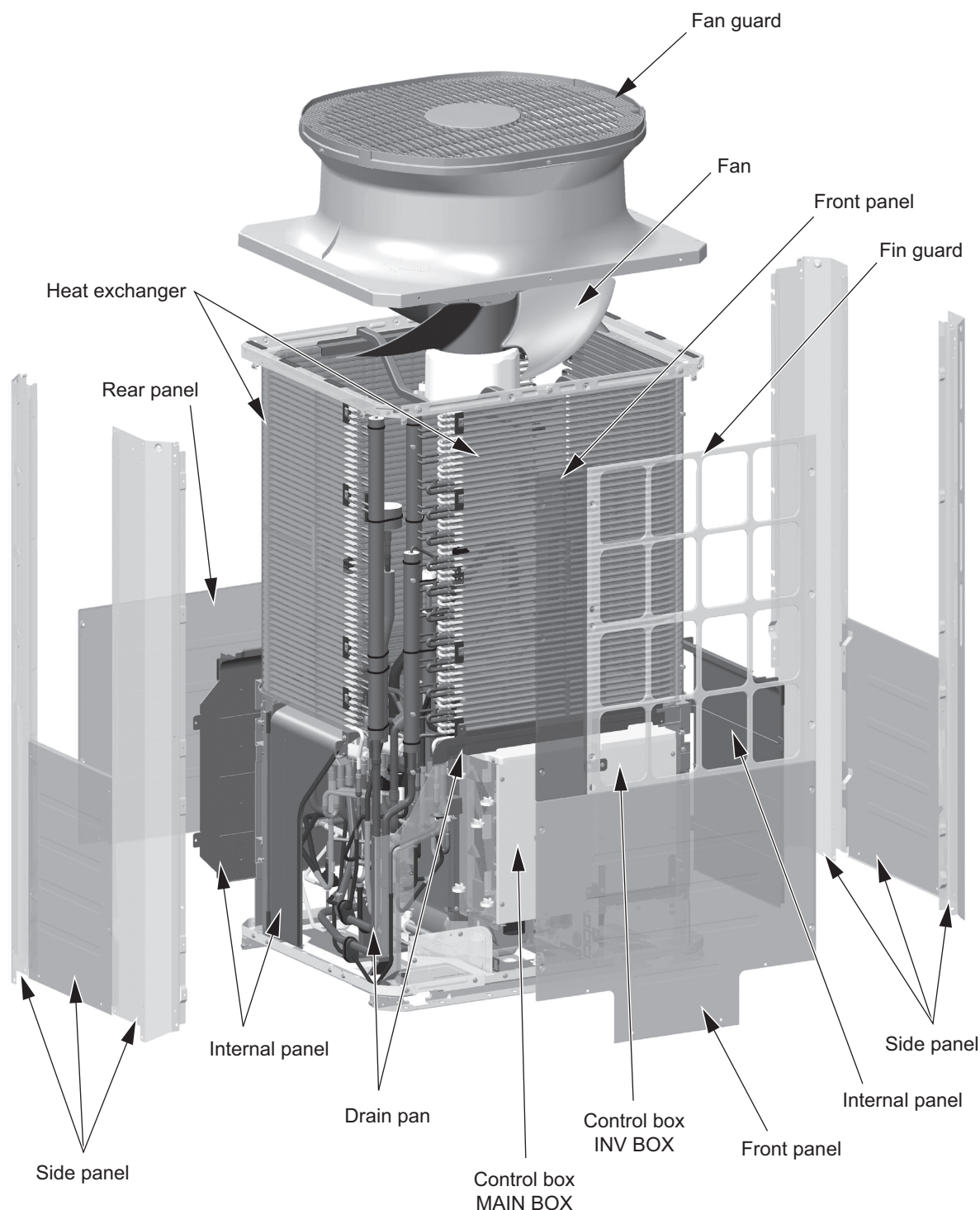


## 3-1 External Appearance and Refrigerant Circuit Components of Outdoor Unit

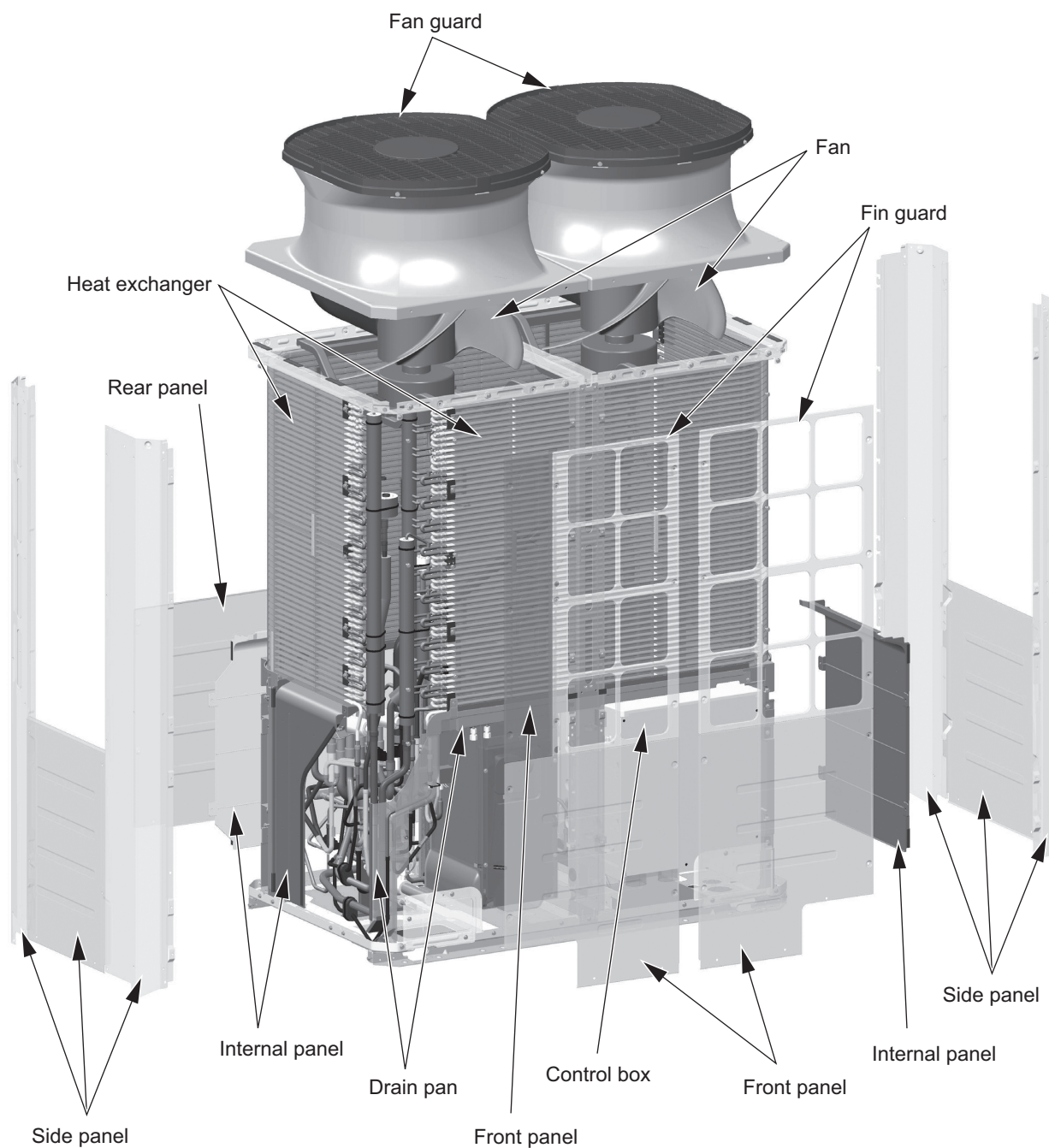
### 3-1-1 External Appearance of Outdoor Unit

