ADTHERM

Polaris series heat pump technical manual

Revision	Short Description of the change	Date
V1.0	First version	03-09-2010
V2.0	Update installation	18-09-2010
V3.0	Update operation range and calibrate the grammar	31-01-2012
V4.0	Add product model and relative specification	10-02-2012

CONTENT

Section 1 The summary of product

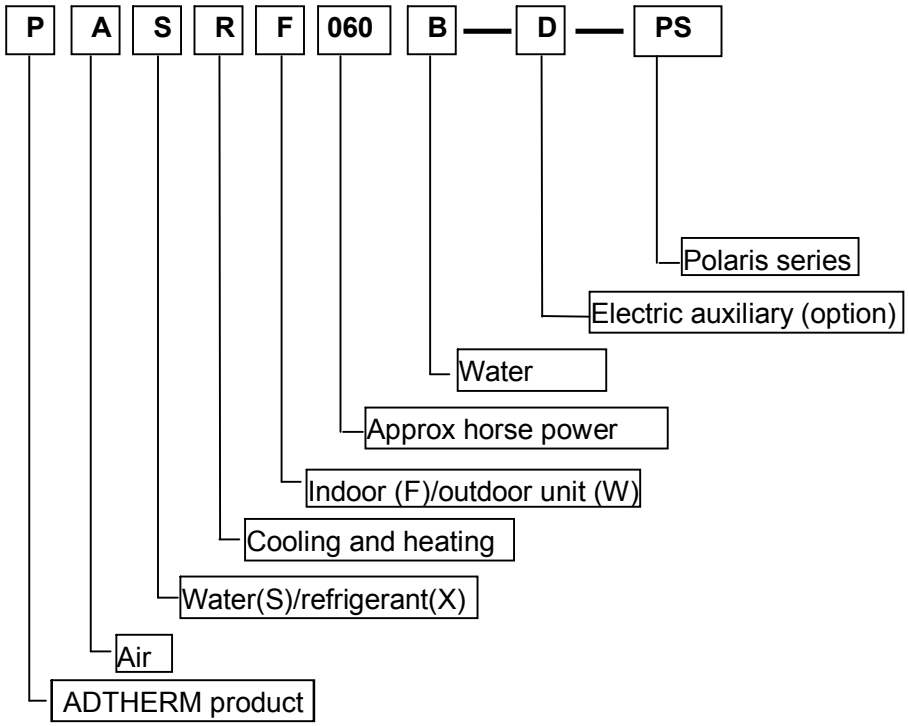
1. Preface

- Thank you for your trust and reliance on ADTHERM and choosing and purchasing ADTHERM Polaris heat pumps.
- The manual includes necessary information concerning correct installation, modification, running and maintenance of units. Before running or mending machines, please carefully read this manual.
- When installing Polaris heat pump, connecting water circulation and wiring electric or electronic devices, please strictly operate on this manual. After finishing installation and checking, then power on machines.
- ADTHERM reserves rights to change specification and design of units which leads to content change of this manual.

2. Product presentation

Polaris series air to water heat pump is the special design for the cold climate or demand hot water place. It can satisfy house warming in cold climate or commercial heating, cooling and hot water that different kinds of demand. This product have broken through kinds of technical difficulties which common product can not insurmountable, such as the lowest safe work ambient temperature is -20℃, high heating efficiency, high hot water outlet etc.

3. Nomenclature



4. Principle

The vapor-injected scroll compressor cycle is similar to two-stage cycle with interstage cooling, but accomplished with a single compressor as shown in Figure 1. The high stage is accomplished by extracting a portion of the condenser liquid and expanding it through an expansion valve into a counter flow brazed-plate heat exchanger acting as a subcooler. The superheated vapor is then injected into an intermediate vapor injection port in the scroll compressor.

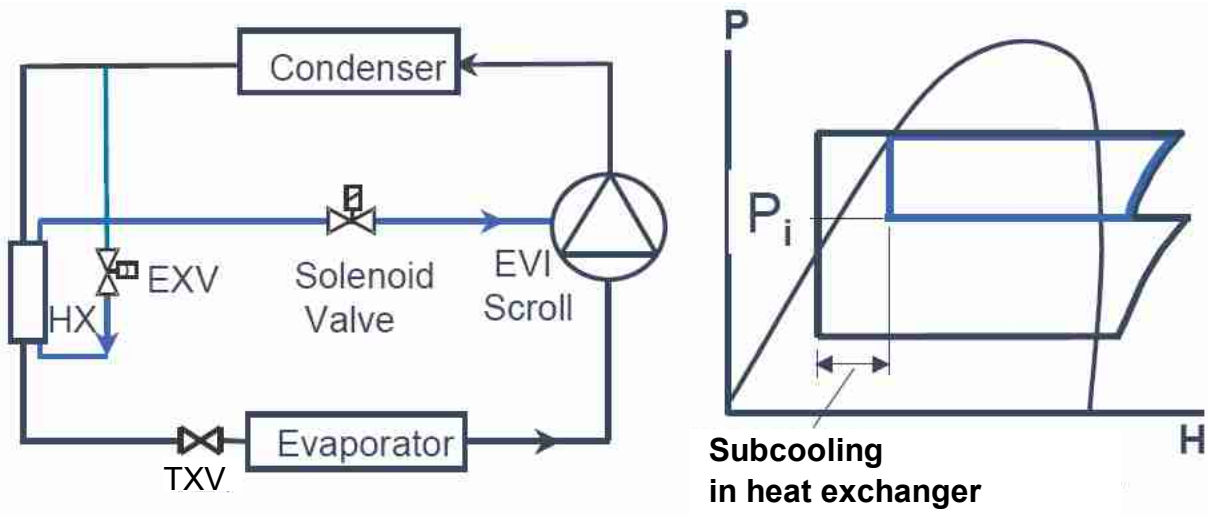


Figure 1-Vapour-injected scroll compressor cycle

5. Features

EVI compressor systems benefit over standard refrigeration compressor systems of equivalent capacity due to the following:

- Capacity Improvement

  Since the added capacity achieved by enhanced subcooling provides higher enthalpy gain across the evaporator, the compressor displacement required can be reduced by the percentage enthalpy gain for the same evaporator capacity.

- Increased COP

  The vapor-injected scroll compressor cycle efficiency is higher than the conventional single-stage delivering the same capacity because the capacity from subcooling is achieved from less power: the incremental vapor created in the subcooling process is compressed only from the higher interstage pressure rather than from the lower suction pressure.

- Cost and Energy Advantage

  Because a smaller size compressor can be used to achieve the same capacity as a larger conventional model, there is an inherent cost advantage

- Low ambient temperature heating

  The products can safely working in -25℃ outside temperature. (fig.1)

- High outlet water temperature

  The product is available 60℃. (fig.1)

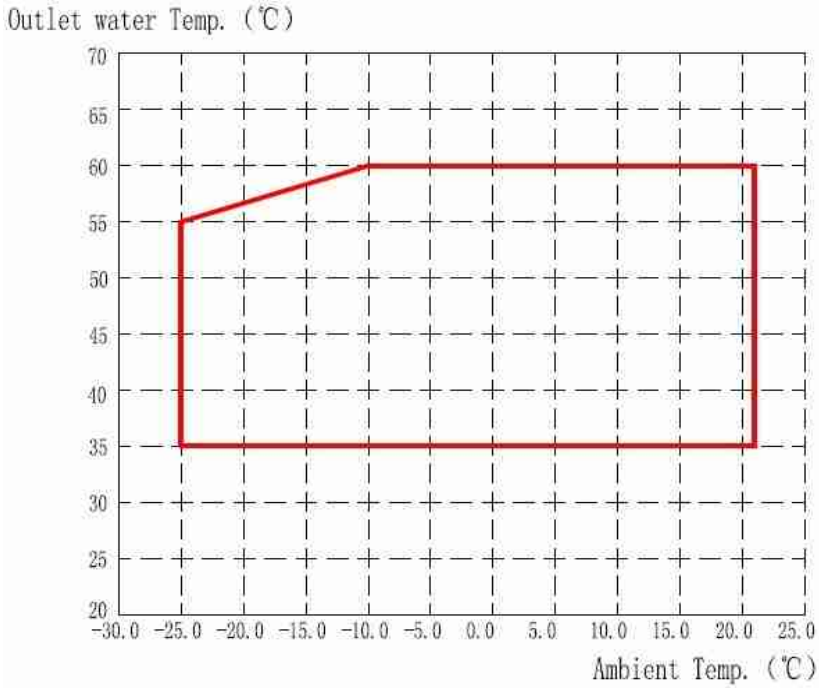
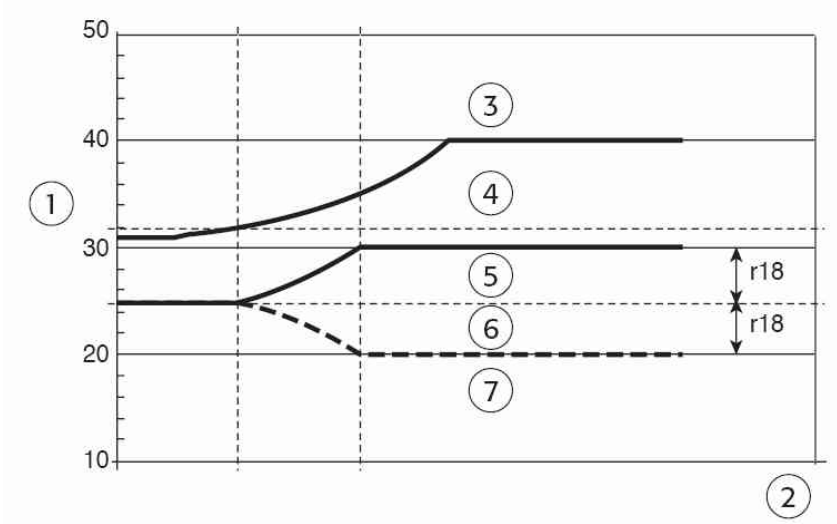


Fig. 1

◆ Ambient temperature compensation

The Polaris series heat pumps the set point can adjust automatic depend on ambient temperature.



Key:

1. Temperature;
2. Time;
3. External temperature;
4. Compressor starts temperature;
5. Positive compensation;
6. Set point;
7. Negative compensation;

6. Product appearance

Model	Appearance	Dimension L*W*H（mm）	Net weight (kg)	Power supply
PASRW030B-D-PS		1160*424*845	117kg	230V~/1P/50Hz/
PASRW040B-D-PS/ PASRW050B-D-PS /PASRW060SB-D-PS		1385*450*1180	189kg/198kg/212kg	230V~/1P/50Hz or 380V~/3P/50Hz

Section2 Performance and specification

7. Specification

7.1 Polaris series (monobloc)

Model	PASRW	030B-D-PS	040B-D-PS
Heating capacity	kW	9.2	12.0
	BTU/h	31300	41000
Cooling capacity	kW	6.2	7.9
	BTU/h	21100	26800
Heating power input	kW	2.6	3.4
COP	/	3.5	3.52
Cooling power input	kW	2.3	3.0
EER	/	2.7	2.63
Heating current	A	11.8	15.5
Cooling current	A	10.5	13.6
Heating element	kW	1.5	3.0
Heating element current	A	6.8	13.0
Power supply		230V～/1P/50Hz	230V～/1P/50Hz
Compressor qty.		1	1
Compressor type	/	EVI	
Fan motor qty.	/	1	2
Fan motor power input	W	120	120*2
Air flow direction		Horizontal	
Noise	dB(A)	50	52
Water pump power input	kW	0.3	0.5
Water head	m	8	22
Water connection	/	DN25	DN25
Water flow	m^3/h	1.5	2.1
Water drop pressure	kPa	17	34
Net dimentions(L/W/H)	mm	1160/424/845	1385/450/1180
Shipping dimensions(L/W/H)	mm	1210/490/1000	1435/500/1300
Net weight	kg	117	195

■Cooling：Ambient temp.(DB/WB)35℃/24℃, Water temp(In/Out)12℃/7℃.

■Heating: Ambient temp.(DB/WB)7℃/6℃, Water temp(In/Out)40℃/45℃.

■Above information just for your reference. Please subject to nameplate on the unit

Model	**PASRW**	**050B-D-PS**	**060SB-D-PS**
Heating capacity	kW	15.0	18.5
	BTU/h	51195	63141
Cooling capacity	kW	9.5	13.5
	BTU/h	32424	46076
Heating power input	kW	4.29	5.14
COP	/	3.5	3.6
Cooling power input	kW	3.65	4.50
EER	/	2.6	3.0
Heating current	A	19.6	9.16
Cooling current	A	16.7	8.1
Heating element	kW	3.0	3.0
Heating element current	A	13.0	13.0
Power supply		230V～/1P/50Hz	380V～/3P/50Hz
Compressor qty.		1	1
Compressor type	/	EVI	
Fan motor qty.	/	2	2
Fan motor power input	W	120*2	120*2
Air flow direction		horizontal	
Noise	dB(A)	50	52
Water pump power input	kW	0.6	0.6
Water head	m	22	22
Water connection	/	DN25	DN25
Water flow	m^3/h	2.6	3.2
Water drop pressure	kPa	34	34
Net dimentions(L/W/H)	mm	1385/450/1180	1385/450/1180
Shipping dimensions (L/W/H)	mm	1435/500/1300	1435/500/1300
Net weight	kg	198	212

■Cooling：Ambient temp.(DB/WB)35℃/24℃, Water temp(In/Out)12℃/7℃.

■Heating: Ambient temp.(DB/WB)7℃/6℃, Water temp(In/Out)40℃/45℃.

■Above information just for your reference. Please subject to nameplate on the unit

7.2 Performance

Heating performance

Model: PASRW030B-D-PS

		Outlet temperature(℃)							
Ambient temperature			30	35.0	40.0	45.0	50	55	60.0
	20	Capacity(kW)	Forbidden	Forbidden	11.46	11.66	11.61	11.62	11.59
		Power input(kW)			2.32	2.76	3.06	3.35	3.73
		COP			4.94	4.23	3.79	3.47	3.10
	15	Capacity(kW)		10.50	10.55	10.49	10.50	10.57	10.40
		Power input(kW)		2.25	2.30	2.67	2.97	3.25	3.44
		COP		4.66	4.59	3.93	3.53	3.25	3.02
	10	Capacity(kW)		9.35	9.45	9.50	9.48	9.44	9.40
		Power input(kW)		2.24	2.32	2.54	2.88	3.05	3.37
		COP		4.17	4.07	3.74	3.29	3.10	2.79
	5	Capacity(kW)		8.87	8.80	8.78	8.82	8.81	8.90
		Power input(kW)		2.27	2.32	2.67	3.00	3.20	3.56
		COP		3.91	3.79	3.29	2.97	2.75	2.50
	0	Capacity(kW)		7.37	7.40	7.60	7.57	7.72	7.80
		Power input(kW)		2.29	2.47	2.81	2.84	3.36	3.92
		COP		3.21	2.99	2.70	2.67	2.30	1.99
	-5	Capacity(kW)		5.97	5.95	6.01	6.05	6.12	6.10
		Power input(kW)		2.34	2.46	2.79	2.94	3.40	3.43
		COP		2.56	2.42	2.16	2.06	1.80	1.78
	-10	Capacity(kW)		5.65	5.63	5.59	5.76	5.83	5.96

		Power input(kW)		2.26	2.29	2.60	2.92	3.10	3.41
		COP		2.50	2.46	2.15	1.97	1.88	1.75
	-15	Capacity(kW)		4.36	4.55	4.69	4.74	4.80	4.83
		Power input(kW)		2.31	2.30	2.77	2.72	2.87	2.88
		COP		2.00	1.98	1.69	1.74	1.67	1.68
	-20	Capacity(kW)		4.18	4.19	4.14	4.27	4.49	Forbidden
		Power input(kW)		2.20	2.23	2.52	2.59	2.97	
		COP		1.90	1.88	1.75	1.65	1.51	
	-25	Capacity(kW)		3.88	3.92	4.10	4.15	Forbidden	
		Power input(kW)		2.44	2.51	2.75	2.96		
		COP		1.59	1.56	1.49	1.40		

Model: PASRW040B-D-PS

		Outlet temperature							
Ambient temperature			30	35.0	40.0	45.0	50	55	60.0
	20	Capacity(kW)	Forbidden	Forbidden	15.64	15.50	15.34	15.10	14.96
		Power input(kW)			3.44	3.77	4.18	4.58	5.09
		COP			4.54	4.11	3.67	3.30	2.94
	15	Capacity(kW)		14.92	14.97	15.02	14.91	14.88	14.85
		Power input(kW)		3.20	3.52	4.05	4.03	4.50	4.97
		COP		4.66	4.25	3.71	3.70	3.31	2.99
	10	Capacity(kW)		13.94	14.07	14.12	14.02	13.98	14.06
		Power input(kW)		3.20	3.46	3.89	4.29	4.68	5.27
		COP		4.35	4.07	3.63	3.27	2.99	2.67
	5	Capacity(kW)		12.04	11.87	11.65	11.30	11.24	12.40
		Power input(kW)		3.21	3.29	3.74	3.91	4.46	5.55

		COP		3.75	3.61	3.11	2.89	2.52	2.24
	0	Capacity(kW)		10.26	10.11	10.07	10.29	10.37	10.49
		Power input(kW)		3.25	2.25	3.93	4.31	4.91	5.75
		COP		3.16	2.99	2.56	2.39	2.11	1.82
	-5	Capacity(kW)		7.76	7.98	8.14	8.31	8.51	8.77
		Power input(kW)		3.42	3.76	4.20	4.42	5.42	5.73
		COP		2.27	2.12	1.94	1.88	1.57	1.53
	-10	Capacity(kW)		7.08	7.21	7.31	7.52	7.66	7.95
		Power input(kW)		3.05	3.19	3.60	3.62	4.45	5.00
		COP		2.32	2.26	2.03	2.08	1.72	1.59
	-15	Capacity(kW)		6.54	6.72	6.80	6.85	6.89	6.94
		Power input(kW)		3.39	3.61	4.30	4.15	4.01	4.11
		COP		1.93	1.86	1.58	1.65	1.72	1.69
	-20	Capacity(kW)		5.45	5.51	5.55	5.69	5.85	Forbidden
		Power input(kW)		2.98	3.28	3.58	3.62	4.33	
		COP		1.83	1.68	1.55	1.57	1.35	
	-25	Capacity(kW)		5.13	5.19	5.21	5.37	Forbidden	
		Power input(kW)		3.33	3.46	3.75	4.10		
		COP		1.54	1.50	1.39	1.31		

Model: PASRW050B-D-PS

			Outlet temperature(℃)						
Ambient temperature			30	35.0	40.0	45.0	50	55	60.0
	20	Capacity(kW)	Forbidden	Forbidden	17.42	17.53	17.53	17.63	17.84
		Power input(kW)			3.65	4.13	4.78	5.04	5.70
		COP			4.77	4.24	3.67	3.50	3.13
	15	Capacity(kW)		16.00	16.54	16.65	16.88	16.98	17.13

