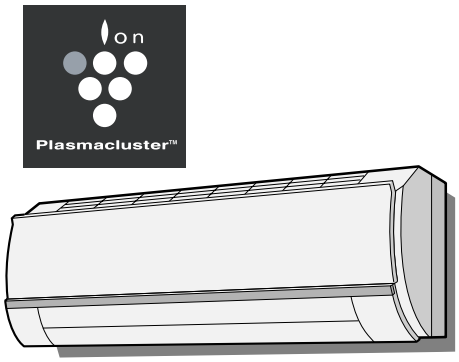
SHARP SERVICE MANUAL

S6512AYXP7FR/T

SPLIT TYPE ROOM AIR CONDITIONER

	INDOOR UNIT	OUTDOOR UNIT
MODELS	AY-XP7FR	AE-X7FR
	AY-XP9FR	AE-X9FR
	AY-XP12FR	AE-X12FR



In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified should be used.

CONTENTS

Parts marked with " ⚠ " are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

This document has been published to be used for after sales service only.
The contents are subject to change without notice.

CHAPTER 1. SPECIFICATION

[1] SPECIFICATION

1. AY-XP7FR – AE-X7FR

ITEMS		MODEL	INDOOR UNIT AY-XP7FR	OUTDOOR UNIT AE-X7FR
Cooling capacity(Min. > Max.)		kW	2.1 (0.9 - 2.5)	
Heating capacity(Min. > Max.)		kW	2.4 (0.9 - 3.4)	
Moisture removal(at cooling)		Liters/h		

Electrical data

Phase			Single	
Rated frequency		Hz	50	
Rated voltage		V	230	
Rated current ☆ (Min - Max.)	Cool	A	2.5 (1.0 - 4.1)	
	Heat	A	2.4 (0.9 - 4.5)	
Rated input ☆ (Min - Max.)	Cool	W	530 (200 - 760)	
	Heat	W	510 (160 - 1100)	
Power factor ☆	Cool	%	92	
	Heat	%	92	
Compressor	Type		Hermetically sealed rotary type	
	Model		DA89X1F-23F	
	Oil charge		370cc (VG74)	
Refrigerant system	Evaporator		Louver Fin and Grooved tube type	
	Condenser		Corrugate Fin and Grooved tube type	
	Control		Expansion valve	
	Refrigerant (R410A)		830g	
	De-lce system		Micro computer controled reversed systems	
Noise level (at cooling)	High	dB(A)	37	45
	Low	dB(A)	–	–
	Soft	dB(A)	28	–

Fan system

Drive			Direct drive	
Air flow quantity (at cooling)	High	m3/min.	8.0	23.2
	Low	m3/min.	6.8	–
	Soft	m3/min.	5.5	–
Fan			Cross flow fan	Propeller fan

Connections

Refrigerant coupling			Flare type	
Refrigerant tube size Gas, Liquid			3/8", 1/4"	
Drain piping mm			O.D ϕ18	

Others

Safety device			Compressor: Thermal protector	
			Fan motors: Thermal fuse	
			Fuse, Micro computer control	
Air filters			Polypropylene net (Washable)	
Net dimensions	Width	mm	790	730
	Height	mm	278	540
	Depth	mm	198	250
Net weight		kg	10	33

2. AY-XP9FR – AE-X9FR

ITEMS		MODEL	INDOOR UNIT AY-XP9FR	OUTDOOR UNIT AE-X9FR
Cooling capacity(Min. > Max.)		kW	2.64 (0.9 - 3.0)	
Heating capacity(Min. > Max.)		kW	3.1 (0.9 - 4.8)	
Moisture removal(at cooling)		Liters/h		
Electrical data				
Phase			Single	
Rated frequency		Hz	50	
Rated voltage		V	230	
Rated current ☆ (Min - Max.)	Cool	A	3.7 (1.0 - 4.8)	
	Heat	A	3.5 (0.9 - 6.1)	
Rated input ☆ (Min - Max.)	Cool	W	780 (200 - 960)	
	Heat	W	730 (160 - 1400)	
Power factor ☆	Cool	%	92	
	Heat	%	91	
Compressor	Type		Hermetically sealed rotary type	
	Model		DA89X1F-23F	
	Oil charge		370cc (VG74)	
Refrigerant system	Evaporator		Louver Fin and Grooved tube type	
	Condenser		Corrugate Fin and Grooved tube type	
	Control		Expansion valve	
	Refrigerant (R410A)		830g	
	De-lce system		Micro computer controled reversed systems	
Noise level (at cooling)	High	dB(A)	39	45
	Low	dB(A)	–	–
	Soft	dB(A)	28	–
Fan system				
Drive			Direct drive	
Air flow quantity (at cooling)	High	m3/min.	8.6	23.3
	Low	m3/min.	7.3	–
	Soft	m3/min.	5.5	–
Fan			Cross flow fan	Propeller fan
Connections				
Refrigerant coupling			Flare type	
Refrigerant tube size Gas, Liquid			3/8", 1/4"	
Drain piping mm			O.D ϕ18	
Others				
Safety device			Compressor: Thermal protector	
			Fan motors: Thermal fuse	
			Fuse, Micro computer control	
Air filters			Polypropylene net (Washable)	
Net dimensions	Width	mm	790	730
	Height	mm	278	540
	Depth	mm	198	250
Net weight		kg	10	33

