TRUST
Air Conditioners

DX TYPE WATER-COOLED SCREW CHILLER

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Contents

توجه:
شرکت تراست حق تغییر مشخصات دستگاه ها را در جهت بهبود و ارتقای کیفیت برای خود محفوظ می دارد.

Troubleshooting

Trust screw chiller has many protection measures and devices. There're many features to aid in troubleshooting. By using the alarm information, DI/O, AI/O and operating conditions of the chiller during chiller operation, it's convenient to find the possible problem. Verify that the chiller is properly configured, including options and/or accessories.

1.Protection items

Protection	Purpose
High pressure / low pressure protection of compressor	Ensures the compressor runs in normal range and ensures its work life.
Converse phase, lack of phase protection	Protects the compressor from damage because of converse phase or lack of phase of power.
Anti-freezing protection during refrigeration	Protects the key components such as evaporator, condenser and water pipe etc. from damage because of the expanse caused by the water becomes into ice
Overload protection	Protects the compressor from burn due to overload running.
Over current protection of compressor	Protects the compressor from burn due to over current running under bad conditions.
Internal protection	Makes the compressor run safely under permitted conditions.
Anti-overheating protection of system	Protects the compressor from burn because of running lack of refrigerant or lubricating oil.
Water flow switch protection	Protects the compressor and the water pump motor from burn because there is lack of cooling water or chilled water.
Protection of sensor fault	Ensures the data from sensor is correct to prevent the system from wrong action.
Oil level and oil pressure difference protection	Ensures the compressor to run normally.
High discharge temperature protection	Makes the compressor run safely under permitted conditions.

- Phase reversal/phase loss (phase protection)

  Power supply A/B/C should exist simultaneously and differ from each other by 120° phase angle. If not, Phase reversal or phase loss fault will occur and be displayed on screen. Before unit start when Phase reversal or phase loss fault occurs, the chiller won't start; when Phase reversal or phase loss fault occurs during chiller operating, the chiller will stop according to protective stop program. Both compressors are shut down and water pumps and cooling tower fan stops in accordance with normal shutdown procedure. When fault record gets cleared and both temperature and time condition gets satisfied, the chiller can restart.

- Water flow failure (both chilled water and cooling water)

  PCB controller begins to detect chilled/cooling water flow switch after water pumps get energized 180s. The switch will disconnect if water flow less than set point and water flow loss signal will generate if it lasts for 5s. During chiller operation (including dual heads unit), any flow switch disconnects for 5s continuously, Unit stops according to protective stop program.

  If chilled water flow fails, chilled water pump stops after 30s delay; cooling water pump and cooling tower stops after 60s delay.

If cooling water flow fails, cooling water pump and cooling tower stops after 60s delay; chilled water pump stops after 600s delay.

Note: fault can be cleared after power re-energized and it needs to be confirmed manually, then when both temperature and time condition gets satisfied, the chiller can restart.

- Temperature sensor failure

Entering chilled water temperature sensor short circuit/open circuit, display entering chilled water temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

Leaving chilled water temperature sensor short circuit/open circuit, display leaving chilled water temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

Entering cooling water temperature sensor short circuit/open circuit, display entering cooling water temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

Leaving cooling water temperature sensor short circuit/open circuit, display leaving cooling water temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

Discharge temperature sensor short circuit/open circuit, display discharge temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

Oil temperature sensor short circuit/open circuit, display oil temperature fault and chiller stops according to abnormal shutdown program. After the sensor reset, fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- Over/under voltage

When power supply voltage is less than 90% or more than 110%, corresponding alarm over voltage or under voltage occurs. The chiller will stop immediately according to abnormal shutdown program. Fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- High/low pressure protection

Alarm as soon as high pressure switch trips and stop the chiller immediately according to abnormal shutdown program. It is one kind of NC switch and needs manual reset of the red reset button when fault happens. Fault on screen must be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

When suction pressure is lower than the protective low pressure set point (effective for time delay),

stop according to abnormal shutdown program. After the switch reset, fault on screen must be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- Anti-freeze protection

  Over low leaving chilled water temperature

  When leaving chilled water temperature gets lower than 4℃ , perform low water temperature protection and stop according to abnormal protective shutdown program. Cooling water pump/chilled water pump/cooling tower fan keeps on running. When leaving chilled water temperature gets higher than 10℃ , unit resets. When both temperature and time condition gets satisfied, the chiller can restart.

