

SHANGHAI FAIVELEY RAILWAY TECHNOLOGY CO.

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6 TROUBLESHOOTING

SHANGHAI FAIVELEY RAILWAY TECHNOLOGY CO.

Release History

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Revision Table

Revision	Date	Revised Sections, Description, Reason for changes
01	29.11.2010	First issue
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6 TROUBLESHOOTING

The general purpose of the fault finding instruction is to help service technician identify the root cause of the problem.

If a fault or a defect happens, the service technician can look out this file to see what happened and find out how the fault is rectified.

Each HVAC system involves two corresponding system: one is refrigeration circuit, and the other is electrical system. Either system is damaged, the HVAC system won't work normally. The general principle is listed as following when the HVAC system can not work well.

Condition of HVAC system	Low pressure	High pressure	Running current
Insufficiency of refrigerant	↘	↘	↘
Jam of expansion valve	↘	↘	↘
The airflow internal shortcut	↘	↘	↘
Bad performance of Condenser	↗	↗	↗
Compressor damaged	↗	↘	↘

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6.1 NORMAL DEFECT CHECKLIST

Trouble	Cause analysis solution	Remedy		Reference to relevant section
		analysis	solution	
Evaporator frosting	The refrigerant in the system is insufficient	It can be observed by sight glass.	The refrigerant shall be recharged through the injection valve	Chapter for cab unit 5.5.7 Chapter for saloon unit 5.5.8
	The thermal expansion valve, the filter dryer etc are slightly jammed	Dirty in refrigerant circuit.	The cooling circuit shall be cleaned completely, even some components shall be replaced if necessary.	Chapter for cab unit 5.5.34,5.5.56 Chapter for saloon unit 5.5.35,5.5.58
Noise	The bolts tighten the HVAC unit are loosen	The loosened bolts make noise.	Tighten the bolts again.	Chapter for cab unit 5.4.7 Chapter for saloon unit 5.4.6
	The performance of the compressor is bad, which can be detected by the current.	The compressor is needed to be replaced.	Replace the compressor immediately.	Chapter for cab unit 5.5.26 Chapter for saloon unit 5.5.27
	The voltage of the power supply is unsteady, which can be detected by multimeter.	It maybe a external reason.	shut down the unit and seek the reason	External failure, no matter with HVAC unit
	The bolts tighten the compressor are loosen.	The loosened bolts make noise.	Tighten the bolts again.	Chapter for cab unit 5.4.7 Chapter for saloon unit 5.4.6
	The impellers of the fan are distorted.	The distorted impeller rubs to make noise	Seek new one to replace it.	Chapter for cab unit 5.5.21 Chapter for saloon unit 5.5.18
Plant is switched on	No voltage	It maybe an external	Check the voltage at the device and	External failure, no matter with HVAC

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Trouble	Cause analysis solution	Remedy		Reference to relevant section
		analysis	solution	
but does not start		reason.	fuses	unit
Condenser fan does not start	No power supply to motor; Fan motor defective	Each of the two causes can lead to the failure.	Check temperature relay, Measure motor windings; replace motor if the motor is burned.	Chapter for cab unit 5.5.20 Chapter for saloon unit 5.5.16
Compressor does not start despite high room temperature	No power supply to motor Compressor motor defective	Each of the two causes can lead to the failure.	Check temperature relay; Measure motor windings, replace compressor if the motor is burned.	Chapter for cab unit 5.5.26 Chapter for saloon unit 5.5.27
Compressor switches off and on again without reaching the set-point temperature	Low pressure	Refrigerant insufficient	charge with refrigerant	Chapter for cab unit 5.5.7 Chapter for saloon unit 5.5.8
		Air filter clogged, which causes lack of air flow	Clean or replace air filter	Chapter for cab unit 5.4.11 Chapter for saloon unit 5.4.9
		The rotation speed of fan is low	Check fan sense of rotation	Chapter for cab unit 5.4.7.4 Chapter for saloon unit 5.4.6.4
	High pressure	Condenser soiled	clean	Chapter for cab unit 5.4.24 Chapter for saloon unit 5.4.12, 5.4.13
		Condenser fan motor defective	Replace condenser fan motor	Chapter for cab unit 5.5.20 Chapter for saloon unit 5.5.16
		High pressure switch does not switch on Refrigerant level is too high (can only happen after filling)	Recharge system	Chapter for cab unit 5.5.1, 5.5.3, 5.5.5, 5.5.7 Chapter for saloon unit 5.5.2, 5.5.4, 5.5.6, 5.5.8
		Filter contaminated	Usual wear	Dirty in air, it is allowable
Actuator defective	Wear	Normal wear	Replace	Chapter 5.5.64, 5.5.65

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Trouble	Cause analysis solution	Remedy		Reference to relevant section
		analysis	solution	
Temperature sensor defective	Wear	Normal wear	Replace	Chapter for cab unit 5.5.48, 5.5.49 Chapter for saloon unit from 5.5.50 to 5.5.52

Actuators may be driven using the service program (test modes), and visual checks serve to establish their moving direction and end position. Actuator end positions may also be requested via test modes. If an actuator does not move into the end position, check the wiring.