(1) PUHY-M200, M250, M300YNW-A1  
PUHY-EM200, EM250, EM300YNW-A1

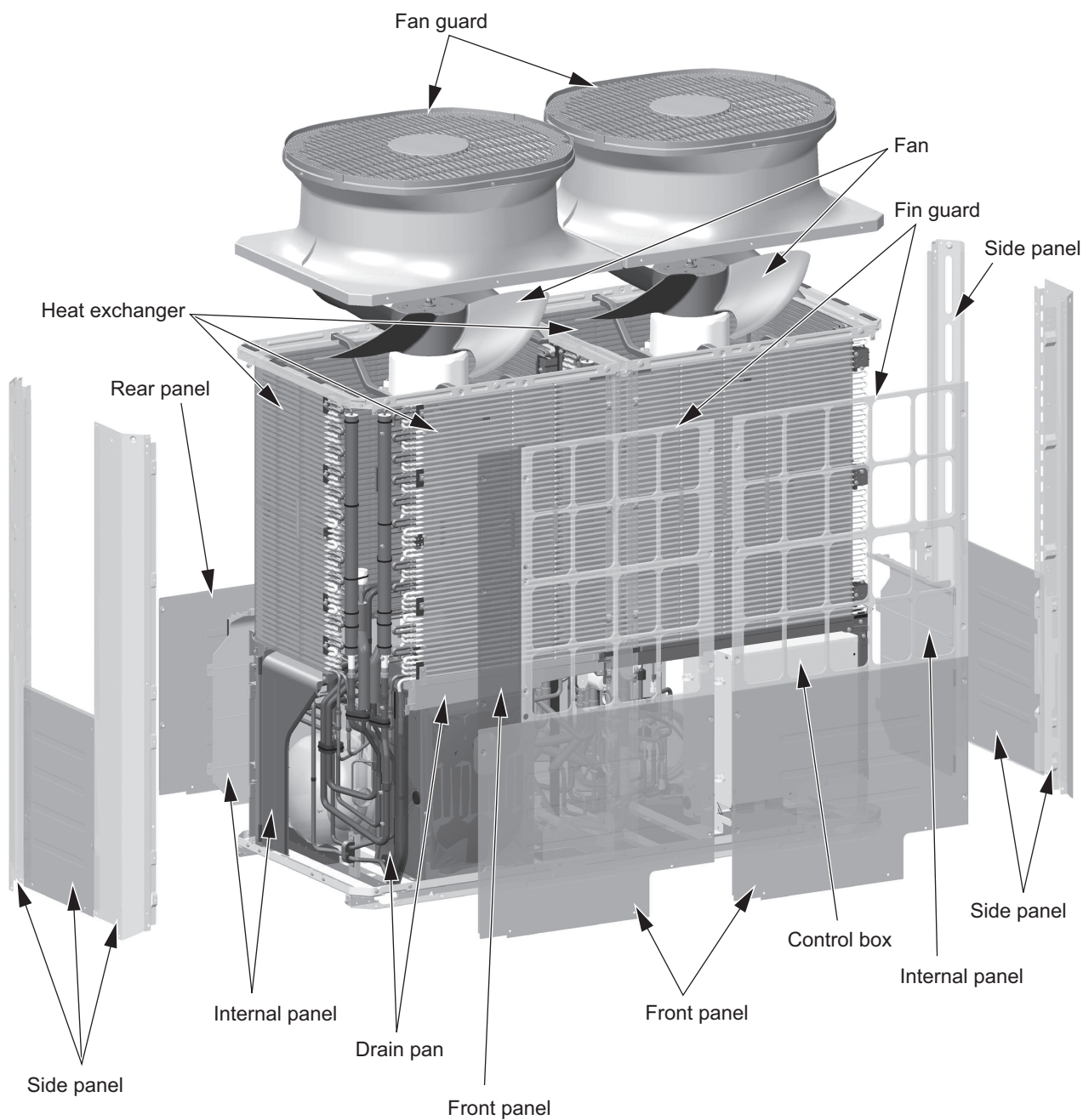


**(2) PUHY-M350, M400, M450YNW-A1  
PUHY-EM350, EM400, EM450YNW-A1**

