

MHI

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TECHNICAL MANUAL
Collection data

 **MITSUBISHI HEAVY INDUSTRIES LTD.**

INVERTER MULTI-SPLIT SYSTEM **ROOM AIR-CONDITIONER** **(Air to air heat pump type)**

(Outdoor unit)

SCM40ZG-S

SCM45ZG-S

SCM48ZG-S

SCM60ZG-S

SCM80ZG-S

(Indoor unit)

SKM20ZG-S

STM25ZF-S

SRRM25ZF-S

SKM22ZG-S

STM35ZF-S

SRRM35ZF-S

SKM25ZG-S

STM50ZF-S

SRRM50ZF-S

SKM28ZG-S

STM60ZF-S

SRRM60ZF-S

SKM35ZG-S

SKM50ZG-S

SKM60ZG-S

SKM71ZG-S



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1 GENERAL INFORMATION

1.1 Specific features

(1) The long piping makes the location of the inside and units flexible.

- No need for additional charge of refrigerant : 40 type · 30m, 45 type · 20m, 48 type · 40m, 60 type · 30m, 80 type · 40m
- Maximum piping length : 40 type · 30m, 45 type · 30m, 48 type · 40m, 60 type · 40m, 80 type · 70m

(2) Connectable indoor capacity

Number of connectable units : 40 type · 2 units, 45 type · 2 units, 48 type · 3 units, 60 type · 3 units, 80 type · 4 units

Total of indoor units (class kW) : 40 type · 5.7 kW, 45 type · 7.0 kW, 48 type · 8.5 kW, 60 type · 11.0 kW, 80 type · 13.5 kW

(3) Indoor units are available with 8 capacities.

8 capacities 20, 22, 25, 28, 35, 50, 60, 71

Types Wall mounted type (SKM).

4-way ceiling cassette type (STM).

Ducted type (SRRM).

(4) Inverter (Frequency converter) for multi-steps power control

- Heating / Cooling

The rotational speed of a compressor is changed in step in relation to varying load, to interlock with the indoor and outdoor unit fans controlled to changes in frequency, thus controlling the power.

- Allowing quick heating/cooling operation during start-up period. Constant room temperature by fine-tuned control after the unit has stabilized.

(5) Fuzzy control

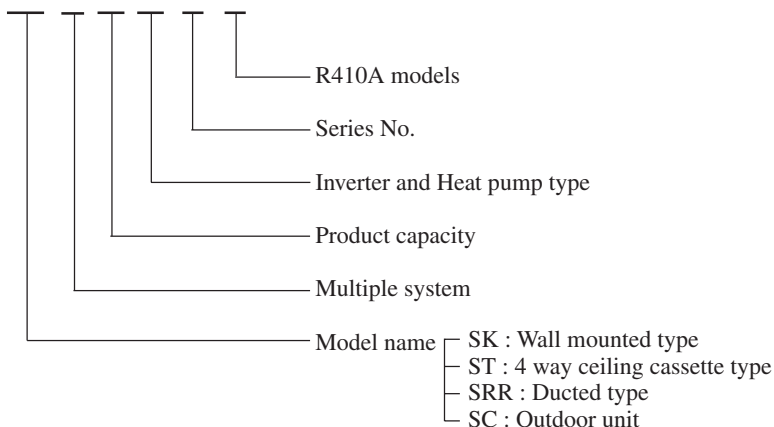
Fuzzy control calculates the amount of variation in the difference between the suction air temperature and the setting temperature in compliance with the fuzzy rules in order to control the air capacity and the inverter frequency.

(6) Self diagnosis function

We are constantly trying to do better service to our customers by installing such judges that show abnormality of operation as follows. (See page 89, 90)

1.2 How to read the model name

Example : SK M 25 Z G - S



2 SELECTION DATA

2.1 Specifications

(1) Indoor unit

Models SKM20ZG-S, 22ZG-S, 25ZG-S

Item			Models			SKM20ZG-S	SKM22ZG-S	SKM25ZG-S				
			W									
Cooling capacity			W			2000	2200	2500				
Heating capacity			W			3000	3200	3400				
Noise level	Cooling	Sound level	dB	Hi : 35	Me : 29	Lo : 23	Hi : 36	Me : 30	Lo : 23	Hi : 36	Me : 30	Lo : 24
		Power level		Hi : 51			Hi : 52			Hi : 52		
	Heating	Sound level		Hi : 37	Me : 32	Lo : 27	Hi : 38	Me : 33	Lo : 27	Hi : 38	Me : 33	Lo : 27
		Power level		Hi : 55			Hi : 56			Hi : 56		
Exterior dimensions Height × Width × Depth			mm	268 × 790 × 199								
Color				Fine snow								
Net weight			kg	8.5								
Air handling equipment Fan type & Q'ty				Tangential fan × 1								
Motor			W	38								
Air flow (at high)	Cooling	CMM		7.5			7.8					
	Heating		9.0			9.5						
Air filter, Q'ty				Polypropylene net × 2 (Washable)								
Operation switch				Wireless-Remote control								
Room temperature control				Microcomputer thermostat								
Pilot lamp				RUN (Green), TIMER (Yellow), HI POWER (Green), 3D AUTO (Green)								
Safety equipment				Frost protection, Serial error protection Fan motor error protection								
Refrigerant piping	O.D	Liquid line	mm (in)	φ 6.35 (1/4")								
		Gas line		φ 9.52 (3/8")								
	Connecting method			Flare connecting								
	Attached length of piping			Liquid line : 0.45m Gas line : 0.38m								
	Insulation			Necessary (Both Liquid & Gas lines)								
Drain hose				Connectable								
Accessories (including)				Mounting kit, Clean filter (Natural enzyme filter × 1, Photocatalytic washable deodorizing filter × 1)								
Optional parts				—								
Outdoor unit to be combined				SCM40, 45, 48, 60, 80ZG-S								

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) Capacity indicated is the rated capacity with one unit operating under ISO-T1 standards conditions.

Models SKM28ZG-S, 35ZG-S, 50ZG-S,

Item		Model		SKM28ZG-S	SKM35ZG-S	SKM50ZG-S
		W				
Cooling capacity		W		2800	3500	5000
Heating capacity		W		4000	4500	5800
Noise level	Cooling	Sound level	dB	Hi : 38 Me : 31 Lo : 24	Hi : 39 Me : 32 Lo : 25	Hi : 45 Me : 36 Lo : 25
		Power level		Hi : 54	Hi : 55	Hi : 61
	Heating	Sound level		Hi : 40 Me : 34 Lo : 28	Hi : 41 Me : 35 Lo : 29	Hi : 44 Me : 39 Lo : 33
		Power level		Hi : 58	Hi : 59	Hi : 62
Exterior dimensions Height × Width × Depth		mm		268 × 790 × 199		
Color				Fine snow		
Net weight		kg		8.5		
Air handling equipment Fan type & Q'ty				Tangential fan × 1		
Motor		W		38		
Air flow (at high)	Cooling	CMM		8.3	8.8	11.3
	Heating			10.0	11.0	12.5
Air filter, Q'ty				Polypropylene net × 2 (Washable)		
Operation switch				Wireless-Remote control		
Room temperature control				Microcomputer thermostat		
Pilot lamp				RUN (Green), TIMER (Yellow), HI POWER (Green), 3D AUTO (Green)		
Safety equipment				Frost protection, Serial error protection Fan motor error protection		
Refrigerant piping	O.D	Liquid line	mm (in)	φ 6.35 (1/4")		
		Gas line		φ 9.52 (3/8")	φ 12.7 (1/2")	
	Connecting method			Flare connecting		
	Attached length of piping			Liquid line : 0.45m Gas line : 0.38m		
Insulation			Necessary (Both Liquid & Gas lines)			
Drain hose				Connectable		
Accessories (including)				Mounting kit, Clean filter (Natural enzyme filter × 1, Photocatalytic washable deodorizing filter × 1)		
Optional parts				—		
Outdoor unit to be combined				SCM40, 45, 48, 60, 80ZG-S		SCM60, 80ZG-S

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) Capacity indicated is the rated capacity with one unit operating under ISO-T1 standards conditions.

Models SKM60ZG-S, 71ZG-S

Item		Model		SKM60ZG-S	SKM71ZG-S
		W			
Cooling capacity		W		6000	7100
Heating capacity		W		6800	8000
Noise level	Cooling	Sound level	dB	Hi : 43 Me : 36 Lo : 26	Hi : 44 Me : 34 Lo : 26
		Power level		Hi : 59	Hi : 60
	Heating	Sound level		Hi : 43 Me : 37 Lo : 27	Hi : 44 Me : 38 Lo : 27
		Power level		Hi : 59	Hi : 60
Exterior dimensions Height × Width × Depth		mm		318 × 1098 × 248	
Color				Yellowish white	
Net weight		kg		15	
Air handling equipment Fan type & Q'ty				Tangential fan × 1	
Motor		W		46	
Air flow (at high)	Cooling	CMM		18.0	19.0
	Heating			20.5	21.5
Air filter, Q'ty				Polypropylene net × 2 (Washable)	
Operation switch				Wireless-Remote control	
Room temperature control				Microcomputer thermostat	
Pilot lamp				RUN (Green), TIMER (Yellow), HI POWER (Green), 3D AUTO (Green)	
Safety equipment				Frost protection, Serial error protection Fan motor error protection	
Refrigerant piping	O.D	Liquid line	mm (in)	φ 6.35 (1/4")	
		Gas line		φ 12.7 (1/2")	
	Connecting method			Flare connecting	
	Attached length of piping			Liquid line : 0.70m Gas line : 0.63m	
Insulation		Necessary (Both Liquid & Gas lines)			
Drain hose				Connectable	
Accessories (including)				Mounting kit, Clean filter (Natural enzyme filter × 1, Photocatalytic washable deodorizing filter × 1)	
Optional parts				—	
Outdoor unit to be combined				SCM60, 80ZG-S	SCM80ZG-S

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) Capacity indicated is the rated capacity with one unit operating under ISO-T1 standards conditions.

