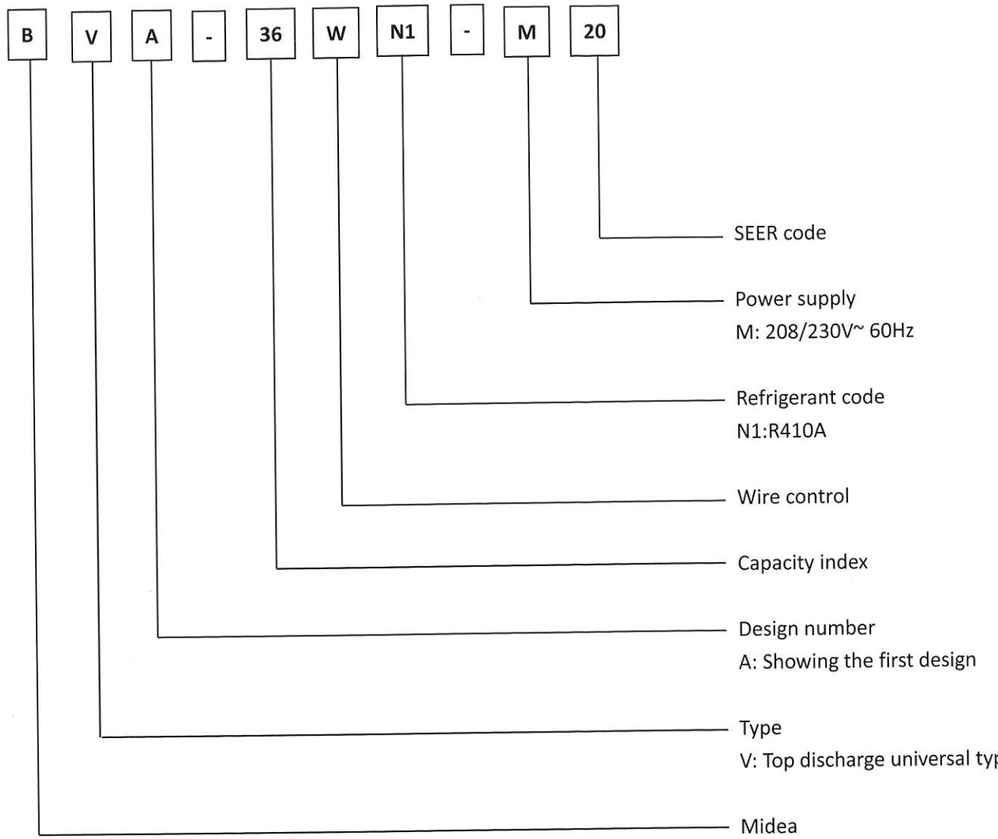
3.2 Indoor Units



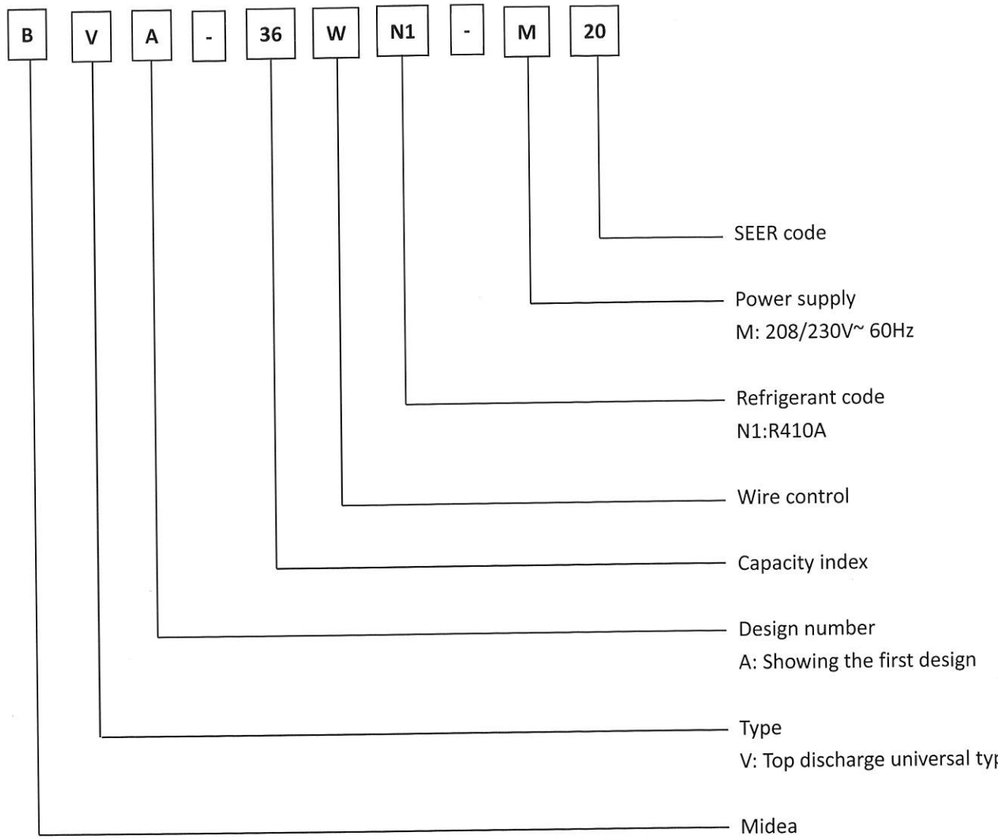
4 Specifications

4.1 Outdoor Units

BOVA-36HDN1-M20G / BOVA-60HDN1-M20G

	BOVA036	BOVA060
Capacity		
Nominal Cooling (BTU/h)	34600	54500
Nominal Heating (BTU/h)	34200	56000
Decibels (dB(A))		
Max @ 100% load	77	79
Min @ min load	56	60
Compressor		
RLA	19	29
LRA	44	52
Condenser Fan Motor		
Horsepower (HP)	1/3	1/3
FLA	2.5	2.5
Refrigeration System		
Refrigerant Line Size		
Liquid Line Size (OD)	3/8"	3/8"
Suction Line Size (OD)	3/4"	7/8"
Refrigerant Connection Size		
Liquid Valve Size (OD)	3/8"	3/8"
Suction Valve Size (OD)	3/4"	7/8"
Refrigerant Charge (R410-A, oz)	7 lbs. 9 oz.	11 lbs. 5 oz.
Expansion Device	EEV	EEV
Maximum Line Length	150 FT	150 FT
Maximum Elevation Difference	50 FT	50 FT
Operating Range		
Cooling	15-125 F	
Heating	-4~86 F	
Electrical Data		
Voltage-Phase-Hz	208/230-1-60	208/230-1-60
Minimum Ciruit Ampacity	26.3	38.8 / 36.5 - min "10"
Max. Overcurrent Protection	45	60
Min/Max Volts	172V/270V	
Weight		
Net Weight (without packaging)	150	220
Gross Weight (including packaging)	180	253
Dimensions		
Unit L x W x H (in.)	29-1/8 x 29-1/8 x 24-15/16	29-1/8 x 29-1/8 x 33-3/16

3.2 Indoor Units



4 Specifications

4.1 Outdoor Units

BOVA-36HDN1-M20G / BOVA-60HDN1-M20G

	BOVA036	BOVA060
Capacity		
Nominal Cooling (BTU/h)	34600	54500
Nominal Heating (BTU/h)	34200	56000
Decibels (dB(A))		
Max @ 100% load	77	79
Min @ min load	56	60
Compressor		
RLA	19	29
LRA	44	52
Condenser Fan Motor		
Horsepower (HP)	1/3	1/3
FLA	2.5	2.5
Refrigeration System		
Refrigerant Line Size		
Liquid Line Size (OD)	3/8"	3/8"
Suction Line Size (OD)	3/4"	7/8"
Refrigerant Connection Size		
Liquid Valve Size (OD)	3/8"	3/8"
Suction Valve Size (OD)	3/4"	7/8"
Refrigerant Charge (R410-A, oz)	7 lbs. 9 oz.	11 lbs. 5 oz.
Expansion Device	EEV	EEV
Maximum Line Length	150 FT	150 FT
Maximum Elevation Difference	50 FT	50 FT
Operating Range		
Cooling	15-125 F	
Heating	-4~86 F	
Electrical Data		
Voltage-Phase-Hz	208/230-1-60	208/230-1-60
Minimum Ciruit Ampacity	26.3	38.8 / 36.5 - min "10"
Max. Overcurrent Protection	45	60
Min/Max Volts	172V/270V	
Weight		
Net Weight (without packaging)	150	220
Gross Weight (including packaging)	180	253
Dimensions		
Unit L x W x H (in.)	29-1/8 x 29-1/8 x 24-15/16	29-1/8 x 29-1/8 x 33-3/16

4.2 Indoor Units

BVA-24WN1-M20 / BVA-36WN1-M20 / BVA-48WN1-M20 / BVA-60WN1-M20

	BVA024	BVA036	BVA048	BVA060
Cooling Capacity				
Nominal Cooling (BTU/h)	24000	34600	47500	54500
Nominal Heating (BTU/h)	24000	34200	48000	56000
Blower				
Diameter	270	279	279	279
Width	207	271	271	271
Fan Motor				
Horsepower (HO)	1/3	1/2	3/4	3/4
Full Load Amps	2.6	3	4.5	4.5
Refrigeration System				
Refrigerant Line Size				
Liquid Line Size (OD)	3/8"	3/8"	3/8"	3/8"
Suction Line Size (OD)	3/4"	3/4"	7/8"	7/8"
Refrigerant Connection Size				
Liquid Line Size (OD)	3/8"	3/8"	3/8"	3/8"
Suction Line Size (OD)	3/4"	3/4"	7/8"	7/8"
Expansion Device [TXV - Thermal Expansion Valve]	TXV			
Decibels dB(A)				
High Speed	63	65	67	68
Medium Speed	59	62	63	64
Low Speed	55	58	59	60
Electrical Data				
Voltage-Phase-Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
Minimum Ciruit Ampacity	3.3	3.8	5.7	5.7
Max. Overcurrent Protection	15	15	15	15
Min/Max Volts	172V/270V			
Air Filter				
Air Filter Sizes	18" x 20"	18" x 20"	20" x 22"	20" x 22"
Weight				
Net Weight (without packaging)(lbs)	119	124	154	161
Gross Weight (including packaging)(lbs)	147	152	187	194
Dimensions				
Unit D x W x H (in.)	21-5/8 x 19-5/8 x 46-1/2		24 x 22 x 54-1/2	

5 Capacity Tables

5.1 Cooling Capacity Tables

Table 5-1.1: BOVA-36HDN1-M20G + BVA-24WN1-M20 cooling capacity

BOVA 36 + BVA 24 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
660	65	TC	18.2	18.4	18.8	19.0	18.8	19.0	19.2	19.4	20.0	20.2	20.4	20.6		26.2	26.4	26.7
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.52	0.66
		kW	0.77	0.77	0.78	0.78	0.78	0.79	0.80	0.81	0.80	0.81	0.82	0.83		1.05	1.06	1.08
	75	TC	18.4	18.6	19.0	19.2	19.0	19.2	19.4	19.6	20.2	20.4	20.6	20.8		25.8	26.1	26.3
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	0.93	0.94	0.95	0.95	0.95	0.96	0.97	0.98	0.98	0.99	1.00	1.01		1.31	1.33	1.35
	85	TC	18.4	18.6	19.0	19.2	19.0	19.2	19.4	19.6	20.2	20.4	20.6	20.8		25.8	26.0	26.3
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	1.10	1.11	1.13	1.13	1.13	1.14	1.15	1.16	1.16	1.17	1.18	1.19		1.45	1.46	1.48
	95	TC	18.3	18.5	18.9	19.1	18.9	19.1	19.3	19.5	20.1	20.4	20.5	20.8		25.7	25.9	26.1
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	1.33	1.35	1.36	1.36	1.36	1.38	1.39	1.40	1.41	1.42	1.43	1.45		1.76	1.77	1.79
	105	TC	18.2	18.4	18.8	19.0	18.8	19.0	19.2	19.4	20.1	20.3	20.5	20.7		25.4	25.7	25.9
		S/T	0.99	1.00	1.00	1.00	0.64	0.99	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.67
		kW	1.60	1.61	1.63	1.63	1.63	1.65	1.67	1.68	1.69	1.70	1.72	1.73		2.11	2.13	2.15
	115	TC	17.9	18.1	18.5	18.7	18.5	18.7	18.9	19.1	19.8	20.0	20.1	20.3		25.2	25.4	25.7
		S/T	1.00	1.00	1.00	1.00	0.64	0.99	1.00	1.00	0.40	0.58	0.76	0.93		0.39	0.53	0.67
		kW	1.87	1.89	1.91	1.91	1.91	1.94	1.96	1.98	1.98	2.00	2.02	2.04		2.52	2.54	2.56
760	65	TC	20.1	20.3	20.8	21.0	20.8	21.0	21.2	21.5	22.2	22.4	22.6	22.9		28.6	28.9	29.1
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.67
		kW	0.91	0.92	0.93	0.93	0.93	0.94	0.95	0.96	0.95	0.96	0.97	0.99		1.22	1.23	1.24
	75	TC	20.3	20.5	21.0	21.2	21.0	21.2	21.4	21.7	22.4	22.6	22.8	23.0		28.7	29.0	29.2
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.67
		kW	1.08	1.09	1.10	1.10	1.10	1.12	1.13	1.14	1.14	1.15	1.16	1.18		1.45	1.47	1.49
	85	TC	20.3	20.5	21.0	21.2	21.0	21.2	21.4	21.7	22.3	22.6	22.8	23.0		28.4	28.6	28.9
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.68
		kW	1.24	1.25	1.26	1.26	1.26	1.28	1.29	1.30	1.31	1.32	1.33	1.34		1.63	1.64	1.66
	95	TC	20.2	20.4	20.9	21.1	20.9	21.1	21.3	21.6	22.2	22.5	22.7	22.8		28.1	28.4	28.6
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.75	0.95		0.39	0.53	0.68
		kW	1.49	1.51	1.52	1.52	1.52	1.54	1.55	1.57	1.58	1.59	1.60	1.61		1.96	1.99	2.00
	105	TC	19.8	20.1	20.5	20.7	20.5	20.7	20.9	21.2	21.9	22.1	22.3	22.5		27.8	28.1	28.3
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.77	0.95		0.39	0.53	0.68
		kW	1.76	1.78	1.80	1.80	1.80	1.82	1.83	1.85	1.86	1.88	1.89	1.91		2.35	2.37	2.40
	115	TC	19.7	19.9	20.4	20.6	20.4	20.6	20.8	21.0	21.7	21.9	22.1	22.4		27.5	27.7	28.0
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.77	0.96		0.39	0.54	0.69
		kW	2.09	2.11	2.13	2.13	2.13	2.16	2.18	2.20	2.21	2.23	2.25	2.27		2.82	2.85	2.88

4.2 Indoor Units

BVA-24WN1-M20 / BVA-36WN1-M20 / BVA-48WN1-M20 / BVA-60WN1-M20

	BVA024	BVA036	BVA048	BVA060
Cooling Capacity				
Nominal Cooling (BTU/h)	24000	34600	47500	54500
Nominal Heating (BTU/h)	24000	34200	48000	56000
Blower				
Diameter	270	279	279	279
Width	207	271	271	271
Fan Motor				
Horsepower (HO)	1/3	1/2	3/4	3/4
Full Load Amps	2.6	3	4.5	4.5
Refrigeration System				
Refrigerant Line Size				
Liquid Line Size (OD)	3/8"	3/8"	3/8"	3/8"
Suction Line Size (OD)	3/4"	3/4"	7/8"	7/8"
Refrigerant Connection Size				
Liquid Line Size (OD)	3/8"	3/8"	3/8"	3/8"
Suction Line Size (OD)	3/4"	3/4"	7/8"	7/8"
Expansion Device [TXV - Thermal Expansion Valve]	TXV			
Decibels dB(A)				
High Speed	63	65	67	68
Medium Speed	59	62	63	64
Low Speed	55	58	59	60
Electrical Data				
Voltage-Phase-Hz	208/230-1-60	208/230-1-60	208/230-1-60	208/230-1-60
Minimum Ciruit Ampacity	3.3	3.8	5.7	5.7
Max. Overcurrent Protection	15	15	15	15
Min/Max Volts	172V/270V			
Air Filter				
Air Filter Sizes	18" x 20"	18" x 20"	20" x 22"	20" x 22"
Weight				
Net Weight (without packaging)(lbs)	119	124	154	161
Gross Weight (including packaging)(lbs)	147	152	187	194
Dimensions				
Unit D x W x H (in.)	21-5/8 x 19-5/8 x 46-1/2		24 x 22 x 54-1/2	

5 Capacity Tables

5.1 Cooling Capacity Tables

Table 5-1.1: BOVA-36HDN1-M20G + BVA-24WN1-M20 cooling capacity

BOVA 36 + BVA 24 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
660	65	TC	18.2	18.4	18.8	19.0	18.8	19.0	19.2	19.4	20.0	20.2	20.4	20.6		26.2	26.4	26.7
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.52	0.66
		kW	0.77	0.77	0.78	0.78	0.78	0.79	0.80	0.81	0.80	0.81	0.82	0.83		1.05	1.06	1.08
	75	TC	18.4	18.6	19.0	19.2	19.0	19.2	19.4	19.6	20.2	20.4	20.6	20.8		25.8	26.1	26.3
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	0.93	0.94	0.95	0.95	0.95	0.96	0.97	0.98	0.98	0.99	1.00	1.01		1.31	1.33	1.35
	85	TC	18.4	18.6	19.0	19.2	19.0	19.2	19.4	19.6	20.2	20.4	20.6	20.8		25.8	26.0	26.3
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	1.10	1.11	1.13	1.13	1.13	1.14	1.15	1.16	1.16	1.17	1.18	1.19		1.45	1.46	1.48
	95	TC	18.3	18.5	18.9	19.1	18.9	19.1	19.3	19.5	20.1	20.4	20.5	20.8		25.7	25.9	26.1
		S/T	1.00	1.00	1.00	1.00	0.64	1.00	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.66
		kW	1.33	1.35	1.36	1.36	1.36	1.38	1.39	1.40	1.41	1.42	1.43	1.45		1.76	1.77	1.79
	105	TC	18.2	18.4	18.8	19.0	18.8	19.0	19.2	19.4	20.1	20.3	20.5	20.7		25.4	25.7	25.9
		S/T	0.99	1.00	1.00	1.00	0.64	0.99	1.00	1.00	0.40	0.57	0.75	0.92		0.39	0.53	0.67
		kW	1.60	1.61	1.63	1.63	1.63	1.65	1.67	1.68	1.69	1.70	1.72	1.73		2.11	2.13	2.15
	115	TC	17.9	18.1	18.5	18.7	18.5	18.7	18.9	19.1	19.8	20.0	20.1	20.3		25.2	25.4	25.7
		S/T	1.00	1.00	1.00	1.00	0.64	0.99	1.00	1.00	0.40	0.58	0.76	0.93		0.39	0.53	0.67
		kW	1.87	1.89	1.91	1.91	1.91	1.94	1.96	1.98	1.98	2.00	2.02	2.04		2.52	2.54	2.56
760	65	TC	20.1	20.3	20.8	21.0	20.8	21.0	21.2	21.5	22.2	22.4	22.6	22.9		28.6	28.9	29.1
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.67
		kW	0.91	0.92	0.93	0.93	0.93	0.94	0.95	0.96	0.95	0.96	0.97	0.99		1.22	1.23	1.24
	75	TC	20.3	20.5	21.0	21.2	21.0	21.2	21.4	21.7	22.4	22.6	22.8	23.0		28.7	29.0	29.2
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.67
		kW	1.08	1.09	1.10	1.10	1.10	1.12	1.13	1.14	1.14	1.15	1.16	1.18		1.45	1.47	1.49
	85	TC	20.3	20.5	21.0	21.2	21.0	21.2	21.4	21.7	22.3	22.6	22.8	23.0		28.4	28.6	28.9
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.53	0.68
		kW	1.24	1.25	1.26	1.26	1.26	1.28	1.29	1.30	1.31	1.32	1.33	1.34		1.63	1.64	1.66
	95	TC	20.2	20.4	20.9	21.1	20.9	21.1	21.3	21.6	22.2	22.5	22.7	22.8		28.1	28.4	28.6
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.75	0.95		0.39	0.53	0.68
		kW	1.49	1.51	1.52	1.52	1.52	1.54	1.55	1.57	1.58	1.59	1.60	1.61		1.96	1.99	2.00
	105	TC	19.8	20.1	20.5	20.7	20.5	20.7	20.9	21.2	21.9	22.1	22.3	22.5		27.8	28.1	28.3
		S/T	0.99	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.77	0.95		0.39	0.53	0.68
		kW	1.76	1.78	1.80	1.80	1.80	1.82	1.83	1.85	1.86	1.88	1.89	1.91		2.35	2.37	2.40
	115	TC	19.7	19.9	20.4	20.6	20.4	20.6	20.8	21.0	21.7	21.9	22.1	22.4		27.5	27.7	28.0
		S/T	1.00	1.00	1.00	1.00	0.65	1.00	1.00	1.00	0.39	0.58	0.77	0.96		0.39	0.54	0.69
		kW	2.09	2.11	2.13	2.13	2.13	2.16	2.18	2.20	2.21	2.23	2.25	2.27		2.82	2.85	2.88

Table 5-1.1: BOVA-36HDN1-M20G + BVA-24WN1-M20 cooling capacity (continued)

BOVA 36 + BVA 24 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
860	65	TC	22.3	22.5	23.0	23.3	23.0	23.3	23.5	23.8	24.6	24.8	25.0	25.3		31.1	31.4	31.7
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.58	0.77	0.95		0.39	0.54	0.68
		kW	0.99	1.00	1.01	1.01	1.01	1.02	1.04	1.05	1.04	1.06	1.07	1.08		1.41	1.43	1.45
	75	TC	22.0	22.3	22.8	23.0	22.8	23.0	23.3	23.5	24.4	24.7	24.8	24.8		31.2	31.4	31.7
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.58	0.77	1.00		0.39	0.54	0.68
		kW	1.23	1.25	1.26	1.26	1.26	1.27	1.29	1.30	1.31	1.32	1.33	1.33		1.66	1.68	1.70
	85	TC	21.9	22.1	22.6	22.9	22.6	22.9	23.1	23.4	24.4	24.5	24.6	24.8		30.8	31.1	31.3
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.54	0.69
		kW	1.36	1.38	1.39	1.39	1.39	1.41	1.42	1.44	1.46	1.46	1.46	1.48		1.81	1.83	1.85
	95	TC	21.7	22.0	22.5	22.7	22.5	22.7	22.9	23.2	24.0	24.2	24.4	24.6		30.5	30.7	30.9
		S/T	1.00	1.00	0.99	1.00	0.66	1.00	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.54	0.69
		kW	1.62	1.64	1.66	1.66	1.66	1.68	1.69	1.71	1.73	1.74	1.75	1.77		2.19	2.21	2.22
	105	TC	21.5	21.8	22.3	22.5	22.3	22.5	22.8	23.0	23.8	24.0	24.2	24.5		30.0	30.2	30.5
		S/T	0.99	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.54	0.70
		kW	1.95	1.97	1.99	1.99	1.99	2.01	2.03	2.05	2.06	2.08	2.09	2.11		2.63	2.65	2.68
	115	TC	21.4	21.6	22.1	22.3	22.1	22.3	22.6	22.8	23.6	23.8	24.0	24.2		28.8	28.8	28.7
		S/T	0.99	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.39	0.59	0.79	0.99		0.39	0.55	0.72
		kW	2.31	2.33	2.36	2.36	2.36	2.38	2.41	2.43	2.44	2.46	2.48	2.50		3.00	3.00	3.00

Table 5-1.2: BOVA-36HDN1-M20G + BVA-36WN1-M20 cooling capacity

BOVA 36 + BVA 36 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1020	65	TC	29.4	29.7	30.3	30.7	30.3	30.7	31.0	31.3	32.4	32.7	33.0	33.2		39.5	39.8	40.1
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.73	0.90		0.39	0.53	0.67
		kW	1.54	1.56	1.57	1.57	1.57	1.59	1.60	1.62	1.62	1.63	1.65	1.67		2.04	2.06	2.09
	75	TC	29.4	29.8	30.4	30.7	30.4	30.7	31.1	31.4	32.5	32.8	33.1	33.3		39.1	39.4	39.7
		S/T	1.00	1.00	0.99	1.00	0.62	0.83	1.00	1.00	0.39	0.56	0.73	0.90		0.39	0.53	0.67
		kW	1.71	1.73	1.75	1.75	1.75	1.77	1.79	1.80	1.79	1.82	1.84	1.86		2.25	2.27	2.29
	85	TC	29.0	29.3	29.9	30.3	29.9	30.3	30.6	30.9	32.0	32.3	32.6	32.8		38.4	38.7	38.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.39	0.53	0.67
		kW	1.93	1.95	1.97	1.97	1.97	1.99	2.01	2.03	2.03	2.05	2.07	2.09		2.55	2.58	2.60
	95	TC	28.5	28.8	29.4	29.8	29.4	29.8	30.1	30.4	31.5	31.8	32.0	32.3		37.5	37.8	38.0
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.92		0.39	0.53	0.68
		kW	2.32	2.34	2.37	2.37	2.37	2.39	2.42	2.44	2.45	2.47	2.49	2.52		3.04	3.06	3.09
	105	TC	27.9	28.3	28.9	29.2	28.9	29.2	29.5	29.8	30.9	31.2	31.4	31.6		36.2	36.3	36.5
		S/T	0.99	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93		0.39	0.54	0.69
		kW	2.76	2.79	2.82	2.82	2.82	2.85	2.88	2.91	2.91	2.94	2.96	2.99		3.52	3.53	3.54
	115	TC	25.0	25.3	25.9	26.1	25.9	26.1	26.4	26.7	27.8	28.0	28.1	28.3		30.1	30.3	30.4
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.40	0.60	0.79	0.99		0.39	0.58	0.76
		kW	2.81	2.84	2.87	2.87	2.87	2.91	2.94	2.97	2.99	3.01	3.03	3.04		3.13	3.15	3.16
1150	65	TC	31.6	31.9	32.7	33.0	32.7	33.0	33.4	33.7	35.0	35.2	35.5	35.8		42.2	42.5	42.8
		S/T	0.99	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.54	0.69
		kW	1.80	1.82	1.84	1.84	1.84	1.86	1.88	1.90	1.89	1.92	1.94	1.96		2.34	2.37	2.39
	75	TC	31.6	32.0	32.7	33.0	32.7	33.0	33.4	33.8	35.0	35.3	35.5	35.8		41.9	42.2	42.5
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.94		0.39	0.54	0.69
		kW	1.97	1.99	2.01	2.01	2.01	2.03	2.05	2.07	2.07	2.09	2.12	2.14		2.46	2.49	2.51
	85	TC	31.1	31.4	32.1	32.5	32.1	32.5	32.8	33.2	34.4	34.7	34.9	35.2		40.8	41.1	41.4
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.95		0.39	0.54	0.70
		kW	2.17	2.19	2.22	2.22	2.22	2.24	2.26	2.29	2.29	2.31	2.33	2.36		2.84	2.86	2.89
	95	TC	30.7	31.1	31.8	32.1	31.8	32.1	32.4	32.8	33.7	34.2	34.5	34.7		39.8	40.0	40.2
		S/T	1.00	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.76	1.00		0.39	0.55	0.71
		kW	2.58	2.61	2.64	2.64	2.64	2.66	2.69	2.72	2.73	2.75	2.78	2.80		3.34	3.37	3.39
	105	TC	29.9	30.3	31.0	31.3	31.0	31.3	31.6	32.0	33.0	33.4	33.6	33.9		36.9	36.9	37.1
		S/T	0.99	1.00	0.99	1.00	0.63	0.87	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.57	0.74
		kW	3.05	3.08	3.11	3.11	3.11	3.15	3.18	3.21	3.22	3.25	3.28	3.30		3.61	3.59	3.61
	115	TC	24.8	25.1	25.6	25.9	25.6	25.9	26.2	26.5	28.2	28.3	27.9	28.0		29.1	29.2	29.3
		S/T	1.00	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.40	0.62	0.86	1.00		0.40	0.62	0.84
		kW	2.86	2.89	2.92	2.92	2.92	2.95	2.98	3.01	3.06	3.08	3.07	3.09		3.12	3.13	3.14

Table 5-1.2: BOVA-36HDN1-M20G + BVA-36WN1-M20 cooling capacity (continued)

BOVA 36 + BVA 36 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1350	65	TC	33.6	34.0	34.7	35.1	34.7	35.1	35.5	35.9	37.2	37.5	37.7	38.0		44.5	44.8	45.5
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99		0.38	0.55	0.71
		kW	2.11	2.13	2.15	2.15	2.15	2.18	2.20	2.22	2.22	2.24	2.27	2.29		2.68	2.70	2.56
	75	TC	33.7	34.1	34.9	35.2	34.9	35.2	35.6	36.0	37.4	37.6	37.9	38.2		45.6	45.8	45.9
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00		0.38	0.55	0.71
		kW	2.17	2.19	2.22	2.22	2.22	2.24	2.26	2.29	2.29	2.31	2.33	2.36		2.95	2.96	2.96
	85	TC	33.0	33.4	34.1	34.5	34.1	34.5	34.8	35.2	36.6	36.8	37.1	37.3		43.0	43.2	43.5
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00		0.39	0.56	0.73
		kW	2.45	2.47	2.50	2.50	2.50	2.53	2.55	2.58	2.59	2.61	2.63	2.65		3.15	3.18	3.20
	95	TC	32.2	32.5	33.2	33.6	33.2	33.6	34.0	34.3	35.7	35.9	36.1	36.4		40.9	41.1	41.1
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00		0.39	0.57	0.75
		kW	2.88	2.91	2.94	2.94	2.94	2.97	3.00	3.03	3.05	3.07	3.09	3.11		3.56	3.57	3.57
	105	TC	31.3	31.6	32.3	32.7	32.3	32.7	33.0	33.4	34.7	34.9	35.1	35.4		37.4	37.6	37.4
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00		0.39	0.59	0.79
		kW	3.36	3.39	3.43	3.43	3.43	3.47	3.50	3.54	3.56	3.59	3.61	3.64		3.74	3.76	3.70
	115	TC	25.0	25.2	25.8	26.1	25.8	26.1	26.4	26.6	27.8	27.9	28.0	28.2		29.8	29.9	30.0
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00		0.40	0.65	0.90
		kW	2.97	3.00	3.04	3.04	3.04	3.07	3.10	3.13	3.17	3.18	3.20	3.21		3.31	3.32	3.33

Table 5-1.3: BOVA-60HDN1-M20G + BVA-48WN1-M20 cooling capacity

BOVA 60 + BVA 48 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1330	65	TC	40.6	41.0	41.9	42.4	41.9	42.4	42.9	43.3	45.3	45.4	45.6	46.0		55.3	55.7	56.2
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.55	0.71	0.87		0.38	0.52	0.64
		kW	2.01	2.03	2.05	2.05	2.05	2.07	2.09	2.11	2.14	2.15	2.16	2.19		2.58	2.61	2.64
	75	TC	40.8	41.2	42.1	42.6	42.1	42.6	43.1	43.5	45.0	45.4	45.8	46.2		55.0	55.4	55.8
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.55	0.71	0.87		0.38	0.52	0.65
		kW	2.17	2.19	2.22	2.22	2.22	2.24	2.26	2.29	2.28	2.31	2.33	2.36		2.80	2.83	2.86
	85	TC	40.2	40.7	41.6	42.0	41.6	42.0	42.5	42.9	44.4	44.8	45.2	45.6		54.1	54.5	54.9
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.56	0.72	0.88		0.38	0.52	0.65
		kW	2.41	2.44	2.46	2.46	2.46	2.49	2.52	2.54	2.55	2.57	2.59	2.62		3.16	3.19	3.22
	95	TC	39.7	40.2	41.1	41.5	41.1	41.5	42.0	42.4	43.9	44.3	44.6	45.0		53.0	53.4	53.8
		S/T	1.00	1.00	1.00	1.00	0.61	0.81	1.00	1.00	0.39	0.56	0.72	0.88		0.38	0.52	0.66
		kW	2.90	2.93	2.96	2.96	2.96	2.99	3.02	3.05	3.06	3.09	3.12	3.14		3.77	3.80	3.83
	105	TC	39.1	39.6	40.5	40.9	40.5	40.9	41.3	41.8	43.3	43.6	44.0	44.3		51.9	52.3	52.6
		S/T	1.00	1.00	1.00	1.00	0.61	0.82	1.00	1.00	0.39	0.56	0.73	0.89		0.38	0.52	0.66
		kW	3.45	3.49	3.53	3.53	3.53	3.57	3.60	3.64	3.65	3.68	3.71	3.74		4.48	4.52	4.55
	115	TC	38.3	38.8	39.6	40.0	39.6	40.0	40.5	40.9	42.6	42.9	43.1	43.0		45.3	45.5	45.7
		S/T	1.00	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.56	0.73	0.90		0.39	0.55	0.71
		kW	4.07	4.11	4.15	4.15	4.15	4.20	4.24	4.28	4.33	4.36	4.37	4.36		4.39	4.41	4.43
1530	65	TC	43.2	43.7	44.6	45.1	44.6	45.1	45.6	46.1	47.7	48.1	48.5	48.9		58.5	58.9	59.4
		S/T	1.00	1.00	1.00	1.00	0.61	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.30	2.33	2.35	2.35	2.35	2.37	2.40	2.42	2.41	2.44	2.47	2.50		2.92	2.95	2.98
	75	TC	43.4	43.9	44.8	45.3	44.8	45.3	45.8	46.3	47.9	48.3	48.7	49.1		58.1	58.5	58.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.44	2.47	2.50	2.50	2.50	2.52	2.55	2.58	2.57	2.60	2.63	2.65		3.11	3.13	3.16
	85	TC	42.7	43.2	44.2	44.7	44.2	44.7	45.1	45.6	47.2	47.7	48.0	48.4		57.0	57.5	57.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.67	2.70	2.73	2.73	2.73	2.76	2.78	2.81	2.82	2.85	2.87	2.90		3.47	3.50	3.52
	95	TC	42.2	42.7	43.7	44.1	43.7	44.1	44.6	45.1	46.6	47.0	47.5	47.8		55.8	56.2	56.6
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.92		0.38	0.53	0.68
		kW	3.18	3.21	3.25	3.25	3.25	3.28	3.32	3.35	3.37	3.39	3.42	3.45		4.12	4.16	4.19
	105	TC	41.4	41.9	42.8	43.3	42.8	43.3	43.7	44.2	45.7	46.2	46.5	46.9		54.5	54.8	55.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.57	0.75	0.93		0.38	0.54	0.69
		kW	3.77	3.81	3.85	3.85	3.85	3.89	3.93	3.97	3.98	4.02	4.05	4.08		4.87	4.90	4.93
	115	TC	38.9	39.3	40.2	40.6	40.2	40.6	41.1	41.5	43.3	43.4	43.7	43.4		46.7	46.9	47.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.86	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.57	0.75
		kW	4.19	4.23	4.28	4.28	4.28	4.32	4.37	4.41	4.49	4.48	4.50	4.45		4.62	4.64	4.65

Table 5-1.2: BOVA-36HDN1-M20G + BVA-36WN1-M20 cooling capacity (continued)

BOVA 36 + BVA 36 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1350	65	TC	33.6	34.0	34.7	35.1	34.7	35.1	35.5	35.9	37.2	37.5	37.7	38.0		44.5	44.8	45.5
		S/T	0.99	1.00	1.00	1.00	0.64	0.88	1.00	1.00	0.39	0.59	0.78	0.99		0.38	0.55	0.71
		kW	2.11	2.13	2.15	2.15	2.15	2.18	2.20	2.22	2.22	2.24	2.27	2.29		2.68	2.70	2.56
	75	TC	33.7	34.1	34.9	35.2	34.9	35.2	35.6	36.0	37.4	37.6	37.9	38.2		45.6	45.8	45.9
		S/T	0.99	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00		0.38	0.55	0.71
		kW	2.17	2.19	2.22	2.22	2.22	2.24	2.26	2.29	2.29	2.31	2.33	2.36		2.95	2.96	2.96
	85	TC	33.0	33.4	34.1	34.5	34.1	34.5	34.8	35.2	36.6	36.8	37.1	37.3		43.0	43.2	43.5
		S/T	0.99	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.59	0.79	1.00		0.39	0.56	0.73
		kW	2.45	2.47	2.50	2.50	2.50	2.53	2.55	2.58	2.59	2.61	2.63	2.65		3.15	3.18	3.20
	95	TC	32.2	32.5	33.2	33.6	33.2	33.6	34.0	34.3	35.7	35.9	36.1	36.4		40.9	41.1	41.1
		S/T	1.00	1.00	1.00	1.00	0.64	0.90	1.00	1.00	0.39	0.60	0.80	1.00		0.39	0.57	0.75
		kW	2.88	2.91	2.94	2.94	2.94	2.97	3.00	3.03	3.05	3.07	3.09	3.11		3.56	3.57	3.57
	105	TC	31.3	31.6	32.3	32.7	32.3	32.7	33.0	33.4	34.7	34.9	35.1	35.4		37.4	37.6	37.4
		S/T	1.00	1.00	1.00	1.00	0.65	0.90	1.00	1.00	0.39	0.60	0.81	1.00		0.39	0.59	0.79
		kW	3.36	3.39	3.43	3.43	3.43	3.47	3.50	3.54	3.56	3.59	3.61	3.64		3.74	3.76	3.70
	115	TC	25.0	25.2	25.8	26.1	25.8	26.1	26.4	26.6	27.8	27.9	28.0	28.2		29.8	29.9	30.0
		S/T	1.00	1.00	1.00	1.00	0.66	1.00	1.00	1.00	0.40	0.66	0.93	1.00		0.40	0.65	0.90
		kW	2.97	3.00	3.04	3.04	3.04	3.07	3.10	3.13	3.17	3.18	3.20	3.21		3.31	3.32	3.33

