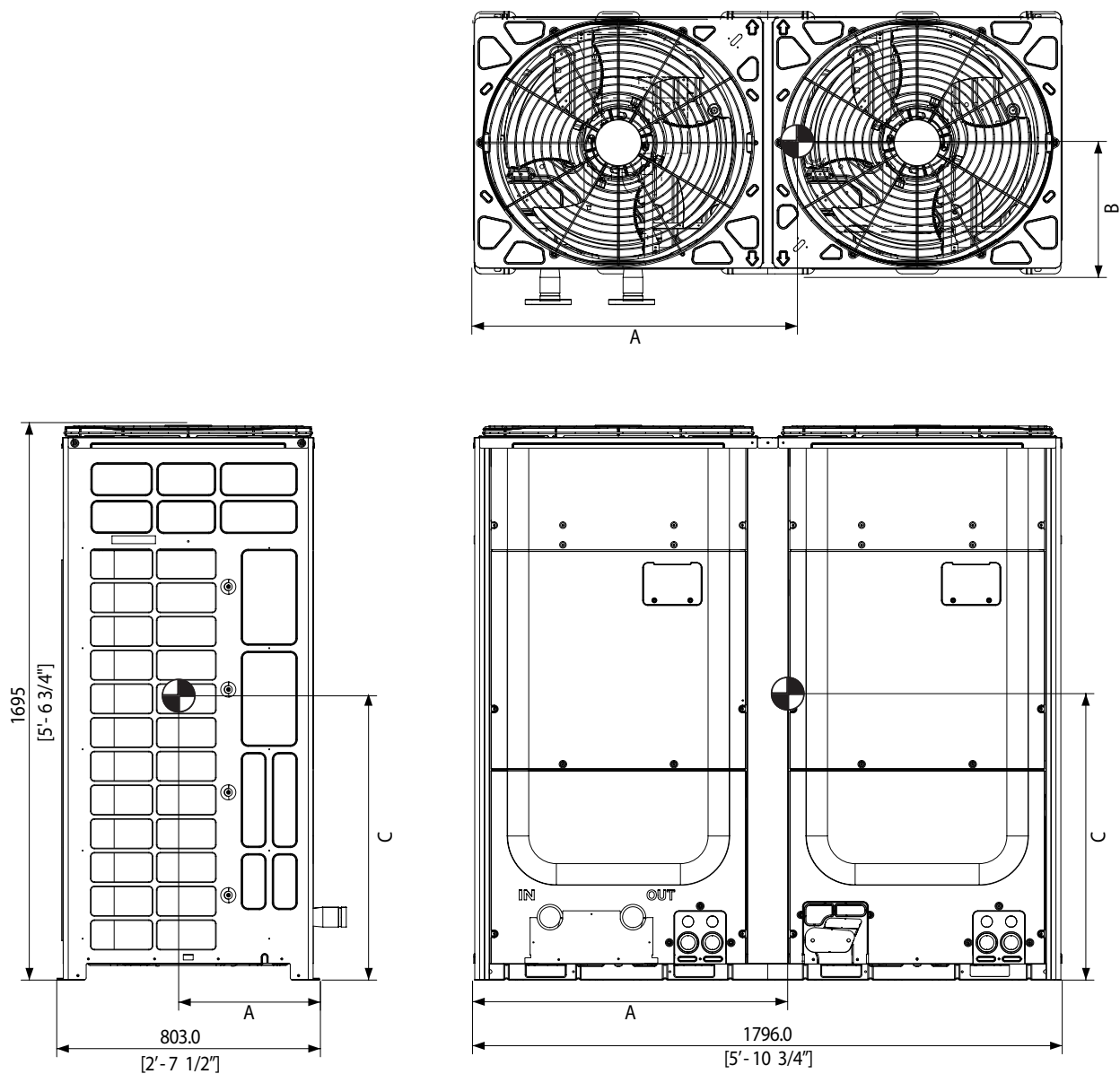
NO	Table of descriptions	Remark
1	Inlet water flange	15/20 HP 50A CUT Grooved Type (Use the Coupling in ASME standardized product)
2	Outlet water flange	15/20 HP 50A CUT Grooved Type (Use the Coupling in ASME standardized product)
3	Power wiring conduit	KNOCK OUT HOLE (FRONT)
4	Communication wiring conduit	KNOCK OUT HOLE (FRONT)

5. Centre of Gravity

DVM Chiller (R-32)

- AG010/015DSV***/AA

Unit: mm (inches)

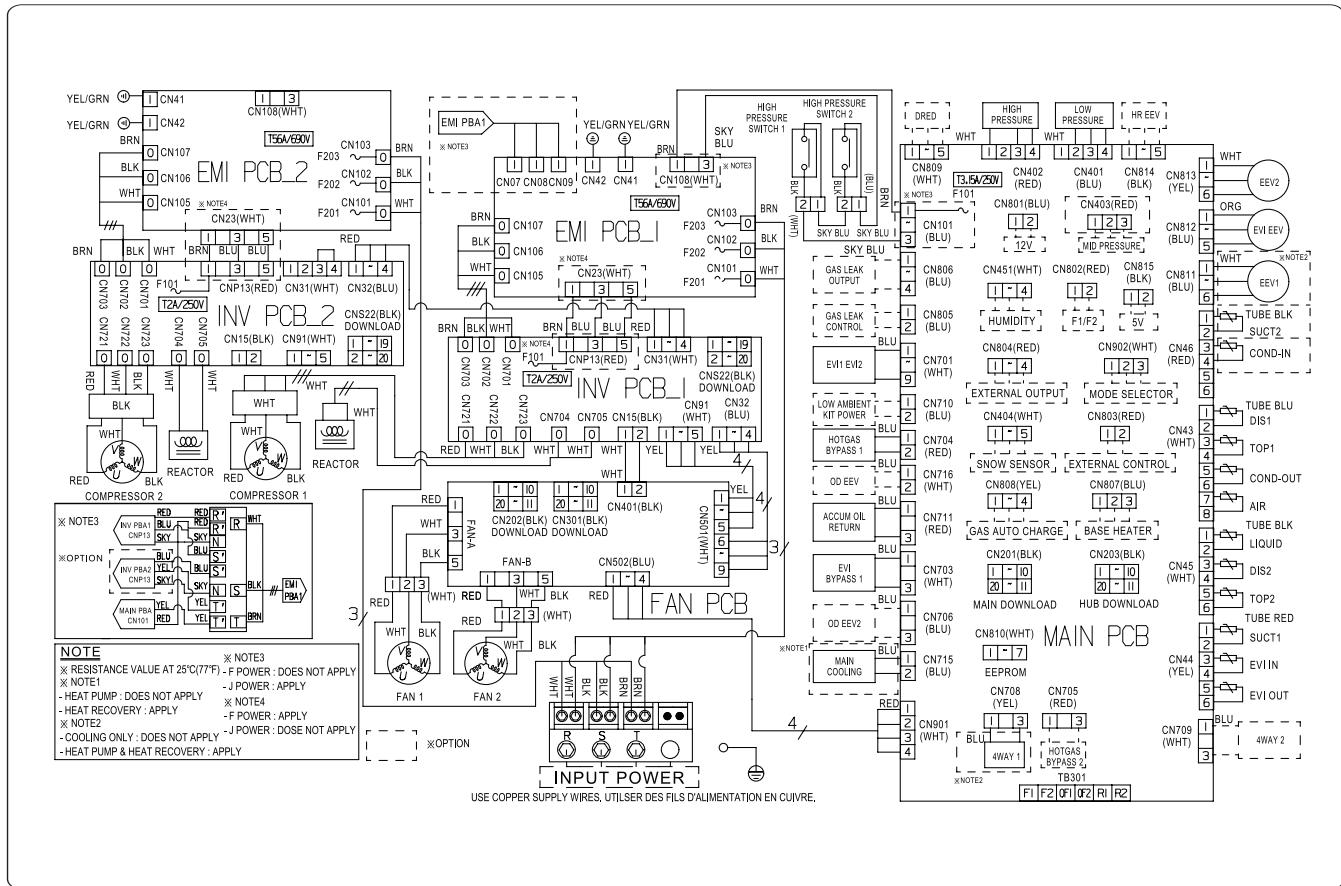


Model	A	B	C
AG010/015DSV***/AA	1020 [3'-4 1/4"]	380 [1'-3]	590 [1'-11 1/4"]

6. Electrical Wiring Diagrams

Inverter controller

AG010/015DSVAFG



INV PCB1	Printed circuit board (inverter1)	EEV1	Electronic expansion valve 1	HOTGAS1 BYPASS V/V	Solenoid valve (Hot Gas Bypass1)
INV PCB2	Printed circuit board (inverter2)	EEV2	Electronic expansion valve 2	EVI BYPASS1 V/V	Solenoid valve (EVI BYPASS)
EMI PCB1	Printed circuit board (emi1)	EVI-OUT(10K)	Thermistor (EVI-out_10kohm)	ACCUM OIL RETURN V/V	Solenoid valve (Accumulator Oil Return)
EMI PCB2	Printed circuit board (emi2)	EVI-IN(10K)	Thermistor (EVI-in_10kohm)	4WAY1 V/V	Solenoid valve (4 Way valve1)
FAN PCB	Printed circuit board (fan motor)	SUCT1(10K)	Thermistor (Suction Temp.1_10Kohm)	4WAY2 V/V	Solenoid valve (4 Way valve2)
MAIN PCB	Printed circuit board (main)	SUCT2(10K)	Thermistor (Suction Temp.2_10Kohm)	MAIN COOLING	Solenoid valve (Main cooling)
COMPRESSOR1	Motor (compressor1)	COND IN(10K)	Thermistor (Cond In Temp_10Kohm)	HOTGAS2 BYPASS V/V	Solenoid valve (Hot Gas Bypass2)
COMPRESSOR2	Motor (compressor2)	AIR(10K)	Thermistor (Ambient Temp_10Kohm)	OD EEV V/V	Electronic expansion valve (Outdoor EEV)
FAN1	Motor (fan1)	COND(10K)	Thermistor (Cond Out Temp_10Kohm)	F101	FUSE (INV PCB)
FAN2	Motor (fan2)	TOP1(200K)	Thermistor (Compressor Top 1_200Kohm)	690V/56A	FUSE (EMI PCB)
EVI V/V1	Solenoid valve (EVI1)	TOP2(200K)	Thermistor (Compressor Top 2_200Kohm)	MODE SELECTOR	Connector (Remote switching cool/heat selector)
EVI V/V2	Solenoid valve (EVI2)	DIS1(200K)	Thermistor (Discharge Temp.1_200Kohm)	EXTERNAL CONTROL	Connector (Output EXTERNAL CONTROL)
EVI EEV	Electronic expansion valve (EVI)	DIS2(200K)	Thermistor (Discharge Temp.2_200Kohm)	EXTERNAL OUTPUT	Connector (Output EXTERNAL)
SNOW SENSOR	SNOW SENSOR	LIQUID(10K)	Thermistor (Liquid Tube Temp_10Kohm)		

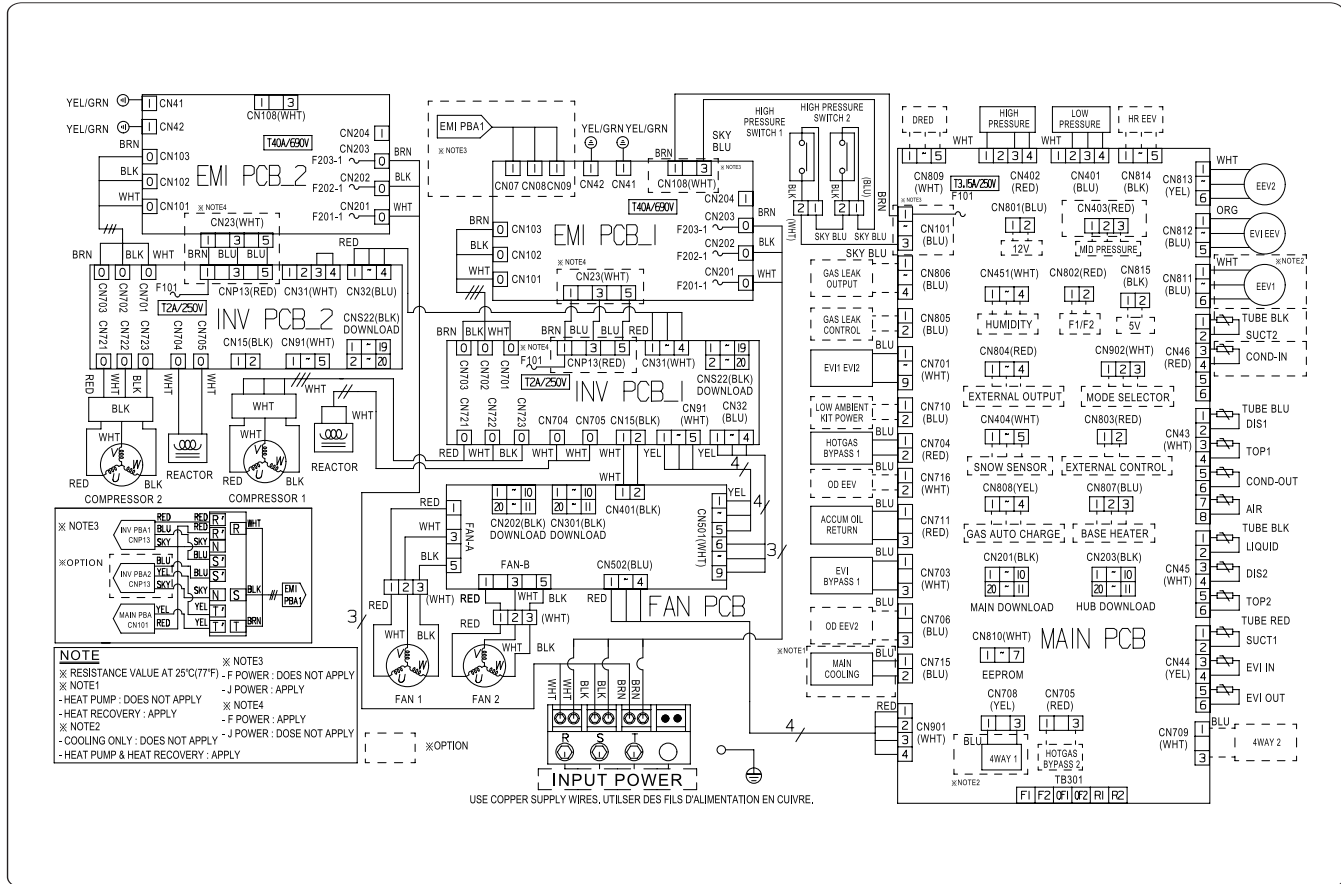
NOTE

- This wiring diagram applies only to the outdoor unit.
- Colors BLK: black, RED: red, BLU: blue, WHT: white, YEL: yellow, BRN: brown, SKY: sky blue
- When operating, don't shortcircuit the protection device (High Pressure switch)
- For connection wiring indoor-outdoor transmission F1-F2, outdoor_outdoor transmission OF1-OF2, refer to the installation manual.
- ⏏ Protective earth(screw), □ : connector, $\frac{N}{\text{wire}}$: The wire quantity