**3 Major Components, Their Functions and Refrigerant Circuits**



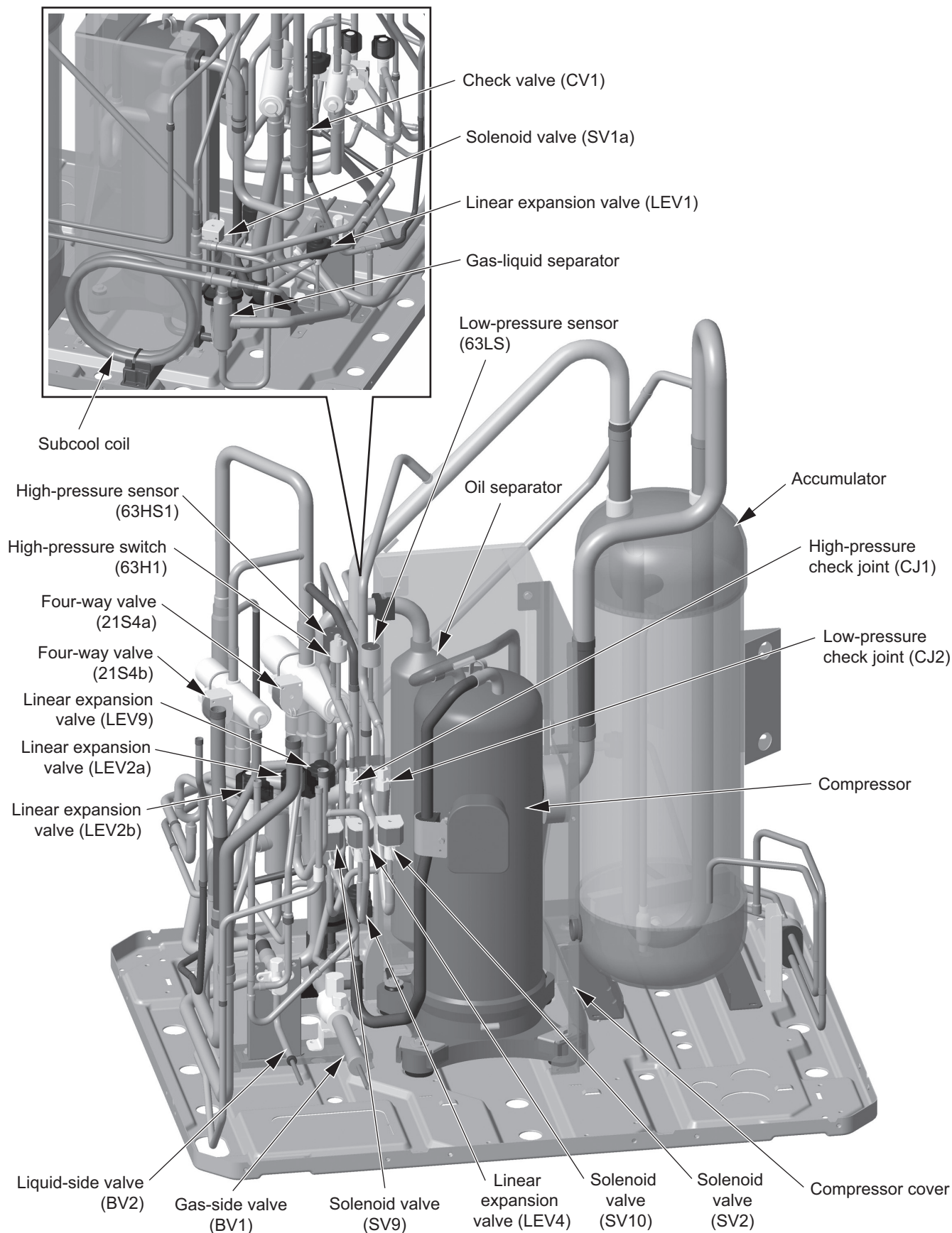
**(3) PUHY-M500YNW-A1  
PUHY-EM500YNW-A1**





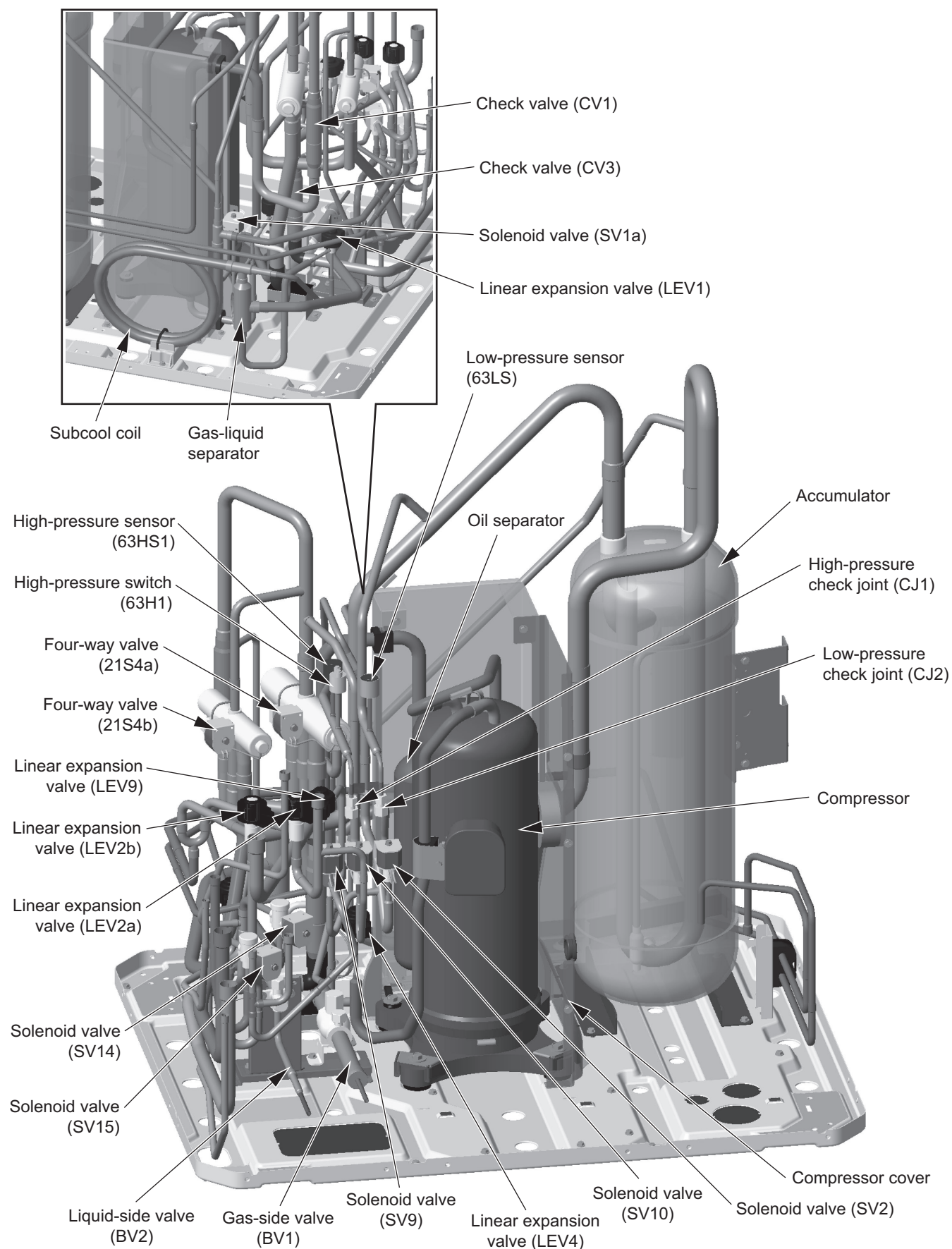
## 3-1-2 Outdoor Unit Refrigerant Circuits