Models STM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S

Item		Models		STM25ZF-S	STM35ZF-S	STM50ZF-S	STM60ZF-S
		W					
Cooling capacity		W		2500	3500	5000	6000
Heating capacity		W		3400	4500	5800	6800
Noise level	Cooling	Sound level	dB	35	38	40	47
		Power level		51	54	56	63
	Heating	Sound level		35	38	40	47
		Power level		51	54	56	63
Exterior dimensions		Main unit	mm	248 × 570 × 570			
Height × Width × Depth		Panel		35 × 700 × 700			
Color				Plaster white (Panel)			
Net weight	Main unit	kg		14		14.5	
	Panel			3.5			
Air handling equipment				Turbo fan × 1			
Fan type & Q'ty							
Motor		W		40			
Air flow (at high)	Cooling	CMM		8.0	9.0	10.0	13.0
	Heating			9.0	10.0	11.0	14.0
Air filter, Q'ty				Long life filter × 1 (Washable)			
Operation switch				Wireless-Remote control			
Room temperature control				Microcomputer thermostat			
Pilot lamp				RUN (Green), TIMER (Yellow), HI POWER (Green), ECONO (Orange)			
Safety equipment				Frost protection, Serial error protection Fan motor error protection, Drain error protection			
Refrigerant piping	O.D	Liquid line	mm (in)	φ 6.35 (1/4")			
		Gas line		φ 9.52 (3/8")		φ 12.7 (1/2")	
	Connecting method			Flare connecting			
	Attached length of piping			—			
Insulation			Necessary (Both Liquid & Gas lines)				
Drain hose				Connectable			
Accessories (including)				Mounting kit			
Optional parts				Wired remote control			
Outdoor unit to be combined				SCM40, 45, 48, 60, 80ZG-S		SCM60, 80ZG-S	

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating	20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) Capacity indicated is the rated capacity with one unit operating under ISO-T1 standards conditions.

Models SRRM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S

Item		Models		SRRM25ZF-S	SRRM35ZF-S	SRRM50ZF-S	SRRM60ZF-S
		W					
Cooling capacity		W		2500	3500	5000	6000
Heating capacity		W		3400	4500	5800	6800
Noise level	Cooling	Sound level	dB	38	40	46	49
		Power level		53	55	60	63
	Heating	Sound level		39	41	46	49
		Power level		54	56	60	63
Exterior dimensions Height × Width × Depth		mm		230 × 740 × 455			
Color				—			
Net weight		kg		22.0		23.0	
Air handling equipment Fan type & Q'ty				Centrifugal fan × 2			
Motor		W		51			
Air flow (at high)	Cooling	CMM		8.5	9.0	10.5	12.5
	Heating			10.0	11.0	13.0	15.0
Air filter, Q'ty				Polypropylene net× 1			
Operation switch				Wireless-Remote control			
Room temperature control				Microcomputer thermostat			
Pilot lamp				RUN (Green), TIMER (Yellow), HI POWER (Green), ECONO (Orange)			
Safety equipment				Frost protection, Serial error protection Fan motor error protection, Drain error protection			
Refrigerant piping	O.D	Liquid line	mm (in)	φ 6.35 (1/4")			
		Gas line		φ 9.52 (3/8")		φ 12.7 (1/2")	
	Connecting method			Flare connecting			
	Attached length of piping			—			
Insulation			Necessary (Both Liquid & Gas lines)				
Drain hose				Connectable			
Accessories (including)				Mounting kit			
Optional parts				Wired remote control			
Outdoor unit to be combined				SCM40, 45, 48, 60, 80ZG-S		SCM60, 80ZG-S	

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) Capacity indicated is the rated capacity with one unit operating under ISO-T1 standards conditions.

(2) Outdoor unit

Models SCM40ZG-S, 45ZG-S

Item		Models		SCM40ZG-S	SCM45ZG-S
Cooling capacity		W		4000 (1900 ~ 5000)	4500 (1000 ~ 6400)
Heating capacity		W		5000 (2200 ~ 5200)	5600 (1800 ~ 6800)
Power source				1 Phase 220/230/240V 50Hz	
Power consumption	Cooling	W		970 (470 ~ 1430)	1190 (190 ~ 2220)
	Heating			1150 (400 ~ 1410)	1350 (220 ~ 1940)
Running current	Cooling	A		4.5/4.3/4.1	5.5/5.2/5.0
	Heating			5.3/5.1/4.8	6.2/5.9/5.7
Noise level	Sound level	dB		Cooling : 45 Heating : 47	Cooling : 45 Heating : 47
	Power level			Cooling : 60 Heating : 62	Cooling : 60 Heating : 62
Exterior dimensions Height × Width × Depth		mm		640 × 850 × 290	
Color				Stucco white	
Net weight		kg		44	46
Refrigerant equipment Compressor type & Q'ty				[Rotary] × 1	[Scroll] × 1
Motor		kW		0.7	0.7
Starting method				Direct start	
Refrigerant control				Capillary tubes + Electric expansion valve	
Refrigerant		kg		R410A 1.4 (Pre-charged up to the piping length of 30m)	R410A 1.6 (Pre-charged up to the piping length of 20m)
Refrigerant oil		ℓ		0.32 (RB68A)	0.48 (RB68A)
Air handling equipment Fan type & Q'ty				Propeller fan × 1	
Motor		W		34	
Air flow (at high)		CMM		40	
Shock & vibration absorber				Rubber (for compressor)	
Safety equipment				Compressor overheat protection, Overcurrent protection Serial signal error protection	
Refrigerant piping	Size × Core × Number	mm (in)		Liquid line: φ 6.35 (1/4") × 2	
				Gas line: φ 9.52 (3/8") × 2	
	Connecting method			Flare connecting	
	Attached length piping			—	
Insulation				Necessary (Both Liquid & Gas lines)	
Power source supply				Terminal block (Screw fixing type)	
Conne- ction wiring	Size × Core number			1.5 mm ² × 4 cores (Including earth cable) × 2	
	Connecting method			Terminal block (Screw fixing type)	
Accessories (included)				Installation sheet, Manual instruction	
Indoor units to be combined				SKM20, 22, 25, 28, 35 type, STM25, 35 type, SRRM25, 35 type	

Notes (1) The data are measured at the following conditions.

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling	27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating	20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) The values for capacity and power consumption shown in a range () indicate the minimum and maximum of the range.

(3) The refrigerant quantity to be charged includes the refrigerant in 30 m connecting piping. (SCM40ZG-S)

(4) If the piping length exceeds 20 m, additional charging is required. (20g/m, SCM45ZG-S)

Item		Models		SCM48ZG-S	SCM60ZG-S
		W			
Cooling capacity		W		4800 (1100~6900)	6000 (1100~7500)
Heating capacity		W		6000 (1400~7100)	7000 (1400~7600)
Power source				1 Phase 220/230/240V 50Hz	
Power consumption	Cooling	W		1190 (200~2350)	1620 (400~3050)
	Heating			1380 (180~2030)	1740 (390~2620)
Running current	Cooling	A		5.5/5.2/5.0	7.4/7.1/6.8
	Heating			6.3/6.1/5.8	8.0/7.6/7.3
Noise level	Sound level	dB		Cooling : 48 Heating : 49	Cooling : 48 Heating : 50
	Power level			Cooling : 63 Heating : 64	Cooling : 63 Heating : 65
Exterior dimensions Height × Width × Depth		mm		640 × 850 × 290	
Color				Stucco white	
Net weight		kg		47	51
Refrigerant equipment Compressor type & Q'ty				[Scroll] × 1	[Twin rotary] × 1
Motor		kW		0.7	1.3
Starting method				Direct start	
Refrigerant control				Capillary tubes + Electronic expansion valve	
Refrigerant		kg		R410A 1.95 (Pre-charged up to the piping length of 40m)	R410A 2.2 (Pre-charged up to the piping length of 30m)
Refrigerant oil		ℓ		0.48 (RB68A)	0.67 (MEL56)
Air handling equipment Fan type & Q'ty				Propeller fan × 1	
Motor		W		34	
Air flow (at high)		CMM		42	
Shock & vibration absorber				Rubber (for compressor)	
Safety equipment				Compressor overheat protection, Overcurrent protection Serial signal error protection	
Refrigerant piping	Size × Core × Number	mm (in)		Liquid line: φ 6.35 (1/4") × 3 Gas line: φ 9.52 (3/8") × 3	
	Connecting method			Flare connecting	
	Attached length piping			—	
	Insulation			Necessary (Both Liquid & Gas lines)	
Power source supply				Terminal block (Screw fixing type)	
Connection wiring	Size × Core number			1.5 mm ² × 4 cores (Including earth cable) × 3	
	Connecting method			Terminal block (Screw fixing type)	
Accessories (included)				Installation sheet, Manual instruction	Union : (φ 9.52 → φ 12.7) × 2 Installation sheet, Manual instruction
Indoor units to be combined				SKM20, 22, 25, 28, 35 type STM25, 35 type SRRM25, 35 type	SKM20, 22, 25, 28, 35, 50, 60 type STM25, 35, 50, 60 type SRRM25, 35, 50, 60 type

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) The values for capacity and power consumption shown in a range () indicate the minimum and maximum of the range.

(3) If the piping length exceeds 30 m, additional charging is required. (20g/m, SCM60ZG-S)

Model SCM80ZG-S

Item		Model	SCM80ZG-S
Cooling capacity		W	8000 (1800~9500)
Heating capacity		W	9300 (800~9600)
Power source			1 Phase 220/230/240V 50Hz
Power consumption	Cooling	W	2220 (310~3000)
	Heating		2430 (210~3430)
Running current	Cooling	A	10.2/9.7/9.3
	Heating		11.2/10.7/10.2
Noise level	Sound level	dB	Cooling : 51 Heating : 52
	Power level		Cooling : 65 Heating : 66
Exterior dimensions Height × Width × Depth		mm	750 × 880 × 340
Color			Stucco white
Net weight		kg	66
Refrigerant equipment Compressor type & Q'ty			[Twin rotary] × 1
Motor		kW	1.3
Starting method			Direct start
Refrigerant control			Capillary tubes + Electronic expansion valve
Refrigerant		kg	R410A 3.15 (Pre-charged up to the piping length of 40m)
Refrigerant oil		ℓ	0.67 (MEL56)
Air handling equipment Fan type & Q'ty			Propeller fan × 1
Motor		W	86
Air flow (at high)		CMM	55
Shock & vibration absorber			Rubber (for compressor)
Safety equipment			Compressor overheat protection, Overcurrent protection Serial signal error protection
Refrigerant piping	Size × Core × Number	mm (in)	Liquid line: φ 6.35 (1/4") × 4 Gas line: φ 9.52 (3/8") × 4
	Connecting method		Flare connecting
	Attached length piping		—
	Insulation		Necessary (Both Liquid & Gas lines)
Power source supply			Terminal block (Screw fixing type)
Connection wiring	Size × Core number		1.5 mm ² × 4 cores (Including earth cable) × 4
	Connecting method		Terminal block (Screw fixing type)
Accessories (included)			Union : (φ 9.52 → φ 12.7) × 2 Installation sheet, Manual instruction
Indoor unit to be combined			SKM20, 22, 25, 28, 35, 50, 60, 71 type STM25, 35, 50, 60 type SRRM25, 35, 50, 60 type

Notes (1) The data are measured at the following conditions.