6. Electrical Wiring Diagrams

Inverter controller

AG010/015DSVAJG



INV PCB1	Printed circuit board (inverter1)	EEV1	Electronic expansion valve 1	HOTGAS1 BYPASS V/V	Solenoid valve (Hot Gas Bypass1)
INV PCB2	Printed circuit board (inverter2)	EEV2	Electronic expansion valve 2	EVI BYPASS1 V/V	Solenoid valve (EVI BYPASS)
EMI PCB1	Printed circuit board (emi1)	EVI-OUT(10K)	Thermistor (EVI-out_10kohm)	ACCUM OIL RETURN V/V	Solenoid valve (Accumulator Oil Return)
EMI PCB2	Printed circuit board (emi2)	EVI-IN(10K)	Thermistor (EVI-in_10kohm)	4WAY1 V/V	Solenoid valve (4 Way valve1)
FAN PCB	Printed circuit board (fan motor)	SUCT1(10K)	Thermistor (Suction Temp.1_10Kohm)	4WAY2 V/V	Solenoid valve (4 Way valve2)
MAIN PCB	Printed circuit board (main)	SUCT2(10K)	Thermistor (Suction Temp.2_10Kohm)	MAIN COOLING	Solenoid valve (Main cooling)
COMPRESSOR1	Motor (compressor1)	COND IN(10K)	Thermistor (Cond In Temp_10Kohm)	HOTGAS2 BYPASS V/V	Solenoid valve (Hot Gas Bypass2)
COMPRESSOR2	Motor (compressor2)	AIR(10K)	Thermistor (Ambient Temp_10Kohm)	OD EEV V/V	Electronic expansion valve (Outdoor EEV)
FAN1	Motor (fan1)	COND(10K)	Thermistor (Cond Out Temp_10Kohm)	F101	FUSE (INV PCB)
FAN2	Motor (fan2)	TOP1(200K)	Thermistor (Compressor Top 1_200Kohm)	690V/40A	FUSE (EMI PCB)
EVI V/V1	Solenoid valve (EVI1)	TOP2(200K)	Thermistor (Compressor Top 2_200Kohm)	MODE SELECTOR	Connector (Remote switching cool/heat selector)
EVI V/V2	Solenoid valve (EVI2)	DIS1(200K)	Thermistor (Discharge Temp.1_200Kohm)	EXTERNAL CONTROL	Connector (Output EXTERNAL CONTROL)
EVI EEV	Electronic expansion valve (EVI)	DIS2(200K)	Thermistor (Discharge Temp.2_200Kohm)	EXTERNAL OUTPUT	Connector (Output EXTERNAL)
SNOW SENSOR	SNOW SENSOR	LIQUID(10K)	Thermistor (Liquid Tube Temp_10Kohm)		

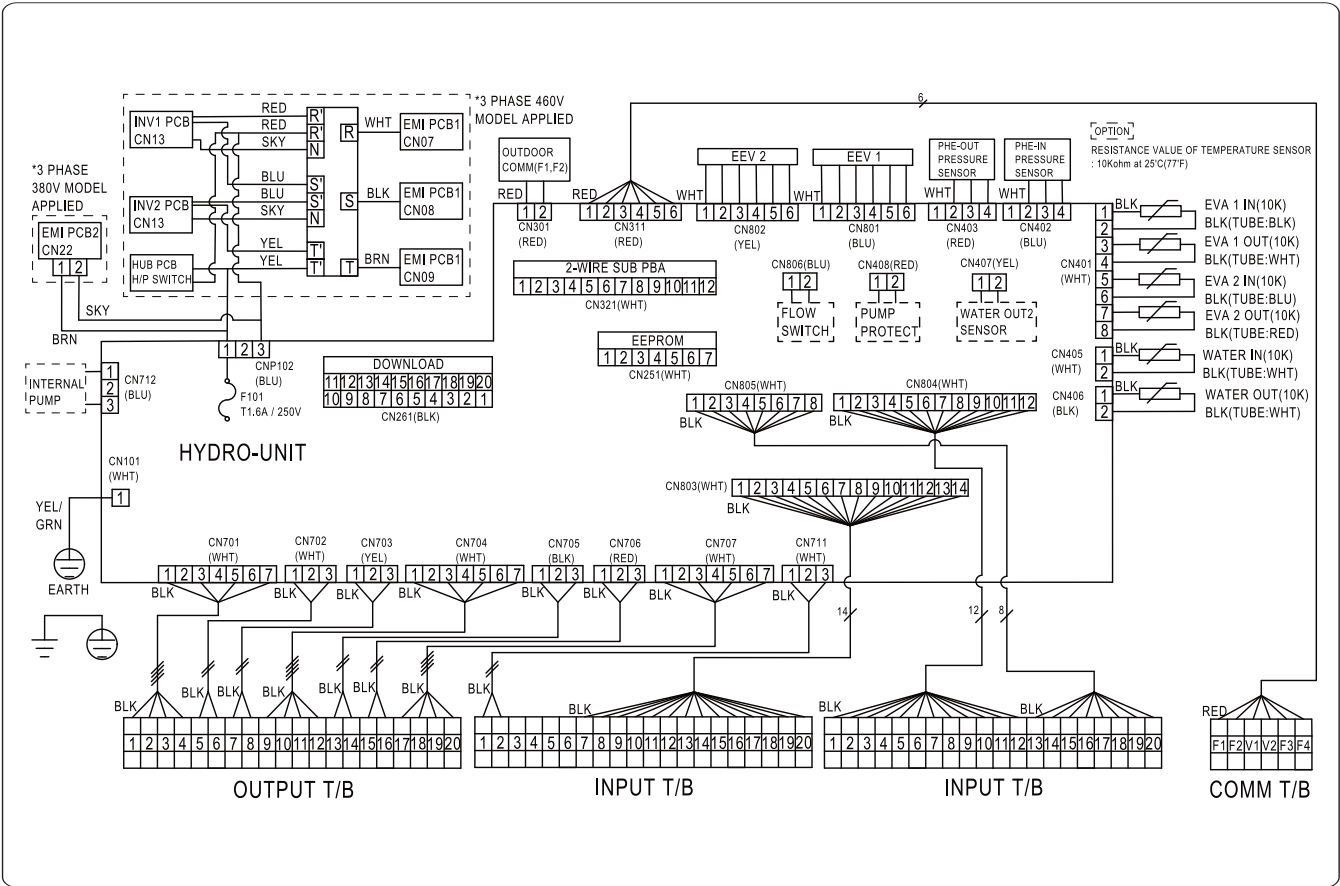
NOTE

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- Colors BLK: black, RED: red, BLU: blue, WHT: white, YEL: yellow, BRN: brown, SKY: sky blue
- When operating, don't short circuit the protection device (High Pressure switch)
- For connection wiring indoor-outdoor transmission F1-F2, refer to the installation manual.
- Protective earth(screw), : connector, : The wire quantity

6. Electrical Wiring Diagrams

Hydro controller

AG010/015DSVAFG, AG010/015DSVAJG



HYDRO-UNIT	Printed circuit board	EVI1-OUT(10K)	Thermistor (EVI-out_10kohm)
F101	FUSE(HYDRO-UNIT)	EVI2-IN(10K)	Thermistor (EVI-in_10kohm)
EEV1	Electronic expansion valve 1	EVI2-OUT(10K)	Thermistor (EVI-out_10kohm)
EEV2	Electronic expansion valve 2	WATER IN(10K)	Thermistor (WATER IN_10kohm)
EVI1-IN(10K)	Thermistor (EVI-in_10kohm)	WATER OUT(10K)	Thermistor (WATER OUT_10kohm)

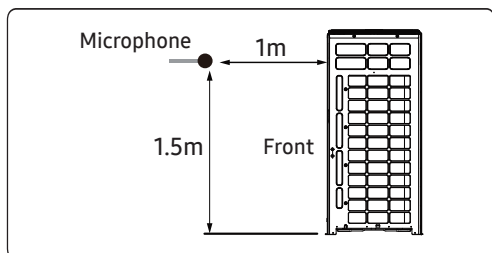
NOTE

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- Colors BLK: black, RED: red, BLU: blue, WHT: white, YEL: yellow, BRN: brown, SKY: skyblue
- When operating, don't short circuit the protection device (High Pressure switch)
- For connection wiring indoor-outdoor transmission F1-F2, refer to the installation manual.
- Protective earth(screw), : connector, : The wire quantity

7. Sound Data

Sound Pressure level

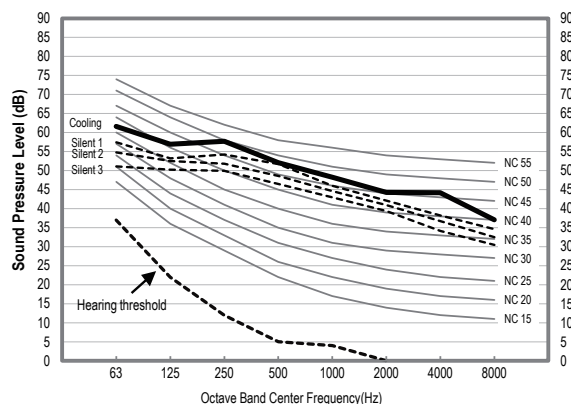
Unit: dB(A)



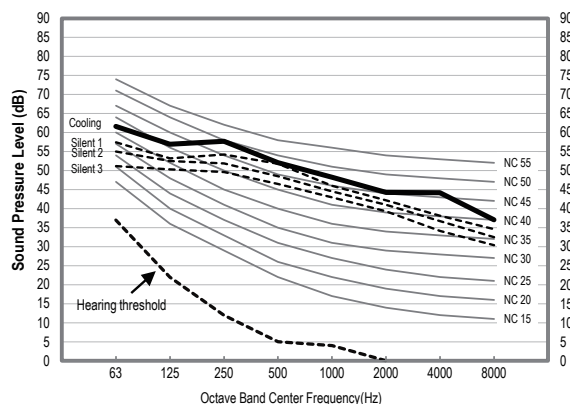
Model	Cooling	Silent1	Silent2	Silent3
AG010DSVAFG/AA	55	54	52	49
AG010DSVAJG/AA	55	54	52	49
AG015DSVAFG/AA	61	57	53	49
AG015DSVAJG/AA	61	57	53	49

• NC Curve

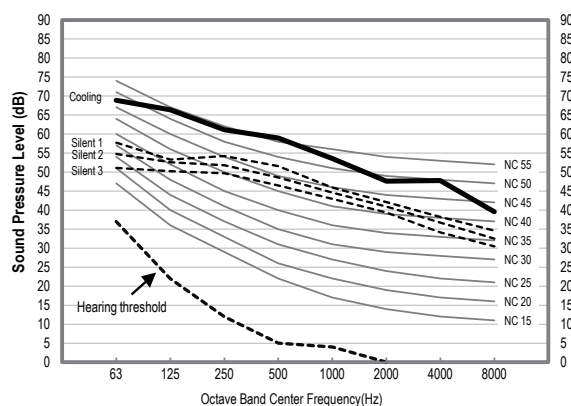
1) AG010DSVAFG/AA



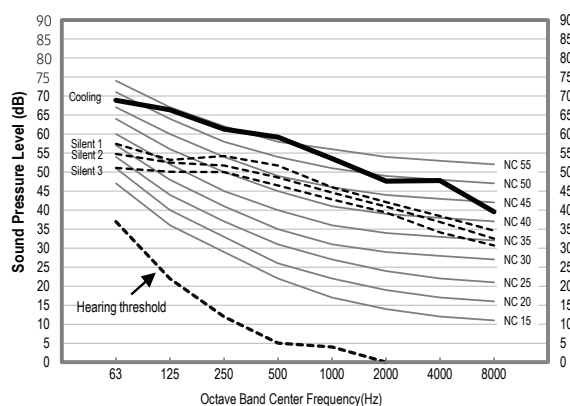
2) AG010DSVAJG/AA



3) AG015DSVAFG/AA



4) AG015DSVAJG/AA



NOTE

- Specifications may be subject to change without prior notice.
 - Sound pressure level is obtained in an anechoic room.
 - Sound pressure level is a relative value, depending on the distance and acoustic environment.
 - Sound pressure level may differ depending on operation condition.
 - dBA = A-weighted sound pressure level
 - Reference acoustic pressure 0 dB = 20μPa

7. Sound Data

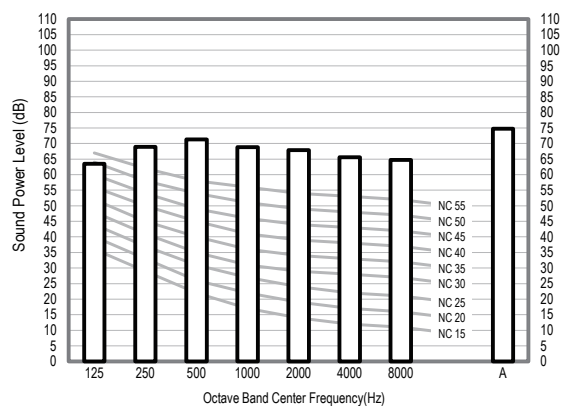
Sound Power level

Unit: dB(A)

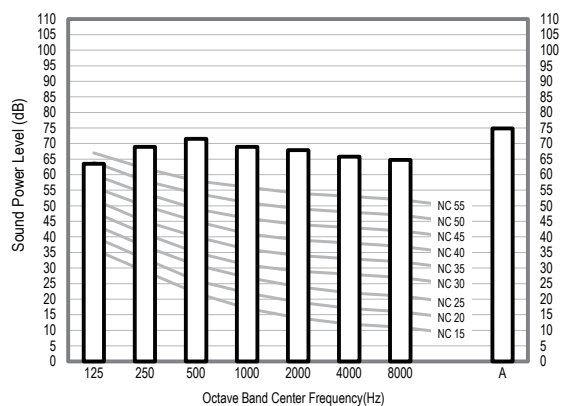
Model	Power
AG010DSVAFG/AA	77
AG010DSVAJG/AA	77
AG015DSVAFG/AA	83
AG015DSVAJG/AA	83