Table 5-1.3: BOVA-60HDN1-M20G + BVA-48WN1-M20 cooling capacity

BOVA 60 + BVA 48 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1330	65	TC	40.6	41.0	41.9	42.4	41.9	42.4	42.9	43.3	45.3	45.4	45.6	46.0		55.3	55.7	56.2
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.55	0.71	0.87		0.38	0.52	0.64
		kW	2.01	2.03	2.05	2.05	2.05	2.07	2.09	2.11	2.14	2.15	2.16	2.19		2.58	2.61	2.64
	75	TC	40.8	41.2	42.1	42.6	42.1	42.6	43.1	43.5	45.0	45.4	45.8	46.2		55.0	55.4	55.8
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.55	0.71	0.87		0.38	0.52	0.65
		kW	2.17	2.19	2.22	2.22	2.22	2.24	2.26	2.29	2.28	2.31	2.33	2.36		2.80	2.83	2.86
	85	TC	40.2	40.7	41.6	42.0	41.6	42.0	42.5	42.9	44.4	44.8	45.2	45.6		54.1	54.5	54.9
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.56	0.72	0.88		0.38	0.52	0.65
		kW	2.41	2.44	2.46	2.46	2.46	2.49	2.52	2.54	2.55	2.57	2.59	2.62		3.16	3.19	3.22
	95	TC	39.7	40.2	41.1	41.5	41.1	41.5	42.0	42.4	43.9	44.3	44.6	45.0		53.0	53.4	53.8
		S/T	1.00	1.00	1.00	1.00	0.61	0.81	1.00	1.00	0.39	0.56	0.72	0.88		0.38	0.52	0.66
		kW	2.90	2.93	2.96	2.96	2.96	2.99	3.02	3.05	3.06	3.09	3.12	3.14		3.77	3.80	3.83
	105	TC	39.1	39.6	40.5	40.9	40.5	40.9	41.3	41.8	43.3	43.6	44.0	44.3		51.9	52.3	52.6
		S/T	1.00	1.00	1.00	1.00	0.61	0.82	1.00	1.00	0.39	0.56	0.73	0.89		0.38	0.52	0.66
		kW	3.45	3.49	3.53	3.53	3.53	3.57	3.60	3.64	3.65	3.68	3.71	3.74		4.48	4.52	4.55
	115	TC	38.3	38.8	39.6	40.0	39.6	40.0	40.5	40.9	42.6	42.9	43.1	43.0		45.3	45.5	45.7
		S/T	1.00	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.56	0.73	0.90		0.39	0.55	0.71
		kW	4.07	4.11	4.15	4.15	4.15	4.20	4.24	4.28	4.33	4.36	4.37	4.36		4.39	4.41	4.43
1530	65	TC	43.2	43.7	44.6	45.1	44.6	45.1	45.6	46.1	47.7	48.1	48.5	48.9		58.5	58.9	59.4
		S/T	1.00	1.00	1.00	1.00	0.61	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.30	2.33	2.35	2.35	2.35	2.37	2.40	2.42	2.41	2.44	2.47	2.50		2.92	2.95	2.98
	75	TC	43.4	43.9	44.8	45.3	44.8	45.3	45.8	46.3	47.9	48.3	48.7	49.1		58.1	58.5	58.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.44	2.47	2.50	2.50	2.50	2.52	2.55	2.58	2.57	2.60	2.63	2.65		3.11	3.13	3.16
	85	TC	42.7	43.2	44.2	44.7	44.2	44.7	45.1	45.6	47.2	47.7	48.0	48.4		57.0	57.5	57.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.74	0.91		0.38	0.53	0.67
		kW	2.67	2.70	2.73	2.73	2.73	2.76	2.78	2.81	2.82	2.85	2.87	2.90		3.47	3.50	3.52
	95	TC	42.2	42.7	43.7	44.1	43.7	44.1	44.6	45.1	46.6	47.0	47.5	47.8		55.8	56.2	56.6
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.92		0.38	0.53	0.68
		kW	3.18	3.21	3.25	3.25	3.25	3.28	3.32	3.35	3.37	3.39	3.42	3.45		4.12	4.16	4.19
	105	TC	41.4	41.9	42.8	43.3	42.8	43.3	43.7	44.2	45.7	46.2	46.5	46.9		54.5	54.8	55.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.57	0.75	0.93		0.38	0.54	0.69
		kW	3.77	3.81	3.85	3.85	3.85	3.89	3.93	3.97	3.98	4.02	4.05	4.08		4.87	4.90	4.93
	115	TC	38.9	39.3	40.2	40.6	40.2	40.6	41.1	41.5	43.3	43.4	43.7	43.4		46.7	46.9	47.1
		S/T	1.00	1.00	1.00	1.00	0.62	0.86	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.57	0.75
		kW	4.19	4.23	4.28	4.28	4.28	4.32	4.37	4.41	4.49	4.48	4.50	4.45		4.62	4.64	4.65

Table 5-1.3: BOVA-60HDN1-M20G + BVA-48WN1-M20 cooling capacity (continued)

BOVA 60 + BVA 48 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1760	65	TC	45.5	46.0	47.0	47.5	47.0	47.5	48.0	48.5	50.4	50.7	51.1	52.3		61.3	61.7	62.7
		S/T	1.00	1.00	1.00	1.00	0.62	0.86	1.00	1.00	0.39	0.58	0.76	0.94		0.38	0.54	0.69
		kW	2.62	2.65	2.68	2.68	2.68	2.70	2.73	2.76	2.76	2.79	2.82	2.62		3.27	3.30	3.08
	75	TC	45.9	46.4	47.4	47.9	47.4	47.9	48.4	49.0	50.5	50.9	51.5	51.9		61.2	61.6	62.0
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.76	0.94		0.38	0.54	0.69
		kW	2.62	2.65	2.68	2.68	2.68	2.71	2.74	2.76	2.89	2.92	2.82	2.85		3.32	3.34	3.37
	85	TC	45.0	45.5	46.5	47.0	46.5	47.0	47.5	48.0	49.8	50.2	50.5	50.9		59.7	60.1	60.5
		S/T	1.00	1.00	1.00	1.00	0.63	0.86	1.00	1.00	0.39	0.58	0.77	0.95		0.38	0.54	0.70
		kW	2.95	2.98	3.01	3.01	3.01	3.04	3.07	3.11	3.12	3.15	3.17	3.20		3.80	3.84	3.87
	95	TC	44.1	44.6	45.6	46.1	45.6	46.1	46.6	47.1	48.9	49.2	49.6	50.0		58.2	58.6	59.0
		S/T	1.00	1.00	1.00	1.00	0.63	0.87	1.00	1.00	0.39	0.58	0.77	1.00		0.38	0.55	0.71
		kW	3.48	3.52	3.56	3.56	3.56	3.59	3.63	3.67	3.69	3.72	3.74	3.78		4.49	4.53	4.56
	105	TC	43.2	43.7	44.7	45.1	44.7	45.1	45.6	46.1	47.9	48.2	48.5	48.9		56.5	56.5	56.7
		S/T	1.00	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.59	0.78	1.00		0.38	0.55	0.72
		kW	4.09	4.14	4.18	4.18	4.18	4.22	4.27	4.31	4.33	4.37	4.40	4.43		5.24	5.24	5.25
	115	TC	38.9	39.3	40.2	40.6	40.2	40.6	41.1	41.5	43.3	43.5	43.7	43.9		47.8	44.3	44.5
		S/T	1.00	1.00	1.00	1.00	0.64	0.89	1.00	1.00	0.39	0.61	0.83	1.00		0.39	0.61	0.82
		kW	4.26	4.31	4.35	4.35	4.35	4.40	4.45	4.49	4.61	4.63	4.58	4.60		4.86	4.57	4.59

Table 5-1.4: BOVA-60HDN1-M20G + BVA-60WN1-M20 cooling capacity

BOVA 60 + BVA 60 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1520	65	TC	48.0	48.5	49.6	50.1	49.6	50.1	50.7	51.2	53.1	53.5	53.9	54.3		62.9	63.4	63.8
		S/T	1.00	1.00	1.00	1.00	0.60	0.80	1.00	1.00	0.39	0.55	0.70	0.85		0.38	0.51	0.64
		kW	2.55	2.57	2.60	2.60	2.60	2.63	2.66	2.68	2.68	2.71	2.74	2.77		3.13	3.17	3.20
	75	TC	47.6	48.2	49.2	49.8	49.2	49.8	50.3	50.8	52.7	53.2	53.5	53.9		62.3	62.7	63.1
		S/T	1.00	1.00	1.00	1.00	0.60	0.80	1.00	1.00	0.39	0.55	0.70	0.86		0.38	0.52	0.65
		kW	2.75	2.78	2.81	2.81	2.81	2.84	2.87	2.90	2.91	2.93	2.96	2.98		3.43	3.46	3.50
	85	TC	46.8	47.3	48.4	48.9	48.4	48.9	49.4	49.9	51.8	52.2	52.6	53.0		60.8	61.3	61.7
		S/T	1.00	1.00	1.00	1.00	0.60	0.80	1.00	1.00	0.39	0.55	0.71	0.87		0.38	0.52	0.65
		kW	3.09	3.12	3.15	3.15	3.15	3.19	3.22	3.25	3.27	3.30	3.32	3.35		3.94	3.98	4.01
	95	TC	45.9	46.4	47.4	48.0	47.4	48.0	48.5	49.0	50.8	51.2	51.6	51.9		59.3	59.7	60.1
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.55	0.72	0.87		0.38	0.52	0.66
		kW	3.66	3.70	3.74	3.74	3.74	3.78	3.82	3.86	3.87	3.90	3.93	3.96		4.66	4.69	4.72
	105	TC	44.8	45.3	46.3	46.8	46.3	46.8	47.4	47.9	49.7	50.0	50.4	50.7		57.7	57.9	57.9
		S/T	1.00	1.00	1.00	1.00	0.60	0.81	1.00	1.00	0.39	0.56	0.72	0.89		0.38	0.53	0.67
		kW	4.31	4.36	4.40	4.40	4.40	4.45	4.50	4.54	4.56	4.60	4.64	4.67		5.46	5.48	5.48
	115	TC	38.4	38.9	39.7	40.2	39.7	40.2	40.6	41.0	42.8	43.0	43.2	43.3		44.7	44.8	45.0
		S/T	1.00	1.00	1.00	1.00	0.61	0.82	1.00	1.00	0.39	0.59	0.78	1.00		0.39	0.58	0.76
		kW	4.25	4.30	4.34	4.34	4.34	4.39	4.43	4.48	4.53	4.55	4.57	4.46		4.60	4.62	4.63
1750	65	TC	51.0	51.6	52.7	53.3	52.7	53.3	53.9	54.4	56.5	56.9	57.3	57.7		66.5	66.9	67.3
		S/T	1.00	1.00	1.00	1.00	0.60	0.82	1.00	1.00	0.39	0.55	0.72	0.88		0.38	0.52	0.66
		kW	2.91	2.94	2.97	2.97	2.97	3.01	3.04	3.07	3.07	3.10	3.13	3.16		3.55	3.58	3.62
	75	TC	50.6	51.1	52.3	52.8	52.3	52.8	53.4	54.0	56.0	56.4	56.8	57.2		65.7	66.1	66.9
		S/T	0.99	1.00	1.00	1.00	0.60	0.82	1.00	1.00	0.39	0.56	0.72	0.89		0.38	0.52	0.66
		kW	3.09	3.12	3.16	3.16	3.16	3.19	3.22	3.26	3.27	3.30	3.32	3.35		3.83	3.87	3.78
	85	TC	49.6	50.2	51.3	51.8	51.3	51.8	52.4	53.0	54.9	55.3	55.7	56.1		64.1	64.5	64.8
		S/T	1.00	1.00	1.00	1.00	0.61	0.82	1.00	1.00	0.39	0.56	0.73	0.90		0.38	0.53	0.67
		kW	3.43	3.47	3.50	3.50	3.50	3.54	3.58	3.61	3.63	3.65	3.69	3.72		4.35	4.39	4.42
	95	TC	48.5	49.0	50.1	50.7	50.1	50.7	51.2	51.7	53.7	54.0	54.5	54.7		62.2	62.6	62.9
		S/T	1.00	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.56	0.73	0.91		0.38	0.53	0.68
		kW	4.03	4.08	4.12	4.12	4.12	4.17	4.21	4.25	4.27	4.31	4.34	4.37		5.09	5.13	5.16
	105	TC	47.2	47.7	48.8	49.3	48.8	49.3	49.8	50.4	52.3	52.7	53.0	53.3		58.5	58.8	58.7
		S/T	0.99	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.57	0.75	0.92		0.38	0.54	0.71
		kW	4.72	4.77	4.83	4.83	4.83	4.88	4.93	4.98	5.01	5.05	5.08	5.11		5.62	5.66	5.62
	115	TC	39.6	40.0	40.9	41.3	40.9	41.3	41.8	42.2	44.1	44.3	44.5	44.6		45.7	45.8	46.0
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.60	0.81	1.00		0.39	0.60	0.80
		kW	4.38	4.42	4.47	4.47	4.47	4.52	4.56	4.61	4.67	4.69	4.71	4.72		4.84	4.85	4.86

Table 5-1.4: BOVA-60HDN1-M20G + BVA-60WN1-M20 cooling capacity (continued)

BOVA 60 + BVA 60 For Cooling																		
Indoor	Outdoor	IWB (°F)	59				63				67				71			
Airflow (CFM)	DB(°F)	IDB (°F)	70	75	80	85	70	75	80	85	70	75	80	85	70	75	80	85
1880	65	TC	53.2	53.8	55.0	55.5	55.0	55.5	56.1	56.7	59.0	59.3	59.7	60.1		69.1	69.5	69.9
		S/T	1.00	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.56	0.73	0.90		0.38	0.53	0.68
		kW	3.18	3.21	3.24	3.24	3.24	3.28	3.31	3.35	3.35	3.38	3.41	3.45		3.86	3.89	3.92
	75	TC	53.0	53.5	54.7	55.3	54.7	55.3	55.9	56.5	58.7	59.1	59.5	59.9		68.6	69.0	69.4
		S/T	1.00	1.00	1.00	1.00	0.61	0.83	1.00	1.00	0.39	0.56	0.73	0.91		0.38	0.53	0.68
		kW	3.22	3.26	3.29	3.29	3.29	3.33	3.36	3.40	3.42	3.44	3.47	3.50		4.00	4.03	4.06
	85	TC	51.6	52.2	53.4	54.0	53.4	54.0	54.5	55.1	57.3	57.6	58.0	58.4		66.4	66.8	67.1
		S/T	1.00	1.00	1.00	1.00	0.61	0.84	1.00	1.00	0.39	0.57	0.74	0.92		0.38	0.54	0.69
		kW	3.68	3.72	3.76	3.76	3.76	3.80	3.84	3.88	3.90	3.93	3.96	3.99		4.65	4.68	4.71
	95	TC	50.3	50.8	52.0	52.5	52.0	52.5	53.1	53.7	55.8	56.2	56.5	56.8		64.2	64.6	64.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.84	1.00	1.00	0.39	0.57	0.75	0.93		0.38	0.54	0.70
		kW	4.31	4.36	4.40	4.40	4.40	4.45	4.50	4.54	4.57	4.60	4.64	4.67		5.40	5.43	5.47
	105	TC	48.8	49.4	50.5	51.0	50.5	51.0	51.6	52.1	54.2	54.5	54.8	55.2		59.6	58.6	58.9
		S/T	1.00	1.00	1.00	1.00	0.62	0.85	1.00	1.00	0.39	0.58	0.76	0.95		0.38	0.56	0.73
		kW	5.02	5.07	5.13	5.13	5.13	5.18	5.24	5.29	5.33	5.36	5.40	5.43		5.78	5.69	5.72
	115	TC	40.5	40.9	41.8	42.3	41.8	42.3	42.7	43.2	45.1	45.3	45.5	45.7		46.4	46.6	46.7
		S/T	1.00	1.00	1.00	1.00	0.63	0.88	1.00	1.00	0.39	0.62	0.84	1.00		0.39	0.61	0.84
		kW	4.54	4.59	4.64	4.64	4.64	4.69	4.74	4.79	4.86	4.87	4.89	4.90		5.00	4.70	4.71

5.2 Heating Capacity Tables

Table 5-2.1: BOVA-36HDN1-M20G + BVA-24WN1-M20 heating capacity

BOVA 36 + BVA 24 For Heating																			
Airflow	ID(°F)	OD(°F)	72	67	62	57	52	47	42	37	32	27	22	17	12	7	2	-4
660	60	TC	27.2	27.1	27.2	27.2	27.1	27.2	27.0	27.0	25.7	26.2	24.5	24.4	23.2	22.1	21.1	19.5
		kW	1.21	1.31	1.44	1.60	1.71	1.86	2.02	2.23	2.22	2.52	2.44	2.36	2.29	2.22	2.15	2.10
	70	TC	20.1	20.1	20.2	20.2	20.1	20.1	20.1	20.0	20.0	20.1	20.0	19.1	18.0	17.2	16.8	16.0
		kW	0.89	0.96	1.05	1.16	1.25	1.37	1.53	1.65	1.76	1.88	2.03	2.20	2.38	2.39	2.31	2.25
	75	TC	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.4	16.4	16.5	16.5	16.5	16.3	16.3	16.3	15.6
		kW	0.73	0.79	0.87	0.97	1.05	1.15	1.24	1.36	1.48	1.56	1.70	1.81	1.93	2.10	2.30	2.34
	80	TC	13.1	13.1	13.1	13.1	13.1	13.1	13.0	13.0	12.9	13.0	13.0	13.0	13.0	13.0	12.9	12.9
		kW	0.58	0.64	0.70	0.78	0.84	0.93	1.02	1.13	1.19	1.28	1.36	1.45	1.58	1.70	1.82	1.96
760	60	TC	29.9	29.9	29.9	29.9	29.8	29.7	29.7	27.8	26.0	26.6	24.8	24.7	23.4	22.3	21.3	19.7
		kW	1.37	1.49	1.61	1.77	1.88	2.06	2.28	2.25	2.18	2.48	2.41	2.34	2.27	2.21	2.14	2.10
	70	TC	22.2	22.2	22.2	22.2	22.1	22.1	22.1	22.0	22.2	22.0	22.0	21.2	19.9	19.1	18.6	17.7
		kW	1.00	1.08	1.18	1.29	1.41	1.57	1.69	1.83	1.93	2.11	2.27	2.46	2.45	2.38	2.30	2.24
	75	TC	18.2	18.2	18.2	18.2	18.2	18.2	18.1	18.1	18.1	18.1	18.2	18.0	18.0	18.0	17.1	15.8
		kW	0.82	0.89	0.97	1.08	1.17	1.27	1.37	1.54	1.63	1.75	1.87	1.99	2.15	2.34	2.40	2.33
	80	TC	14.4	14.4	14.4	14.4	14.4	14.4	14.4	14.3	14.4	14.4	14.4	14.4	14.4	14.3	14.2	14.2
		kW	0.66	0.72	0.79	0.87	0.94	1.05	1.13	1.24	1.31	1.41	1.50	1.63	1.74	1.82	2.01	2.17
860	60	TC	32.6	32.7	32.6	32.7	32.4	32.4	30.4	28.2	26.1	26.9	25.0	24.8	23.5	22.5	21.4	19.9
		kW	1.54	1.66	1.80	1.96	2.11	2.30	2.29	2.23	2.17	2.46	2.40	2.34	2.27	2.21	2.15	2.10
	70	TC	24.2	24.3	24.2	24.3	24.2	24.2	24.1	24.1	24.0	24.0	24.0	22.9	21.6	20.6	19.7	18.2
		kW	1.13	1.22	1.32	1.48	1.58	1.73	1.86	2.01	2.14	2.35	2.53	2.52	2.45	2.38	2.31	2.26
	75	TC	19.9	19.9	19.9	19.9	19.9	19.9	19.8	19.8	19.8	19.8	19.7	19.7	19.7	19.0	17.4	16.1
		kW	0.93	1.00	1.09	1.20	1.29	1.41	1.57	1.69	1.79	1.93	2.05	2.20	2.39	2.48	2.40	2.34
	80	TC	15.8	15.8	15.8	15.8	15.8	15.7	15.7	15.7	15.7	15.7	15.8	15.8	15.8	15.6	15.6	15.6
		kW	0.75	0.82	0.89	0.97	1.06	1.16	1.24	1.36	1.44	1.55	1.68	1.79	1.89	2.04	2.23	2.40

Table 5-2.2: BOVA-36HDN1-M20G + BVA-36WN1-M20 heating capacity

BOVA 36 + BVA 36 For Heating																			
Airflow	ID(°F)	OD(°F)	72	67	62	57	52	47	42	37	32	27	22	17	12	7	2	-4
1020	60	TC	41.0	41.0	40.9	40.9	40.8	39.3	36.1	33.4	31.0	31.1	29.2	27.9	26.1	24.2	22.6	21.1
		kW	2.18	2.33	2.53	2.74	2.96	2.98	2.87	2.77	2.69	2.96	2.88	2.80	2.72	2.65	2.57	2.52
	70	TC	31.7	31.5	31.7	31.6	31.3	31.2	31.2	31.2	30.5	30.5	28.4	27.5	25.6	23.8	22.3	20.7
		kW	1.63	1.72	1.89	2.02	2.17	2.36	2.60	2.83	2.94	3.22	3.12	3.03	2.93	2.85	2.76	2.69
	75	TC	26.7	26.6	26.6	26.6	26.6	26.6	26.2	26.2	26.2	26.2	26.2	26.1	24.2	22.3	20.4	18.9
		kW	1.36	1.46	1.58	1.70	1.86	2.01	2.14	2.34	2.50	2.74	2.95	3.16	3.06	2.97	2.88	2.80
	80	TC	21.9	21.9	21.9	21.9	21.8	21.8	21.7	21.7	21.8	21.5	21.5	21.5	21.5	21.5	20.1	18.6
		kW	1.13	1.20	1.30	1.41	1.51	1.64	1.76	1.95	2.07	2.20	2.37	2.56	2.76	3.01	3.00	2.92
1150	60	TC	45.8	45.8	45.7	44.5	42.0	39.8	36.7	33.9	31.7	31.6	29.3	28.5	26.6	24.7	23.1	21.5
		kW	2.58	2.73	2.95	3.03	2.95	2.92	2.83	2.74	2.68	2.94	2.86	2.79	2.72	2.65	2.58	2.53
	70	TC	35.5	35.3	35.0	35.0	35.0	34.8	34.7	33.1	31.0	30.9	28.9	28.2	26.0	24.1	22.6	21.0
		kW	1.88	2.01	2.13	2.31	2.51	2.66	3.00	2.99	2.91	3.18	3.10	3.01	2.93	2.85	2.77	2.71
	75	TC	29.9	29.8	29.6	29.8	29.7	29.3	29.3	29.4	29.4	29.4	28.5	26.5	24.6	22.6	20.6	19.2
		kW	1.58	1.68	1.79	1.97	2.08	2.24	2.46	2.68	2.87	3.15	3.23	3.14	3.05	2.96	2.88	2.81
	80	TC	24.5	24.5	24.5	24.5	24.5	24.4	24.4	24.1	24.1	24.0	24.1	24.1	24.1	22.3	20.3	18.9
		kW	1.30	1.38	1.50	1.61	1.73	1.86	2.05	2.17	2.32	2.52	2.72	2.92	3.16	3.09	2.99	2.92
1350	60	TC	51.0	50.2	47.4	45.3	42.7	40.5	37.2	34.4	32.2	32.1	30.0	28.9	27.0	25.1	23.5	21.9
		kW	3.03	3.10	3.03	3.01	2.94	2.92	2.83	2.76	2.70	2.96	2.89	2.83	2.77	2.70	2.64	2.59
	70	TC	39.2	39.1	39.1	39.1	39.0	39.0	36.4	33.6	31.5	31.4	29.4	28.4	26.5	24.6	23.0	21.4
		kW	2.16	2.30	2.50	2.70	2.91	3.14	3.09	3.00	2.93	3.20	3.12	3.04	2.97	2.90	2.82	2.77
	75	TC	33.4	33.3	33.3	32.9	32.9	32.8	32.9	32.8	31.1	31.0	29.0	27.0	25.0	23.0	21.2	19.7
		kW	1.84	1.95	2.12	2.22	2.40	2.60	2.85	3.09	3.06	3.34	3.25	3.17	3.09	3.01	2.93	2.87
	80	TC	27.5	27.4	27.4	27.4	27.4	27.3	26.9	26.9	27.0	26.9	26.9	26.6	24.7	22.7	20.8	19.3
		kW	1.53	1.62	1.75	1.86	2.02	2.17	2.31	2.51	2.67	2.91	3.12	3.30	3.21	3.13	3.04	2.97

IDS 2.0 Service manual

Table 5-2.3: BOVA-60HDN1-M20G + BVA-48WN1-M20 heating capacity

BOVA 60 + BVA 48 For Heating																			
Airflow	ID(°F)	OD(°F)	72	67	62	57	52	47	42	37	32	27	22	17	12	7	2	-4
1330	60	TC	57.2	57.2	57.1	57.1	56.8	56.9	53.3	49.2	46.1	43.8	42.4	40.6	39.2	37.4	35.5	33.7
		kW	2.86	3.06	3.32	3.59	3.87	4.21	4.14	3.99	3.83	4.03	4.41	4.41	4.29	4.22	4.14	3.99
	70	TC	44.0	44.0	44.0	43.9	43.8	43.8	43.7	43.7	43.7	41.6	40.2	38.5	37.2	35.4	33.7	31.9
		kW	2.19	2.32	2.52	2.71	2.92	3.17	3.46	3.75	4.04	4.24	4.65	4.65	4.53	4.45	4.36	4.20
	75	TC	37.1	37.0	37.0	37.0	37.0	36.9	36.8	37.0	37.0	36.8	36.8	36.8	35.0	33.5	31.7	29.8
		kW	1.90	1.99	2.13	2.30	2.45	2.69	2.90	3.16	3.37	3.65	3.92	4.23	4.27	4.15	4.06	3.89
	80	TC	30.5	30.5	30.4	30.4	30.4	30.3	30.2	30.4	30.4	30.4	30.4	30.4	30.2	30.3	30.2	28.2
		kW	1.63	1.72	1.82	1.97	2.08	2.23	2.39	2.62	2.77	3.00	3.21	3.43	3.69	4.01	4.40	4.33
1530	60	TC	62.9	63.0	62.8	62.7	62.0	58.8	53.7	49.9	46.6	44.3	42.9	41.0	39.6	37.8	35.9	34.0
		kW	3.27	3.49	3.76	4.07	4.31	4.25	4.08	3.96	3.85	4.04	4.43	4.43	4.31	4.24	4.16	4.00
	70	TC	48.4	48.5	48.4	48.4	48.3	48.2	48.2	48.2	45.6	43.3	42.0	40.1	38.8	36.9	35.1	33.3
		kW	2.46	2.63	2.83	3.07	3.30	3.61	3.91	4.25	4.19	4.40	4.82	4.82	4.70	4.61	4.53	4.36
	75	TC	40.9	40.8	40.8	40.6	40.8	40.7	40.6	40.8	40.6	40.6	40.6	40.1	38.1	36.5	34.5	32.5
		kW	2.13	2.24	2.39	2.56	2.78	3.01	3.27	3.54	3.77	4.12	4.43	4.76	4.81	4.66	4.57	4.38
	80	TC	33.7	33.6	33.6	33.6	33.6	33.5	33.4	33.6	33.6	33.6	33.6	33.4	33.4	33.4	31.0	28.7
		kW	1.83	1.92	2.04	2.19	2.33	2.49	2.72	2.93	3.12	3.38	3.60	3.85	4.16	4.53	4.63	4.67
1760	60	TC	68.7	68.7	68.7	66.8	63.0	59.7	54.8	50.6	46.8	44.4	43.0	41.2	39.8	37.9	36.0	34.1
		kW	3.70	3.95	4.28	4.40	4.29	4.24	4.10	3.97	3.87	4.06	4.45	4.45	4.33	4.25	4.18	4.02
	70	TC	53.0	53.2	53.0	53.0	52.9	52.7	52.8	49.4	46.3	44.0	42.6	40.7	39.3	37.5	35.6	33.8
		kW	2.77	2.98	3.21	3.47	3.72	4.00	4.39	4.33	4.22	4.43	4.85	4.85	4.72	4.64	4.55	4.39
	75	TC	44.8	44.9	44.8	44.8	44.7	44.6	44.5	44.6	44.5	44.5	42.0	40.6	38.6	36.9	34.9	32.9
		kW	2.39	2.53	2.72	2.92	3.13	3.38	3.67	3.97	4.25	4.65	4.93	4.78	4.83	4.69	4.59	4.40
	80	TC	37.0	36.9	36.9	36.9	36.9	36.8	36.7	36.9	36.9	36.7	36.7	36.7	36.7	34.5	31.6	29.3
		kW	2.07	2.16	2.29	2.46	2.61	2.84	3.05	3.29	3.50	3.76	4.03	4.32	4.69	4.68	4.77	4.82

Table 5-2.4: BOVA-60HDN1-M20G + BVA-60WN1-M20 heating capacity

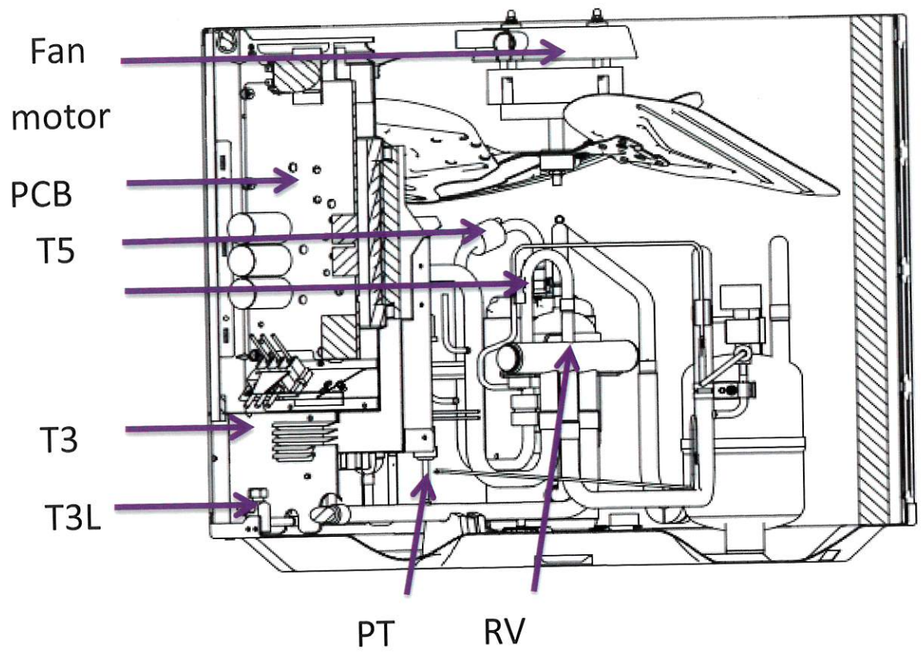
BOVA 60 + BVA 60 For Heating																		
Airflow	ID(°F)	OD(°F)	72	67	62	57	52	47	42	37	32	27	22	17	12	7	2	-4
1520	60	TC	69.0	68.5	68.5	68.4	68.3	67.4	61.6	56.6	53.0	52.2	52.7	49.1	45.6	42.1	38.7	36.0
		kW	3.45	3.65	3.98	4.30	4.67	4.92	4.73	4.56	4.44	5.30	5.34	5.18	5.02	4.86	4.70	4.57
	70	TC	52.0	52.0	52.0	52.0	51.9	51.3	51.5	51.4	51.4	48.9	45.8	42.7	41.6	40.6	38.0	36.0
		kW	2.50	2.68	2.91	3.16	3.40	3.63	4.03	4.39	4.76	4.90	5.04	5.09	4.99	4.91	4.80	4.76
	75	TC	43.2	43.2	43.1	43.1	43.1	43.0	42.9	42.8	42.6	42.6	42.6	42.6	40.5	38.8	36.7	34.5
		kW	2.12	2.24	2.40	2.58	2.78	3.04	3.32	3.56	3.82	4.19	4.51	4.90	4.90	4.71	4.56	4.46
	80	TC	34.8	34.8	34.8	34.7	34.7	34.7	34.4	34.7	34.7	34.7	34.2	34.2	34.2	34.2	34.2	33.9
		kW	1.78	1.88	2.00	2.16	2.29	2.46	2.64	2.88	3.10	3.36	3.53	3.80	4.10	4.47	4.92	5.36
1750	60	TC	75.6	75.5	75.5	75.5	72.1	68.2	62.4	57.5	53.8	51.1	49.5	47.3	45.7	43.6	41.4	39.3
		kW	3.97	4.22	4.58	4.96	4.95	4.88	4.71	4.56	4.45	2.10	5.12	5.12	4.98	4.90	4.81	4.63
	70	TC	57.3	57.5	57.4	57.2	56.4	56.2	56.1	55.3	53.6	51.0	47.7	44.5	43.4	42.4	39.7	37.0
		kW	2.87	3.08	3.33	3.60	3.82	4.13	4.56	4.77	4.84	4.99	5.13	5.18	5.08	5.00	4.89	4.84
	75	TC	47.7	47.8	47.7	47.6	47.6	47.5	47.1	47.0	47.0	47.0	47.0	44.0	41.8	40.1	37.9	35.7
		kW	2.40	2.55	2.74	2.96	3.20	3.45	3.73	4.04	4.34	4.78	5.17	5.42	5.42	5.20	5.04	4.93
	80	TC	38.4	38.5	38.5	38.4	38.4	38.3	38.2	38.4	38.4	37.9	37.9	37.8	37.9	37.8	37.2	34.9
		kW	2.02	2.13	2.27	2.43	2.58	2.76	3.01	3.29	3.51	3.74	4.01	4.30	4.68	5.09	5.54	5.39
1880	60	TC	81.0	81.0	81.0	77.1	72.6	68.6	62.6	58.0	54.2	54.4	53.8	50.0	46.5	43.1	39.7	37.0
		kW	4.40	4.66	5.08	5.02	4.90	4.84	4.69	4.56	4.45	5.27	5.33	5.19	5.05	4.91	4.77	4.65
	70	TC	61.6	61.7	61.6	61.0	60.8	60.9	61.0	56.8	54.2	51.5	48.2	45.0	43.9	42.8	40.1	37.9
		kW	3.18	3.39	3.66	3.90	4.20	4.54	5.03	4.97	4.84	4.99	5.13	5.18	5.08	5.00	4.89	4.84
	75	TC	51.2	51.3	50.9	51.1	51.1	51.0	50.5	50.5	50.6	50.5	50.6	44.6	42.4	40.6	38.4	36.1
		kW	2.62	2.79	2.98	3.26	3.50	3.76	4.08	4.43	4.77	5.27	5.70	5.85	5.85	5.62	5.44	5.32
	80	TC	41.4	41.4	41.4	41.3	41.2	41.2	41.2	41.3	40.9	40.7	40.7	40.7	40.7	40.7	37.7	34.9
		kW	2.21	2.32	2.47	2.64	2.80	3.02	3.32	3.59	3.77	4.09	4.39	4.73	5.13	5.65	5.56	5.41

Part 2

Component Layout and Refrigerant Circuits

1 Layout of Functional Components

Figure 2-1.1: Functional Part-3T



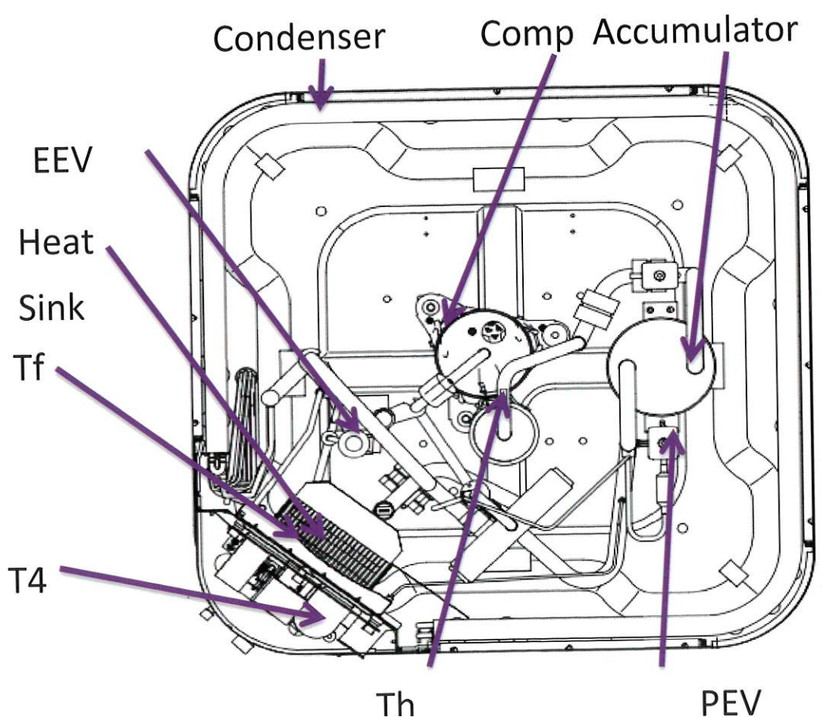
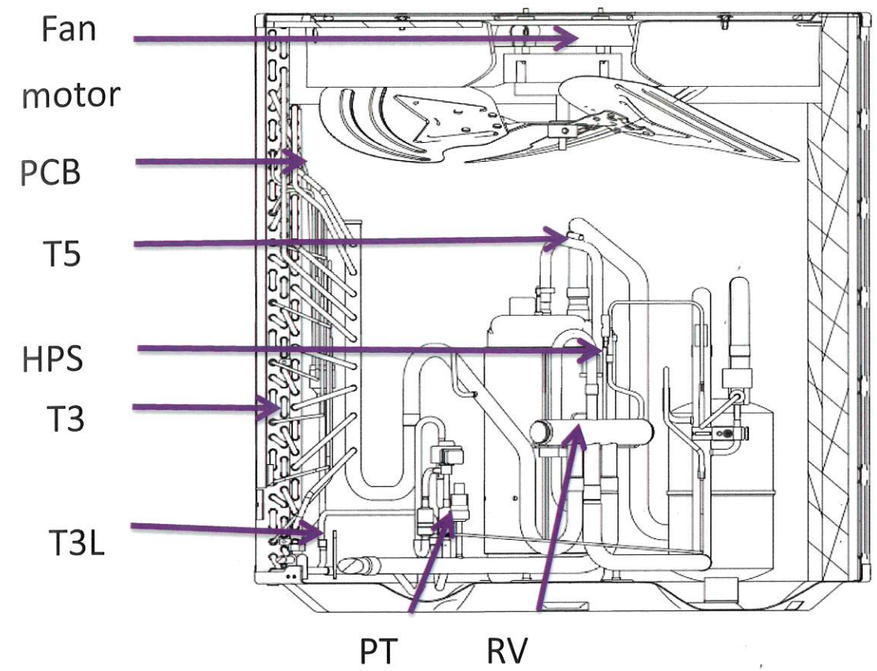
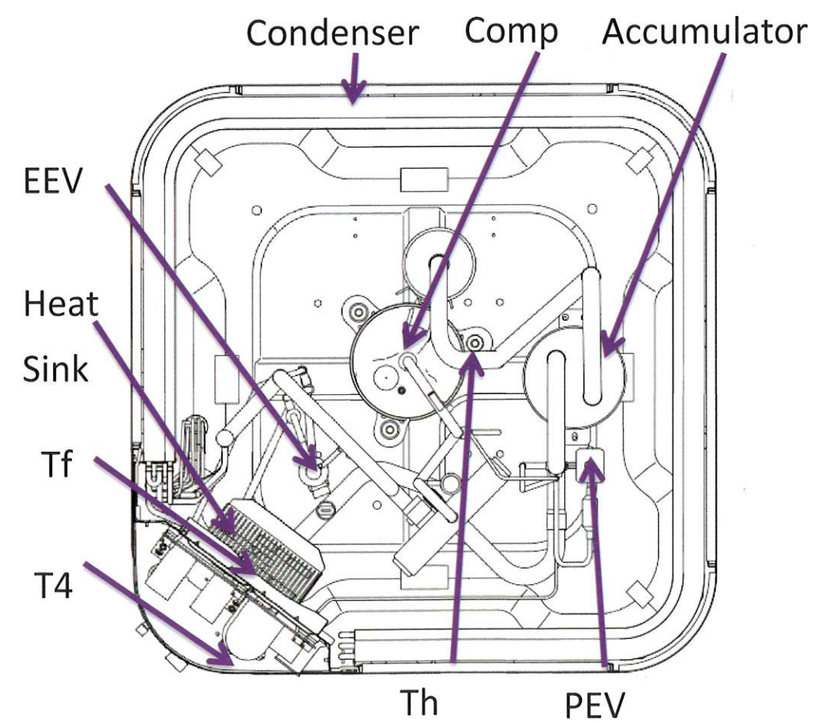


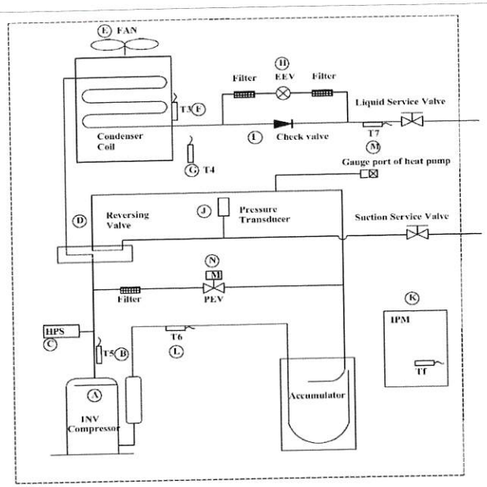
Figure 2-1.1: Functional Part-5T





2 Piping Diagrams

Figure 2-2.1: piping diagram



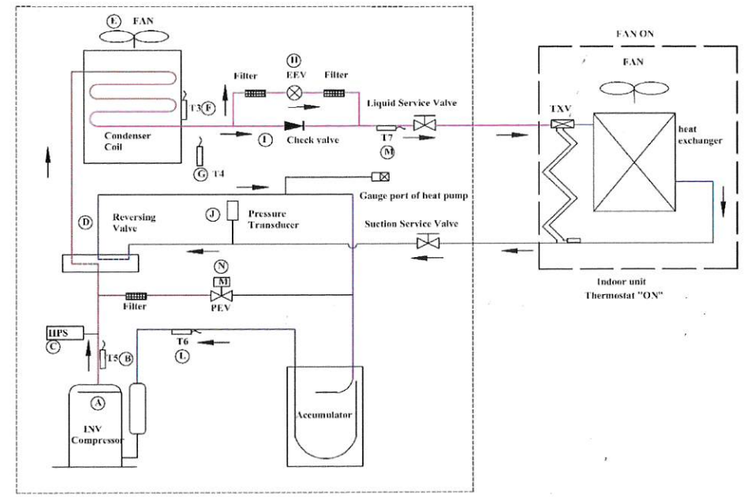
No. in diagram	Symbol	Part Name	Major function
A	INV Comp.	Inverter Compressor	Inverter compressor is operated in multi-steps according to PT.
B	T5	Compressor discharge temperature sensor	Used to compressor discharge temperature protection and EEV control in heating mode.
C	HPS	High pressure switch	Used to high pressure protection when up to 580 PSIG and recovery when below to 435PSIG.
D	RV	The Reversing Valve	Used to switch mode between cooing and heating.
E	Fan	Fan of outdoor	Used to help heat exchange by 10-speeds ECM motor.
F	T3	Condenser coil temperature sensor	Used to discharge temperature protection and Fan control in cooling mode, and defrost control.
G	T4	Ambient temperature sensor	Used to ambient protection and Fan control in heating mode, and defrost control.
H	EEV	Electronic Expansion Valve	Fully open during cooling and adjust opening during heating by compressor discharge superheat.
I	CV	Check Valve	Open during cooling and shutoff during heating by itself
J	PT	Pressure Transducer	Used to pressure measure for compressor control, evaporating pressure during cooling and condensing pressure during heating.
K	Tf	Control board heat dissipation temperature sensor	Used to control board heat dissipation temperature protection.
L	Th	Suction temperature	Used to monitor suction temperature
M	T3L	Condenser outlet temperature	Used to monitor condenser outlet temperature
N	PEV	Pressure Equalizer Valve	To balance pressure before compressor starts