		Power input(kW)		3.43	3.63	4.12	4.74	5.03	5.67
		COP		4.66	4.56	4.04	3.56	3.38	3.02
	10	Capacity(kW)	14.86	15.56	15.59	15.83	15.92	15.93	16.15
		Power input(kW)	3.05	3.40	3.60	4.12	4.71	5.02	5.66
		COP	4.87	4.58	4.33	3.84	3.38	3.17	2.85
	5	Capacity(kW)	13.43	13.94	14.16	14.32	14.45	14.62	14.84
		Power input(kW)	3.03	3.38	3.58	4.10	4.69	5.03	5.66
		COP	4.43	4.12	3.96	3.49	3.08	2.91	2.62
	0	Capacity(kW)	12.22	12.58	12.68	12.77	12.81	13.10	13.19
		Power input(kW)	3.01	3.38	3.56	4.08	4.66	5.01	5.65
		COP	4.06	3.72	3.56	3.13	2.75	2.62	2.33
	-5	Capacity(kW)	11.21	11.21	11.21	11.23	11.28	11.39	11.56
		Power input(kW)	2.98	3.39	3.57	4.02	4.63	4.96	5.63
		COP	3.76	3.31	3.14	2.79	2.44	2.30	2.05
	-10	Capacity(kW)	9.03	9.34	9.45	9.59	9.71	10.00	10.41
		Power input(kW)	3.00	3.38	3.58	3.99	4.60	4.91	5.61
		COP	3.01	2.76	2.64	2.40	2.11	2.04	1.86
	-15	Capacity(kW)	8.16	8.34	8.61	8.93	9.03	9.27	9.52
		Power input(kW)	2.94	3.39	3.61	4.03	4.62	4.96	5.67
		COP	2.77	2.46	2.39	2.22	1.95	1.87	1.68
	-20	Capacity(kW)	7.04	7.32	7.64	7.83	8.02	8.32	Forbidden
		Power input(kW)	2.92	3.32	3.56	3.96	4.60	4.90	
		COP	2.41	2.20	2.15	1.98	1.74	1.70	
	-25	Capacity(kW)	5.50	5.95	6.22	6.55	7.03	Forbidden	
		Power input(kW)	3.01	3.33	3.52	3.90	4.58		
		COP	1.83	1.79	1.77	1.68	1.53		

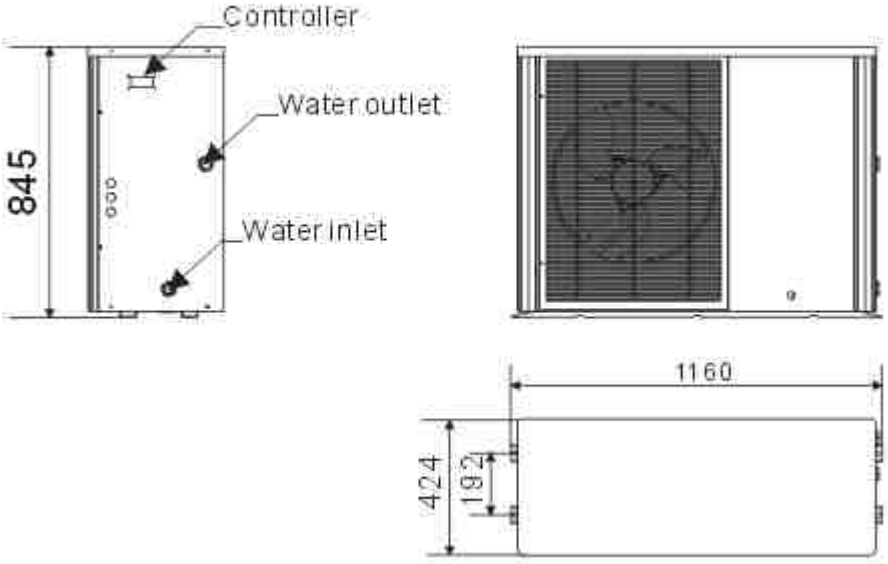
Model: PASRW060SB-D-PS

		Outlet temperature							
Ambient temperature			30	35.0	40.0	45.0	50	55	60.0
	20	Capacity(kW)	Forbidden	Forbidden	21.47	21.53	21.53	21.63	21.84
		Power input(kW)			4.61	5.13	5.78	6.35	6.90
		COP			4.66	4.20	3.72	3.41	3.17
	15	Capacity(kW)		19.86	20.01	20.15	21.95	21.75	21.59
		Power input(kW)		4.23	4.59	5.19	5.75	6.30	6.98
		COP		4.70	4.36	3.88	3.82	3.45	3.09
	10	Capacity(kW)	18.46	18.56	19.09	19.53	19.38	19.26	19.15
		Power input(kW)	4.10	4.22	4.60	5.20	5.71	6.28	6.95
		COP	4.50	4.40	4.15	3.76	3.39	3.07	2.76
	5	Capacity(kW)	17.43	17.72	18.06	18.35	18.45	18.61	18.53
		Power input(kW)	4.03	4.21	4.58	5.16	5.69	6.27	6.94
		COP	4.33	4.21	3.94	3.56	3.24	2.97	2.67
	0	Capacity(kW)	15.22	15.17	15.12	15.08	15.07	15.10	15.19
		Power input(kW)	4.01	4.18	4.49	5.18	5.63	6.24	6.95
		COP	3.80	3.63	3.37	2.91	2.68	2.42	2.19
	-5	Capacity(kW)	13.21	13.21	13.21	13.23	13.28	13.39	13.56
		Power input(kW)	3.96	4.20	4.58	5.16	5.61	6.23	6.93
		COP	3.34	3.15	2.89	2.57	2.37	2.15	1.96
	-10	Capacity(kW)	11.43	11.27	11.51	11.60	11.71	11.84	12.20
		Power input(kW)	4.00	4.16	4.61	5.06	5.62	6.16	6.95
		COP	2.86	2.71	2.50	2.29	2.08	1.92	1.76
	-15	Capacity(kW)	9.86	9.90	10.41	10.53	10.83	10.97	11.40

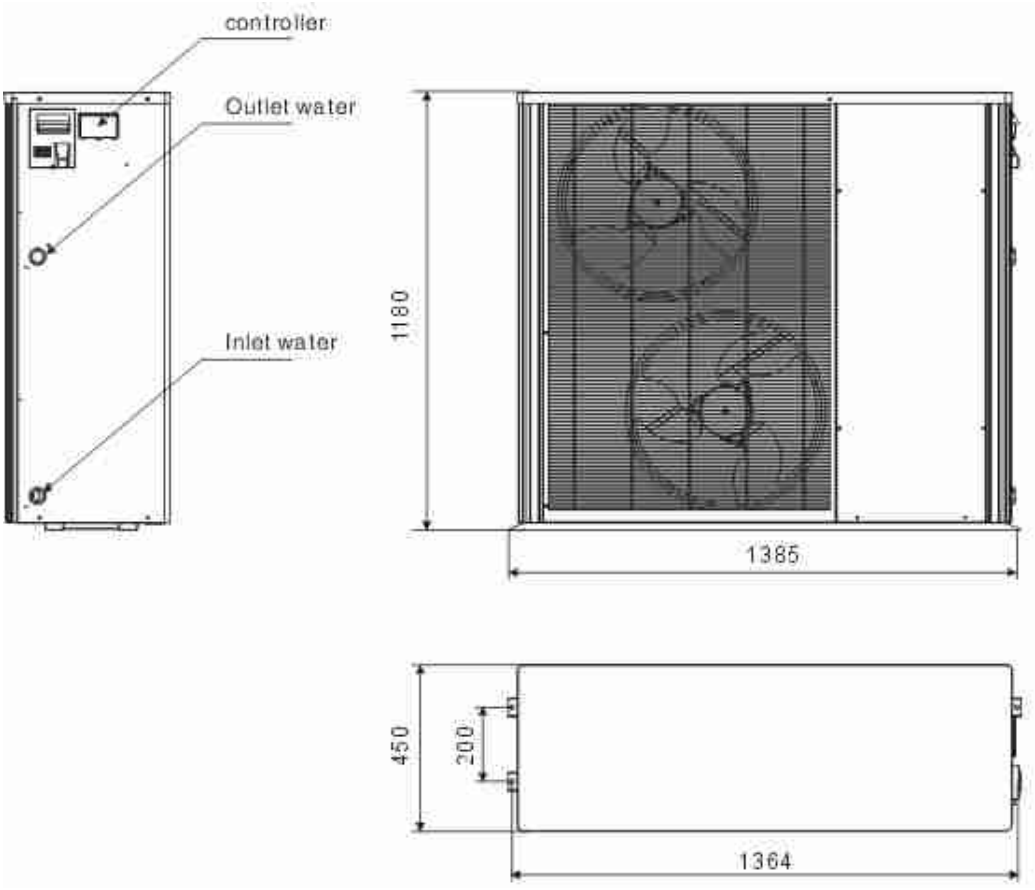
		Power input(kW)	3.94	4.09	4.61	5.03	5.60	4.86	5.37
		COP	2.50	2.42	2.26	2.09	1.93	2.25	2.12
	-20	Capacity(kW)	8.45	9.08	9.34	9.55	9.79	10.09	Forbidden
		Power input(kW)	3.92	4.21	4.63	5.05	5.57	6.23	
		COP	2.16	2.16	2.02	1.89	1.76	1.62	
	-25	Capacity(kW)	7.20	7.35	7.52	7.75	8.03	Forbidden	
		Power input(kW)	3.91	4.21	4.52	5.00	5.55		
		COP	1.84	1.75	1.66	1.55	1.45		