NC Curve

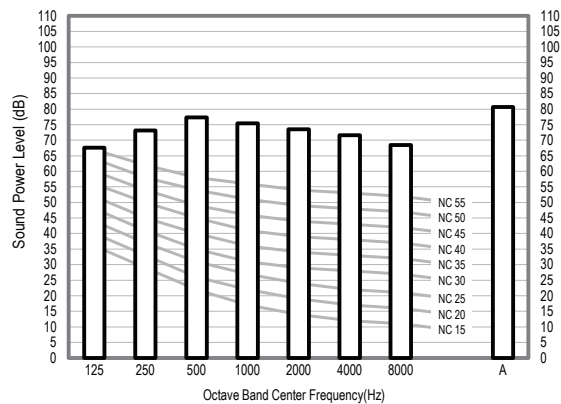
1) AG010DSVAFG/AA



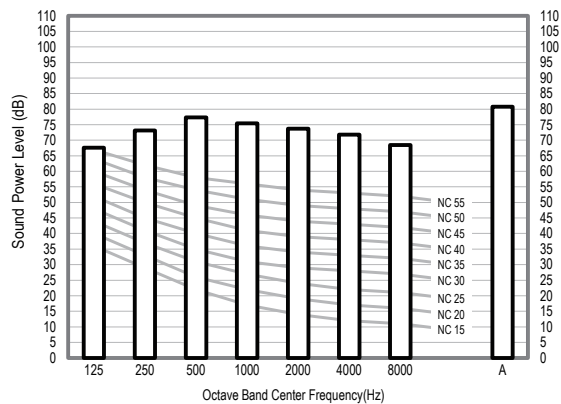
2) AG010DSVAJG/AA



3) AG015DSVAFG/AA



4) AG015DSVAJG/AA



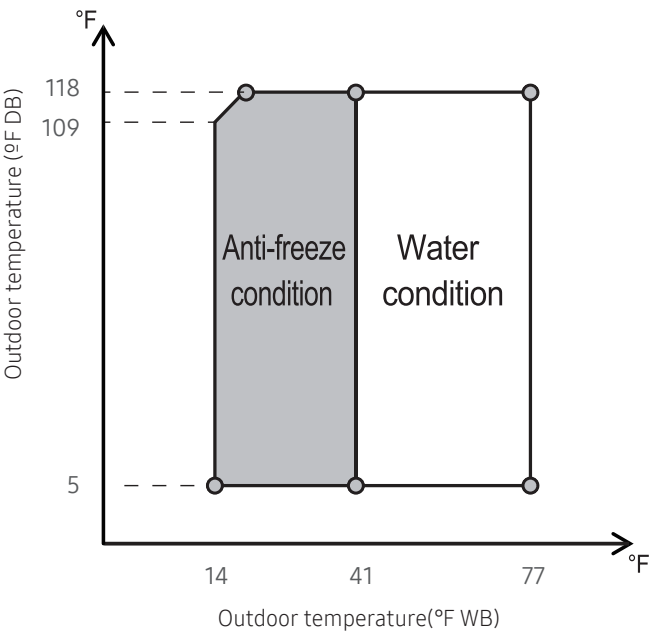
NOTE

- Specifications may be subject to change without prior notice.
 - Sound power level is an absolute value that a sound source generates.
 - dBA = A-weighted sound power level.
 - Reference power : 1pW.
 - Measured according to ISO 3741.

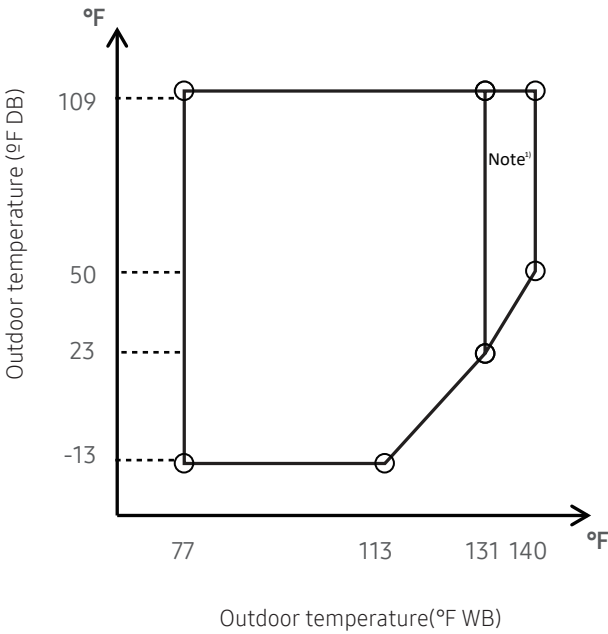
8. Operation Range

Inverter controller

Cooling



Heating

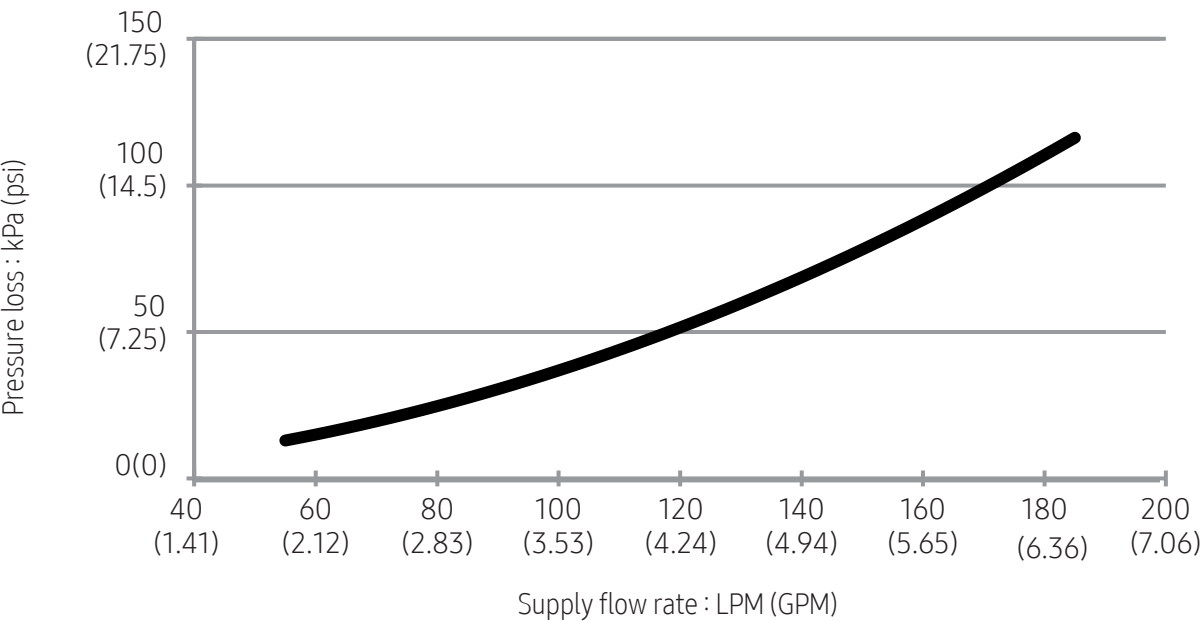


Note1) It might work in part load in this area

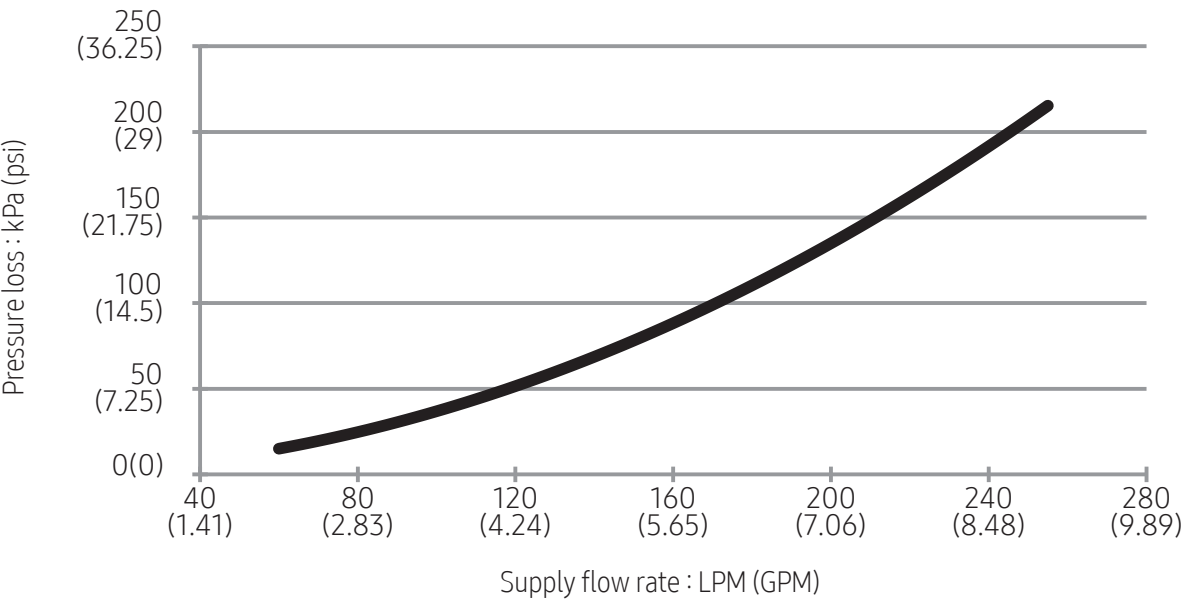
8. Operation Range

Hydro controller

AG010DSV***/AA



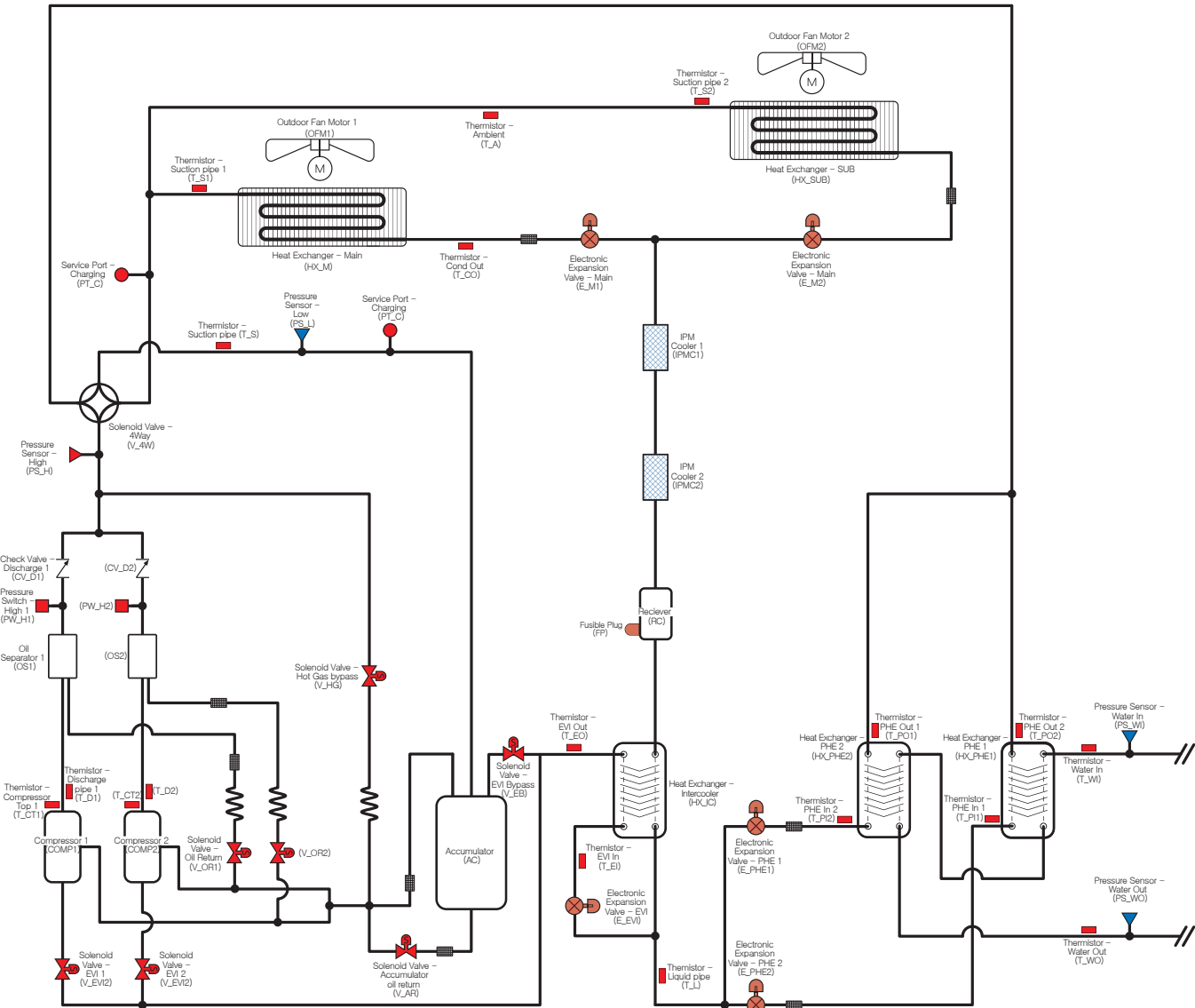
AG015DSV***/AA



9. Piping Diagram

DVM Chiller (R-32)

- AG010/015DSV***/AA



10. Capacity Table

AG010DSV***

Cooling ($\Delta T = 10^{\circ}\text{F}$)