### (1) PUHY-M200, M250, M300YNW-A1

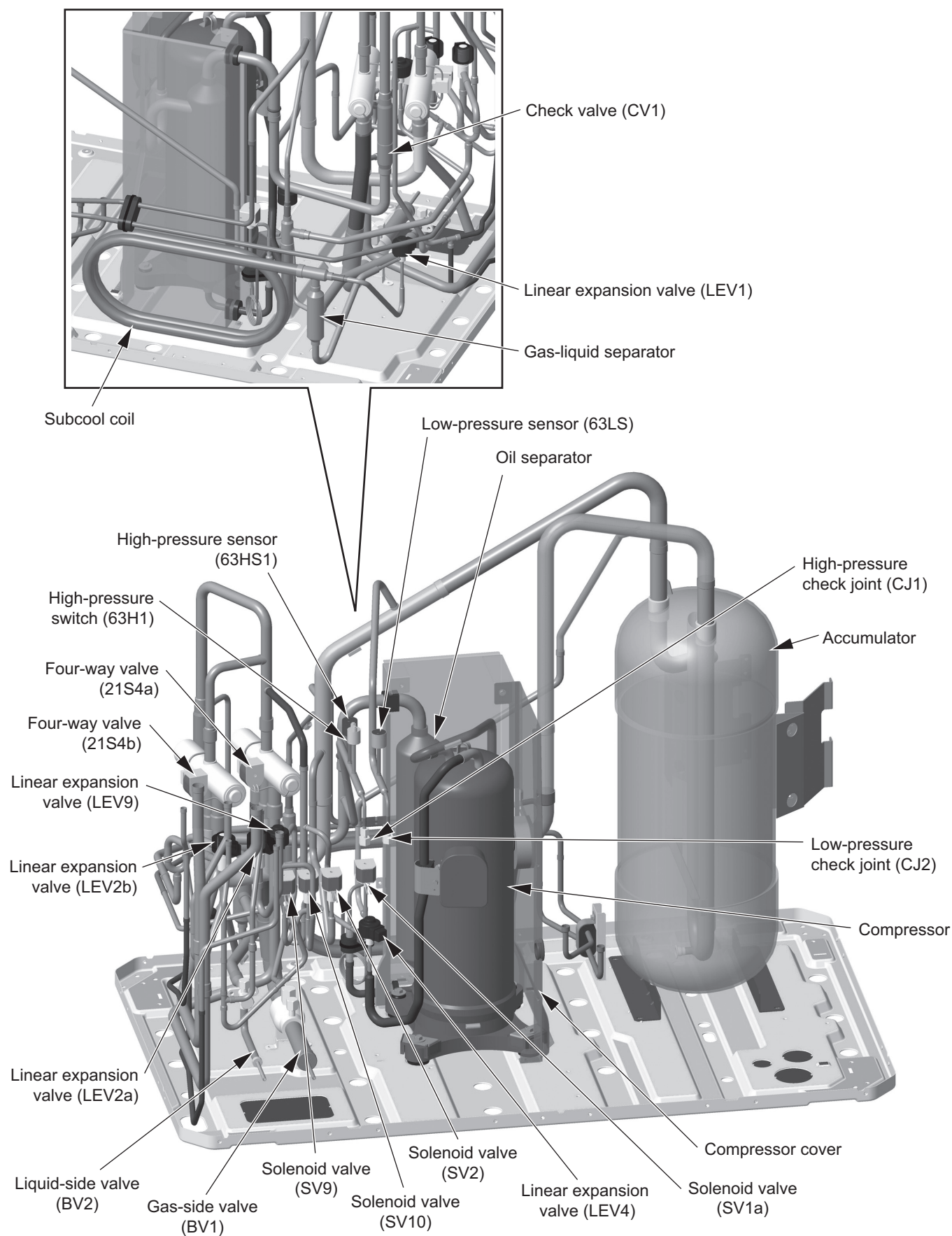




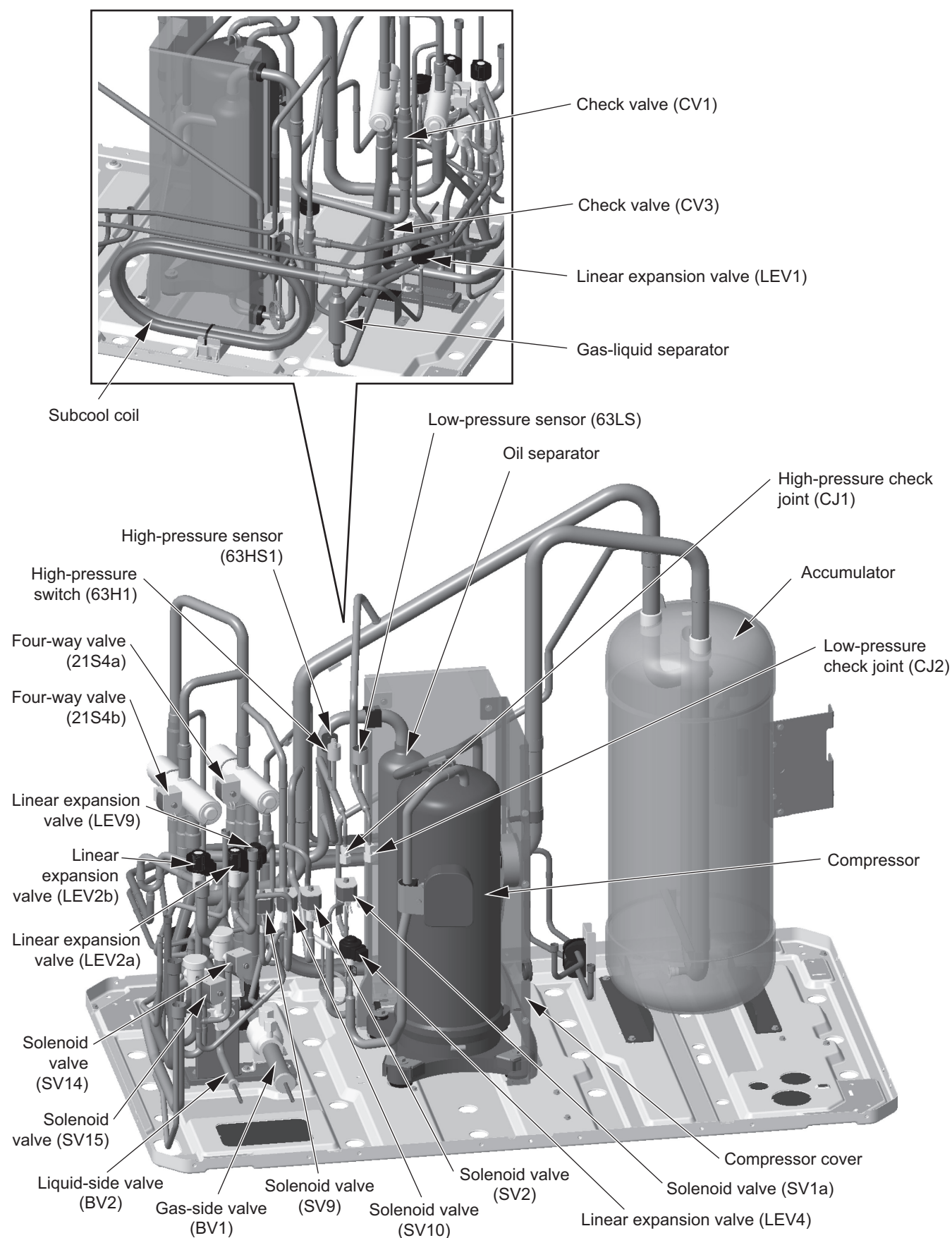
## (2) PUHY-EM200, EM250, EM300YNW-A1



### (3) PUHY-M350, M400, M450YNW-A1