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1, JIS C9612
Heating		20°C	—	7°C	6°C	ISO-T1, JIS C9612

(2) The values for capacity and power consumption shown in a range () indicate the minimum and maximum of the range.

(3) If the piping length exceeds 40 m, additional charging is required. (20g/m)

(3) Operation data

- The combinations of the indoor units is indicated by numbers. They are read as follows.

(Example) SKM22ZG-S → 22 SKM35ZG-S → 35

- The capacity of the indoor units is shown by rooms. If this exceeds the maximum capacity of the outdoor unit, the demand capacity will be proportionally distributed.
- If units are to be combined, use the table below to make the proper selection.

• Number of connectable indoor units

	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
MIN	1	1	2	2	*3
MAX	2	2	3	3	4

* only combination of SKM60+SKM60 and SKM60+SKM71(2 indoor units) to SCM80ZG-S can be available

Model SCM40ZG-S

(a) Heating

Indoor unit combination	Heating capacity (kW)						Power consumption (W)			Standard current (A)		
	Room heating capacity (kW)		Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	Min.	Standard	Max.							
1 room	20	3.0	—	2.2	3.0	3.9	400	790	1160	3.6	3.5	3.3
	22	3.2	—	2.2	3.2	4.1	400	860	1260	3.9	3.8	3.6
	25	3.4	—	2.2	3.4	4.5	400	930	1340	4.3	4.1	3.9
	28	4.0	—	2.2	4.0	4.7	400	1140	1410	5.2	5.0	4.8
	35	4.5	—	2.2	4.5	4.7	400	1350	1410	6.2	5.9	5.7
2 room	20 + 20	2.50	2.50	2.4	5.0	5.2	450	1150	1260	5.3	5.1	4.8
	20 + 22	2.43	2.67	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	20 + 25	2.27	2.83	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	20 + 28	2.13	2.98	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	20 + 35	1.85	3.25	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	22 + 22	2.55	2.55	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	22 + 25	2.39	2.71	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	22 + 28	2.24	2.86	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	22 + 35	1.97	3.13	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	25 + 25	2.55	2.55	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
	25 + 28	2.41	2.69	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1
28 + 28	2.55	2.55	2.4	5.1	5.2	450	1210	1260	5.6	5.3	5.1	

(b) Cooling

Indoor unit combination	Cooling capacity (kW)						Power consumption (W)			Standard current (A)		
	Room cooling capacity (kW)		Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	Min.	Standard	Max.							
1 room	20	2.0	—	1.9	2.0	2.5	470	490	660	2.3	2.2	2.1
	22	2.2	—	1.9	2.2	2.8	470	560	770	2.7	2.5	2.4
	25	2.5	—	1.9	2.5	3.1	470	660	860	3.1	3.0	2.8
	28	2.8	—	1.9	2.8	3.4	470	760	970	3.5	3.4	3.2
	35	3.5	—	1.9	3.5	4.3	470	990	1280	4.5	4.3	4.2
2 room	20 + 20	2.00	2.00	2.9	4.0	5.0	480	970	1430	4.5	4.3	4.1
	20 + 22	2.00	2.20	2.9	4.2	5.0	480	1070	1430	4.9	4.7	4.5
	20 + 25	2.00	2.50	2.9	4.5	5.0	480	1240	1430	5.7	5.4	5.2
	20 + 28	1.96	2.74	2.9	4.7	5.0	480	1390	1430	6.4	6.1	5.9
	20 + 35	1.75	3.05	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0
	22 + 22	2.20	2.20	2.9	4.4	5.0	480	1180	1430	5.4	5.2	5.0
	22 + 25	2.20	2.50	2.9	4.7	5.0	480	1350	1430	6.2	5.9	5.7
	22 + 28	2.11	2.69	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0
	22 + 35	1.85	2.95	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0
	25 + 25	2.40	2.40	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0
	25 + 28	2.26	2.54	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0
28 + 28	2.40	2.40	2.9	4.8	5.0	480	1420	1430	6.5	6.2	6.0	

Model SCM45ZG-S

(a) Heating

Indoor unit combination		Heating capacity (kW)					Power consumption (W)			Standard current (A)		
		Room heating capacity (kW)		Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V
		A room	B room	Min.	Standard	Max.						
1 room	20	3.0	—	1.8	3.0	4.2	220	710	1410	3.3	3.1	3.0
	22	3.2	—	1.8	3.2	4.4	220	830	1510	3.8	3.7	3.5
	25	3.4	—	1.8	3.4	4.7	220	980	1660	4.5	4.3	4.1
	28	4.0	—	1.8	4.0	4.8	220	1250	1710	5.7	5.5	5.3
	35	4.5	—	1.8	4.5	4.8	220	1500	1710	6.9	6.6	6.3
2 room	20 + 20	2.70	2.70	2.6	5.4	6.8	360	1250	1940	5.7	5.5	5.3
	20 + 22	2.62	2.88	2.6	5.5	6.8	360	1290	1940	5.9	5.7	5.4
	20 + 25	2.49	3.11	2.6	5.6	6.8	360	1330	1940	6.1	5.8	5.6
	20 + 28	2.42	3.38	2.6	5.8	6.8	360	1380	1940	6.3	6.1	5.8
	20 + 35	2.18	3.82	2.6	6.0	6.8	360	1490	1940	6.8	6.5	6.3
	22 + 22	2.80	2.80	2.6	5.6	6.8	360	1350	1940	6.2	5.9	5.7
	22 + 25	2.67	3.03	2.6	5.7	6.8	360	1360	1940	6.2	6.0	5.7
	22 + 28	2.55	3.25	2.6	5.8	6.8	360	1410	1940	6.5	6.2	5.9
	22 + 35	2.35	3.75	2.6	6.1	6.8	360	1520	1940	7.0	6.7	6.4
	25 + 25	2.90	2.90	2.6	5.8	6.8	360	1410	1940	6.5	6.2	5.9
	25 + 28	2.78	3.12	2.6	5.9	6.8	360	1460	1940	6.7	6.4	6.1
	25 + 35	2.58	3.62	2.6	6.2	6.8	360	1570	1940	7.2	6.9	6.6
	28 + 28	3.05	3.05	2.6	6.1	6.8	360	1510	1940	6.9	6.6	6.4
	28 + 35	2.84	3.56	2.6	6.4	6.8	360	1620	1940	7.4	7.1	6.8
	35 + 35	3.25	3.25	2.6	6.5	6.8	360	1670	1940	7.7	7.3	7.0

(b) Cooling

Indoor unit combination		Cooling capacity (kW)					Power consumption (W)			Standard current (A)		
		Room cooling capacity (kW)		Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V
		A room	B room	Min.	Standard	Max.						
1 room	20	2.0	—	1.0	2.0	2.8	190	480	750	2.3	2.2	2.1
	22	2.2	—	1.0	2.2	3.1	190	540	860	2.5	2.4	2.3
	25	2.5	—	1.0	2.5	3.4	190	640	950	3.0	2.9	2.7
	28	2.8	—	1.0	2.8	3.8	190	730	1080	3.4	3.2	3.1
	35	3.5	—	1.0	3.5	4.8	190	960	1400	4.4	4.2	4.0
2 room	20 + 20	2.00	2.00	2.2	4.0	5.3	380	1050	1670	4.8	4.6	4.4
	20 + 22	2.00	2.20	2.2	4.2	5.6	380	1110	1830	5.1	4.9	4.7
	20 + 25	2.00	2.50	2.2	4.5	5.8	380	1220	1960	5.6	5.4	5.1
	20 + 28	1.96	2.74	2.2	4.7	6.1	380	1310	2100	6.0	5.8	5.5
	20 + 35	1.82	3.18	2.2	5.0	6.4	380	1480	2220	6.8	6.5	6.2
	22 + 22	2.25	2.25	2.2	4.5	5.9	380	1190	1960	5.5	5.2	5.0
	22 + 25	2.15	2.45	2.2	4.6	6.1	380	1290	2080	5.9	5.7	5.4
	22 + 28	2.11	2.69	2.2	4.8	6.4	380	1360	2220	6.2	6.0	5.7
	22 + 35	1.97	3.13	2.2	5.1	6.4	380	1530	2220	7.0	6.7	6.4
	25 + 25	2.40	2.40	2.2	4.8	6.3	380	1360	2180	6.2	6.0	5.7
	25 + 28	2.31	2.59	2.2	4.9	6.4	380	1430	2220	6.6	6.3	6.0
	25 + 35	2.21	3.09	2.2	5.3	6.4	380	1620	2220	7.4	7.1	6.8
	28 + 28	2.55	2.55	2.2	5.1	6.4	380	1520	2220	7.0	6.7	6.4
	28 + 35	2.36	2.94	2.2	5.3	6.4	380	1650	2220	7.6	7.2	6.9
	35 + 35	2.90	2.90	2.2	5.8	6.4	380	1880	2220	8.6	8.3	7.9