3 Refrigerant Flow Diagrams

Cooling operation

Figure 2-3.1: refrigerant flow during cooling operation /cooling oil return operation/defrost operation

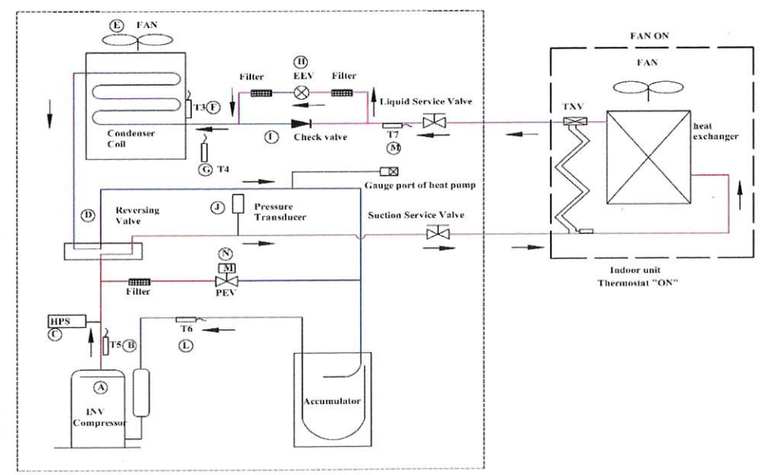
High pressure gas
High pressure liquid
Low pressure



Heating operation

Figure 2-3.2: refrigerant flow during heating operation/heating oil return operation

High pressure gas
High pressure liquid
Low pressure



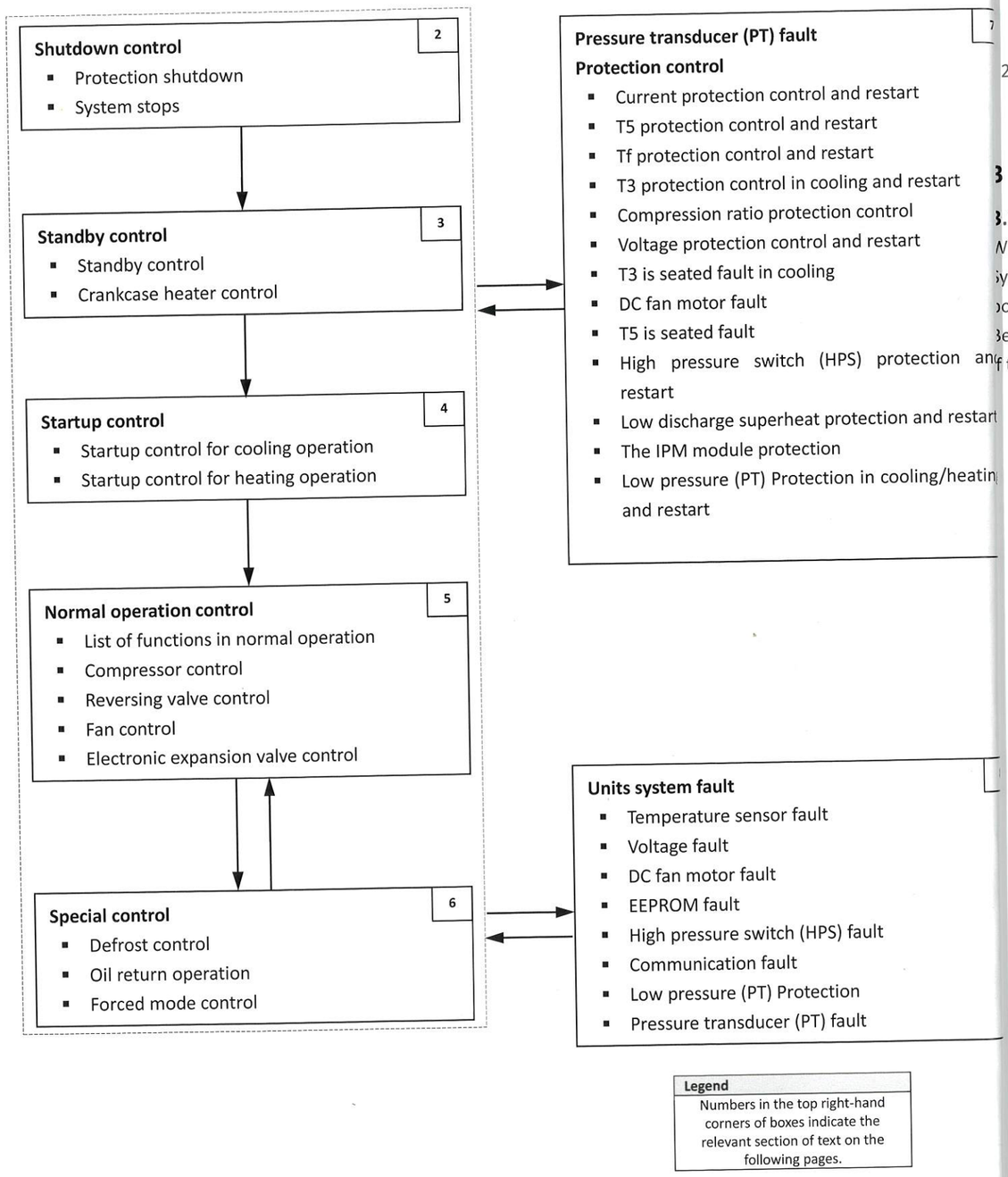
IDS 2.0 Service manual

Part 3

Control

1 General Control Scheme Flowchart

Sections 3-2 to 3-7 on the following pages detail when each of the controls in the flowchart below is activated.



2 Stop control

The stop operation occurs for one of the three following reasons:

1. Unit protection shutdown
   To protect the outdoor unit, our system will shut down when there is something abnormal. Also the digital tube would show the fault code when fault presents.
2. Thermostat satisfied shutdown
   Anytime system is in standby period, digital tube will display ambient temperature (T4).

3 Standby Control

3.1 Standby control

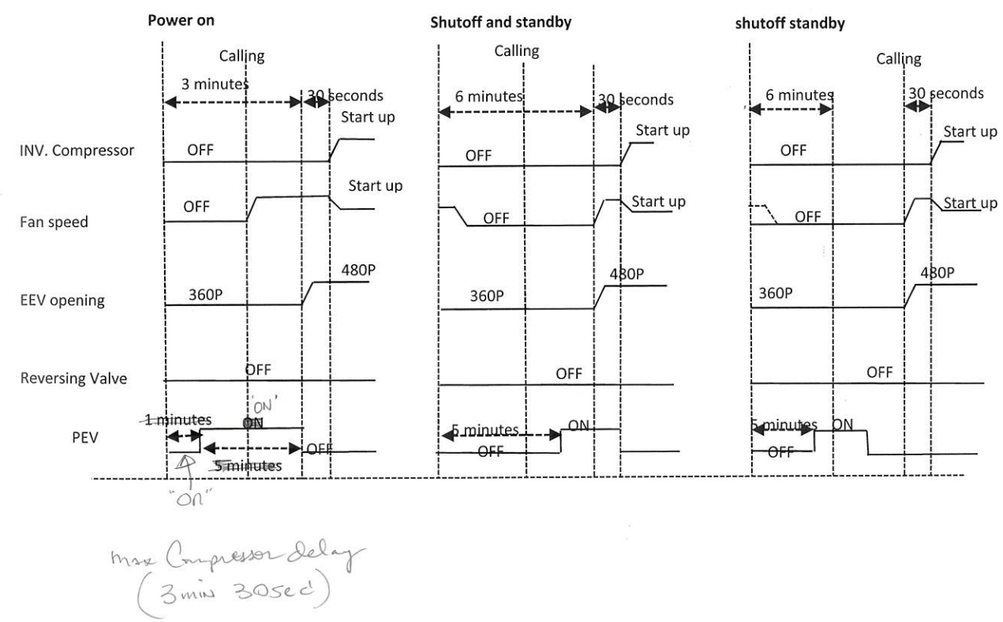
When compressor stops, the outdoor fan motor would continue to run for 60 seconds to move off excess heat.

System will wait at least 6 mins(cooling mode)/3 mins(heating mode) before it starts again at power on. If it is the first time power on, system will wait at least 3mins before it starts, the outdoor fan motor will always start first when calling.

Before compressor starts, the outdoor fan motor will run at least 30 seconds.

If there is no fault code and you are in standby mode, the digital tube will show ambient temperature.

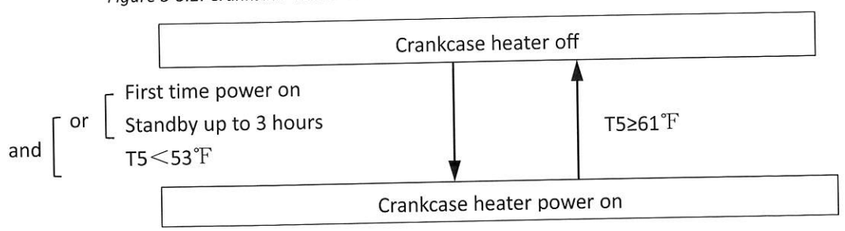
Figure 3-3.1: Example: Cooling mode diagram



3.2 Crankcase heater control

Refrigerant migration during the OFF cycle can result in noisy start-ups, therefore a CrankCase Heater (CCH) is used t minimize refrigerant migration thereby minimizing start-up noise and/or bearing "wash out".Its purpose is to warm th compressor during the OFF cycle, driving refrigerant from compressor. After extended shutdown periods in cold weather, is recommended to allow CCH to be energized for at least 12 hours prior to compressor operation by applying line voltag to heat pump with thermostat OFF. Refer to Figures 3-3.2.

Figure 3-3.2: Crankcase heater control



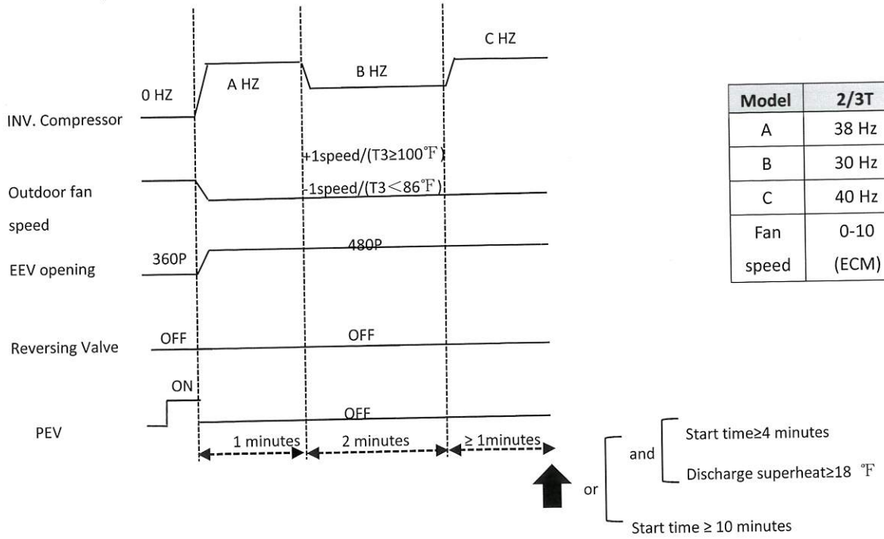
Notes:

1.T5 is the compressor discharge temperature

4 Startup Control

4.1 Startup Control for Cooling Operation

Figure 3-4.1: *Component control during startup in cooling mode*



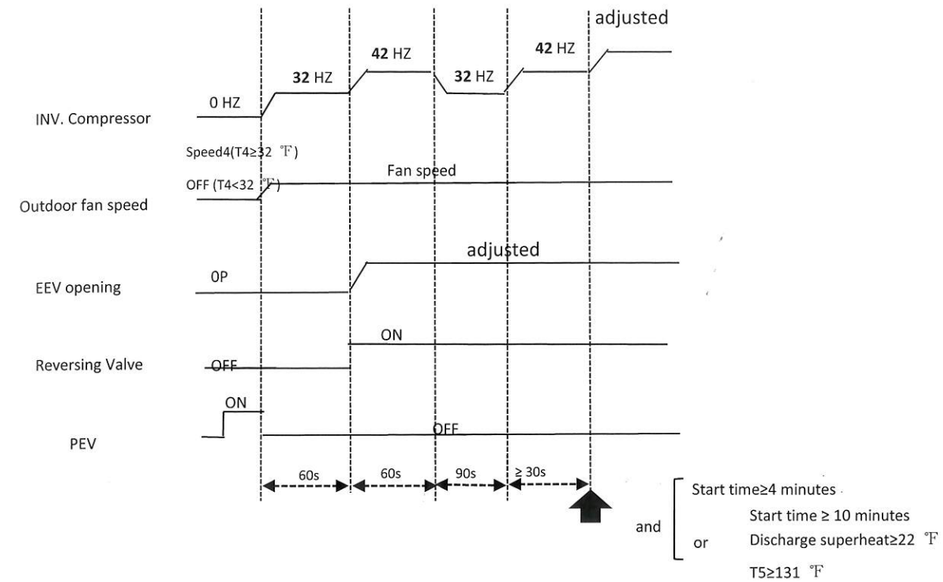
Model	2/3T	4/5T
A	38 Hz	38 Hz
B	30 Hz	32 Hz
C	40 Hz	40 Hz
Fan speed	0-10 (ECM)	0-10 (ECM)

Notes:

1. Above chart could be within 1-2 HZ of what is actually shown on the unit.

4.2 Startup Control for Heating Operation

Figure 3-4.2: Component control during startup in heating mode



Note:

1.Above chart could be within 1-2 HZ of what is actually shown on the unit.

2.Pc is the condensing pressure by PT in heating mode.

3. Because of the different starting environment, there are actually some differences.

5 Normal Operation Control

5.1 Component Control during Normal Operation

Anytime the compressor is operating, the digital tube will show the frequency of compressor.

Table 3-5.1: Component control during normal cooling operation

Component	Wiring diagram label	Control functions and states
Inverter compressor	INV Comp.	Control by PT pressure target depends on field dipswitch setting SW4-2/3/4.
The Reversing Valve	RV	OFF
Outdoor fan motor	Fan	10 speeds ECM motor. Controlled by T3.
Electronic Expansion Valve	EEV	480P (full open)

Table 3-5.2: Component control during heating operation

Component	Wiring diagram label	Control functions and states
Inverter compressor	INV Comp.	Control by PT pressure target depends on field dipswitch setting SW4-2/3/4
The Reversing Valve	RV	ON
Outdoor fan motor	FAN	10 speeds ECM motor. Controlled by T4 and Compressor speed
Electronic Expansion Valve	EEV	Control by compressor discharge superheat, Initial target is 32℉

5.2 Compressor Control

The compressor speed is adjusted according to the PT (pressure transducer).It converts to a evaporator temperature(Pe) i cooling, condenser temperature(Pc) in heating.

In cooling mode:

- Compressor speed will be PI controlled by the evaporating pressure (Pe) which is measured by PT (the targ temperature depends on field dipswitch setting SW4)..

In heating mode:

- Compressor speed will be PI controlled by the condensing pressure (Pc) which is measured by PT (the targ temperature depends on field dipswitch setting SW4).

Table 3-5.3: Max operation frequency of compressor

	Max operation frequency(Hz)			
Model	2T	3T	4T	5T
cooling	68	86	68	76
Heating(T4≥ -2℃)	70	86	70	80
Heating(T4<-2℃)	80	96	80	94

5.3 Reversing valve control

B terminal to be connected with thermostat (O/B) wiring. Reversing valve energizes in heating.

In cooling mode:

- The reversing valve is off during cooling.

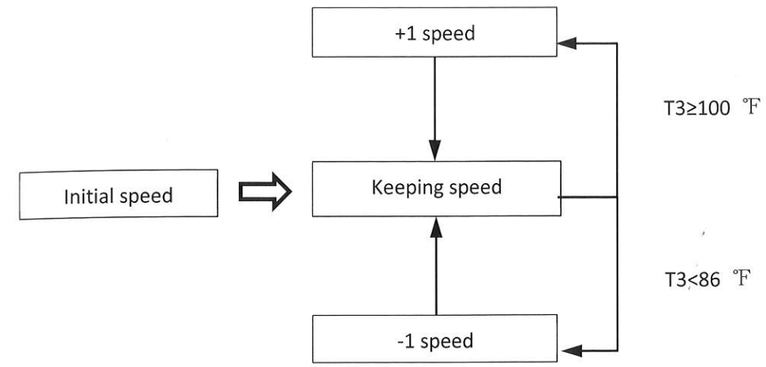
In heating mode:

- The reversing valve energizes in heating and heating standby.

Special control: The reversing valve will delay about 1 minute when the first heating started for system reliability.

5.4 Fan control

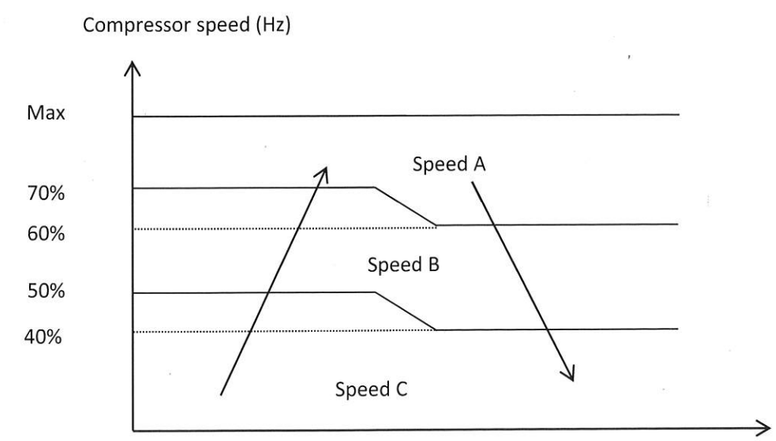
n cooling mode:



Note:
.. ±1 speed/25 seconds,10 speeds ECM motor, the motor can be stopped when the ambient temperature less than 50℉.

n heating mode:

Fan speed when heating depends on compressor and T4 as shown below.



The speed of the outdoor unit fans is adjusted in steps, as shown in Table 3-5.3.

Table 3-5.4: Outdoor fan speed steps

	T4<27	27≤T4<41	41≤T4<50	50≤T4<59	59≤T4<68	68≤T4<77	T4≥77
Fan Speed A	10	10	10	9	8	7	6
Fan Speed B	9	9	8	7	6	5	4
Fan Speed C	8	7	7	6	5	4	3

Notes: ±1 speed/70 seconds.

5 Normal Operation Control

5.1 Component Control during Normal Operation

Anytime the compressor is operating, the digital tube will show the frequency of compressor.

Table 3-5.1: Component control during normal cooling operation

Component	Wiring diagram label	Control functions and states
Inverter compressor	INV Comp.	Control by PT pressure target depends on field dipswitch setting SW4-2/3/4.
The Reversing Valve	RV	OFF
Outdoor fan motor	Fan	10 speeds ECM motor. Controlled by T3.
Electronic Expansion Valve	EEV	480P (full open)

Table 3-5.2: Component control during heating operation

Component	Wiring diagram label	Control functions and states
Inverter compressor	INV Comp.	Control by PT pressure target depends on field dipswitch setting SW4-2/3/4
The Reversing Valve	RV	ON
Outdoor fan motor	FAN	10 speeds ECM motor. Controlled by T4 and Compressor speed
Electronic Expansion Valve	EEV	Control by compressor discharge superheat, Initial target is 32℉

5.2 Compressor Control

The compressor speed is adjusted according to the PT (pressure transducer).It converts to a evaporator temperature(Pe) i cooling, condenser temperature(Pc) in heating.

In cooling mode:

- Compressor speed will be PI controlled by the evaporating pressure (Pe) which is measured by PT (the targ temperature depends on field dipswitch setting SW4)..

In heating mode:

- Compressor speed will be PI controlled by the condensing pressure (Pc) which is measured by PT (the targ temperature depends on field dipswitch setting SW4).

Table 3-5.3: Max operation frequency of compressor

	Max operation frequency(Hz)			
Model	2T	3T	4T	5T
cooling	68	86	68	76
Heating(T4≥ -2℃)	70	86	70	80
Heating(T4<-2℃)	80	96	80	94

5.3 Reversing valve control

B terminal to be connected with thermostat (O/B) wiring. Reversing valve energizes in heating.

In cooling mode:

- The reversing valve is off during cooling.

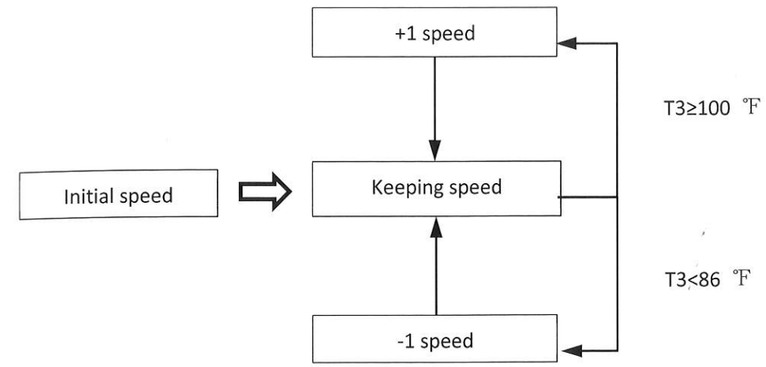
In heating mode:

- The reversing valve energizes in heating and heating standby.

Special control: The reversing valve will delay about 1 minute when the first heating started for system reliability.

5.4 Fan control

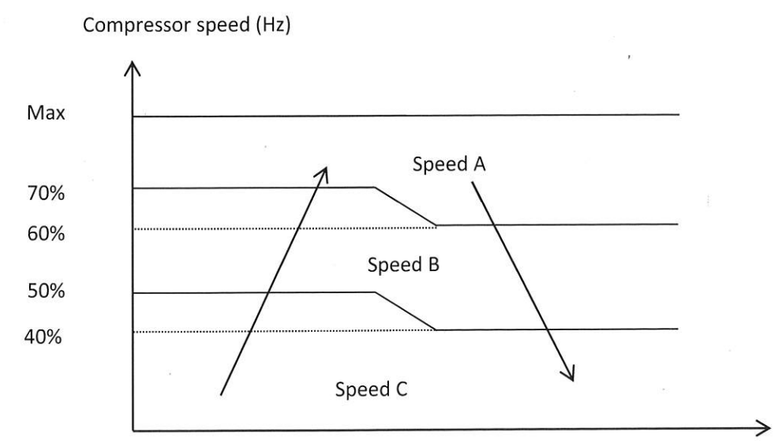
n cooling mode:



Note:
.. ±1 speed/25 seconds,10 speeds ECM motor, the motor can be stopped when the ambient temperature less than 50℉.

n heating mode:

Fan speed when heating depends on compressor and T4 as shown below.



The speed of the outdoor unit fans is adjusted in steps, as shown in Table 3-5.3.

Table 3-5.4: Outdoor fan speed steps

	T4<27	27≤T4<41	41≤T4<50	50≤T4<59	59≤T4<68	68≤T4<77	T4≥77
Fan Speed A	10	10	10	9	8	7	6
Fan Speed B	9	9	8	7	6	5	4
Fan Speed C	8	7	7	6	5	4	3

Notes: ±1 speed/70 seconds.

5.5 Electronic Expansion Valve Control

EEV is located in outdoor unit and works during heating, and TXV is located in indoor unit and works during cooling.

In cooling mode:

EEV is at fixed positon (360P) when compressor is off (standby).
EEV is at fully open position (480P) when compressor is on (normal operation in cooling).

In heating mode:

EEV is at fixed position (360P) when compressor is off (standby).

EEV is adjusted by PI control compressor discharge superheat in normal operation in heating:

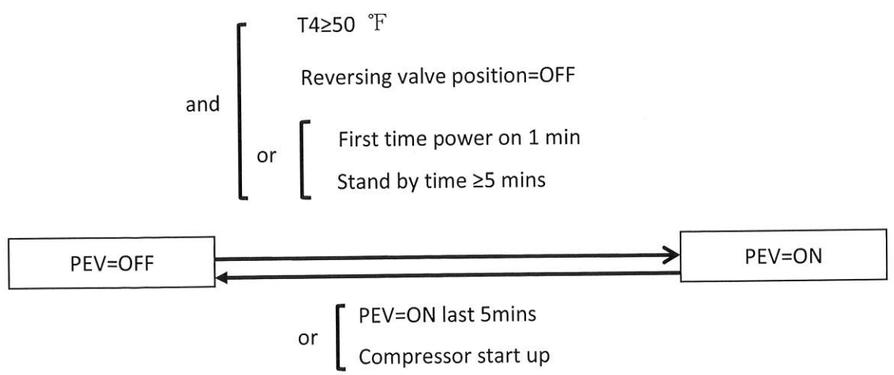
- At startup: EEV is at Initial position (a few fixed opening according to compressor and T5 temperature).
- PI control discharge superheat, Modulated opening by:
  - Compressor discharge superheat = T5 (compressor discharge temperature) – Tc (condensing temperature).

Notes:
1.Tc in heating is the condensing saturated temperature from PT pressure.
2.Initial target of discharge superheat = 32 ℉
3.The current target = 32 ℉ ±4 ℉ (adjusted by compressor speed and running time)
4.Limited opening according to the scope of the system.

Model	2T	3T	4T	5T
Initial min limited opening	104	120	96	96

5.6 PEV(Pressure Equalizer Valve) Control

PEV is used to balance the pressure in the system before compressor start up



5 Special Control

5.1 Defrost control

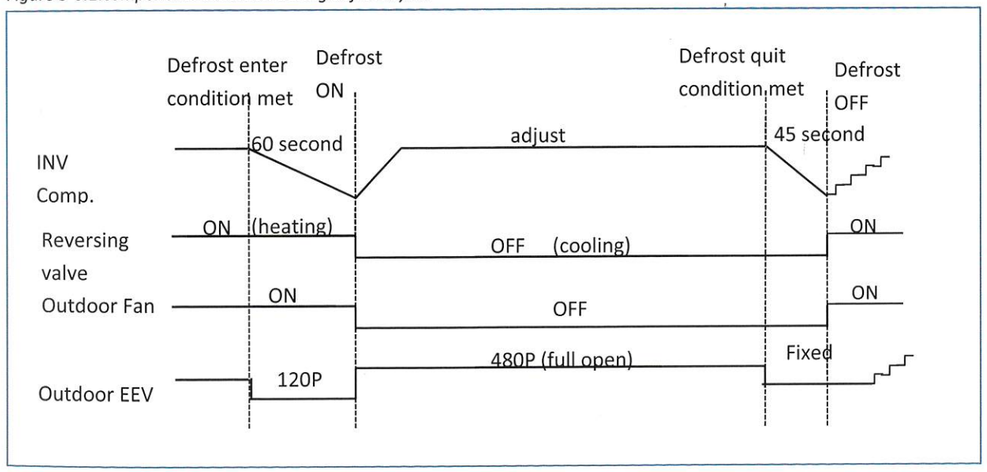
The Demand Defrost Control (DDC) monitors the ODU coil temperature using thermistor (T3). A second thermistor (T4) monitors outdoor ambient temperature. Based on these parameters, as well as accumulative running time and high pressure, the DDC calculates proper initiation of defrost. The digital tube will show "dF" during defrost cycle.

Any one of three conditions is required to enter defrost:

- The calculated temperature difference between the outdoor temperature (T4) and the coil temperature (T3) is called Delta T. After Delta T is achieved and lasted for 3 minutes.
  --T4≥36℉, Delta T=18℉
  --T4≥30℉, Delta T=16℉
  --T4≥19℉, Delta T=14℉
  --when T4<19℉, T3<9℉, accumulative compressor running time ≥ 80 minutes.
- After "Minimum Running Time" (MRT) is achieved. MRT is based on outdoor ambient temperature (T4), for example:
  --MRT is 4 hours when: T4<23℉
  --MRT is 2 hours when: 23℉≤T4<42℉
- After the high pressure saturation temperature drops below 82℉ for 20 minutes.

Defrost will terminate once outdoor coil temperature (T3) reaches 64℉ for a period of 1 minute or defrost time has exceeded 8 minutes.

Figure 3-6.1:components condition during defrost cycle



6.2 Oil Return Operation

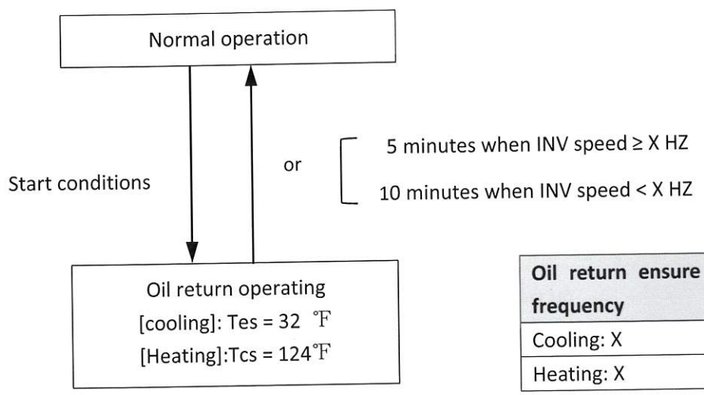
In order to prevent the compressor from operating in a low oil condition, the oil return operation is conducted to recov oil flown to the compressor. The digital tube will show "A**" during oil return cycle (** shows the frequency compressor).

Starting conditions:

Referring to the set conditions for following items, start the oil return operation.

1. Cumulative compressor oil discharge rate
2. Timer setting (The initial operating time reaches 2 hours of continuous operation or accumulati compressor running time reaches 8 hours).

Oil return operation:



Oil return ensure frequency	2T/3T	4T/5T
Cooling: X	46/46	46/46
Heating: X	50/50	40/48

Define:

Tes is the Te (evaporating saturated temperature by PT) target of controlling compressor speed in cooling.

Tcs is the Tc (condensing saturated temperature by PT) target of controlling compressor speed in heating.

6.3 Forced mode control

Force mode is also referred to as charge mode in cooling.

Function: To verify charge the system in cooling

Enter: Press FORCE button for 1 second (should press it after the "start up phase" finished. If failed to enter, we can again after a few mins)

Quit: Press FORCE button or it will automatically quit after 2 hours.

Display: ⊢**(** shows the frequency of compressor)

Table 3-6.1: compressor frequency during force mode

Force mode frequency	2T	3T	4T	5T	Remark
Cooling	48	72	54	62	Charge mod
Heating	48	72	54	62	/

Protection Control

.1 Protection control list

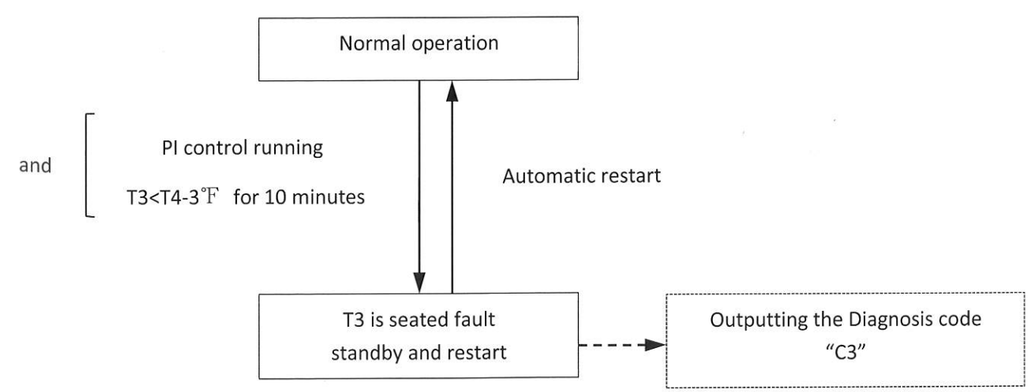
he unit protection codes are shown due to a condition that could harm the unit. To protect itself, the unit shutdown until e abnormal condition is corrected.

able 3-7.1: protection code

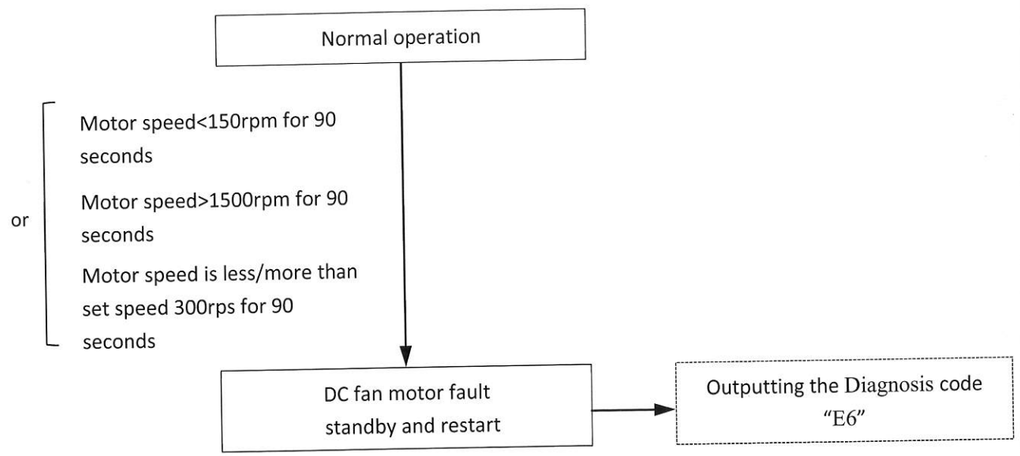
No.	Operation code	Protection code	Protection control description	Supposed cause
1	/	C3	T3 sensor not reading correctly in cooling	T3 sensor is not properly placed/High pressure switch fault
2	/	E6	DC fan motor of outdoor fault	Motor fault/severe weather (fan rpm too high due to wind)
3	/	E7	T5 sensor not reading correctly	T5 sensor is not properly placed.
4	F**	P0	Tf protection control and restart	High temperature and load/Heat sink blocked
5	/	P1	High pressure switch (HPS) protection and restart	Poor heat exchange on condensing side
6	/	P2/H5	Low pressure (PT) Protection in cooling or heating and restart	TXV/EEV blocked/Charging leakage (low refrigerant)
7	C**	P3	Current protection control and restart	High temperature and load/poor heat exchange on condensing side/compressor abnormal.
8	D**	P4	T5 protection control and restart	High temperature and load/Throttle blockage/Charging leakage (low refrigerant)
9	L**	P5	T3 protection control in cooling and restart	High temperature and overload/poor heat exchange on condensing side.
10	/	L0-L9	The IPM module protection	Control board failed/Compressor failed/external electromagnet interference
11	/	P8	DC fan motor of outdoor typhoon protection	severe weather (fan run in standby mode due to wind)
12	/	PH	Low discharge superheat protection and restart	TXV or EEV fault/poor heat exchange on evaporating side/over charged
13	P**	/	Compression ratio protection control	Low temperature and low load
14	U**	/	Voltage protection control and restart	Power supply issue. U**=unit operating but not ideal voltage. E5=unit will not run.
15	/	ATL	Ambient Temperature Limited	Ambient temperature is out of range, or T4 is abnormal.

otes: 1.After 6minutes standby the unit can be automatic restart except for H5/ATL.
2.**shows the frequency of compressor

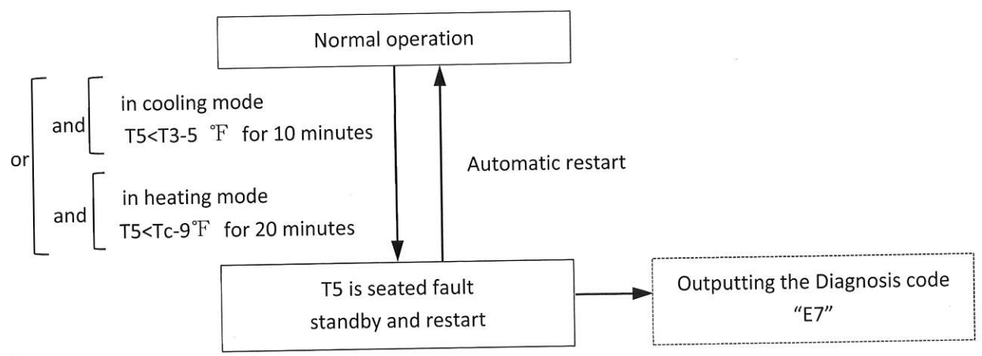
.2 T3 sensor not reading correctly in cooling



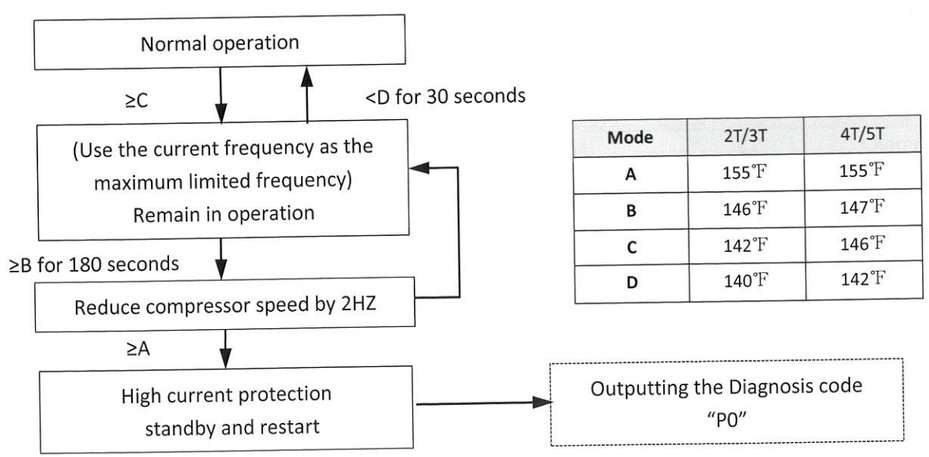
7.3 DC fan motor of outdoor fault



7.4 T5 sensor not reading correctly

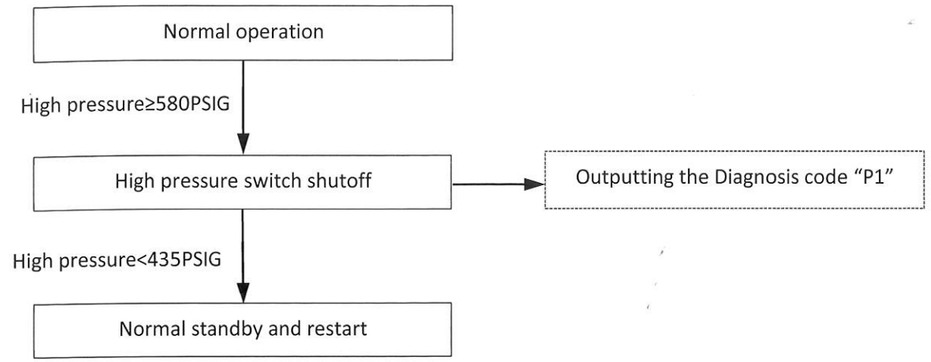


7.5 [F**] Tf protection control and restart

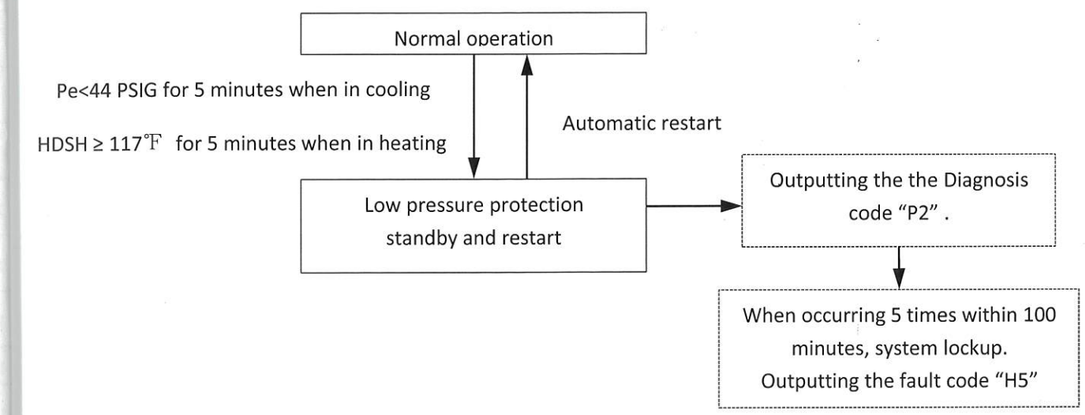


Mode	2T/3T	4T/5T
A	155℉	155℉
B	146℉	147℉
C	142℉	146℉
D	140℉	142℉

.6 High pressure switch (HPS) protection and restart

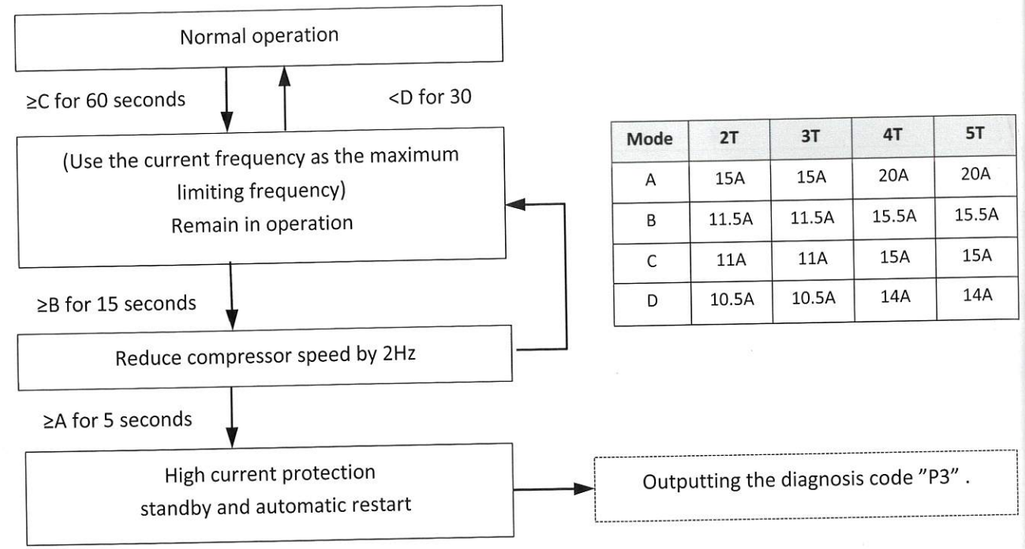


.7 Low pressure (PT) Protection in cooling and restart



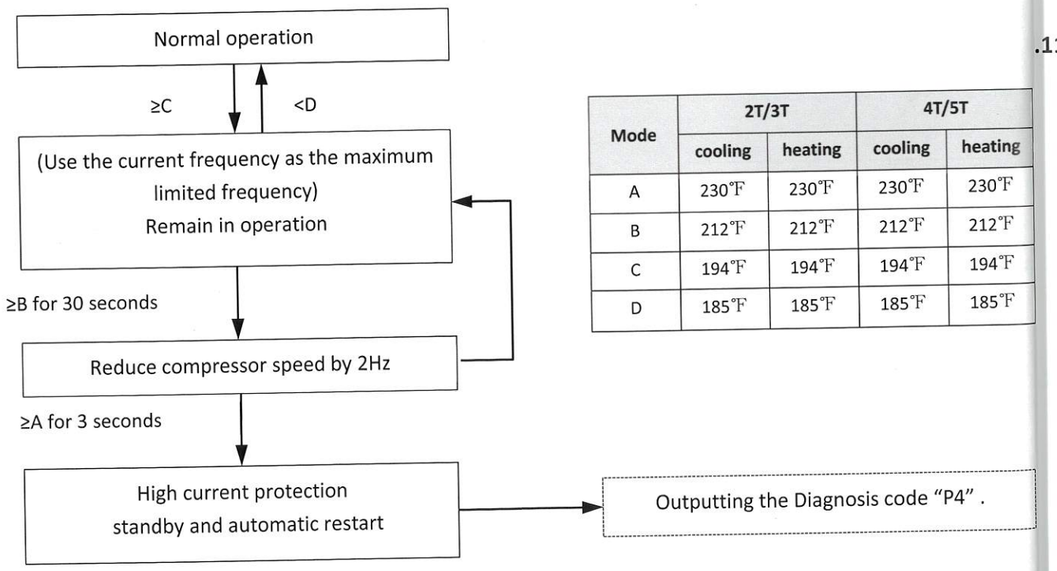
otes:
HDSH means head discharge superheat.