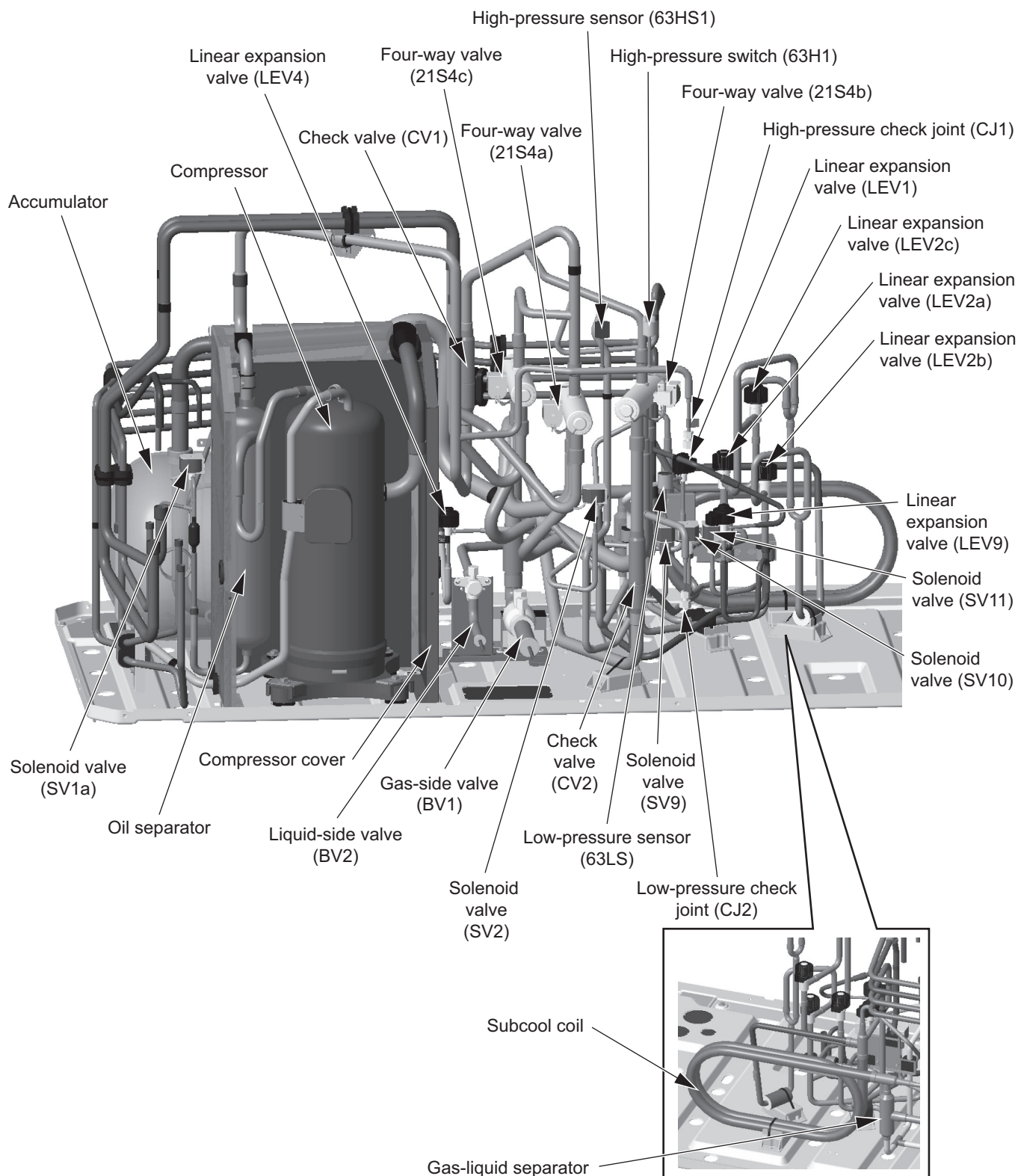
#### (4) PUHY-EM350, EM400, EM450YNW-A1





## (5) PUHY-(E)M500YNW-A1

### 3 Major Components, Their Functions and Refrigerant Circuits

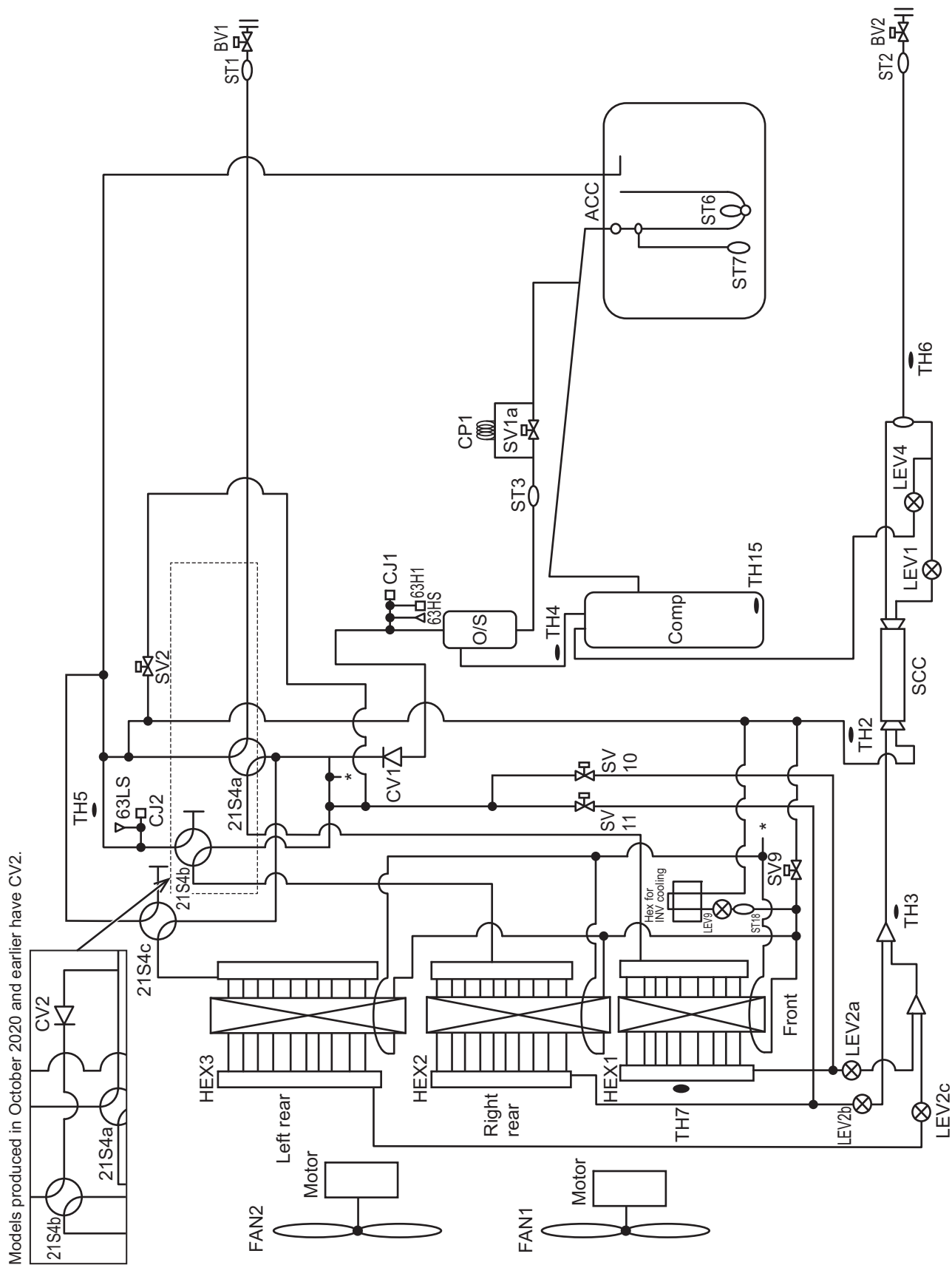