Model SCM48ZG-S

(a) Heating

Indoor unit combination	Heating capacity (kW)						Power consumption (W)			Standard current (A)			
	Room heating capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	C room	Min.	Standard	Max.							
1 room	20	3.0	—	—	1.4	3.0	4.1	180	830	1420	3.8	3.7	3.5
	22	3.2	—	—	1.4	3.2	4.3	180	940	1530	4.3	4.1	4.0
	25	3.4	—	—	1.4	3.4	4.6	180	1070	1690	4.9	4.7	4.5
	28	4.0	—	—	1.4	4.0	4.7	180	1350	1810	6.2	5.9	5.7
	35	4.5	—	—	1.4	4.5	5.2	180	1630	1970	7.5	7.2	6.9
2 room	20 + 20	2.95	2.95	—	2.0	5.9	6.6	310	1710	2030	7.9	7.5	7.2
	20 + 22	2.86	3.14	—	2.0	6.0	6.6	310	1760	2030	8.1	7.7	7.4
	20 + 25	2.71	3.39	—	2.0	6.1	6.6	310	1800	2030	8.3	7.9	7.6
	20 + 28	2.58	3.62	—	2.0	6.2	6.6	310	1860	2030	8.5	8.2	7.8
	20 + 35	2.33	4.07	—	2.0	6.4	6.6	310	1930	2030	8.9	8.5	8.1
	22 + 22	3.05	3.05	—	2.0	6.1	6.6	310	1780	2030	8.2	7.8	7.5
	22 + 25	2.86	3.24	—	2.0	6.1	6.6	310	1830	2030	8.4	8.0	7.7
	22 + 28	2.73	3.47	—	2.0	6.2	6.6	310	1900	2030	8.7	8.3	8.0
	22 + 35	2.47	3.93	—	2.0	6.4	6.6	310	1940	2030	8.9	8.5	8.2
	25 + 25	3.10	3.10	—	2.0	6.2	6.6	310	1860	2030	8.5	8.2	7.8
	25 + 28	2.97	3.33	—	2.0	6.3	6.6	310	1930	2030	8.9	8.5	8.1
	25 + 35	2.75	3.85	—	2.0	6.6	6.6	310	1970	2030	9.0	8.7	8.3
	28 + 28	3.20	3.20	—	2.0	6.4	6.6	310	1930	2030	8.9	8.5	8.1
	28 + 35	2.93	3.67	—	2.0	6.6	6.6	310	1970	2030	9.0	8.7	8.3
	35 + 35	3.30	3.30	—	2.0	6.6	6.6	310	1970	2030	9.0	8.7	8.3
3 room	20 + 20 + 20	2.00	2.00	2.00	3.0	6.0	7.1	490	1380	1870	6.3	6.1	5.8
	20 + 20 + 22	1.94	1.94	2.13	3.0	6.0	7.1	490	1400	1870	6.4	6.1	5.9
	20 + 20 + 25	1.88	1.88	2.35	3.0	6.1	7.1	490	1450	1870	6.7	6.4	6.1
	20 + 20 + 28	1.82	1.82	2.55	3.0	6.2	7.1	490	1530	1870	7.0	6.7	6.4
	20 + 20 + 35	1.76	1.76	3.08	3.0	6.6	7.1	490	1640	1870	7.5	7.2	6.9
	20 + 22 + 22	1.91	2.10	2.10	3.0	6.1	7.1	490	1440	1870	6.6	6.3	6.1
	20 + 22 + 25	1.85	2.04	2.31	3.0	6.2	7.1	490	1480	1870	6.8	6.5	6.2
	20 + 22 + 28	1.80	1.98	2.52	3.0	6.3	7.1	490	1560	1870	7.2	6.9	6.6
	20 + 22 + 35	1.74	1.91	3.05	3.0	6.7	7.1	490	1660	1870	7.6	7.3	7.0
	20 + 25 + 25	1.80	2.25	2.25	3.0	6.3	7.1	490	1530	1870	7.0	6.7	6.4
	20 + 25 + 28	1.75	2.19	2.45	3.0	6.4	7.1	490	1640	1870	7.5	7.2	6.9
	20 + 25 + 35	1.70	2.13	2.98	3.0	6.8	7.1	490	1700	1870	7.8	7.5	7.2
	20 + 28 + 28	1.74	2.43	2.43	3.0	6.6	7.1	490	1700	1870	7.8	7.5	7.2
	20 + 28 + 35	1.66	2.33	2.91	3.0	6.9	7.1	490	1720	1870	7.9	7.6	7.2
	22 + 22 + 22	2.03	2.03	2.03	3.0	6.1	7.1	490	1470	1870	6.7	6.5	6.2
	22 + 22 + 25	2.01	2.01	2.28	3.0	6.3	7.1	490	1500	1870	6.9	6.6	6.3
	22 + 22 + 28	1.96	1.96	2.49	3.0	6.4	7.1	490	1590	1870	7.3	7.0	6.7
	22 + 22 + 35	1.89	1.89	3.01	3.0	6.8	7.1	490	1690	1870	7.8	7.4	7.1
	22 + 25 + 25	1.96	2.22	2.22	3.0	6.4	7.1	490	1560	1870	7.2	6.9	6.6
	22 + 25 + 28	1.94	2.20	2.46	3.0	6.6	7.1	490	1660	1870	7.6	7.3	7.0
	22 + 25 + 35	1.85	2.10	2.95	3.0	6.9	7.1	490	1720	1870	7.9	7.6	7.2
	22 + 28 + 28	1.89	2.41	2.41	3.0	6.7	7.1	490	1720	1870	7.9	7.6	7.2
	22 + 28 + 35	1.81	2.31	2.88	3.0	7.0	7.1	490	1740	1870	8.0	7.6	7.3
	25 + 25 + 25	2.20	2.20	2.20	3.0	6.6	7.1	490	1640	1870	7.5	7.2	6.9
	25 + 25 + 28	2.15	2.15	2.41	3.0	6.7	7.1	490	1700	1870	7.8	7.5	7.2
25 + 25 + 35	2.06	2.06	2.88	3.0	7.0	7.1	490	1740	1870	8.0	7.6	7.3	
25 + 28 + 28	2.10	2.35	2.35	3.0	6.8	7.1	490	1720	1870	7.9	7.6	7.2	
28 + 28 + 28	2.33	2.33	2.33	3.0	7.0	7.1	490	1740	1870	8.0	7.6	7.3	

Model SCM48ZG-S

(b) Cooling

Indoor unit combination		Cooling capacity (kW)						Power consumption (W)			Standard current (A)		
		Room cooling capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V
		A room	B room	C room	Min.	Standard	Max.						
1 room	20	2.0	—	—	1.1	2.0	2.5	200	550	830	2.6	2.5	2.4
	22	2.2	—	—	1.1	2.2	2.7	200	650	950	3.0	2.9	2.8
	25	2.5	—	—	1.1	2.5	2.9	200	850	1050	3.9	3.8	3.6
	28	2.8	—	—	1.1	2.8	3.1	200	1050	1200	4.8	4.6	4.4
	35	3.5	—	—	1.1	3.5	3.8	200	1500	1600	6.9	6.6	6.3
2 room	20 + 20	2.00	2.00	—	2.0	4.0	5.1	330	1180	1720	5.4	5.2	5.0
	20 + 22	2.00	2.20	—	2.0	4.2	5.4	330	1250	1880	5.7	5.5	5.3
	20 + 25	1.96	2.44	—	2.0	4.4	5.6	330	1350	2000	6.2	5.9	5.7
	20 + 28	1.92	2.68	—	2.0	4.6	5.9	330	1470	2200	6.7	6.5	6.2
	20 + 35	1.82	3.18	—	2.0	5.0	6.3	330	1720	2350	7.9	7.6	7.2
	22 + 22	2.20	2.20	—	2.0	4.4	5.7	330	1350	2050	6.2	5.9	5.7
	22 + 25	2.15	2.45	—	2.0	4.6	5.9	330	1440	2200	6.6	6.3	6.1
	22 + 28	2.07	2.63	—	2.0	4.7	6.2	330	1550	2330	7.1	6.8	6.5
	22 + 35	2.01	3.19	—	2.0	5.2	6.3	330	1800	2350	8.3	7.9	7.6
	25 + 25	2.35	2.35	—	2.0	4.7	6.2	330	1550	2310	7.1	6.8	6.5
	25 + 28	2.31	2.59	—	2.0	4.9	6.3	330	1650	2350	7.6	7.2	6.9
	25 + 35	2.25	3.15	—	2.0	5.4	6.3	330	1910	2350	8.8	8.4	8.0
	28 + 28	2.55	2.55	—	2.0	5.1	6.3	330	1750	2350	8.0	7.7	7.4
	28 + 35	2.53	3.17	—	2.0	5.7	6.3	330	2040	2350	9.4	9.0	8.6
	35 + 35	3.00	3.00	—	2.0	6.0	6.3	330	2250	2350	10.3	9.9	9.5
3 room	20 + 20 + 20	1.60	1.60	1.60	3.2	4.8	6.9	580	1190	2200	5.5	5.2	5.0
	20 + 20 + 22	1.55	1.55	1.70	3.2	4.8	6.9	580	1190	2200	5.5	5.2	5.0
	20 + 20 + 25	1.51	1.51	1.88	3.2	4.9	6.9	580	1230	2200	5.6	5.4	5.2
	20 + 20 + 28	1.47	1.47	2.06	3.2	5.0	6.9	580	1260	2200	5.8	5.5	5.3
	20 + 20 + 35	1.39	1.39	2.43	3.2	5.2	6.9	580	1370	2200	6.3	6.0	5.8
	20 + 22 + 22	1.53	1.68	1.68	3.2	4.9	6.9	580	1230	2200	5.6	5.4	5.2
	20 + 22 + 25	1.49	1.64	1.87	3.2	5.0	6.9	580	1260	2200	5.8	5.5	5.3
	20 + 22 + 28	1.43	1.57	2.00	3.2	5.0	6.9	580	1290	2200	5.9	5.7	5.4
	20 + 22 + 35	1.35	1.49	2.36	3.2	5.2	6.9	580	1400	2200	6.4	6.1	5.9
	20 + 25 + 25	1.43	1.79	1.79	3.2	5.0	6.9	580	1290	2200	5.9	5.7	5.4
	20 + 25 + 28	1.40	1.75	1.96	3.2	5.1	6.9	580	1340	2200	6.2	5.9	5.6
	20 + 25 + 35	1.33	1.66	2.32	3.2	5.3	6.9	580	1430	2200	6.6	6.3	6.0
	20 + 28 + 28	1.37	1.92	1.92	3.2	5.2	6.9	580	1370	2200	6.3	6.0	5.8
	20 + 28 + 35	1.30	1.82	2.28	3.2	5.4	6.9	580	1490	2200	6.8	6.5	6.3
	22 + 22 + 22	1.63	1.63	1.63	3.2	4.9	6.9	580	1230	2200	5.6	5.4	5.2
	22 + 22 + 25	1.59	1.59	1.81	3.2	5.0	6.9	580	1290	2200	5.9	5.7	5.4
	22 + 22 + 28	1.56	1.56	1.98	3.2	5.1	6.9	580	1320	2200	6.1	5.8	5.6
	22 + 22 + 35	1.48	1.48	2.35	3.2	5.3	6.9	580	1430	2200	6.6	6.3	6.0
	22 + 25 + 25	1.56	1.77	1.77	3.2	5.1	6.9	580	1320	2200	6.1	5.8	5.6
	22 + 25 + 28	1.53	1.73	1.94	3.2	5.2	6.9	580	1370	2200	6.3	6.0	5.8
	22 + 25 + 35	1.45	1.65	2.30	3.2	5.4	6.9	580	1460	2200	6.7	6.4	6.1
	22 + 28 + 28	1.49	1.90	1.90	3.2	5.3	6.9	580	1400	2200	6.4	6.1	5.9
	22 + 28 + 35	1.42	1.81	2.26	3.2	5.5	6.9	580	1520	2200	7.0	6.7	6.4
	25 + 25 + 25	1.73	1.73	1.73	3.2	5.2	6.9	580	1370	2200	6.3	6.0	5.8
	25 + 25 + 28	1.70	1.70	1.90	3.2	5.3	6.9	580	1400	2200	6.4	6.1	5.9
	25 + 25 + 35	1.62	1.62	2.26	3.2	5.5	6.9	580	1520	2200	7.0	6.7	6.4
	25 + 28 + 28	1.67	1.87	1.87	3.2	5.4	6.9	580	1460	2200	6.7	6.4	6.1
	28 + 28 + 28	1.83	1.83	1.83	3.2	5.5	6.9	580	1490	2200	6.8	6.5	6.3