All Temperature sensors may be read in and checked using the service program MONA. The software monitors possible short circuits or defective terminals supplying Temperature sensors and stores them in an error memory which may then be evaluated to locate defective Temperature sensors.

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6.2 FAULT SIGNALS LIST

The diagnosis code is listed below; any others would be added or modified during commissioning if needed.

Fault signals list of Saloon HVAC

Code number	Function (event)	Remark Intern	gravity	Name
1	Supply fan high speed contactor KM15 fault or thermo protector FR01 fault	1	1	DF_SAFH
2	Supply fan low speed contactor KM16 fault or thermo protector FR02 fault	2	1	DF_SAFL
3	Supply fan emergency ventilation contactor KM17 fault or circuit breaker QF05 fault	3	1	DF_ESAF
4	400V AC power line fault	4	1	DF_400VAC
5	CPR1 contactor KM11 or thermo protector QF01 fault	5	2	DF_CTH1
6	Compressor 1 low pressure LP1 fault	6	2	DF_CLP1
7	Compressor 1 high pressure HP1 fault	7	2	DF_CHP1
8	One or more of DF_CTH1, DF_CLP1 and DF_CHP1 are active	8	2	DF_FAIL_CPR1
9	CPR2 contactor KM12 or thermo protector QF02 fault	9	2	DF_CTH2
10	Compressor 2 low pressure LP2 fault	10	2	DF_CLP2
11	Compressor 2 high pressure HP2 fault	11	2	DF_CHP2
12	One or more of DF_CTH2, DF_CLP2 and DF_CHP2 are active	12	2	DF_FAIL_CPR2
13	Condenser fan 1 contactor KM13 or circuit breaker QF03 fault	13	2	DF_CDF1
14	Condenser fan 2 contactor KM14 or circuit breaker QF04 fault	14	2	DF_CDF2
15	Unit heater 1 KM18 or breaker QF06 fault	15	2	DF_UH1
16	Unit heater 2 KM19 or breaker QF06 fault	16	2	DF_UH2
17	Unit heater overload fault	17	2	DF_UHOV
18	Fresh air damper fault	18	3	DF_FAD

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Code number	Function (event)	Remark Intern	gravity	Name
19	Return air damper fault	19	3	DF_RAD
20	Fresh air temperature sensor fault	20	3	DF_SEN_FAS
21	Return air temperature sensor fault	21	3	DF_SEN_RAS
22	Supply air temperature sensor fault	22	3	DF_SEN_SAS
23	The serial number of FPC24	23	15	FPC_SN

Fault signals list of Cab HVAC

Code number	Function (event)	Remark Intern	gravity	Name
1	Supply fan1 control contactor KM3 fault or high speed contactor KM7 fault or thermo protector FR1 fault when SA2 speed request is high vent	1	1	DF_SAF1H
2	Supply fan1 control contactor KM3 low speed contactor KM8 fault or thermo protector FR1 fault when SA2 speed request is low vent	2	1	DF_SAF1L
3	Supply fan 2 control contactor KM6 or high speed contactor KM10 fault or thermo protector FR2 fault when SA3 speed request is high vent	3	1	DF_SAF2H
4	Supply fan 2 control contactor KM6 or low speed contactor KM11 fault or thermo protector FR2 fault when SA3 speed request is low vent	4	1	DF_SAF2L
5	Supply fan emergency ventilation contactor KM9 fault or thermo protector FR1 fault when power is in emergency mode	5	1	DF_ESAF
6	CPR contactor KM1 or thermo protector QF01 fault or CDF contactor KM2 or thermo protector QF02 fault or HP fault	6	2	DF_CTHHP
7	Compressor low pressure LP fault	7	2	DF_CLP
8	One or more of DF_CTHHP, DF_CLP are active	8	2	DF_FAIL_CPR
9	Unit heater 1 KM4 or heater1 overload fault	9	2	DF_UH1

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Code number	Function (event)	Remark Intern	gravity	Name
10	Unit heater 2 KM5 or heater2 overload fault	10	2	DF_UH2
11	Emergency heater KA5 fault	11	2	DF_EMH
12	400V AC power line fault	12	2	DF_MLF
13	250V Decteded	13	2	DF_AC250
14	Supply air temperature sensor fault	14	3	DF_SEN_SAS
15	Return air temperature sensor fault	15	3	DF_SEN_RAS
16	The serial number of FPC08	23	15	FPC_SN

Classification of Gravity is valid for the device which is described. The gravity of the error description in the following section is same.

If more faults come together, please check the chapter of function

Description of Gravity:

[1]...Serious fault (Subsystem fault), maintenance after current turn required

[2]...Medium fault (Subsystem reduced load), maintenance after service required,

[3]...Slight fault (Component fail, unit OK), maintenance required,

[15]...Event supervision, no fault

Procedure for fault gravity generation (take in account special position of ventilation):

- If a component fail, a slight fault is generated (failure of sensor, fan, flap, detector, heater)
- If a subsystem works with reduced load, a medium fault is generated (failure of cooling, one supply fan, one emergency fan)
- If a subsystem fault a serious fault is generated (failure of ventilation, emergency ventilation, emergency inverter)