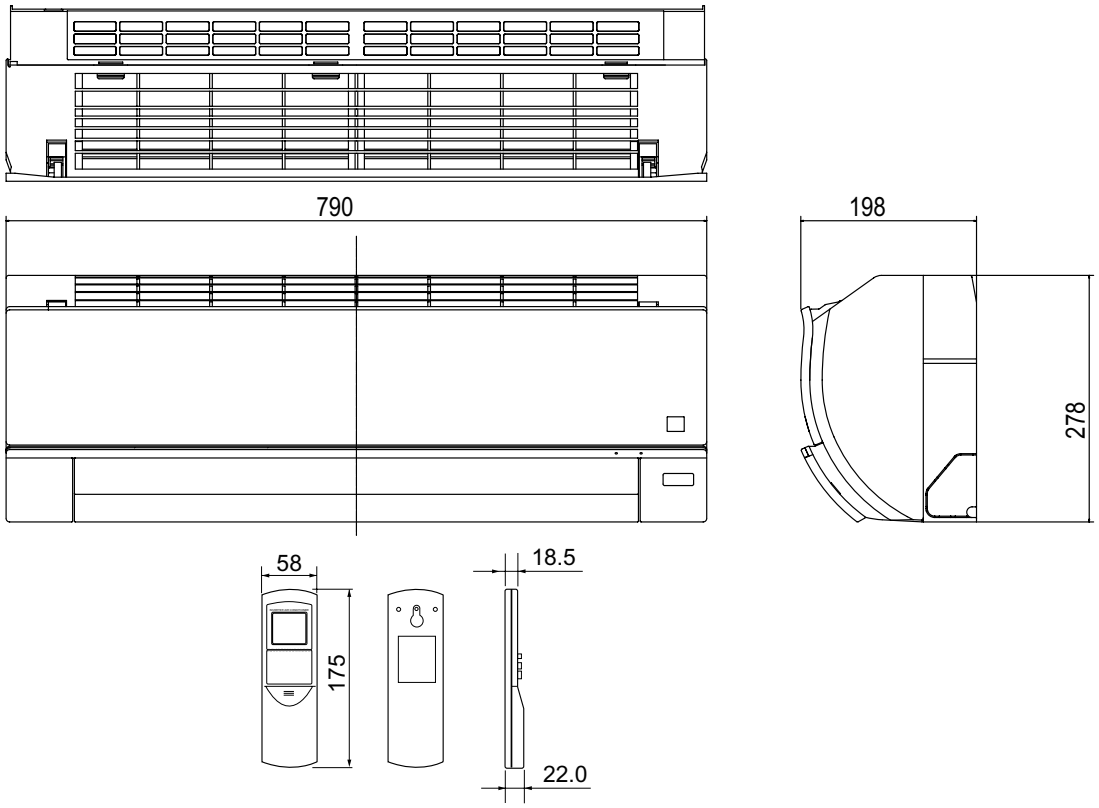
3. AY-XP12FR – AE-X12FR

ITEMS		MODEL	INDOOR UNIT AY-XP12FR	OUTDOOR UNIT AE-X12FR
Cooling capacity(Min. > Max.)		kW	3.5 (0.9 - 3.8)	
Heating capacity(Min. > Max.)		kW	4.0 (0.9 - 6.0)	
Moisture removal(at cooling)		Liters/h		
Electrical data				
Phase			Single	
Rated frequency		Hz	50	
Rated voltage		V	230	
Rated current ☆ (Min - Max.)	Cool	A	5.0 (1.1 - 8.2)	
	Heat	A	4.8 (1.0 - 8.0)	
Rated input ☆ (Min - Max.)	Cool	W	1090 (210 - 1300)	
	Heat	W	1030 (180 - 1900)	
Power factor ☆	Cool	%	95	
	Heat	%	93	
Compressor	Type		Hermetically sealed rotary type	
	Model		5RS102XBE01	
	Oil charge		320cc (RB68A or Freol Alpha 68M)	
Refrigerant system	Evaporator		Louver Fin and Grooved tube type	
	Condenser		Corrugate Fin and Grooved tube type	
	Control		Expansion valve	
	Refrigerant (R410A)		1030g	
	De-lce system		Micro computer controled reversed systems	
Noise level (at cooling)	High	dB(A)	40	48
	Low	dB(A)	–	–
	Soft	dB(A)	28	–
Fan system				
Drive			Direct drive	
Air flow quantity (at cooling)	High	m3/min.	9.8	26.7
	Low	m3/min.	8.5	–
	Soft	m3/min.	6.9	–
Fan			Cross flow fan	Propeller fan
Connections				
Refrigerant coupling			Flare type	
Refrigerant tube size Gas, Liquid			3/8", 1/4"	
Drain piping mm			O.D ϕ18	
Others				
Safety device			Compressor: Thermal protector	
			Fan motors: Thermal fuse	
			Fuse, Micro computer control	
Air filters			Polypropylene net (Washable)	
Net dimensions	Width	mm	790	730
	Height	mm	278	540
	Depth	mm	198	250
Net weight		kg	10	37