Model SCM60ZG-S

(a) Heating

Indoor unit combination	Heating capacity (kW)						Power consumption (W)			Standard current (A)			
	Room heating capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	C room	Min.	Standard	Max.							
1 room	20	3.0	—	—	1.4	3.0	4.1	390	930	1700	4.4	4.2	4.0
	22	3.2	—	—	1.4	3.2	4.3	390	1000	1800	4.7	4.5	4.3
	25	3.4	—	—	1.4	3.4	4.6	390	1160	2000	5.4	5.2	5.0
	28	4.0	—	—	1.4	4.0	4.7	390	1280	2110	6.0	5.7	5.5
	35	4.5	—	—	1.4	4.5	5.2	390	1540	2390	7.1	6.8	6.5
	50	5.8	—	—	1.4	5.8	6.5	390	2190	2580	10.1	9.6	9.2
2 room	60	6.8	—	—	1.4	6.8	6.9	390	2590	2620	11.9	11.4	10.9
	20 + 20	3.00	3.00	—	2.4	6.0	7.3	400	1680	2120	7.7	7.4	7.1
	20 + 22	2.86	3.14	—	2.4	6.0	7.3	400	1680	2120	7.7	7.4	7.1
	20 + 25	2.71	3.39	—	2.4	6.1	7.3	400	1720	2120	7.9	7.6	7.2
	20 + 28	2.58	3.62	—	2.4	6.2	7.3	400	1730	2120	7.9	7.6	7.3
	20 + 35	2.36	4.14	—	2.4	6.5	7.3	400	1810	2120	8.3	7.9	7.6
	20 + 50	2.00	5.00	—	2.5	7.0	7.3	470	1900	2120	8.7	8.3	8.0
	20 + 60	1.78	5.33	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2
	22 + 22	3.05	3.05	—	2.4	6.1	7.3	400	1700	2120	7.8	7.5	7.2
	22 + 25	2.90	3.30	—	2.4	6.2	7.3	400	1720	2120	7.9	7.6	7.2
	22 + 28	2.77	3.53	—	2.4	6.3	7.3	400	1750	2120	8.0	7.7	7.4
	22 + 35	2.55	4.05	—	2.4	6.6	7.3	400	1810	2120	8.3	7.9	7.6
	22 + 50	2.17	4.93	—	2.5	7.1	7.3	470	1920	2120	8.8	8.4	8.1
	22 + 60	1.90	5.20	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2
	25 + 25	3.15	3.15	—	2.4	6.3	7.3	400	1750	2120	8.0	7.7	7.4
	25 + 28	3.02	3.38	—	2.4	6.4	7.3	400	1780	2120	8.2	7.8	7.5
	25 + 35	2.79	3.91	—	2.4	6.7	7.3	400	1840	2120	8.4	8.1	7.7
	25 + 50	2.37	4.73	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2
	25 + 60	2.09	5.01	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2
	28 + 28	3.25	3.25	—	2.4	6.5	7.3	400	1810	2120	8.3	7.9	7.6
	28 + 35	3.02	3.78	—	2.4	6.8	7.3	400	1860	2120	8.5	8.2	7.8
28 + 50	2.55	4.55	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2	
28 + 60	2.26	4.84	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2	
35 + 35	3.50	3.50	—	2.4	7.0	7.3	400	1900	2120	8.7	8.3	8.0	
35 + 50	2.92	4.18	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2	
35 + 60	2.62	4.48	—	2.5	7.1	7.3	470	1940	2120	8.9	8.5	8.2	
50 + 50	3.55	3.55	—	2.7	7.1	7.3	500	1940	2120	8.9	8.5	8.2	
50 + 60	3.23	3.87	—	2.7	7.1	7.3	500	1940	2120	8.9	8.5	8.2	
3 room	20 + 20 + 20	2.23	2.23	2.23	2.8	6.7	7.6	520	1640	2420	7.5	7.2	6.9
	20 + 20 + 22	2.16	2.16	2.38	2.8	6.7	7.6	520	1640	2420	7.5	7.2	6.9
	20 + 20 + 25	2.09	2.09	2.62	2.8	6.8	7.6	520	1670	2420	7.7	7.3	7.0
	20 + 20 + 28	2.00	2.00	2.80	2.8	6.8	7.6	520	1670	2420	7.7	7.3	7.0
	20 + 20 + 35	1.84	1.84	3.22	2.8	6.9	7.6	520	1710	2420	7.9	7.5	7.2
	20 + 20 + 50	1.58	1.58	3.94	3.0	7.1	7.6	570	1770	2420	8.1	7.8	7.4
	20 + 20 + 60	1.44	1.44	4.32	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6
	20 + 22 + 22	2.13	2.34	2.34	2.8	6.8	7.6	520	1670	2420	7.7	7.3	7.0
	20 + 22 + 25	2.03	2.23	2.54	2.8	6.8	7.6	520	1670	2420	7.7	7.3	7.0
	20 + 22 + 28	1.94	2.14	2.72	2.8	6.8	7.6	520	1700	2420	7.8	7.5	7.2
	20 + 22 + 35	1.79	1.97	3.14	2.8	6.9	7.6	520	1710	2420	7.9	7.5	7.2
	20 + 22 + 50	1.54	1.70	3.86	3.0	7.1	7.6	570	1770	2420	8.1	7.8	7.4
	20 + 22 + 60	1.41	1.55	4.24	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6
	20 + 25 + 25	1.94	2.43	2.43	2.8	6.8	7.6	520	1700	2420	7.8	7.5	7.2
	20 + 25 + 28	1.89	2.36	2.65	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2
	20 + 25 + 35	1.75	2.19	3.06	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3
	20 + 25 + 50	1.49	1.87	3.74	3.0	7.1	7.6	570	1770	2420	8.1	7.8	7.4
	20 + 25 + 60	1.37	1.71	4.11	3.0	7.2	7.6	570	1830	2420	8.4	8.0	7.7
	20 + 28 + 28	1.82	2.54	2.54	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2
	20 + 28 + 35	1.69	2.36	2.95	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3
	20 + 28 + 50	1.47	2.06	3.67	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6
	20 + 28 + 60	1.35	1.89	4.06	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7
	20 + 35 + 35	1.58	2.76	2.76	2.8	7.1	7.6	520	1770	2420	8.1	7.8	7.4
	20 + 35 + 50	1.37	2.40	3.43	3.0	7.2	7.6	570	1830	2420	8.4	8.0	7.7
	22 + 22 + 22	2.27	2.27	2.27	2.8	6.8	7.6	520	1670	2420	7.7	7.3	7.0
	22 + 22 + 25	2.17	2.17	2.46	2.8	6.8	7.6	520	1700	2420	7.8	7.5	7.2
	22 + 22 + 28	2.11	2.11	2.68	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2
	22 + 22 + 35	1.92	1.92	3.06	2.8	6.9	7.6	520	1740	2420	8.0	7.6	7.3
	22 + 22 + 50	1.66	1.66	3.78	3.0	7.1	7.6	570	1770	2420	8.1	7.8	7.4
	22 + 22 + 60	1.52	1.52	4.15	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6
	22 + 25 + 25	2.11	2.40	2.40	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2
	22 + 25 + 28	2.02	2.30	2.58	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2
	22 + 25 + 35	1.88	2.13	2.99	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3
22 + 25 + 50	1.63	1.86	3.71	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6	
22 + 25 + 60	1.50	1.71	4.09	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7	
22 + 28 + 28	1.95	2.48	2.48	2.8	6.9	7.6	520	1740	2420	8.0	7.6	7.3	
22 + 28 + 35	1.81	2.31	2.88	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3	
22 + 28 + 50	1.58	2.02	3.60	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6	
22 + 28 + 60	1.46	1.86	3.98	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7	
22 + 35 + 35	1.70	2.70	2.70	2.8	7.1	7.6	520	1770	2420	8.1	7.8	7.4	
22 + 35 + 50	1.50	2.39	3.41	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7	
25 + 25 + 25	2.30	2.30	2.30	2.8	6.9	7.6	520	1700	2420	7.8	7.5	7.2	
25 + 25 + 28	2.21	2.21	2.48	2.8	6.9	7.6	520	1740	2420	8.0	7.6	7.3	
25 + 25 + 35	2.06	2.06	2.88	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3	
25 + 25 + 50	1.80	1.80	3.60	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6	
25 + 25 + 60	1.66	1.66	3.98	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7	