TC : Total Capacity, PI : Power Input

LWT (°F)	Outdoor Air temperature(°F, DB)																							
	55			65			75			85			95			105			115			118.4		
	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow
	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM
14 ²⁾	7.671	5.596	18.410	7.499	6.799	17.995	7.251	7.588	17.401	6.575	8.181	15.800	5.930	9.213	15.800 ³⁾	5.258	10.434	15.800 ³⁾	4.004	10.321	15.800 ³⁾	3.583	9.498	15.800 ³⁾
23 ²⁾	9.853	6.000	23.646	9.844	7.216	23.624	9.738	7.975	23.369	9.293	8.589	22.302	8.844	9.688	21.224	7.793	10.855	18.701	6.340	11.197	15.800 ³⁾	5.673	10.770	15.800 ³⁾
32 ²⁾	9.954	6.076	23.887	9.946	7.403	23.867	9.839	8.283	23.611	9.394	8.895	22.544	8.945	10.001	21.466	7.914	11.232	18.992	6.795	11.537	16.308	6.081	11.188	15.800 ³⁾
41	10.859	6.235	26.059	10.857	7.593	26.054	10.748	8.489	25.792	10.299	9.189	24.715	9.749	10.314	23.395	8.660	11.542	20.783	7.274	11.913	17.456	6.550	11.641	15.800 ³⁾
44	11.110	6.302	26.653	11.108	7.675	26.653	11.004	8.572	26.412	10.550	9.274	25.314	10.000	10.400	24.000	8.860	11.630	21.272	7.430	11.918	17.820	6.646	11.564	15.949
48	11.820	6.416	28.368	11.820	7.795	28.368	11.670	8.691	28.013	11.250	9.497	27.003	10.620	10.604	25.487	9.410	11.556	22.577	7.890	11.740	18.936	7.095	11.358	17.026
52	12.390	6.527	29.733	12.390	7.914	29.733	12.240	8.807	29.371	11.730	9.584	28.153	11.178	10.808	26.826	9.887	11.482	23.724	8.310	11.526	19.941	7.370	11.063	17.686
56	12.947	6.645	31.072	12.950	8.040	31.072	12.797	8.927	30.710	12.290	9.545	29.492	11.642	10.594	27.936	10.330	11.216	24.799	8.690	11.247	20.858	7.750	10.762	18.599
60	13.500	6.765	32.394	13.500	8.160	32.394	13.350	9.050	32.032	12.820	9.575	30.774	12.172	10.585	29.213	10.760	10.954	25.830	9.060	10.983	21.735	8.106	10.533	19.453
64.4	14.073	6.834	33.773	14.078	8.235	33.785	13.927	9.134	33.422	13.320	9.729	31.966	12.663	10.750	30.389	11.195	11.116	26.865	9.400	11.093	22.558	8.387	10.661	20.127

Heating ($\Delta T = 10^{\circ}\text{F}$)

TC : Total Capacity, PI : Power Input

LWT (°F)	Outdoor Air temperature(°F, DB)																																
	-13.0			-4.0			5.0			14.0			17.0			19.4			28.4			35.6			47.0			59.0			68.0		
	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow			
	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM			
86	6.16	14.97	15.80	6.73	12.40	16.08	7.05	10.82	16.84	7.45	9.82	17.80	7.61	9.90	18.17	7.73	9.48	18.46	8.90	9.74	21.26	10.11	9.50	24.13	11.60	8.84	27.68	12.86	8.91	30.69	13.93	7.48	33.25
95	6.00	15.93	15.80	6.56	13.20	15.80	6.87	11.52	16.41	7.26	10.46	17.34	7.41	10.54	17.70	7.54	10.10	17.99	8.68	10.37	20.71	9.94	10.12	23.72	11.30	9.41	26.98	12.53	9.50	29.91	13.57	8.91	32.40
105	5.25	16.30	15.80	6.19	13.81	15.80	6.49	12.00	15.80	6.85	10.90	16.36	7.00	11.35	16.71	7.11	10.52	16.98	8.19	10.80	19.55	9.30	10.55	22.20	10.66	9.74	25.46	11.82	9.89	28.22	12.81	9.80	30.58
120	-	-	-	-	-	-	6.17	13.64	15.80	6.52	12.32	15.80	6.65	12.85	15.88	6.76	11.90	16.14	7.74	12.41	18.49	8.75	12.29	20.89	10.01	11.54	23.90	11.10	11.62	26.49	12.02	11.51	28.70
122	-	-	-	-	-	-	5.61	16.55	15.80	5.92	15.01	15.80	6.05	15.12	15.80	6.15	14.50	15.80	7.04	15.05	16.81	7.96	14.90	18.99	9.10	13.96	21.73	10.09	14.09	24.08	10.93	13.96	26.09
131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.61	12.75	15.80	6.34	12.59	15.80	7.26	11.77	17.32	8.04	11.88	19.21	8.71	11.62	20.80
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.94	10.02	16.10	6.13	9.54	16.63

NOTE

- Capacity table may be subject to change without prior notice.
- ΔT = Leaving water temperature - Entering water temperature
- LWT : Leaving water temperature, TC : Total Capacity, PI : Power Input
- When using brine, refer to the capacity correction factors by brine %wt.
(This capacity data is based on Ethylene glycol 50%wt.)
- ΔT is comply with the condition of minimum flow-rate.

10. Capacity Table

AG015DSV***

Cooling ($\Delta T = 10^{\circ}\text{F}$)

TC : Total Capacity, PI : Power Input

LWT (°F)	Outdoor Air temperature(°F, DB)																							
	55			65			75			85			95			105			115			118.4		
	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow
	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM	Ton	kW	GPM
14 ²⁾	10.931	8.823	26.232	10.685	10.610	25.642	10.336	12.384	24.805	9.368	13.481	22.481	8.646	14.645	20.748	7.235	15.596	17.363	4.990	13.007	16.800 ³⁾	4.205	11.580	16.800 ³⁾
23 ²⁾	14.039	9.460	33.691	14.027	11.262	33.661	13.881	13.020	33.311	13.240	14.156	31.773	12.574	14.462	30.174	10.778	16.467	25.866	7.901	14.460	18.962	6.657	13.196	16.800 ³⁾
32 ²⁾	14.183	9.578	34.035	14.171	11.553	34.007	14.025	13.523	33.657	13.383	14.659	32.116	12.713	15.388	30.509	10.900	17.005	26.157	8.468	14.834	20.322	7.136	13.804	17.126
41	15.472	9.830	37.129	15.469	11.847	37.123	15.320	13.855	36.765	14.672	15.144	35.210	13.901	16.314	33.359	11.887	17.530	28.527	9.035	15.206	21.683	7.687	14.655	18.447
44	15.830	9.936	37.981	15.830	11.971	37.981	15.680	13.997	37.637	15.030	15.286	36.072	14.000	16.120	33.600	12.190	17.681	29.253	9.260	15.269	22.219	7.799	14.567	18.716
48	16.840	10.477	40.424	16.840	12.572	40.424	16.630	13.978	39.918	16.030	15.189	38.480	15.130	16.605	36.319	12.940	17.761	31.048	9.840	15.296	23.610	8.353	14.524	20.045
52	17.650	10.750	42.370	17.650	12.598	42.370	17.440	13.958	41.854	16.720	15.092	40.118	15.364	16.224	36.874	13.590	17.845	32.622	10.360	15.315	24.864	8.615	14.357	20.674
56	18.450	11.060	44.277	18.450	12.749	44.277	18.232	13.937	43.762	17.510	15.112	42.025	16.590	16.634	39.809	14.210	17.535	34.100	10.840	15.335	26.008	9.089	14.315	21.813
60	19.230	11.232	46.161	19.230	12.572	46.161	19.020	13.918	45.646	18.270	15.128	43.852	16.860	16.343	40.471	14.800	17.215	35.519	11.290	15.354	27.101	9.512	14.378	22.828
64.4	20.047	11.341	48.108	20.054	12.689	48.125	19.842	14.044	47.617	18.983	15.378	45.556	17.524	16.869	42.054	15.398	17.483	36.951	11.729	15.489	28.148	9.842	14.550	23.619

Heating ($\Delta T = 10^{\circ}\text{F}$)

TC : Total Capacity, PI : Power Input

LWT (°F)	Outdoor Air temperature(°F, DB)																																		
	-13.0			-4.0			5.0			14.0			17.0			19.4			28.4			35.6			47.0			59.0			68.0				
	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow	TC	PI	Water flow					
	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM	USRT	kW	GPM					
86	6.60	15.79	16.80	7.22	13.08	17.23	7.56	11.41	18.05	7.99	10.36	19.07	8.16	10.44	19.47	8.51	10.38	20.31	10.88	12.35	25.98	13.61	13.73	32.49	16.49	13.72	39.37	18.28	13.84	43.65	19.81	11.61	47.29		
95	6.43	16.81	16.80	7.03	13.92	16.80	7.37	12.15	17.59	7.79	11.04	18.59	7.95	11.12	18.97	8.29	11.05	19.79	10.60	13.15	25.32	13.38	14.63	31.94	16.07	14.61	38.37	17.82	14.75	42.53	19.30	13.84	46.08		
105	5.63	17.20	16.80	6.64	14.56	16.80	6.95	12.69	16.80	7.35	11.50	17.54	7.50	11.81	17.91	7.82	11.52	18.67	10.01	13.70	23.89	12.52	15.24	29.88	15.17	15.12	36.21	16.81	15.36	40.14	18.22	15.22	43.49		
120	-	-	-	-	-	-	6.57	13.83	16.80	6.94	12.49	16.80	7.08	12.75	16.80	7.39	12.54	17.65	9.44	15.24	22.54	11.79	17.26	28.14	14.25	17.45	34.02	15.82	17.57	37.75	17.13	17.41	40.90		
122	-	-	-	-	-	-	5.97	16.86	16.80	6.31	15.22	16.80	6.44	15.34	16.80	6.72	15.25	16.80	8.58	18.48	20.49	10.72	20.92	25.58	12.97	21.11	30.96	14.38	21.31	34.32	15.58	21.11	37.18		
131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.85	15.61	16.80	8.54	17.65	20.39	10.34	17.80	24.69	11.46	17.97	27.37	12.42	17.56	29.65		
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.79	13.90	21.13	8.05	13.23	21.83

NOTE

- Capacity table may be subject to change without prior notice.
- ΔT = Leaving water temperature - Entering water temperature
- LWT : Leaving water temperature, TC : Total Capacity, PI : Power Input
- When using brine, refer to the capacity correction factors by brine %wt.
(This capacity data is based on Ethylene glycol 50%wt.)
- ΔT is comply with the condition of minimum flow-rate.

11. Capacity correction

DVM Chiller (R-32)

1) Correction factor by % glycol

Anti-freeze	Ethylene glycol					Propylene glycol				
%wt	Freezing point (°F)	Min. LWT (°F)	Correction factor			Freezing point (°F)	Min. LWT (°F)	Correction factor		
			Capacity	Power Input	Pressure drop			Capacity	Power Input	Pressure drop
0%	32.0	41.0	1.000	1.000	1.000	32.0	41.0	1.000	1.000	1.000
10%	24.8	33.8	0.989	0.995	1.010	26.6	35.6	0.988	0.994	1.029
20%	15.8	24.8	0.975	0.990	1.023	19.4	28.4	0.973	0.988	1.061
30%	3.2	14.0	0.960	0.985	1.041	8.6	17.6	0.955	0.982	1.098
40%	-9.4	14.0	0.943	0.980	1.064	-7.6	14.0	0.933	0.976	1.142
50%	-34.6	14.0	0.924	0.975	1.082	-31.0	14.0	0.910	0.970	1.193

2) Defrosting correction factor (Capacity coefficient)

Model	Outdoor Air Temperature (°F, DB)								
	14.0	17.6	21.2	24.8	28.4	32.0	35.6	41.0	44.6
AG010DSV***	0.99	0.99	0.99	0.98	0.94	0.91	0.89	0.94	1.00
AG015DSV***	0.99	0.99	0.98	0.97	0.92	0.90	0.88	0.93	1.00

NOTE

- Corrected heating capacity = Heating Capacity x Capacity coefficient.
- On heating operation, frost can be formed on heat exchanger according to outdoor temperature. (Frost on heat exchanger results in decreasing the performance.)
- To remove frost on heat exchanger of air cooled chiller unit, defrost operation is carried out periodically.
- During defrost operation, capacity of air cooled chiller unit may decrease.
- The decrement is not considered to the individual capacity tables.

11. Capacity correction

DVM Chiller (R-32)

3) Correction factor by water flow rate

Correction	Outdoor Air Temperature (°F, DB)									
	50	56	67	78	89	100	111	133	167	200
Power input	0.981	0.981	0.985	0.990	0.995	1.000	1.005	1.015	1.030	1.044
ΔT (°F)	20.0	18.0	15.0	12.9	11.3	10.0	9.0	7.5	6.0	4.5

4) Quiet function correction factor

- Cooling

Quiet function	Outdoor Air Temperature (°F, DB)							
	32.0		68.0		95.0		113.0	
	Capacity	Power Input	Capacity	Power Input	Capacity	Power Input	Capacity	Power Input
Level 1	1.00	1.00	1.00	1.00	1.00	1.27	0.52	1.08
Level 2	1.00	1.00	1.00	1.00	1.00	1.36	0.51	1.07
Level 3	1.00	1.00	0.90	0.86	0.70	0.90	0.40	0.96

- Heating

Quiet function	Outdoor Air Temperature (°F, DB)							
	5.0		35.6		44.6		59.0	
	Capacity	Power Input	Capacity	Power Input	Capacity	Power Input	Capacity	Power Input
Level 1	0.47	1.08	0.88	1.21	1.00	1.24	1.00	1.00
Level 2	0.46	1.06	0.88	1.27	1.00	1.33	1.00	1.00
Level 3	0.34	0.96	0.60	0.92	0.67	0.91	1.00	1.00

5) Correction factor by altitude

Altitude (m)	0	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000
Power input	1.0000	1.0091	1.0185	1.0281	1.0380	1.0481	1.0585	1.0692	1.0801	1.0913	1.1029

12. Installation

Choosing the installation location

Required space for installation

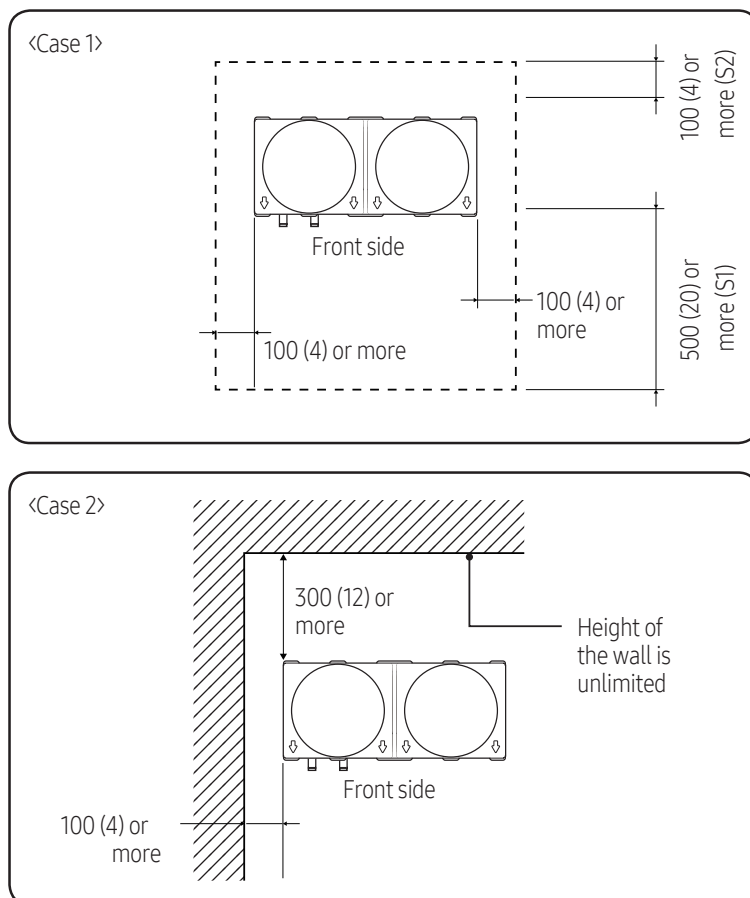
- Space requirement is based on the following conditions; Cooling mode, outdoor temperature of 35°C (95°F). Larger space is required if the outdoor temperature is higher than 35°C (95°F) or if the place is heated easily by extreme solar radiation.
- When you secure installation space, consider path for people and the direction of the wind.
- Secure installation space as shown in the figure, considering ventilation and the service space.
- If the installation space is narrow, installer or other worker may get injured during work and may also cause a problem with the product.
- If you install multiple number of DVM CHILLERS in one space, make sure to secure enough ventilation space if there's any walls around the product that may disturb the air flow. If enough ventilation space is not secured, the product may malfunction.
- DVM CHILLERS can be installed with 4 inches between each unit, but performance may decrease depending on the installation environment. More than 4 inches is recommended.