7.3 Dimension

Model: PASRW030B-PS

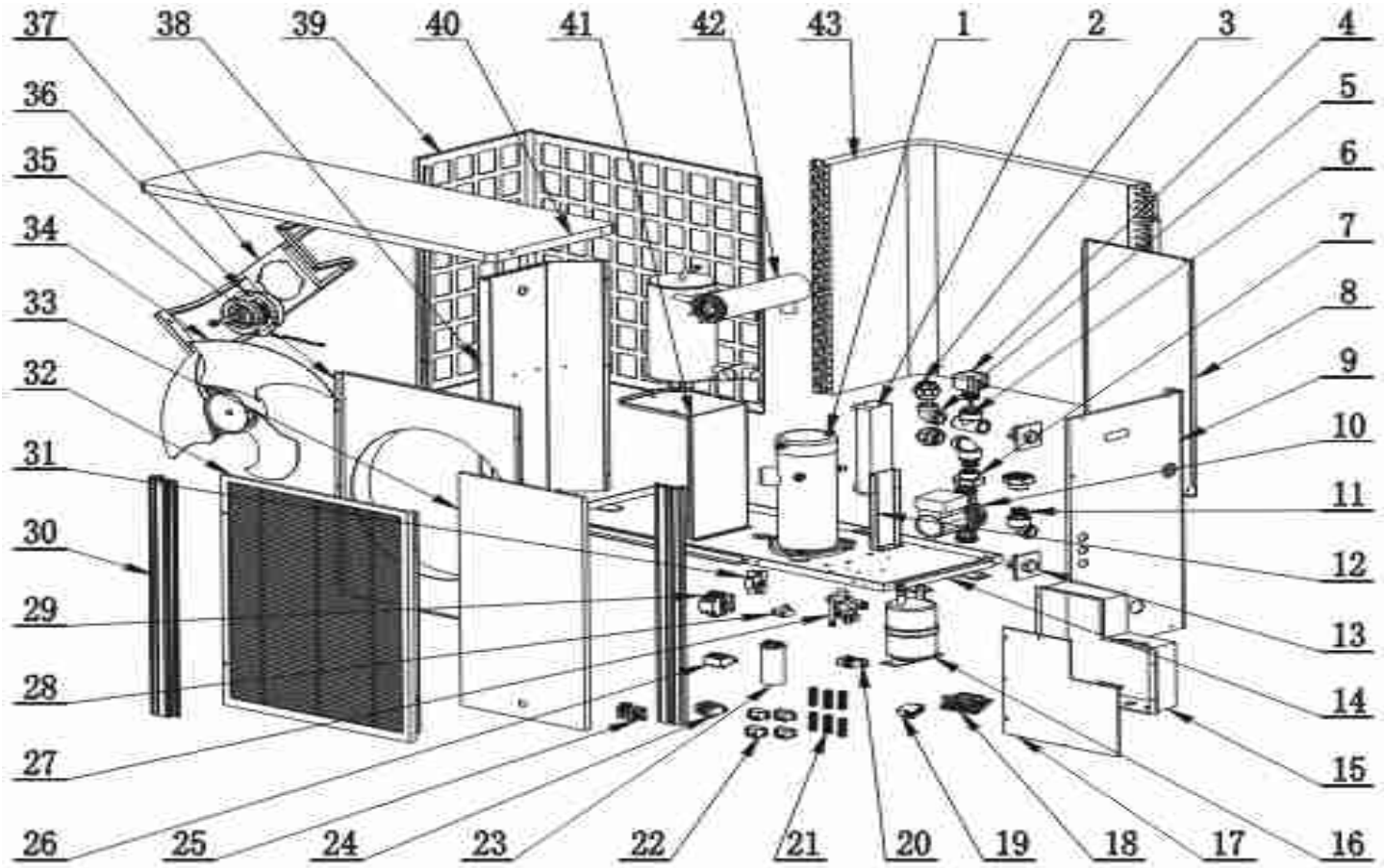


Model: PASRW040B-PS/PASRW050B-PS / PASRW060SB-PS



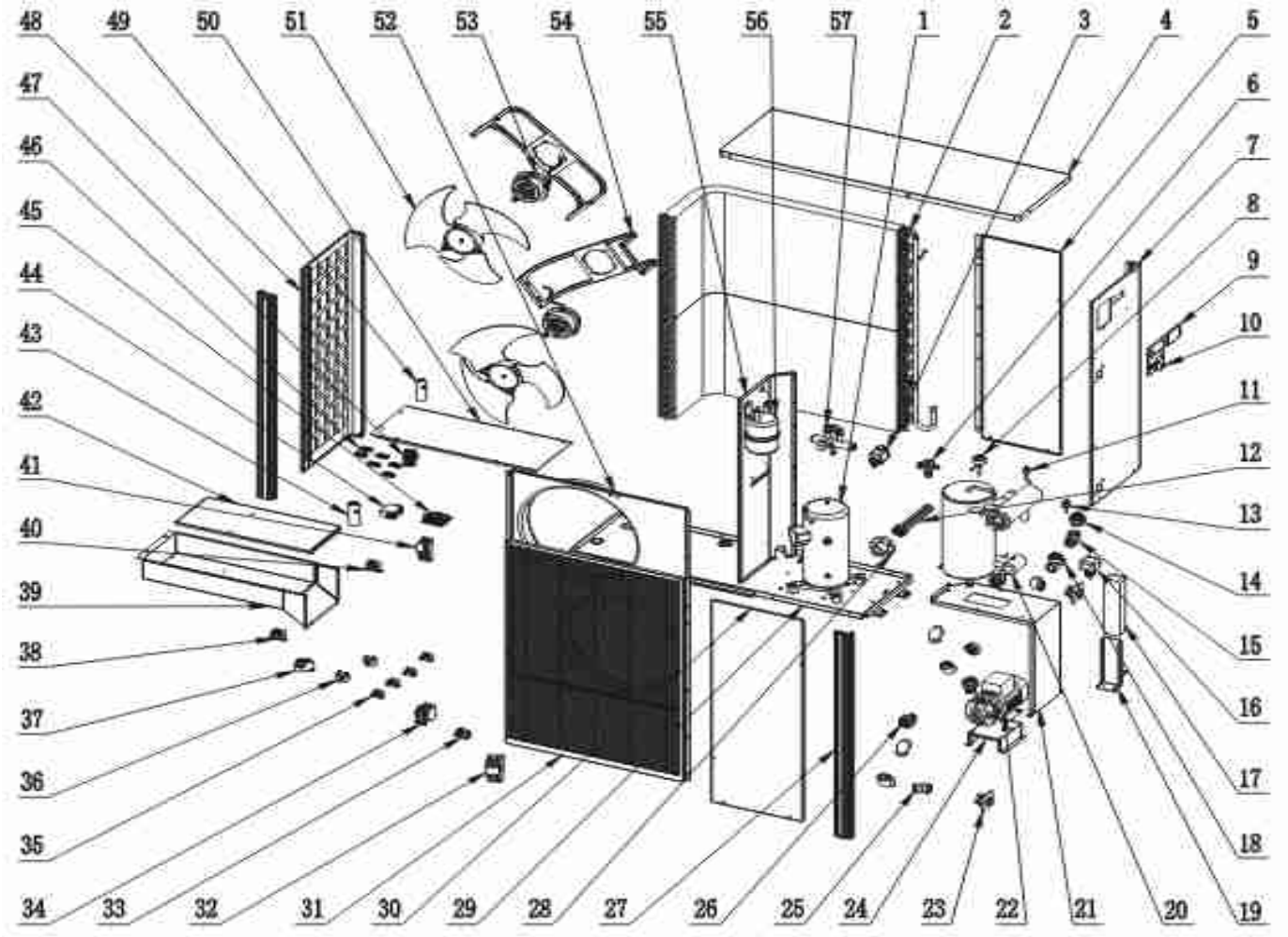
8. Explode chart

PASRW030B-D-PS



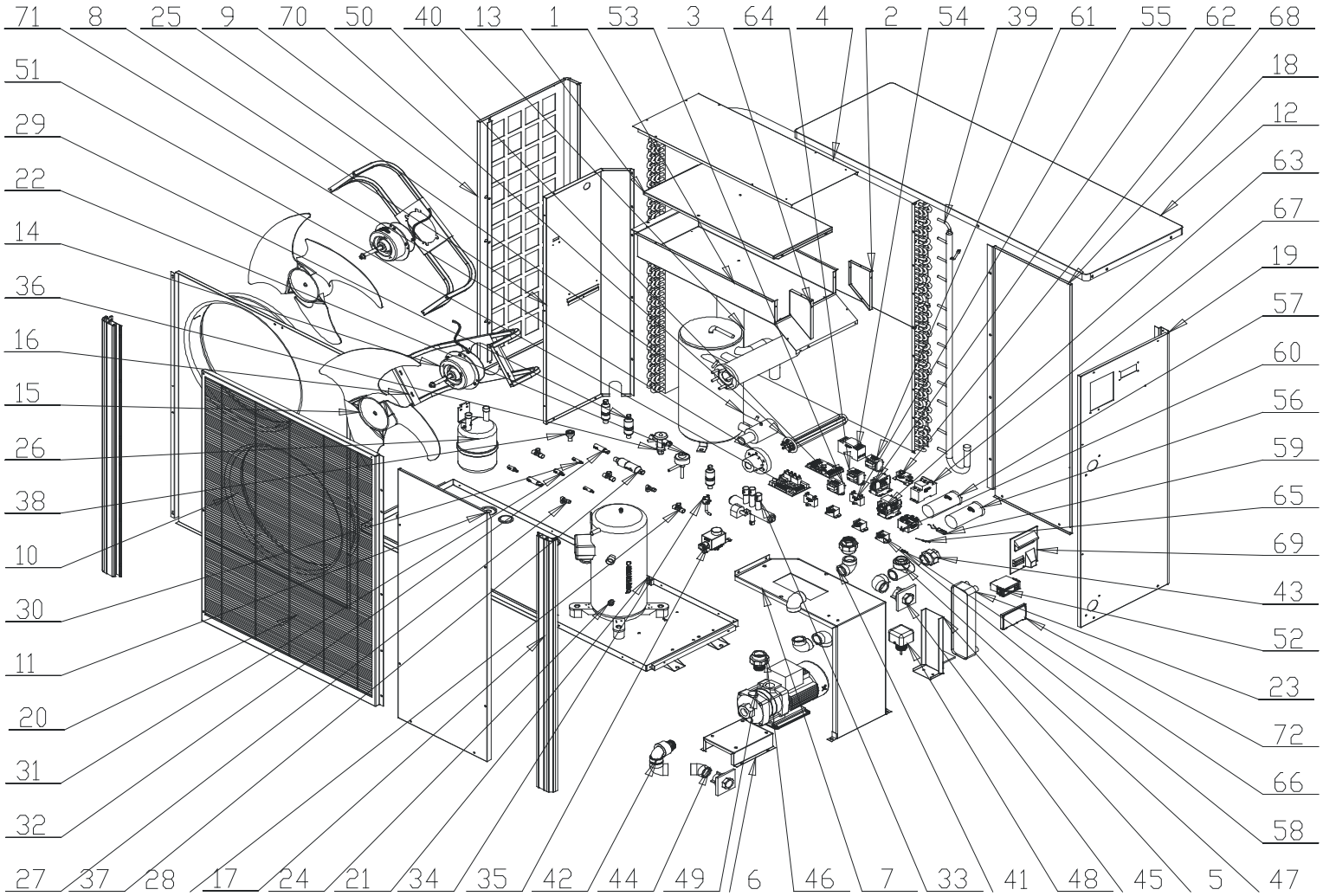
NO	Part Number	Part Name	Qty	NO	Part Number	Part Name	Qty	NO	Part Number	Part Name	Qty
1	20000-110098	Compressor	1	16	3500-1401	Flash chamber	1	31	2000-3678	Circuit breaker	1
2	20000-120049	Plate heat exchanger	1	17	35012-210043	Cover panel of electrical box	2	32	35012-210024	Fan grill	1
3	2003-1322	female connector	1	18	20000-430031	Protect controller	1	33	35012-210040	Front panel	1
4	2000-3606	Flow switch	1	19	20000-310051	Carel controller	1	34	2000-2705	Fan blade	1
5	2000-1318	90° elbow	3	20	2001-3674	Thermostat	1	35	35012-210020	Shroud panel	1
6	2000-1317	Female 3-way connector	1	21	2000-3909	2 tole terminal	6	36	2001-3328	Fan motor	1
7	2006-1366	Pump connector	2	22	2000-3619	Relay	4	37	3421-2106	Fan motor bracket	1
8	35012-210022	Back panel	1	23	20000-350004	Compressor capacitor	1	38	35012-210027	Partition panel	1
9	35012-210069	Right panel	1	24	20000-370007	Transformer	1	39	35012-210021	left panel	1
10	20000-330027	Water pump	1	25	2000-3920	3 tole terminal	1	40	35012-210045	Top cover panel	1
11	2000-1314	Male elbow	2	26	20000-370011	Transformer	1	41	35012-210044	Heat exchanger bracket	1
12	39021-210008	Plate heat exchanger bracket	1	27	2004-1437	4-way valve	1	42	35012-120004	Tube in shell heat exchanger	1
13	2000-2284	inlet/outlet water connector	2	28	2000-3508	Fan capacitor	1	43	35012-120001	Fin heat exchanger	1
14	35012-210016	Chassis	1	29	20000-360007	Contactor	1				
15	35012-210042	Electrical box	1	30	35012-210019	Aluminum alloy column	2				

PASRW040B-D-PS



NO	Part Number	Part Name	Qty	NO	Part umber	Part Name	Qty	NO	Part umber	Part Name	Qty
1	20000-110086	Compressor	1	20	35046-120001	Tube in shell heat exchanger	1	39	35036-210099	Electrical box	1
2	35046-120003	Fin heat exchanger	1	21	35036-210098	Tube exchanger bracket	1	40	20000-370011	Transformer	1
3	20000-140194	Solenoid valve	1	22	20000-330070	Water pump	1	41	2001-3630	Relay	1
4	35010-210026	Top cover	1	23	2000-2284	Inlet/outlet water connector	1	42	35036-210108	Scaleboard	1
5	35045-210002	Back cover	1	24	35045-210009	pump bracket	1	43	2000-3510	Compressor capacitor	1
6	2002-1444	Thermal expansion valve	1	25	2006-1303	45° elbow	1	44	20000-310051	Carel uc2se	1
7	35036-210106	Right panel	1	26	2003-1319	Male connector	1	45	20000-430031	Protect controller	1
8	2002-1434	Electronic expansion valve	1	27	35010-210032	Aluminum alloy column	2	46	2000-3909	2 tole terminal	6
9	32012-220007	waterproof cover	1	28	20000-220048	Waterproof cover of electrical heater	1	47	2000-3920	3 tole terminal	1
10	3400-2202	Electrical box	1	29	35036-210096	Chassis	1	48	35045-210001	Left panel	1
11	20000-360032	High pressure switch	1	30	35010-210025	Front panel	1	49	2000-3524	Compressor capacitor	1
12	20000-000025	Electrical heater	1	31	35036-210121	Front grill	1	50	35036-210111	Cover panel of electrical box	1
13	2000-3603	Low pressure	1	32	2001-3650	Circuit breaker	1	51	2000-2705	Fan blade	2
14	2003-1322	female connector	2	33	2001-3674	Thermostat	1	52	35010-210023	Shroud panel	1
15	2000-1318	90° elbow	6	34	20000-360007	Contactor	1	53	2001-3328	Fan motor	2
16	2000-3606	Flow switch	1	35	2000-3619	Relay	4	54	3421-2106	Fan motor bracket	2
17	20000-120049	Plate heat exchanger	1	36	2000-3508	Fan capacitor	2	55	35036-210100	Partition panel	1
18	2000-1317	female 3-way connector	1	37	2000-3676	Start relay	1	56	2000-1440	Flash chamber	1
19	35036-210075	Bracket of plate heat exchanger	1	38	20000-370007	Transformer	1	57	2001-1491	4-way valve	1

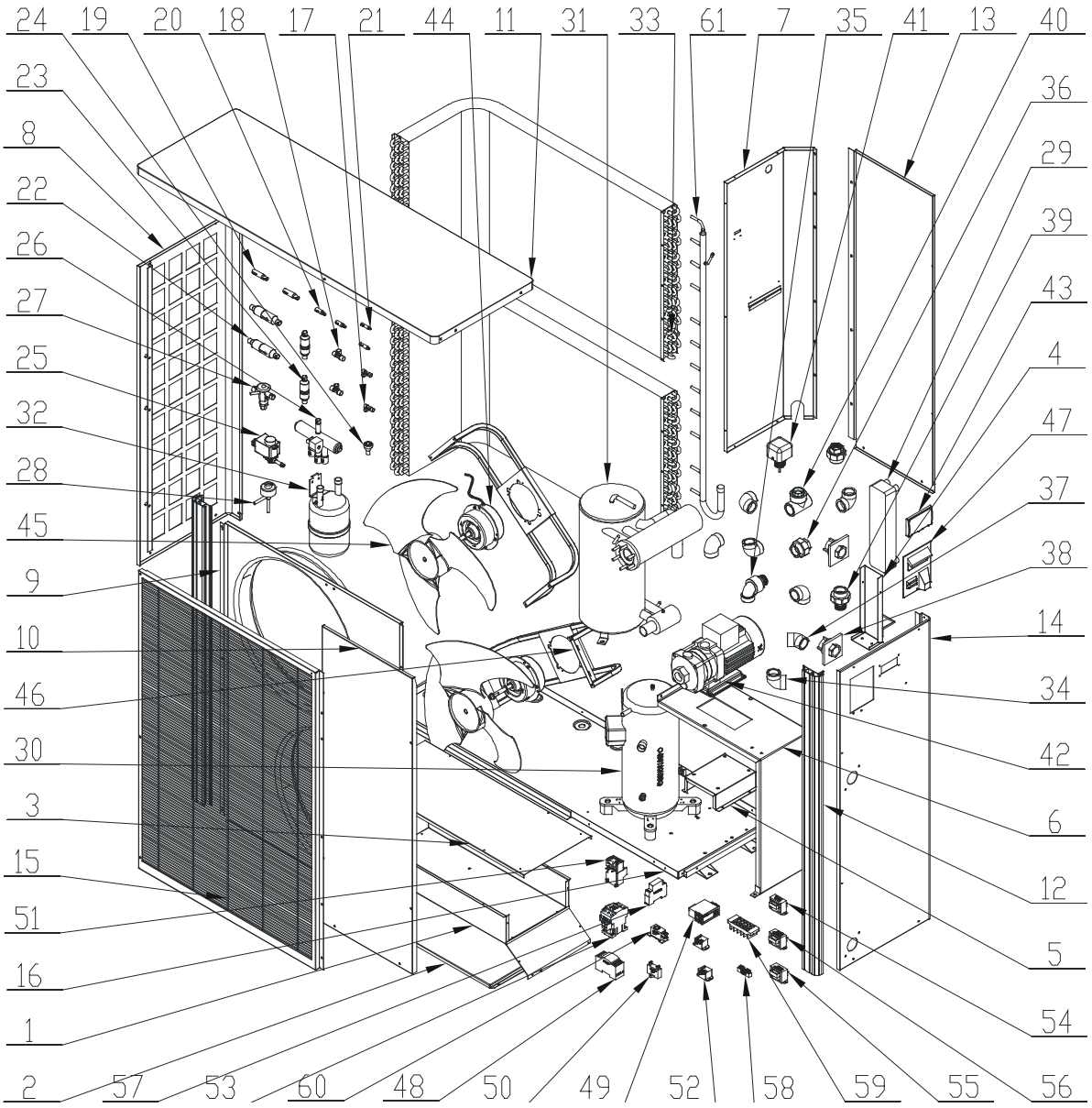
PASRW050B-D-PS



SN	Part Number	Part Name	Qty	SN	Part Number	Part Name	Qty	SN	Part Number	Part Name	Qty
1	35036-210099	Electrical box	1	25	35036-120010	Tube heat exchanger	1	49	2000-3332	Water pump	1
2	35036-210109	Electrical box plate 1	1	26	2000-1440	Flash chamber	1	50	35005-310080	Electrical expansion valve expand board	1
3	35036-210110	Electrical box plate 2	1	27	2000-1435	Three way 1	2	51	35005-310087	Solenoid valve expand board	1
4	35036-210111	Electrical box cover	1	28	2000-1449	Three way 2	3	52	2000-3135	Carel controller	1
5	35036-210075	Braze-plate bracket	1	29	20000-140027	Gas filter	3	53	20000-370011	Transformer(22V)	1
6	35036-210122	Pump bracket	1	30	20000-140058	transitional connector 1	2	54	2000-3136	Fan on/off control board	1
7	35036-210098	Tube heat exchanger bracket	1	31	20000-140085	transitional connector 2	2	55	2000-3508	Fan capacitor	2
8	35036-210100	Middle plate	1	32	4000-1429	transitional connector 3	2	56	2000-3510	Compressor capacitor	1
9	35045-210001	Left plate	1	33	2001-1491	Reverse valve	1	57	2000-3524	Compressor capacitor	1
10	35010-210023	Fan guide ring	1	34	2000-3603	Low pressure switch	1	58	2000-3619	Relay	3
11	35010-210025	Front panel	1	35	20000-140016	Solenoid valve	1	59	2000-3629	Discharge temp. protection	1
12	35010-210026	Top cover	1	36	2002-1444	Expansion valve	1	60	2000-3676	Start relay	1
13	35036-210108	Electrical box bottom plate	1	37	2001-1497	One way valve	1	61	2000-3711	Transformer(11.5V)	1
14	2001-3328	Fan motor	2	38	35010-120010	Brass distribute	1	62	20000-360006	Contactor	1
15	2000-2705	Blade	2	39	35045-140001	Collection pipe	1	63	20000-360007	Contactor	1

16	3421-2106	Motor bracket	2	40	35010-120009	evaporator	2	64	20000-370006	Transformer(11.5V)	1
17	35010-210032	Right support	2	41	2000-1318	Elbow	6	65	2001-3631	Thermal fuse	1
18	35045-210002	Back plate	1	42	2000-1314	Male elbow	1	66	2001-3632	Thermal overload protection	1
19	35036-210106	Right plate	1	43	2003-1322	Female union	2	67	2001-3650	Miniature circuit breaker	1
20	35010-210030	Front net	1	44	2006-1303	45° elbow	1	68	2001-3674	Thermal controller	1
21	35036-210096	Chassis	1	45	2000-2284	Square plate union	2	69	3400-2202	Power supply box	1
22	2002-1435	Electrical expansion valve	1	46	2003-1319	Male union	1	70	20000-000025	Heating element	1
23	20000-120050	Braze-plate heat exchanger	1	47	2000-1317	female branch tee	1	71	20000-220048	Plastic cover of heating element	1
24	20000-110034	Compressor	1	48	2000-3606	Flow switch	1	72	32012-220007	Plastic cover of Carel controller	1

PASRW060SB-D-PS



SN	Part Number	Part Name	Qty	SN	Part Number	Part Name	Qty	SN	Part Number	Part Name	Qty
1	35036-210099	Electrical box	1	22	2001-1497	One way valve	2	42	2000-3332	Water pump	1
2	35036-210108	Electrical box bottom plate	1	23	20000-140027	Filter	2	43	32012-220007	Plastic cover of Carel controller	1
3	35036-210111	Electrical box cover	1	24	35010-120010	Brass distribute	1	44	2001-3328	Fan motor	2
4	35036-210075	Braze-plate bracket	1	25	20000-140016	Solenoid valve	1	45	2000-2705	Blade	2
5	35036-210122	Pump bracket	1	26	2001-1491	Reverse valve	1	46	3421-2106	Motor bracket	2
6	35036-210098	Tube heat exchanger bracket	1	27	2002-1444	Expansion valve	1	47	3400-2202	Power supply box	1
7	35036-210100	Middle plate	1	28	2002-1435	Electrical expansion valve	1	48	2000-3136	Fan on/off control board	1
8	35045-210001	Left plate	1	29	20000-120050	Braze-plate heat exchanger	1	49	2000-3135	Carel controller	1
9	35010-210023	Fan guide ring	1	30	20000-110034	Compressor	1	50	2000-3508	Fan capacitor	1
10	35010-210025	Front panel	1	31	35036-120010	Tube heat exchanger	1	51	2000-3656	Thermal overload relay	1
11	35010-210026	Top cover	1	32	2000-1440	Flash chamber	1	52	2000-3619	Relay	2
12	35010-210032	Right support	2	33	35010-120009	Condenser	2	53	2000-3653	Contactor	1
13	35045-210002	back panel	1	34	2000-1318	90°elbow	6	54	2000-3711	Transformer	1
14	35036-210106	Right plate	1	35	2000-1314	Male elbow	1	55	20000-370011	Transformer	1
15	35010-210030	Front net	1	36	2003-1322	Female union	2	56	20000-370006	Transformer	1
16	35036-210096	Chassis	1	37	2006-1303	45°elbow	1	57	20000-360023	Three phase monitor	1

17	2000-1435	Three way pipe	2	38	2000-2284	Square plate union	2	58	2000-3909	Two bit terminal	1
18	2000-1449	Three way pipe	2	39	2003-1319	Male union	1	59	2000-3922	Five bit terminal	1
19	4000-1429	transitional connector	2	40	2000-1317	1" Female tee	1	60	2001-3674	Thermal controller	1
20	20000-140085	transitional connector	2	41	2000-3606	Water flow switch	1	61	35045-140001	Collection pipe	1
21	20000-140058	transitional connector									

9. Component instruction

1) Compressor

a) EVI Scroll compressors are equipped with a vapor injection connection for Economizer Operation. Economizing can be accomplished by utilizing a subcooling circuit similar to the circuit shown in Figure 3. This increases the refrigeration capacity and the system efficiency. The benefits provided will increase as the compression ratio increases.

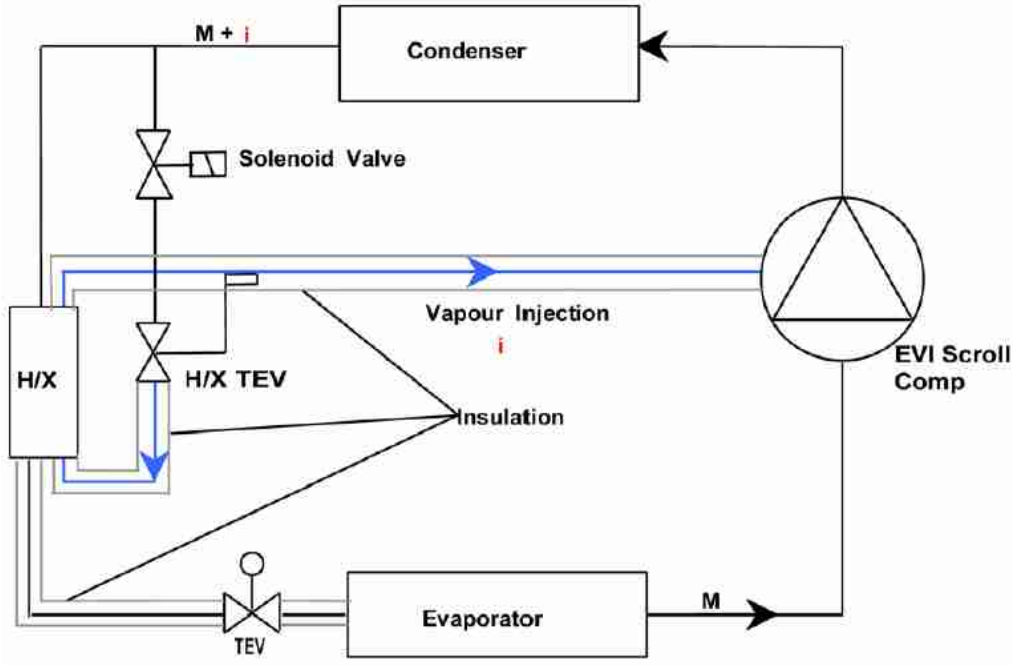
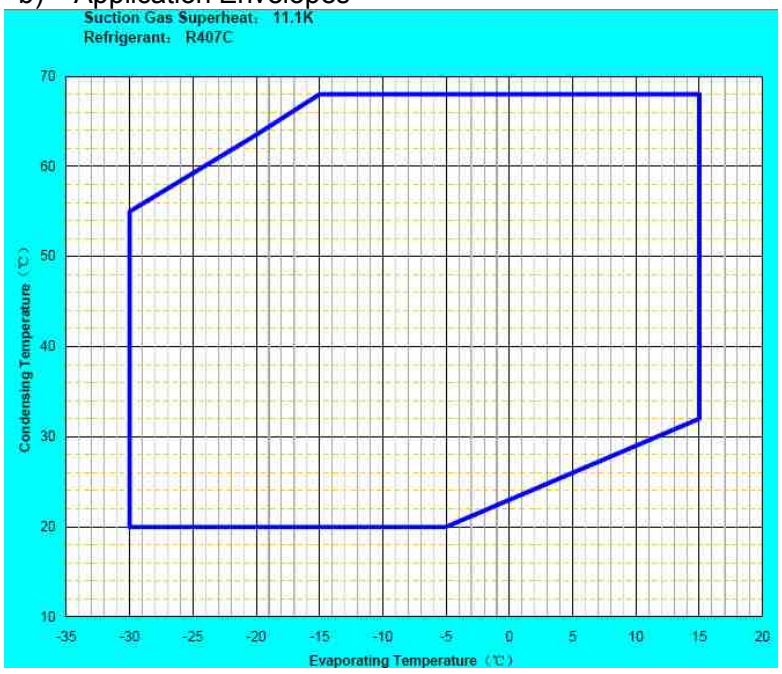


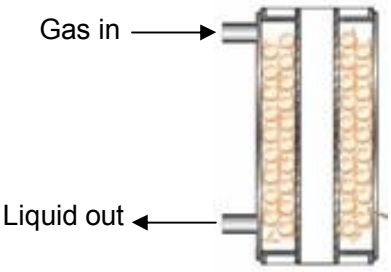
Figure 3

b) Application Envelopes



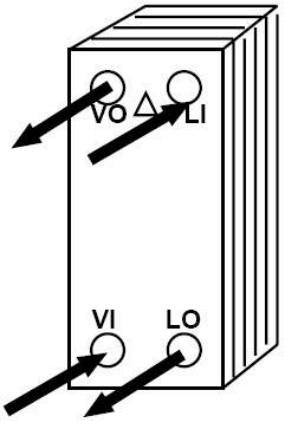
2) Heat exchanger

a) Use own patent highly efficiency tube in shell heat exchanger.



b) Braze-plate heat exchanger

The braze-plate heat exchanger is useful increase enthalpy. A heat exchanger is used to provide additional subcooling to the refrigerant before it enters the evaporator. This subcooling process provides the increased capacity gain measured in the system. During the subcooling process, a certain amount of refrigerant is evaporated. This evaporated refrigerant is injected into the compressor and provides additional cooling at higher compression ratios, similar to liquid injection.