Model SCM60ZG-S

(a) Heating

Indoor unit combination	Heating capacity (kW)						Power consumption (W)			Standard current (A)			
	Room heating capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	C room	Min.	Standard	Max.							
3 room	25 + 28 + 28	2.16	2.42	2.42	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3
	25 + 28 + 35	1.99	2.23	2.78	2.8	7.0	7.6	520	1770	2420	8.1	7.8	7.4
	25 + 28 + 50	1.75	1.96	3.50	3.0	7.2	7.6	570	1800	2420	8.3	7.9	7.6
	25 + 35 + 35	1.87	2.62	2.62	2.8	7.1	7.6	520	1770	2420	8.1	7.8	7.4
	25 + 35 + 50	1.66	2.32	3.32	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7
	28 + 28 + 28	2.33	2.33	2.33	2.8	7.0	7.6	520	1740	2420	8.0	7.6	7.3
	28 + 28 + 35	2.18	2.18	2.73	2.8	7.1	7.6	520	1770	2420	8.1	7.8	7.4
	28 + 28 + 50	1.93	1.93	3.44	3.0	7.3	7.6	570	1830	2420	8.4	8.0	7.7
	28 + 35 + 35	2.06	2.57	2.57	2.8	7.2	7.6	520	1800	2420	8.3	7.9	7.6
	35 + 35 + 35	2.40	2.40	2.40	2.8	7.2	7.6	520	1830	2420	8.4	8.0	7.7

Model SCM60ZG-S

(b) Cooling

Indoor unit combination	Cooling capacity (kW)						Power consumption (W)			Standard current (A)				
	Room cooling capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V		
	A room	B room	C room	Min.	Standard	Max.								
1 room	20	2.0	—	—	1.1	2.0	2.8	330	510	960	2.5	2.4	2.3	
	22	2.2	—	—	1.1	2.2	3.1	330	630	1110	3.0	2.9	2.8	
	25	2.5	—	—	1.1	2.5	3.4	330	780	1190	3.8	3.6	3.5	
	28	2.8	—	—	1.1	2.8	3.7	330	860	1340	4.1	3.9	3.8	
	35	3.5	—	—	1.1	3.5	4.5	330	1200	1750	5.6	5.4	5.2	
	50	5.0	—	—	1.1	5.0	5.8	330	1910	2420	8.8	8.4	8.0	
2 room	60	6.0	—	—	1.1	6.0	6.1	330	2420	3050	11.1	10.6	10.2	
	20 + 20	2.00	2.00	—	2.3	4.0	6.0	400	1250	2150	5.9	5.6	5.4	
	20 + 22	2.00	2.20	—	2.3	4.2	6.3	400	1330	2340	6.2	6.0	5.7	
	20 + 25	2.00	2.50	—	2.3	4.5	6.5	400	1430	2450	6.6	6.3	6.1	
	20 + 28	1.96	2.74	—	2.3	4.7	6.8	400	1520	2640	7.1	6.7	6.5	
	20 + 35	1.93	3.37	—	2.3	5.3	7.3	400	1850	2910	8.5	8.1	7.8	
	20 + 50	1.89	4.71	—	2.5	6.6	7.3	480	2540	2910	11.7	11.2	10.7	
	20 + 60	1.88	5.03	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	22 + 22	2.20	2.20	—	2.3	4.4	6.7	400	1430	2560	6.6	6.3	6.1	
	22 + 25	2.20	2.50	—	2.3	4.7	6.8	400	1520	2640	7.1	6.7	6.5	
	22 + 28	2.16	2.74	—	2.3	4.9	7.2	400	1600	2840	7.4	7.1	6.8	
	22 + 35	2.12	3.38	—	2.3	5.5	7.3	400	1940	2910	8.9	8.5	8.2	
	22 + 50	2.05	4.65	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	22 + 60	1.80	4.90	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	25 + 25	2.45	2.45	—	2.3	4.9	7.0	400	1650	2750	7.6	7.2	6.9	
	25 + 28	2.45	2.75	—	2.3	5.2	7.3	400	1750	2910	8.0	7.7	7.4	
	25 + 35	2.42	3.38	—	2.3	5.8	7.3	400	2080	2910	9.6	9.1	8.8	
	25 + 50	2.23	4.47	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	25 + 60	1.97	4.73	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	28 + 28	2.70	2.70	—	2.3	5.4	7.3	400	1850	2910	8.5	8.1	7.8	
	28 + 35	2.67	3.33	—	2.3	6.0	7.3	400	2180	2910	10.0	9.6	9.2	
	28 + 50	2.41	4.29	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	28 + 60	2.13	4.57	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	35 + 35	3.30	3.30	—	2.3	6.6	7.3	400	2540	2910	11.7	11.2	10.7	
	35 + 50	22.76	3.94	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	35 + 60	2.47	4.23	—	2.5	6.7	7.3	480	2560	2910	11.8	11.2	10.8	
	50 + 50	3.35	3.35	—	2.6	6.7	7.3	550	2560	2910	11.8	11.2	10.8	
	50 + 60	3.05	3.65	—	2.6	6.7	7.3	550	2560	2910	11.8	11.2	10.8	
	3 room	20 + 20 + 20	1.80	1.80	1.80	3.3	5.4	7.5	680	1400	2610	6.5	6.2	6.0
		20 + 20 + 22	1.74	1.74	1.92	3.3	5.4	7.5	680	1400	2610	6.5	6.2	6.0
		20 + 20 + 25	1.69	1.69	2.12	3.3	5.5	7.5	680	1480	2610	6.9	6.6	6.3
		20 + 20 + 28	1.65	1.65	2.31	3.3	5.6	7.5	680	1470	2610	6.8	6.5	6.3
		20 + 20 + 35	1.55	1.55	2.71	3.3	5.8	7.5	680	1530	2610	7.1	6.8	6.5
		20 + 20 + 50	1.38	1.38	3.44	3.5	6.2	7.5	760	1690	2610	7.8	7.4	7.1
		20 + 20 + 60	1.28	1.28	3.84	3.5	6.4	7.5	760	1780	2610	8.2	7.8	7.5
20 + 22 + 22		1.72	1.89	1.89	3.3	5.5	7.5	680	1440	2610	6.7	6.4	6.1	
20 + 22 + 25		1.64	1.81	2.05	3.3	5.5	7.5	680	1440	2610	6.7	6.4	6.1	
20 + 22 + 28		1.60	1.76	2.24	3.3	5.6	7.5	680	1480	2610	6.9	6.6	6.3	
20 + 22 + 35		1.51	1.66	2.64	3.3	5.8	7.5	680	1570	2610	7.3	7.0	6.7	
20 + 22 + 50		1.35	1.48	3.37	3.5	6.2	7.5	760	1690	2610	7.8	7.4	7.1	
20 + 22 + 60		1.27	1.40	3.82	3.5	6.5	7.5	760	1820	2610	8.4	8.0	7.7	
20 + 25 + 25		1.60	2.00	2.00	3.3	5.6	7.5	680	1480	2610	6.9	6.6	6.3	
20 + 25 + 28		1.56	1.95	2.19	3.3	5.7	7.5	680	1530	2610	7.1	6.8	6.5	
20 + 25 + 35		1.48	1.84	2.58	3.3	5.9	7.5	680	1570	2610	7.3	7.0	6.7	
20 + 25 + 50		1.33	1.66	3.32	3.5	6.3	7.5	760	1730	2610	7.9	7.6	7.3	
20 + 25 + 60		1.26	1.57	3.77	3.5	6.6	7.5	760	1860	2610	8.5	8.2	7.8	
20 + 28 + 28		1.53	2.14	2.14	3.3	5.8	7.5	680	1530	2610	7.1	6.8	6.5	
20 + 28 + 35		1.45	2.02	2.53	3.3	6.0	7.5	680	1620	2610	7.4	7.1	6.8	
20 + 28 + 50		1.31	1.83	3.27	3.5	6.4	7.5	760	1780	2610	8.2	7.8	7.5	
20 + 28 + 60		1.24	1.74	3.72	3.5	6.7	7.5	760	1860	2610	8.5	8.2	7.8	
20 + 35 + 35		1.38	2.41	2.41	3.3	6.2	7.5	680	1690	2610	7.8	7.4	7.1	
20 + 35 + 50		1.26	2.20	3.14	3.5	6.6	7.5	760	1820	2610	8.4	8.0	7.7	
22 + 22 + 22		1.83	1.83	1.83	3.3	5.5	7.5	680	1440	2610	6.7	6.4	6.1	
22 + 22 + 25		1.79	1.79	2.03	3.3	5.6	7.5	680	1480	2610	6.9	6.6	6.3	
22 + 22 + 28		1.74	1.74	2.22	3.3	5.7	7.5	680	1480	2610	6.9	6.6	6.3	
22 + 22 + 35		1.64	1.64	2.61	3.3	5.9	7.5	680	1570	2610	7.3	7.0	6.7	
22 + 22 + 50		1.47	1.47	3.35	3.5	6.3	7.5	760	1730	2610	7.9	7.6	7.3	
22 + 22 + 60		1.38	1.38	3.75	3.5	6.5	7.5	760	1820	2610	8.4	8.0	7.7	
22 + 25 + 25		1.74	1.98	1.98	3.3	5.7	7.5	680	1530	2610	7.1	6.8	6.5	
22 + 25 + 28		1.70	1.93	2.17	3.3	5.8	7.5	680	1530	2610	7.1	6.8	6.5	
22 + 25 + 35		1.58	1.80	2.52	3.3	5.9	7.5	680	1620	2610	7.4	7.1	6.8	
22 + 25 + 50		1.45	1.65	3.30	3.5	6.4	7.5	760	1780	2610	8.2	7.8	7.5	
22 + 25 + 60		1.36	1.54	3.70	3.5	6.6	7.5	760	1860	2610	8.5	8.2	7.8	
22 + 28 + 28		1.64	2.08	2.08	3.3	5.8	7.5	680	1570	2610	7.3	7.0	6.7	
22 + 28 + 35		1.55	1.98	2.47	3.3	6.0	7.5	680	1620	2610	7.4	7.1	6.8	
22 + 28 + 50		1.41	1.79	3.20	3.5	6.4	7.5	760	1780	2610	8.2	7.8	7.5	
22 + 28 + 60		1.34	1.71	3.65	3.5	6.7	7.5	760	1910	2610	8.8	8.4	8.0	
22 + 35 + 35		1.48	2.36	2.36	3.3	6.2	7.5	680	1690	2610	7.8	7.4	7.1	
22 + 35 + 50		1.36	2.16	3.08	3.5	6.6	7.5	760	1860	2610	8.5	8.2	7.8	
25 + 25 + 25		1.93	1.93	1.93	3.3	5.8	7.5	680	1530	2610	7.1	6.8	6.5	
25 + 25 + 28	1.86	1.86	2.08	3.3	5.8	7.5	680	1570	2610	7.3	7.0	6.7		
25 + 25 + 35	1.76	1.76	2.47	3.3	6.0	7.5	680	1650	2610	7.6	7.2	6.9		
25 + 25 + 50	1.60	1.60	3.20	3.5	6.4	7.5	760	1780	2610	8.3	7.9	7.6		
25 + 25 + 60	1.52	1.52	3.65	3.5	6.7	7.5	760	1910	2610	8.8	8.4	8.0		