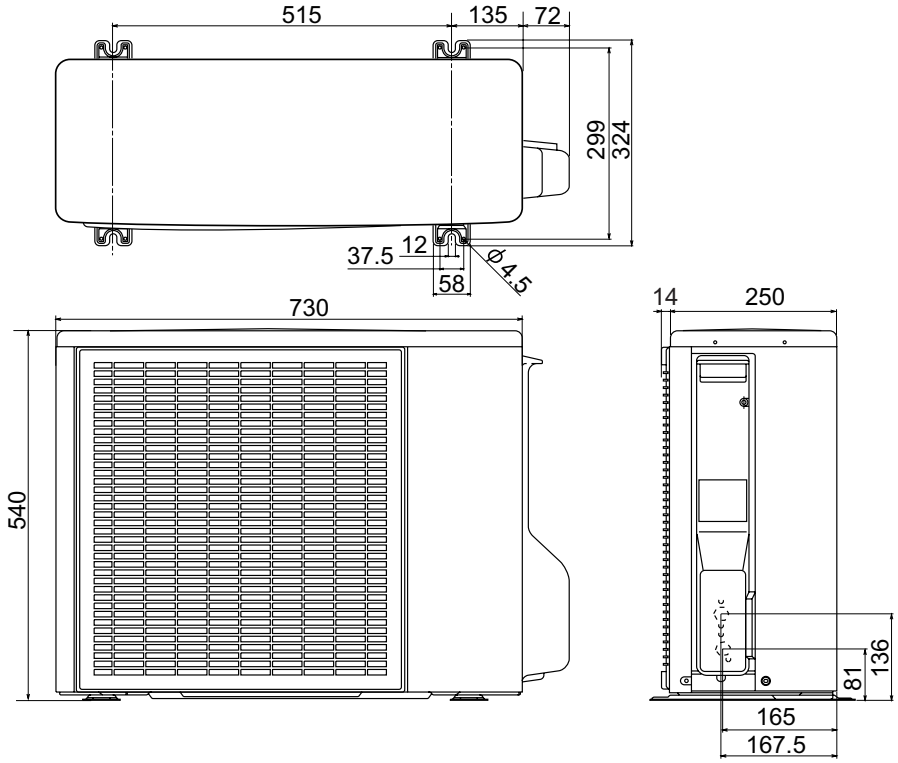
NOTE: The condition of star"☆" marked item are 'ISO5151' : 1994(E), contition T1.

[2] EXTERNAL DIMENSION

1. Indoor unit



2. Outdoor unit



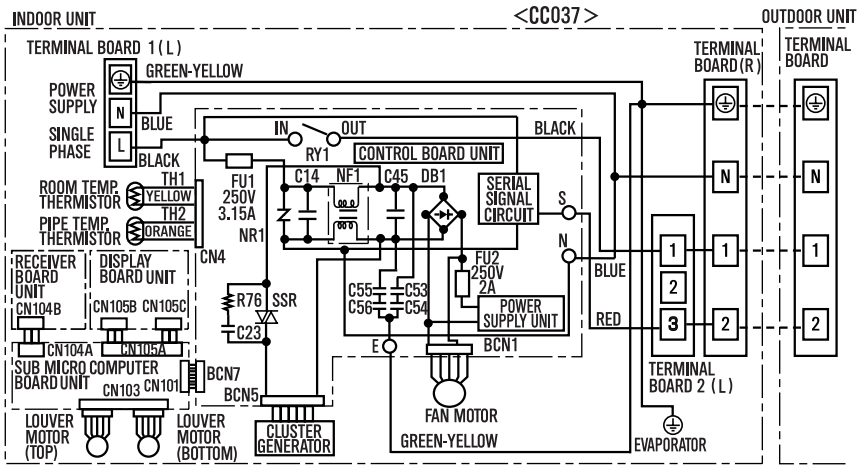
[3] WIRING DIAGRM

1. Indooa unit

LED INDICATION FOR SELF-DIAGNOSIS

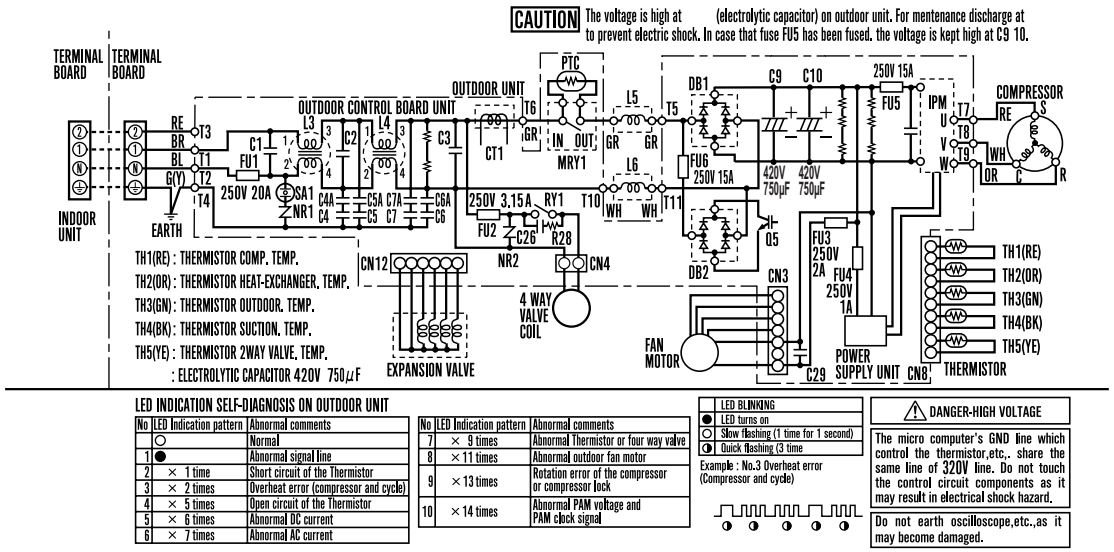
Temperature Indicator Blinking No.	Abnormal contents
1	Short circuit of the Thermistor
2	Overheat error (compressor and cycle)
5	Open circuit of the Thermistor
6	Abnormal DC current
7	Abnormal AC current
9	Abnormal Thermistor or four way valv
11	Abnormal outdoor fan motor
13	Rotation error of the compressor or compressor lock
14	Abnormal PAM voltage and PAM clock signal
17	Open circuit of serial signal line
18	Short circuit of serial signal line
19	Abnormal fan motor of indoor unit