7.8 [C**] Current protection control and restart



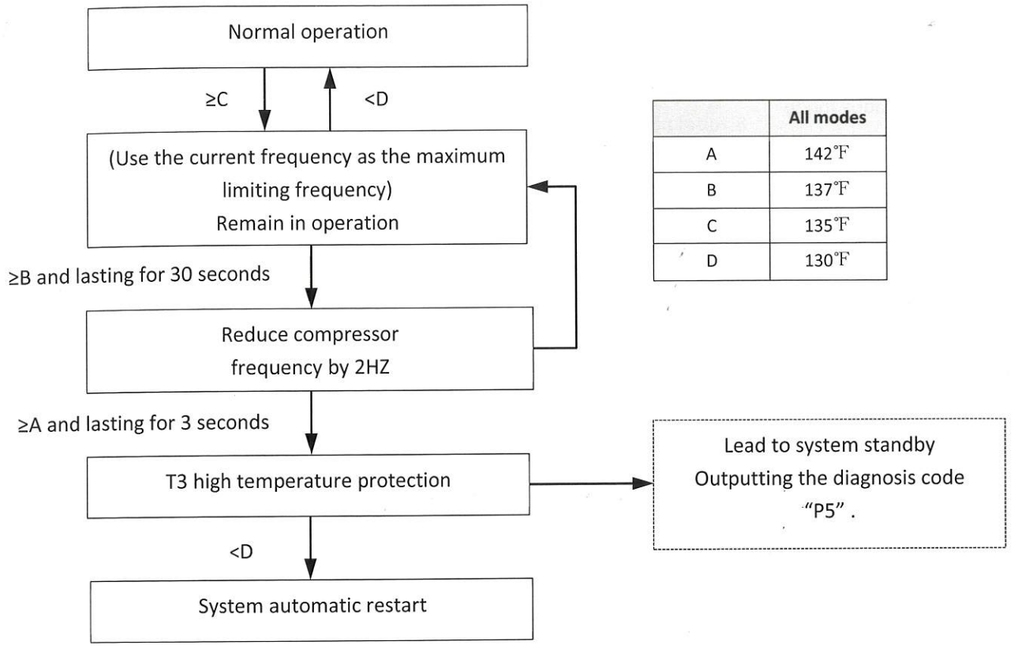
Mode	2T	3T	4T	5T
A	15A	15A	20A	20A
B	11.5A	11.5A	15.5A	15.5A
C	11A	11A	15A	15A
D	10.5A	10.5A	14A	14A

7.9 [D**] T5 high temperature protection control and restart



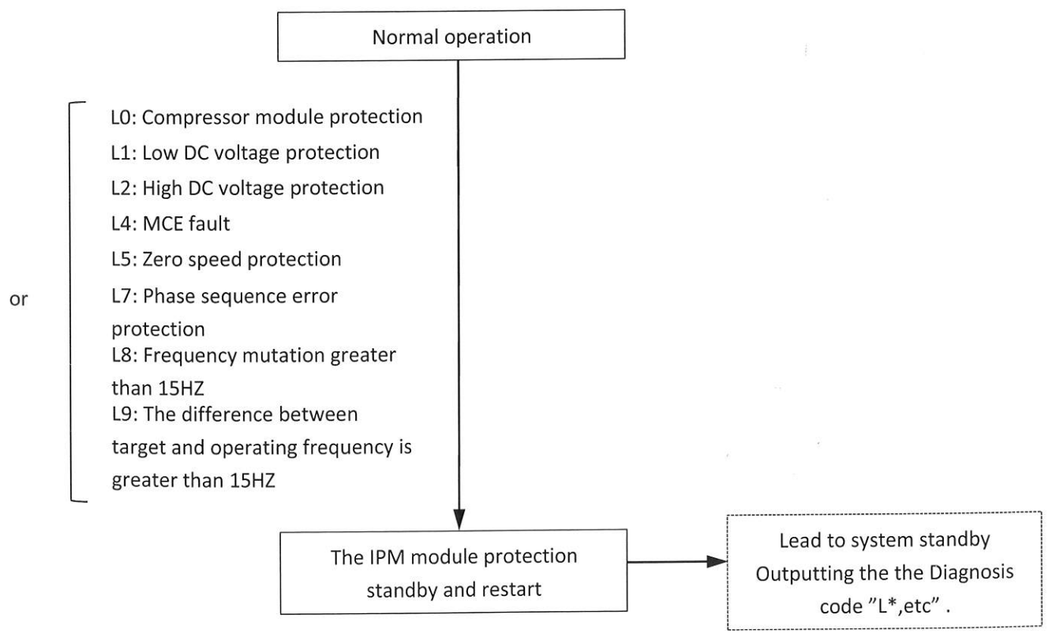
Mode	2T/3T		4T/5T	
	cooling	heating	cooling	heating
A	230°F	230°F	230°F	230°F
B	212°F	212°F	212°F	212°F
C	194°F	194°F	194°F	194°F
D	185°F	185°F	185°F	185°F

.10 [L**] T3 protection control in cooling and restart

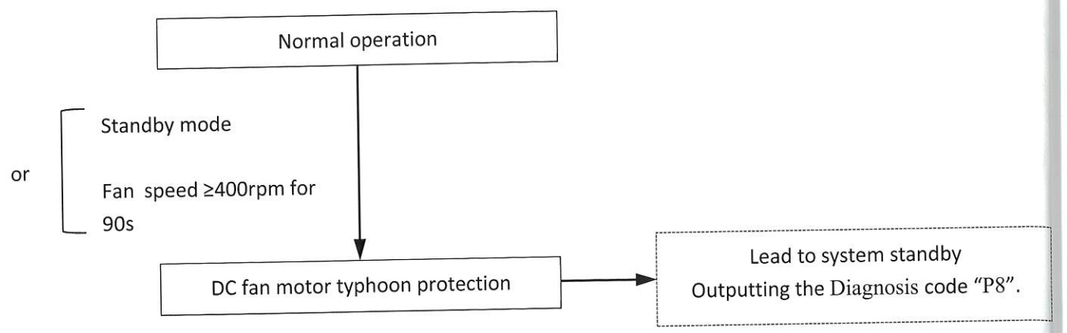


	All modes
A	142°F
B	137°F
C	135°F
D	130°F

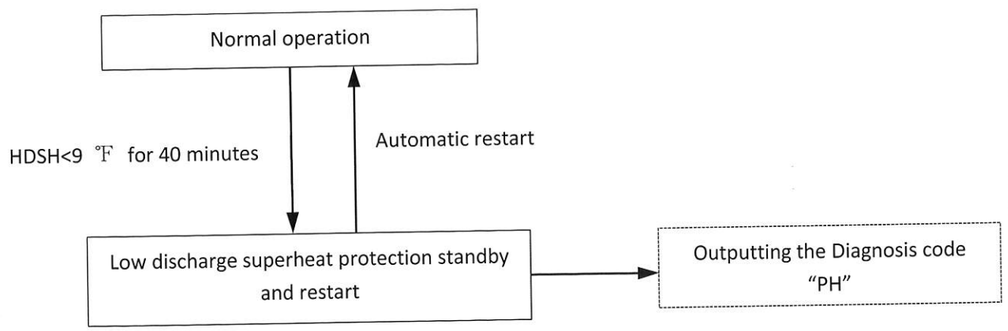
.11 The IPM module protection



7.12 DC fan motor of outdoor typhoon protection and restart



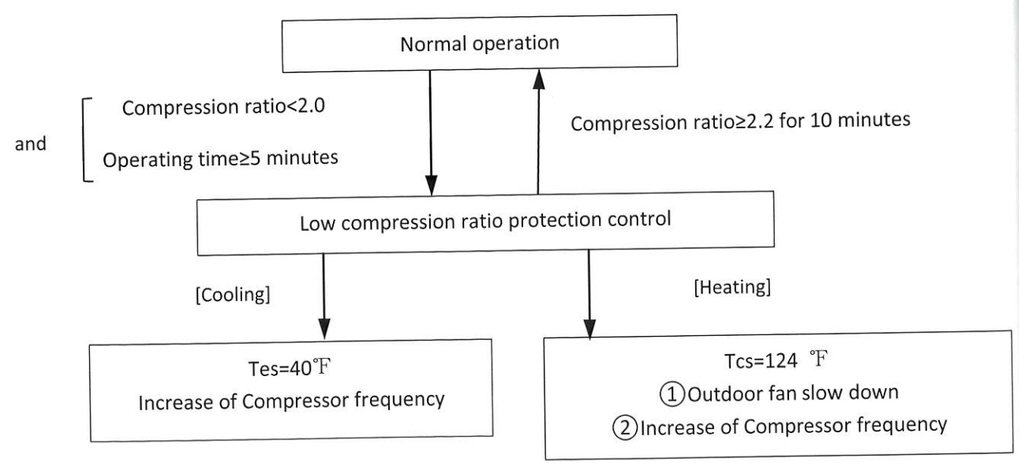
7.13 Low discharge superheat protection and restart



Notes:
1.HDSH means head discharge superheat

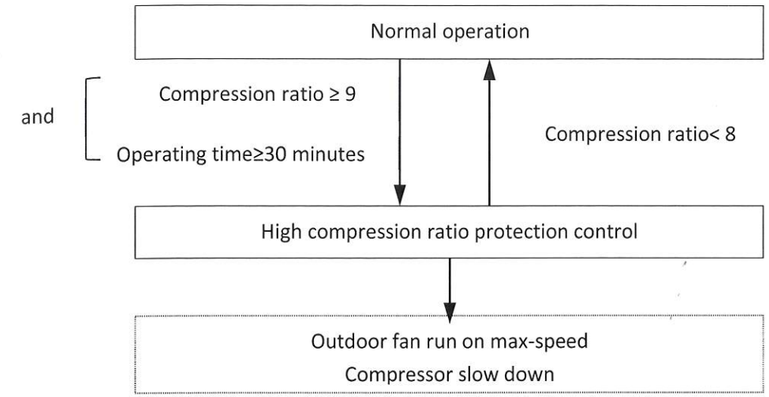
7.14 [P**] Compression ratio protection control

Low compression ratio protection control

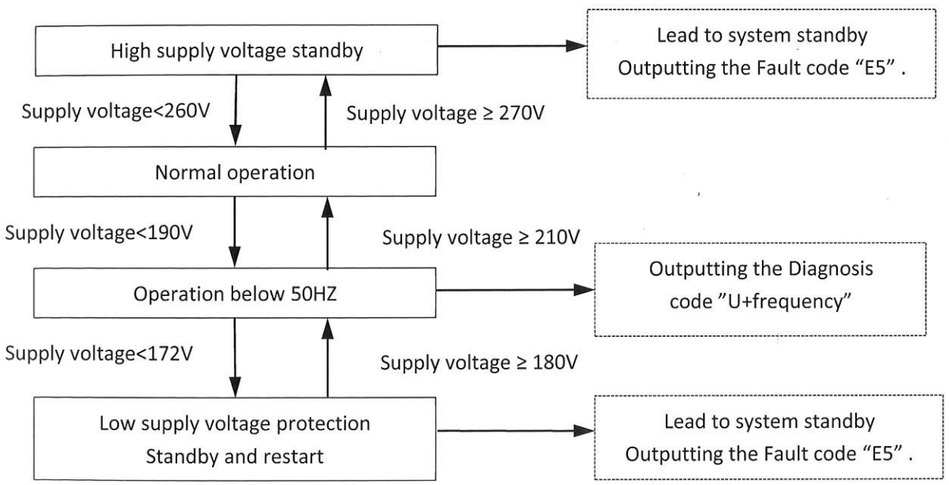


Notes:
PT and T3 are being monitoring to determine if compression ratio is acceptable

High compression ratio protection control

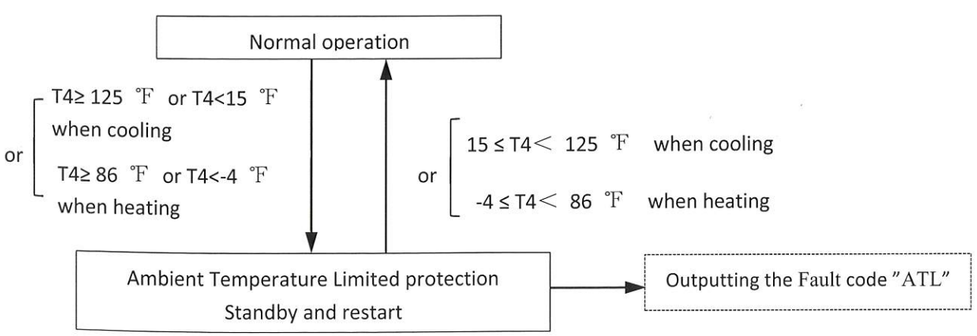


.15 [U**] Voltage protection control and restart



Notes:
1.Logic decision parameters only, actual voltage detection may be biased.

16 Ambient Temperature Limited protection control and restart



Notes:
1. High temperature will limit the frequency of compressor and lead to protection

8 Fault Control

8.1 System fault list

The unit fault codes are shown when the unit is abnormal. To protect itself, the unit shutdown until the abnorm condition is corrected. Refer to table 3-8.1.

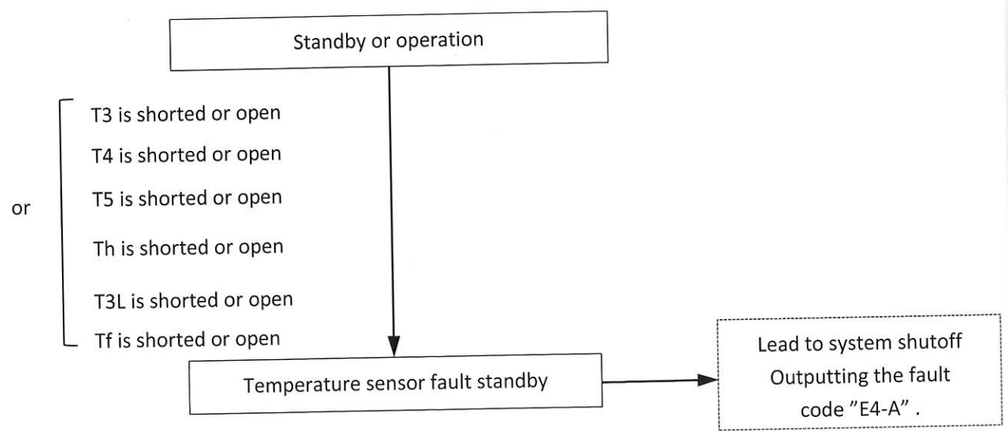
Table 3-8.1:Fault code table

No.	Fault code	Fault code description	Supposed cause
1	E4	Temperature sensor fault	T3/T4/T5/T6/T7/Tf sensor is short or open
2	E5	High/low voltage protection	Supply Power is abnormal (<170V, or ≥270V), or control board is fault when E5 show at normal power.
3	E6	DC fan motor of outdoor fault	DC fan is affected by environment (eg. storm wind, foreign body) or fault.
4	E9	EEPROM fault	EEPROM is poor contact.
5	F1	High pressure switch(HPS) fault	HPS harness is open, or HPS is fault.
6	H0	Communication fault in main control chip	Control board is fault
7	H5	(P2 occur 5 times within 100 minutes)	System charge is leakage, or refrigeration circuit is blocked.
8	H8	Pressure transducer (PT) fault	Pressure transducer (PT) is short or open, or control board is fault.

Notes:

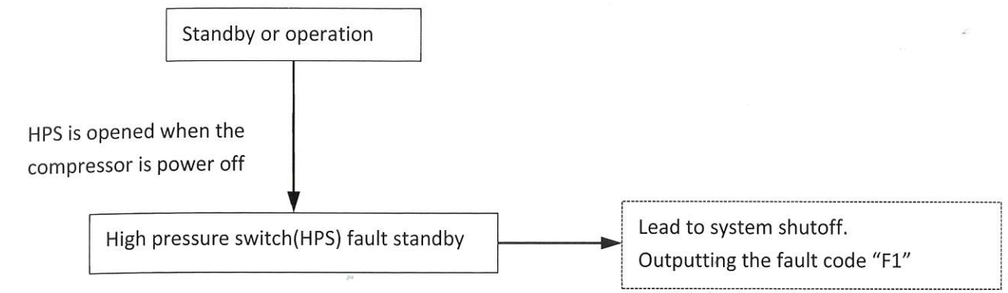
1. When failure condition vanishing, system can resume operation except as specified. The abnormal condition must be corrected by the Professi technical support

8.2 Temperature sensor fault



For example,E4-t3L means T3L sensor is fault.

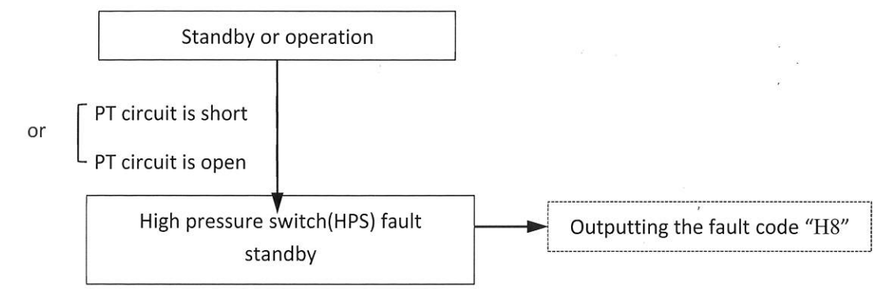
.3 High pressure switch(HPS) fault



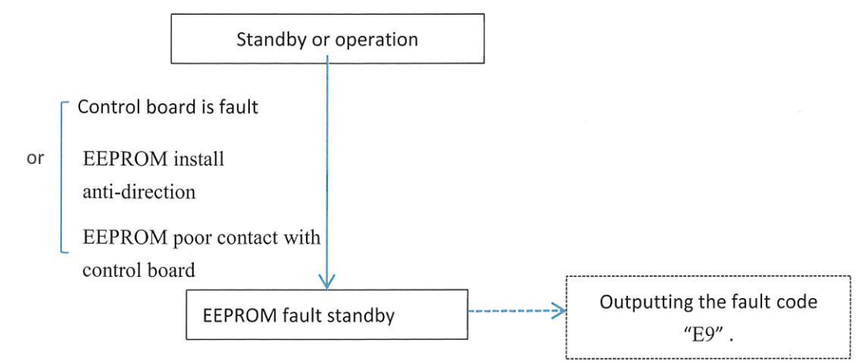
otes:

Normal high pressure switch opens above 580PSIG, resets below 435PSIG.

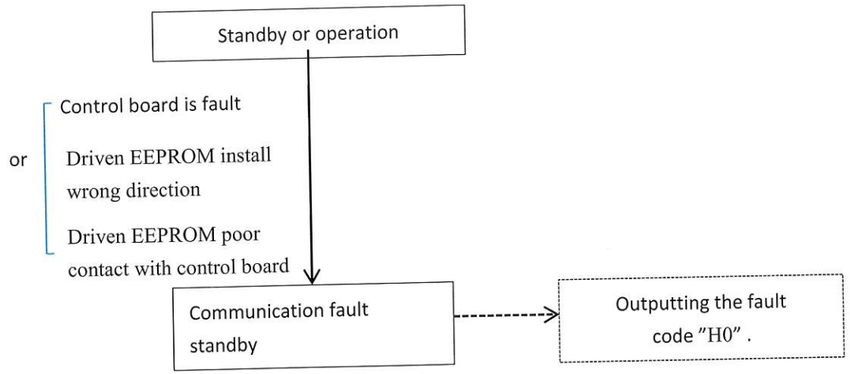
.4 Pressure transducer (PT) fault



.5 EEPROM fault



8.6 Communication fault



Part 4

Field Settings

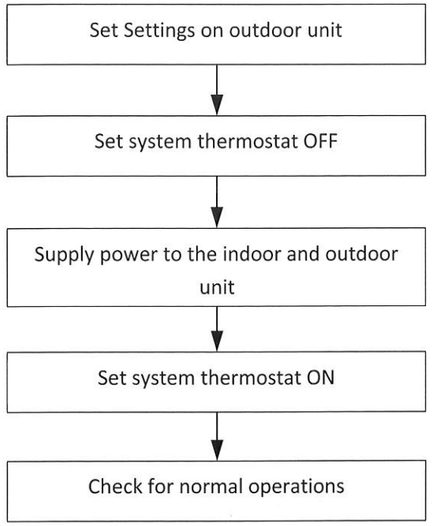
1 Test operation

1.1 Checks before test operation

Table 4-1.1: Outdoor unit main PCB switch settings

No.	Checkpoints	Cautions or warnings
1	Are all units securely installed?	Dangerous for turning over during storm Possible damage to pipe connections
2	Is the earth wire installed according to the applicable local standard?	Dangerous if electric leakage occurs
3	Are the condenser unit installed according to location restrictions requirement?	Poor capacity abnormal operation
4	Are all air inlets and outlets of the indoor and outdoor units unobstructed?	Poor cooling Poor heating
5	Does the drain flow out smoothly?	Pipeline water leak
6	Is piping adequately heat-insulated?	Pipeline water leak Poor capacity
7	Have the connections been checked for air tight test and vacuum drying?	Poor capacity abnormal operation
8	Is a proper quantity of refrigerant charged?	Poor capacity abnormal operation
9	Are the service valve open fully?	abnormal operation
10	Do the supply power wirings connected Normally? Including the earth wiring.	Dangerous if electric leakage occurs
11	Does the earth leakage circuit breaker connected normally?	Dangerous if electric leakage occurs
12	Do the wirings of 24V signal connected according to wiring diagram? Including the thermostat wiring and setting.	abnormal operation
13	Is the supply voltage conform to the specifications on the name plate?	abnormal operation Damage unit
14	Are the cable sizes as specified and according to local regulations?	Damage of cables

.2 Turn power on



tes:
Make field setting if needed (For the setting procedure, refer to information in "4.2.2 Setting by DIP switches").
n a normal condition, the digital display show the ambient temperature.
nsure to turn the power on 1 hour before starting operation when the ambient temperature is below 60°F
Check operations, check for the 24V signal from thermostat, check for operation mode, check for the digital display shows the compressor frequency

1.3 Charging Refrigerant

1.3.1 Charging method selection

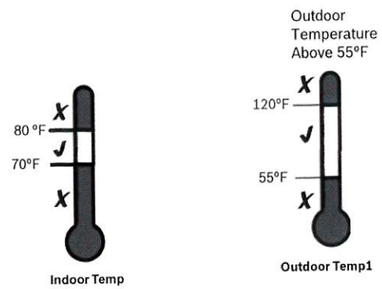
1. Weigh-in charging method

Weigh-in charging method can be used for the initial installation, or anytime a system charge is being replaced. Weig charging method can also be used when power is not available to the equipment site or operating conditi (Indoor/Outdoor temperatures) are out of range to verify with the subcooling charging method.

For mixed system, when have to use weigh-in method for charging, it is important to return in the spring or summe accurately charge the system in the cooling mode when outdoor ambient temperature is above 55℉.

2. Subcooling charging method

Subcooling (in cooling mode) is better method of charging above 55℉ outdoor ambient temperature, especially the mi system.



Notes:
1.It could be appear diagnosis code when running force mode under the temperature beyond 115F.Need to quit force mode.

1.3.2 Factory charge (Condenser charging)

There is some refrigerant when unit come out from factory. It is 7 lbs 9 oz for 3 ton and 11 lbs 5 oz for 5 ton.

1.3.3 Calculate additional charging of refrigerant line length

The factory charge in the outdoor unit is sufficient for 15 feet of standard size refrigerant line, need to add refrigera the pipe beyond 15 feet.

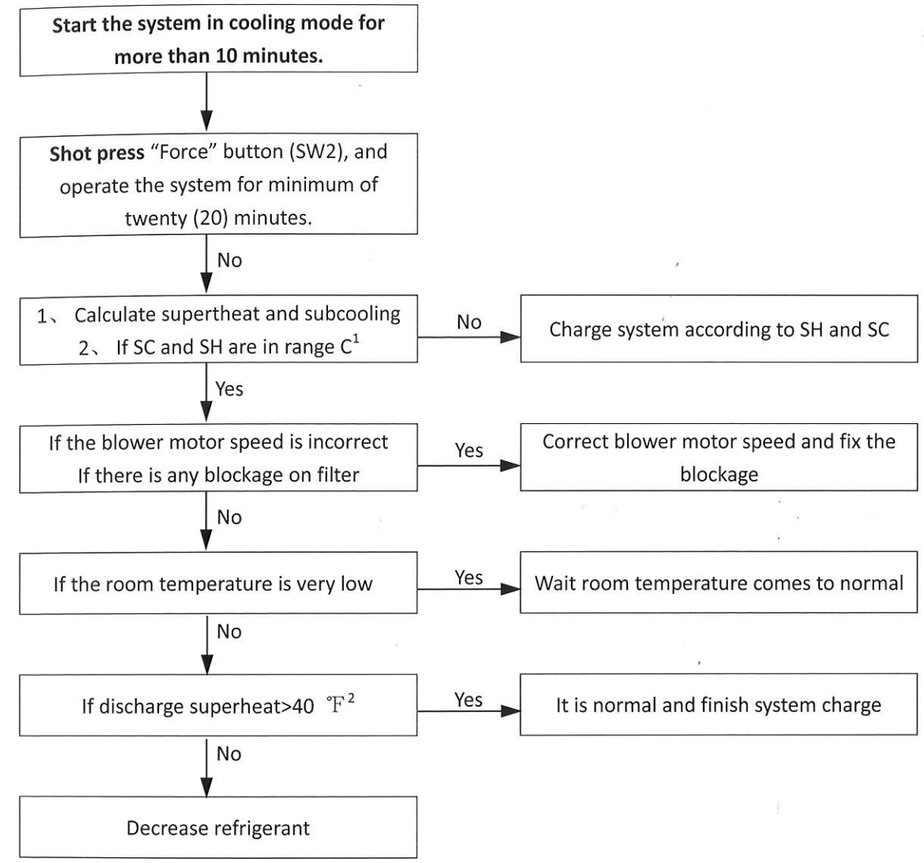
Calculate the additional refrigerant to be charged:

=(L-15)*0.6

L=Total length (feet) of liquid line (3/8``)

*If liquid line is less than 15ft, don`t need to do it.

3.4 Method for charging mode



es:
Refer to below designed subcooling table
Press check button to get discharge superheat

Design subcooling			
Model	Area	SC/℉	SH/℉
24K/36K	A	10±2	10～18
	B	8±2	7～10
	C	6±2	5～7
48K	A	8±2	9～18
	B	6±2	7～9
	C	5±2	5～7
60K	A	8±2	8～18
	B	6±2	6～8
	C	5±2	5～7

If superhteat >18℉, please check if there are abnormal condition for insulation,high humidity,high room temperature. Also check if discharge superheat> 60 ℉ or there is fault code. Replace txv if everything is normal.

If superhteat <7℉, please check if there are abnormal on blower motor speed or low room temperature. Also check if discharge superheat< 40 ℉ or there is fault code. Replace txv if everything is normal.

Note:
If adjust the charging, we should wait the system balance again.
"Force" mode will be exit after 2 hours automatically, you may repeat it.

1.4 Manual defrost

Step 1
Starting the system in heating mode for more than 10 minutes.

↓

Step 2
Press "Force" button (SW2) on control board for more than 6 seconds, and then the frequency drop in 60 seconds.

↓

Step 3
The system defrost, showing "0dF".

↓

Step 4
If needed, repeat step 2 again after a few minutes.

Notes:
1. If enter the defrost, the system decrease the compressor frequency first for 60 seconds.Please try again after 1 minute if not.
2. Defrost will exit automatically, the display will indicate running compressor frequency.

5 Check parameter

display system parameters, press the "check" button to index through the series of parameters available. The first time u press on the "check" button, it will display the sequence, and after 1 second it will display the value of the parameter. you press the "check" button again, it will display the next sequence.
ter 20 seconds on same parameter, display will revert back to normal status (exit the check parameter).

Table 4-1.2: xx

No.	Point check content	Example	Remark
0	Outdoor unit capacity	H3	H3=Heat pump 3 ton
1	Outdoor unit mode	2	0 standby,
			2 cooling,
			3 heating
2	Outdoor unit set compressor speed(Hz)	66	
3	T3(outdoor coil temp.)（°F）		
4	T4 (outdoor ambient temp.) (°F)		
5	T5 (compressor discharge temp.) (°F)		
6	T6 (compressor suction temp.) (°F)		
7	T7 (liquid line temp.)（°F）		
8	Tf (module temp.) (°F)		
9	Pe (evaporating pressure) (PSI)		Low Suction Pressure
10	Pc (condensing pressure) (PSI)		High Heat Pressure
11	Tes （target of the evaporating temp. ）(only use for cooling mode) (°F)		
12	Te (evaporating temp.) (°F)		
13	Tcs （target of the condensing temp. ）(only use for heatling mode) (°F)		
14	Tc (condensing temp.) (°F)		
15	Target of the compressor discharge superheat (only use for heating mode) (°F)		
16	Compressor discharge superheat (°F)		
17	Openings of EEV		
18	Fan speed		
19	Compressor current (A)		
20	Alternating voltage(V)		
21	Compressor input dc voltage(V)		
22	Continuous running time of the compressor(min)		
23	Last Fault Code	00	
24	Software version	01	
25	Remark"--"	--	--

1.4 Manual defrost

Step 1
Starting the system in heating mode for more than 10 minutes.

↓

Step 2
Press "Force" button (SW2) on control board for more than 6 seconds, and then the frequency drop in 60 seconds.

↓

Step 3
The system defrost, showing "0dF".

↓

Step 4
If needed, repeat step 2 again after a few minutes.

Notes:
1. If enter the defrost, the system decrease the compressor frequency first for 60 seconds.Please try again after 1 minute if not.
2. Defrost will exit automatically, the display will indicate running compressor frequency.

5 Check parameter

display system parameters, press the "check" button to index through the series of parameters available. The first time u press on the "check" button, it will display the sequence, and after 1 second it will display the value of the parameter. you press the "check" button again, it will display the next sequence.
ter 20 seconds on same parameter, display will revert back to normal status (exit the check parameter).