- Mechanical antifreeze switch

  The switch trips when leaving chilled water temperature <= 3℃ and chiller stops according to abnormal protective shutdown program. Reset at 10℃ and fault on screen must be cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- Compressor motor protection

  Alarm when compressor protection module trips. Perform abnormal protective shutdown program immediately. Fault on screen must be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- Compressor overload protection

  Thermal overload relay trips when heat storage reaches trip point. Faulted compressor will stop immediately to abnormal protective shutdown program and other normal system will keep on running. After the switch reset, fault on screen must be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

- Oil level protection

  During unit running, if oil level keeps on lower than set point for 30s, the unit will stop immediately according to abnormal protective shutdown program. After the switch reset, fault on screen must be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart

- High cooling leaving water temperature protection

  When leaving cooling water temp. is higher than 45℃ during unit operating, the chiller will stop immediately according to abnormal protective shutdown program. Reset at 38℃ and it needs to be confirmed and cleared manually; when both temperature and time condition gets satisfied, the chiller can restart.

2.Troubleshooting

No.	Alarm	Trouble Description	Action	Reset Type	Possible Cause
1	Power Failure Protection	Phase sequence relay switches OFF	Compressor cannot work; The compressor stop running immediately	Reset manually on the touch screen	The power quality is poor, there may exist phase inversion, lacking phase or phase imbalance.
2	Compressor Motor Protection	Compressor motor module switches OFF	Compressor cannot work; The compressor stop running immediately	Power off the unit and re-up electricity ,reset manually on the touch screen	1.The power of motor is poor, there may exist phase inversion, lacking phase, over-voltage, under-voltage 2. The motor overheat
3	Compressor Overload Protection	Excess current and cumulate energy make the thermal relay trip	The compressor stop running immediately	Reset manually on the touch screen	1,The compressor continue running in bad condition, over-current 2,The setting value of thermal relay too low
4	Contactor Protection	The coil of contactor does not suction normally	The compressor stop running immediately	Reset manually on the touch screen	1.The suction of the contactor is abnormal when Y type switch to △ type 2.The vibration during operation cause the contact to loosen
5	Anti-freeze Protection	Anti-freeze switch OFF	The compressor stop running immediately	Reset manually on the touch screen	1,The chilled water flow fall sharply, the water temperature too low 2,Anti-freeze switch is damaged or wiring connection is abnormal
6	Water Flow Fault	The water flow switch continue disconnecting more than 5s	1.Compressor cannot work; The compressor stop running immediately ； 2.Chilled water flow failure. The chilled water pump stop working after 30s delay; Cooling water pump and cooling tower shut down after 120s delay 3.Cooling water flow failure: The cooling water pump and cooling tower shut down after 30s delay; chilled water pump stop working after 180s delay.	Power off the unit and re-up electricity, reset manually on the touch screen	1,The water pump failure, the water flow too small 2,Water flow switch failure or wrong wiring connection
7	High-pressure Protection	High pressure switch OFF	The compressor which exists protection stop running immediately; Other compressors continue running	Press red reset button, reset manually on the touch screen	1,The cooling water quality is too bad and the heat exchange of condenser is abnormal 2,There is too much non-condensable gas in the system 3,The cooling water flow too small or the temperature too high 4,Too much refrigerant

					5,Wrong refrigerant type 6,The discharge shutoff valve does not open fully
8	Low-pressure Protection	The low pressure switch continue disconnecting more than 3s (setting is allowed)	1.The compressor which exists protection stop running immediately; Other compressors continue running 2.If the protection occurs before the unit starts to work, all of the compressors in the unit cannot run.	Reset manually on the touch screen	1,The refrigerant not enough 2,EXV failure, cannot work abnormally 3,The delay time of low pressure switch alarm too short 4,There is plugging in the filter 5,Some water enter the refrigerant system in evaporator 6,Poor system matching(the evaporator too small or the compressor too large) 7,There is too much oil in the system 8,Chilled water flow too small or the temperature too low
9	Low Oil Level Protection	The oil level switch continue disconnecting more than 60s (setting is allowed)	The compressor which exists protection stop running immediately; Other compressors continue running	Reset manually on the touch screen	1,Too low oil temperature when starting lead to too low pressure difference and return oil is abnormal 2,Return oil solenoid valve failure or plugging in the filter 3,Mix different oil types and return oil system is abnormal 4,Oil level switch failure or wrong wiring connection 5. The oil volume not enough
10	High Discharge Temperature Protection	The compressor discharge temperature is greater than the setting value	The compressor which exists protection stop running immediately; Other compressors continue running	The protection is relieved once the discharge temperature is lower than the setting value and reset manually on the touch screen	1,The superheat too high(the refrigerant not enough, EXV failure) 2,The discharge pressure too high 3,The oil level too low and the oil volume in the system too small 4,Running in bad condition, too high compression ratio , no auxiliary cooling 5,Bearting or screws are damage 6,Poor system matching
11	Low Chilled Leaving Water Temperature Protection	The chilled water temperature is lower than the setting value	The compressor stop running immediately	No display. Reset automatically when the water temperature is greater than the setting value	1,The chilled water flow is not enough 2,The unit continue running in under load condition.