CAUTION

- If unit is to be stored, it shall be stored in an area or room without continuously operating open flames (for example, an operating gas appliance) or other potential ignition sources, such as operating electric heaters or hot surfaces.

1 Single installation

Unit: mm (inch)

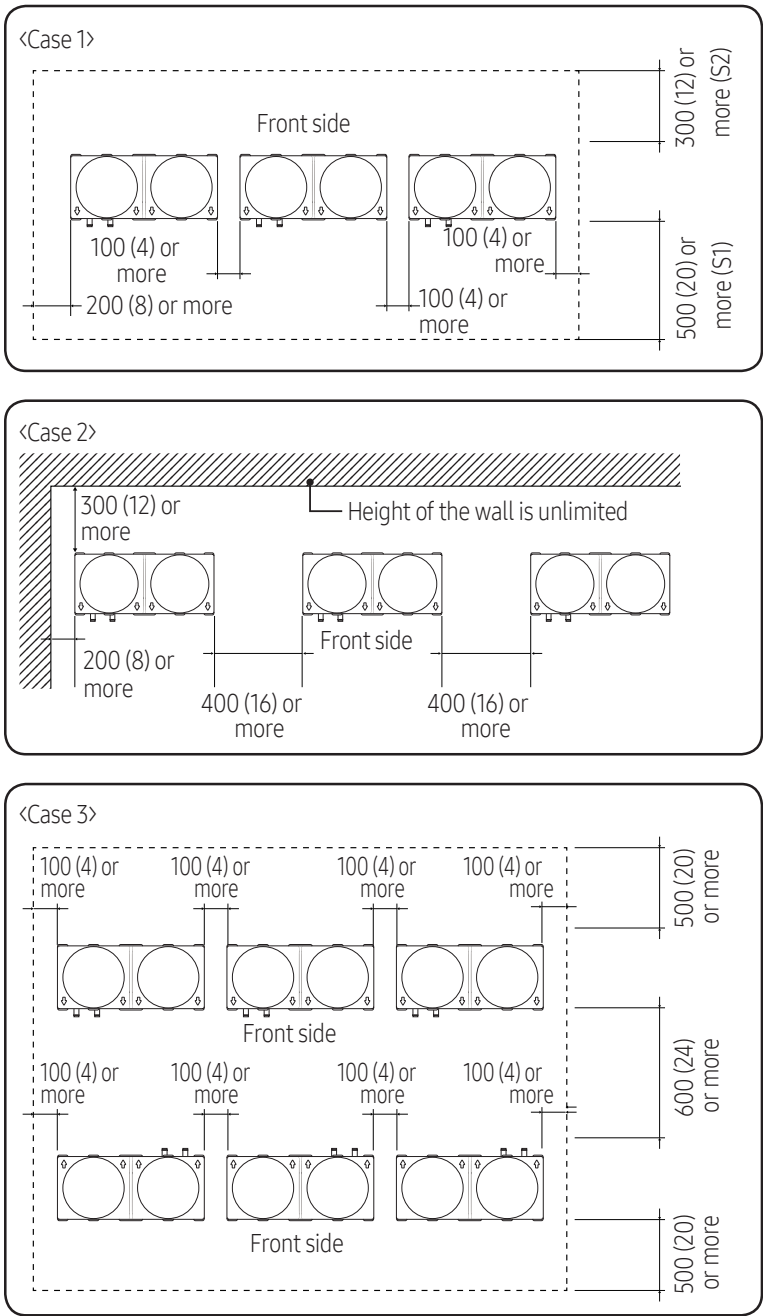


12. Installation

Choosing the installation location

2 Module installation

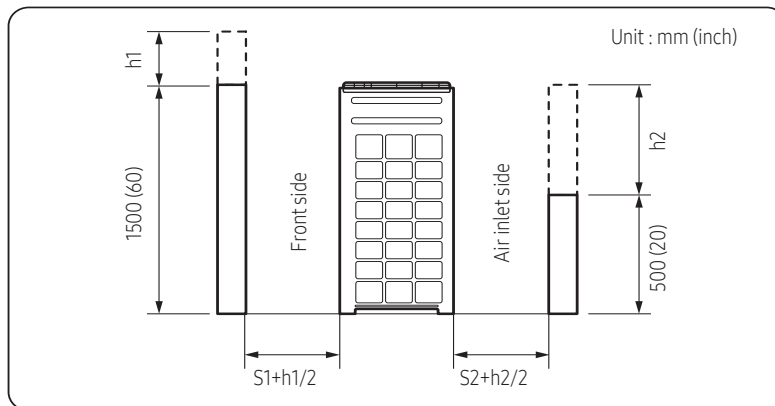
Unit: mm (inch)



12. Installation

Choosing the installation location

- Installing by <Case 1> or <Case 3>
 - Height of the wall on the front side should not be higher than 1500 mm (59 inch).
 - Height of the wall on the air inlet side should not be higher than 500 mm (20 inch).
 - Height of the wall on the side is not limited.
 - If the height of the wall exceeds by certain value (h_1 , h_2), additional clearance [$(h_1)/2$, $(h_2)/2$: Half of the exceeded distance] should be added to the service space (S_1 , S_2).



WARNING

- Make sure to remove the wooden pallet before installing the DVM CHILLER. If you do not remove the wooden pallet, there is risk of fire during welding the pipes. If the DVM CHILLER is installed with wooden pallet on, and it was used for long period time, wooden palette may break and cause electrical hazard or high pressure may damage the pipes.
- Fix DVM CHILLER firmly on the base ground with anchor bolts.

CAUTION

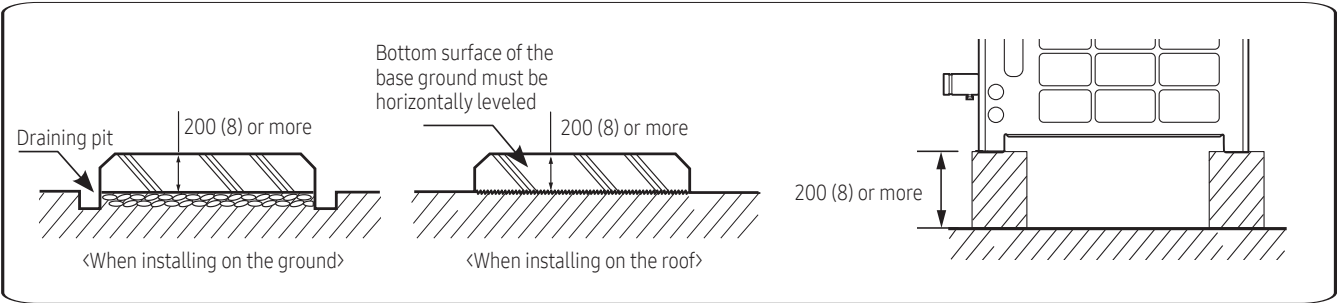
- Manufacturer is not responsible for the damage occurred by not following the installation standards.
- 1 Make sure that the height of the base ground is 20 mm (8 inch) or higher to protect the product from rain water or other external conditions. Also, install a drainage hole around the supporting base and connect the drain pipe to the drainage pit.
 - 2 Considering the vibration and weight of the product, strength of the base ground must be strong to prevent noise and the top surface of it should be flat.
 - 3 Area of the base ground should be 1.5 times larger than the bottom of the product.
 - 4 Product must be fixed firmly so that it can withstand the wind speed of 30 m/s (100 ft/s). If you cannot fix the DVM CHILLER on the supporting base, fix it by side or use extra structure.
 - 5 In heating operation, defrost water may form so you must pay close attention to the drainage and waterproofing of the floor. To prevent defrost water from stagnating or freezing, construct a drainage pit with over 1/50 slant to prevent ice formation on the floor in the winter time.
 - 6 It is necessary to add wire mesh or steel bar during concrete construction for the base ground to prevent damage or cracks.
 - 7 When installing multiple DVM CHILLERS at the same place, construct an H beam or a vibration-isolation frame on the base ground to install the product.
 - 8 After installing an H beam or a vibration-isolation frame, apply corrosion protection and other necessary coating.
 - 9 When concrete construction for product installation is complete, install an isolation pad ($t = 20$ mm (0.78 inch) or more) or a vibration-isolation frame to prevent vibration of the product from transferring to the supporting base.
 - 10 Place the product on an H beam or a vibration isolation frame and fix it with the anchor bolt, nut and washer. (The bearing capacity of the anchor bolt has to be over 3.5 kN (787 lbf))

12. Installation

Outdoor unit installation

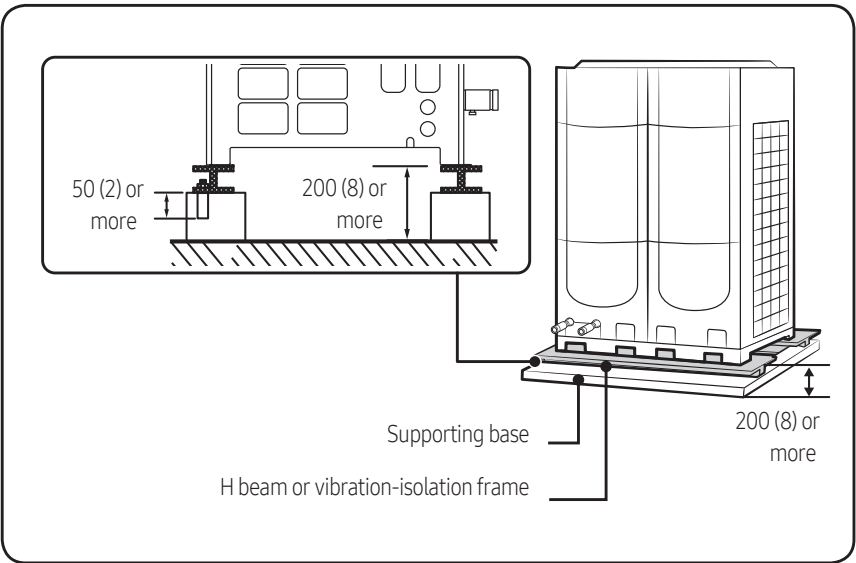
Supporting base construction

Unit : mm (inch)



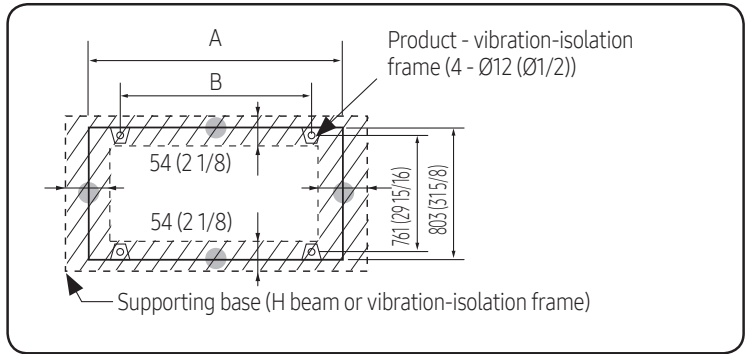
Product installation

Unit: mm (inch)



Base mount and anchor bolt position

Unit: mm (inch)



Unit: mm (inch)

Applied model	Net dimension	
	A	B
AG010/015***	1795 (70 11/16)	1655 (65 3/16)

- When applying vibration-isolation frame additionally on supporting base, specification of fixed holes with the base should be referred to specification of the frame.

