Model Name				PUHZ-SHW140YHA	PUHZ-SHW230YKA
Power supply (phase, cycle, voltage)				3φ, 400V, 50Hz	3φ, 400V, 50Hz
	Max. current		A	13.0	26.0
Breaker size			A	16	32
Outer casing				Galvanized plate	Galvanized plate
External finish				Munsell 3Y 7.8/1.1	Munsell 3Y 7.8/1.1
Refrigerant control				Linear expansion valve	Linear expansion valve
Compressor				Hermetic scroll	Hermetic scroll
	Model			ANB33FJQMT	ANB66FJNMT
	Motor output		kW	2.5	4.7
	Start type			Inverter	Inverter
	Protection devices			HP switch LP switch Discharge thermo Comp. Surface thermo	HP switch LP switch Discharge thermo Comp. Surface thermo
	Oil (Model)		L	1.40 (FVC68D)	1.70 (FV50S)
Crankcase heater			W	-	-
Heat exchanger		Air		Plate fin coil	Plate fin coil
		Water		-	-
Fan	Fan(drive) x No.			Propeller fan ×2	Propeller fan ×2
	Fan motor output		kW	0.074 ×2	0.150 ×2
	Air flow		m^3/min(CFM)	100 (3,530)	140 (4,940)
Defrost method				Reverse cycle	Reverse cycle
Noise level (SPL)		Heating	dB(A)	52	59
		Cooling	dB(A)	51	58
Noise level (PWL)		Heating	dB(A)	70	75
Dimensions		Width	mm(in)	950 (37-3/8)	1050 (41-5/16)
		Depth	mm(in)	330+30 (13+1-3/16)	330+30 (13+1-3/16)
		Height	mm(in)	1350 (53-1/8)	1338 (52-11/16)
Weight			kg(lbs)	134 (296)	148 (327)
Refrigerant (GWP)				R410A (1975)	R410A (1975)
		Quantity	kg(lbs)	5.5 (12.1)	7.1 (15.7)
Pipe size O.D.		Liquid	mm(in)	9.52 (3/8)	9.52 (3/8)
		Gas	mm(in)	15.88 (5/8)	25.4 (1)
Connection method				Flared	Flared
Between the indoor & outdoor unit		Height difference	m	Max. 30	Max. 30
		Piping length	m	2 to 75	2 to 80
Guaranteed operating range (Outdoor)		Heating	°C	-25 to +21	-25 to +21
		DHW	°C	-25 to +35	-25 to +35
		Cooling*	°C	-15 to +46	-5 to +46
Outlet water temp. (Max in heating, Min in cooling)		Heating	°C	+60	+60
		Cooling	°C	+5	+5
Nominal return water temperature range		Heating	°C	+10 to +59	+10 to +59
		Cooling	°C	+8 to +28	+8 to +28
Water flow rate range			L/min	17.9 to 40.1	28.7 to 65.9

* Optional air protection guide is required where ambient temperature is lower than -5°C.

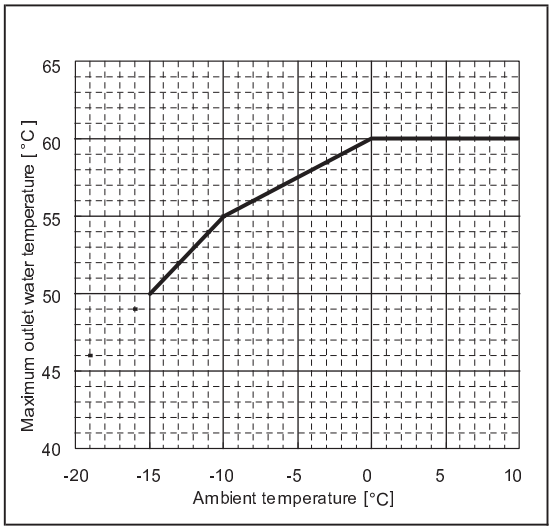
Model name			PUHZ-SHW112YHA	PUHZ-SHW140YHA
Nominal water flow rate (Heating mode)		L/min	32.1	40.1
Heating (A7/W35)	Capacity	kW	11.20	14.00
	COP		4.46	4.22
	Power input	kW	2.51	3.32
Heating (A2/W35)	Capacity	kW	11.20	14.00
	COP		3.34	2.96
	Power input	kW	3.35	4.73
Pressure difference (water circuit)		kPa	-	-
Heating pump input (based on EN14511)		kW	-	-
Nominal water flow rate (Cooling mode)		L/min	28.7	35.8
Cooling (A35/W7)	Capacity	kW	10.00	12.50
	EER (COP)		2.83	2.17
	Power input	kW	3.53	5.76
Cooling (A35/W18)	Capacity	kW	10.00	12.50
	EER (COP)		4.74	4.26
	Power input	kW	2.11	2.93
Pressure difference (water circuit)		kPa	-	-
Cooling pump input (based on EN14511)		kW	-	-
Recommended plate heat exchanger			ACH70-40	ACH70-40

The table shows performance data obtained when a plate heat exchanger is connected.

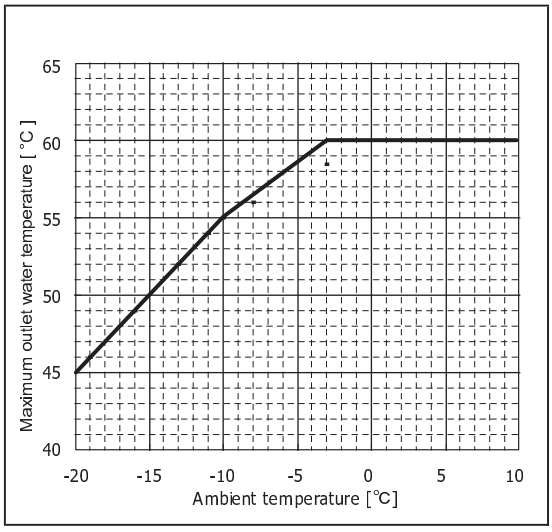
Model name			PUHZ-SHW230YKA
Nominal water flow rate (Heating mode)		L/min	65.9
Heating (A7/W35)	Capacity	kW	23.00
	COP		3.65
	Power input	kW	6.31
Heating (A2/W35)	Capacity	kW	23.00
	COP		2.37
	Power input	kW	9.69
Pressure difference (water circuit)		kPa	-
Heating pump input (based on EN14511)		kW	-
Nominal water flow rate (Cooling mode)		L/min	57.3
Cooling (A35/W7)	Capacity	kW	20.00
	EER (COP)		2.22
	Power input	kW	9.01
Cooling (A35/W18)	Capacity	kW	20.00
	EER (COP)		3.55
	Power input	kW	5.64
Pressure difference (water circuit)		kPa	-
Cooling pump input (based on EN14511)		kW	-
Recommended plate heat exchanger			ACH70-40 x 2 Parallel connection

The table shows performance data obtained when a plate heat exchanger is connected.