Table 4-1.2: xx

No.	Point check content	Example	Remark
0	Outdoor unit capacity	H3	H3=Heat pump 3 ton
1	Outdoor unit mode	2	0 standby,
			2 cooling,
			3 heating
2	Outdoor unit set compressor speed(Hz)	66	
3	T3(outdoor coil temp.)（°F）		
4	T4 (outdoor ambient temp.) (°F)		
5	T5 (compressor discharge temp.) (°F)		
6	T6 (compressor suction temp.) (°F)		
7	T7 (liquid line temp.)（°F）		
8	Tf (module temp.) (°F)		
9	Pe (evaporating pressure) (PSI)		Low Suction Pressure
10	Pc (condensing pressure) (PSI)		High Heat Pressure
11	Tes （target of the evaporating temp. ）(only use for cooling mode) (°F)		
12	Te (evaporating temp.) (°F)		
13	Tcs （target of the condensing temp. ）(only use for heatling mode) (°F)		
14	Tc (condensing temp.) (°F)		
15	Target of the compressor discharge superheat (only use for heating mode) (°F)		
16	Compressor discharge superheat (°F)		
17	Openings of EEV		
18	Fan speed		
19	Compressor current (A)		
20	Alternating voltage(V)		
21	Compressor input dc voltage(V)		
22	Continuous running time of the compressor(min)		
23	Last Fault Code	00	
24	Software version	01	
25	Remark"--"	--	--

2 Field Settings

2.1 Setting by DIP switches

Figure 4-2.1: 3ton

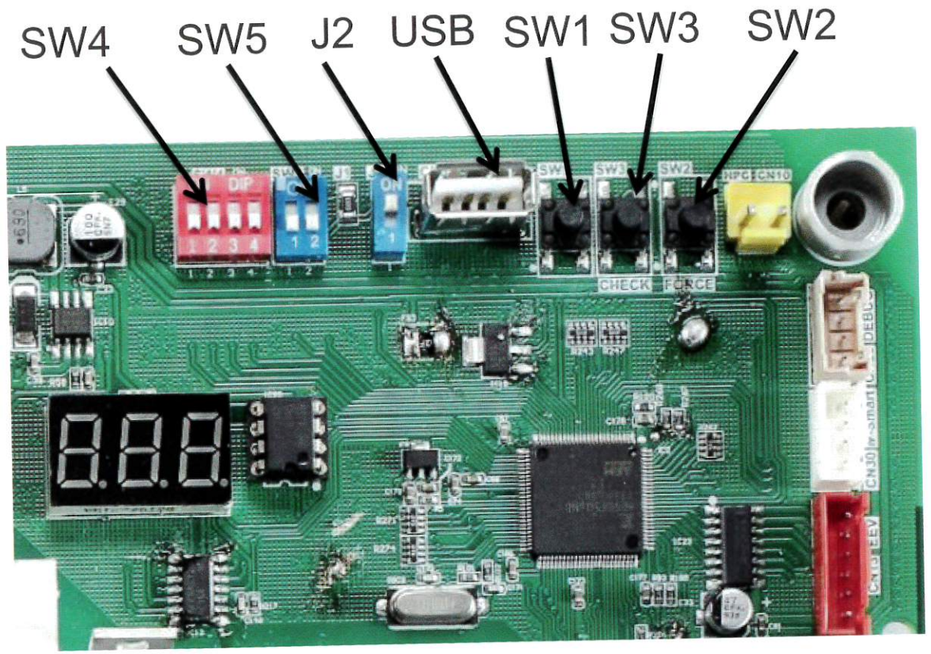


Figure 4-2.2: 5ton

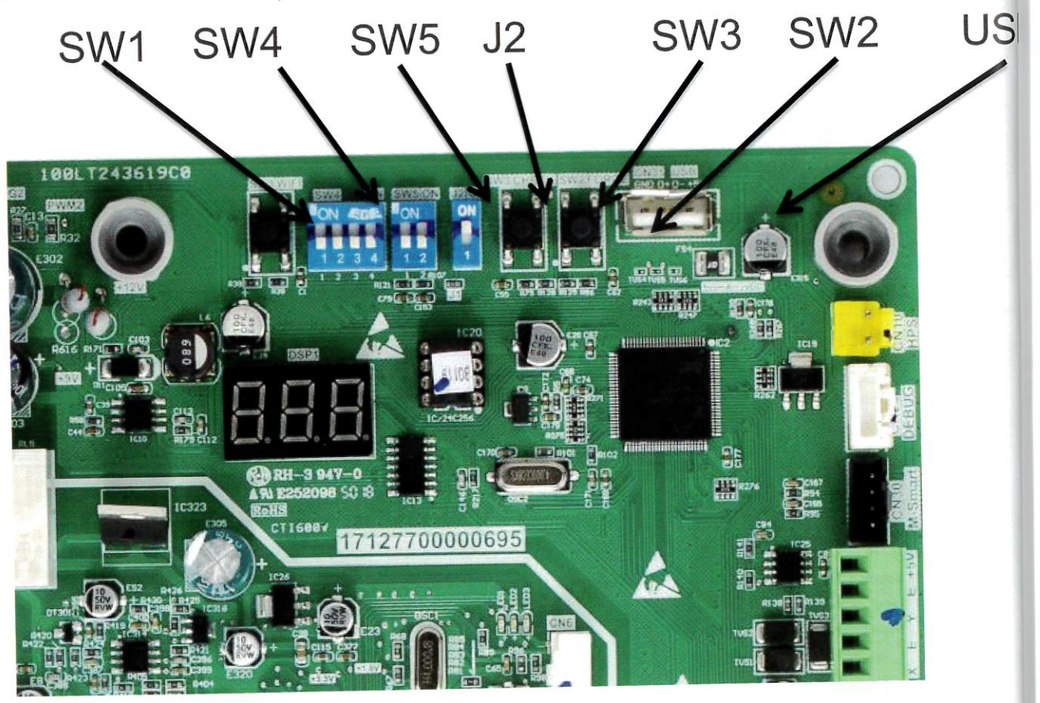


Table 4-2.1: Dip switch settings

Switch	Position	Function
SW1	For wifi settings	
SW2	For check data/testing mode	
SW2	Force mode/manual defrost	
SW4-1	ON	Program For IDP
	OFF	Program For IDS 2.0
SW4-2	Not used	
SW4-3	ON	Adaptive capacity output disabled
	OFF	Adaptive capacity output enabled
SW4-4	ON	Accelerated cooling/heating
	OFF	Normally cooling/heating
SW5-1	ON	Operating time is reduced by 10%
	OFF	Normal operation
SW5-2	ON	Defrosting extended for 60 seconds
	OFF	Normal operation
JC2	ON	For 3/5ton Capacity(default setting)
	OFF	For 2/4ton Capacity

3 Thermostat

3.1 Control wiring

Figure 4-3.1: 3H and 2C type

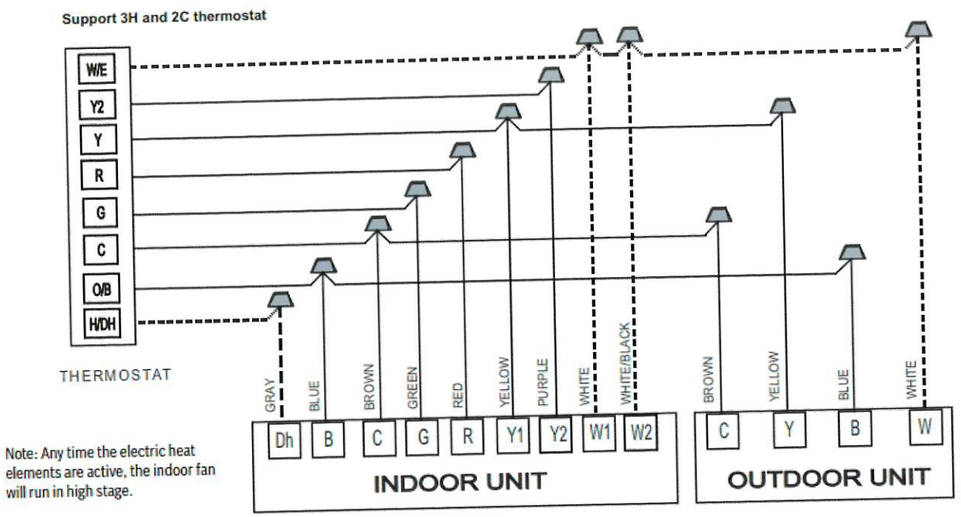
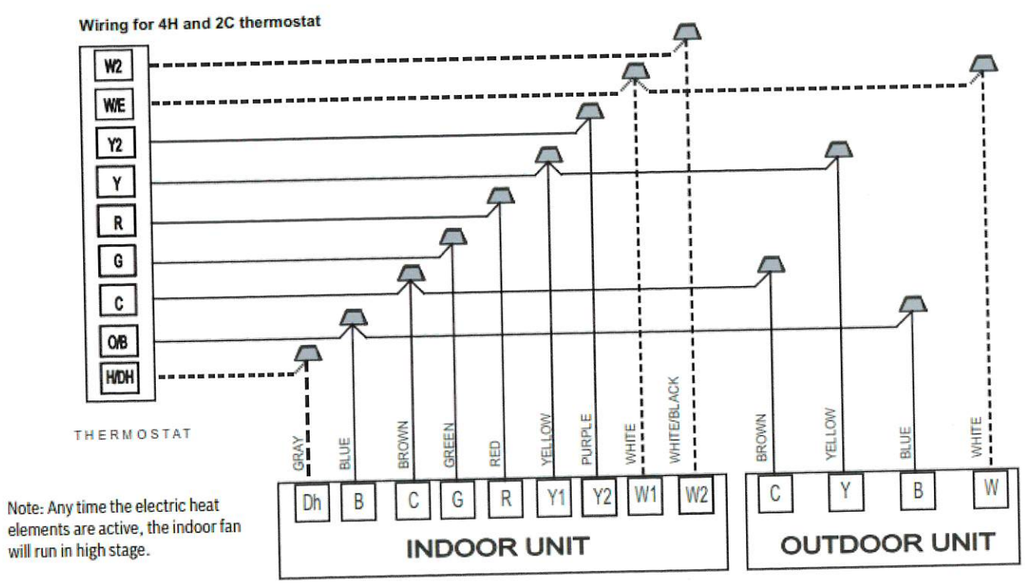
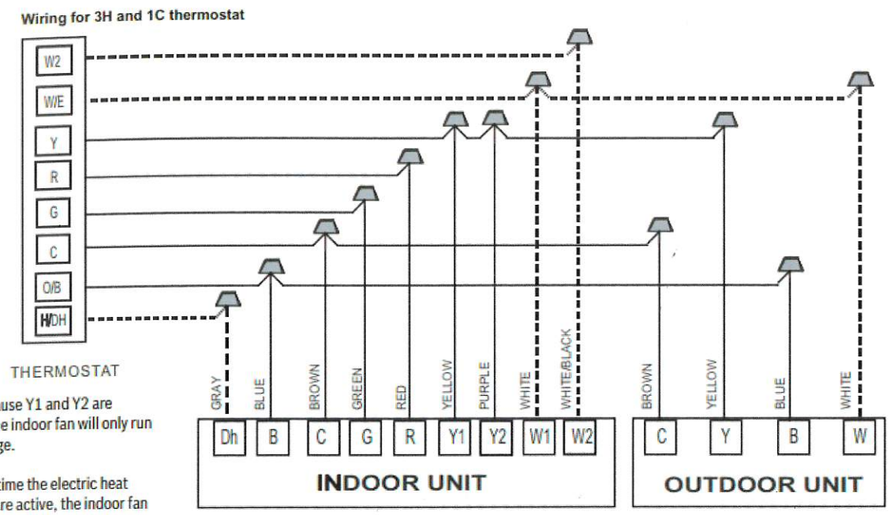


Figure 4-3.2: 4H and 2C type



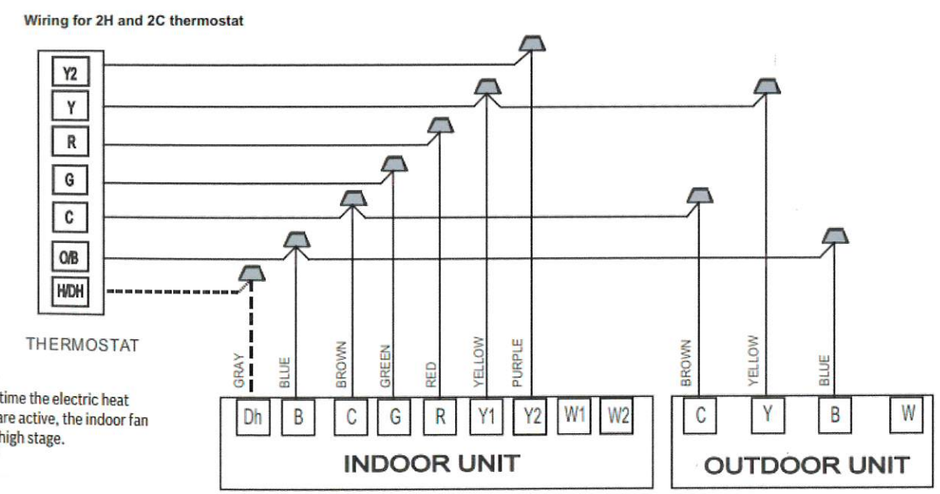
ure 4-3.3: 3H and 1C type



ote: Because Y1 and Y2 are
mped, the indoor fan will only run
high stage.

ote: Any time the electric heat
lements are active, the indoor fan
ill run in high stage.

ure 4-3.4: 2H and 2C type



ote: Any time the electric heat
ements are active, the indoor fan
ill run in high stage.

Figure 4-3.5: 2H and 1C type

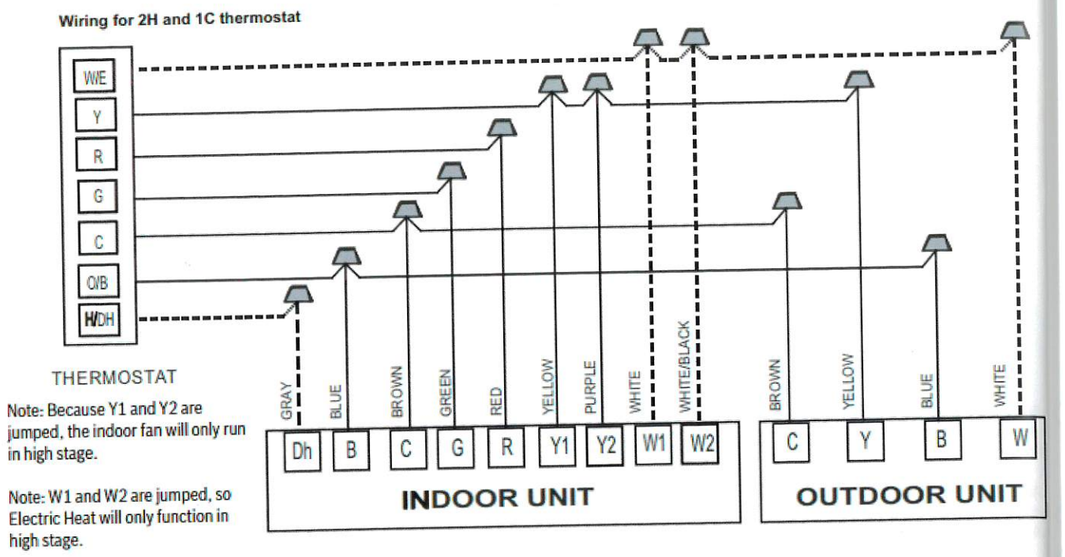
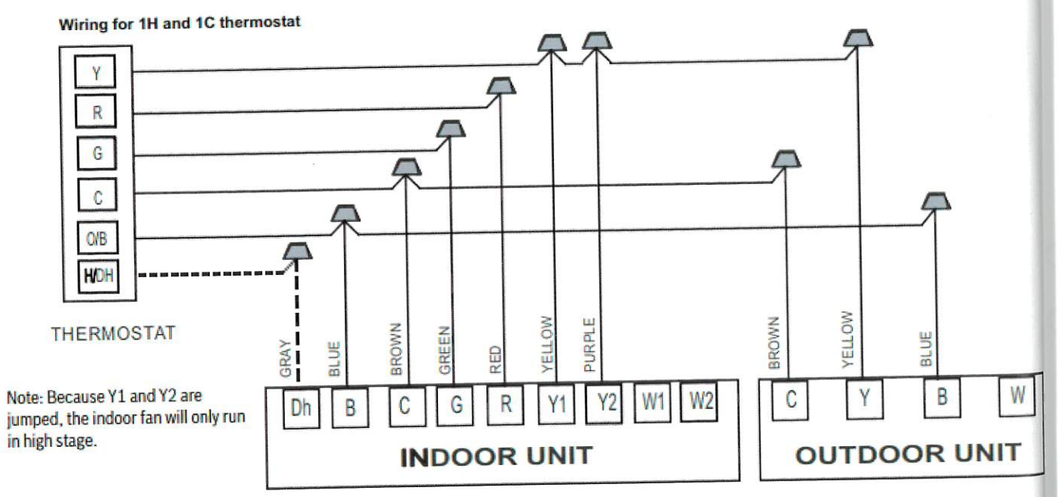


Figure 4-3.4: 1H and 1C type



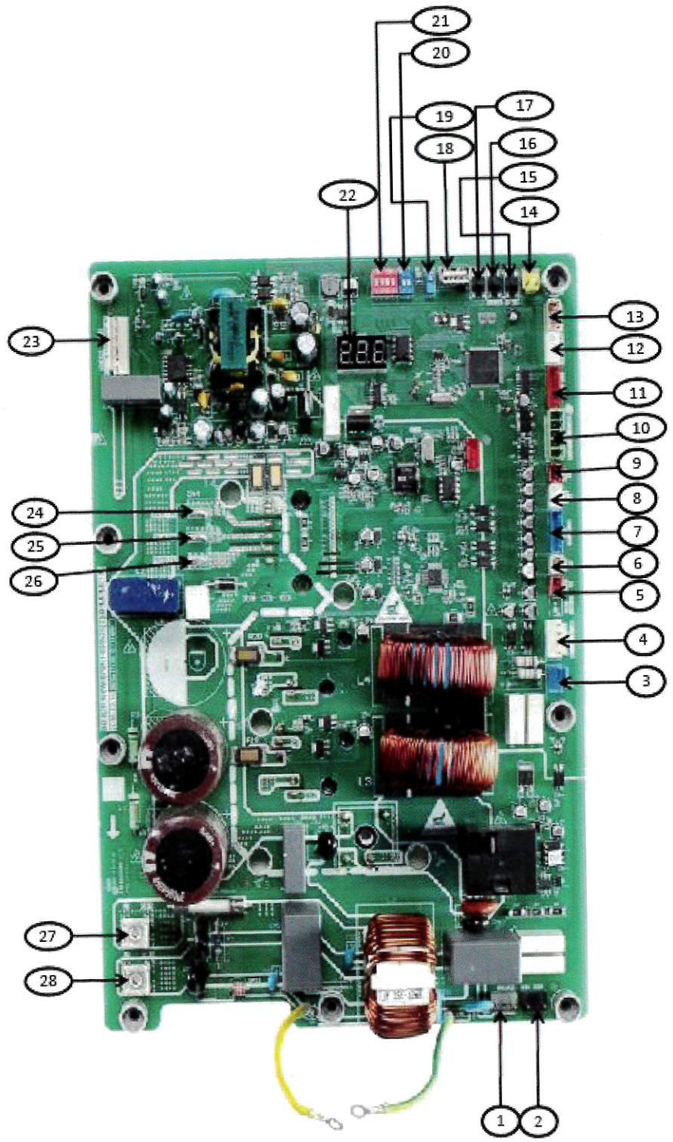
Part 5

Diagnosis and Troubleshooting

1 Outdoor Unit Main PCB

1.1 Ports

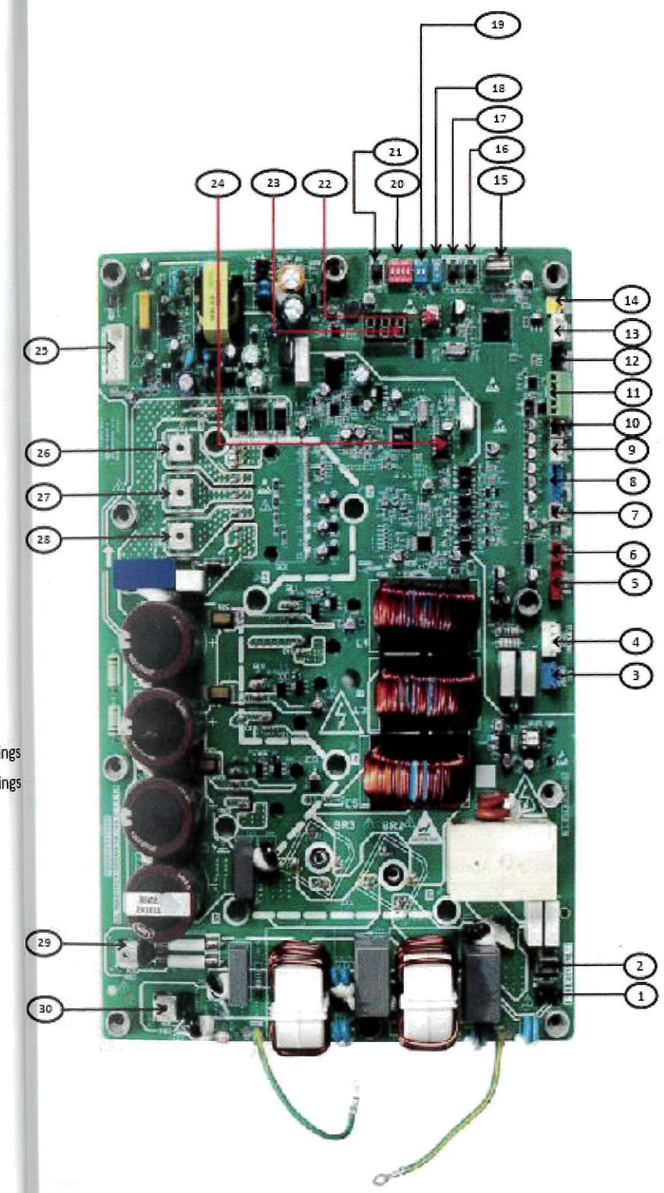
Figure 5-1.1: Outdoor unit main PCB ports for 3 ton



No.	Function Description
1	Compressor crankcase heater port
2	Pressure equalizer valve port
3	Reversing valve port
4	Thermostat wire connections
5	Th sensor port
6	TF sensor port
7	T3 T4 T3L sensor port
8	Pressure transducer port
9	T5 sensor port
10	Reserve
11	EEV port
12	Reserve
13	Reserve
14	High pressure switch port
15	SW2 FORCE BUTTON
16	SW3 CHECK BUTTON
17	Reserve
18	USB
19	J2 Dip SWITCH: Select capacity
20	SW5 Dip SWITCH: Defrost logic settings
21	SW4 Dip SWITCH: Control logic settings
22	LED
23	ECM motor port
24	Compressor: W port
25	Compressor: V port
26	Compressor: U port
27	Power input
28	Power input

2

ure 5-1.2: Outdoor unit main PCB ports for 5 ton



No.	Function description
1	Pressure equalizer valve port
2	Compressor crankcase heater port
3	Reversing valve port
4	Thermostat wire connections
5	EEV port
6	Th sensor port
7	TF sensor port
8	T3 T4 T3L sensor port
9	Pressure transducer port
10	T5 sensor port
11	Reserve
12	Reserve
13	Reserve
14	High pressure switch port
15	USB port
16	SW2 FORCE BUTTON
17	SW3 CHECK BUTTON
18	J2 Dip SWITCH: Select capacity
19	SW5 Dip SWITCH: Defrost logic settings
20	SW4 Dip SWITCH: Control logic settings
21	Reserve
22	IC20 EEPROM Chip
23	LED
24	IC14 Drive EEPROM Chip
25	ECM motor port
26	Compressor: W port
27	Compressor: V port
28	Compressor: U port
29	Power input
30	Power input

2 Error Code Table

Table 5-3.1: Error code table

No.	Operation code	Protection code	Protection control description	Supposed cause
1	/	C3	T3 sensor not reading correctly in cooling	T3 sensor is not properly placed/High pressure switch fau
2	/	E6	DC fan motor of outdoor fault	Motor fault/severe weather (fan rpm too high due to wind)
3	/	E7	T5 sensor not reading correctly	T5 sensor is not properly placed.
4	F**	P0	Tf protection control and restart	High temperature and load/Heat sink blocked
5	/	P1	High pressure switch (HPS) protection and restart	Poor heat exchange on condensing side
6	/	P2/H5	Low pressure (PT) Protection in cooling or heating and restart	TXV/EEV blocked/Charging leakage (low refrigerant)
7	C**	P3	Current protection control and restart	High temperature and load/poor heat exchange on condensing side/compressor abnormal.
8	D**	P4	T5 protection control and restart	High temperature and load/Throttle blockage/Charging leakage (low refrigerant)
9	L**	P5	T3 protection control in cooling and restart	High temperature and overload/poor heat exchange on condensing side.
10	/	L0-L9	The IPM module protection	Control board failed/Compressor failed/external electromagnet interference
11	/	P8	DC fan motor typhoon protection	severe weather (fan run in standby mode due to wind)
12	/	PH	Low discharge superheat protection and restart	TXV or EEV fault/poor heat exchange on evaporating side/over charged
13	P**	/	Compression ratio protection control	Low temperature and low load
14	U**	/	Voltage protection control and restart	Power supply issue. U**=unit operating but not ideal volta
15	/	ATL	Ambient Temperature Limited	Ambient temperature is out of range, or T4 is abnormal.
16		E4	Temperature sensor fault	T3/T4/T5/TH/T3L/Tf sensor is short or open
17		E5	High/low voltage protection	Supply Power is abnormal (<172V, or ≥270V), or control bo is fault when E5 show at Normal power. Refer to 3.1.16
18		E6	DC fan motor fault	DC fan is affected by environment (eg. storm wind, foreign body) or fault.
19		E9	EEPROM fault	EEPROM is poor contact.
20		F1	High pressure switch(HPS) fault	HPS harness is open, or HPS is fault.
21		H0	Communication fault in main control chip	Control board is fault
22		H5	(P2 occur 5 times within 100 minutes)	System charge is leakage, or refrigeration circuit is blocked
23		H8	Pressure transducer (PT) fault	Pressure transducer (PT) is short or open, or control board fault.

Notes:

1. These fault codes will be displayed on the digital tube until the issue is resolved.
2. The system must be repowered when H5 has been solved.

Troubleshooting

1 Warning

Warning ⚠

- All electrical work must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation (all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation).
- Power-off the outdoor units before connecting or disconnecting any connections or wiring, otherwise electric shock (which can cause physical injury or death) may occur or damage to components may occur.

3.2 Digital Tube Show Nothing Troubleshooting

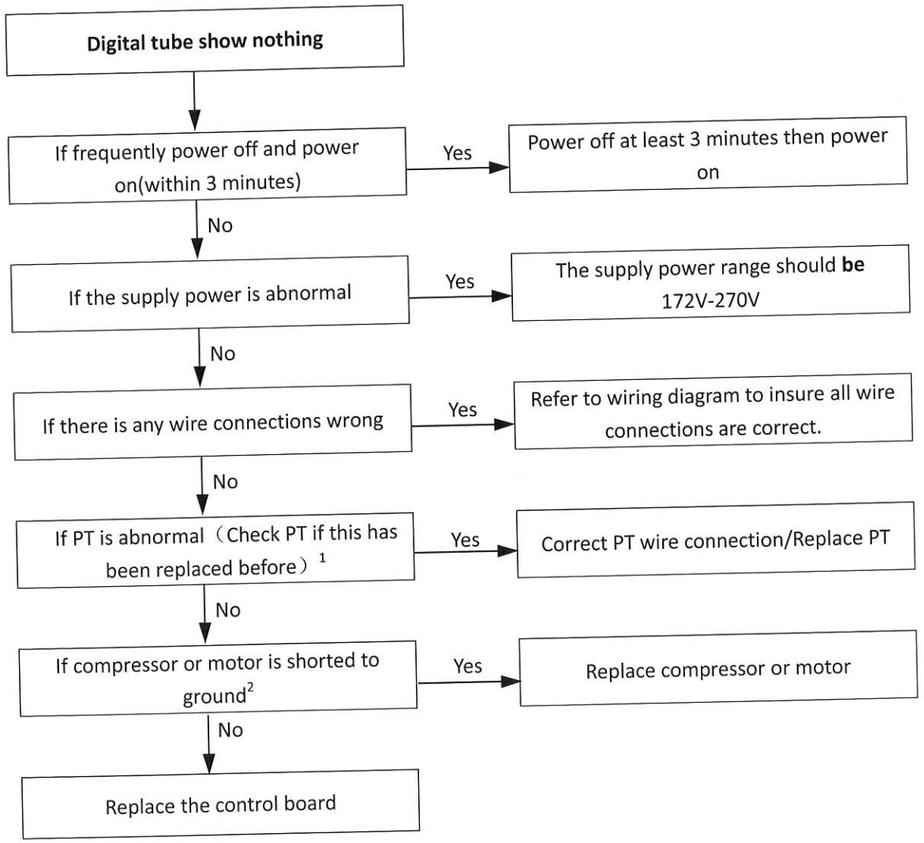
3.2.1 Description

Digital tube show nothing

3.2.2 Possible causes

- Frequently power off and power on （within 3 minutes）
- Abnormal power input
- Abnormal wire connections

3.2.3 Procedure



Notes:

1. Refer to figure 5.1.1 and 5.1.2 for PT location
2. Refer to section 6 check 11 on how to check compressor

3 System does not start operation Troubleshooting

.1 Description

stem does not start up

.2 Possible causes

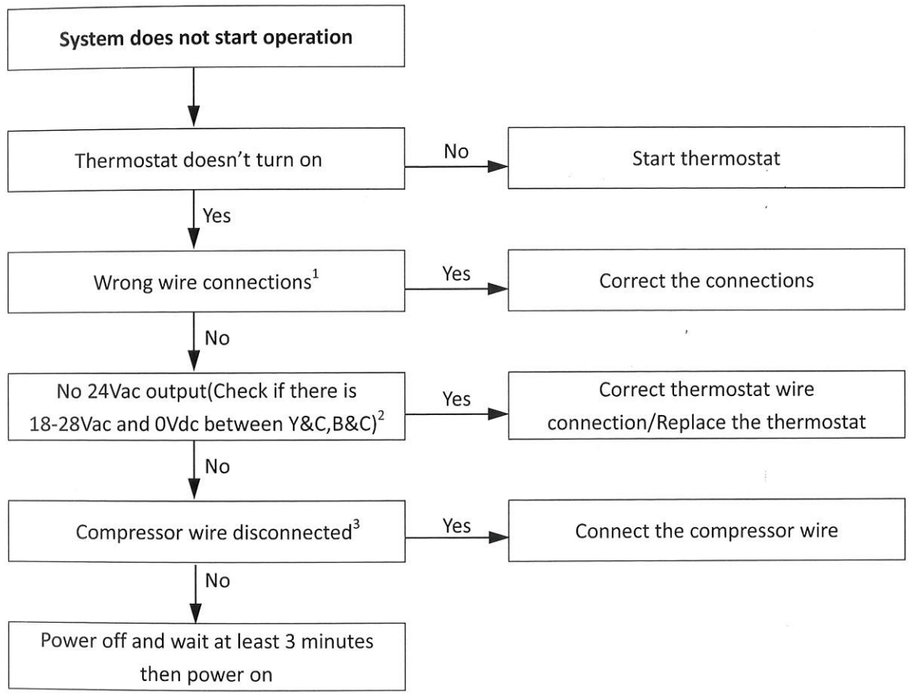
The thermostat doesn't start

Wrong wire connections between thermostat and unit

Damaged thermostat

Disconnect the compressor wire（could be caused after service）

.3 Procedure



s:

Refer to wiring diagram to correct all wire connections

Measure the voltage between YC and BC terminal

Refer to wiring diagram.

3.4 Poor Capacity

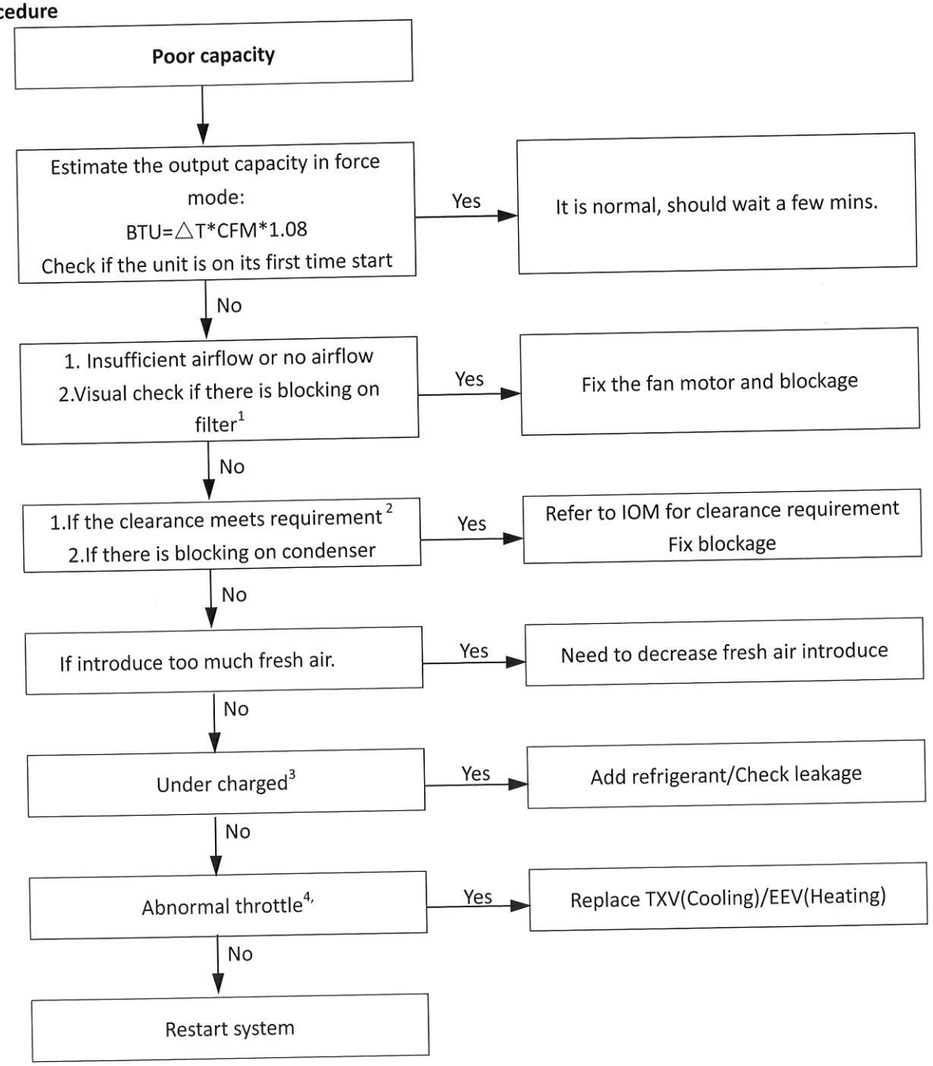
3.4.1 Description

No fault code display but poor Capacity

3.4.2 Possible causes

- Poor heat dissipation in indoor unit
- Poor heat dissipation in outdoor unit
- Under charged
- First time start
- Failed TXV or EEV

3.4.3 Procedure



Notes:
1. Refer to 【6.12】
2. Check the environment meet the requirements refer to installation manual.
3. Refer to 【6.6、6.7 】
4. Refer to 【4.1.3 Charging Refrigerant 】

5 Digital display tube is incomplete

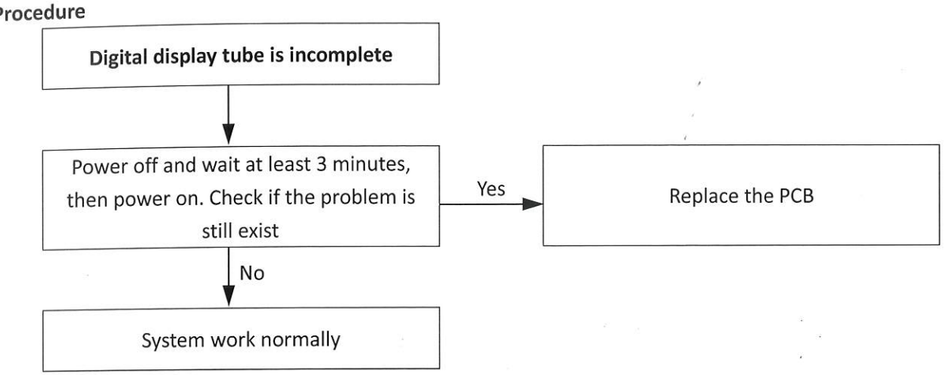
5.1 Description

gital display tube is incomplete.

5.2 Possible causes

Electric components issue.

5.3 Procedure



3.6 C3 Troubleshooting

3.6.1 Digital display output

C3

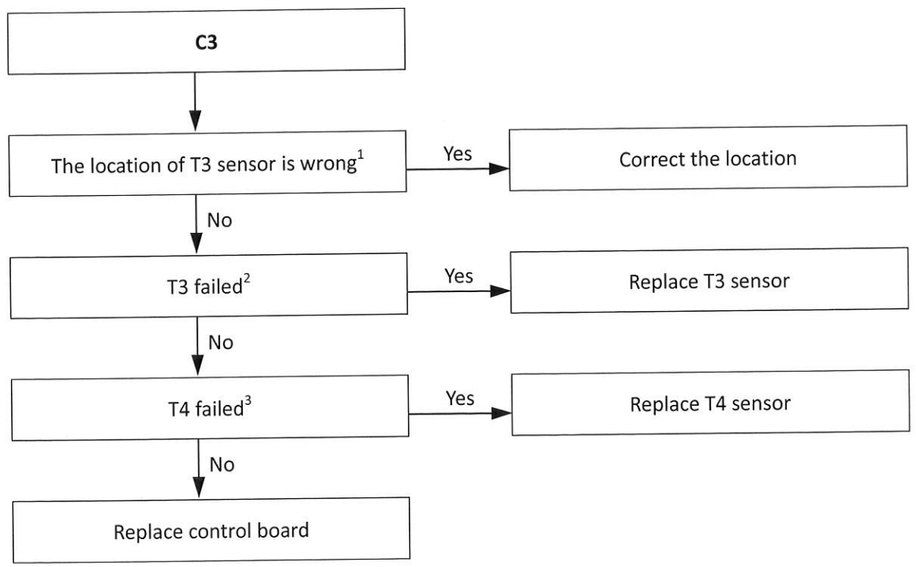
3.6.2 Description

T3 sensor is not reading correctly **in cooling**.

3.6.3 Possible causes

- Wrong location of T3 sensor
- Faulty T3 sensor.
- Faulty T4 sensor

3.6.4 Procedure



Notes:
1. Refer to【Figure 2.1 for sensor location】.
2. Refer to【6.8】*Temperature-OHM chart.
3. Refer to 【6.8】*Temperature-OHM chart

7 E6 Troubleshooting

.1 Digital display output

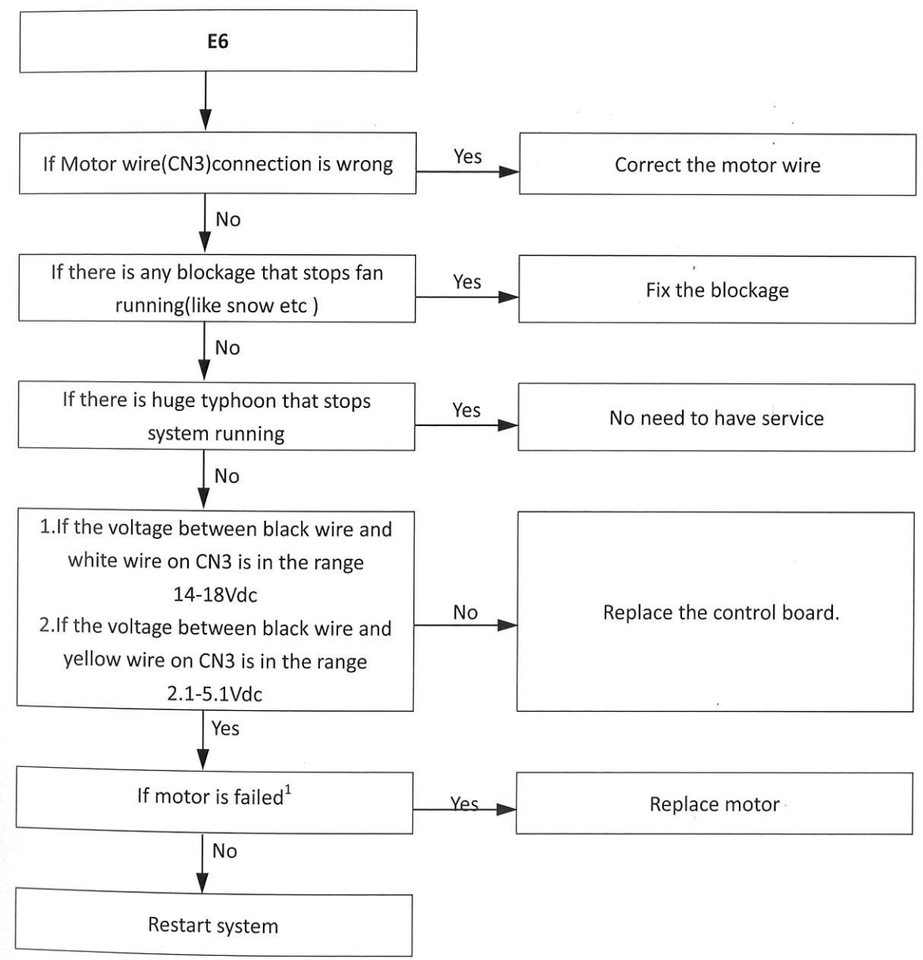
.2 Description

fan motor of outdoor fault

.3 Possible causes

Start electromagnetic interference.
Motor failed.
Electric issue.

.4 Procedure



s:
Refer to【6. 10】

3.8 E7 Troubleshooting

3.8.1 Digital display output

E7

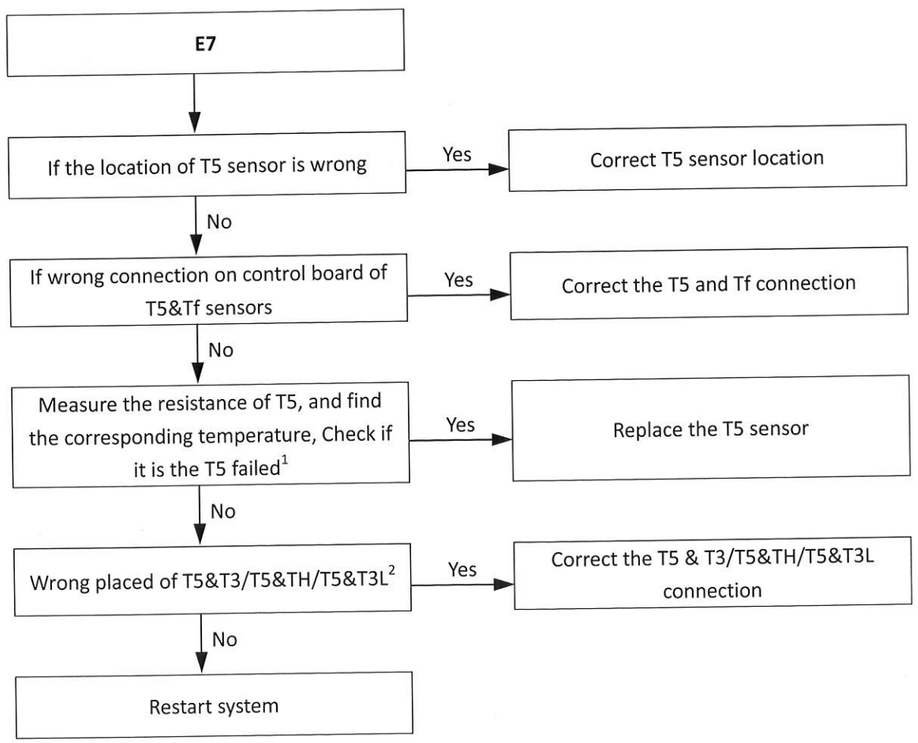
3.8.2 Description

T5 sensor not read correctly.

3.8.3 Possible causes

- Wrong location of T5 sensor (Compressor discharge temp. sensor).
- Wrong connection on pipe of T3&T5/Th&T5/T3L&T5.
- Wrong connection on control board of T5&Tf.

3.8.4 Procedure



Notes:
1. Refer to 【6.8】
2. Refer to 【2.2】Functional Part.