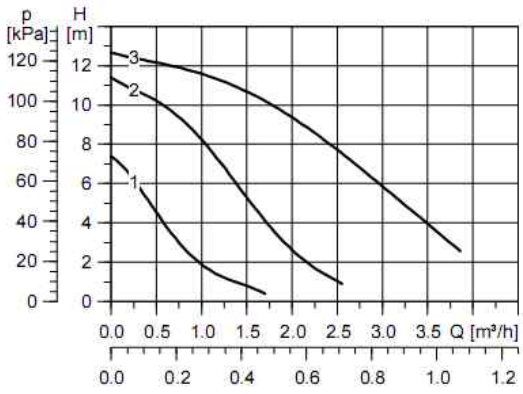


VO = Vapor temperature leaving H/X
VI = Vapour temperature entering H/X
LI = Liquid temperature entering H/X
LO = Sub-cooled liquid leaving H/X

3) Water pump

a) PASRW030B-PS

GRUNDFOS：UPS25-125

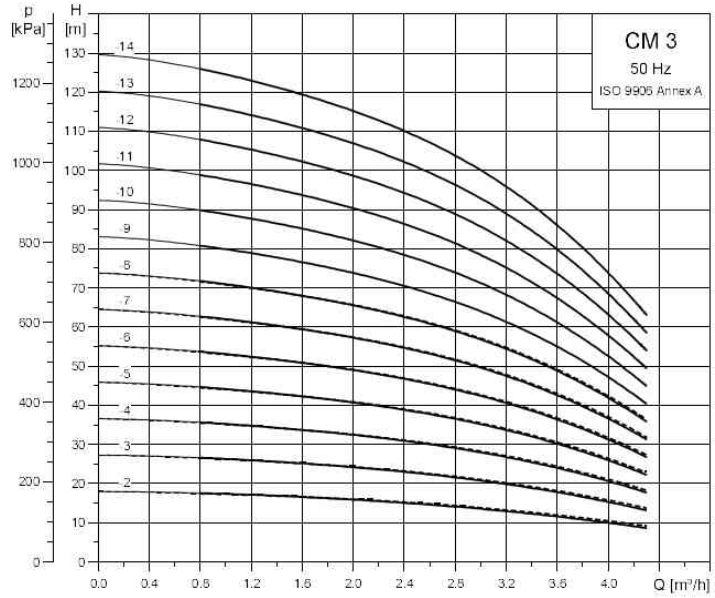


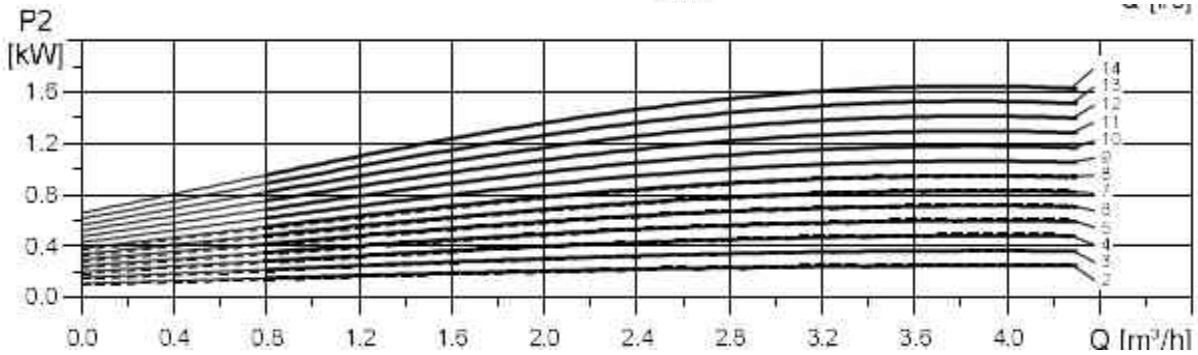
Speed	P_1 [W]	$I_{1/1}$ [A]
3	270	1.18
2	210	0.93
1	135	0.61

b) PASRW040B-D-PS /PASRW050B-D-PS /PASRF050B-D-PS

Grundfos: CM3-3A

Performance curve: CM3-3A

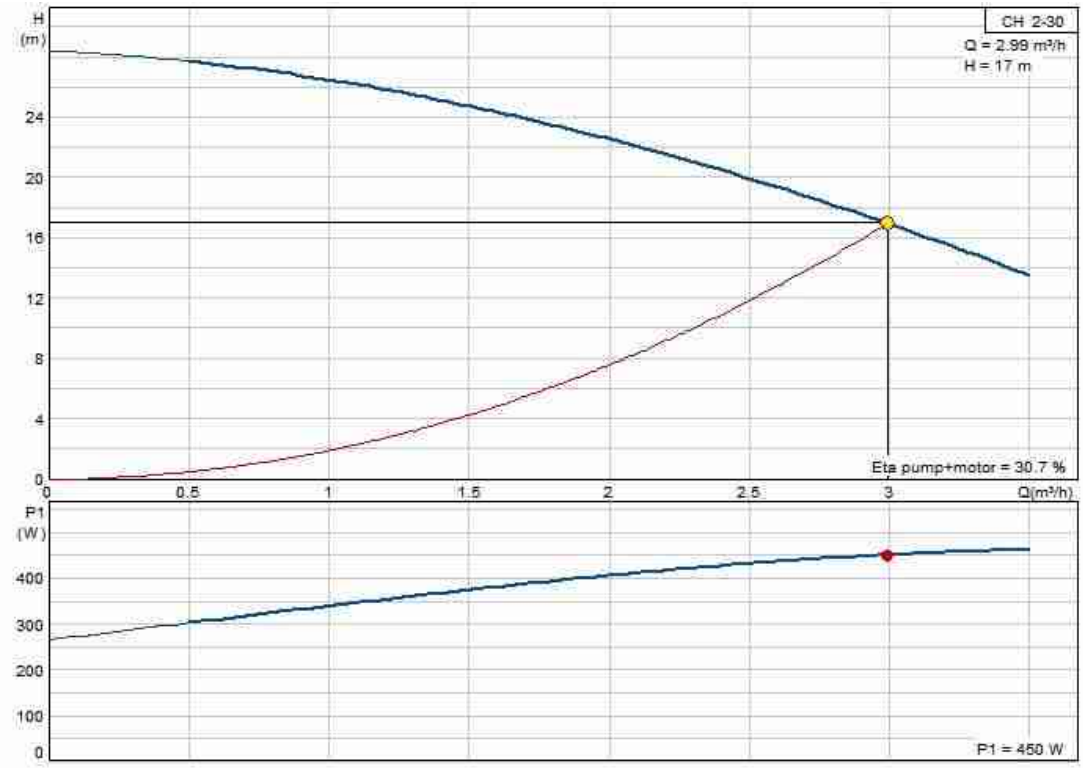




c) PASRW060SB-PS/ PASRF060SB-PS

Grundfos：CH2-30

Performance curve:

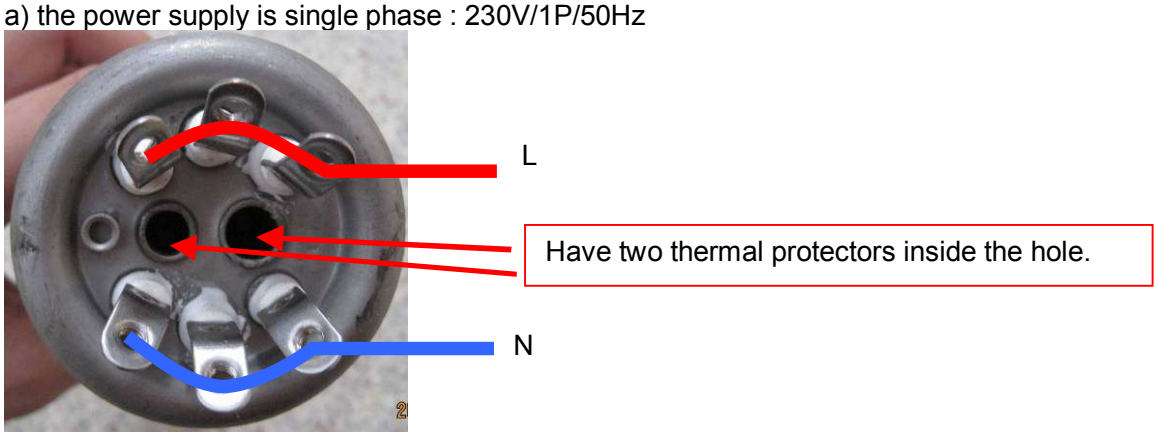


4) Heating element

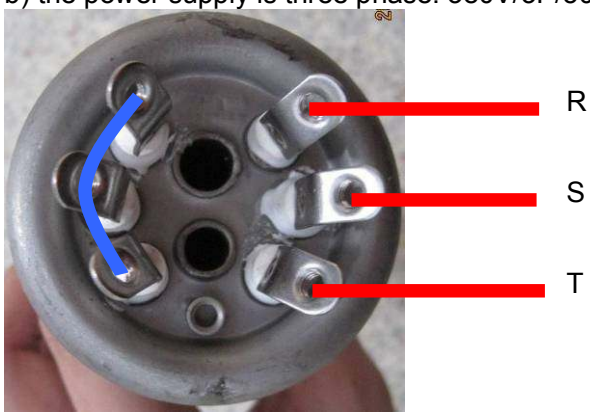
We use 3kw heating element in all the units.

Electrical diagram

a) the power supply is single phase : 230V/1P/50Hz



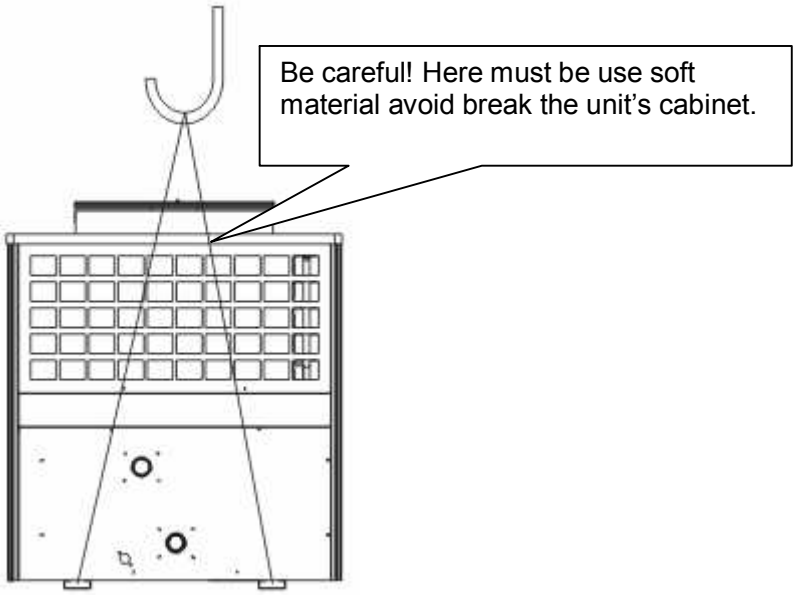
b) the power supply is three phase: 380V/3P/50Hz



Section 3 Installation

10. Transportation

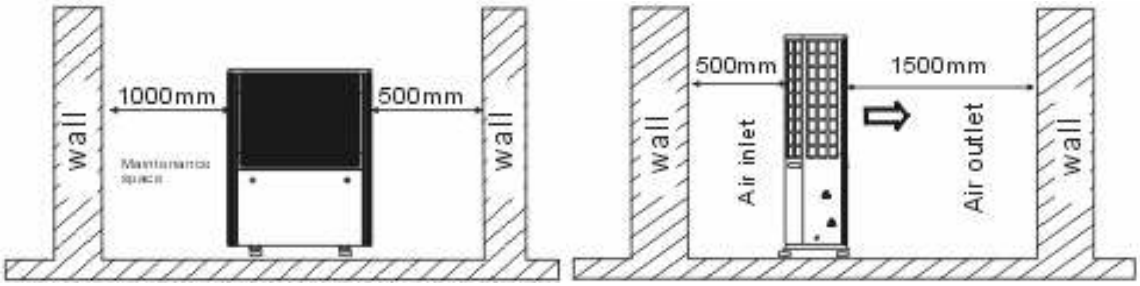
1) Please check the route of the transit, to make sure the unit with the package can through it. Do not remove the package before the unit arrive the place.
2) When the unit is transported, please keep the unit stand up. Do not incline the unit above 15 degree, to prevent the unit fall down.
3) When the unit needs to be hung up, the strength of the cables that use to hang the unit should be 3 times than the unit weight. Inspection and ensure the hanger fix the unit well and angle should be bigger than 60 degree.
   Caution: Do not stand under the unit when hang up it.
4) There must be use soft material between the cable and the unit to prevent damage the heat pump cabinet. As following:



11. Location of installation

1) Unit can be installed on veranda, proof, ground or any place where is cleaning, bright and good ventilation place.
2) The unit should avoid be installed under the direct sunlight, heating radiation, cooking fumes or the other heat source around it.
3) If the unit is installed the place that without authorization person can approach it, you have to take isolation security to protect it.
4) You had better chose the place that does not mind the noise, cool air, hot air.
5) Near the power supply, convenient for connect cables.
6) Ground surface's strength is solid, difficult to raise vibration and noise place.
7) The unit need enough space for maintenance, and inspection no barrier nearby the air-h exchanger.

8) When you install several units parallel, please pay attention the distance between two contiguous units, the minimum distance is 500mm.

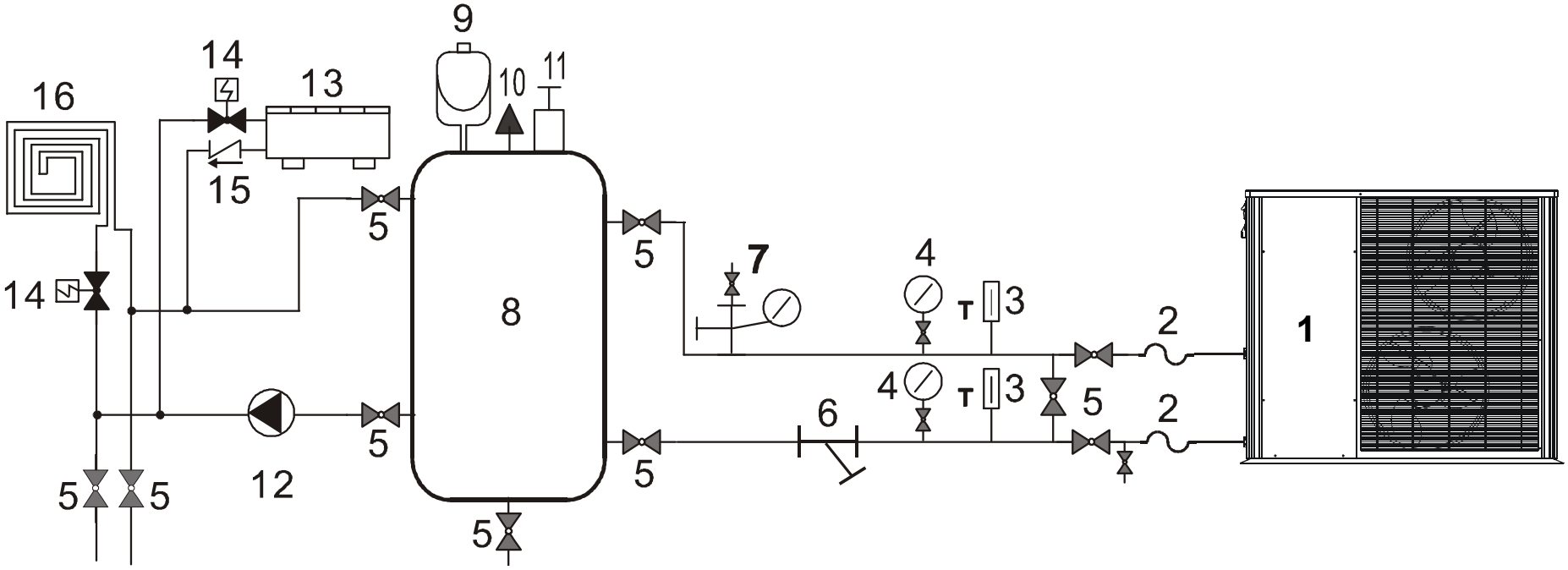


9) A cover is needed in winter to protect the heat pump from the rain and snow. But the distance between the cover and units should be more than 2m.

12. Hydraulic connection

- You have to install a Y type filter near the inlet water connection and insulation.
- Heat pump should be installed a by-pass valve, so that clean the external water pipe convenience. You can cut off water pipe of heat pump and do not affect other equipment.
- You should install temperature meter and pressure meter on the inlet and outlet water pipe in order to easily maintenance.
- Water flow direction must accord with the label which is near the water connection.
- You have to clean the whole water pipe system before you connect to the heat pump. Please ensure no impurity inside.
- In order to water system works well, please install the expansion tank.
- You should install a draining valve in the lowest and discharge valve in the highest of the pipe network.

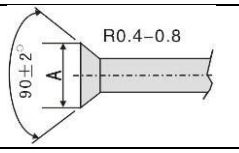
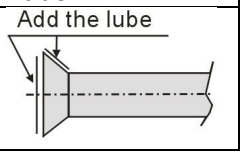
Hydraulic connection sketch map



1	Polaris heat pump	9	Expansion tank
2	Flex connection	10	Relief valve
3	Thermometer	11	Discharge valve
4	Pressure meter	12	Water pump
5	Shut off valve	13	Fan coil
6	Y type filter	14	Solenoid valve
7	Pressure reduce valve	15	One way valve
8	Buffer tank	16	Floor heating pipe

13. Refrigerant pipe connection for split model

1) Copper pipe connection:
   a) Please select the diameter of copper pipe as the form shows;
   b) The size of dilator as the form shows;
   c) Please daub the lube in the dilator when connect the dilator nut. Fastening the nut screw three to four teeth before the final fastness;
   d) The torque of pinch please check the form;

Diameter	Torque	Size of dilator(A)	Dilator	Lube
Φ12.7mm	50-60N.M	15.6±0.2mm		
Φ19.05mm	65-70N.M	23.5±0.2mm		

2) Connect the pipe to the indoor unit:
   a) Take off the nut from the heat pump, expanding the pipe and connect it to heat pump;
   b) Connect the pipe expanding to the joints of heat pump, and then screw the nut, the torque please refers to the above form.
3) Connect the pipe to the outdoor unit;
   a) Take off the cooper nut and put in through the pipe, then expanding the pipe as the above form shows;
   b) Connect the pipe expanding to the joins on the outdoor unit; Make sure the axis in the same direction.
   c) Screw on the nut step by step, according to the torque as the form shows.