<Indication of the abnormal condition>
LED indicator will blink, if the set is in abnormal condition.



2. Outdooa unit

2.1. AE-X7FR / AE-X9FR



LED INDICATION SELF-DIAGNOSIS ON OUTDOOR UNIT

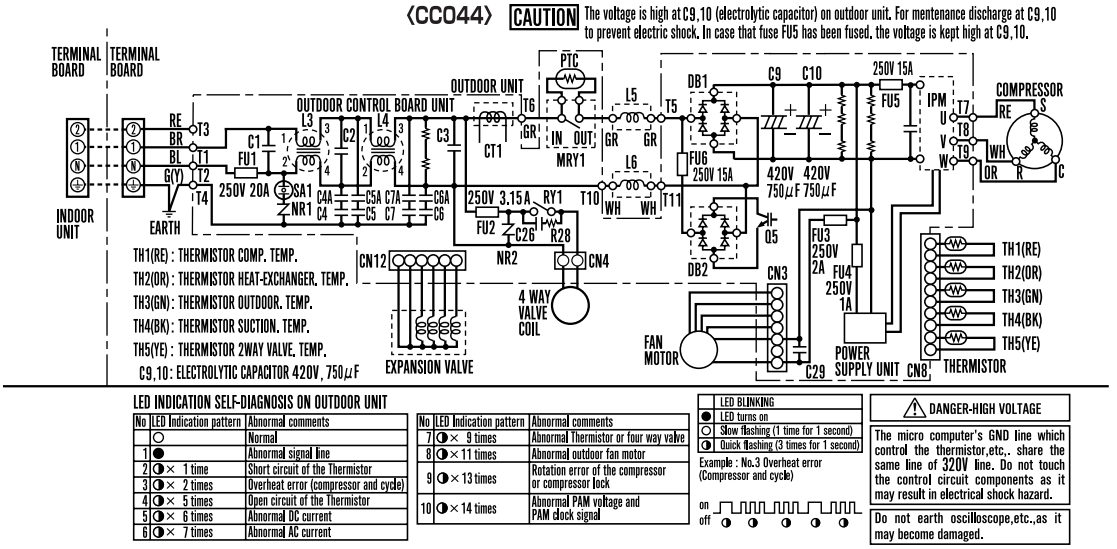
No	LED Indication pattern	Abnormal comments
	○	Normal
1	●	Abnormal signal line
2	○ × 1 time	Short circuit of the Thermistor
3	○ × 2 times	Overheat error (compressor and cycle)
4	○ × 5 times	Open circuit of the Thermistor
5	○ × 6 times	Abnormal DC current
6	○ × 7 times	Abnormal AC current

No	LED Indication pattern	Abnormal comments
7	○ × 9 times	Abnormal Thermistor or four way valve
8	○ ×11 times	Abnormal outdoor fan motor
9	○ ×13 times	Rotation error of the compressor or compressor lock
10	○ ×14 times	Abnormal PAM voltage and PAM clock signal

LED BLINKING
● LED turns on
○ Slow flashing (1 time for 1 second)
◑ Quick flashing (3 time
Example : No.3 Overheat error (Compressor and cycle)

⚠ DANGER-HIGH VOLTAGE
The micro computer's GND line which control the thermistor,etc,. share the same line of 320V line. Do not touch the control circuit components as it may result in electrical shock hazard.
Do not earth oscilloscope,etc.,as it may become damaged.

2.2. AE-X12FR



LED INDICATION SELF-DIAGNOSIS ON OUTDOOR UNIT

No	LED Indication pattern	Abnormal comments
	○	Normal
1	●	Abnormal signal line
2	◑○ × 1 time	Short circuit of the Thermistor
3	◑○ × 2 times	Overheat error (compressor and cycle)
4	◑○ × 5 times	Open circuit of the Thermistor
5	◑○ × 6 times	Abnormal DC current
6	◑○ × 7 times	Abnormal AC current

No	LED Indication pattern	Abnormal comments
7	◑○ × 9 times	Abnormal Thermistor or four way valve
8	◑○ ×11 times	Abnormal outdoor fan motor
9	◑○ ×13 times	Rotation error of the compressor or compressor lock
10	◑○ ×14 times	Abnormal PAM voltage and PAM clock signal

LED BLINKING
● LED turns on
○ Slow flashing (1 time for 1 second)
◑ Quick flashing (3 times for 1 second)
Example : No.3 Overheat error (Compressor and cycle)

⚠ DANGER-HIGH VOLTAGE
The micro computer's GND line which control the thermistor,etc,. share the same line of 320V line. Do not touch the control circuit components as it may result in electrical shock hazard.
Do not earth oscilloscope,etc.,as it may become damaged.