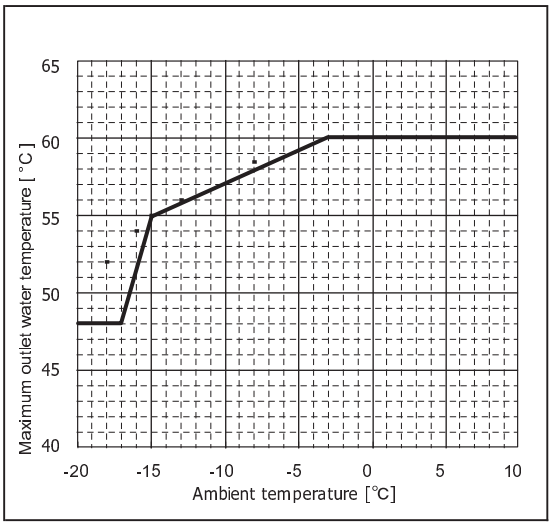
PUHZ-SW40/50VHA



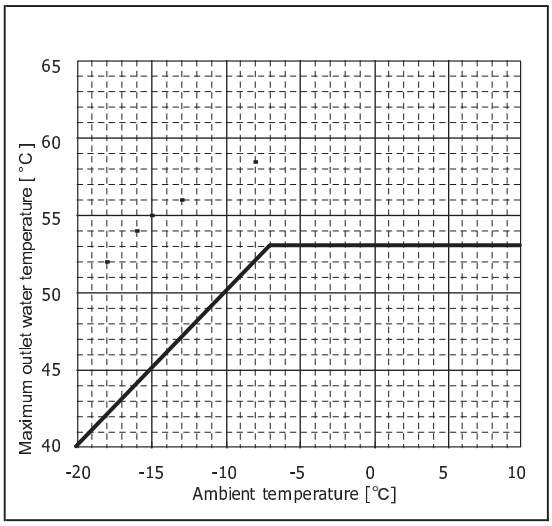
PUHZ-SW75VHA



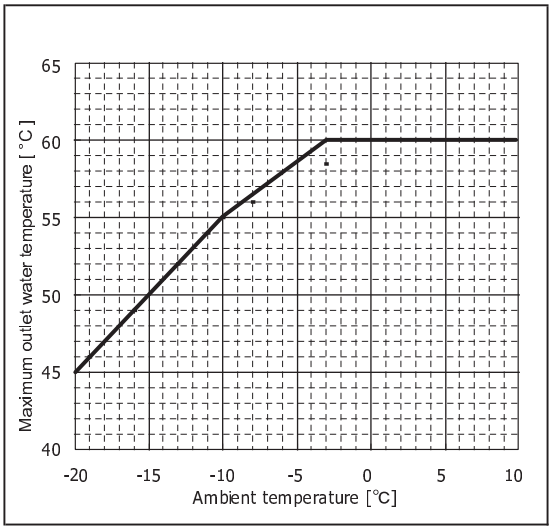
PUHZ-SW100/120VHA
PUHZ-SW100/120YHA



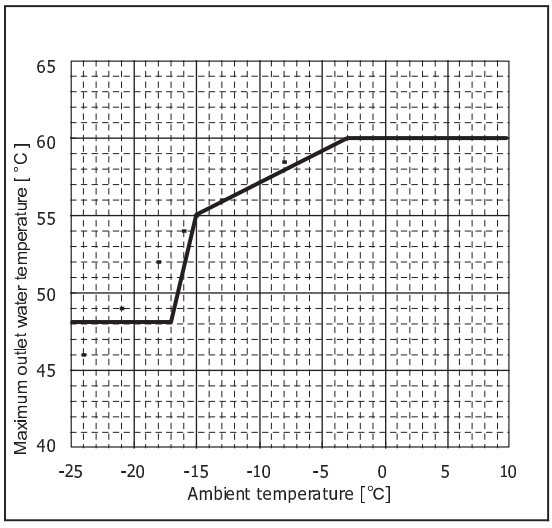
PUHZ-RP200/250YKA



■Mr.SLIM+
PUHZ-FRP71VHA

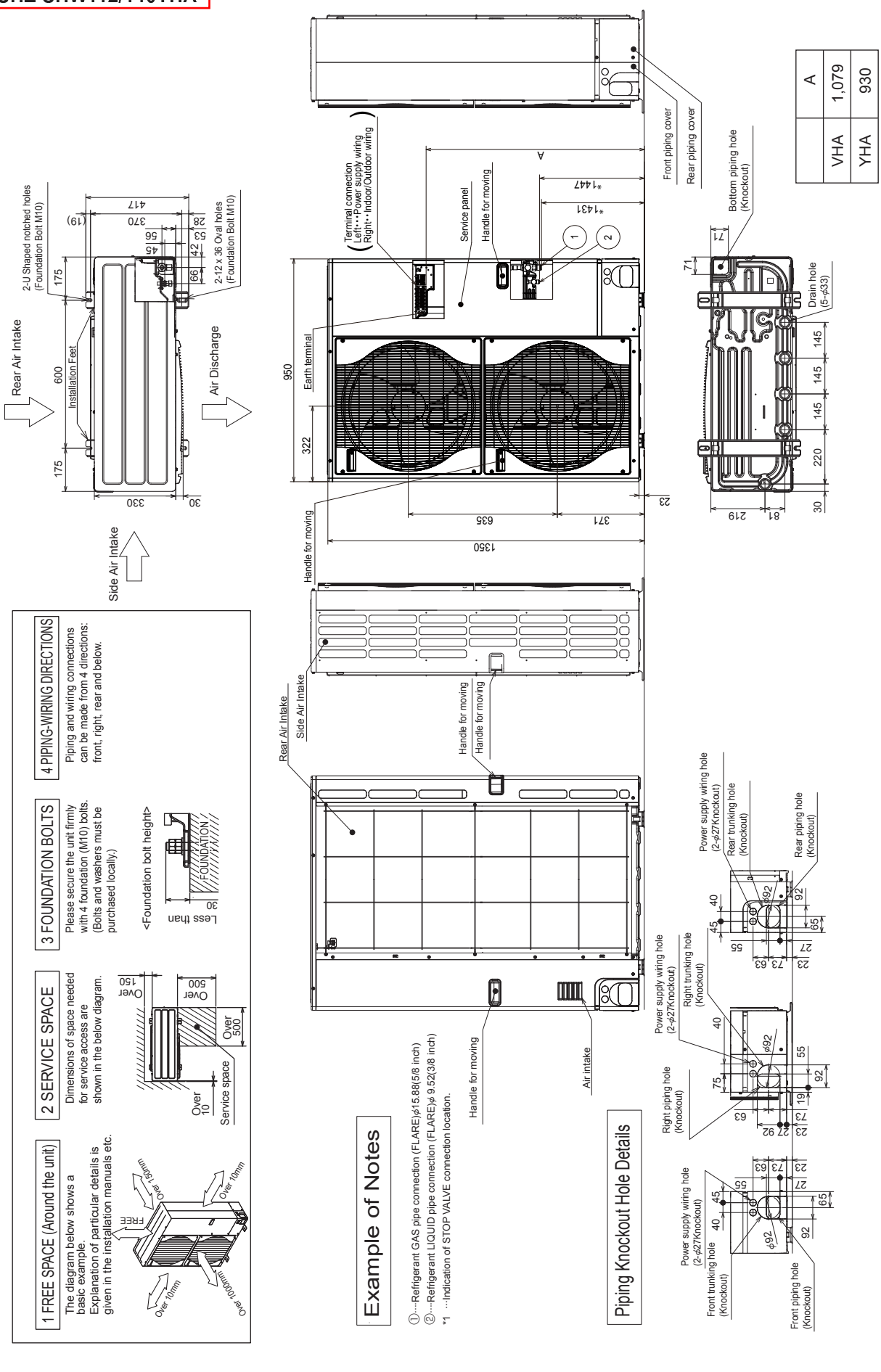


■Zubadan
PUHZ-SHW80/112VHA
PUHZ-SHW112/140YHA
PUHZ-SHW230YKA



■ **PUHZ-SHW80/112VHA**
PUHZ-SHW112/140YHA

Unit : mm



<Note> These data are measured based on EN14511-2011.