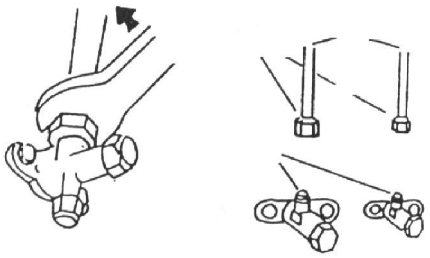


Figure 1

Caution:
The length of pipe between the indoor unit and the outdoor unit is less than 30m, and the height difference is less than 15m.

4) Leakage test
   Please make the leakage test when finish the pipe connection. Inject the nitrogen from the high pressure valve up to 16 bars and keep it 20 hours. And then check the pressure meter, the value should not be fallen down.
5) Vacuum
   The refrigerant has been filled into the indoor unit in the factory, when finish the connection between the indoor and outdoor unit, must vacuum the pipe between them.
   a) Unscrew the screw cap of the high pressure valve on the outdoor unit, and connect the multiplex manometer to the check valve;
   b) Connect the vacuum pump to the multiplex manometer, and then open them to vacuum the heat pump. To make sure the absolute pressure is less than 30Pa and lasts 60 mins.
   c) When finish the vacuum, open the check valve to let the refrigerant go into the outdoor unit.

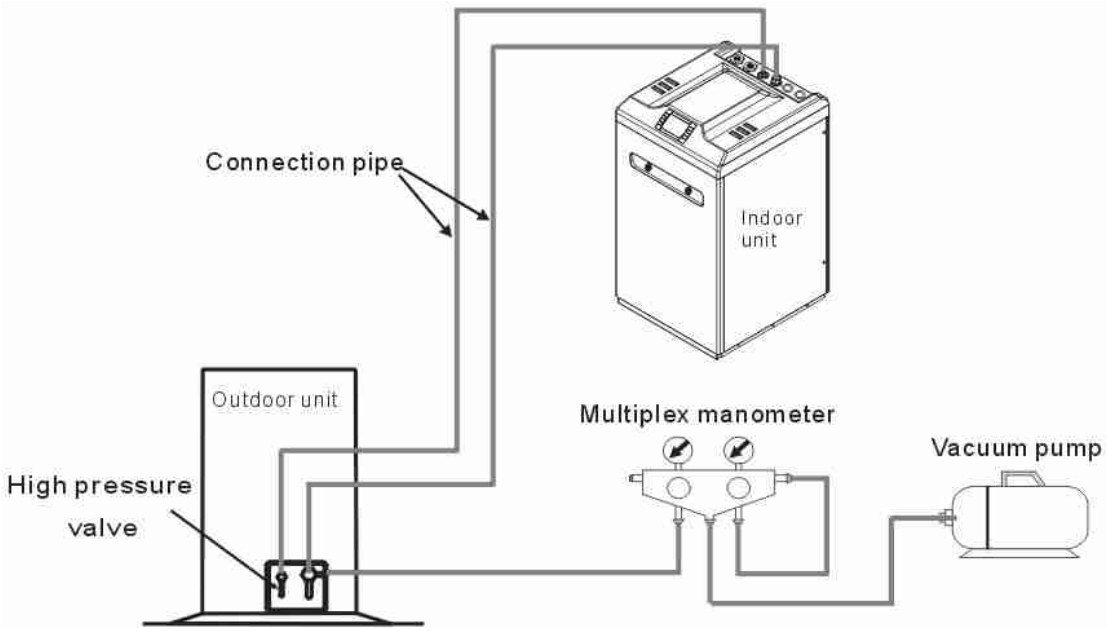
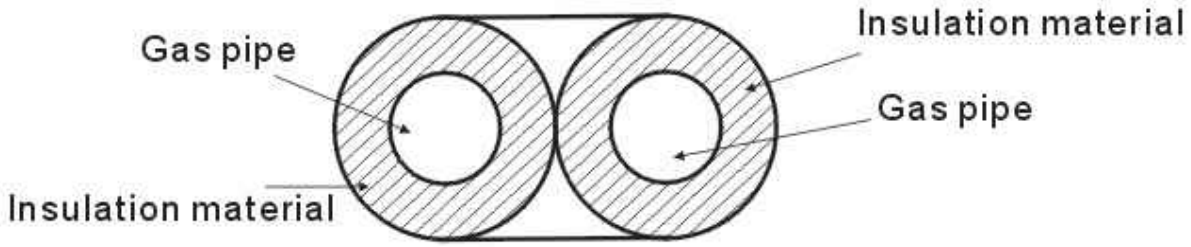


Figure 2

6) Insulation treatment

As the below picture shows, must take the insulation treatment for the connection pipe, and can use the 15mm-20mm thickness material.

a) Please pack the two gas pipes by insulation material separately, in order to organize the pipes easily, you can enswathe the packed two gas pipes together, and should not be forced tied too closed to prevent the frost caused by cold air;



Section 4 Electrical data

14. General precautions on wiring

- Before wiring, confirm the rated voltage of the unit as shown on its nameplate, then carry out the wiring closely following the wiring diagram.
- Provide a power outlet to be used exclusively for each unit and a power supply disconnect and circuit breaker for over current protection should be provided in the exclusive line.
- To prevent possible hazards due to insulation failure, the unit must be grounded.
- Each wiring connection must be done in accordance with the wiring system diagram. Wrong wiring may cause unit to misoperation or damaged.
- Do not allow wiring to touch the refrigerant tubing, compressor, or any moving parts of the fan.
- Unauthorized changes in the internal wiring can be very dangerous. The manufacturers will accept no responsibility for any damage or misoperation that occurs as a result of such unauthorized changes.
- Single phase voltage range is 207~253V, three phase voltage range is 342~418V. The voltage is higher or lower will affect unit's damage.
- If the respective phase of the 3 phase power wiring is not connected correctly, a reverse phase will occur and the compressor will not start running. If this happens, swap over 2 of the 3 phases（R, S, T）
  Regulations on wire diameters differ from locality to locality. For filed wiring rules, please refer to your local electrical codes before beginning. You must insure that installation complies with all relevant rules and regulations.
- To prevent malfunction of the heat pump caused by electrical noise, care must be taken when wiring as follows:
  - The remote control wiring and the inter unit control wiring should be wired apart from the inter unit power wiring.
  - It is recommended that shielded wires or twisted pair wires be used for the remote control and the unit control wiring if the heat pump is installed where it is exposed to the influence of electrical and/or electromagnetic noise.

15. Recommended power supply specification

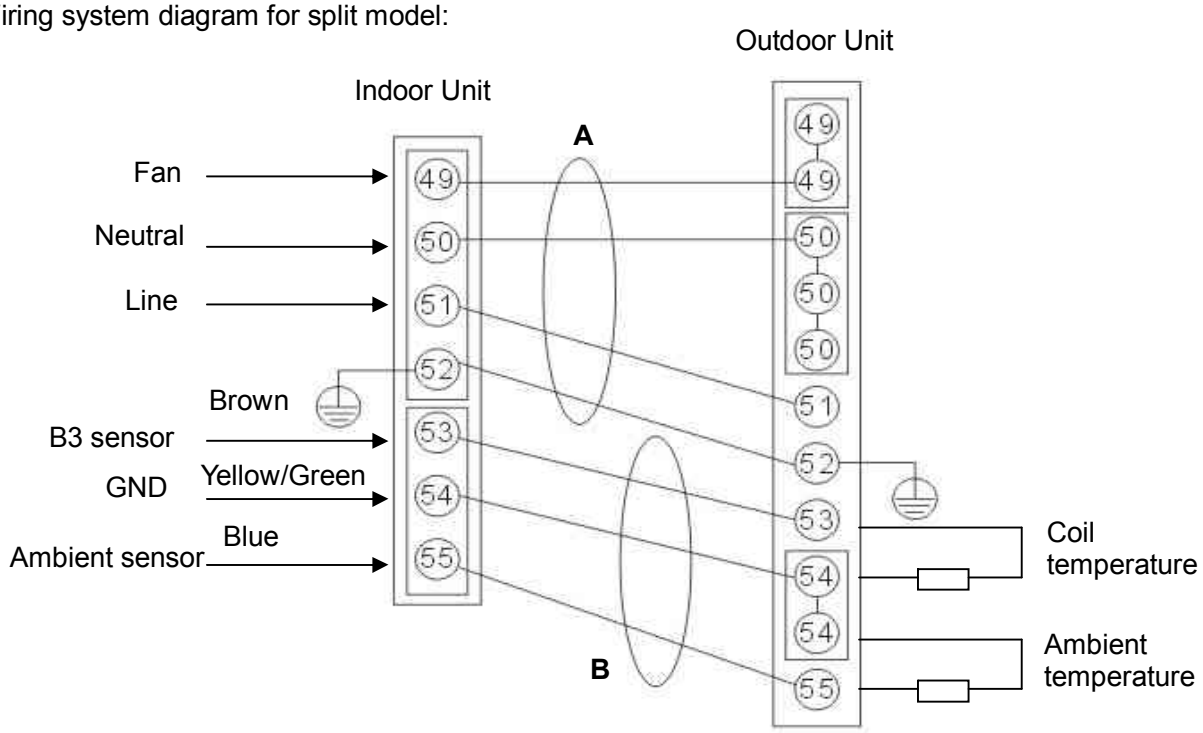
Monobloc model:

Item / Model	Power Supply	Diameter of the thinnest cable	Miniature Circuit Breaker（MCB）
		Length (＜20m)	Capacity
PASRW030B-D-PS	230V-1ph-50Hz	6mm^2	32A
PASRW040B-D-PS	230V-1ph-50Hz	10mm^2	50A
PASRW050B-D-PS	230V-1ph-50Hz	10mm^2	50A
PASRW060SB-D-PS	380V-3ph-50Hz	6mm^2	32A

Split model:

Item / Model	Power Supply	Diameter of the thinnest cable	Miniature Circuit Breaker（MCB）	Inter-unit wiring(A)	Control Wiring(B)
		Length (＜20m)	Capacity	Gauge	Gauge
PASRF050B-D-PS	230V-1ph-50Hz	10mm^2	50A	1.5 mm^2	0.75 mm^2
PAXRW050	230V-1ph-50Hz	/	/	1.5mm^2	0.75 mm^2
PASRW060SB-D-PS	380V-3ph-50Hz	6mm^2	32A	1.5mm^2	0.75 mm^2
PAXRW060	380V-3ph-50Hz	/	/	1.5mm^2	0.75 mm^2

Wiring system diagram for split model:



16. Electrical characteristics

Model: PASRW030B-D-PS

- Cooling

		Fan motor	Water pump	Heat element (disable)	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65	1.2	6.8	8.65	10.5
	kW	0.15	0.27	1.5	1.88	2.3
Full load conditions	A	0.65	1.2	6.8	10.93	12.78
	kW	0.15	0.27	1.5	2.5	2.92
Starting amperes	A	1	1.5	6.8	58.4	58.8

- Heating

		Fan motor	Water pump	Heat element	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65	1.2	6.8	9.95	18.6
	kW	0.15	0.27	1.5	2.18	4.1
Full load conditions	A	0.65	1.2	6.8	15.95	24.6
	kW	0.15	0.27	1.5	3.68	5.6
Starting amperes	A	1	1.5	6.8	58.4	58.8

Model: PASRW040B-D-PS

- Cooling

		Fan motor	Water pump	Heat element (disable)	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65*2	1.3	13.0	10.6	13.2
	kW	0.15*2	0.3	3.0	2.3	2.9
Full load conditions	A	0.65*2	1.3	13.0	13.8	16.4
	kW	0.15*2	0.3	3.0	2.99	3.6
Starting amperes	A	2	2	13.0	103	103

- Heating

		Fan motor	Water pump	Heat element	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65*2	1.3	13.0	11.6	27.1
	kW	0.15*2	0.3	3.0	2.5	6.1
Full load conditions	A	0.65*2	1.3	13.0	18.6	34.2
	kW	0.15*2	0.3	3.0	6.7	10.3
Starting amperes	A	2	2	13.0	103	103

Model: PASRW050B-D-PS/ PASRF050B-D-PS+ PAXRW050

- Cooling

		Fan motor	Water pump	Heat element (disable)	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65*2	1.8	13.0	13.7	16.7
	kW	0.15*2	0.4	3.0	3.0	3.65
Full load conditions	A	0.65*2	1.8	13.0	18.4	21.4
	kW	0.15*2	0.4	3.0	4.1	4.74

Starting amperes	A	2	2	13.0	112	112

- Heating

		Fan motor	Water pump	Heat element	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz				
Rating conditions	A	0.65*2	1.8	13.0	16.6	32.6
	kW	0.15*2	0.4	3.0	3.65	7.29
Full load conditions	A	0.65*2	1.8	13.0	22.8	39.4
	kW	0.15*2	0.4	3.0	5.06	8.7
Starting amperes	A	2	2	13.0	112	112

Model: PASRW060SB-D-PS/ PASRF060SB-D-PS+ PAXRW060

- Cooling

		Fan motor	Water pump	Heat element (disable)	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz		380V/ 3 phase/ 50Hz		
Rating conditions	A	0.55/0.55	1.8	4.5	6.9	8.1
	kW	0.12/0.12	0.4	3.0	3860	4.5
Full load conditions	A	0.55/0.55	1.8	4.5	8.8	10
	kW	0.12/0.12	0.4	3.0	4960	5.6
Starting amperes	A	1/1	2	4.5	73	73

- Heating

		Fan motor	Water pump	Heat element	Compressor	Complete Unit
Power supply		230V/1 phase/50Hz		380V/ 3 phase/ 50Hz		
Rating conditions	A	0.55/0.55	1.8	4.5	8.04	13.66
	kW	0.12/0.12	0.4	3.0	4.5	8.14
Full load conditions	A	0.55/0.55	1.8	4.5	11.2	16.9
	kW	0.12/0.12	0.4	3.0	6.3	9.94
Starting amperes	A	1/1	2	4.5	73	73

Cooling:

Rating conditions: Ambient temp.(DB/WB) 35℃/24℃,
Inlet water temperature: 12℃ Outlet water temperature: 7℃

Full load conditions: Ambient temp.(DB/WB) 43℃/33℃,
Inlet water temperature: 19℃ Outlet water temperature: 15℃

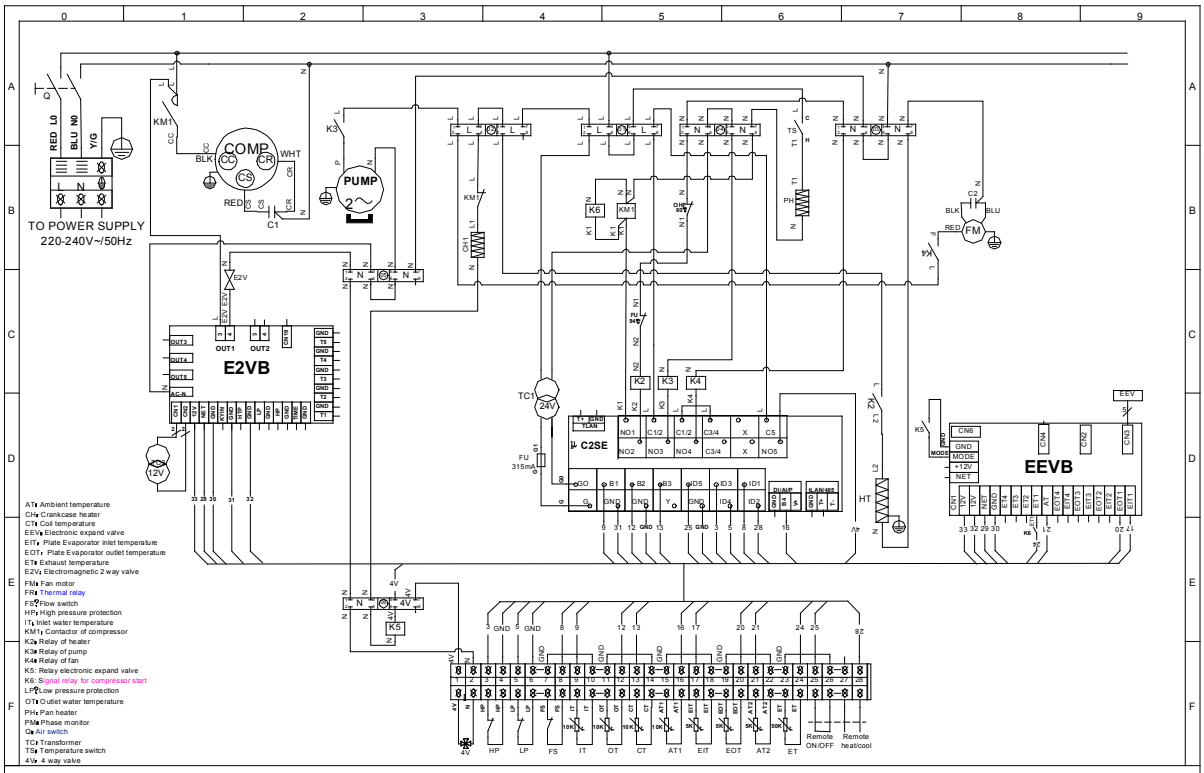
Heating:

Rating conditions: Ambient temp.(DB/WB)7℃/6℃,
Inlet water temperature: 40℃, outlet water temperature 45℃.

Full load conditions: Ambient temp.(DB/WB)21℃/16℃,
Inlet water temperature: 55℃, outlet water temperature 60℃.