Appendix 1

1.Temperature-Resistance characteristic sheet for discharge temperature sensor

NTC sensor characteristic sheet **Unit**：Temp:℃--K.Ratio:KΩ，5K@90℃

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-20	542.7	20	68.66	60	13.59	100	3.702
-19	511.9	21	65.62	61	13.11	101	3.595
-18	483	22	62.73	62	12.65	102	3.492
-17	455.9	23	59.98	63	12.21	103	3.392
-16	430.5	24	57.37	64	11.79	104	3.296
-15	406.7	25	54.89	65	11.38	105	3.203
-14	384.3	26	52.53	66	10.99	106	3.113
-13	363.3	27	50.28	67	10.61	107	3.025
-12	343.6	28	48.14	68	10.25	108	2.941
-11	325.1	29	46.11	69	9.902	109	2.86
-10	307.7	30	44.17	70	9.569	110	2.781
-9	291.3	31	42.33	71	9.248	111	2.704
-8	275.9	32	40.57	72	8.94	112	2.63
-7	261.4	33	38.89	73	8.643	113	2.559
-6	247.8	34	37.3	74	8.358	114	2.489
-5	234.9	35	35.78	75	8.084	115	2.422
-4	222.8	36	34.32	76	7.82	116	2.357
-3	211.4	37	32.94	77	7.566	117	2.294
-2	200.7	38	31.62	78	7.321	118	2.233
-1	190.5	39	30.36	79	7.086	119	2.174
0	180.9	40	29.15	80	6.859	120	2.117
1	171.9	41	28	81	6.641	121	2.061
2	163.3	42	26.9	82	6.43	122	2.007
3	155.2	43	25.86	83	6.228	123	1.955
4	147.6	44	24.85	84	6.033	124	1.905
5	140.4	45	23.89	85	5.844	125	1.856
6	133.5	46	22.89	86	5.663	126	1.808
7	127.1	47	22.1	87	5.488	127	1.762
8	121	48	21.26	88	5.32	128	1.717
9	115.2	49	20.46	89	5.157	129	1.674
10	109.8	50	19.69	90	5	130	1.632
11	104.6	51	18.96	91	4.849		
12	99.69	52	18.26	92	4.703		
13	95.05	53	17.58	93	4.562		
14	90.66	54	16.94	94	4.426		
15	86.49	55	16.32	95	4.294		
16	82.54	56	15.73	96	4.167		
17	78.79	57	15.16	97	4.045		
18	75.24	58	14.62	98	3.927		
19	71.86	59	14.09	99	3.812		

2.**Temperature-Resistance characteristic sheet for water temp. sensor, ambient temp. sensor, oil temp. sensor.**