PUHZ-SHW140YHA

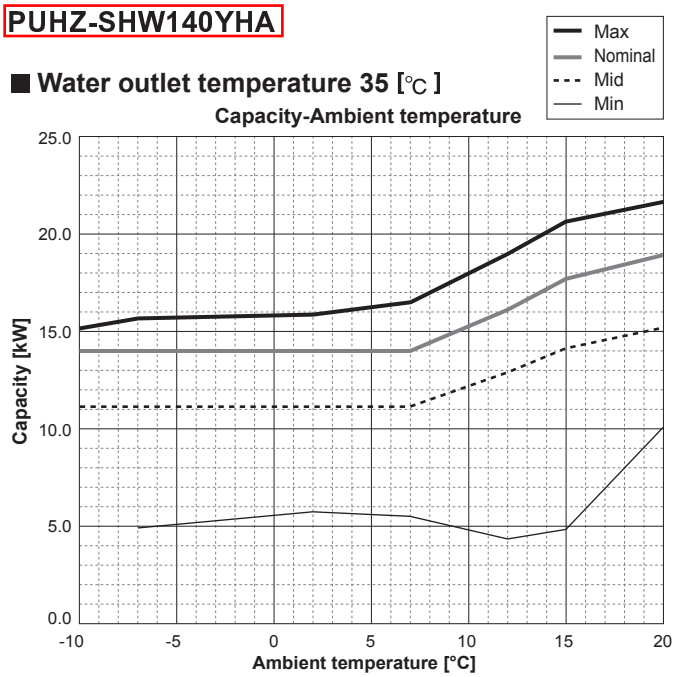
Water outlet temperature[℃]		25		35		40		45		50		55		60	
Ambient temperature[℃]		Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP
Max	(INJ) -20	-	-	11.77	2.08	11.77	1.89	11.77	1.69	-	-	-	-	-	-
	(INJ) -15	-	-	14.00	2.15	14.00	1.95	14.00	1.75	13.25	1.57	13.00	1.37	-	-
	(INJ) -10	15.21	2.64	15.04	2.33	14.95	2.11	14.87	1.89	14.60	1.71	14.33	1.51	-	-
	(INJ) -7	15.93	2.76	15.66	2.44	15.53	2.21	15.39	1.98	15.26	1.80	15.13	1.60	-	-
	(INJ) 2	16.77	3.02	15.79	2.71	15.30	2.43	14.82	2.16	14.58	1.95	14.35	1.72	13.84	1.47
	7	17.28	4.33	16.42	3.79	15.98	3.39	15.55	2.98	15.15	2.73	14.75	2.45	14.36	2.22
	12	20.01	4.78	18.95	4.23	18.22	3.75	17.48	3.27	17.05	3.00	16.62	2.70	16.32	2.48
	15	21.49	5.05	20.63	4.52	19.64	3.98	18.64	3.43	18.19	3.20	17.74	2.94	17.84	2.64
	20	22.63	5.21	21.60	4.69	21.09	4.20	20.57	3.72	20.09	3.42	19.60	3.09	19.45	2.81
Nominal	(INJ) -20	-	-	11.77	2.08	11.77	1.89	11.77	1.69	-	-	-	-	-	-
	(INJ) -15	-	-	14.00	2.15	14.00	1.95	14.00	1.75	13.25	1.57	13.00	1.37	-	-
	(INJ) -10	14.00	2.77	14.00	2.42	14.00	2.17	14.00	1.92	14.00	1.73	14.00	1.53	-	-
	(INJ) -7	14.00	2.98	14.00	2.58	14.00	2.30	14.00	2.02	14.00	1.84	14.00	1.64	-	-
	(INJ) 2	14.00	3.34	14.00	2.96	14.00	2.70	14.00	2.44	14.00	2.17	14.00	1.89	13.84	1.47
	7	14.00	4.75	14.00	4.22	14.00	3.75	14.00	3.28	14.00	2.91	14.00	2.49	14.00	2.23
	12	16.16	5.21	16.16	4.60	16.16	4.08	16.16	3.55	16.16	3.18	16.16	2.77	16.16	2.50
	15	17.60	5.52	17.60	4.86	17.60	4.29	17.60	3.73	17.60	3.36	17.60	2.96	17.60	2.66
	20	18.99	5.81	18.99	5.10	18.99	4.50	18.99	3.90	18.99	3.54	18.99	3.14	18.99	2.84
Mid	(INJ) -20	-	-	9.41	2.16	9.41	1.94	9.41	1.73	-	-	-	-	-	-
	(INJ) -15	-	-	11.20	2.31	11.20	2.06	11.20	1.80	10.60	1.59	10.40	1.38	-	-
	(INJ) -10	11.20	3.12	11.20	2.65	11.20	2.33	11.20	2.01	11.20	1.80	11.20	1.55	-	-
	(INJ) -7	11.20	3.38	11.20	2.85	11.20	2.50	11.20	2.14	11.20	1.91	11.20	1.66	-	-
	(INJ) 2	11.20	3.90	11.20	3.34	11.20	3.02	11.20	2.70	11.20	2.38	11.20	2.03	11.07	1.65
	7	11.20	4.98	11.20	4.45	11.20	3.94	11.20	3.44	11.20	3.06	11.20	2.64	11.20	2.34
	12	12.93	5.57	12.93	4.98	12.93	4.40	12.93	3.82	12.93	3.42	12.93	2.99	12.93	2.64
	15	14.08	5.93	14.08	5.33	14.08	4.70	14.08	4.07	14.08	3.66	14.08	3.22	14.08	2.85
	20	15.19	6.47	15.19	5.67	15.19	4.99	15.19	4.31	15.19	3.90	15.19	3.44	15.19	3.04
Min	-20	-	-	9.41	2.16	9.41	1.94	9.41	1.73	-	-	-	-	-	-
	-15	-	-	11.20	2.31	11.20	2.06	11.20	1.80	10.60	1.59	10.40	1.38	-	-
	-10	11.20	3.12	11.20	2.65	11.20	2.33	11.20	2.01	11.20	1.80	11.20	1.55	-	-
	-7	5.95	3.57	4.89	2.82	4.70	2.46	4.50	2.10	4.30	1.90	4.11	1.67	-	-
	2	8.00	4.35	5.71	3.67	5.46	3.19	5.21	2.72	4.95	2.43	4.69	2.11	-	-
	7	8.99	5.15	5.51	4.38	5.27	3.81	5.04	3.23	4.78	2.89	4.53	2.52	-	-
	12	10.49	5.69	4.38	4.88	4.19	4.23	4.00	3.58	3.80	3.20	3.60	2.78	-	-
	15	11.30	6.13	4.76	5.30	4.58	4.61	4.40	3.93	4.18	3.51	3.97	3.05	-	-
	20	12.27	6.66	10.03	5.90	9.73	5.19	9.43	4.49	9.05	4.01	8.67	3.50	-	-