Model SCM60ZG-S

(b) Cooling

Indoor unit combination	Cooling capacity (kW)						Power consumption (W)			Standard current (A)			
	Room cooling capacity (kW)			Total capacity (kW)			Min.	Standard	Max.	220V	230V	240V	
	A room	B room	C room	Min.	Standard	Max.							
3 room	25 + 28 + 28	1.82	2.04	2.04	3.3	5.9	7.5	680	1570	2610	7.3	7.0	6.7
	25 + 28 + 35	1.73	1.94	2.43	3.3	6.1	7.5	680	1650	2610	7.6	7.2	6.9
	25 + 28 + 50	1.58	1.77	3.16	3.5	6.5	7.5	760	1820	2610	8.4	8.0	7.7
	25 + 35 + 35	1.66	2.32	2.32	3.3	6.3	7.5	680	1730	2610	7.9	7.6	7.3
	25 + 35 + 50	1.52	2.13	3.05	3.5	6.7	7.5	760	1910	2610	8.8	8.4	8.0
	28 + 28 + 28	2.00	2.00	2.00	3.3	6.0	7.5	680	1620	2610	7.4	7.1	6.8
	28 + 28 + 35	1.91	1.91	2.38	3.3	6.2	7.5	680	1690	2610	7.8	7.4	7.1
	28 + 28 + 50	1.74	1.74	3.11	3.5	6.6	7.5	760	1820	2610	8.4	8.0	7.7
	28 + 35 + 35	1.83	2.29	2.29	3.3	6.4	7.5	680	1730	2610	7.9	7.6	7.3
	35 + 35 + 35	2.20	2.20	2.20	3.3	6.6	7.5	680	1820	2610	8.4	8.0	7.7

Model SCM80ZG-S

(a) Heating

Indoor unit combination	Heating capacity (kW)								Power consumption (W)			Standard current (A)		
	Room heating capacity (kW)				Total capacity (kW)				Min.	Standard	Max.	220V	230V	240V
	A room	B room	C room	D room	Min.	Standard	Max.							
4 room	28 + 28 + 28 + 28	2.30	2.30	2.30	2.30	3.6	9.2	9.6	910	2400	2550	11.0	10.5	10.1
	28 + 28 + 28 + 35	2.16	2.16	2.16	2.71	3.6	9.2	9.6	910	2400	2550	11.0	10.5	10.1
	28 + 28 + 28 + 50	1.94	1.94	1.94	3.47	3.7	9.3	9.6	950	2430	2550	11.2	10.7	10.2
	28 + 28 + 35 + 35	2.07	2.07	2.58	2.58	3.6	9.3	9.6	910	2430	2550	11.2	10.7	10.2
	28 + 35 + 35 + 35	1.96	2.45	2.45	2.45	3.6	9.3	9.6	910	2430	2550	11.2	10.7	10.2

Model SCM80ZG-S

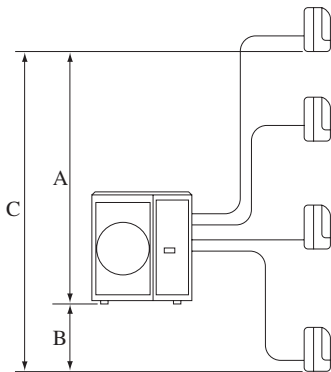
(b) Cooling

Indoor unit combination	Cooling capacity (kW)								Power consumption (W)			Standard current (A)		
	Room cooling capacity (kW)				Total capacity (kW)				Min.	Standard	Max.	220V	230V	240V
	A room	B room	C room	D room	Min.	Standard	Max.							
4 room	28 + 28 + 28 + 28	1.98	1.98	1.98	1.98	3.8	7.9	9.5	890	2200	2990	10.1	9.7	9.3
	28 + 28 + 28 + 35	1.86	1.86	1.86	2.32	3.8	7.9	9.5	890	2200	2990	10.1	9.7	9.3
	28 + 28 + 28 + 50	1.67	1.67	1.67	2.99	4.1	8.0	9.5	970	2220	2990	10.2	9.7	9.3
	28 + 28 + 35 + 35	1.78	1.78	2.22	2.22	3.8	8.0	9.5	890	2220	2990	10.2	9.7	9.3
	28 + 35 + 35 + 35	1.68	2.11	2.11	2.11	3.8	8.0	9.5	890	2220	2990	10.2	9.7	9.3

2.2 Range of usage & limitations

Item		Models				
		SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
Indoor intake air temperature (Upper, lower limits)	Cooling	18 to 32°C				
	Heating	15 to 30°C				
Outdoor air temperature (Upper, lower limits)	Cooling	-15 to 43°C				
	Heating	-15 to 24°C				
Indoor units that can be used in combination	Number of connected units	1 to 2 units		2 to 3 units		※3 to 4 units
	Total of indoor Units (class kW)	5.7kW	7.0kW	8.5kW	11.0kW	13.5kW
Total length for all rooms		Max. 30m		Max. 40m		Max. 70m
Length for one indoor unit		Max. 25m				
Difference in height between indoor and outdoor units	When indoor unit is above outdoor unit (A)	15m				20m
	When indoor unit is below outdoor unit (B)	15m				20m
Difference in height between indoor units (C)		Max. 25m				
Compressor stop/start frequency	1 cycle time	6 min or more (from stop to stop or from start to start)				
	Stop time	3 min or more				
Power source voltage	Voltage fluctuation	Within $\pm 10\%$ of rated voltage				
	Voltage drop during start	Within $\pm 15\%$ of rated voltage				
	Interval unbalance	Within $\pm 3\%$ of rated voltage				

※ Only combination of SKM60 + SKM60 and SKM60 + SKM71 (2 indoor units) to SCM80ZG-S can be available.