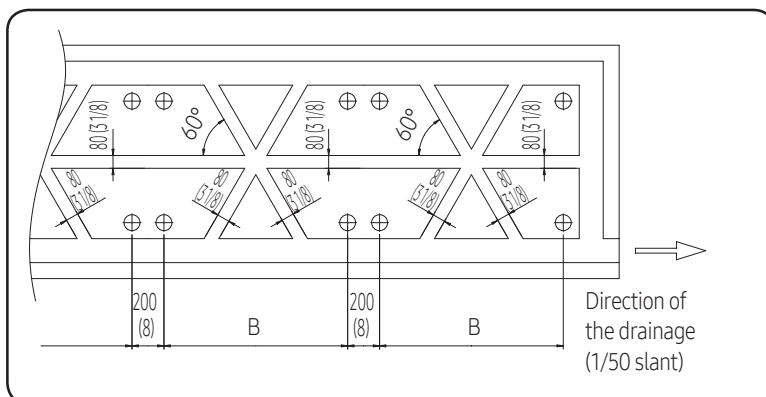
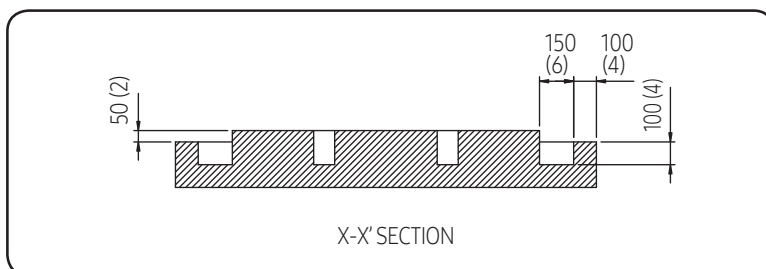
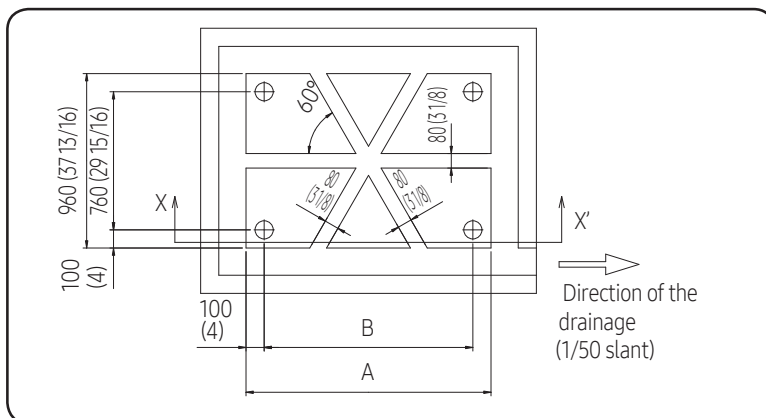
12. Installation

Outdoor unit installation

Examples of draining work

- Use concrete or steel bar for draining work to prevent any damage or cracks.
- For smooth draining of defrost water, make sure to apply 1/50 slant.
- Construct a drainage ditch/channel around the product to prevent the defrost water (from the product) from stagnating, overflowing or freezing near the installation space.
- When the product is installed on the roof, check the strength and waterproof status of the roof.

Unit: mm (inch)



Unit: mm (inch)

Applied model	Net dimension	
	A	B
AG010/015***	1855 (73 1/16)	1655 (65 3/16)

12. Installation

Base construction and installation

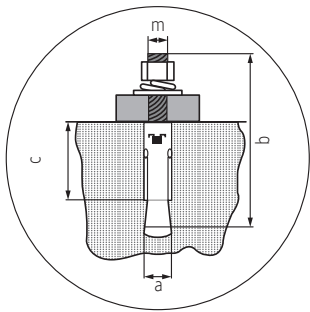
Connecting the anchor bolt

 CAUTION

- Tighten the rubber washer to prevent the bolt connection part of the DVM CHILLER from corroding.



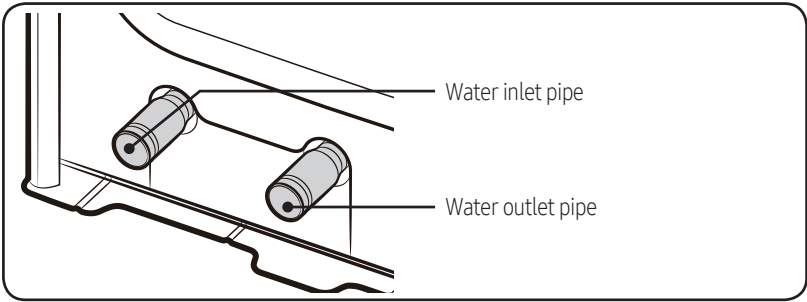
Anchor specification



- Use the anchor bolts and nuts that is zinc plated or made of STS material. Regular anchor bolts or nuts may get damaged by corrosion.

Size	Diameter of drill bit (a)	Anchor length (b)	Sleeve length (c)	Insertion depth	Fastening torque
ø10 (ø3/8)	14 (1/2)	75 (3)	40 (1 1/2)	50 (2)	30 N·m (22.1 lbf·ft)

Connecting the pipe

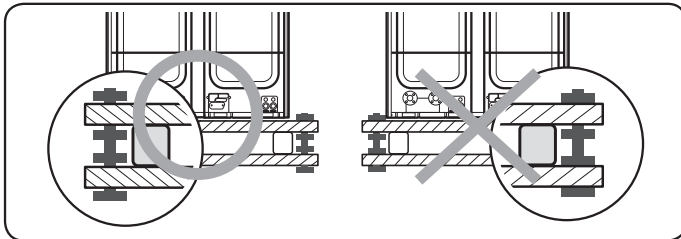


- If you install the DVM CHILLER on the rooftop, check the strength and make sure to waterproof the rooftop.
- Construct draining pit around the supporting base and pay attention to the drainage around the product. (Condensation or defrost water may form during product operation.)
- If there's any possibility of small animals entering into the product through pipe outlet, block the outlet.

12. Installation

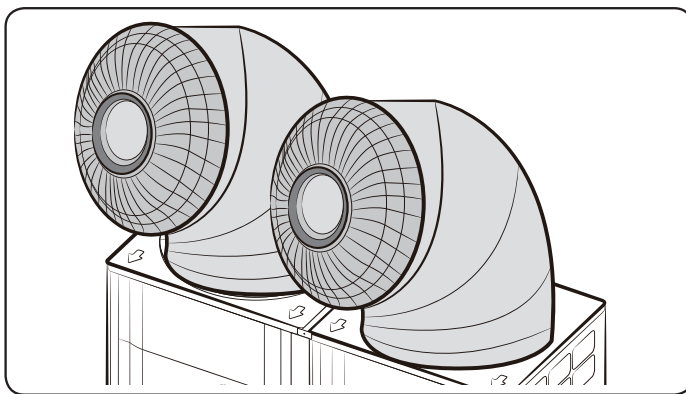
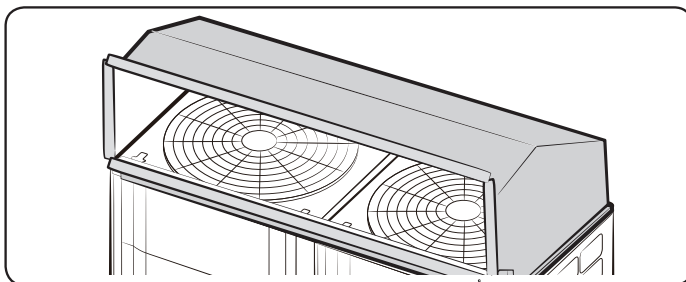
Base construction and installation

Installing vibration-isolation frame



- During installation, make sure there is no gap between the supporting base and the extra structures such as vibration-isolation frame or H beam.
- Supporting base must be constructed strongly to support the bottom part of the vibration-isolation mount.
- After installing the vibration-isolation frame, unscrew the fixing part on the top and bottom part of the frame.

Installing discharge duct

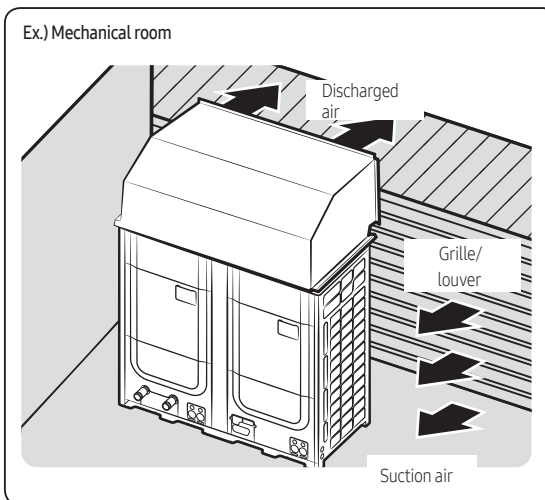
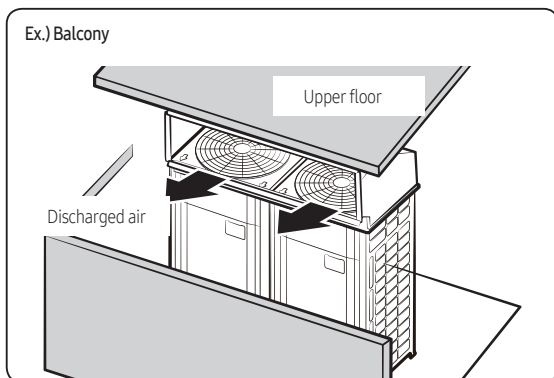


- Static pressure of the discharge duct should be within the standard specification 78.5 Pa (0.315 W.G) when installing the duct.
 - If you remove the fan guard to install the discharge duct, make sure to install a fan guard on the duct outlet. Foreign substance may enter into the product and there could be a risk of personal injury.
 - Wear protection equipment at all times when making galvanized sheet metal duct, since the worker may get injured by the sharp parts.
 - When installing the product under the tree or near forest, leaves and other debris may get into the product and cause problems. Therefore, install a discharge duct to prevent foreign substance infiltration.
-

12. Installation

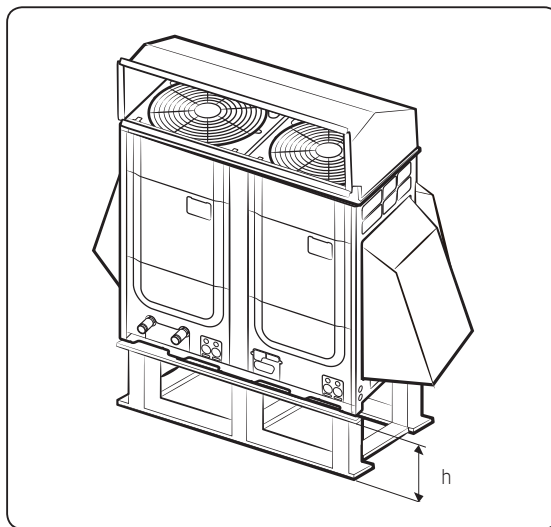
Installing the wind/snow prevention duct

Installing vibration-isolation frame



- It is necessary to install a wind/snow prevention duct (field supply) to direct exhaust from the fan horizontally, when it is difficult to provide a minimum space of 2 m (6.56 ft) between the air outlet and a nearby obstacle above.

Installing the outdoor unit in windy region



- In cold regions with lots of snowfall, install a snow prevention duct, as a sufficient countermeasure, to prevent snow from accumulating on the product. When the snow prevention duct is not installed properly, frost may accumulate on the heat exchanger and heating operation may not work normally.
- Air outlet of the duct should not be directed to the enclosed space.

CAUTION

- Cautions regarding on installing the frame and selecting the base ground
 - Height (h) of the frame and the base ground should be higher than the "heaviest expected snowfall".
 - Area of the frame and the supporting base should not be larger than the area of the product. Snow may accumulate if the area of the frame or the base ground is larger.

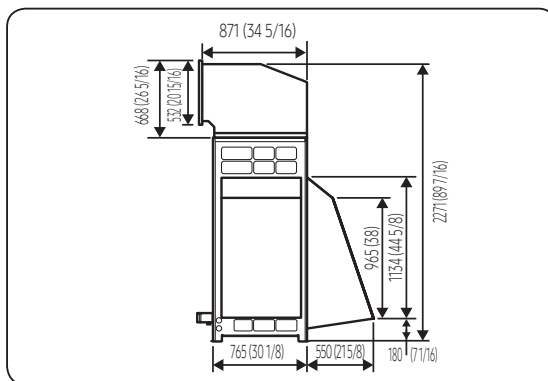
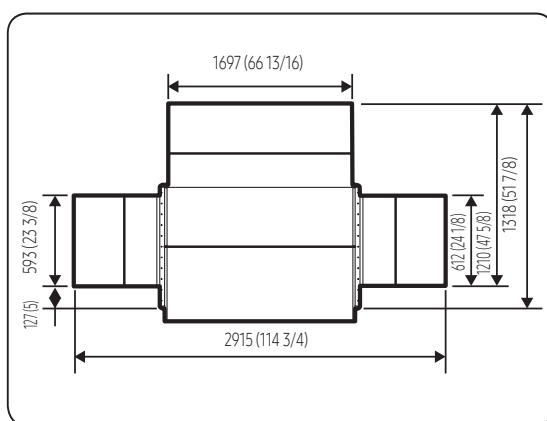
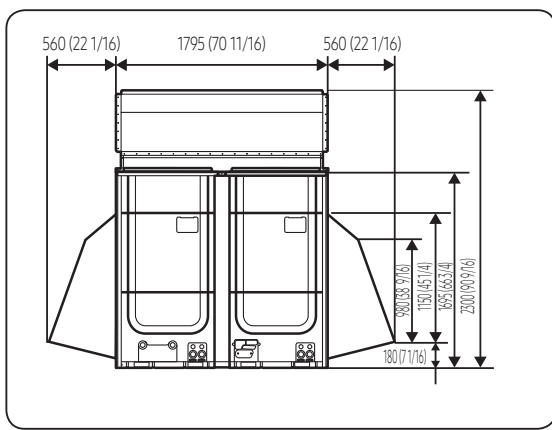
12. Installation

Installing the wind/snow prevention duct

Installing the discharge duct in regions with strong wind

- In windy regions such as near sea shores, protection wall or wind protection duct must be installed for normal operation of the product. (Refer to the illustration of the snow prevention duct, for installing the wind protection duct.)
- When installing a wind prevention duct consider potential wind direction. If the direction of the discharge duct is the same as main direction of prevailing winds, it can cause performance decrease (wind blowing into discharge duct outlet).