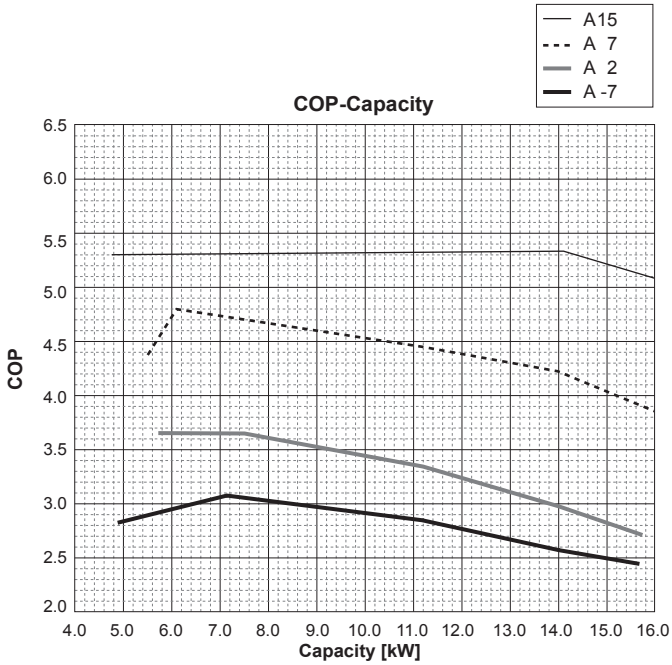
PUHZ-SHW230YKA

Water outlet temperature[℃]		35		40		45		50		55		60	
Ambient temperature[℃]		Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP	Capacity	COP
Max	(INJ) -20	20.27	2.06	19.76	1.84	19.25	1.62	-	-	-	-	-	-
	(INJ) -15	22.91	2.20	22.70	2.00	22.49	1.80	21.64	1.61	20.79	1.41	-	-
	(INJ) -10	25.55	2.34	25.64	2.16	25.73	1.98	25.65	1.84	25.57	1.69	-	-
	(INJ) -7	27.13	2.43	27.40	2.26	27.67	2.09	28.05	1.98	28.43	1.86	-	-
	(INJ) 2	23.20	2.29	23.00	2.16	22.86	2.02	22.82	2.02	22.78	2.02	22.65	1.98
	7	27.95	3.28	27.93	3.07	27.90	2.85	27.70	2.65	27.50	2.42	26.26	2.05
	12	29.53	3.48	29.32	3.21	29.11	2.94	28.81	2.75	28.50	2.54	27.44	2.24
	15	30.48	3.60	30.16	3.30	29.84	3.00	29.47	2.82	29.10	2.61	28.15	2.35
	20	32.06	3.80	31.56	3.45	31.05	3.09	30.58	2.92	30.10	2.73	29.33	2.54
Nominal	(INJ) -20	20.27	2.06	19.76	1.84	19.25	1.62	-	-	-	-	-	-
	(INJ) -15	22.91	2.20	22.70	2.00	22.49	1.80	21.64	1.61	20.79	1.41	-	-
	(INJ) -10	23.00	2.60	23.00	2.36	23.00	2.12	23.00	1.99	23.00	1.85	-	-
	(INJ) -7	23.00	2.85	23.00	2.58	23.00	2.32	23.00	2.22	23.00	2.11	-	-
	(INJ) 2	23.00	2.37	23.00	2.16	22.86	2.02	22.82	2.02	22.78	2.02	22.65	1.98
	7	23.00	3.65	23.00	3.34	23.00	3.02	23.00	2.76	23.00	2.47	23.00	2.09
	12	24.28	4.10	24.28	3.68	24.28	3.26	24.28	2.98	24.28	2.67	24.28	2.34
	15	25.71	4.29	25.71	3.84	25.71	3.39	25.71	3.10	25.71	2.79	25.71	2.49
	20	28.10	4.61	28.10	4.10	28.10	3.59	28.10	3.31	28.10	2.99	28.10	2.75
Mid	(INJ) -20	16.22	2.00	15.81	1.87	15.40	1.73	-	-	-	-	-	-
	(INJ) -15	18.33	2.36	18.16	2.16	17.99	1.97	17.31	1.82	16.63	1.66	-	-
	(INJ) -10	18.40	2.72	18.40	2.46	18.40	2.21	18.40	2.06	18.40	1.90	-	-
	(INJ) -7	18.40	2.93	18.40	2.64	18.40	2.35	18.40	2.21	18.40	2.05	-	-
	(INJ) 2	18.40	2.90	18.40	2.60	18.29	2.30	18.26	2.26	18.22	2.21	18.12	2.08
	7	18.40	4.01	18.40	3.58	18.40	3.14	18.40	2.83	18.40	2.49	18.40	2.24
	12	19.42	4.58	19.42	4.05	19.42	3.52	19.42	3.15	19.42	2.76	19.42	2.55
	15	20.57	4.91	20.57	4.34	20.57	3.76	20.57	3.37	20.57	2.96	20.57	2.74
	20	22.48	5.55	22.48	4.89	22.48	4.23	22.48	3.80	22.48	3.34	22.48	3.05
Min	-20	16.22	2.00	15.81	1.87	15.40	1.73	-	-	-	-	-	-
	-15	18.33	2.36	18.16	2.16	17.99	1.97	17.31	1.82	16.63	1.66	-	-
	-10	18.40	2.72	18.40	2.46	18.40	2.21	18.40	2.06	18.40	1.90	-	-
	-7	12.64	2.72	12.14	2.41	11.63	2.10	10.65	1.83	9.66	1.53	-	-
	2	11.80	3.52	11.31	3.11	10.83	2.70	9.99	2.35	9.14	1.97	-	-
	7	11.43	4.31	10.49	3.73	9.55	3.15	8.40	2.64	7.24	2.10	-	-
	12	11.37	5.08	10.37	4.39	9.36	3.70	8.29	3.39	7.22	3.05	-	-
	15	13.47	5.58	12.43	4.87	11.38	4.17	10.43	3.85	9.47	3.49	-	-
	20	19.95	5.94	19.11	5.29	18.26	4.63	17.48	4.21	16.71	3.75	-	-