[8] TROUBLESHOOTING GUIDE

1. Self-Diagnosis Function and Display Mode

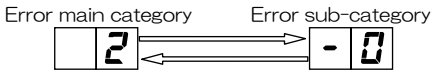
To call out the content of the self-diagnosis memory, hold down the emergency operation button for more than 5 seconds when the indoor unit is not operating.

- The number of indications displayed by the LEDs on the outdoor unit differs from that for the 2001 cooling unit models (for detailed display of malfunction information).

  The display of malfunction No. differs from that of the 2001 cooling unit models. To show detailed malfunction information, two types of numbers flash alternately. (example: "21" ←→ "-0")

1) The content of the self-diagnosis memory can be called out and displayed on the seven-segment display section on the indoor unit. (The error data cannot be called out for display by the LED on the outdoor unit.)
2) If the power cord is unplugged from the AC outlet or the circuit breaker is turned off, the self-diagnosis memory loses the stored data.
   a) The self-diagnosis display function of the indoor unit indicates the content of diagnosis by showing the error main category (number) and the error sub-category (-number) alternately in 1-second intervals on the seven-segment display section of the indoor unit.

      Example of self-diagnosis display on indoor unit: Compressor high-temperature error

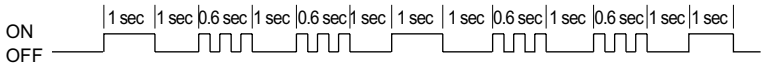


   b) The self-diagnosis display function of the outdoor unit indicates the error information by flashing LED1 on the outdoor unit according to the content of self-diagnosis.

      The self-diagnosis display function of the outdoor unit is active only for about 3 to 10 minutes after self-diagnosis is performed during operation, and the display returns to normal condition after this display period.

      The content of self-diagnosis cannot be called out by the self-diagnosis display function of the outdoor unit.

      Example of self-diagnosis display on outdoor unit: Compressor high-temperature error



   c) The content of diagnosis is transferred to the indoor unit via serial communication, but it does not trigger a complete shutdown operation.

⊛ : Flashes in 2-sec intervals (normal), ●: On, ×: Off, ◑: Flashes 3 times in 0.2-sec intervals (When LED1 on the outdoor unit flashes in 2-sec intervals, the outdoor unit is in normal condition.)

Status of indoor/ outdoor units	Indication by LED1 on outdoor unit *2	Malfunction No. displayed on main unit display section *1		Content of diagnosis		Inspection location/method	Remedy
		Main category	Sub-category	Main category	Sub-category		
Indoor/ outdoor units in operation	⊛ Normal flashing	0	0		Normal	–	–
Indoor/ outdoor units in complete shutdown	◑ 1 time	1	-0	Outdoor unit thermistor short-circuit	Heat exchanger thermistor short-circuit error	(1) Measure resistance of the outdoor unit thermistors. (TH2 to TH5: Approx. 4.4 kΩ at 25°C) (2) Check the lead wire of the outdoor unit thermistor for torn sheath and short-circuit. (3) No abnormality found in above inspections (1) and (2).	(1) Replace the outdoor unit thermistor assembly. (2) Replace the outdoor unit thermistor assembly. (3) Replace the outdoor unit control PWB assembly.
			-1		Outside temperature thermistor short-circuit error		
			-2		Suction thermistor short-circuit error		
			-3		2-way valve thermistor short-circuit error		