17. Electric wiring diagrams

◆ Model: PASRW030B-D-PS



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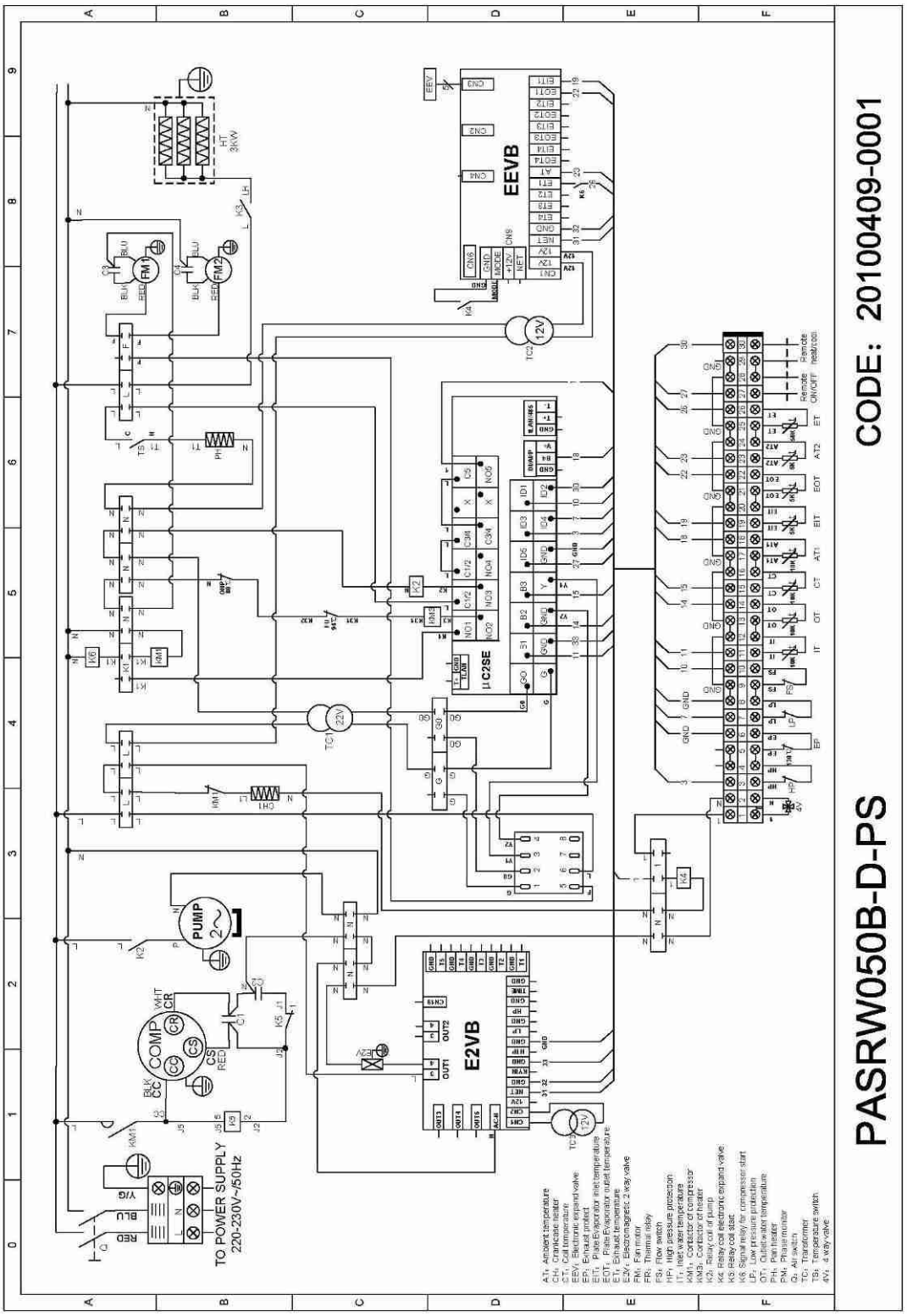
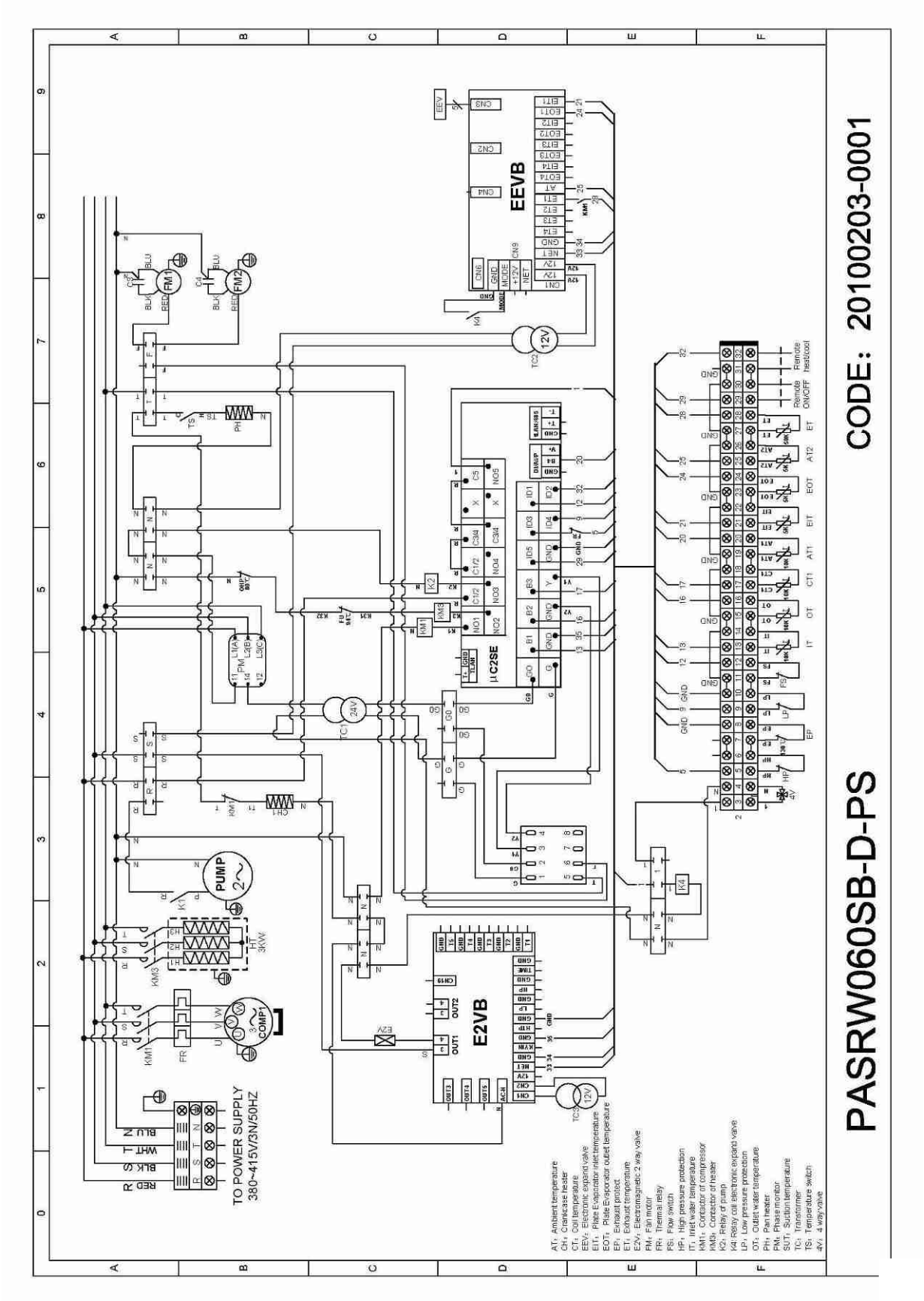
◆ Model: PASRW040B-D-PS /PASRW050B-D-PS



◆ Model: PASRW060SB-D-PS



Symbols	Description	Symbols	Description
AT	Ambient temperature	E2V	Solenoid valve
CH	Crankcase heater	FM	Fan motor
EIT	Evaporator inlet temperature	FR	Thermal relay
EOT	Evaporator outlet temperature	FS	Flow switch
EEV	Electrical expansion valve	HP	High pressure protection
ET	Exhaust temperature	LP	Low pressure protection
EP	Exhaust protection	K(1-10)	relay
IT	Inlet water temperature	KM(1-10)	Contactor
OT	Outlet water temperature	TC	Transformer
PM	Phase monitor	4V	4 way valve
TS	Thermal switch	PH	Panel heater

Section 5 Controller and functions

18. User interface

◆ Display

The display features 3 digits, with the display of the decimal point between -99.9 and 99.9.Outside of this range of measurement, the value is automatically displayed without the decimal (even if internally the unit still operates considering the decimal part).In normal operation, the value displayed corresponds to the temperature read by probe B1, that is, the evaporator water inlet temperature (for water chillers) or the ambient air temperature for direct expansion units.

◆ Symbols on the display

Display with 3 green digits (plus sign and decimal point), amber symbols and red alarm symbols.

Symbol	Color	Meaning		Reference refrigerant circuit
		With LED ON	With LED flashing	
1;2	Amber	Amber Compressor 1 and/or 2 ON	Start up request	1
3;4	Amber	Amber Compressor 3 and/or 4 ON	Start up request	2
	Amber	At least one compressor ON		1/2
	Amber	Pump/air outlet fan ON	Start up request	1/2
	Amber	Condenser fan ON		1/2
	Amber	Defrost active	Defrost request	1/2
	Amber	Heater ON		1/2
	Amber	Alarm active		1/2
	Amber	Heat pump mode (P6=0)	Heat pump mode request (P6=0)	1/2
	Amber	Chiller mode (P6=0)	Chiller mode request (P6=0)	1/2

◆ Functions associated with the buttons

Button	Unit status	Button press mode
	Loading default values	Press at power ON
Prg mute	Go up a sub-group inside the programming area, until exiting (saving changes to EEPROM)	Press once
	In the event of alarms, mute the buzzer (if present) and deactivate the alarm relay	Press once
	Access the direct parameters	Press for 5 s
Sel	Select item inside the programming area and display value of direct parameters/confirm the changes to the parameters	Press once
Prg mute Sel	Program parameters after entering password	Press for 5 s
	Select top item inside the programming area	Press once or press and hold
☀	Increase value	Press once or press and hold
	Switch from standby to chiller mode (P6=0) and vice versa	Press for 5 s
	Select bottom item inside the programming area	Press once or press and hold
❄	Decrease value	Press once or press and hold
	Switch from standby to heat pump mode (P6=0) and vice versa	Press for 5 s
	Manual alarm reset	Press for 5 s
❄	Immediately reset the hour counter (inside the programming area)	Press for 5 s
Sel ☀	Force manual defrost on both circuits	Press for 5 s

◆ Programming and saving the parameters

1) Press“Prg mute” and “sel” for 5 seconds;
2) The heating and cooling symbol and the figure “00”are displayed;
3) Use “☀”and “❄” set the password and confirm by pressing “sel ”;
4) Use “☀” and “❄” to select the parameter menu (S-P) and then press “sel”;
5) Use “☀” and“❄” to select the parameter group and then press “sel”;
6) Use“☀” and“❄” to select the parameter and then press “sel”;
7) After making the changes to the parameter, press “sel” to confirm or“Prg mute” to cancel the changes;
8) Press “Prg mute”to return to the previous menu;
9) To save the modifications, press “Prg mute”repeatedly until reaching the main menu.

Note:

a) The parameters that have been modified without being confirmed using the “sel” button return to the previous value

b) If no operations are performed on the keypad for 60 seconds, the controller exits the parameter modification menu by timeout and the changes are cancelled

19. Parameters

1) General parameters
The parameters are divided into 4 different types, according to their level of access by the user (password) and their function.
For each level, only the access to the parameters of the same or lower level can be set. This means that through “factory” password, accessing the menu” levels” (S-P), it is possible to set the desired level for each parameter.

2) Factory parameters
Accessible with the 66 “factory” password, allow the configuration of all the unit parameters.

3) Super User parameters
Accessible with the 11 “Super User” passwords, allow the configuration of the Super user. User and Direct parameters.

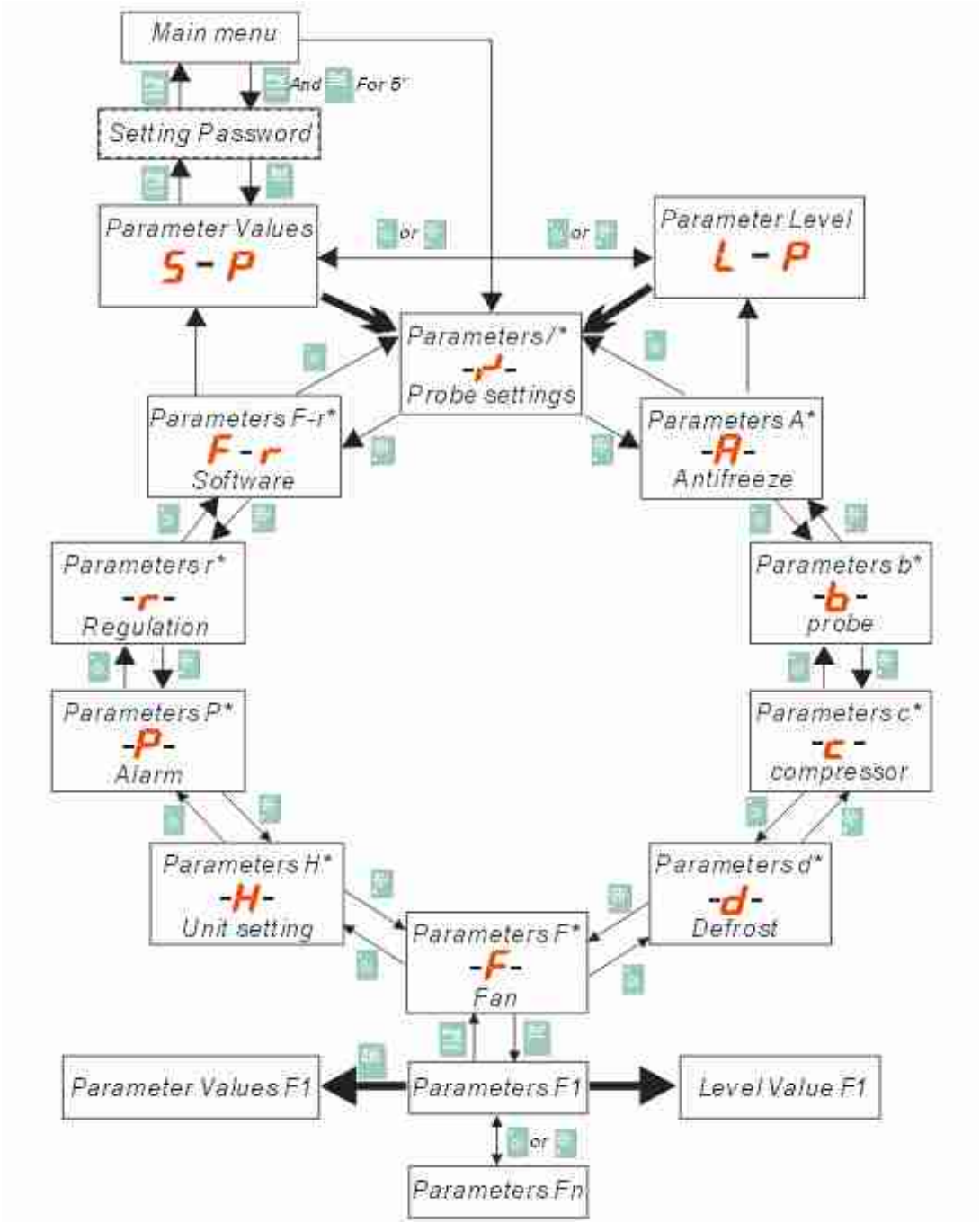
4) User parameters
Accessible with password 22, allow the configuration of the parameters that typically can be set by the user (User parameters) and the Direct parameters, consequently relating to the options.

5) Direct parameters
Accessible without password, this are used to read the probe measurements and any data, by any user, without compromising the operation of the unit.

N.B.: The modifications to the parameters regarding the configuration of the unit (Type, number of compressors,...) must be performed with the controller in standby.

6) Menu structure

level	*Level name*	*password*
*_d_*	*Direct*	*No password*
*_U_*	*User*	*22*
*_S_*	*Super user*	*11*
*_F_*	*factory*	*66*



7) Parameter tables:

Display indication	Parameter and description	Min	Max.	U.O.M	Default value
/01	Probe type B1	0	1	Flag	1
/02	Probe type B2	0	1	Flag	1
/03	Probe type B3	0	2	Flag	1
/04	Probe type B4	0	3	Flag	2
/05	Probe type B5	0	1	Flag	0
/06	Probe type B6	0	1	Flag	0
/07	Probe type B7	0	2	Flag	0
A01	Antifreeze alarm set-point	A07	A04	℃/℉	2.0
A02	Differential for antifreeze/low ambient temperature alarm	0.3	122.0	℃/℉	1.0
A04	Set point for the activation of antifreeze heater/auxiliary heater	A01	R16	℃/℉	4.0
A07	Antifreeze alarm set point limit	-40.0	176.0	℃/℉	40.0
A08	Auxiliary heater set point in heating mode	A01	R15	℃/℉	30
A09	Auxiliary heater differential in heating mode	0.3	50	℃/℉	5.0
A10	Antifreeze automatic start up	0	3	Flag	2
B00	Config. of probe to be shown on the display	0	10	Flag	1
B01	Value read by probe B1	---	---	℃/℉	---
B02	Value read by probe B2	---	---	℃/℉	---
B03	Value read by probe B3	---	---	℃/℉	---
B04	Value read by probe B4	---	---	℃/℉ bar	---
C03	Delay between 2 starts of the same compressor	0	999	S	300
C04	Delay between starts of the 2 compressors	0	999	S	5
C05	Delay between 2 shut-downs of The 2 compressors	0	999	S	5

Display indication	Parameter and description	Min.	Max.	U.O.M	Default value
C07	Delay in switching on the comp. after switching on the pump	0	150	S	60
C08	Delay in switching OFF the comp. After switching OFF the pump	0	150	MIN	2
C09	Maximum compressor operating time in tandem	0	60	MIN	0
d01	Defrosting cycle/Condenser antifreeze	0	1	Flag	1
d02	Time or temp.- Press. based defrosting	0	2	Flag	1
d03	Start defrosting temperature	-40.0	D04	℃	-7
d04	End defrosting temperature	d03	176.0	℃	13
d05	Min.time to start a defrosting cycle	10	160	s	120
d06	Min.duration of a defrosting cycle	0	160	s	0
d07	Max.duration of a defrosting cycle	1	160	s	10
d08	cycle requests within the same circuit	10	160	min	45
d09	Defrosting delay between the 2 circuits	0	160	Min	1
d12	Waiting time before defrosting	0	3	Min	1
d13	Waiting time after defrosting	0	3	Min	1
d14	End defrosting with 2 refrigerating circuits	0	2	Flag	0
d15	Start defrost with 2 circuits	0	2	Flag	0
d16	Forced ventilation time at the end of the defrosting	0	360	s	30
F01	Fan output	0	1	Flag	1
F02	Fan operating mode	0	3	Flag	2
F03	Min.voltage threshold for Triac	0	F04	Step	0
F04	Max.voltage threshold for Triac	F03	100	Step	100
F05	Temp.value and Pressure value for min.speed Cooling	-40.0	176.0	℃	18
F06	Temp. value for min. speed Cooling	0	50.0	℃	5

Display Indication	Parameter and description	Min	Max	U.O.M	Default value
F08	Temperature value for max speed in Heating mode	-40.0	176	℃	45
F09	Temperature value for max. speed in Heating mode	0	50.0	℃	5
F12	Triac impulse duration	0	10	S	0
F13	Fan management in defrost mode	0	2	Flag	2
H01	Unit model	0	10	Flag	3
H02	Number of condenser fan circuits	0	1	Flag	0
H04	Number of compressors per circuit	0	5	Flag	0
H05	Pump mode	0	3	Flag	1
H06	Cooling/Heating digital input	0	1	Flag	1
H07	ON/OFF digital input	0	1	Flag	1
H08	µC2se network configuration	0	3	Flag	0
H11	Output modes	0	5	Flag	12
H12	Capacity- control logic valve and inversion valve	0	3	Flag	0
P01	Flow switch alarm delay when starting the pump	0	150	s	30
P02	Flow switch alarm delay during steady operation	0	120	s	2
P03	Low pressure alarm delay at start-up	0	200	s	200
P05	Alarm reset	0	6	Flag	5
P06	Cooling/heating logic	0	1	Flag	1
P08	Digital input 1 selection	0	22	Flag	2
P09	Digital input 2 selection	0	22	Flag	10
P16	High temperature alarm set	-40.0	176	℃/℉	60.0
P19	System low temperature alarm set point	-40.0	176	℃/℉	5.0
P20	Enable system start-up protection	0	1	Flag	1
P22	Low pressure alarm delay at start-up Compressor in heat pump	0	200	s	200
P23	Low pressure alarm delay at compressor start-up in defrost	0	999	s	300
P25	Select digital output 2	0	17	Flag	2
P26	Select digital output 3	0	17	Flag	4
P27	Select digital output 4	0	17	Flag	8
P28	Select digital output 5	0	17	Flag	3

Display Indication	Parameter and description	Min.	Max.	U.O.M	Default value
r01	Cooling set point	R13	R14	℃/℉	12.0
r02	Cooling differentia	0.3	50.0	℃/℉	2.0
r03	Heating set point	R15	R16	℃/℉	40.0
r04	Heating differential	0.3	50.0	℃/℉	2.0
r05	Compressor rotation	0	3	flag	0
r06	Type of compressor control	1	4	flag	0
r07	DEAD ZONE	0.1	50	℃/℉	2
r13	Min. Cooling set point	-40.0	R14	℃/℉	8
r14	Max. Cooling set point	R13	176.0	℃/℉	28
r15	Min. Heating set point	-40.0	R16	℃/℉	15.0
r16	Max. Heating set point	R15	176.0	℃/℉	55.0
r17	Cooling compensation constant	-5	5	/	0
r18	Maximum distance from the set point	3	20	℃/℉	5
r19	Start compensation temperature in cooling mode	-40	176	℃/℉	30
r20	Start compensation temperature in heating mode	-40	176	℃/℉	-5
r31	Heating compensation constant	-5	5	/	0.5

20. Parameter description

Function of probe
/01,/02,/05,/06 :set the function of probe
0= not present
1= Present
/03,/07 :set the function of probe
0= not present
1= NTC Cond. Probe
2= NTC Out. Probe
/04:set the function of probe
0= not present
1= ON/OFF (D.I)
2= Out. Probe
3= Radiometric cond. Probe, 5 Vdc

Antifreeze alarm set point (low ambient temp. for air/air units)
A01: This represents the temperature (antifreeze set point) of the water at the evaporator outlet below which an antifreeze alarm is activated; in this condition the compressors corresponding to the circuit in question are stopped, while the pump remains on to decrease the possibility of freezing. The alarm is reset manually (or automatically, depending on parameter P05) only when the water temperature returns within the operating limits (that is, above A01+A20).In the Air/Air units (H1=0,1) the value represents the low room temperature warning threshold; this alarm, activated according to value read by probe B1 or B2 (depending on parameter A06) is signal only, and is reset depending on the value of P05.