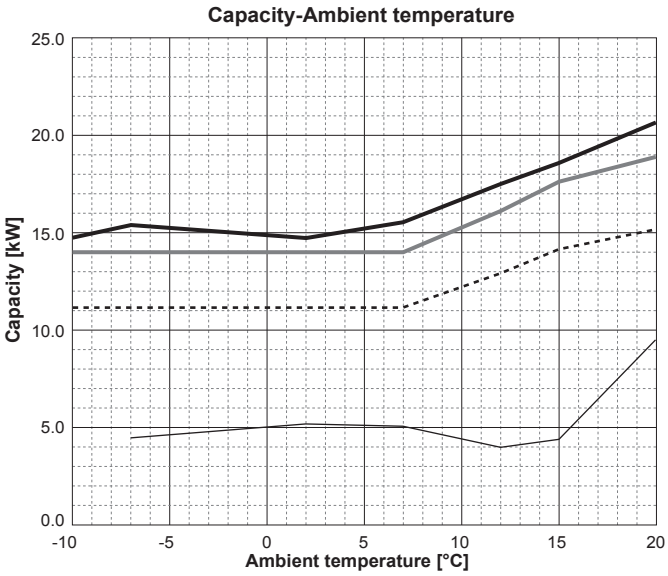
PUHZ-SHW140YHA

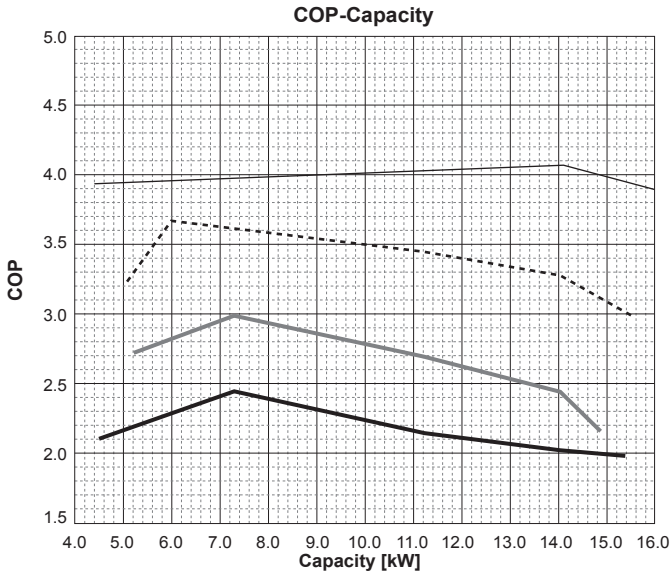
■ Water outlet temperature 35 [℃]



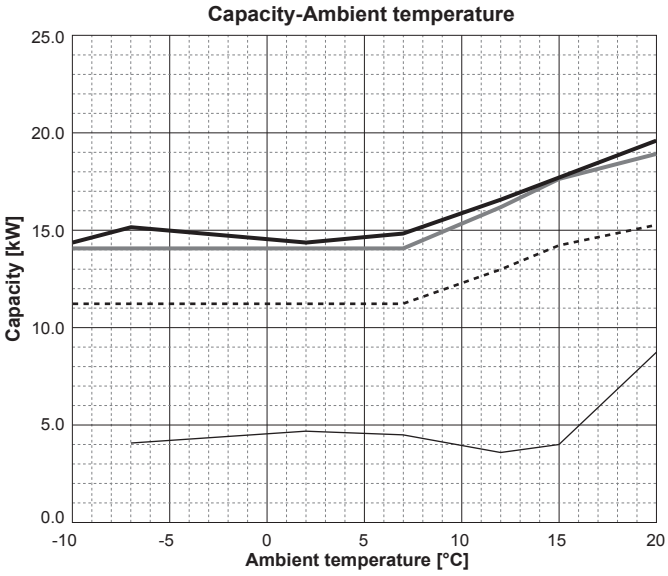


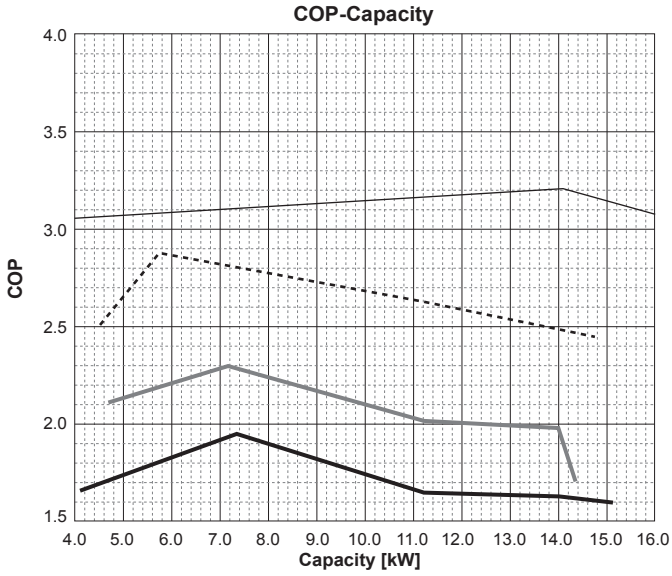
■ Water outlet temperature 45 [℃]





■ Water outlet temperature 55 [℃]





5.4 Best COP

<Notes>
1) These data are measured based on EN14511-2011.
2) Max COP of each model at each condition are shown.

■ Power inverter

Water outlet temperature[℃]		35		45		55	
Ambient temperature[℃]		Capacity	COP	Capacity	COP	Capacity	COP
SUHZ-SW 45VA/VAH	-7	3.22	3.12 / 2.80	2.96	2.18 / 2.00	3.50	1.41 / 1.34
	2	3.32	3.42 / 3.04	3.27	2.78 / 2.52	3.50	2.04 / 1.91
		3.25	3.54 / 3.14	3.08	2.54 / 2.31	2.91	1.87 / 1.74
	7	4.10	5.10	4.50	3.70	4.50	2.70
PUHZ-SW 40VHA(-BS)	-7	3.49	2.85	3.36	2.15	3.24	1.65
	2	3.04	3.58	3.14	2.74	3.18	1.98
		2.85	3.72	2.82	2.87	2.79	2.08
	7	3.91	4.82	3.76	3.66	3.65	2.45
PUHZ-SW 50VHA(-BS)	-7	3.52	2.85	3.39	2.16	3.26	1.66
	2	3.06	3.60	3.16	2.76	3.21	1.99
		2.87	3.74	2.85	2.88	2.82	2.09
	7	3.94	4.84	3.79	3.67	3.68	2.46
PUHZ-SW 75VHA(-BS)	-7	6.16	2.95	5.92	2.26	5.33	1.80
	2	5.11	3.60	4.73	3.05	4.18	2.28
		4.57	3.71	4.23	3.12	3.75	2.35
	7	5.64	4.72	5.94	3.65	6.14	2.87
PUHZ-SW 100V/YHA(-BS)	-7	7.15	2.95	7.35	2.27	7.48	1.68
	2	7.32	3.69	7.17	2.86	6.89	2.15
		6.74	3.88	6.63	2.97	6.42	2.29
	7	6.21	4.71	6.35	3.62	6.58	2.80
PUHZ-SW 120V/YHA(-BS)	-7	8.11	2.92	8.34	2.26	8.56	1.76
	2	7.81	3.67	7.54	2.88	7.32	2.12
		6.82	3.84	6.78	2.97	6.72	2.21
	7	9.24	4.65	9.55	3.54	9.89	2.71
PUHZ-W112VHA(-BS)	-7	7.15	3.01	7.35	2.33	7.48	1.68
	2	7.32	3.75	7.32	2.93	6.89	2.17
		6.75	3.95	6.70	3.09	6.40	2.31
	7	6.30	4.77	6.30	3.66	6.60	2.83

■ Mr.SLIM+

Water outlet temperature[℃]		35		45		55	
Ambient temperature[℃]		Capacity	COP	Capacity	COP	Capacity	COP
PUHZ-FRP 71VHA	-7	3.40	3.05	3.20	2.45	2.20	2.05
	2	4.70	3.55	4.00	3.00	3.20	2.35
		4.40	3.65	3.90	3.10	2.90	2.45
	7	5.40	4.55	4.50	3.65	3.70	2.75