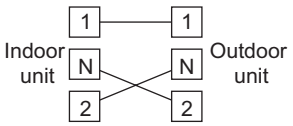
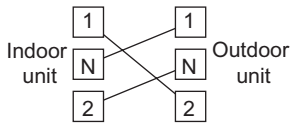
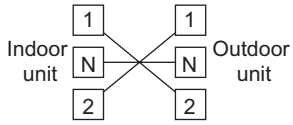
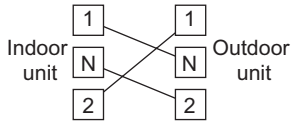
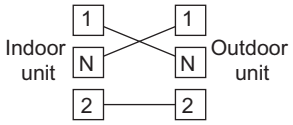
Status of indoor/ outdoor units	Indication by LED1 on outdoor unit *2	Malfunction No. displayed on main unit display section *1		Content of diagnosis		Inspection location/method	Remedy
		Main category	Sub-category	Main category	Sub-category		
Indoor/ outdoor units in complete shutdown	◑ 2 times	2	-0	Cycle temperature	Compressor high-temperature error	(1) Check the outdoor unit air outlet for blockage. (2) Check if the power supply voltage is 90 V or higher at full power. (3) Check the pipe connections for refrigerant leaks. (4) Measure resistance of the outdoor unit compressor thermistor. (TH1: Approx. 53 kΩ at 25°C) (5) Check the expansion valve for proper operation.	(1) Ensure unobstructed air flow from the outdoor unit air outlet. (2) Connect power supply of proper voltage. (3) Charge the specified amount of refrigerant. (4) Replace the outdoor unit compressor thermistor assembly. (5) Replace the expansion valve coil, expansion valve or outdoor unit control PWB assembly.
Indoor unit in operation Outdoor unit in temporary stop			-1		Temporary stop due to compressor discharge overheat *3	(Temporary stop for cycle protection)	–
			-2		Temporary stop due to outdoor unit heat exchanger overheat *3	(Temporary stop for cycle protection)	–
			-3		Temporary stop due to outdoor unit heat exchanger overheat *3	(Temporary stop for cycle protection)	–
			-4		Temporary stop due to 2-way valve freeze *3	(Temporary stop for cycle protection)	–
Indoor unit in operation Outdoor unit in temporary stop	◑ 3 times	3	-0	Dry operation	Temporary stop due to dehumidifying operation *3	(Temporary stop for cycle protection)	–
Indoor/ outdoor units in complete shutdown	◑ 5 times	5	-0	Outdoor unit thermistor open-circuit	Heat exchanger thermistor open-circuit error	(1) Check connector CN8 of the outdoor unit thermistor for secure installation. (2) Measure resistance of outdoor thermistors TH1 to TH5. (3) Check the lead wires of thermistors TH1 through TH5 on the outdoor unit control PWB for open-circuit. (4) No abnormality found in above inspections (1) through (3).	(1) Correct the installation. (2) Replace the outdoor unit thermistor assembly. (3) Replace the outdoor unit thermistor assembly. (5) Replace the outdoor unit control PWB assembly.
			-1		Outside temperature thermistor open-circuit error		
			-2		Suction thermistor open-circuit error		
			-3		2-way valve thermistor open-circuit error		
			-4		Discharge thermistor open-circuit error		

Status of indoor/ outdoor units	Indication by LED1 on outdoor unit *2	Malfunction No. displayed on main unit display section *1		Content of diagnosis		Inspection location/method	Remedy
		Main category	Sub-category	Main category	Sub-category		
Indoor/ outdoor units in complete shutdown	◑ 6 times	6	-0	Outdoor unit DC	DC overcurrent error	(1) IPM continuity check (2) Check the IPM and heat sink for secure installation. (3) Check the outdoor unit fan motor for proper rotation. (4) No abnormality found in above inspections (1) through (3). (5) No abnormality found in above inspections (1) through (4).	(1) Replace the outdoor unit control PWB assembly. (2) Correct the installation (tighten the screws). (3) Replace the outdoor unit fan motor. (4) Replace the outdoor unit control PWB assembly. (5) Replace the compressor.
			-1		IPM pin level error	Check the IPM is attached correctly to the outdoor unit control PWB.	Replace the outdoor unit control PWB assembly.
Indoor/ outdoor units in complete shutdown	◑ 7 times	7	-0	Outdoor unit AC	AC overcurrent error	(1) Check the outdoor unit air outlet for blockage. (2) Check the outdoor unit fan for proper rotation.	(1) Ensure unobstructed air flow from the outdoor unit air outlet. (2) Check the outdoor unit fan motor.
			-1		AC overcurrent error in OFF status	(1) IPM continuity check	(1) Replace the outdoor unit control PWB assembly.
			-2		AC maximum current error	(1) Check the outdoor unit air outlet for blockage. (2) Check the outdoor unit fan for proper rotation.	(1) Ensure unobstructed air flow from the outdoor unit air outlet. (1) Check the outdoor unit fan motor.
			-3		AC current deficiency error	(1) Check if there is an open-circuit in the secondary winding of the current transformer of the outdoor unit control PWB. (2) Check if the refrigerant volume is abnormally low. (3) Check if the refrigerant flows properly.	(1) Replace the outdoor unit control PWB assembly. (2) Charge the specified amount of refrigerant. (3) Correct refrigerant clogs. (2-way valve, 3-way valve, pipe, expansion valve)
Indoor/ outdoor units in complete shutdown	◑ 9 times	9	-0	Outdoor unit cooling/heating switchover	Thermistor installation error or 4-way valve error	(1) Check to make sure outdoor unit thermistor TH2 (heat exchanger) and TH5 (2-way valve) are installed in correct positions. (2) Measure resistance of thermistors TH1 and TH5. (3) Check the 4-way valve for proper operation. (4) No abnormality found in above inspections (1) through (3).	(1) Correct the installation. (2) Replace the thermistor assembly. (3) Replace the 4-way valve. (4) Replace the outdoor unit control PWB assembly.
			-3		Torque control error	(1) Check if the refrigerant volume is abnormally low. (2) Check the 4-way valve for proper operation. (3) check to see compressor type is correct.	(1) Change the specified amount of refrigerant. (2) Replace the 4-way valve. (3) Replace the compressor with the correct part.