Antifreeze/low room temperature (air/air) alarm differential
A02: This represents the differential for the activation of the antifreeze alarm (low room temperature in air/air units); the alarm condition cannot be reset until the temperature exceeds the set point +differential (A01+A02).

Antifreeze heater/auxiliary heater set point in cooling
A04: Determines the threshold below which the antifreeze heater switched on. In the air/air units (H01=0, 1) this parameter represents the temperature value below which the auxiliary heater is activated. In the air/air heat pumps (H01=1) the auxiliary heater are not used in cooling mode.

Antifreeze alarm set point limit
A07: Establishes the minimum limit for setting the antifreeze alarm set point (A01).

Antifreeze heater in defrost/auxiliary heater in heating set point
A08: Represents the threshold below which the auxiliary heater is ON in defrost and in heating mode. In the heat pumps (H01=1-3-6), during heating mode, it represents the set point for the auxiliary heater; during the defrost cycle, it represents the set point for the activation of the antifreeze heaters. In the air/air units (H01=0) it only represents the set point for the heating heaters. In heat pump mode (H1=5-10) this represents the set point for the antifreeze heater and the antifreeze probe becomes B3/B7

Antifreeze heater/auxiliary heater differential in heating
A09: Represents the differential for the activation/deactivation of the antifreeze heater in defrost/auxiliary heater in heating

-Automatic start for antifreeze

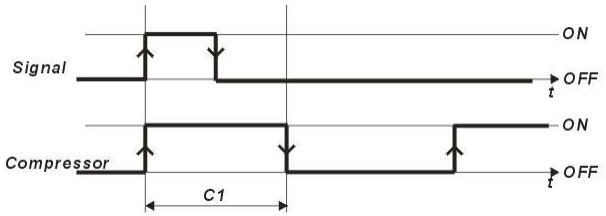
A10: This parameter is valid when the unit is in standby. The operating mode switchover delay times are ignored. A10=0: function not enabled, A10=1: Auxiliary heater and pump are ON at the same time, based to the respective set: points, A04 or A08, according to the settings of the antifreeze or auxiliary heaters; the exception is when H01=1 in cooling, in which case not even the pump will be activated. Each circuit, in the case of two evaporators, will be controlled based on its own probe (B2, B6).A10=2: pump and auxiliary heater ON independently based on the respective set point, A04 or A08. If the temperature falls below the antifreeze alarm set point, A01, the unit is started in heating mode, controlling the steps (compressors) .based on the set point A01 and differential A02, in proportional mode. Each circuit, in the case of two evaporators, will be controlled based on its own probe, (B2), B6: step 1 and 2 for circuit 1, and step 3 and 4 for circuit 2. This mode ends automatically when the antifreeze set point A01 + the differential A02 is reached (returning to the previous mode); in any case, the function can be terminated manually by modifying the parameters or disconnecting the power supply to the device. In this case, the display will be as follows:
- operating mode LED OFF;
- Cooling heating flag not switched (not detected by the Supervisor);
- Antifreeze alarm A01 (remains active even at the end of the special operation if the unit was previously ON, deactivated by Manual reset or in standby).

A10=3: heaters ON based on the respective set point A04 and A08.
Do not use with H1= 6

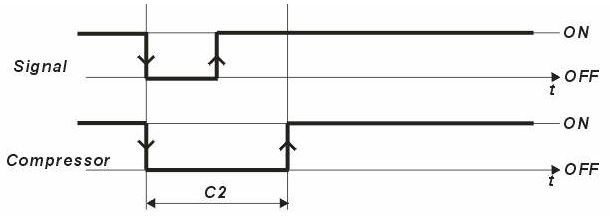
- Select probe to be shown on display.
b00: Sets the probe reading to be displayed.
0 = probe B1
1 = probe B2
2 = probe B3
3 = probe B4
4 = probe B5
5 = probe B6
6 = probe B7
7 = probe B8
8 = set point without compensation
9 = dynamic set point with possible compensation
10 = remote ON/OFF digital input status

Note: probes that are not present cannot be selected。

- Minimum ON time
c01: This establishes the time that the compressor must remain ON for when started, even if the stop signal is sent.

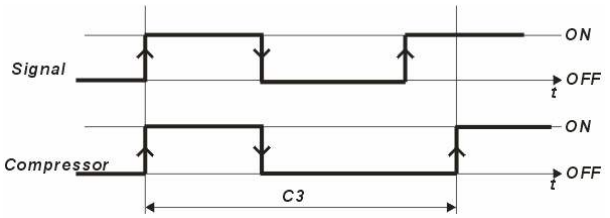


- Minimum OFF time
c02: This establishes the time that the compressor must remain Off for when stopped, even if the start signal is sent. The compressor LED flashes in this phase.



- Delay between 2 starts of the compressor

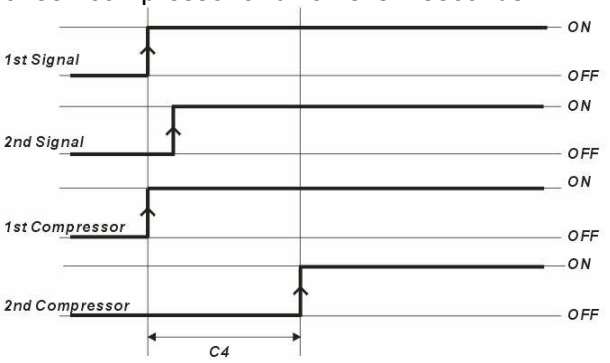
c03: This sets the minimum time that must elapse between two successive starts of the same compressor (determines the maximum number of starts per hour for the compressor). The compressor LED flashes in this phase. If by mistake the user enters a value lower than the sum of C01 + C02, this parameter will be ignored and only the times C01 and C02 will be considered.



- Start delay between compressors

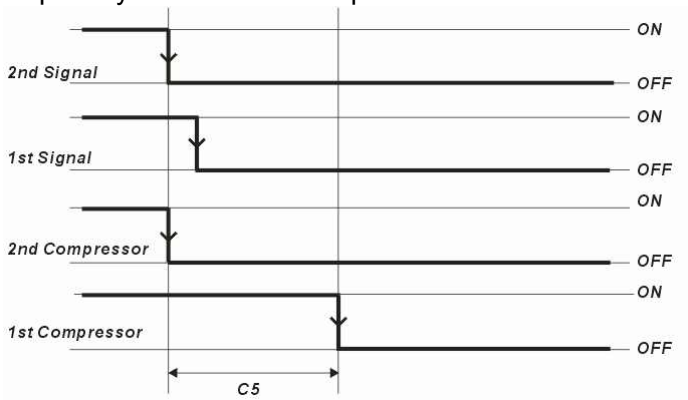
c04: This sets the delay between the starts of the two compressors, so as to reduce the peak power input and make the compressors start more smoothly. The compressor LED flashes in this phase.

- In the event of capacity control, the delay c04 between compressor and valve becomes c04/2;
- In the event of defrost operation, the delay between compressor and compressor is 3 seconds, and between compressor and valve is 2 seconds.



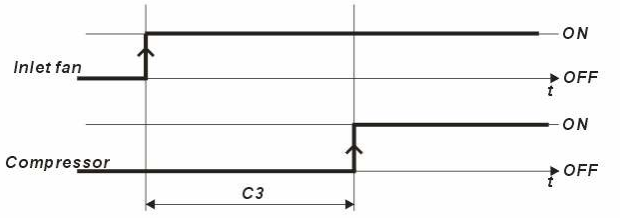
- Stop delay between compressors

c05: This sets the stop delay between the compressors.



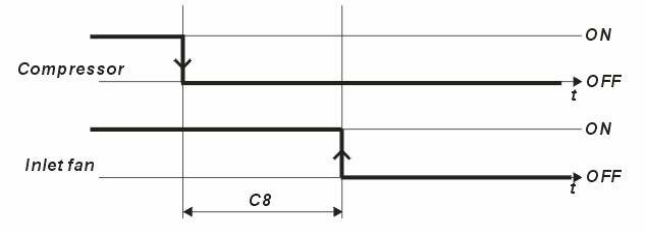
- Compressor start delay from pump/outlet fan (air/air) ON.

c07: In cooling and heating operation, if the operation of the pump (outlet fan) is subject to the controller (parameter H05=2), the compressor is started when required after the set time from the activation of the water pump (or outlet fan in air/air units). If the pump/outlet fan is always ON (H05=1) and consequently does not depend on the control logic, the compressor is started after the set time from when the unit starts.



- Pump/outlet fan (air/air) start delay from compressor OFF

c08: In cooling and heating operation, if the operation of the pump (outlet fan) is subject to the controller (parameter H05=2), when the compressor is requested to stop, the control first stops the compressor and the pump (outlet fan). If the pump/outlet fan is always ON (H05=1), it is only stopped in standby mode.



- Maximum tandem compressor operating time

c09: In the case of two compressors in tandem per circuit, one compressor should not operate for longer than the time set for c09 while the other compressor in the circuit is OFF. This prevents the oil shared in common from migrating over the allowed limit towards the active compressor, and consequently avoids damage when inactive compressor next starts (FIFO logic) due to poor lubrication. As a result, compressor 1 (or 2) in circuit 1, if requested to operate continuously, will actually stop OFF after the time c09 and hand over to compressor 2 (or 1) that was previously OFF. This function always considers the compressor times. Any value lower than the time set for c03 will be ignored, and the compressors (if the above condition is satisfied) will switch over after the time c03. When C9=0, the function is disabled (the compressors will not switch over).

- Enable condenser defrost/antifreeze

d01: For heat pumps with air-cooled condensers (H01=1, 3, 8), this establishes whether defrost control must be performed on the outdoor exchanger (evaporator in heating mode). On the other hand, for water/water heat pumps with reversal on the gas circuit (H01=5-10), It enables antifreeze control on the cooling water for the outdoor exchanger, which becomes the evaporator in heating mode, see d03. If the fan is not present, the function is not enabled for air/water units.

d01=0: condenser defrosts/antifreeze disabled;

d01=1: condenser defrosts/antifreeze enabled.

If defrosting is enabled, the LED corresponding to the condensate symbol on the display will come ON.

- Type of defrost

d02: establishes the type of defrost. d02=0: the defrost has a fixed duration that depends on 007 d02=1: the defrost starts and ends according to the temperature or pressure thresholds, see d03 and d04; d02=2: the pressure transducer and temperature probe

are both located on the outside exchanger; the defrost starts when the value read by the pressure transducer is below the threshold d03 and ends when the value read by the temperature probe is above the threshold d04; during the defrost, the pressure probe controls the fan speed, as in chiller mode, so as to limit the pressure, even if the NTC probe, caked by ice, delays the end defrost. In any case, after the maximum time allowed for the defrost, the unit will always exit the defrost procedure.

- Start defrost temperature/pressure or condenser antifreeze alarm set point

d03: For heat pumps with air-cooled condensers (H01=1, 3, 8, 10, 12), this sets the temperature or pressure below which the defrost cycle starts. To start the defrost cycle, the condition must be valid for the time d05. For water/water heat pumps with reversal on the gas circuit (H01=5, 10), it defines the set point for the activation of the antifreeze alarm for the outdoor exchanger cooling water (evaporator in heating mode, on probe B3)

- End defrost temperature/pressure

d04: Establishes the temperature or pressure above which the defrost cycle ends.

- Minimum start defrost time

d05: Establishes the time that temperature/pressure must remain below the start defrost threshold d03, while the compressor is ON, for the defrost cycle to be activated.

- Minimum defrost duration

d06: Represents the minimum duration of the defrost cycle (the defrost continues even if the value read by the condenser probe exceeds the end temperature/pressure). If set to 0, the minimum defrost time function is disabled.d06=0: control disabled

- Maximum defrost duration

d07: If timed defrost is set (d02=0), this establishes the duration of the cycle. If, on the other hand, the defrost ends at a set temperature/pressure, it represents the maximum duration (being in this case a safety feature, an alarm is signaled, “dF1”or “dF2”.

- Delay between two defrost requests in the same circuit

d08: Represents the minimum delay between two successive defrost cycles.

- Defrost delay between the 2 circuits

d09: Represents the minimum delay between the defrost cycles on the 2 circuits.

- Waiting time before defrost/delay in switching from heating to cooling

d12: As soon as the defrost condition arises, but before the actual cycle starts, the unit stops the compressor for the time d12 (selectable from 0 to 3 minutes). When the compressor stops, the four-way valve is switched (reversing of the cycle), after a time equal to d12/2; this waiting time allows the pressure to balance before starting the defrost cycle. In this procedure the compressor protection times are ignored, and consequently the compressor is stopped, and subsequently restarted, immediately. If d12=0, the compressor is not stopped and the reversing valve is switched immediately.

- Waiting time after defrost/delay in switching from cooling to heating

d13: At the end of the defrost cycle, the unit stops the compressor for a time d13 (selectable from 0 to 3 minutes). When the compressor stops, the four-way valves is switched (reversing of the cycle), after a time equal to d13/2; this waiting time allows the pressure to balance and the outdoor coil to drip. In this procedure the compressor protection times are ignored, and consequently the compressor is stopped, and subsequently restarted, immediately. If d13=0, the compressor is not stopped and the reversing valve is switched immediately.

- End defrost with two gas circuits/1 fan circuit

d14: This parameter is used to select, in units with two refrigerant circuits and one fan circuit, the end defrost mode. d14 = 0 (default): the two circuits end the defrost independently (each according to their own temperature or pressure probe reading), only if H2= 1; d14 = 1: when both the circuits have reached the defrost condition; d14 = 2: when one of the two circuits has reached the end defrost condition.

- Start defrost with 2 circuits

d15: This parameter is used to select whether to defrost the two circuits together or separately.
d15 = 0 (default): the two circuits start defrosting independently (each according to their own temperature or pressure probe reading), only if H2=1; d15 = 1: the two circuits start defrosting when both have reached the start defrost conditions; d15 = 2: the two circuits start defrosting when at least one of the two has reached the defrost conditions.

	d14 = 0	d14 = 1	d14 = 2
d15 = 0	OK	OK	OK
d15 = 1	OK	OK	OK
d15 = 2	No possible	OK	No possible

- Forced ventilation time at end defrost

d16: If the parameter F13 = 2, as soon as the end defrost temperature or pressure is reached, the fans are activated at maximum speed for the set time, before the change in operating mode. Only at the end of this time will the cycle switch back to heat pump mode, with the normal management of the fans.

- Fan output

F01: Enables the operation of the fans.
F01=0: fans absent;
F01=1: fans present.
The PWM output (1 or 2, depending on the value of parameter H02) requires the presence of the optional fan control cards (ON/OFF for the CONVONOFF module or speed variation for MCHRTF or FCS three-phase).

- Fan operating mode

F02: This establishes the operating logic for the fans:
F02=0: always ON at maximum speed, independently from the compressors. The fans are only switched OFF when the unit is in standby.
F02=1: ON at maximum speed when at least one compressor in the corresponding circuit is ON (parallel operation in each circuit).
F02=2: ON when the corresponding compressor is ON, with ON/OFF control based on the temperature/pressure settings for the minimum and maximum speed (parameters F05-F06-F08 and F09). When the compressors are stopped, the corresponding fans are also stopped, irrespective of the condensing temperature/pressure.
F02=3: ON when the corresponding compressor is ON, with speed control. When the compressors are stopped the corresponding fans are also stopped, irrespective of the condensing temperature/pressure. With F02=3 and an NTC condenser probe, when the compressor starts the fans are started at maximum speed for the time F11, irrespective of the temperature measured. In the event of a condenser probe fault, the fans will be switched OFF.

- Minimum voltage threshold for Triac

F03: In the event of fan speed control, the optional phase cutting cards (MCHRTF*) are required, fitted with a triac. The voltage delivered by the triac to the electric fan motor corresponding to the minimum speed must be set. The set value does not correspond to the actual voltage in Volts applied, but rather to an internal unit of calculation in the UC2.If using FCS controllers, set this parameter to 0. F03 = Represents the minimum threshold for the triac

- Maximum voltage threshold for Triac

F04: In the event of fan speed control, the optional phase cutting cards (MCHRTF*) are required, fitted with a triac. The voltage delivered by the triac to the electric fan motor corresponding to the maximum speed must be set. The set value does not correspond to the actual voltage in Volts applied, but rather to an internal unit of calculation in the UC2. If using FCS controllers, set this parameter to 100. F04 = Represents the maximum threshold for the triac.

- Temperature/pressure set point for minimum speed in cooling

F05: This represents the temperature or pressure below which the fans remain ON at minimum speed. In the case of ON/OFF control, it represents the temperature or pressure below which the fans are switched OFF.

- Temperature/pressure differential for maximum speed in cooling

F06: This represents the temperature or pressure differential in reference to F05 above which the fans are started at maximum speed; in the case of ON/OFF control, this represents the differential above which the fans are started.