P0 Troubleshooting

.1 Digital display output

)

.2 Description

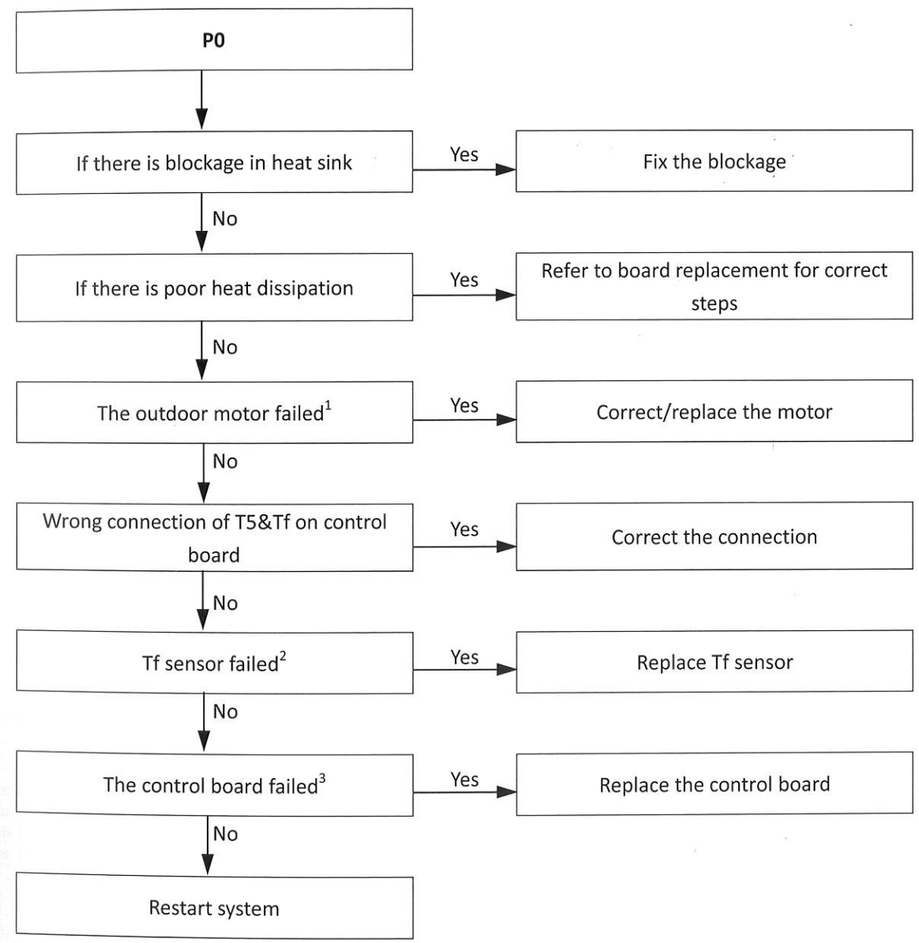
h module radiator temperature (TF) protection.

.3 Possible causes

Heat Sink blocked.

Tf sensor failed.

.4 Procedure



s:
Refer to 【6.10】
Refer to 【6.8】
Compare the difference within 20℉ between Temp-Ohm and Tf value from check mode 8#.

3.10 P1 Troubleshooting

3.10.1 Digital display output

P1

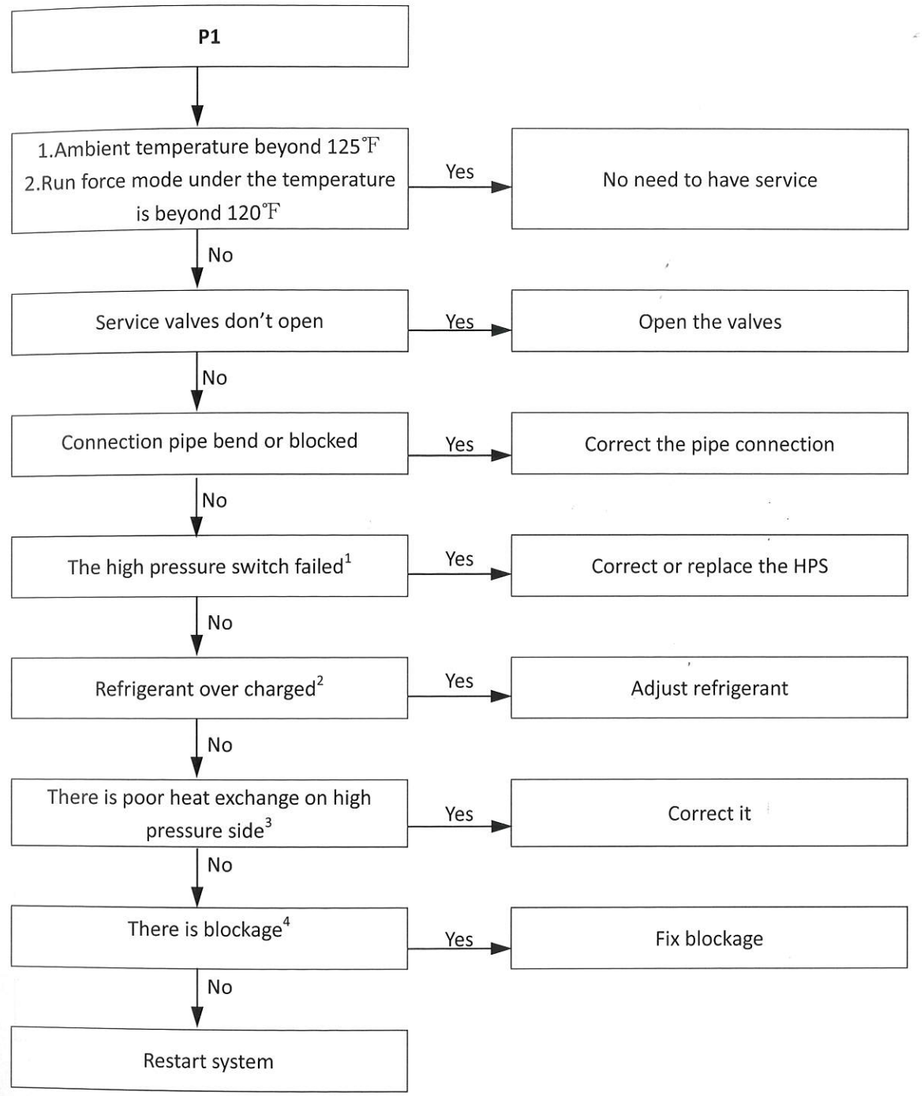
3.10.2 Description

High pressure switch (HPS) protection.

3.10.3 Possible causes

- Indoor unit stopped abnormally/poor heat exchange (heating mode).
- Poor heat exchange on outdoor unit (cooling mode).
- Service valves not open.
- TXV/EEV/filter blocked.
- Over charged.

0.4 Procedure



s:
Refer to【6.9】.
Refer to【4.1.3 Charging Refrigerant】.
Refer to【6.1】.
Refer to【6.4】.

3.11 P2 Troubleshooting

3.11.1 Digital display output

P2

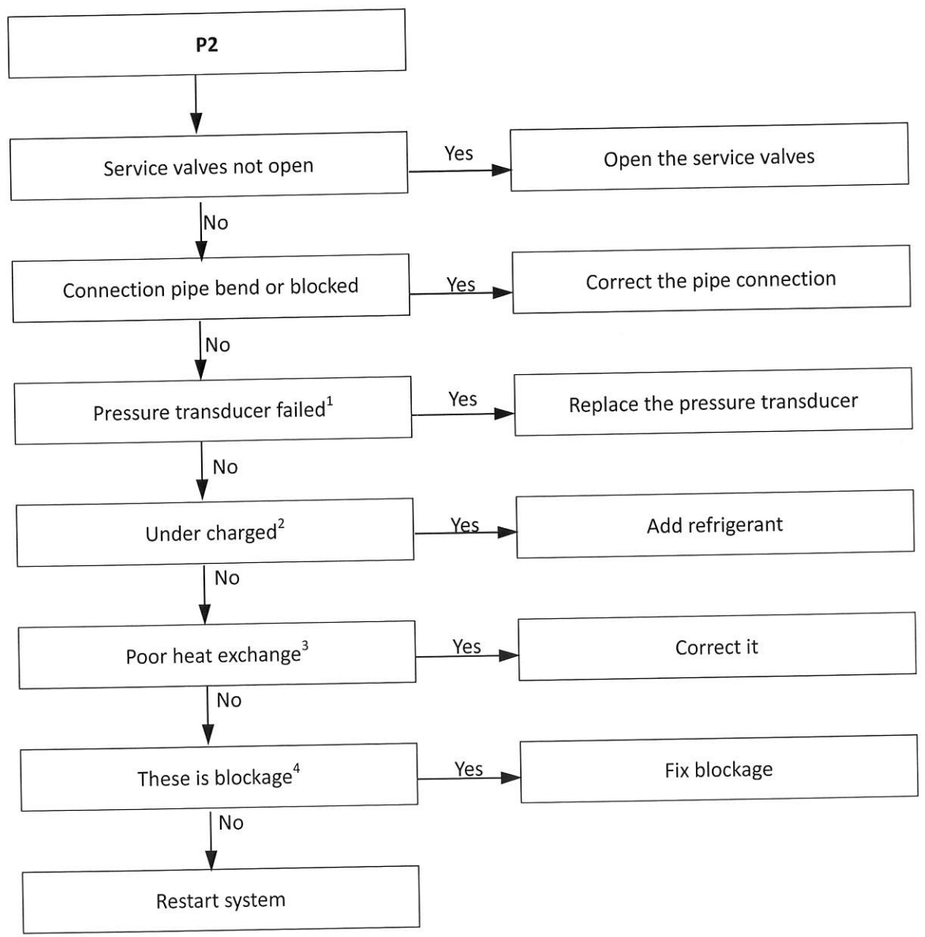
3.11.2 Description

Low pressure Protection.

3.11.3 Possible causes

- Indoor unit motor stopped abnormally/poor heat exchange.
- TXV/EEV/filter drier/indoor coil blocked.
- Service valves not open.
- Under charged.

3.11.4 Procedure



Notes:

1. Refer to 【6.6】.
2. Refer to 【4.1.3 Charging Refrigerant 】.
3. Refer to 【6.1/6.2/6.3】.
4. Refer to 【6.4】.

12 P3 Troubleshooting

12.1 Digital display output

3

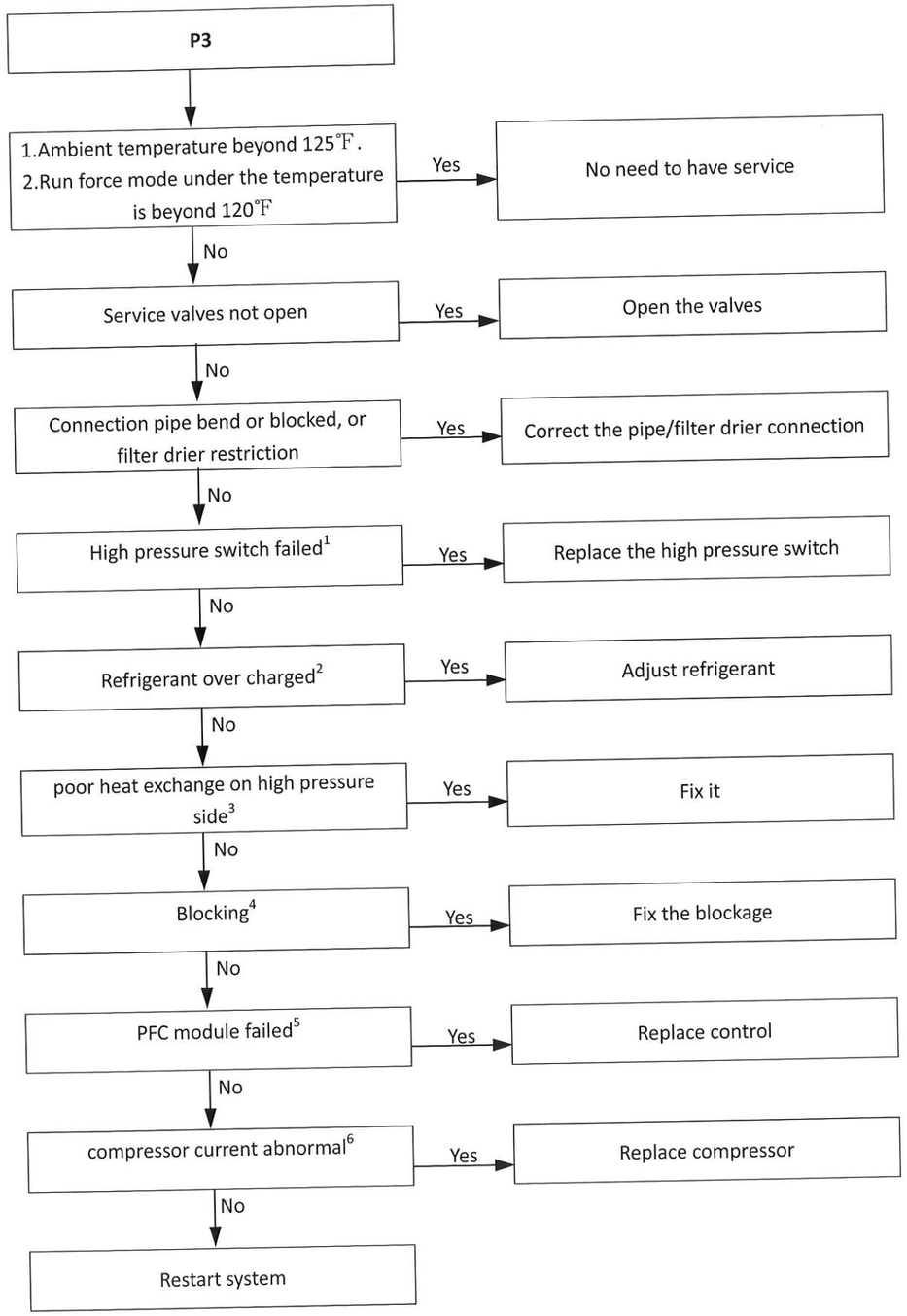
12.2 Description

mpressor over current protection

12.3 Possible causes

Indoor unit motor stopped abnormally /poor heat exchange (heating mode).
Poor heat exchange on outdoor unit (cooling mode).
Service valves not open/filter drier restriction
TXV/EEV/filter drier blocked.
Refrigerant over charged/non-condensable gas.
Control board or compressor issue.

3.12.4 Procedure



Notes:

1. Refer to 【6.9】.
2. Refer to 【4.1.3 Charging Refrigerant】
3. Refer to 【6.1】
4. Refer to 【6.4】

L3 P4 Troubleshooting

.3.1 Digital display output

.3.2 Description

;h compressor discharge temperature(T5) protection.

.3.3 Possible causes

TXV/EEV/filter drier blocked

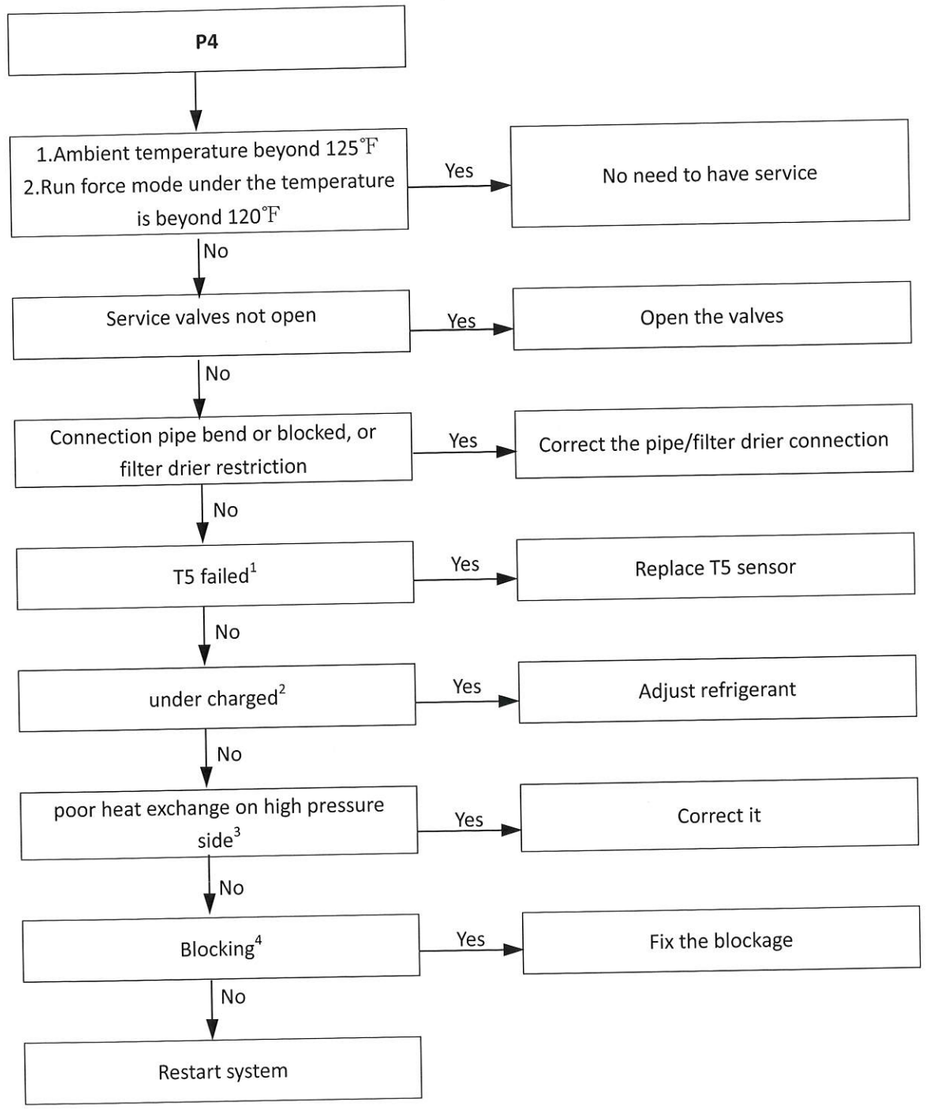
Under charged

Service valves not open/filter drier restriction

Indoor unit motor stopped abnormally / poor heat exchange (heating mode)

Poor heat exchange on outdoor unit (cooling mode)

3.13.4 Procedure



Notes:

1. Refer to 【6.8】.
2. Refer to 【4.1.3 Charging Refrigerant】
3. Refer to 【6.1】
4. Refer to 【6.4】

4 P5 Troubleshooting

4.1 Digital display output

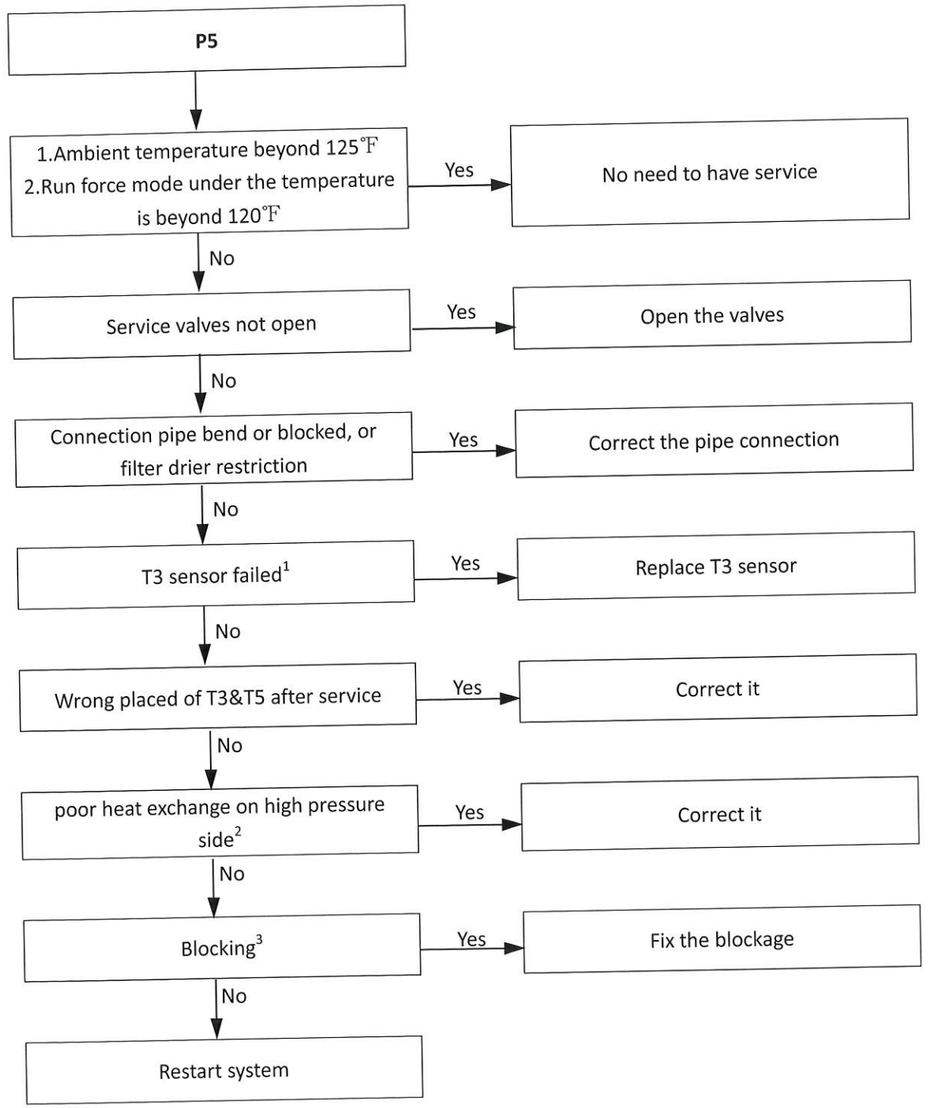
4.2 Description

ndenser coil temperature(T3) protection in cooling

4.3 Possible causes

Poor heat exchange on outdoor unit (cooling mode)
TXV/EEV/filter drier blocked
Service not open/filter drier restriction
Refrigerant over charged

3.14.4 Procedure



Notes:
1. Refer to 【6.6】.
2. Refer to 【6.1】
3. Refer to 【6.3】

5 P6/L0-L6 Troubleshooting

5.1 Digital display output

/L0-L6

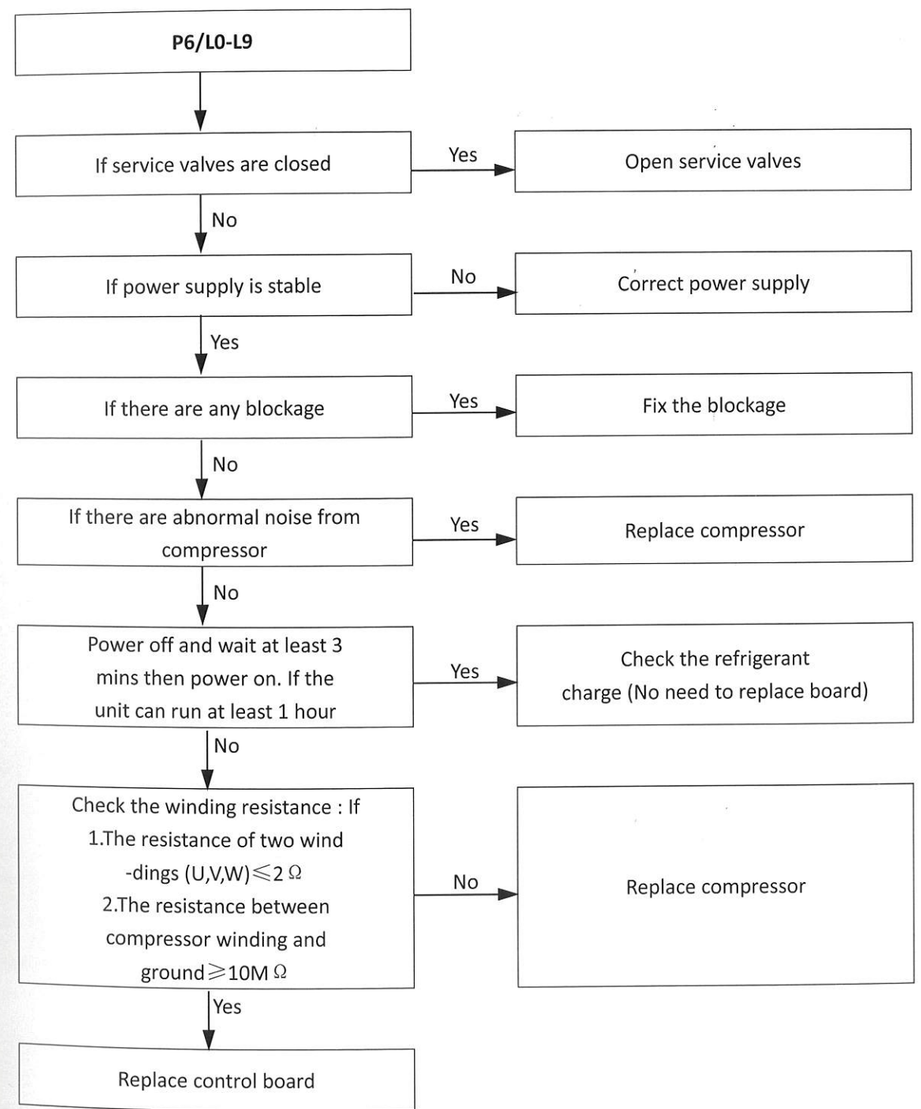
5.2 Description

IPM module protection

5.3 Possible causes

Control board failed
Compressor failed
Incidental fault
System issue

5.4 Procedure



3.16 P8 Troubleshooting

3.16.1 Digital display output

P8

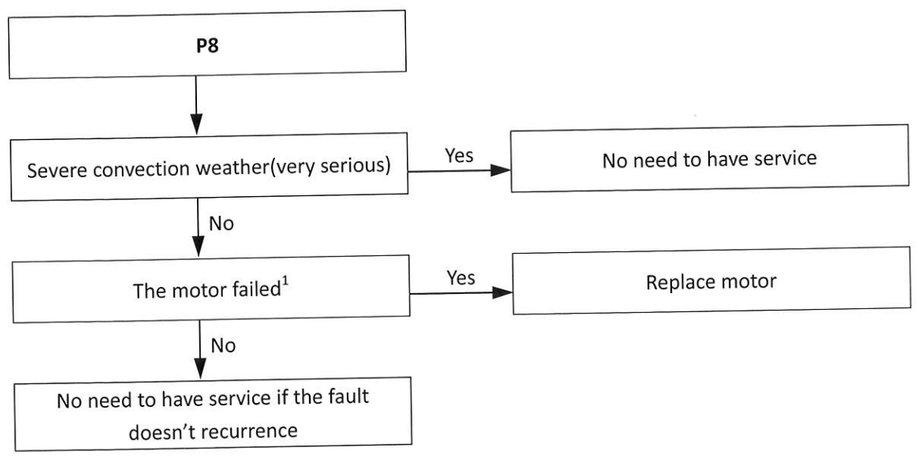
3.16.2 Description

DC fan motor of outdoor typhoon protection.

3.16.3 Possible causes

- Fan run in standby mode due to wind.

3.16.4 Procedure



Notes:

1. Refer to 【6.10】.

7 PH Troubleshooting

7.1 Digital display output

I

7.2 Description

v discharge superheat protection. When system appears this issue, the motor probably has some problems.

7.3 Possible causes

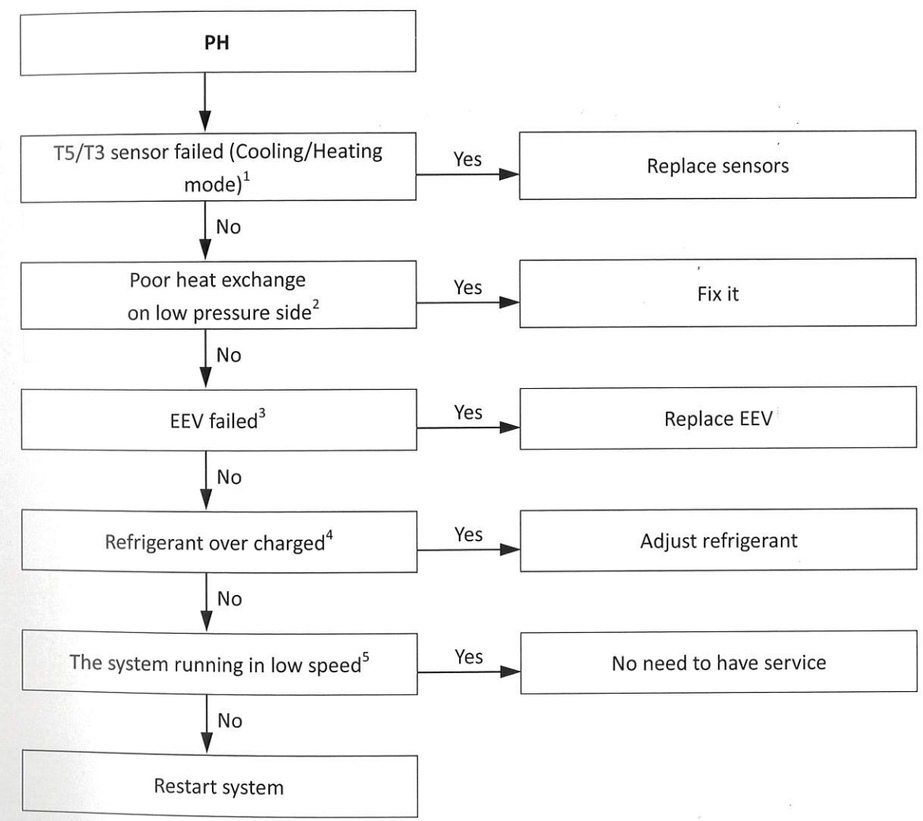
EEV failed.

Poor heat exchange in indoor unit (Cooling mode).

Poor heat exchange in outdoor unit (Heating mode).

Refrigerant over charged.

7.4 Procedure



s:

Refer to 【6.6/6.8】.

Refer to 【6.2/6.3】.

Refer to 【6.7】

Refer to 【4.1.3 Charging Refrigerant】

If the ambient temperature is <23F(Cooling mode) or >80F (Heating mode), low load indoor air handler.

3.18 U**(E5) Troubleshooting

3.18.1 Digital display output

E5

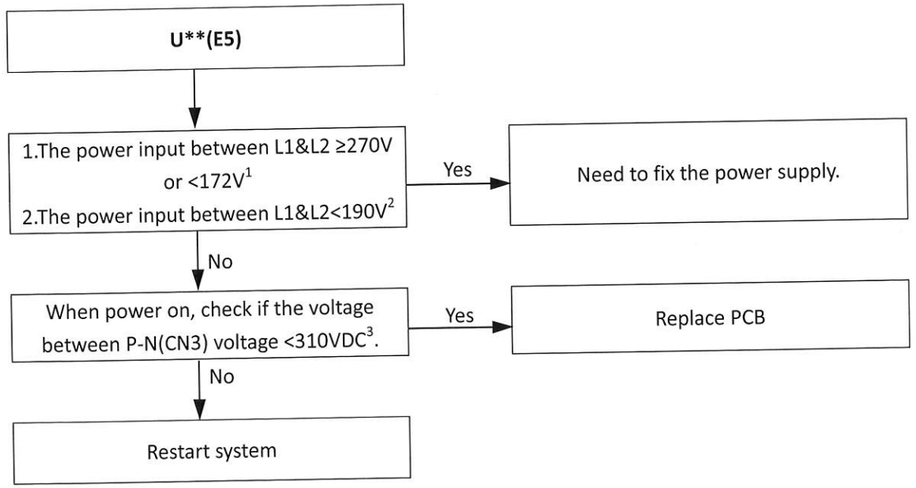
3.18.2 Description

High/low voltage protection

3.18.3 Possible causes

- Power supply ≥270V or < 172V
- Power supply <190V
- Control board issue

3.18.4 Procedure



Notes:

1. Outputting the the Diagnosis code "E5".
2. Outputting the the Diagnosis code "U**" . The frequency not more than 50HZ.
3. Outputting the the Diagnosis code "U**" . The frequency not more than 50HZ.

19 P** Troubleshooting

9.1 Digital display output

*

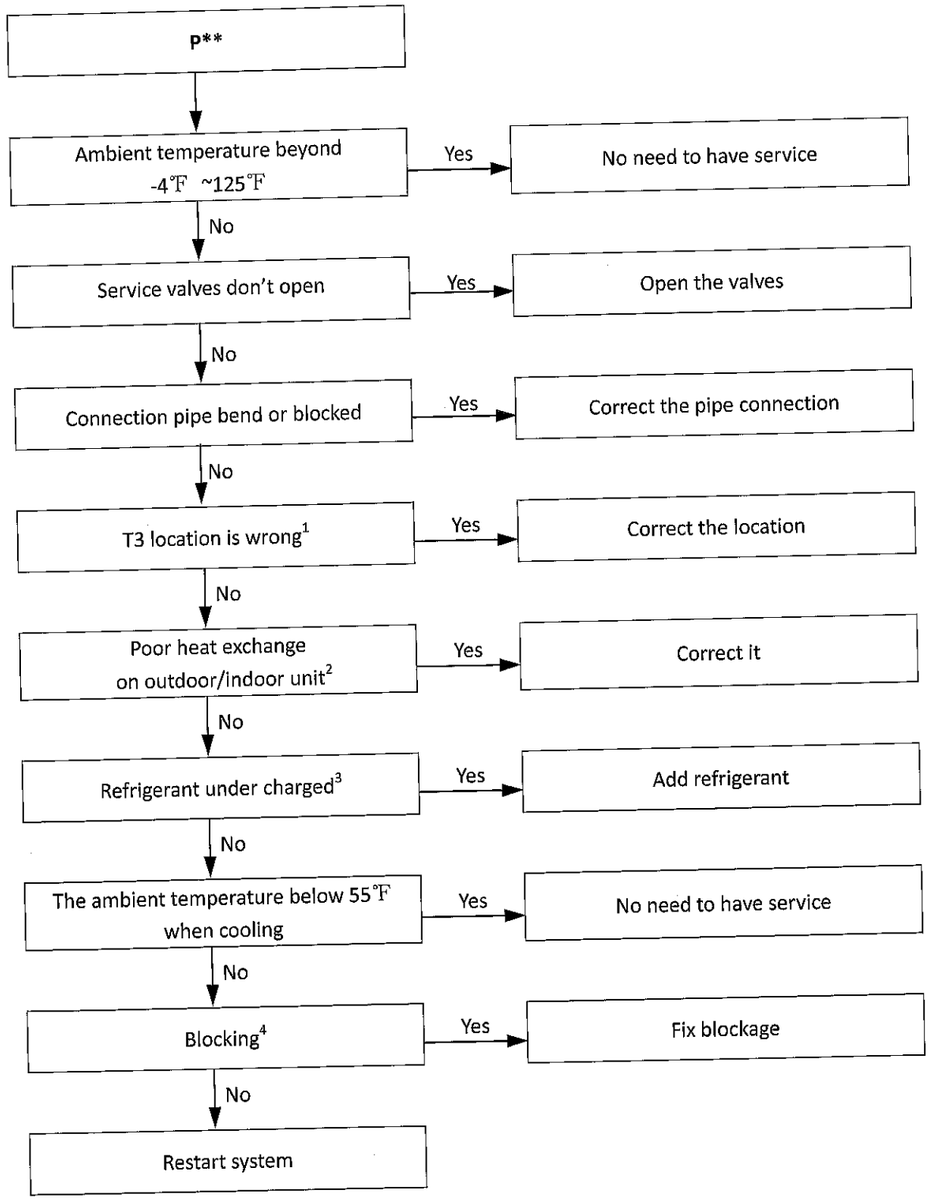
9.2 Description

mpression ratio protection control

9.3 Possible causes

Indoor unit stopped abnormally / poor heat exchange (heating mode).
Poor heat exchange on outdoor unit (cooling mode).
Service valves not open
TXV/EEV/filter blocked.
Under charged.

3.19.4 Procedure



Notes:
1. If aftermarket or serviced before Refer to 2.2
2. Refer to 【6.1】.
3. Refer to 【4.1.3 Charging Refrigerant】.
4. Refer to 【6.4】.

20 AtL Troubleshooting

20.1 Digital display output

AtL

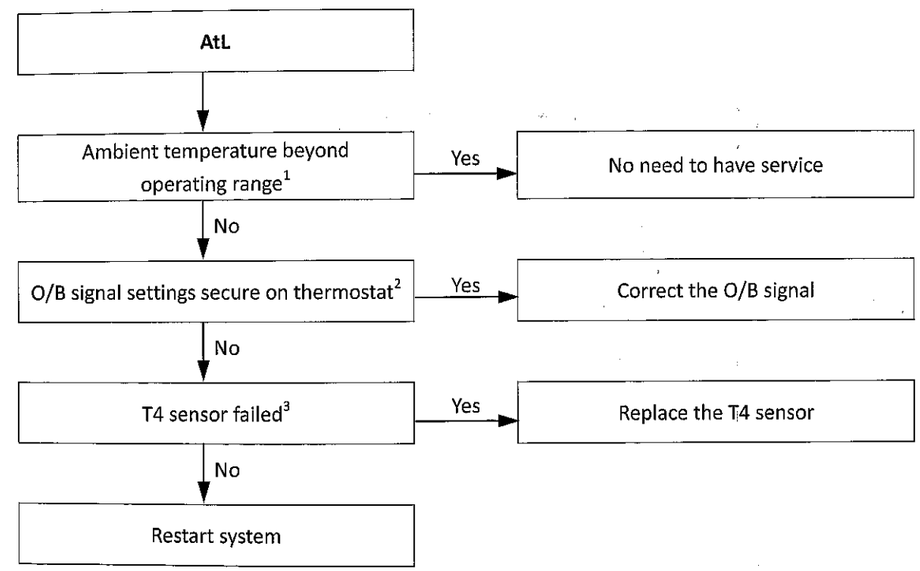
20.2 Description

Ambient Temperature Limited

20.3 Possible causes

Ambient temperature beyond operating range.
The O/B mode on thermostat set secure.
T4 sensor fault.

20.4 Procedure



Notes:
1. Cooling:15~125℉.Heating:-4~86℉.
2. O/B: The reversing valve is energized when the System switch is set to Heat
3. Refer to 【6.8】.

3.21 E4 Troubleshooting

3.21.1 Digital display output

E4

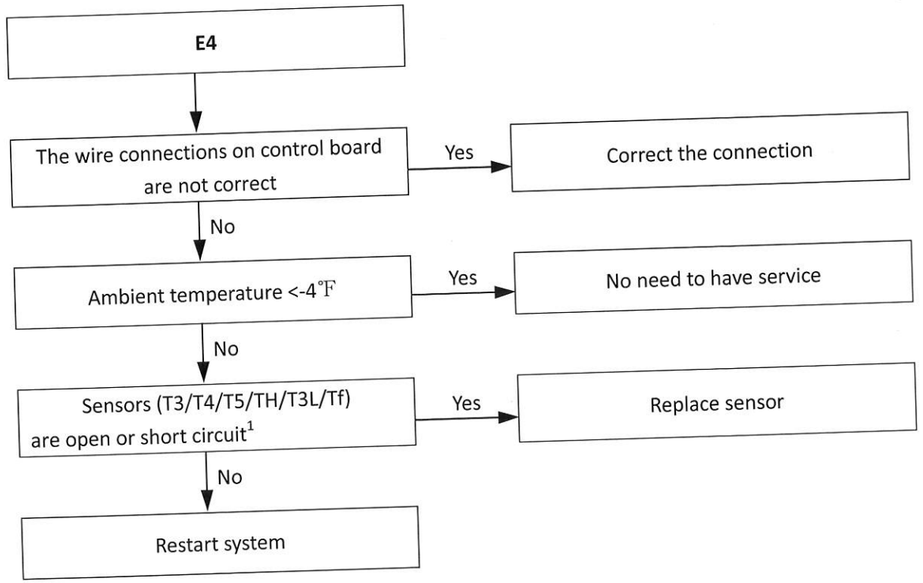
3.21.2 Description

Temperature sensor fault.

3.21.3 Possible causes

- Sensors failed.
- Wrong wire connections of sensor.
- Ambient temperature beyond our operation range.