Unit: mm (inch)



CAUTION

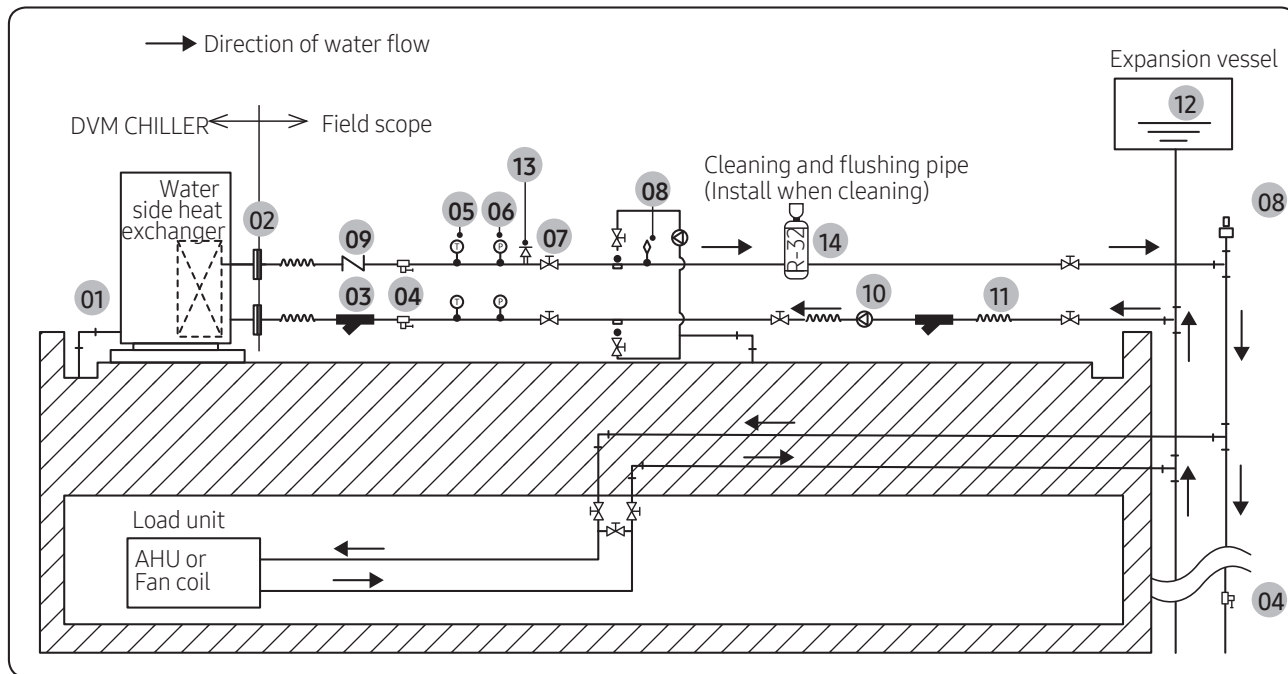
- Cautions regarding on installing the frame and selecting the base ground
 - The base ground must be solid and the product must be fixed with anchor bolts.
 - Make sure to install the product in a place strong enough to withstand its weight. If the place cannot withstand the weight of the product, product may fall and cause personal injury.
 - When installing on a rooftop subject to strong wind, countermeasures must be taken to prevent the product from falling down.
 - Use a frame that is resistant to corrosion.

12. Installation

Water pipe installation

Water pipe diagram

- Install the water system according to the diagram.



No.	Name	Remarks
01	Drain plug	Make 1/100 ~ 1/200 for drain to flow by height difference. To prevent freezing in winter time, make slope steep and distance of level side short as possible. Take appropriate countermeasures such as drain heater to prevent freezing in cold region.
02	Coupling	Install coupling to allow unit exchange.
03	Strainer	Install strainer at the nearest place of the product to prevent foreign materials flow into water side heat exchanger. (50 Mesh)
04	Drain valve	Install drain valve to drain water for service.
05	Temperature gauge	It is recommended for checking ability and operation.
06	Pressure gauge	It is recommended for checking operation status.
07	Valve	Install valves for services such as flowmeter exchange and cleaning.

No.	Name	Remarks
08	Air vent valve	Install air vent valve where there is a risk of air remaining. (Auto air valve usable)
09	Check valve	Install check valve to prevent water flowing backward when pump is stopped.
10	Pump	Install pump which holds amount for keeping the head loss and delivering enough water amount to the product. (Refer to water flow rate range on page 27.)
11	Flexible joint	It is recommended to prevent noise and vibration of pump.
12	Expansion vessel	To absorb the water volume change caused by temperature variation, be sure to install the expansion vessel.
13	Pressure relief valve	A safety device that prevents abnormal pressure rise inside the water piping system
14	Gas separator	Depressurizes or discharges high-pressure gases to the outside when the water-side heat exchanger has ruptured

12. Installation

Water pipe installation

Warning

- The maximum operation water pressure of the product is 1.0 Mpa (145 psi).
- The water strainer is not included in the product. You must install 50 Mesh stainless strainers (field supply). If the strainer is not installed, it may cause breakdown of the product.
- The strainer needs periodical maintenance. Consider space for maintenance when installing pipes.
- For units with R-32 refrigerant, it is required that an automatic air separator with vent be installed at the highest point relative to the outlet of the heat exchanger. The air separator must be installed outdoors and must not be installed within the chiller envelope.
- For units with R-32 refrigerant, it is required that a pressure relief valve be installed at the highest point relative to the outlet of the heat exchanger. The pressure relief valve must be installed outdoors and must not be installed within the chiller envelope.

Installation precautions

- Heat source water with high level of foreign substances can cause corrosion or creation of water scale on plate type heat exchanger and pipe, so select installation place where the heat source water is qualified according to water maintenance standard for air conditioning equipment. (Refer to page 64 for water maintenance standard table.)
- Install strainer (field supply) on heat source water inlet.
- If sand, dust, corroded particles flow into water system, heat exchanger may get damaged because of sedimentation of metallic particles and blocking the heat exchanger. (Refer to page 11 for specification of strainer.)
- Be careful not to change inlet/outlet of chilled/ heating water.
- For normal operation, supply chilled/heating water regularly to keep operation conditions stable.
- Install valves at inlet/outlet of water pipes for services.
- Install temperature gauge and pressure gauge at inlet/outlet of water pipes to check operation status.
- Insulate pipes to prevent thermal loss of water pipes and freezing of pipe surface.
- When insulation is not done thoroughly, you will waste energy caused by thermal loss and may get property damage during cold seasons when water pipe freezes. If the product is stopped at night or not operated for long time during winter time, solution for water pipe freezing may be necessary. Freezing may cause product damage, so take appropriate countermeasures such as pump operation, water drainage, or heating by heater depending on the situation.
- Install flexible joints at water pipes to prevent vibrations.
- Support water pipes with holders so that too much weight is not loaded on pipes.
- Install valves to drain water when the product is not used for a long time or outdoor temperature is below freezing point. Use drain valve to drain water left in plate type heat exchanger and inside the product.
- Install pipe returning to the pump inside the water to prevent bubbles when thermal storage or tank is installed. If dissolved oxygen is increased, corrosion on water side heat exchanger and pipe can be faster.

Installing strainer

- Install strainer (Field scope: 50 Mesh) that is serviceable for cleaning at the inlet of DVM CHILLER to prevent foreign substances such as bolts and stones from flowing into water side heat exchanger.
 - If strainer is not installed or the mesh is too wide, foreign substances may flow into the system and cause damage by freezing.
 - Install drain valves at inlet/outlet pipes to drain water from water side heat exchanger for services.
 - Install extra strainer that is serviceable for cleaning near inlet pipe of the water pump.
-

12. Installation

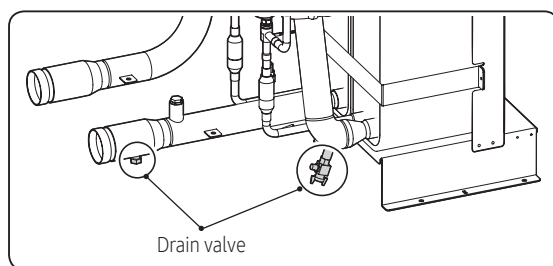
Water pipe installation

Maintaining circulating water amount

- If the product is operated below minimum amount of circulating water (more than 50 % of rated flow rate), plate type heat exchanger may freeze and be damaged. Use the product within recommended circulating water amount.
- Maintain water level since it may decrease by blocked strainer, remaining air, malfunction of circulating pump.

Drainage during winter time

- When DVM CHILLER is not operated during winter time, drain all water by opening drain valves in CHILLER shown in figure.

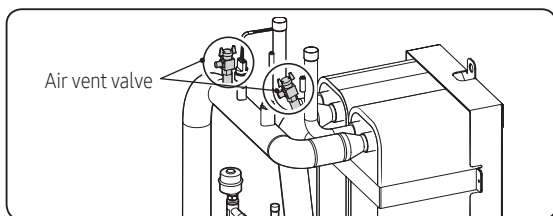


CAUTION

- Be careful that because the water inlet pipe has no drain plug, a small amount of water may come out from the pipe when the coupling is disassembled.

Air venting

- Vent air by opening two air vent valves on inlet and middle of the pipe of water side heat exchanger. If air venting is not done properly, it is difficult to maintain rated flow rate, and pipe corrosion or noise by remaining oxygen may occur.



- When venting air, be aware to prevent water get in to the box.

Solution for freeze protection device

- When freeze protection device is activated, plate heat exchanger may freeze. Operate the product after taking care of the cause. If you operate the product before the problem has been taken care of, plate type heat exchanger will be frozen and damaged, causing refrigerant leakage or water may enter into the refrigerant cycle.

Solution for pump vibration noise

- Install flexible joints at inlet/outlet and use vibration proof rubber on the pump since noise may occur when pump vibration is transferred to pipes.
-

12. Installation

Water pipe installation

Maintaining contamination

Small foreign substances in chilled/heating water may pass through the strainers and may become stuck or stacked inside plate type heat exchanger. Foreign substance accumulation inside the plate type heat exchanger can lead to performance decrease or it may freeze and be permanently damaged. Therefore, clean the plate type heat exchanger periodically.

Turbidity is a standard for water pollution level, and standard water pollution set by Corrosion Prevention Association is under turbidity 4. If the turbidity is high or foreign substance is contamination is too high, clean the plate type heat exchanger periodically and maintain the turbidity under 4. If it is over 4, clean the product in about 1 year after the initial operation of the product.

NOTE

- Refer to page 64 for water maintenance standard table.

Solution for water level decrease

When a tank or thermal storage is installed, select a pump that can provide required water amount considering head loss pipe resistance.

CAUTION

- The product should be operated for 3 minutes after it has stopped to protect water side heat exchanger (plate type heat exchanger) from freezing.

NOTE

- Expansion vessel is to buffer expanded water and also to purge air in water pipes. The capacity of expansion vessel should be 2 ~ 2.5 times larger than amount of water expansion or 4 ~ 5 % of total amount of circulating water.

Freeze protection operation

Forced pump operation may be operated periodically to protect water side heat exchanger (plate type heat exchanger) from freezing in winter time or night time when the pump is stopped. Be careful not to be injured.

Water flow rate range

Refer to the table to maintain minimum amount of circulating water. If circulating amount is not enough, the product will not only operate in best performance but also affect the life of the product. Keep the amount above the minimum level.

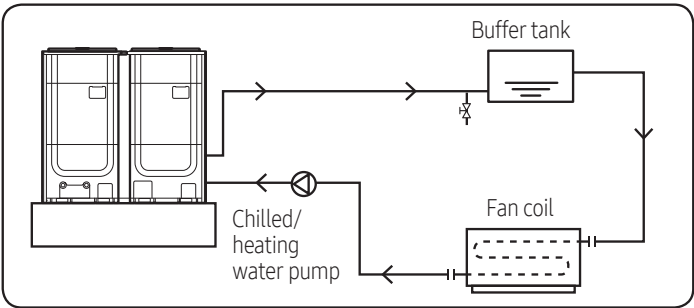
Unit: LPM (GPM)

	Min	Nominal	Max
AG010DSV Series	59.8 (15.8)	90.8 (24.0)	181.7 (48.0)
AG015DSV Series	63.6 (16.8)	127.2 (33.6)	254.4 (67.2)

12. Installation

Securing water storage

Minimum water storage



- If the length of water pipe is too short, water storage within the system becomes lower and ON/OFF operation of the compressor occurs more often. For stable operation, maintain certain water storage by applying header or Buffer tank.

CAUTION

- The product should be operated for 3 minutes after it has stopped to protect water side heat exchanger (plate type heat exchanger) from freezing.
- If total water storage becomes under the minimum storage, install another tank to retain more water storage.
 - In case of variable flow system, retain certain amount of water by bypass pipe system.

Unit : L (gal)

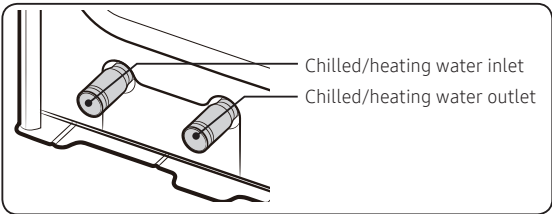
Model name	Minimum water storage
AG010DSV Series	272.5 (72)
AG015DSV Series	381.6 (100.8)

NOTE

- Total water storage in the system = water storage within the water pipe + water storage in DVM CHILLER + water storage in AHU (or fan coil)
- Minimum capacity of buffer tank = Minimum water storage - Total water storage in the system excluding buffer tank
- Select the capacity of buffer tank according to system installation condition of the field.
- Water amount within the DVM CHILLER: 3.17 gal

Water pipe installation

Connecting water pipe

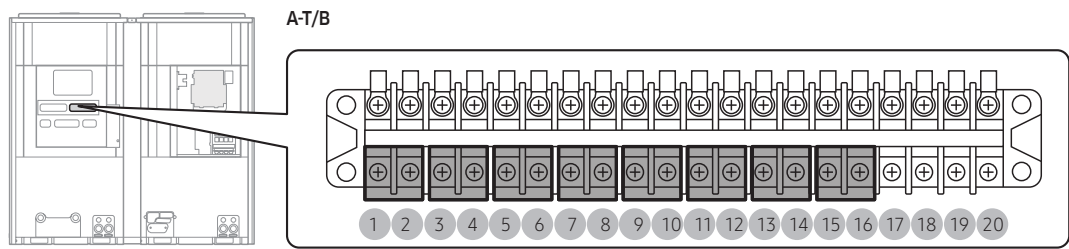


Companion coupling is not supplied. Use field supplied one in ASME standardized product.