Status of indoor/ outdoor units	Indication by LED1 on outdoor unit *2	Malfunction No. displayed on main unit display section *1		Content of diagnosis		Inspection location/method	Remedy
		Main category	Sub-category	Main category	Sub-category		
Indoor/ outdoor units in complete shutdown	◑ 11 times	11	-0	Outdoor unit DC fan	Outdoor unit DC fan rotation error	(1) Check connector CN3 of the outdoor unit DC fan motor for secure installation. (2) Check the outdoor unit fan motor for proper rotation. (3) Check fuse FU3. (4) Outdoor unit control PWB	(1) Correct the installation. (2) Replace the outdoor unit fan motor. (3) Replace the outdoor unit control PWB assembly. (4) Replace the outdoor unit control PWB assembly.
Indoor/ outdoor units in complete shutdown	◑ 13 times	13	-0	DC compressor	Compressor startup error	(1) Check the colors (red, white, orange) of the compressor cords for proper connection. (PWB side, compressor side)	(1) Correct the installation. (U: Red, V: White, W: Orange)
			-1		Compressor rotation error (120° energizing error)	(2) Check if the IPM terminal resistance values are uniform. (3) No abnormality found in above inspections (1) and (2). (4) No abnormality found in above inspections (1) through (3).	(2) Replace the outdoor unit control PWB assembly. (3) Replace the outdoor unit control PWB assembly. (4) Replace the compressor.
Indoor/ outdoor units in complete shutdown	◑ 14 times	14	-0	Outdoor unit PAM	PAM over voltage error Compressor rotation error	(1) Check the AC power supply voltage for fluctuation. (2) No abnormality found in above inspection (1).	(1) Connect stable power supply. (2) Replace the outdoor unit control PWB assembly.
Indoor/ outdoor units in operation			-1		PAM clock error	(1) Check the PAM clock for proper input.	(1) Replace the outdoor unit control PWB assembly.
Indoor unit in operation Outdoor unit in complete shutdown	●	17	-0	Wires between units	Serial open-circuit	(1) Check the wires between units. (2) Check voltage between Nos. 1 and 2 on the indoor/outdoor unit terminal boards.	(1) Connect stable power supply. (2) Replace the outdoor unit control PCB assembly.
	×				Outdoor unit does not turn on due to erroneous wiring	(1) Check the wires between units.	(1) Correct the wiring.
						(2) Check the outdoor unit fuse.	(2) Replace the fuse/outdoor unit control PCB assembly.
						(3) Check 15-V, 13-V and 5-V voltages on the PWB. Check resistance between IPM terminals.	(3) Replace the outdoor unit control PCB assembly.
						(4) Check pins No. 5 and 7 of connector CN3 of the outdoor unit fan motor for short-circuit.	(4) Replace the outdoor unit fan motor.
						(5) Outdoor unit control PCB	(5) Replace the outdoor unit control PCB board.
	●	18	-0		Serial short-circuit	(1) Check the wires between units.	(1) Correct the wiring.
			-1		Serial erroneous wiring	(1) Check the wires between units.	(1) Correct the wiring.

Status of indoor/ outdoor units	Indication by LED1 on outdoor unit *2	Malfunction No. displayed on main unit display section *1		Content of diagnosis		Inspection location/method	Remedy
		Main category	Sub-category	Main category	Sub-category		
Indoor/ outdoor units in complete shutdown	×	19	-0	Indoor unit fan	Indoor unit fan error	(1) Check the indoor fan motor for proper rotating operation.(Check fan lock.) (2) Check the lead wire of the indoor fan motor for open-circuit. (3) Check CN1 of the indoor unit fan motor for secure installation. (4) No abnormality found in above inspections (1) through (3).	(1) Replace the indoor fan motor. (2) Replace the indoor fan motor. (3) Correct the installation of CN1 of the indoor fan motor. (4) Replace the indoor unit control PWB.
Indoor/ outdoor units in operation	×	20	-0	Indoor unit control PCB	EEPROM data error	(EEPROM read data error)	Replace the indoor unit control PWB.
Indoor/ outdoor units in operation	×	88		Control and display PCB	Communication error	(1) Check for disconnected connector between control PCB and display PCB, and open-circuit in lead wires. (2) Check that control PCB outputs signals correctly.	(1) Insert connectors correctly, or replace control PWB. (2) Replace control PWB.

Malfunction indications due to erroneous wiring during air conditioner installation

	Inter-unit wiring error mode	Symptom	
1		Indoor unit relay Malfunction diagnosis display	Turns On momentarily, then turns Off. "18-1"
2		Indoor unit relay Malfunction diagnosis display	Relays turns Off after about 30 minutes. None (Displays "18-0" when malfunction code is called out.)
3		Indoor unit relay Malfunction diagnosis display	Relays turns Off after about 30 minutes. None (Displays "18-0" when malfunction code is called out.)
4		Indoor unit relay Malfunction diagnosis display	Turns On momentarily, then turns Off. "18-1"
5		Indoor unit relay Malfunction diagnosis display	Turns On momentarily, then turns Off. "18-1"