3.21.4 Procedure



Notes:

1. Refer to【6.8】.

2 E5 Troubleshooting

2.1 Digital display output

2.2 Description

h/low voltage protection

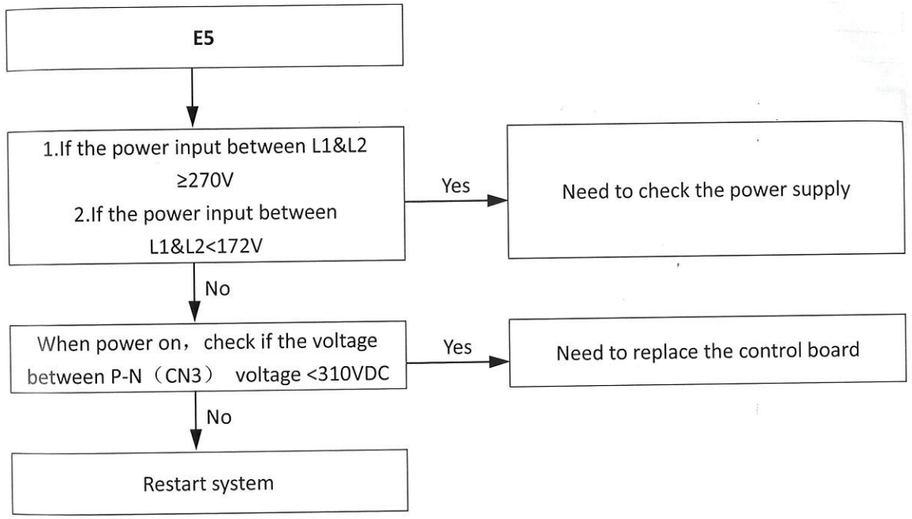
2.3 Possible causes

Power supply ≥270V

Power supply <172V

Control board issue

2.4 Procedure



s:

Refer to【6.5】.

3.23 E6 Troubleshooting

3.23.1 Digital display output

E6

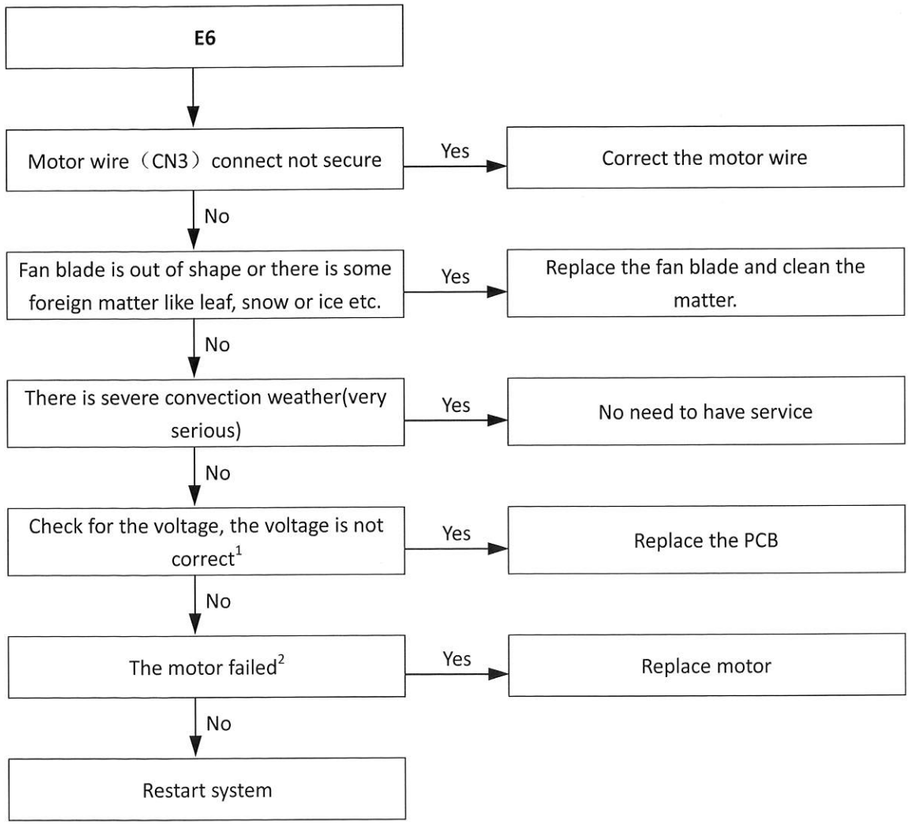
3.23.2 Description

DC fan motor of outdoor fault.

3.23.3 Possible causes

- Motor failed.
- Electric issue.

3.23.4 Procedure



Notes:

1. If the voltage between black wire and white wire on CN3 is in the range 14-18Vdc
   If the voltage between black wire and yellow wire on CN3 is in the range 2.1-5.1Vdc
2. Refer to【6. 10】

3.24 E9 Troubleshooting

3.24.1 Digital display output

E9

3.24.2 Description

EEPROM fault

3.24.3 Possible causes

- EEPROM poor contact.
- EEPROM install anti-direction.

3.24.4 Procedure

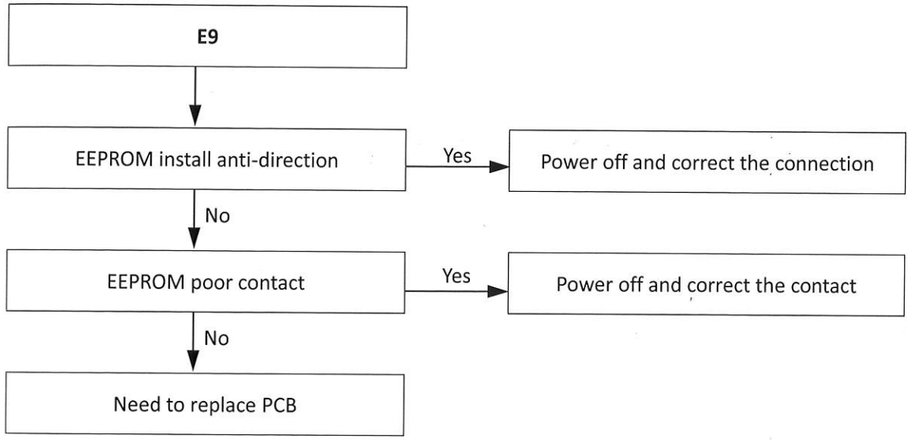
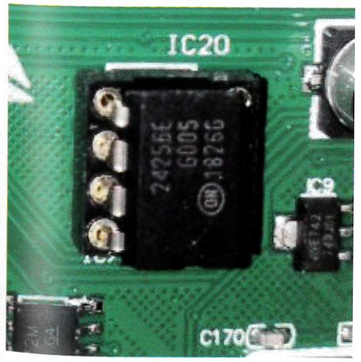


Figure 5-4.18: Fan module layout

EEPROM right direction



3.25 F1 Troubleshooting

3.25.1 Digital display output

F1

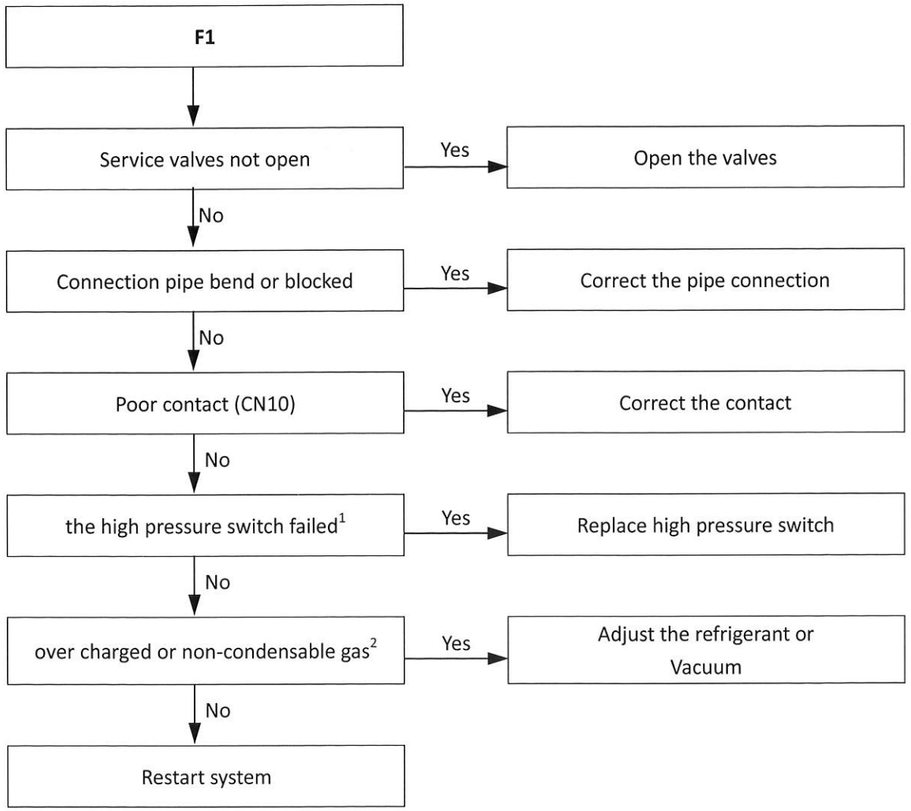
3.25.2 Description

High pressure switch(HPS) fault.

3.25.3 Possible causes

- High pressure switch failed
- Service valve not open
- Refrigerant over charged

3.25.4 Procedure



Notes:

1. Refer to【6. 9】
2. Refer to【4.1.3 Charging Refrigerant】

3.26 H0 Troubleshooting

3.26.1 Digital display output

H0

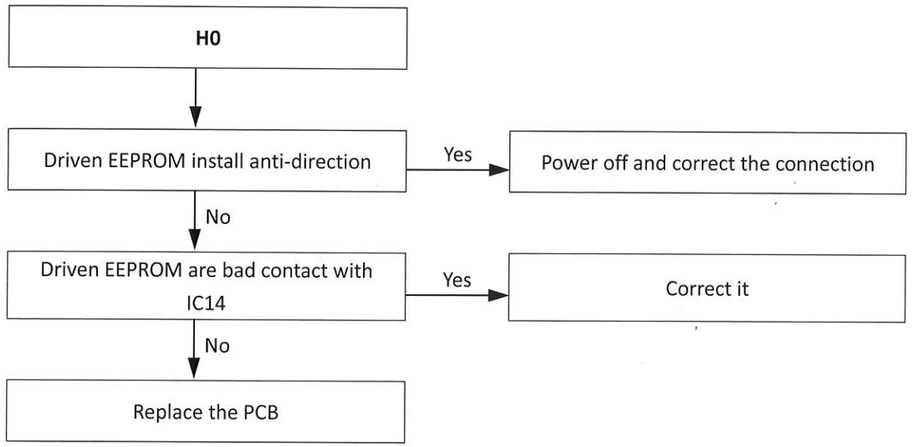
3.26.2 Description

Communication fault in main control chip.

3.26.3 Possible causes

- Control board failed.

3.26.4 Procedure



3.27 H5 Troubleshooting

3.27.1 Digital display output

H5

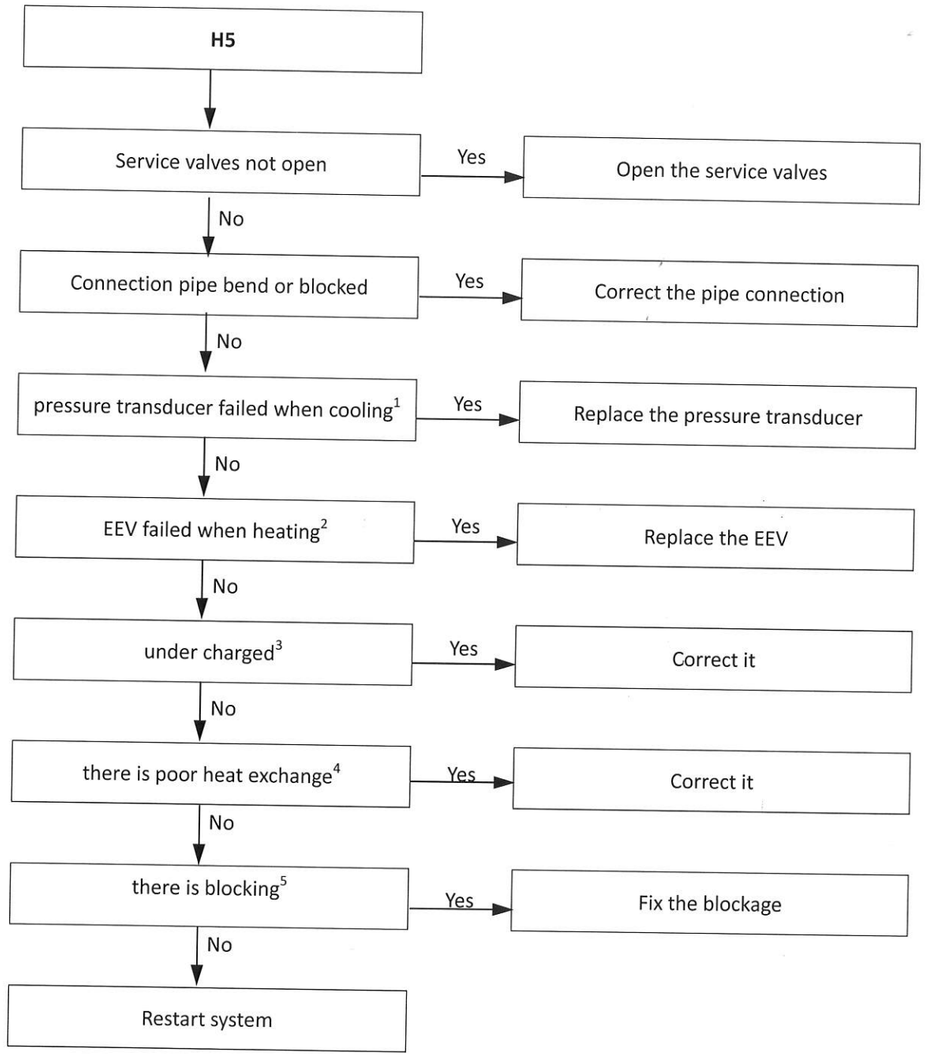
3.27.2 Description

Low pressure protection in cooling or heating.

3.27.3 Possible causes

- Indoor or outdoor unit motor stopped abnormally / poor heat exchange.
- TXV/EEV/filter drier/indoor coil blocked.
- Service valves not open
- Under charged.

3.27.4 Procedure



Notes:

1. Refer to【6.6】
2. Refer to【6.7】
3. Refer to【4.1.3 Charging Refrigerant】
4. Refer to【6.1 6.2 6.3】
5. Refer to【6.4】

3.28 H8 Troubleshooting

3.28.1 Digital display output

H8

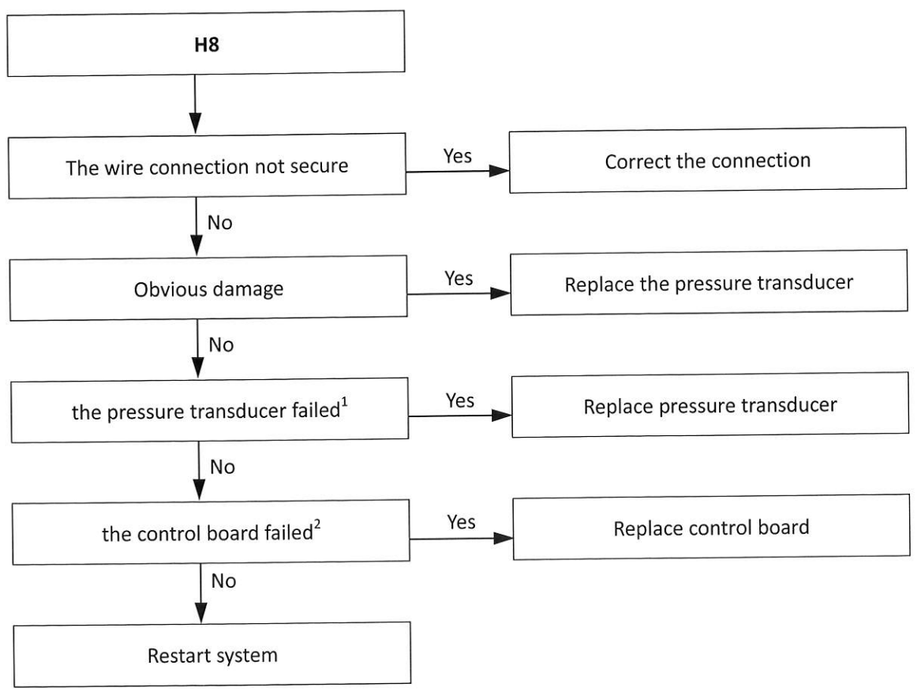
3.28.2 Description

Pressure transducer(PT) fault

3.28.3 Possible causes

- Wrong wire connections of Pressure transducer
- Pressure transducer failed.

3.28.4 Procedure



Notes:

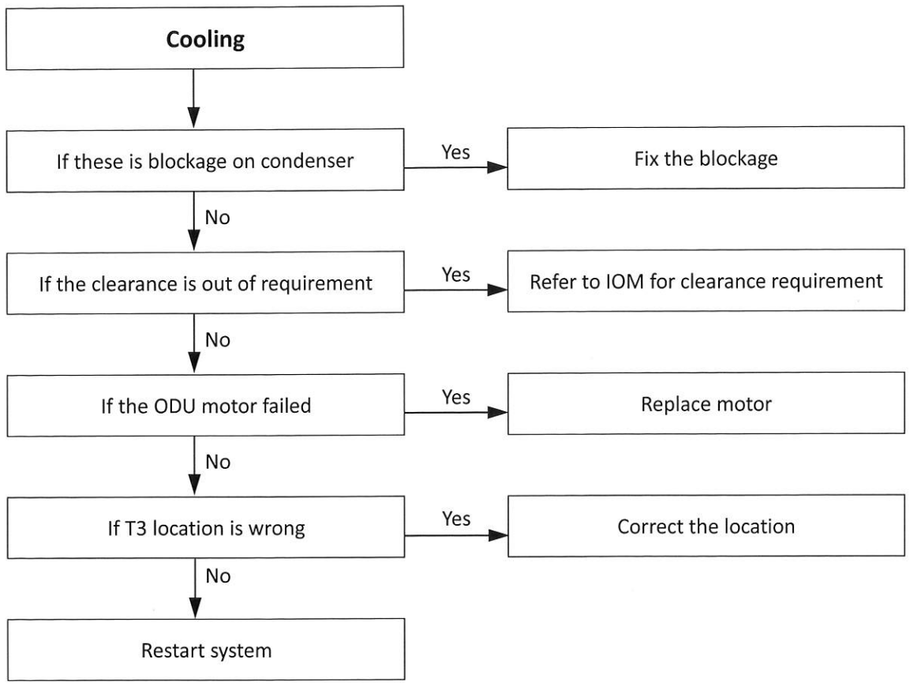
1. Refer to【6.6】
2. Compare the difference within 50 PSIG between suction pressure and Pe-#10 in cooling mode or discharge pressure and Pc-#11 in heating mode value from check mod

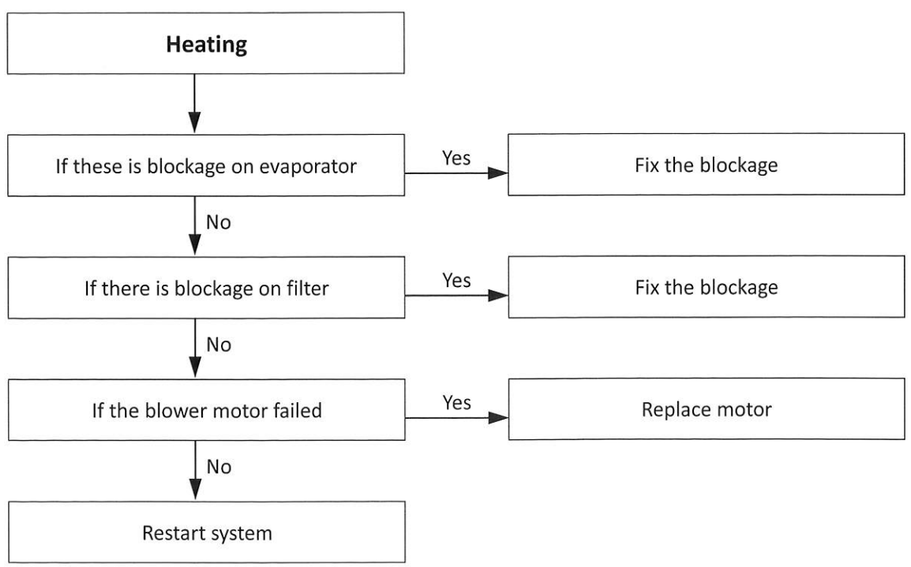
Part 6

Check

1 Check for abnormal high head pressure

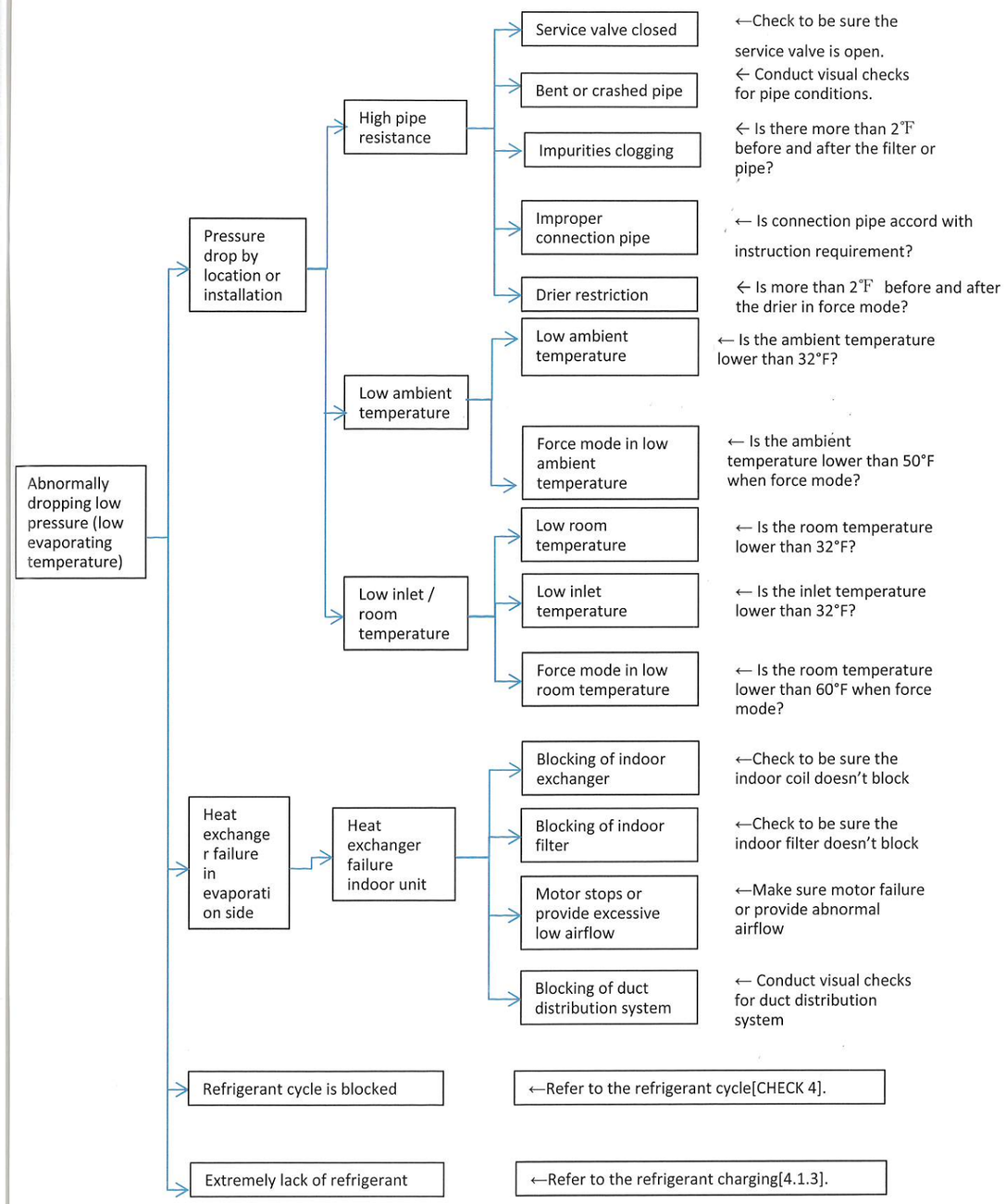
Note:310-380PSIG head pressure is normal for heating in normal conditions operation. The pressure may raise to 440 PSIG under 40 °F outdoor temperature or higher, Start-up or return oil stages during heating.



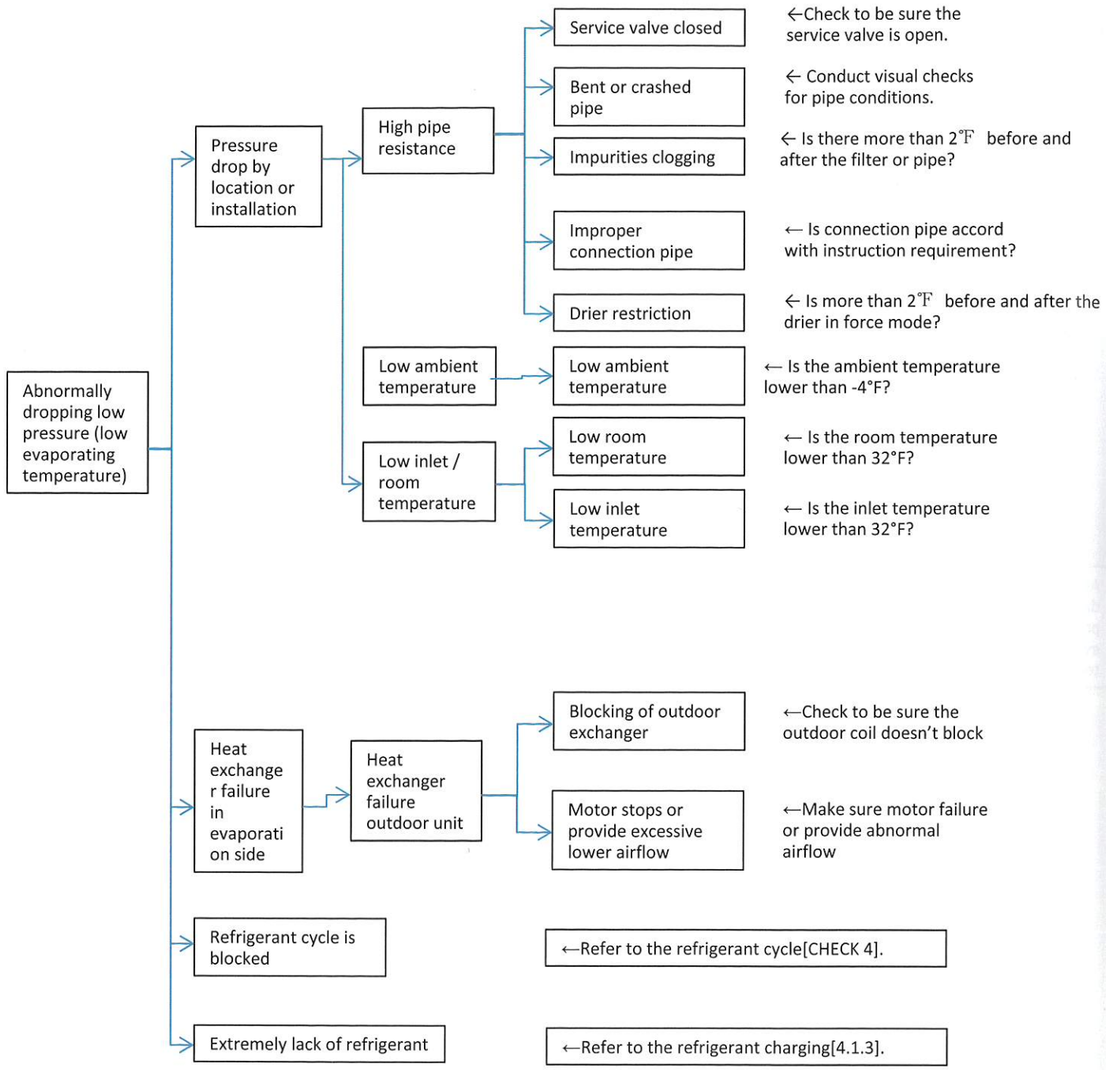


2 Check for Causes of Dropping Low Pressure in cooling

Note: 110-140PSIG head pressure is normal in cooling conditions. The value may be lower/higher at maximum/minimum/limited frequency of compressor operation, Start-up or return oil stages.

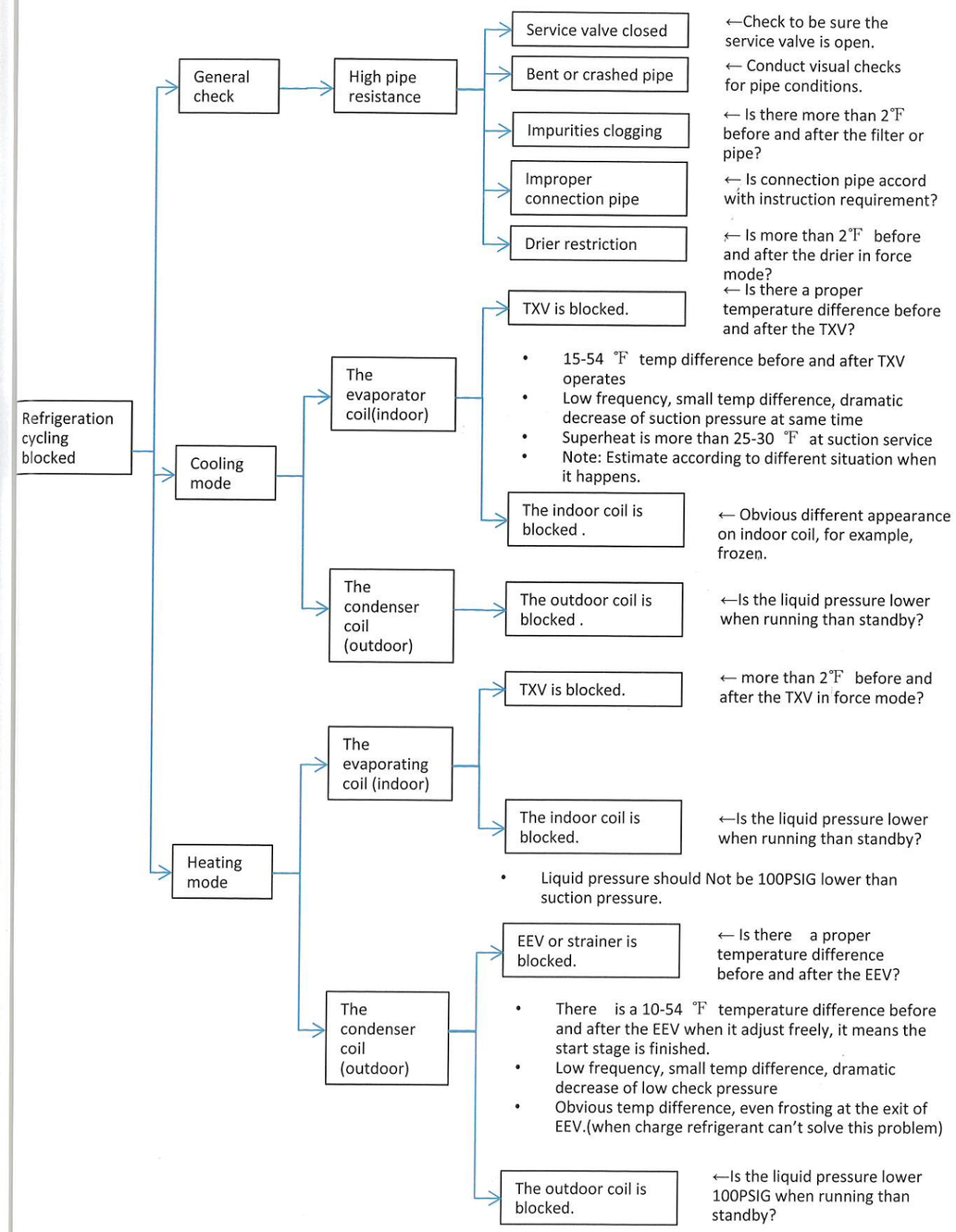


3 Check for Causes of Dropping Low Pressure in heating



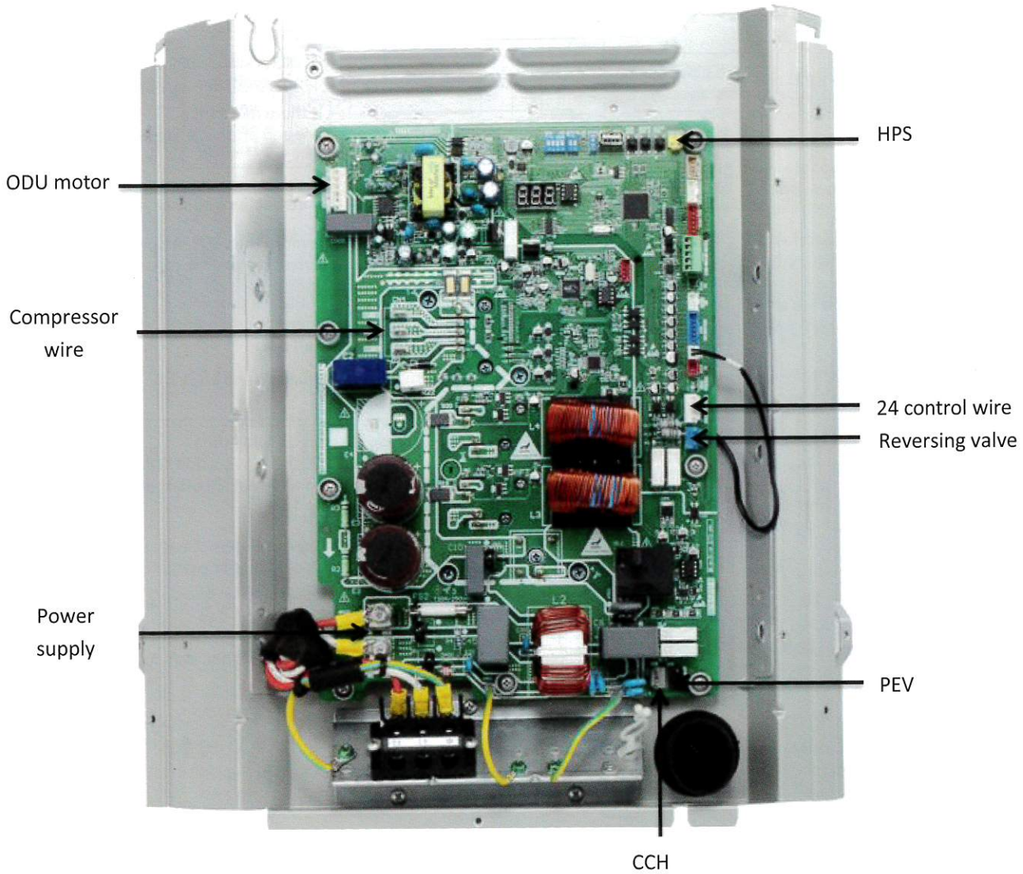
4 Check for Causes of Refrigeration cycling blocked

Note: Check at normal and force mode operation, some problems will be more obvious



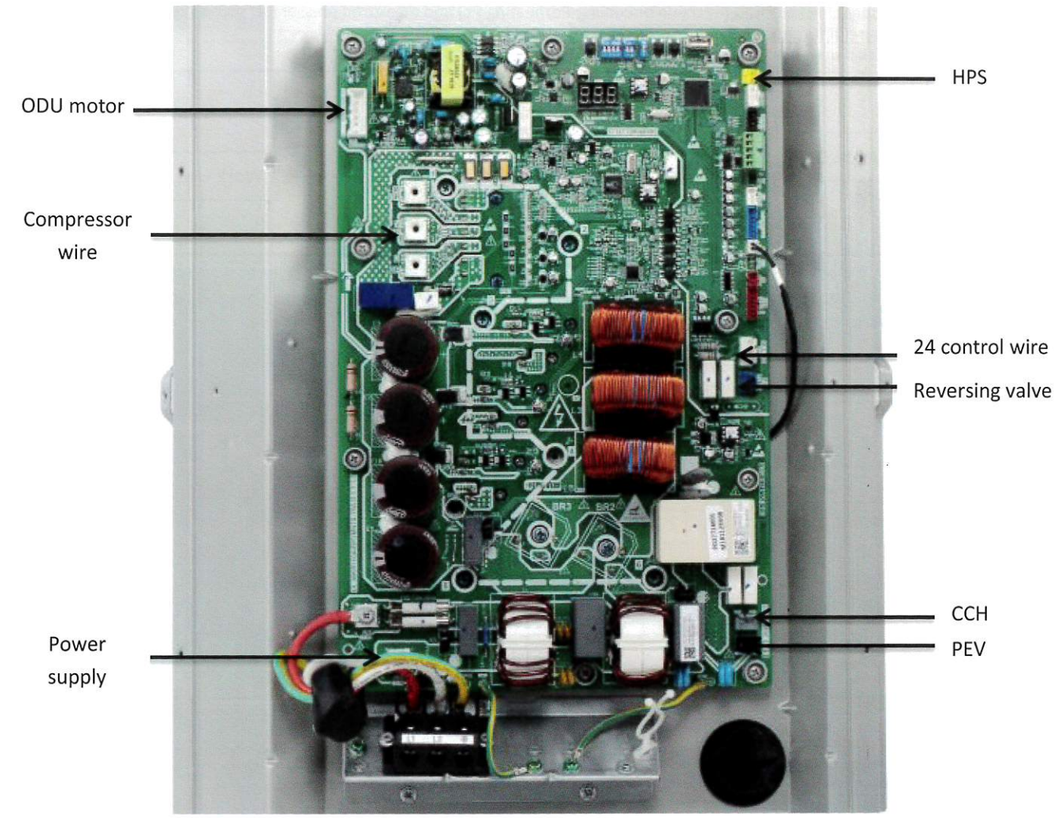
5 Check for control board

3T



No.	Point check content	Example	Parameter	Remark
1	Power supply	L1-L2	172-270V(AC)	When power on
2	24V signal	Y-C/B-C/W-C	18-30V(AC)	When power on
3	Control board check	Digital tube	Digital	When power on
4	DC motor control power	+15V-N	14-18V(DC)	When power on
5	Drive board check	LED	Light or flash	When power on
6	RV		24-36V(AC)	When power on
7	CCH		172-270V(AC)	When power on
8	PEV		172-270V(AC)	When power on

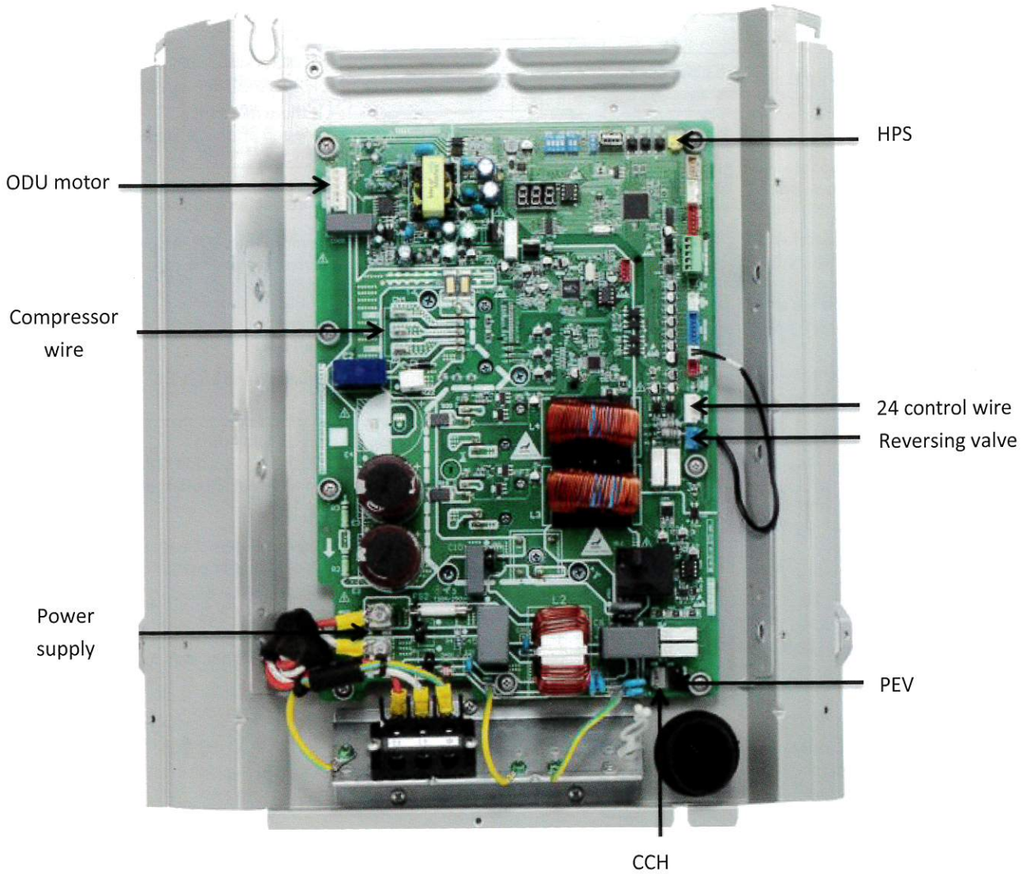
5T



No.	Point check content	Example	Parameter	Remark
1	Power supply	L1-L2	172-270V(AC)	When power on
2	24V signal	Y-C/B-C/W-C	18-30V(AC)	When power on
3	Control board check	Digital tube	Digital	When power on
4	Motor control power	+15V-N	14-18V(DC)	When power on
5	Drive check	LED	Light or flash	When power on
6	RV		24-36V(AC)	When power on
7	CCH		172-270V(AC)	When power on
8	PEV		172-270V(AC)	When power on

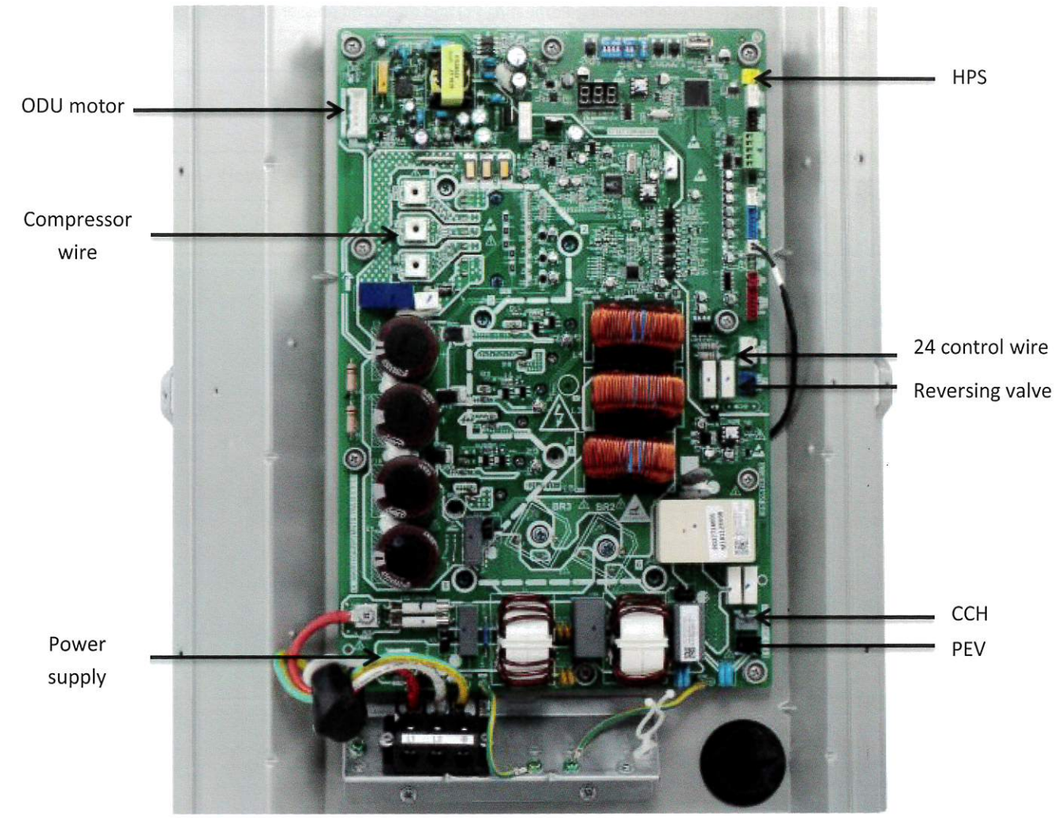
5 Check for control board

3T



No.	Point check content	Example	Parameter	Remark
1	Power supply	L1-L2	172-270V(AC)	When power on
2	24V signal	Y-C/B-C/W-C	18-30V(AC)	When power on
3	Control board check	Digital tube	Digital	When power on
4	DC motor control power	+15V-N	14-18V(DC)	When power on
5	Drive board check	LED	Light or flash	When power on
6	RV		24-36V(AC)	When power on
7	CCH		172-270V(AC)	When power on
8	PEV		172-270V(AC)	When power on

5T



No.	Point check content	Example	Parameter	Remark
1	Power supply	L1-L2	172-270V(AC)	When power on
2	24V signal	Y-C/B-C/W-C	18-30V(AC)	When power on
3	Control board check	Digital tube	Digital	When power on
4	Motor control power	+15V-N	14-18V(DC)	When power on
5	Drive check	LED	Light or flash	When power on
6	RV		24-36V(AC)	When power on
7	CCH		172-270V(AC)	When power on
8	PEV		172-270V(AC)	When power on

Check for Pressure transducer

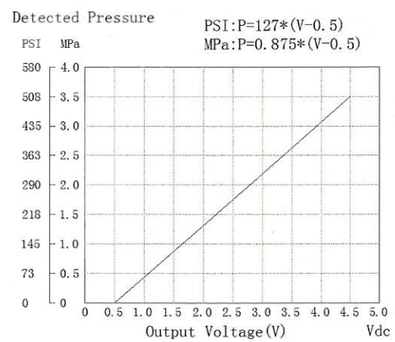
Note: Be careful of static electricity when insert and extract, especially in dry weather.