NTC sensor characteristic sheet **Unit**：Temp:℃--K . Ratio:KΩ，10K@25℃

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-20	103.882	20	12.598	60	2.383	100	0.623
-19	97.868	21	12.023	61	2.296	101	0.605
-18	92.246	22	11.478	62	2.213	102	0.587
-17	86.987	23	10.961	63	2.134	103	0.570
-16	82.065	24	10.470	64	2.057	104	0.553
-15	77.457	25	10.005	65	1.984	105	0.537
-14	73.106	26	9.564	66	1.913	106	0.521
-13	69.031	27	9.146	67	1.846	107	0.506
-12	65.211	28	8.749	68	1.781	108	0.492
-11	61.629	29	8.372	69	1.718	109	0.478
-10	58.270	30	8.013	70	1.659	110	0.464
-9	55.099	31	7.669	71	1.601		
-8	52.123	32	7.342	72	1.546		
-7	49.328	33	7.031	73	1.492		
-6	46.703	34	6.735	74	1.441		
-5	44.235	35	6.453	75	1.392		
-4	41.896	36	6.183	76	1.346		
-3	39.697	37	5.927	77	1.301		
-2	37.628	38	5.683	78	1.258		
-1	35.682	39	5.450	79	1.217		
0	33.849	40	5.228	80	1.177		
1	32.115	41	5.016	81	1.139		
2	30.483	42	4.813	82	1.101		
3	28.944	43	4.620	83	1.066		
4	27.494	44	4.436	84	1.031		
5	26.126	45	4.261	85	0.998		
6	24.833	46	4.092	86	0.966		
7	23.613	47	3.932	87	0.935		
8	22.461	48	3.778	88	0.906		
9	21.373	49	3.632	89	0.877		
10	20.344	50	3.492	90	0.850		
11	19.365	51	3.357	91	0.823		
12	18.438	52	3.229	92	0.798		
13	17.563	53	3.106	93	0.773		
14	16.734	54	2.989	94	0.749		
15	15.950	55	2.876	95	0.727		
16	15.205	56	2.769	96	0.704		
17	14.500	57	2.666	97	0.683		
18	13.831	58	2.568	98	0.662		
19	13.198	59	2.473	99	0.643		

3.Temperature-Resistance characteristic sheet for EXV temp. sensor.

NTC Sensor characteristic sheet **Unit**：Temp:℃--K. Ratio:KΩ10K@25℃

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-20	67.74	20	12.09	60	3.02	100	0.97
-19	64.54	21	11.63	61	2.92	101	0.94
-18	61.52	22	11.20	62	2.83	102	0.92
-17	58.66	23	10.78	63	2.75	103	0.90
-16	55.95	24	10.38	64	2.66	104	0.87
-15	53.39	25	10.00	65	2.58	105	0.85
-14	50.96	26	9.63	66	2.51	106	0.83
-13	48.65	27	9.28	67	2.43	107	0.81
-12	46.48	28	8.94	68	2.36	108	0.79
-11	44.41	29	8.62	69	2.29	109	0.77
-10	42.25	30	8.31	70	2.22	110	0.75
-9	40.56	31	8.01	71	2.16		
-8	38.76	32	7.72	72	2.10		
-7	37.05	33	7.45	73	2.04		
-6	35.43	34	7.19	74	1.98		
-5	33.89	35	6.94	75	1.92		
-4	32.43	36	6.69	76	1.87		
-3	31.04	37	6.46	77	1.81		
-2	29.72	38	6.24	78	1.76		
-1	28.47	39	6.03	79	1.71		
0	27.28	40	5.82	80	1.66		
1	67.74	41	5.63	81	1.62		
2	26.13	42	5.43	82	1.57		
3	25.03	43	5.25	83	1.53		
4	23.99	44	5.08	84	1.49		
5	22.99	45	4.91	85	1.45		
6	22.05	46	4.74	86	1.41		
7	21.15	47	4.59	87	1.37		
8	20.29	48	4.44	88	1.33		
9	19.40	49	4.30	89	1.30		
10	18.70	50	4.16	90	1.26		
11	17.96	51	4.02	91	1.23		
12	17.24	52	3.90	92	1.20		
13	16.55	53	3.77	93	1.16		
14	15.90	54	3.65	94	1.13		
15	15.28	55	3.53	95	1.10		
16	14.68	56	3.42	96	1.08		
17	14.12	57	3.31	97	1.05		
18	13.57	58	3.21	98	1.02		
19	13.06	59	3.11	99	0.99		

1. Temperature-Resistance characteristic sheet for EXV temp. sensor.

NTC Sensor characteristic sheet **Unit:** Temp:℃--K. Ratio:KΩ 50K@25℃

Temp.	Ratio	Temp.	Ratio	Temp.	Ratio	Temp.	Ratio
-40	1630,77						
-35	1178,11						
-30	860,97						
-25	636,08						
-20	474,78						
-15	357,83						
-10	272,18						
-5	208,83						
0	161,56						
5	125,97						
10	98,96						
15	78,29						
20	62,37						
25	50,00						
30	40,34						
35	32,73						
40	26,71						
45	21,92						
50	18,08						
55	14,99						
60	12,48						
65	10,44						
70	8,78						
75	7,41						
80	6,28						
85	5,34						
90	4,56						
95	3,91						
100	3,37						
105	2,91						
110	2,52						
115	2,19						
120	1,91						
125	1,67						
130	1,46						
135	1,28						
140	1,13						
145	1,00						
150	0,89						

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