### 3 Major Components, Their Functions and Refrigerant Circuits



(2) PUHY-M500YNW-A1

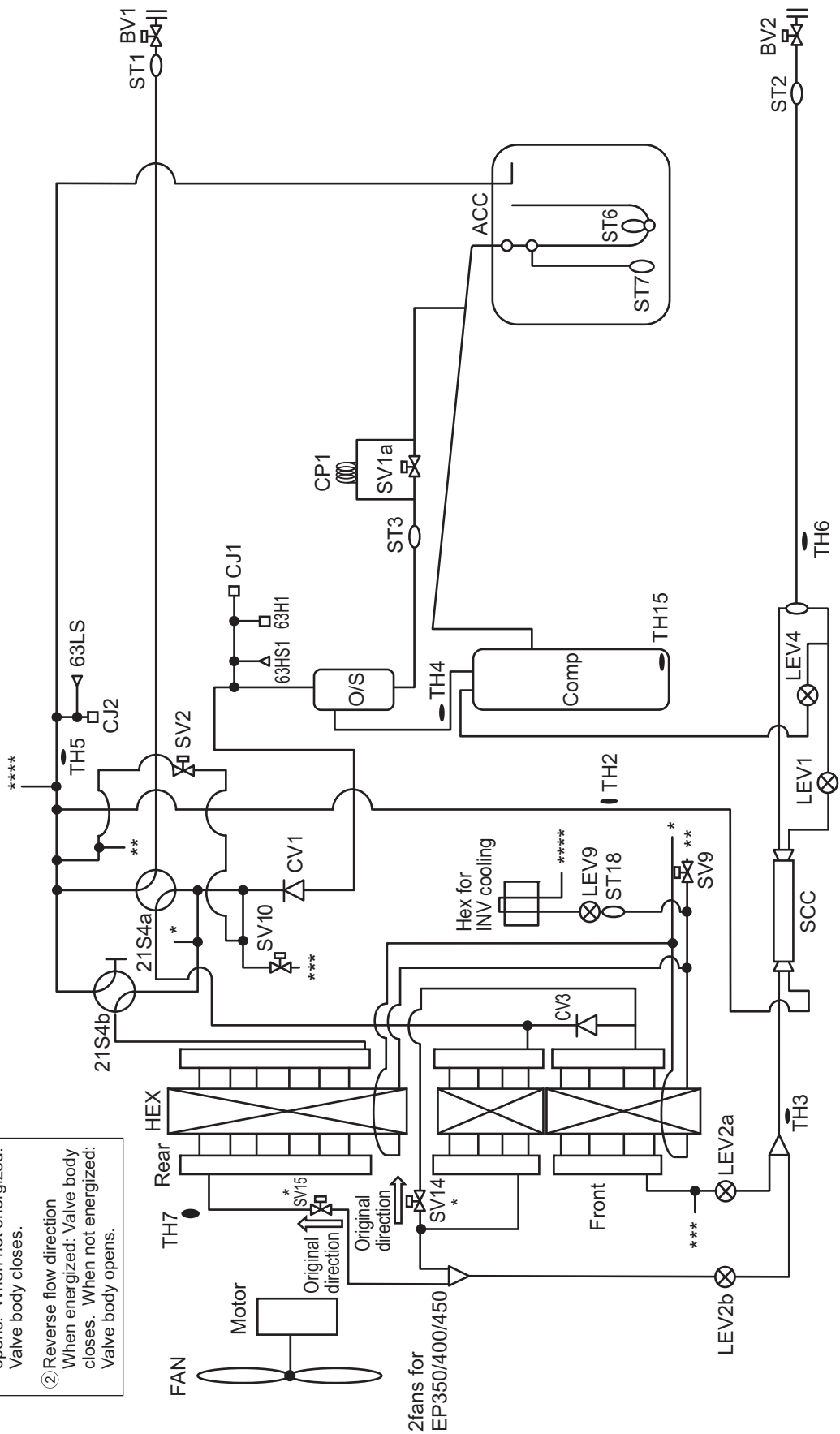
3 Major Components, Their Functions and Refrigerant Circuits