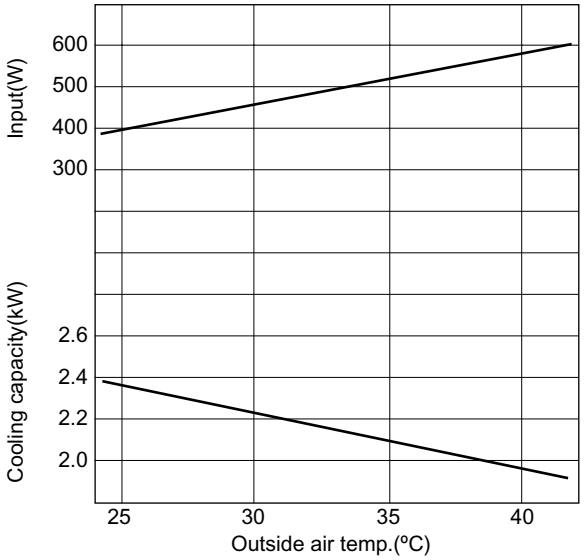
[4] PERFORMANCE CURVES

NOTE

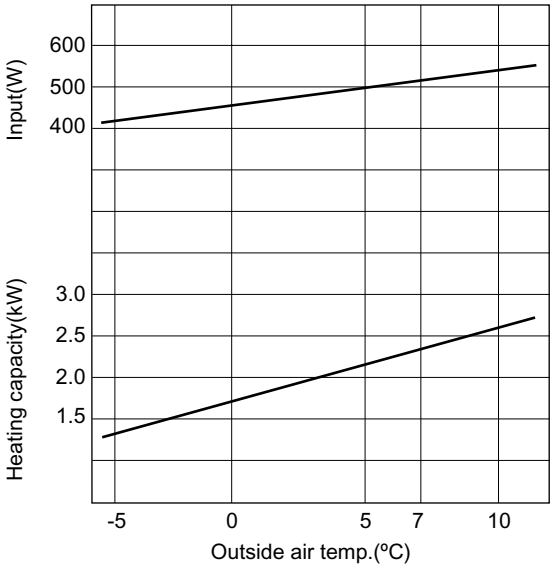
1) Indoor fan speed: Hi
2) Vertical adjustment louver "45°", Horizontal adjustment louver "front"
3) Indoor air temp. : Cooling 27°C, Heating 20°C
4) Power source : 230V, 50Hz

1. AY-XP7FR

1.1. At Cooling

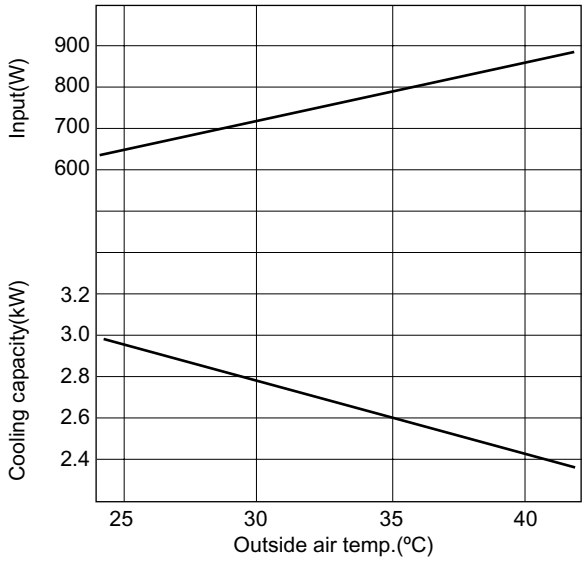


1.2. At Heating

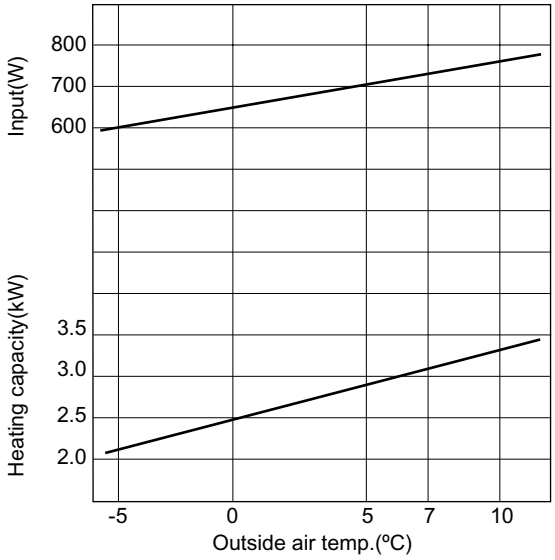


2. AY-XP9FR

2.1. At Cooling

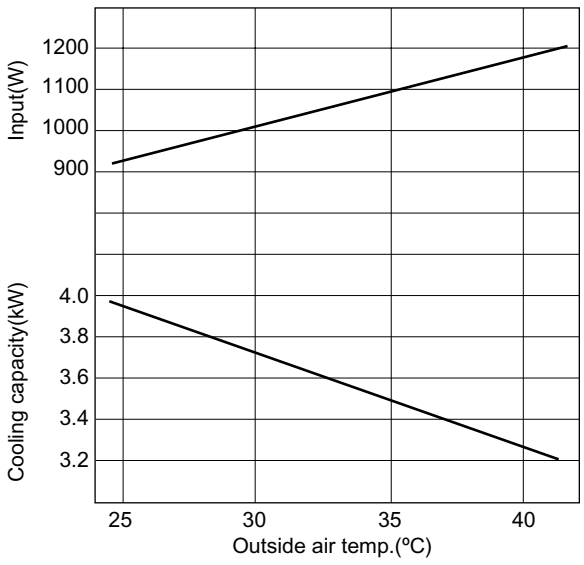


2.2. At Heating



3. AY-XP12FR

3.1. At Cooling



3.2. At Heating