■ Zubadan

Water outlet temperature[℃]		35		45		55	
Ambient temperature[℃]		Capacity	COP	Capacity	COP	Capacity	COP
PUHZ-SHW 80VHA	-7	7.18	3.20	7.33	2.46	7.40	1.97
	2	7.54	3.68	7.35	3.00	7.21	2.33
		6.82	4.06	6.72	3.15	6.66	2.46
	7	6.15	4.82	6.03	3.70	5.79	2.90
PUHZ-SHW 112V/YHA	-7	7.16	3.18	7.31	2.45	7.38	1.96
	2	7.52	3.66	7.33	2.99	7.19	2.32
		6.80	4.04	6.70	3.13	6.64	2.45
	7	6.13	4.80	6.01	3.68	5.77	2.89
PUHZ-SHW 140YHA	-7	7.14	3.18	7.29	2.44	7.36	1.96
	2	7.50	3.65	7.31	2.98	7.17	2.31
		6.79	4.03	6.69	3.13	6.63	2.44
	7	6.12	4.79	6.00	3.67	5.76	2.88
PUHZ-SHW 230YKA	-7	16.68	2.95	19.41	2.37	20.98	2.13
	2	13.20	3.45	13.04	2.59	12.91	2.27
		12.49	3.55	12.22	2.73	12.00	2.33
	7	11.43	4.31	13.94	3.17	15.42	2.50

9.4 Split-type units (ZUBADAN)

PUHZ-SHW80VHA, PUHZ-SHW112VHA,
PUHZ-SHW112YHA, PUHZ-SHW140YHA,
PUHZ-SHW230YKA

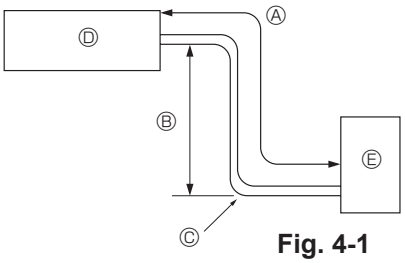
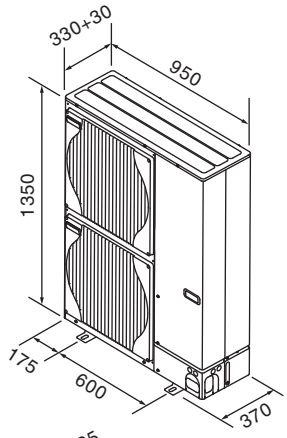


Fig. 4-1

SHW80,112,140



SHW230

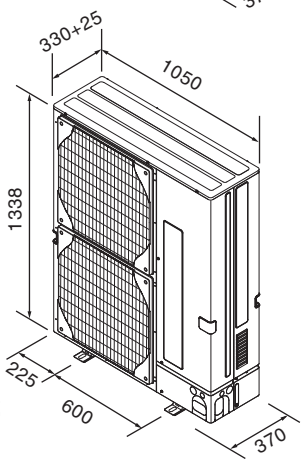


Fig. 4-2

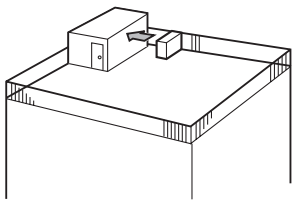


Fig. 4-3

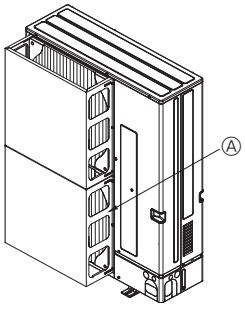


Fig. 4-4

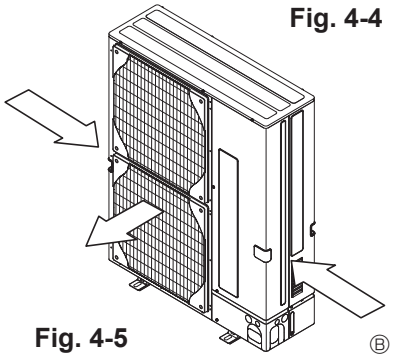


Fig. 4-5

■ Refrigerant pipe (Fig. 4-1)

Check that the difference between the heights of the indoor and outdoor units, the length of refrigerant pipe, and the number of bends in the pipe are within the limits shown below.

Models	Ⓐ Pipe length (one way)	Ⓑ Height difference	Ⓒ Number of bends (one way)
SHW80,112,140	Max. 75 m	Max. 30 m	Max. 15
SHW230	Max. 80 m	Max. 30 m	Max. 15

- Height difference limitations are binding regardless of which unit, indoor or outdoor, is positioned higher.
  ⒹIndoor unit ⒺOutdoor unit

■ Choosing the outdoor unit installation location

- Avoid locations exposed to direct sunlight or other sources of heat.
- Select a location from which noise emitted by the unit will not inconvenience neighbors.
- Select a location permitting easy wiring and pipe access to the power source and indoor unit.
- Avoid locations where combustible gases may leak, be produced, flow, or accumulate.
- Note that water may drain from the unit during operation.
- Select a level location that can bear the weight and vibration of the unit.
- Avoid locations where the unit can be covered by snow. In areas where heavy snow fall is anticipated, special precautions such as raising the installation location or installing a hood on the air intake must be taken to prevent the snow from blocking the air intake or blowing directly against it. This can reduce the airflow and a malfunction may result.
- Avoid locations exposed to oil, steam, or sulfuric gas.
- Use the transportation handles of the outdoor unit to transport the unit. If the unit is carried from the bottom, hands or fingers may be pinched.

■ Outline dimensions (Outdoor unit) (Fig. 4-2)

■ Ventilation and service space

(1) Windy location installation

When installing the outdoor unit on a rooftop or other location unprotected from the wind, situate the air outlet of the unit so that it is not directly exposed to strong winds. Strong wind entering the air outlet may impede the normal airflow and a malfunction may result.

The following shows three examples of precautions against strong winds.

① Face the air outlet towards the nearest available wall about 50 cm away from the wall. (Fig. 4-3)

② Install an optional air guide if the unit is installed in a location where strong winds from a typhoon, etc. may directly enter the air outlet. (Fig. 4-4)
ⒶAir protection guide

③ Position the unit so that the air outlet blows perpendicularly to the seasonal wind direction, if possible. (Fig. 4-5)
ⒷWind direction

(2) When installing a single outdoor unit **(Refer to the next page)**

Minimum dimensions are as follows, except for Max., meaning Maximum dimensions, indicated.

Refer to the figures for each case.

① Obstacles at rear only (Fig. 4-6)

② Obstacles at rear and above only (Fig. 4-7)

③ Obstacles at rear and sides only (Fig. 4-8)

④ Obstacles at front only (Fig. 4-9)
*When using the optional air outlet guides, the clearance is 500 mm or more.

⑤ Obstacles at front and rear only (Fig. 4-10)
*When using the optional air outlet guides, the clearance is 500 mm or more.

⑥ Obstacles at rear, sides, and above only (Fig. 4-11)
•Do not install the optional air outlet guides for upward airflow.

(3) When installing multiple outdoor units **(Refer to the next page)**

Leave 10 mm space or more between the units.

① Obstacles at rear only (Fig. 4-12)

② Obstacles at rear and above only (Fig. 4-13)
•No more than 3 units must be installed side by side. In addition, leave space as shown.
•Do not install the optional air outlet guides for upward airflow.

③ Obstacles at front only (Fig. 4-14)
*When using the optional air outlet guides, the clearance is 1000 mm or more.

④ Obstacles at front and rear only (Fig. 4-15)
*When using the optional air outlet guides, the clearance is 1000 mm or more.