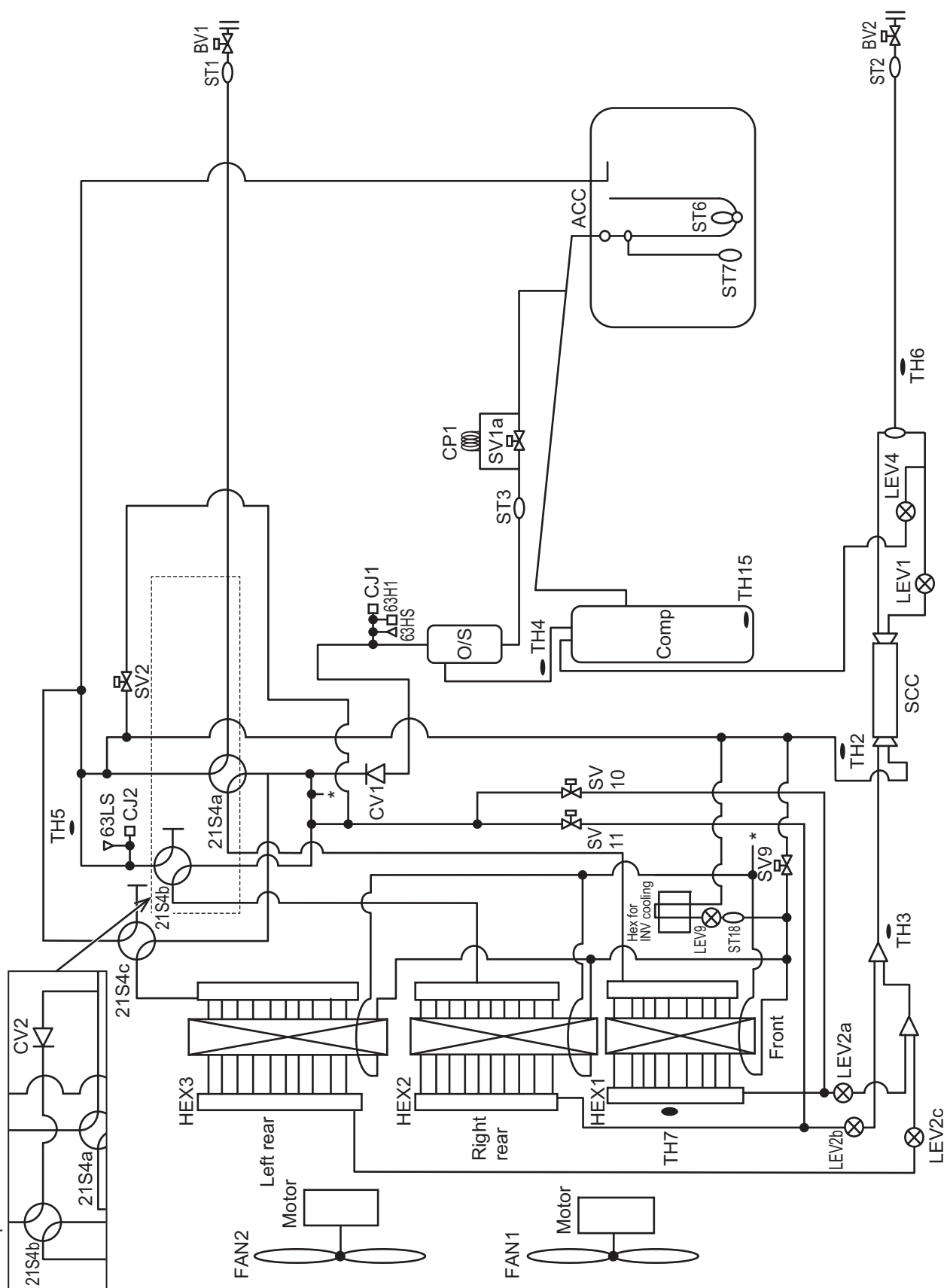


(3) PUHY-EM200-EM450YNW-A1

\*Notes on SV14 and 15  
Special pressure-difference driven two-way valve  
① Normal flow direction  
When energized: Valve body opens. When not energized: Valve body closes.  
② Reverse flow direction  
When energized: Valve body closes. When not energized: Valve body opens.



Models produced in October 2020 and earlier have CV2.



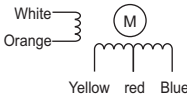
### 3-3 Functions of the Major Components of Outdoor Unit

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Com-pressor	MC1 (Comp1)		Adjusts the amount of circulating refrigerant by adjusting the operating frequency based on the operating pressure data	(E)M200 - (E)M350 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F]: 0.192 Ω (E)M400 - (E)M500 models Low-pressure shell scroll compressor wirewound resistance 20°C [68°F]: 0.219 Ω	
High pressure sensor	63HS1		1) Detects high pressure 2) Regulates frequency and provides high-pressure protection	<p>63HS1</p> <p>Pressure 0~4.15 MPa [601psi] Vout 0.5~3.5V 0.071V/0.098 MPa [14psi] Pressure [MPa] =1.38 x Vout [V]-0.69 Pressure [psi] =(1.38 x Vout [V] - 0.69) x 145</p> <p>1 GND (Black) 2 Vout (White) 3 Vcc (DC5V) (Red)</p>	
Low pressure sensor	63LS		1) Detects low pressure 2) Provides low-pressure protection 3) Defrost control during heating operation	<p>63LS</p> <p>Pressure 0~1.7 MPa [247psi] Vout 0.5~3.5V 0.173V/0.098 MPa [14psi] Pressure [MPa] =0.566 x Vout [V] - 0.283 Pressure [psi] =(0.566 x Vout [V] - 0.283) x 145</p> <p>1 GND (Black) 2 Vout (White) 3 Vcc (DC5V) (Red)</p>	
Pressure switch	63H1		1) Detects high pressure 2) Provides high-pressure protection	4.15MPa [601psi] OFF setting	