- Temperature/pressure differential for fans off in cooling

F07: This represents the temperature or pressure differential in reference to F05 below which the fans are stopped. The fans are started 1 0C “lower” when using NTC temperature probes, or 0. 5 bars if using pressure probes. When using NTC temperature or pressure probes for condenser control, the fans are started with a hysteresis of 1 0C or 0. 5 bars.

- Temperature/pressure set point for minimum speed in heating

F08: This represents the temperature or pressure above which the fans are started at minimum speed. In the case of ON/OFF control, it represents the temperature or pressure above which the fans are switched OFF.

- Temperature/pressure differential for maximum speed in heating

F09: If fan speed control is used, this represents the temperature or pressure differential in reference to F08 below which the fans are started at maximum speed .in the case of ON/OFF control, this represents the differential below which the fans are started.

- Triac impulse duration

F12: This represents the duration in milliseconds for the impulse applied to the triac. For induction motors, set the parameter to 2 (default). On the other hand, when using the CONVONOFF0, CONV0/10A0 modules or FCS controllers, set the parameter to 0.

- Fan management mode in defrost

F13: This parameter sets the operating logic for the condensing fans during the defrost phase:

F13 = 0: (default) the fans are OFF.

F13 = 1: the fans are ON as in cooling mode, based on the temperature or pressure.

F13 = 2: the fans are OFF until the ends defrost temperature or pressure is reached, above which they are started at maximum speed for the time set for parameter d16. Only at the end of this time will the cycle return to heat pump mode with the normal management of the fans.

Note: If the unit is running the Fan Defrost function (parameter d17), the fan management selected by F13 is disabled

- Unit model

H01: Used to select the type of unit being controlled:

H01= 0: air/air units

H01= 1: AIR/AIR heat pump

H01= 2: AIR/WATER Chiller

H01= 3: AIR/WATER heat pump

H01= 4: WATER/WATER Chiller

H01= 5: water/water heat pump with rev. on gas (*)

H01= 6: water/water heat pump with rev. on water (*)
H01= 7: air-cooled condensing unit
H01= 8: air-cooled condensing unit with reversal on gas circuit
H01= 9: water-cooled condensing unit
H01= 10: water-cooled unit condensing with reversal on gas circuit
(*) Note: Set H21= 4 (Condenser pump always on), if H02= 1 (Two condensers).

- Number of compressors/circuits
H04: This establishes the number of compressors per circuit and the number of circuits.
H04=0:1 comp. ON 1 circuit (single circuit)
H04=1:2 comp. in tandem ON 1 circuit (single circuit)
H04=2:1 comp. per circuit, 2 circuits (two circuits)
H04=3:2 comp. in Tandem, 2 circuits (two circuits)
H04=4:1 compressor and 1 capacity step in one circuit
H04=5:1 compressor and 1 capacity step per circuit

- Evaporator pump/fan operating mode
H05: This establishes the operating mode for the evaporator water pump or the outlet fan (in air/air units).
H05 = 0: pump disabled, (the flow switch alarm is ignored)
H05 = 1: always ON (the alarm is managed)
H05 = 2: ON when called by compressor (the alarm is managed)
H05 = 3: the pump will be started and stopped at regular intervals (independently from the compressors) as per the Burst setting (see parameters c17 and c18). When the heating or cooling signal is received, first the evaporator pump/outlet fan starts (always ON), and then the compressor, after the set times (c07, c08). The pump will not be stopped until all the compressors are Off. Note: with air/air units (H01=0,1), if heaters are used as the heating device, the fan must not be stopped while heating is active. This would cause the risk of fire. Therefore, if H01=0 or 1, H05 must be set to 1.

- UC2se network configuration
H08: Establishes the layout of the tLan network.
0 = UC2se only
1 = UC2se + valve
2 = UC2se + exp.
3 = UC2se + exp. + valve

- Selection map outputs
H11: This parameter is used to arbitrarily associate some digital outputs to the devices on the unit.
H11= 12:

Outputs	Associated device
C1	Compressor 1
C2	P25
C3	P26
C4	P27
C5	P28
C6	Compressor 3
C7	P29
C8	P30
C9	P31
C10	P32

Parameters P25 to P32 can have the following meanings:

0	no function associated with the relay
1	compressor 2
2	Heater 1
3	4 way valve 1
4	water pump
5	Open freecooling/ freeheating
6	Close freecooling/ freeheating
7	Humidifier
8	Condenser fan 1 on/off
9	heater 2
10	alarm
11	Boiler contact
12	compressor 4
13	4 way valve 2
14	water pump
15	Condenser fan 2 on/off
16	Warning
17	Condenser pump/Backup

Capacity-control logic

H12: Specifies the logic for the activation of the capacity-control steps for the compressors and the 4-way reversing valve.

H12 = 0: 4-way reversing valve and capacity-control normally energized

H12 = 1: 4-way reversing valve and capacity-control normally de-energized. Default value.

H12 = 2: 4-way reversing valve normally de-energized and capacity-control normally energized

H12 = 3: 4-way reversing valve normally energized and capacity-control normally de-energized.

Note: in the event of capacity-control, the rotation between compressor and corresponding valve is disabled. FIFO or time logic can be used between the 2 circuits to optimize the starts or the operating hours of the 2 compressors (1 per circuit)

- Flow switch alarm delay when starting pump

P01: Establishes a delay in the recognition of the flow switch alarm when starting the pump (this allows the flow-rate to stabilize). In the event of alarms, the compressors are stopped immediately, ignoring the times.

- Flow switch alarm delay in steady operation

P02: Establishes a delay in the recognition of the flow switch alarm in steady operation, so as to filter any variations in flow-rate or air bubbles present in the water circuit. In the event of alarms, the compressors are stopped immediately, ignoring the times.

- Low pressure alarm delay at compressor start

P03: Establishes a delay in the recognition of the low pressure alarm when the compressor starts, so as to allow stable operating conditions to be reached. This delay is also counted when reversing the 4-way valve in the refrigerant circuit.

- Alarm reset

P05: Enables automatic reset for all those alarms that normally feature manual reset (high pressure, low pressure, flow switch /antifreeze) as per the following table:

P05=0	high pressure, low pressure and antifreeze (low temperature) with manual reset
P05=1	all the alarms with automatic reset
P05=2	high pressure and antifreeze (low temperature) manual, low pressure automatic

P05=3	high pressure manual, low pressure and antifreeze (low temperature) automatic
P05=4	high and low pressure manual, antifreeze (low temperature) automatic
P05=5	high and low pressure manual after the third activation in one hour*, antifreeze (low temperature) automatic
P05=6	high and low pressure manual after the third activation in one hour*, antifreeze (low temperature) manual

- Cooling/Heating logic

P06: If this parameter is set to 1, the operating logic of the Cooling/Heating logic is reversed (from the keypad, the remote control and the digital input).

Symbol	P06=0	P06=1
	Cooling	Heating
	Heating	Cooling

- **Select digital input Id1**

P08=0	none
P08=1	Flow switch with manual reset (normally closed)
P08=2	Flow switch with automatic reset (NC)
P08=3	general thermal overload with manual reset (NC)
P08=4	general thermal overload with automatic reset (NC)
P08=5	thermal overload circuit 1 with manual reset (NC)
P08=6	thermal overload circuit 1 with automatic reset (NC)
P08=7	thermal overload circuit 2 with manual reset (NC)
P08=8	thermal overload circuit 2 with automatic reset (NC)
P08=9	cooling/heating (open = Cooling, closed = Heating) if H06= 1
P08=10	cooling/heating with delays d12 and d13 (open =Cooling, closed = Heating) if H06= 1
P08=11	alarm signal with manual reset (NC)
P08=12	alarm signal with automatic reset (NC)
P08=13	second set point from external contact (cooling and heating), (normally open)
P08=14	second cooling set point from external contact and heating from time band (NO)
P08=15	end defrost from external contact circuit 1 (NC)
P08=16	end defrost from external contact circuit 2 (NC)
P08=17	start defrost from external contact circuit 1 (NC)
P08=18	start defrost from external contact circuit 2 (NC)
P08=19	condenser step 1 (NO)
P08=20	condenser step 2 (NO)
P08=21	condenser step 3 (NO)
P08=22	condenser step 4 (NO)

- Select digital inputs ID2, ID6, ID7, and ID10

P09, P10, P11, and P12: Configuration of digital inputs ID2, ID6, ID7 and ID10 respectively (as per the above table for digital input ID1).

Note: cooling/heating (9, 10) cannot be set on P10, P11, P12, and P14.

-High temperature/high system start-up temperature alarm delay

P16: Represents the high temperature alarm threshold detected by probe B1; the differential is set at 2 0C and the alarm is reset automatically (the warning relay is activated, signal only, and the message “Ht” is shown). When starting the system, this alarm is ignored for the time P17.If the system start-up protection is enabled (see parameter P20) and the alarm is activated, t
P17 is ignored and the alarm has no hysteresis.

- Low system start-up temperature alarm set point

P19: Represents a threshold for the low temperature (measured by probe B1) alarm, without hysteresis; it is reset automatically (the alarm relay is not activated and the display shows the message “Alt”).

- System start-up protection for high/low temperature

P20: If set to 1, this parameter enables the system protection function when starting, both at power ON and when switching ON from Standby. In chiller mode (cooling), for values of B1 greater than the set point P19, an alarm is activated and the unit, is not started (display “AHt”). In heat pump mode (heating), for values lower than the set point P19, an alarm is activated and the unit is not started (display “ALt”) The alarm is reset automatically. P20=0: the function is not enabled.

- Cooling set point

r01: between r13 and r14
r02: cooling differential

- Heating set point (heat pump)

r03: between r15 and r16
r04: heating differential

- Minimum Cooling Set-Point

r13: Establishes the minimum limit for setting the Cooling set point.

- Maximum Cooling Set-Point

r14: Establishes the maximum limit for setting the Cooling set point.

- Minimum heating set point

r15: Establishes the minimum limit for setting the heating set point.

- Maximum heating set point

r16: Establishes the maximum limit for setting the heating set point.

- Cooling compensation constant (chiller mode):

r17: Sets the coefficient that controls the cooling compensation algorithm. In cooling mode, if r17 is positive, the set point increases as the outside temperature increases (measured by the outside probe); if on the other hand r17 is negative the set point decreases as the outside temperature increases.
This difference in the set point from the set value can have a maximum absolute value equal to the setting of r18. The values for the parameters shown on the graph are: r17=±2, r01=25, r19=32and r18=5).

- Maximum deviation from the set point

r18: Indicates the maximum deviation from the set point beyond which compensation is stopped (maximum and minimum limits in reference to the set point).

- Start compensation temperature in cooling (outside probe)

r19: Sets the temperature (measured by the outside probe) above which the compensation function starts (cooling), value between -40 to 80 ℃.

- Start compensation temperature in heating (outside probe)

r20: Sets the temperature (measured by the outside probe) below which the compensation function starts (heating), the value must be between -40 to 80 ℃.

- Heating compensation constant (mode Heat pump)

r31: Sets the coefficient that controls the heating compensation algorithm. In heating mode, if r31 is positive, the set point decreases as the outside temperature decreases (measured by the probe); if, on the other hand, r31 is negative, the set point increases as the outside temp decreases. This maximum deviation of the set point from the set value is equal to parameter r for example, parameter r17.

21. Table of alarm

Alarm display	Alarm type	Resetting	Compressor	Pump	Fan	Heater	Alarm	Warning
Hp1	High pressure	Depends on P05	OFFC1-2	--	ON	--	ON	--
HP2	High pressure	Depends on P05	OFFC3-4	--	ON	--	ON	--
Lp1	Low pressure	Depends on P05	OFFC1-2	--	OFF1	--	ON	--
LP2	Low pressure	Depends on P05	OFFC3-4	--	OFF2	--	ON	--
TP	General overload	Depends on P08	OFF	OFF	OFF	--	ON	--
tC1	Circuit 1 overload	Depends on P08	OFFC1-2	--	OFF1	--	ON	--
tC2	Circuit 2 overload	Depends on P08	OFFC3-4	--	OFF2	--	ON	--
LA	Advice	Depends on P08	--	--	--	--	ON*	ON
FL	Flow controller alarm	Depends on P08	OFF	OFF	OFF	--	ON	--
FLb	Backup pump warning	Automatic	--	--	--	--	--	ON
E1	Probe B1 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E2	Probe B2 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E3*	Probe B3 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E4*	Probe B4 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E5	Probe B5 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E6	Probe B6 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E7*	Probe B7 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
E8*	Probe B8 alarm	Automatic	OFF	OFF	OFF	OFF	ON	--
Hc1-4	Hour warning C1-4	Automatic	--	--	--	--	--	ON
EPr	EEPROM error during operation	Automatic	--	--	--	--	--	ON
EPb	EEPROM error at the start-up	Automatic	OFF	OFF	OFF	OFF	OFF	OFF
ESP	Expansion error	Automatic	OFF	OFF	OFF	OFF	ON	--
EL1-2	Zero cross	Automatic	--	--	100%	--	ON*	ON
dF1-2	Defrosting error.	Automatic	--	--		--	--	ON
d1-2	Defrost on circuit in question	--	--	--		--	--	--
A1	Frost alarm circ.1/2	Depends on P05	OFFC1-2	--	OFF1	--	ON	--
A2	Ice alarm circ.2	Depends on P05	OFFC3-4	--	OFF2	--	ON	--
Ht	High temperature	Automatic	--	--	--	--	ON*	ON
Lt	Low ambient temp	Depends on P05	--	--	--	--	ON*	ON
AHt	High temperature at the start-up	Automatic	OFF	--	OFF	OFF	--	ON
ALt	Low temperature at the start-up	Automatic	OFF	--	OFF	OFF	--	ON

22. Temperature sensor table:

Resistance/Temperature table for NTC CAREL probes

Temp.	Resistance value			Temp.	Resistance value			Temp.	Resistance value		
	Max.	Std	Min.		Max.	Std	Min.		Max.	Std	Min.
°C	K	K	K	°C	K	K	K	°C	K	K	K
-50	344,40	329,20	314,70	1	26,64	26,13	25,52	56	3,49	3,42	3,35
-49	324,70	310,70	297,20	2	25,51	25,03	24,55	57	3,39	3,31	3,24
-48	306,40	293,30	280,70	3	24,24	23,99	23,54	58	3,28	3,21	3,14
-47	289,20	277,00	265,30	4	23,42	22,99	22,57	59	3,18	3,11	3,04
-46	273,20	261,80	250,60	5	22,45	22,05	21,66	60	3,09	3,02	2,95
-45	258,10	247,50	237,20	6	21,52	21,15	20,78	61	2,99	2,92	2,86
-44	244,00	234,10	244,60	7	20,64	20,29	19,95	62	2,90	2,83	2,77
-43	230,80	221,60	212,70	8	19,80	19,40	19,15	63	2,81	2,75	2,69
-42	218,50	209,80	201,50	9	19,00	18,70	18,40	64	2,73	2,66	2,60
-41	206,80	198,70	191,00	10	18,24	17,96	17,67	65	2,65	2,58	2,52
-40	195,90	188,40	181,10	11	17,51	17,24	16,97	66	2,57	2,51	2,45
-39	185,40	178,30	171,59	12	16,80	16,55	16,31	67	2,49	2,43	2,37
-38	175,50	168,90	162,00	13	16,13	15,90	15,87	68	2,42	2,36	2,30
-37	166,20	160,10	154,10	14	15,50	15,28	15,06	69	2,35	2,29	2,24
-36	157,50	151,80	140,20	15	14,89	14,68	14,48	70	2,28	2,22	2,17
-35	149,30	144,00	138,80	16	14,31	14,12	13,93	71	2,21	2,16	2,10
-34	141,60	136,60	131,80	17	13,75	13,57	13,40	72	2,15	2,10	2,04
-33	134,40	129,70	125,20	18	13,22	13,06	12,89	73	2,09	2,04	1,98
-32	127,60	123,20	118,90	19	12,72	12,56	12,41	74	2,03	1,98	1,93
-31	121,20	117,10	113,10	20	12,23	12,09	11,95	75	1,97	1,92	1,87
-30	115,10	111,30	107,50	21	11,77	11,63	11,57	76	1,92	1,87	1,82
-29	109,30	105,70	102,20	22	11,32	11,20	11,07	77	1,86	1,81	1,78
-28	103,80	100,40	97,16	23	10,90	10,78	10,60	78	1,81	1,76	1,71
-27	98,63	95,47	92,41	24	10,49	10,38	10,27	79	1,76	1,71	1,68
-26	93,75	90,80	87,93	**25**	**10,10**	**10,00**	**9,90**	80	1,71	1,66	1,62
-25	89,15	86,39	83,70	26	9,73	9,63	9,52	81	1,66	1,62	1,57
-24	84,82	82,22	79,71	27	9,38	9,28	9,18	82	1,62	1,57	1,53
-23	80,72	78,29	75,93	28	9,04	8,94	8,84	83	1,57	1,53	1,49
-22	76,85	74,58	72,36	29	8,72	8,62	8,52	84	1,53	1,49	1,44
-21	73,20	71,07	68,99	30	8,41	8,31	8,21	85	1,49	1,45	1,40
-20	69,74	67,74	65,80	31	8,11	8,01	7,91	86	1,45	1,41	1,37
-19	66,42	64,54	62,72	32	7,82	7,72	7,62	87	1,41	1,37	1,33
-18	63,27	61,52	59,81	33	7,55	7,45	7,35	88	1,37	1,33	1,29
-17	60,30	58,66	57,05	34	7,28	7,19	7,09	89	1,34	1,30	1,26
-16	57,49	53,39	51,97	35	7,03	6,94	6,84	90	1,30	1,26	1,22
-15	54,83	53,39	51,97	36	6,79	6,69	6,60	91	1,27	1,23	1,19
-14	52,31	50,96	49,83	37	6,56	6,46	6,37	92	1,23	1,20	1,16
-13	49,93	48,65	47,12	38	6,33	6,24	6,15	93	1,20	1,16	1,13
-12	47,67	46,48	45,31	39	6,12	6,03	5,94	94	1,17	1,13	1,10
-11	45,53	44,41	43,32	40	5,92	5,82	5,73	95	1,14	1,10	1,07
-10	43,50	42,25	41,43	41	5,72	5,63	5,54	96	1,11	1,08	1,04
-9	41,54	40,56	39,59	42	5,53	5,43	5,35	97	1,08	1,05	1,01
-8	39,68	38,76	37,85	43	5,34	5,25	5,17	98	1,05	1,02	
-7	37,91	37,05	36,20	44	5,16	5,08	4,99	99	1,03	0,99	
-6	36,24	35,43	34,02	45	4,99	4,91	4,82	**100**	**1,00**	**0,97**	

-5	34,65	33,89	33,14	46	4,83	4,74	4,66	101	0,98	0,94	0,91
-4	33,14	32,43	31,73	47	4,67	4,59	4,51	102	0,95	0,92	0,89
-3	31,71	31,04	30,39	48	4,52	4,44	4,36	103	0,93	0,90	0,87
-2	30,35	29,72	29,11	49	4,38	4,30	4,22	104	0,91	0,87	0,84
-1	30,00	28,47	27,89	50	4,24	4,16	4,08	105	0,88	0,85	0,82
0	**27,83**	**27,28**	**26,74**	51	4,10	4,02	3,95	106	0,86	0,83	0,80
				52	3,97	3,90	3,82	107	0,84	0,81	0,78
				53	3,84	3,77	3,69	108	0,82	0,79	0,76
				54	3,72	3,65	3,57	109	0,80	0,77	0,74
				55	3,61	3,53	3,46	110	0,78	0,75	0,73

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