⑤ Single parallel unit arrangement (Fig. 4-16)
*When using the optional air outlet guides installed for upward airflow, the clearance is 1000 mm or more.

⑥ Multiple parallel unit arrangement (Fig. 4-17)
*When using the optional air outlet guides installed for upward airflow, the clearance is 1500 mm or more.

⑦ Stacked unit arrangement (Fig. 4-18)
•The units can be stacked up to 2 units high.
•No more than 2 stacked units must be installed side by side. In addition, leave space as shown.

UNIT : mm

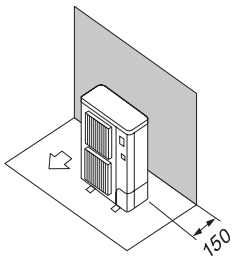


Fig. 4-6

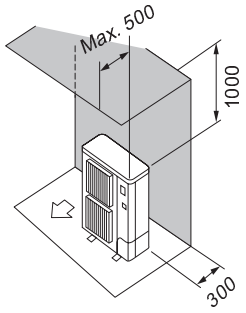


Fig. 4-7

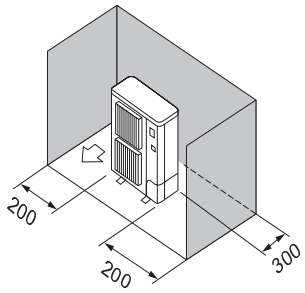


Fig. 4-8

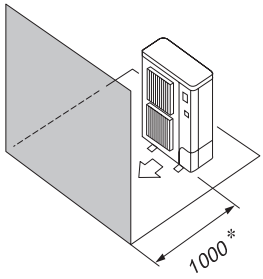


Fig. 4-9

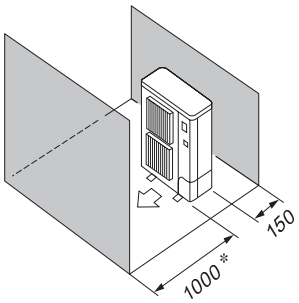


Fig. 4-10

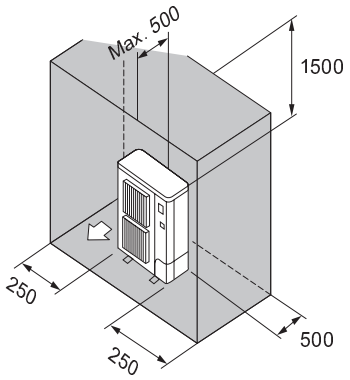


Fig. 4-11

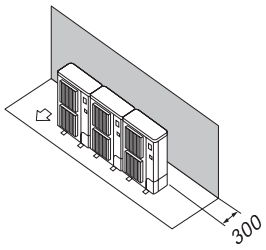


Fig. 4-12

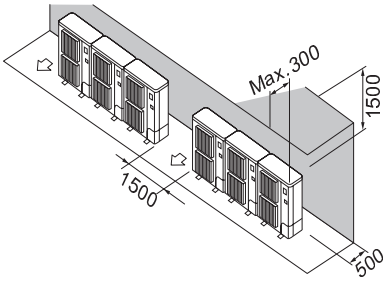


Fig. 4-13

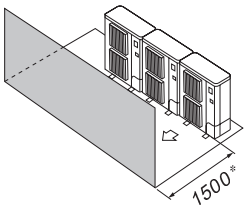


Fig. 4-14

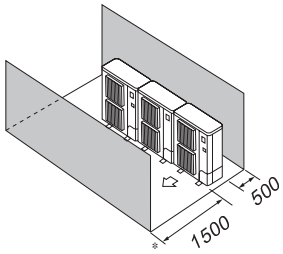


Fig. 4-15

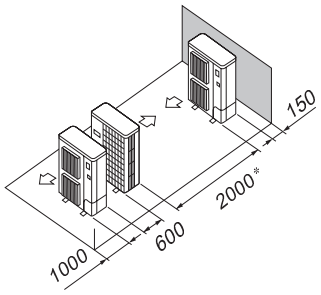


Fig. 4-16

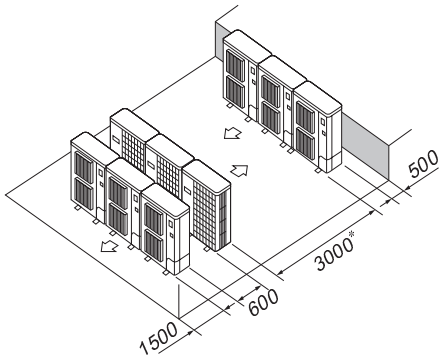


Fig. 4-17

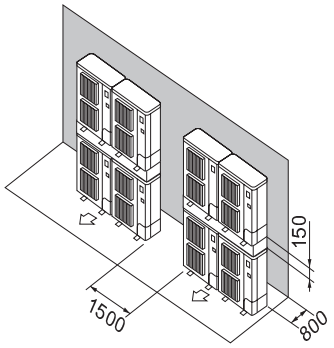


Fig. 4-18

4.1 Water Quality and System Preparation

General

- The water in both primary and sanitary circuit should be clean and with pH valve of 6.5-8.0
- The followings are the maximum valves;
  Calcium: 100mg/L, Ca hardness: 250mg/L
  Chlorine: 100mg/L, Copper: 0.3mg/L
  Iron/Manganese: 0.5mg/L
- Other constituents should be to European Directive 98/83 EC standards.l
- In known hard water areas, to prevent/minimise scaling, it is beneficial to restrict the routine stored water temperature (DHW max. temp.) to 55°C.

Anti-Freeze

Anti-freeze solutions MUST use propylene glycol with a toxicity rating of Class 1 as listed in Clinical Toxicology of Commercial Products, 5th Edition.

Note:

1. Ethylene glycol is toxic and must NOT be used in the primary water circuit in case of any cross-contamination of the potable circuit.

2. For 2-zone valve ON/OFF control, propylene glycol MUST be used.

New Installation (primary water circuit)

- Before connecting outdoor unit, thoroughly cleanse pipework of building debris, solder etc using a suitable chemical cleansing agent.
- Flush the system to remove chemical cleanser.
- For all packaged model systems add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.
- For split model systems the responsible installer should decide if anti-freeze solution is necessary for each site's conditions. Corrosion inhibitor however should always be used.

Existing Installation (primary water circuit)

- Before connecting outdoor unit the existing heating circuit MUST be chemically cleansed to remove existing debris from the heating circuit.
- Flush the system to remove chemical cleanser.
- For all packaged model systems add a combined inhibitor and anti-freeze solution to prevent damage to the pipework and system components.
- For split model systems the responsible installer should decide if anti-freeze solution is necessary for each site's conditions. Corrosion inhibitor however should always be used.

When using chemical cleansers and inhibitors always follow manufacturer's instructions and ensure the product is appropriate for the materials used in the water circuit

Minimum amount of water required in the space heating / cooling circuit

Outdoor heat pump unit		Minimum water quantity [L]
Packaged model	PUHZ-W50	40
	PUHZ-W85	60
	PUHZ-W112	80
	PUHZ-HW112	80
	PUHZ-HW140	100
Split model	SUHZ-SW45	40
	PUHZ-SW40	32
	PUHZ-SW50	40
	PUHZ-FRP71	60
	PUHZ-SW75	60
	PUHZ-SW100	80
	PUHZ-SW120	120
	PUHZ-SHW80	60
	PUHZ-SHW112	80
	PUHZ-SHW140	100

Note:

For 2-zone temperature control system, the value in the table above excludes the amount of stored water in zone 2.