12. Installation

External contact wiring work

Output contact



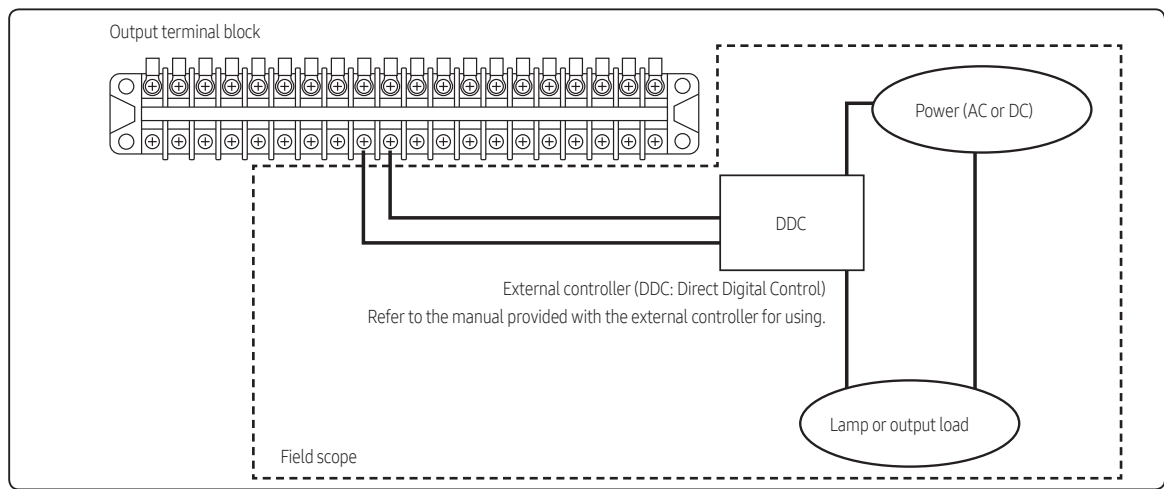
No.		Name	Signal	Function	Contact On (Short)	Contact Off (Open)	Maximum allowable current
A-T/B	1-2	Cooling/Heating display	Zero voltage contact	Display when operates in heating mode	Heat	Cool	0.5A
	3-4	Operation display		Display when operates	Operate	Stop	0.5A
	5-6	Warning display		Display when error occurs	Error occurred	No error	0.5A
	7-8	Defrost operation display		Display when defrosting	Defrost ON	Defrost OFF	0.5A
	9-10	Pump operation display		Display when pump operates	Pump ON	Pump OFF	0.5A
	11-12	Comp operation display		Display when compressor operates	Compressor ON	Compressor OFF	0.5A
	13-14	Pump operation		Signal of pump operation	Pump signal ON	Pump signal OFF	0.5A
	15-16	Freeze protection display		Display when freeze protection operates	Pump ON for freeze protection	Others	0.5A
	17-18	Disuse	-	-	-	-	-
	19-20	Disuse	-	-	-	-	-

- Output written above is information about individual unit.

⚠ CAUTION

- You must turn off the power before working on external contact wiring.
- Output contact can be connected neutral contact and Open/Short only.
- Be sure to install a buzzer (alarm) on terminals 15 and 16 in order that the operator can check the system when the freeze protection function starts.

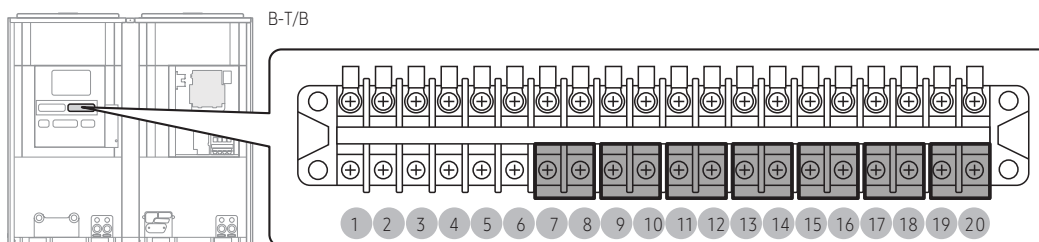
- Example of output contact installation



12. Installation

External contact wiring work

Input contact



No.	Name	Signal	Function	Contact On (Short)	Contact Off (Open)	Signal recognition	Setting unit	Maximum allowable current
B-T/B	1-2	Disuse	-	-	-	-	-	-
	3-4	Disuse	-	-	-	-	-	-
	5-6	Disuse	-	-	-	-	-	-
	7-8	Pump interlock	Signal about pump operation • Pump interlock error (E918) occurs if ON is not input when operating pump	Pump ON	Pump OFF	Usual input	Each unit	10 mA
	9-10	Operation ON/OFF	Controlling operation ON/OFF ^{Note1)}	^{Note3)}		Usual/instant input	Main unit of group ^{NOTE4)}	10 mA
	11-12							
	13-14	Operation mode	Selecting cool/heat mode ^{Note2)}	Heat	Cool	Usual input	Main unit of group ^{NOTE4)}	10 mA
	15-16	Hot water (Cool storage) mode	Entering hot water (cool storage) mode by external control • Cool + ON: Cool storage • Heat + ON: Hot water	Cool storage/ Hot water	Cool/Heat	Usual input	Main unit of group ^{NOTE4)}	10 mA
	17-18	Hot water (Cool storage) control standard	Control depending on set temperature when ON Control depending on external hot water (cool storage) thermostat when OFF	Control by set temperature	Control by thermostat	Usual input	Main unit of group ^{NOTE4)}	10 mA
	19-20	Hot water (Cool storage) thermostat signal	When thermostat is set as standard for hot water (cool storage) mode • Thermo ON when ON (Not over range of water outlet temperature) • Thermo OFF when OFF	Thermo ON	Thermo OFF	Usual input	Main unit of group ^{NOTE4)}	10 mA

- To use hot water (cool storage) mode, the function should be activated by Module Control.

12. Installation

External contact wiring work

- Usual input: Operate by current status of contact
Instant input: Operate when contact signal changes from OFF to ON / from ON to OFF. For use of external contacts, be sure to set options for each function.

Note1) Operates when input method of Operation On/Off is set as external contact

Note2) Operates when input method of operation mode is set as external contact

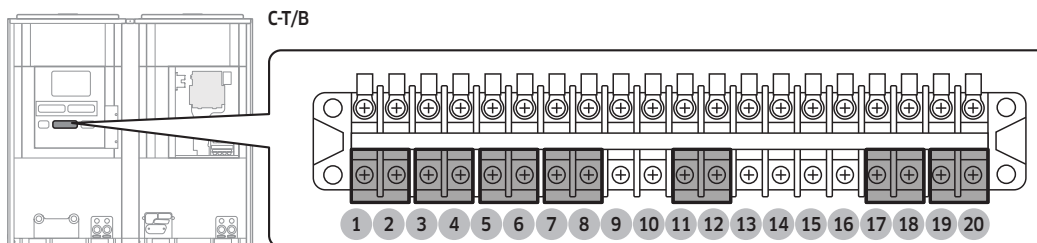
Note3) Operation depending on external contact operation ON/OFF input method (Refer to "Operation On/Off by external contact" in the 28th row in the table.)

- When set as usual input (0): Operation ON when 9-10 is ON; OFF when 9-10 is OFF
- When set as instant input (1): Operation ON when 9-10 is ON more than 0.1 second; OFF when 11-12 is ON more than 0.1 second

Note4) Main unit of module when group is not available

NOTE

- Refer to page 36 for example of installation.



No.	Name	Signal	Function	Contact On (Short)	Contact Off (Open)	Signal recognition	Setting unit	Maximum allowable current
C-T/B	1-2	Quiet function	Operate quiet function in level set by main option or module control ^{Note4)}	Quiet function	-	Usual input	Main unit of group ^{Note8)}	10 mA
	3-4	Demand function	Operate demand function (current limit control) in level set by main operation or module control ^{Note5)}	Demand function	-	Usual input	Main unit of group ^{Note8)}	10 mA
	5-6	Forced fan function	Operate forced fan function ^{Note6)}	Forced fan function	-	Usual input	Main unit of group ^{Note8)}	10 mA
	7-8	Unusual condition reset	Reset on error occurred status • Operates only when remote error reset input function is set to use	Reset error	-	Instant input	Main unit of module	10 mA
	9-10	Disuse	-	No use (N/A)	-	-	-	-
	11-12	Water law	Operate water law ^{Note7)}	Water law control	Water outlet set temperature control	Usual input	Main unit of group ^{Note8)}	10 mA
	13-14	Disuse	-	No use (N/A)	-	-	-	-
	15-16	Disuse	-	No use (N/A)	-	-	-	-

- To use hot water (cool storage) mode, the function should be activated by Module Control.

12. Installation

Electrical wiring work

No.		Name	Signal	Function	Contact On (Short)	Contact Off (Open)	Signal recognition	Setting unit	Maximum allowable current
C-T/B	17-18	Set temperature/ room temperature sensor	Analog current	Recognize water outlet set temperature by external input (4 ~ 20 mA) ^{Note1)} Recognize value of room temperature sensor (4 ~ 20 mA) when standard for water law is room temperautre ^{Note2)}	-	-	Current input	Main unit of group ^{Note8)}	20 mA
	19-20	External water outlet temperature	Analog current	Recognize external water outlet temperature by external temperature sensor (4 ~ 20 mA) ^{Note3)}	-	-	Current input	Main unit of group ^{Note8)}	20 mA

- Usual input: Operate by current status of contact
Instant input: Operate when contact signal changes from OFF to ON / from ON to OFF

^{Note1)} Value of water outlet set temperature (°C) = 5.625 x Current - 32.5

Heat (Hot water) mode recognizes minimum 25°C (77°F) and maximum 60°C (140°F) (Maximum 55°C(131°F) when the outside temperature is below 10°C (55°F))

Cool (Cool storage) mode recognizes minimum 5°C (41°F) and maximum 25°C (77°F) (Minimum -10°C (14°F) when using low temperature function)

Current (mA)	4	6	8	10	12	14	16	18	20
Temperature (°C)	-10.00	1.25	12.50	23.75	35.00	46.25	57.50	68.75	80.00
Temperature (°F)	14.00	34.25	54.50	74.75	95.00	115.25	135.50	155.75	176.00

^{Note2)} Room temperature (°C) = 6.25 x Current - 75

Current (mA)	4	6	8	10	12	14	16	18	20
Temperature (°C)	-50.00	-37.50	-25.00	-12.50	0.00	12.50	25.00	37.50	50.00
Temperature (°F)	-58.00	-35.50	-13.00	9.50	32.00	54.50	77.00	99.50	122.00

^{Note3)} If operation pattern is not standard control, control standard temperature depends on external water outlet temperature sensor. External water outlet temperature sensor should be installed where can represent the temperature of water pipe system.

Water outlet temperature (°C) = 6.25 x Current - 55

Current (mA)	4	6	8	10	12	14	16	18	20
Temperature (°C)	-30.00	-17.50	-5.00	7.50	20.00	32.50	45.00	57.50	70.00
Temperature (°F)	-22.00	0.50	23.00	45.50	68.00	90.50	113.00	135.50	158.00

^{Note4)} Operates when input method for quiet function is set as external contact

- If the contact is short, quiet function operates in Cool/Heat mode.
- Quiet function by Module Control operates in Cool mode and night time.

^{Note5)} Operates when input method for demand function is set as external contact

^{Note6)} Operates when input method for forced fan function is set as external contact

^{Note7)} Operates when input method for water law function is set as external contact

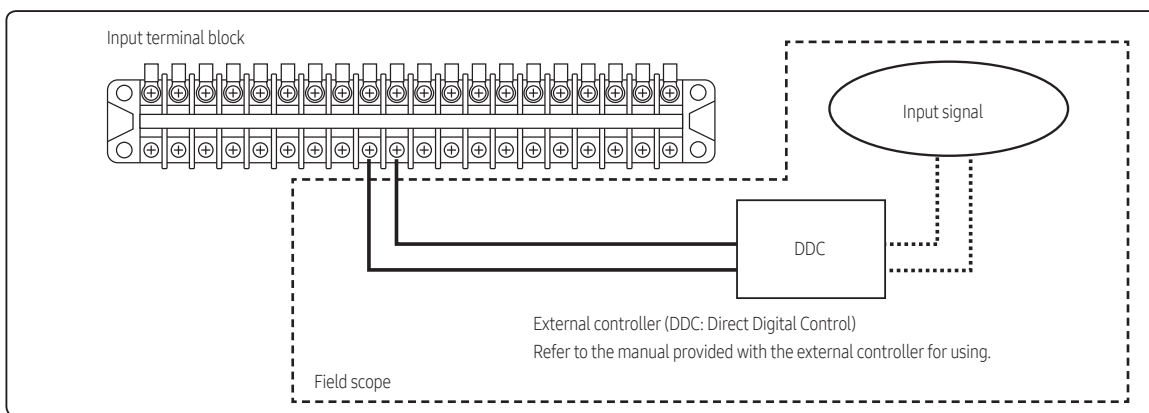
^{Note8)} Main unit of module when group is not available

12. Installation

Electrical wiring work

NOTE

- Room temperature sensor and external water outlet temperature sensor is not supplied. Purchase and install the appropriate sensor according to the usage.
 - Room temperature sensor: 4 mA: -50°C (-58°F), 20mA: 50°C (122°F))
 - External water outlet temperature sensor: 4 ~ 20 mA (4 mA: -30°C (-22°F), 20mA: 70°C (158°F))
- Example of input contact installation



12. Installation

Electrical wiring work

Function description

No.	Description
1	Select operation On/Off input method of module/group
2	Select temperature setting input method of module/group
3	Select operation mode (Cool/Heat, Hot water/Cool storage) input method of module/group
4	Select demand control input method of module/group
5	Select demand level Current will be limited below the set level when "Perform" command is transmitted.
6	Select quiet function input method of module
7	Select forced fan function input method of module - Forced fan: Removes accumulated snow by operating the fan of stopped unit in low frequency - Snow accumulation prevention, which operates occasionally when outdoor temperature is below 0°C (32°F), is basic function.
8	Select water law input method of module/group
9	Select pump operation status when thermo OFF
10	Select to use error clear function by external contact
11	Setting CHILLER unit address: identical with Chiller address(Channel address) used by DMS
12	Select quiet function level - Quiet function will start in set level when "Perform" command is transmitted. - Level comparison: Level3 > Level2 > Level1
13	Confirm delay for unsecured flow rate when operating: Delay for inspecting no input for pump interlock and unsecured flow rate Compressor will not operate until water flow is detected.
14	Set when controlling water outlet temperature by installing extra water temperature gauge on water pipe header or tank - External water outlet temperature sensor should be installed on main unit of group (or module when group is not available). - Standard for water outlet temperature depends on external water outlet temperature sensor except when operation pattern is standard control.
15	Setting water law standard - To set room temperature as standard, external room temperature sensor should be installed. - Room temperature sensor should be installed on main unit of group (or module when group is not available).
16 ~ 27	Water law control constant: Refer to water law operation graph.
28	Recognition of external control operation ON/OFF 0 (recognizing usual signal): Constantly inspects ON/OFF status of contact and set operation ON/OFF 1 (recognizing instant signal): Set operation ON/OFF when contact ON/OFF signal is input (when external contact is consisted of button click)
34	Select to use low temperature function - The function will operate when set simultaneously with product option of module control (Seg23 of installation option 02 = 'E') - Low temperature function: Expands water outlet usage range in Cool/Cool storage mode (5°C (41°F) ~ 25°C (77°F) → -10°C (14°F) ~ 25°C (77°F)) - When using low temperature function, use brine and maintain the concentration under freezing point.



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