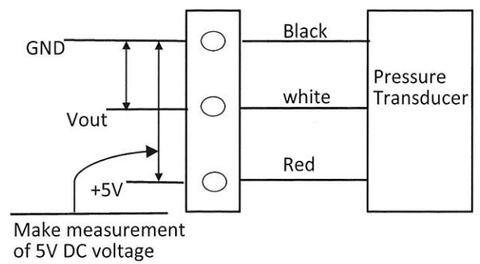
Check pressure transducer:
Compare the pressure checked (standby mode or cooling-Pe/heating-Pc) and measured pressure at suction service valve, it's normal if pressure difference was within 50PSIG.
(refer to 4.1.5 Check parameter)

Normal? — Yes → Work well

No ↓

When power on and seated.





+5V～GND=5V DC? — No → Abnormal board, replace it

Note: Low probability, caution in handling

Yes ↓

DC pressure of Vout～GND meets the chart above? — No → Abnormal pressure transducer

Yes ↓

Test pressure if meets the above chart — No → Abnormal board, replace it

Note: Small probability

Yes → Work well

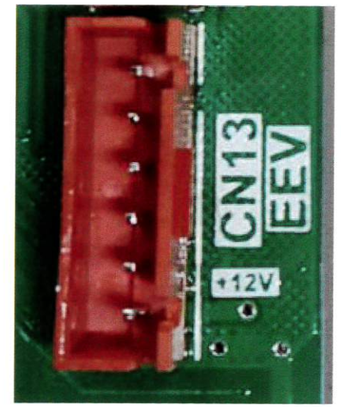
6 Check for Electric expansive valve(EEV)

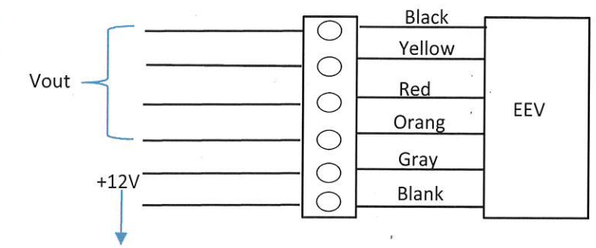
Check EEV:
Check if the EEV is plugged in the control board , and the EEV electromagnetic coil is tightly inserted.(refer to 2.2 Functional Part-3/5T)

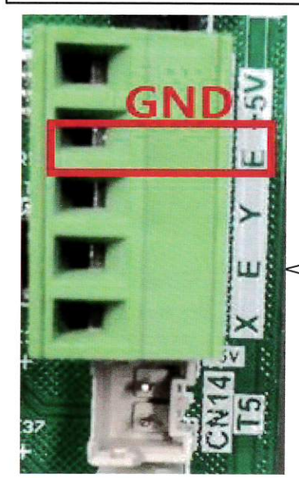
If above conditions Normal? — No → Correct it

Yes ↓

When power on and seated.







+12V～GND=+12V DC? — No → Abnormal board, replace

Note: small probability

Yes ↓

DC pressure of Vout～GND =+12V DC? — No

Abnormal EEV, replace

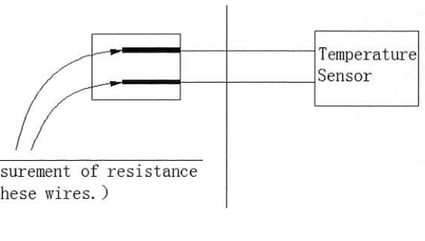
7 Check for Temperature Sensor（T3/T4/T5/TH/T3L/Tf）

Check temp sensor(T3/T4/T5/Th/T3L/Tf）:
Compare the temperature checked (T3-3#/T4-4#/T5-5#/ T6-6#/ T3L-7#/ Tf-8#, refer to 4.1.5), it's normal if the temperature difference was within 15°F when standby

T3/T4/Th/T3L: 77°F --10KΩ
T5/Tf: 77°F --55KΩ

normal — Yes → Work well
No ↓
Ambient temp below -4°F? — Yes → Out of operating range. Do nothing
No ↓

When power off and sensor unplugged



(Make measurement of resistance between these wires.)

Resistance in thermistor meet the chart above? — No → Replace sensor
Yes ↓
Check from board meet the chart above? — No → Replace control
Note: low probability, caution in handling
Yes → Work normal

T3/T4 Temperature Sensor		
T/℉	T/℃	KΩ
0	-17.8	93.535
10	-12.2	67.795
20	-6.7	49.652
30	-1.1	36.710
40	4.4	27.386
50	10.0	20.610
60	15.6	15.648
70	21.1	11.987
80	26.7	9.265
90	32.2	7.225
100	37.8	5.683
110	43.3	4.509
120	48.9	3.606
130	54.4	2.902
140	60.0	2.350
150	65.6	1.914
160	71.1	1.574
170	76.7	1.276

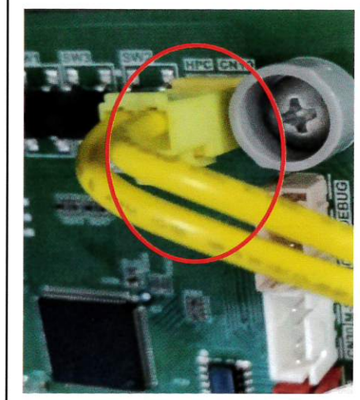
T5/Tf Temperature Sensor		
T/℉	T/℃	KΩ
0	-17.8	505.551
10	-12.2	362.739
20	-6.7	265.398
30	-1.1	195.601
40	4.4	146.695
50	10.0	110.707
60	15.6	84.465
70	21.1	65.408
80	26.7	50.904
90	32.2	40.152
100	37.8	31.807
110	43.3	25.506
120	48.9	20.529
130	54.4	16.708
140	60.0	13.643
150	65.6	11.214
160	71.1	9.308
170	76.7	7.746
180	82.2	6.504
190	87.8	5.474
200	93.3	4.645
210	98.9	3.949
220	104.4	3.383
230	110.0	2.904
240	115.6	2.503
250	121.1	2.172
260	126.7	1.888
270	132.2	1.651

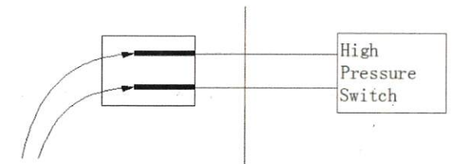
8 Check for High Pressure Switch(HPS)

High Pressure Switch :
Whether the switch can start normally when start the machine

Start — Yes → Work well
No ↓

When power off and pull up



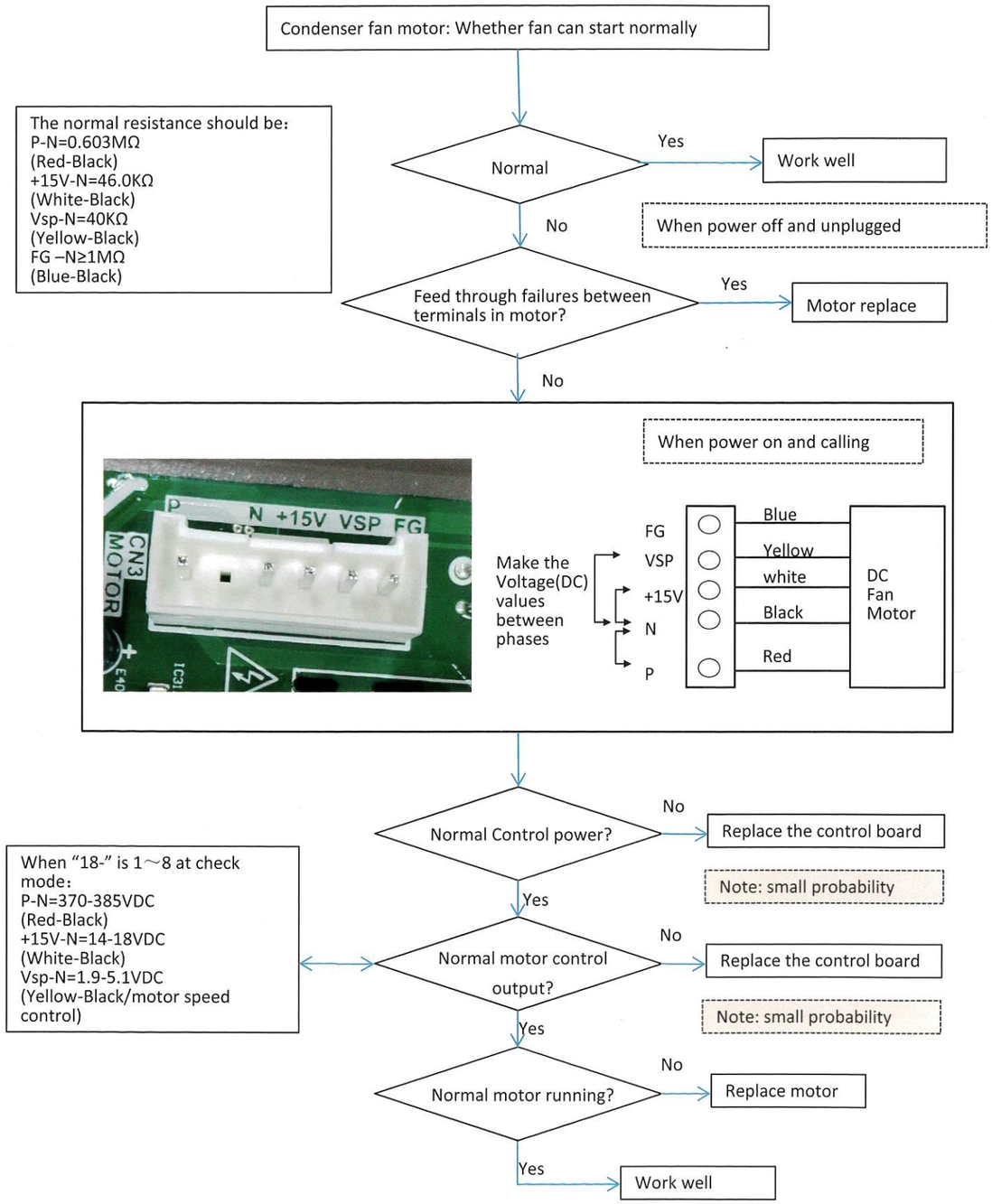


(Make measurement of resistance between these wires.)

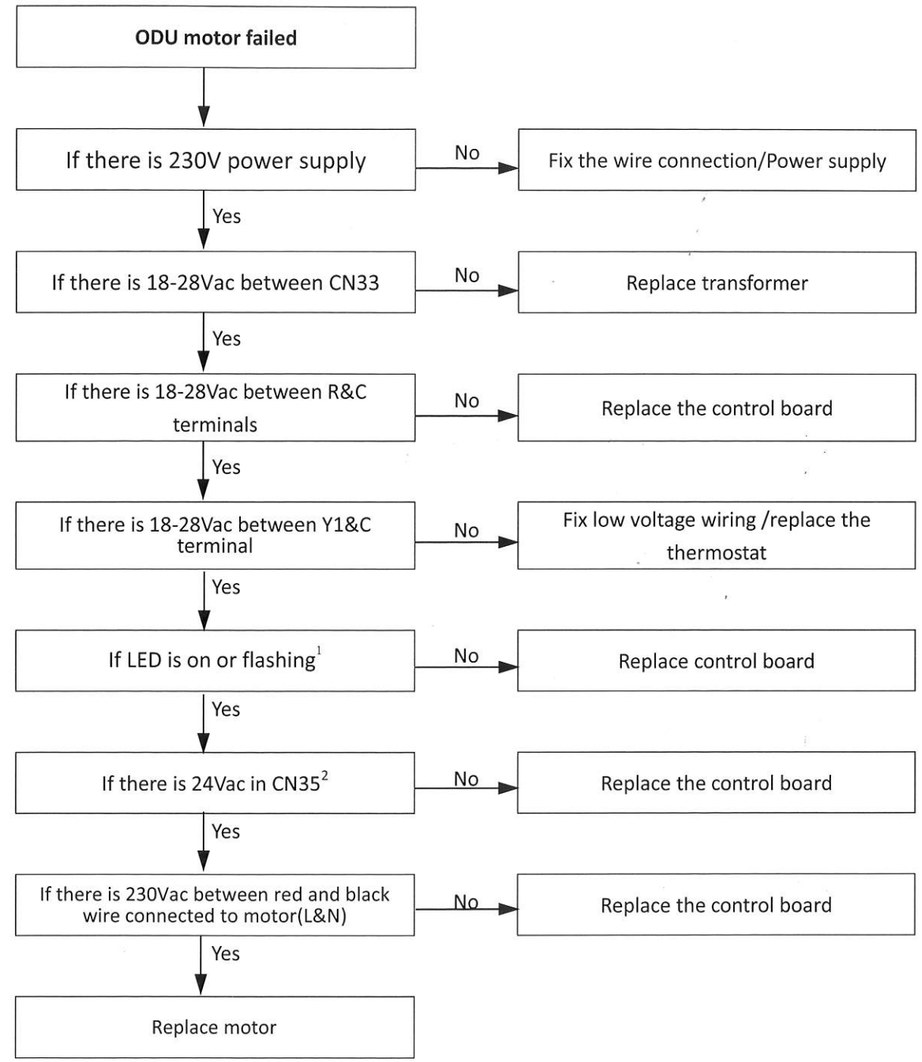
High pressure switch secure, no wiring damages? — No → Reconnect/fix the wiring damages
Yes ↓
R≤<1Ω — No → Abnormal pressure switch, replace it
Yes ↓
Still in high pressure protection? — Yes → Should replace board
Note:Low probability, caution in handling
No → Work well

Note:
Normal high pressure switch opens above 580PSIG, resets below 435PSIG.

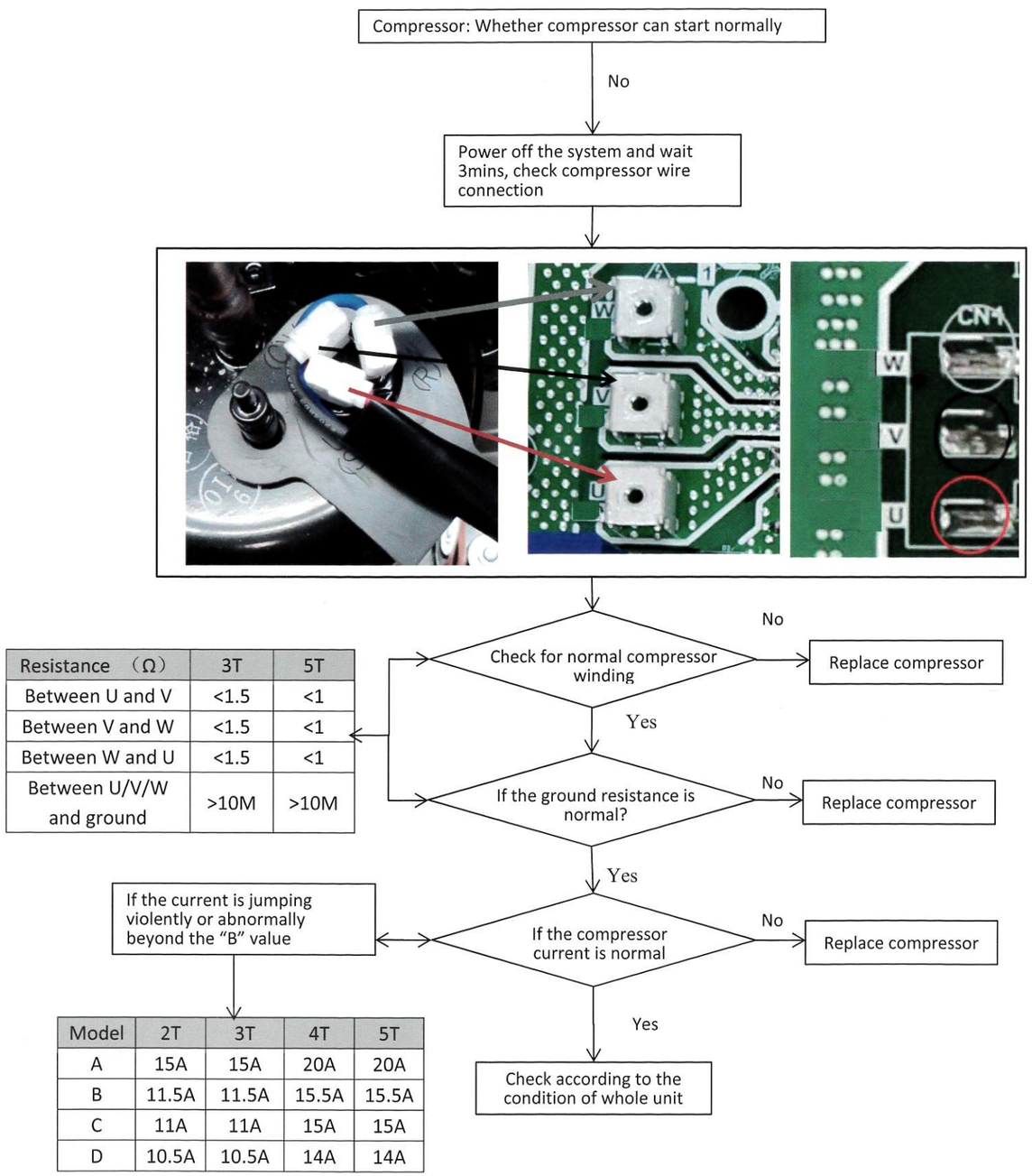
9 Check for Condenser fan motor-all model



10 Check for ODU fan motor



11 Check for Compressor

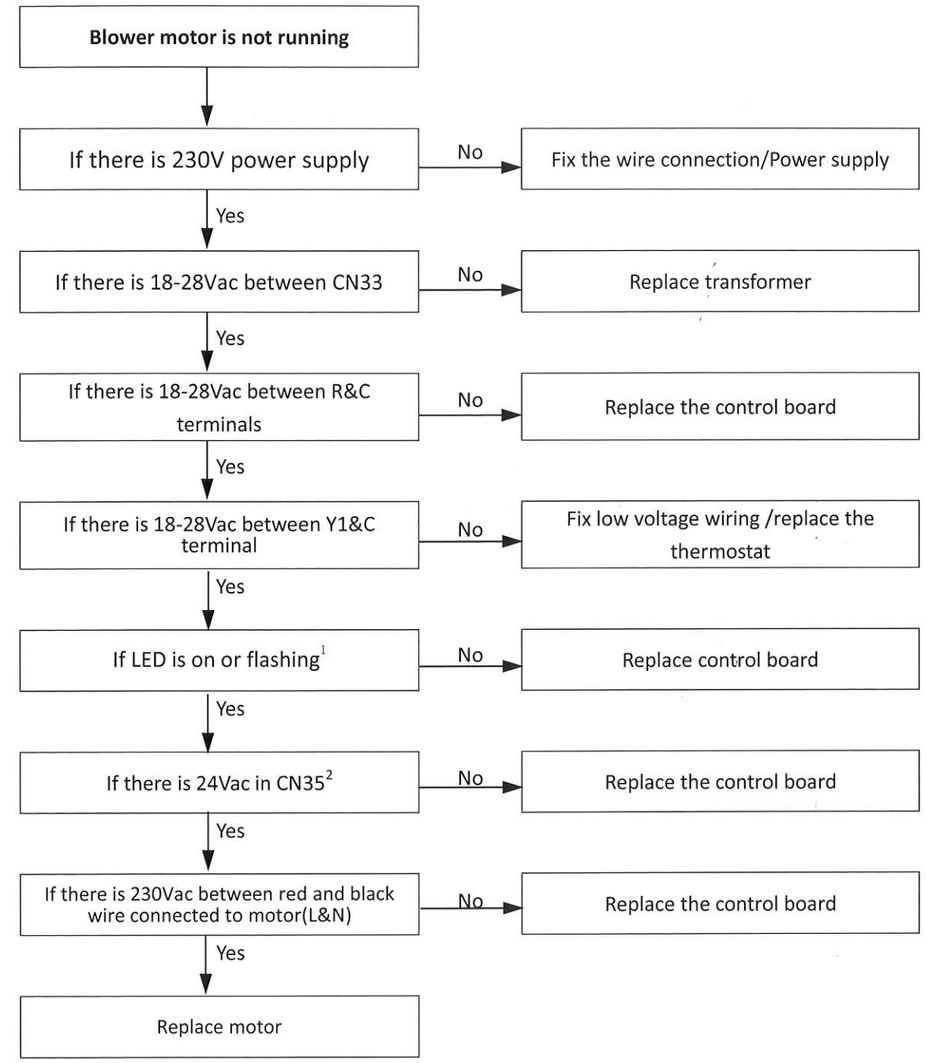


Resistance （Ω）	3T	5T
Between U and V	<1.5	<1
Between V and W	<1.5	<1
Between W and U	<1.5	<1
Between U/V/W and ground	>10M	>10M

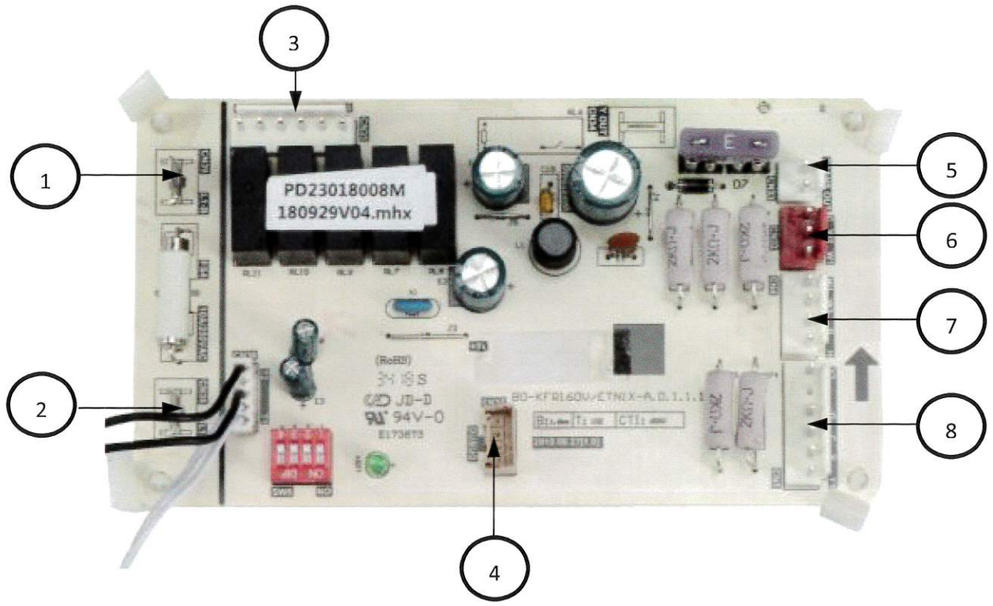
Model	2T	3T	4T	5T
A	15A	15A	20A	20A
B	11.5A	11.5A	15.5A	15.5A
C	11A	11A	15A	15A
D	10.5A	10.5A	14A	14A

IDS 2.0 Service manual

12 Check for indoor blower motor



Notes:
1. LED is flashing the anti-cold air function is on, no action is needed.
2. There are several wires and terminals. It depends on the speed the blower motor is runing, refer to wiring diagram to find speed setting and measure wiring voltage.

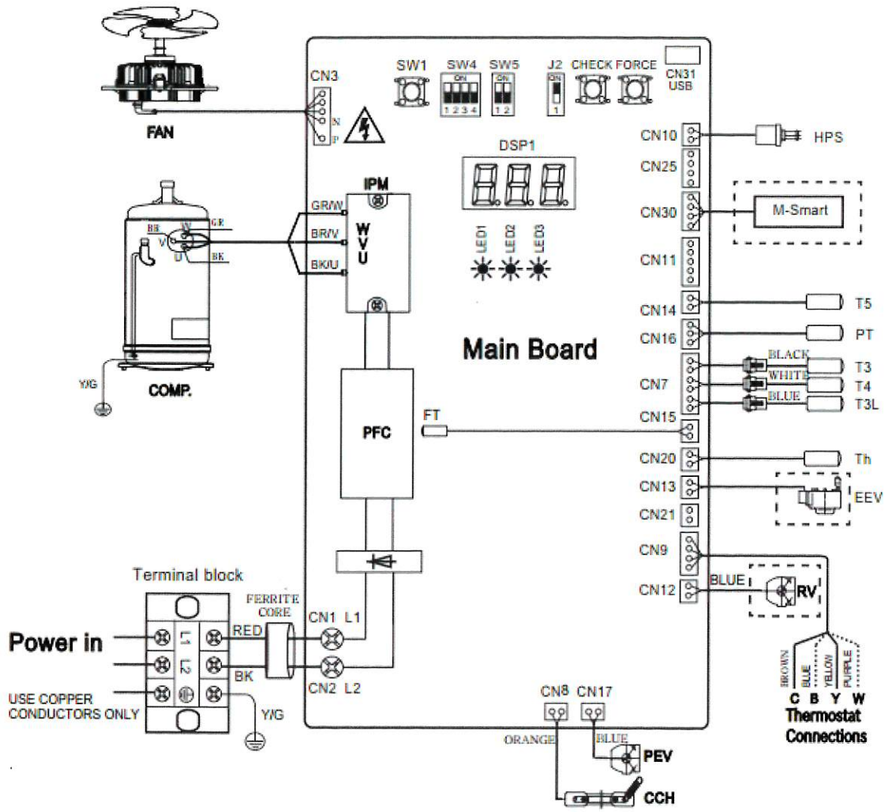


No.	Port code	Content	Port voltage
1	CN39	Fan motor power input	0V or 230V AC
2	CN38	Fan motor power input	0V or 230V AC
3	CN35	Fan speed control	0V or 24V AC
4	CN37	Reserved (debug)	/
5	CN33	Power input of main board	0V or 24V AC
6	CN6	Electric heater signal input	0V or 24V AC
7	CN4	Signals input (W1, W2 , Dh , B)	0V or 24V AC
8	CN5	Signals input (Y1,Y2,R,C , G)	0V or 24V AC

Part 7

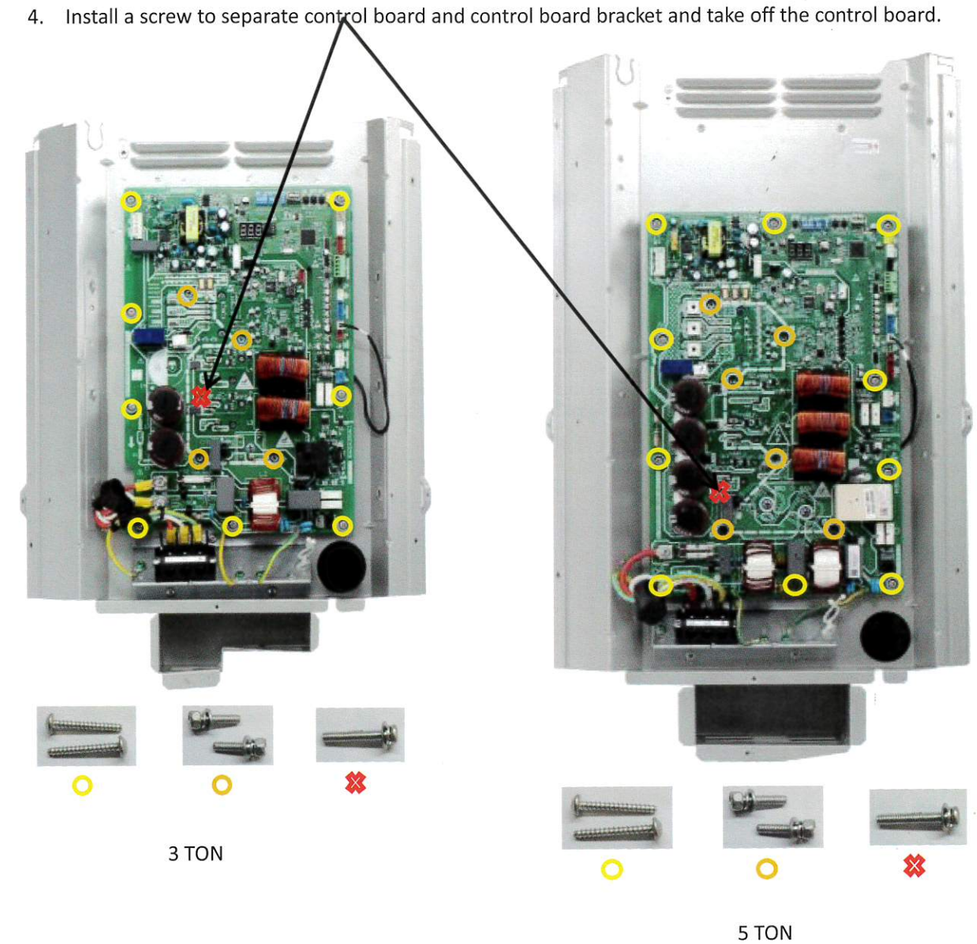
Appendix

1 Wiring diagrams-3/5T



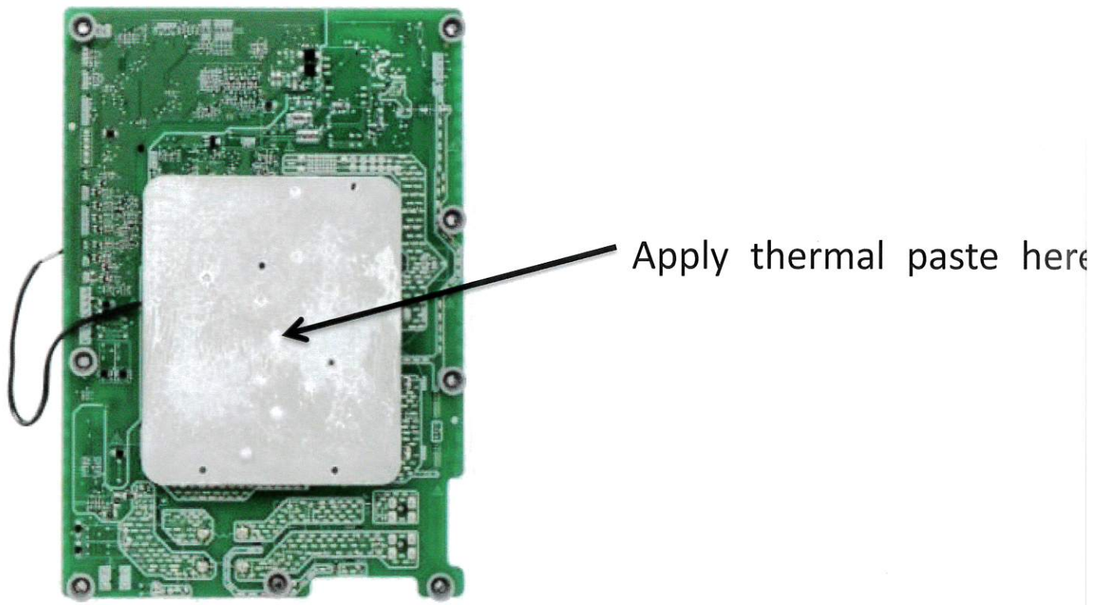
2 Board replacement instruction

1. Power off and wait at least 3 mins before opening the electric control box.
2. Remove the wirings carefully.
3. Remove the 12(3ton)/16(5 ton) screws on the board (Refer to left Figure and information below before removing)
4. Install a screw to separate control board and control board bracket and take off the control board.



5. Clean the thermal paste on heat sink.
6. Put thermal paste on heat sink. The entire contact surface must be covered.
7. Install the new board on the unit.
8. Fasten the 12 screws.
9. Reconnect the wires according to the wire diagram.

Figure 7-2.2: heat sink



3 Troubleshooting guide

Figure 7-3.1: Troubleshooting table

SYSTEM FAULTS		WHAT TO CHECK MODE	POW RESUPPLY OR HIGH VOLTAGE W RNG	LOW VOLTAGE W RNG OR THERMOSTAT	INEFFICIENT COMP.	I. D. FUSE	CONTROL BOARD OR WRES	RES I. D. AIRFLOW	RES O. D. AIRFLOW	INEFFICIENT O. D. FAN	RES O. D. RADIATOR	REF. UNDERCHARGE	REF. OVERCHARGE	REF. CIR. RESTRICTIONS	EEV STUCK OPEN OR NEED TO ADJUST	REV OR COIL DEF.	SERVICE VALVE LEAKING	REF LEAKING	PT SENSOR DEF.	T3 SENSOR DEF.	T4 SENSOR DEF.	T5 SENSOR DEF.	TF SENSOR DEF.	HPS SENSOR DEF.
SYSTEM	Display shows nothing	C	P					S																
		H	P					S																
	System won't start	C			P	P		S																S
		H			P	P		S																S
	Capacity is insufficiency	C							P	P	P		P			S			S	S			S	
		H							P	P	P		P				S		S	S			S	
	Display is not normal when running	C						P																
		H						P																
	Cool when heating requirement	H		P														S						
REFRIGERANT CIRCUIT	P1	C								P	P			S	P									
		H							P					S	P									
	P2/H5	C				P							P			S				S				
		H				P							P			S				S				
	P3	C									P	P		S	P									
		H							P					S	P									
	P5	C								P	P			S	S							S		
		H													S									
	P0	C								P	P	S												
		H								P	P	S												
	P4	C											P			S							S	
		H											P				S						S	
	PH	C												P		P						S	S	
		H												P			P						S	
	C3 (T3 is seated fault)	C																				P			S
	E7 (T5 is seated fault)	C																				S	P	
		H																			S		P	
	ALT (Ambient temp. beyond the license)	C																					S	
		H																					S	
ELECTRICAL OR CONTROL	E4	C																				P	P	P	P
		H																				P	P	P	P
	H8	C																			P				
		H																			P				
	F1	C																				S			P
		H																							P
	E6	C						S			P														
		H						S			P														
	P6	C					S	P																	
		H					S	P																	
	P8	C									P														
		H									P														
	L0-L9	C					S	P																	
		H					S	P																	
	E9	C						P																	
		H						P																	
	H0	C						P																	
		H						P																	
	E5	C	P					S																	
		H	P					S																	

C-cooling H-Heating P-Primary Causes S-Secondary Causes
Comp.-compressor RES.-Restrictions REF.-Refrigeration DEF.-Defective CIR.-Circuit EEV-Electronic expansion valve REV.-Reversing Valve PT-Pressure Transducer T3-Outdoor coil temp. sensor T4-Ambient temp. sensor T5-Comp. discharge temp. sensor Tf-Module radiator fin temp. sensor HPS-High pressure switch
RES I.D. AIRFLOW -Perhaps failue of fan motor or fan capacitor or filter
RES O.D. AIRFLOW -Perhaps failue of fan motor or fan capacitor or recirculation or blocking coil
RES O.D. RADIATOR-Perhaps failue of blocking radiator