4.2 Water Pipe Work

Note: Prevent the field piping from straining the piping on the hydrobox by fixing it to a wall or applying other methods.

Hot Water Pipework

The function of the following safety components of the hydrobox should be checked on installation for any abnormalities;

- Pressure relief valve
- Expansion vessel pre-charge (gas charge pressure)

The instruction on the following pages regarding safe discharge of hot water from Safety devices should be followed carefully.

- The pipework will become very hot, so should be insulated to prevent burns.
- When connecting pipework, ensure that no foreign objects such as debris or the like do not enter the pipe.

Hydraulic Filter Work (ONLY EHPX series)

Install a hydraulic filter or strainer (local supply) at the water intake ("Pipe E" in Table 2.2.1, also see associated schematic Fig. 4.6.)

Pipework Connections

Connections to the hydrobox should be made using the 28 mm compression as appropriate. (except for ERSC series)

Do not over-tighten compression fittings as this will lead to deformation of the olive ring and potential leaks.

Note: To weld the pipes in the field, cool the pipes on the hydrobox using wet towel etc.

ERSC series have G1 (male) thread connections.

Insulation of Pipework

- All exposed water pipework should be insulated to prevent unnecessary heat loss and condensation. To prevent condensate entering the hydrobox, the pipework and connections at the top of the hydrobox should be carefully insulated.
- Cold and hot water pipework should not be run close together where possible, to avoid unwanted heat transfer.
- Pipework between outdoor heat pump unit and hydrobox should be insulated with suitable pipe insulation material with a thermal conductivity of ≤ 0.04 W/m.K.

Filling the System (Primary Circuit)

1. Check all connections including factory fitted ones are tight.
2. Insulate pipework between hydrobox and outdoor unit.
3. Thoroughly clean and flush, system of all debris. (see section 4.1 for instruction.)
4. Fill hydrobox with potable water. Fill primary heating circuit with water and suitable anti-freeze and inhibitor as necessary. **Always use a filling loop with double check valve when filling the primary circuit to avoid back flow contamination of water supply.**

- Anti-freeze should always be used for packaged model systems (see section 4.1 for instruction). It is the responsibility of the installer to decide if anti-freeze solution should be used in split model systems depending on each site's conditions. Corrosion inhibitor should be used in both split model and packaged model systems.
- When connecting metal pipes of different materials insulate the joints to prevent a corrosive reaction taking place which will damage the pipe-work.

5. Check for leakages. If leakage is found, retighten the screws onto the connections.
6. Pressurise system to 1 bar.
7. Release all trapped air using air vents during and following heating period.
8. Top up with water as necessary. (If pressure is below 1 bar)

Sizing Expansion Vessels

Expansion vessel volume must fit the local system water volume.
To size an expansion vessel both for the heating and cooling circuits the following formula and graph can be used.
When the necessary expansion vessel volume exceeds the volume of an built-in expansion vessel, install an additional expansion vessel so that the sum of the volumes of the expansion vessels exceeds the necessary expansion vessel volume.

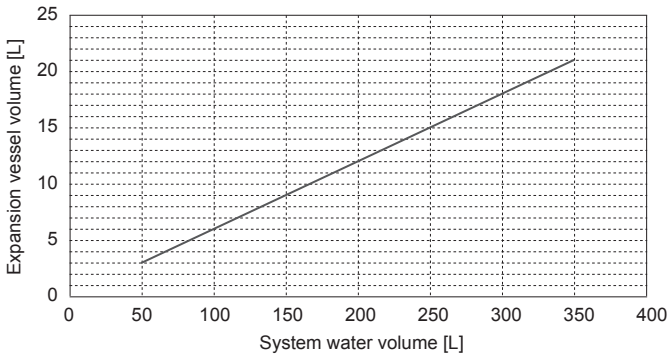
* For installation of an E*S*-*M*EC model, provide and install an expansion vessel in the field as the model does not come fitted with an expansion vessel.

$$V = \frac{\varepsilon \times G}{1 - \frac{P_1 + 0.098}{P_2 + 0.098}}$$

Where;
- V : Necessary expansion vessel volume [L]
- ε : Water expansion coefficient
- G : Total volume of water in the system [L]
- P_1 : Expansion vessel setting pressure [MPa]
- P_2 : Max pressure during operation [MPa]

Graph to the right is for the following values
- ε : at 70 °C = 0.0229
- P_1 : 0.1 MPa
- P_2 : 0.3 MPa
- *A 30% safety margin has been added.

Expansion vessel sizing



<Figure 4.2.1>

Water Circulation Pump Characteristics

Pump speed can be selected by main controller setting (see Section 4.3).
Adjust the pump speed setting so that the flow rate in the primary circuit is appropriate for the outdoor unit installed (see Table 4.2.1). It may be necessary to add an additional pump to the system depending on the length and lift of the primary circuit.
For outdoor unit model not listed in the <Table 4.2.1>, refer to Water flow rate range in the specification table of outdoor unit Data Book. In such case, make sure that the flow rate is greater than 7.1 L/min and less than 27.7 L/min.

<Second pump >
If a second pump is required for the installation please read the following carefully.
If a second pump is used in the system it can be positioned in 2 ways.
The position of the pump influences which terminal of the FTC the signal cable should be wired to. If the additional pump(s) have current greater than 1A please use appropriate relay. Pump signal cable can either be wired to TBO.1 1-2 or CNP1 but not both.

Option 1 (Space heating/cooling only)
If the second pump is being used for the heating circuit only then the signal cable should be wired to TBO.1 terminals 3 and 4 (OUT2). In this position the pump can be run at a different speed to the hydrobox's in-built pump.

Option 2 (Primary circuit DHW and space heating/cooling)
If the second pump is being used in the primary circuit between the hydrobox and the outdoor unit (Package system ONLY) then the signal cable should be wired to TBO.1 terminals 1 and 2 (OUT1). In this position the pump speed **MUST** match the speed of the hydrobox's in-built pump.
Note: Refer to 3.1.3 (cylinder) or 3.2.3 (hydrobox) Connecting inputs/outputs.

Outdoor heat pump unit		Water flow rate range [L/min]
Packaged model	PUHZ-W50	7.1-14.3
	PUHZ-W85	10.0-25.8
	PUHZ-W112	14.4-27.7
	PUHZ-HW112	14.4-27.7
	PUHZ-HW140	17.9-27.7
Split model	SUHZ-SW45	7.1-12.9
	PUHZ-SW40	7.1-11.8
	PUHZ-SW50	7.1-17.2
	PUHZ-FRP71	11.5-22.9
	PUHZ-SW75	10.2-22.9
	PUHZ-SW100	14.4-27.7
	PUHZ-SW120	20.1-27.7
	PUHZ-SHW80	10.2-22.9
	PUHZ-SHW112	14.4-27.7
	PUHZ-SHW140	17.9-27.7

<Table 4.2.1>

* If the water flow rate is less than 7.1 L/min, the flow rate error will be activated.
If the water flow rate exceeds 27.7 L/min, the flow speed will be greater than 1.5 m/s, which could erode the pipes.