[3-3 Functions of the Major Components of Outdoor Unit ]

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Thermistor	TH4 (Discharge temperature)		1) Detects discharge air temperature 2) Provides high-pressure protection	<b>Degrees Celsius</b> $R_{120} = 7.465k\Omega$ $R_{25/120} = 4057$ $R_t = 7.465 \exp \{ 4057 (\frac{1}{273+t} - \frac{1}{393}) \}$	Resistance check
			0°C[32°F]: 698 kΩ 10°C[50°F]: 413 kΩ 20°C[68°F]: 250 kΩ 30°C[86°F]: 160 kΩ 40°C[104°F]: 104 kΩ 50°C[122°F]: 70 kΩ 60°C[140°F]: 48 kΩ 70°C[158°F]: 34 kΩ 80°C[176°F]: 24 kΩ 90°C[194°F]: 17.5 kΩ 100°C[212°F]: 13.0 kΩ 110°C[230°F]: 9.8 kΩ		
	TH2 (Pipe temperature)		LEV 1 is controlled based on the TH2, TH3, and TH6 values.	<b>Degrees Celsius</b> $R_0 = 15k\Omega$ $R_{0/80} = 3460$ $R_t = 15 \exp \{ 3460 (\frac{1}{273+t} - \frac{1}{273}) \}$	Resistance check
	TH3 (Pipe temperature)		1) Controls frequency 2) LEV1 is controlled based on the subcool at heat exchange outlet that is obtained based on the HPS data and TH3 value.	0°C[32°F]: 15 kΩ 10°C[50°F]: 9.7 kΩ 20°C[68°F]: 6.4 kΩ 25°C[77°F]: 5.3 kΩ 30°C[86°F]: 4.3 kΩ 40°C[104°F]: 3.1 kΩ	
	TH7 (Outdoor temperature)		1) Detects outdoor air temperature 2) Controls fan operation		
	TH5 (Pipe temperature)		LEV2 are controlled based on the 63LS and TH5 values.		
	TH6 (Pipe temperature)		Controls LEV1 based on TH2, TH3, and TH6 data.		
	TH15 (Compressor shell bottom temperature)		Detects compressor shell bottom temperature		
	THHS Inverter heat sink temperature		Inverter overheating protection	<b>Degrees Celsius</b> $R_{50} = 17k\Omega$ $R_{25/120} = 4016$ $R_t = 17 \exp \{ 4016 (\frac{1}{273+t} - \frac{1}{323}) \}$	
	THL DCL temperature		DCL overheat protection	<b>Degrees Celsius</b> $R_{100} = 3.3k\Omega$ $R_{0/100} = 3970$ $R_t = 3.3 \exp \{ 3970 (\frac{1}{273+t} - \frac{1}{373}) \}$	
				0°C[32°F]: 161 kΩ 10°C[50°F]: 97 kΩ 20°C[68°F]: 60 kΩ 25°C[77°F]: 48 kΩ 30°C[86°F]: 39 kΩ 40°C[104°F]: 25 kΩ	
				0°C[32°F]: 162.2 kΩ 10°C[50°F]: 98.3 kΩ 25°C[77°F]: 49.1 kΩ 50°C[122°F]: 17.6 kΩ 100°C[212°F]: 3.3 kΩ	

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Solenoid valve	SV1a Discharge-suction bypass		1) High/low pressure bypass at start-up and stopping, and capacity control during low-load operation 2) High-pressure-rise prevention	AC220-240V Open while being powered/ closed while not being powered	Continuity check with a tester
	SV2		Makes excessive refrigerant in the accumulator evaporate	Open while being powered/ closed while not being powered	
	SV9		High-pressure-rise prevention	Open while being powered/ closed while not being powered	
	SV10		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV11		Continuous heating cycle mode	Open while being powered/ closed while not being powered	
	SV14, 15	EM200-EM450 models only	Controls outdoor unit heat exchanger capacity	(1) Normal direction flow Open while being powered/ closed while not being powered (2) Reverse direction flow Closed while being powered/ open while not being powered	
Linear expansion valve	LEV1 (SC control)		Adjusts the amount of bypass flow from the liquid pipe on the outdoor unit during cooling	DC12V Opening of a valve driven by a stepping motor 0-480 pulses	Refer to the following page(s). [8-8 Troubleshooting LEV, FCV Problems]
	LEV9 (Refrigerant flow adjustment)		Adjusts the flow of refrigerant bypassed from the pipe for cooling the control board when the control board temperature rises		
	LEV4		Injection amount control	DC12V Opening of stepping motor driving valve 0-480 pulses (direct driven type)	Continuity Test with a Tester. Continuity between white and orange. Continuity between yellow, red, and blue. 
	LEV2a (Refrigerant flow adjustment)	(E)M500 model only	Adjusts refrigerant flow during heating Cut off the refrigerant flow during continuous heating cycle	DC12V Opening of a valve driven by a stepping motor 2100 pulses (Max. 3000 pulses)	
	LEV2b (Refrigerant flow adjustment)				
	LEV2c (Refrigerant flow adjustment)				
4-way valve	21S4a		Changeover between heating and cooling	AC220-240V Dead: cooling cycle Live: heating cycle	Continuity check with a tester
	21S4b		1) Changeover between heating and cooling 2) Controls outdoor unit heat exchanger capacity	AC220-240V Dead: cooling cycle Outdoor unit heat exchanger capacity at 100% Live: heating cycle Outdoor unit heat exchanger capacity at 25%, 50% or heating cycle	
	21S4c	(E)M500 models only			

[3-3 Functions of the Major Components of Outdoor Unit ]

Part name	Symbols (functions)	Notes	Usage	Specifications	Check method
Fan motor	FAN motor 1,2	FAN motor 2 is only on the (E)M350-(E)M500 models.	Regulates the heat exchanger capacity by adjusting the operating frequency and operating the propeller fan based on the operating pressure.	AC380-400V, 920W *The (E)M200-300/500 models and (E)M350-450 models are equipped with different types of fan motors.	