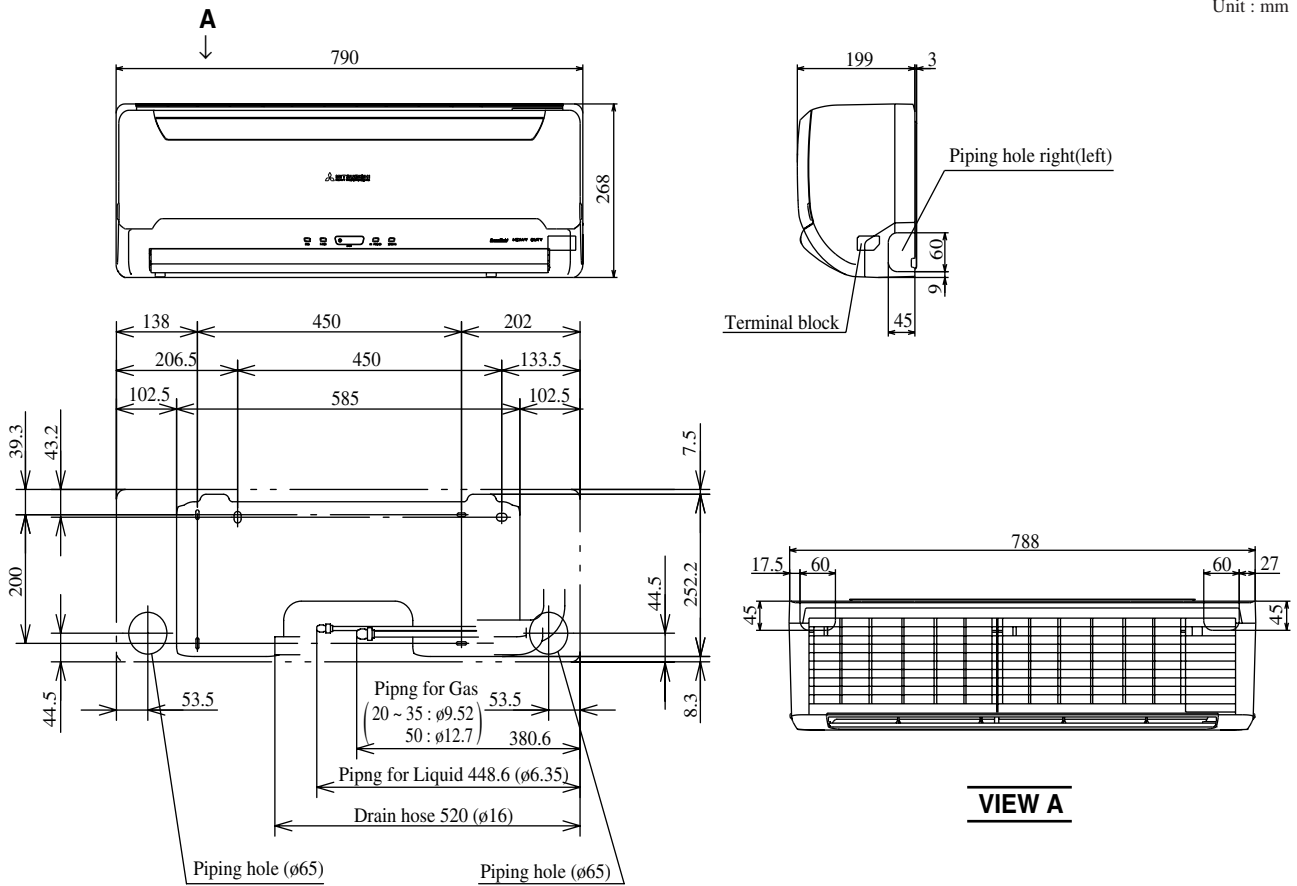


2.3 Exterior dimensions

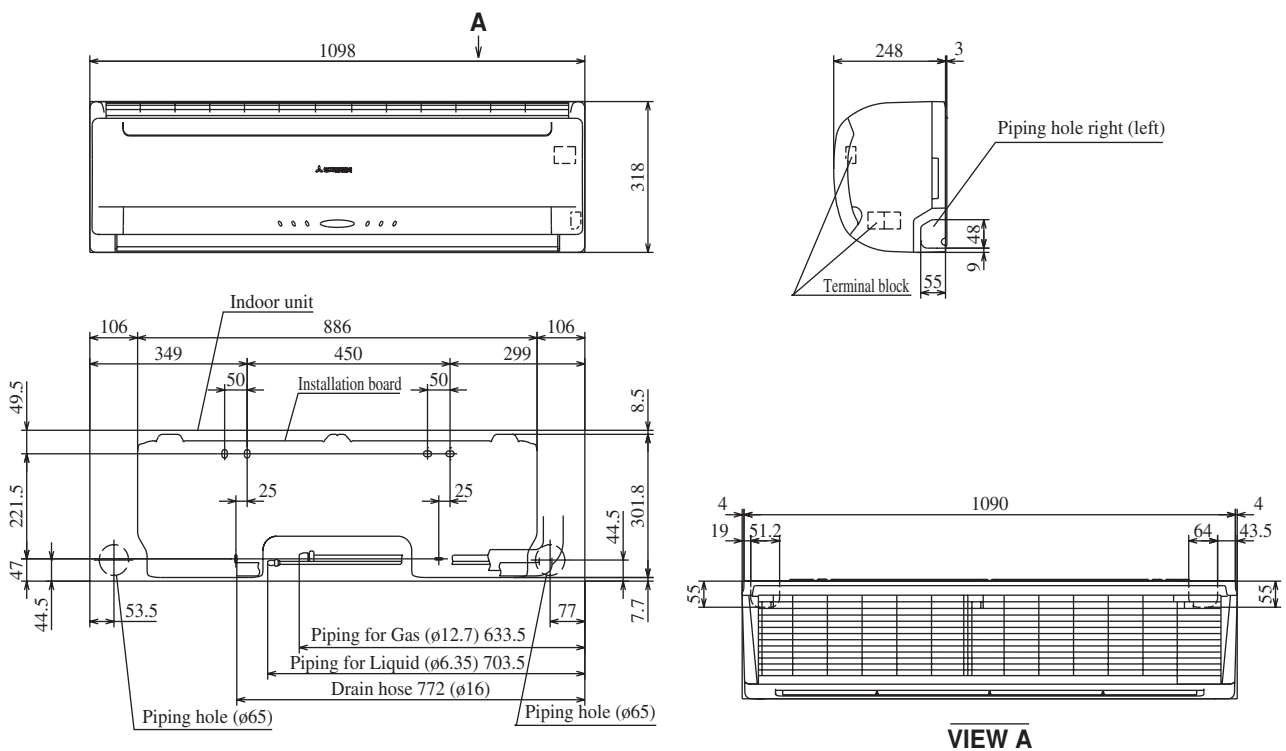
(1) Indoor unit

Models SKM20ZG-S, 22ZG-S, 25ZG-S, 28ZG-S, 35ZG-S, 50ZG-S

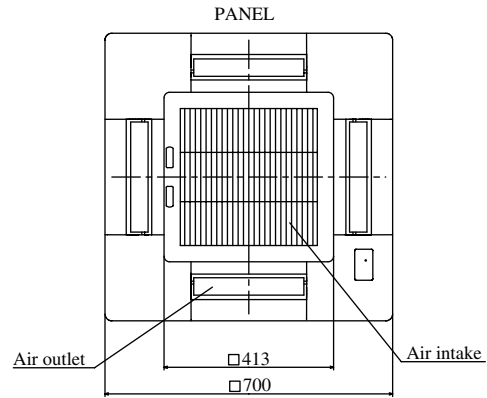
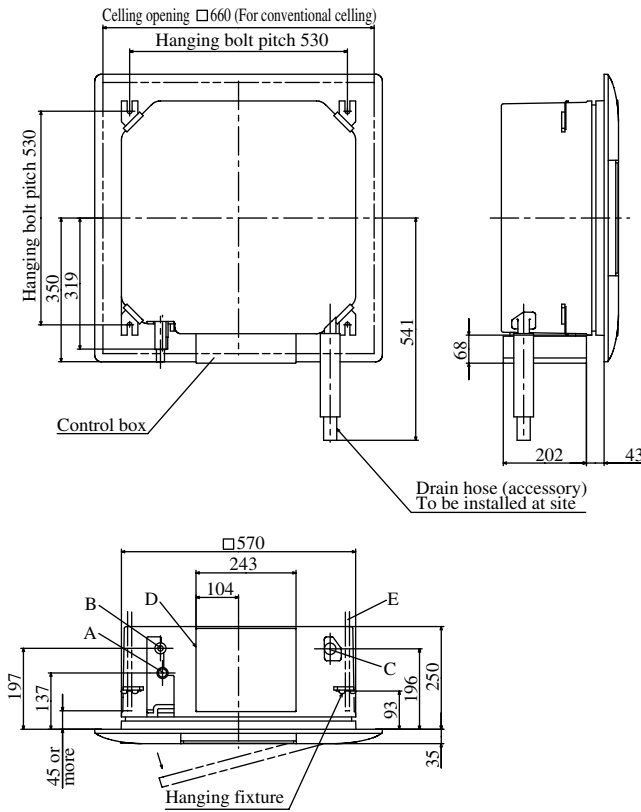
Unit : mm



Models SKM60ZG-S, 71ZG-S



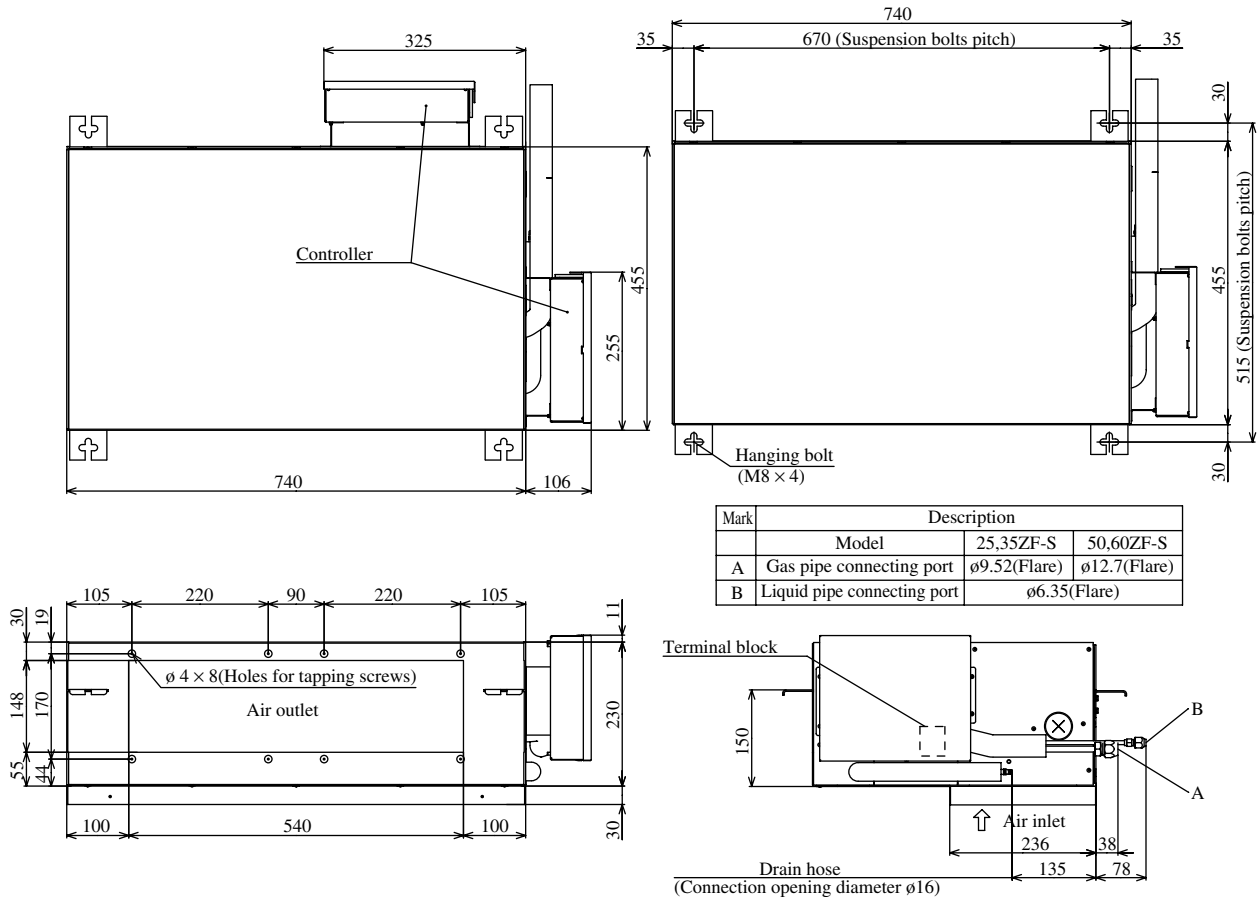
Models STM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S



Mark	Description		
	Model	25,35ZF-S	50,60ZF-S
A	Gas pipe connecting port	ø 9.52(Flare)	ø 12.7(Flare)
B	Liquid pipe connecting port	ø 6.35(Flare)	
C	Drain line tube connecting port	VP25*	
D	Power intake		
E	Hanging bolt	(M10 or M8)	

*Please arrange VP25 connector sockets on the installer's part.

Models SRRM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S

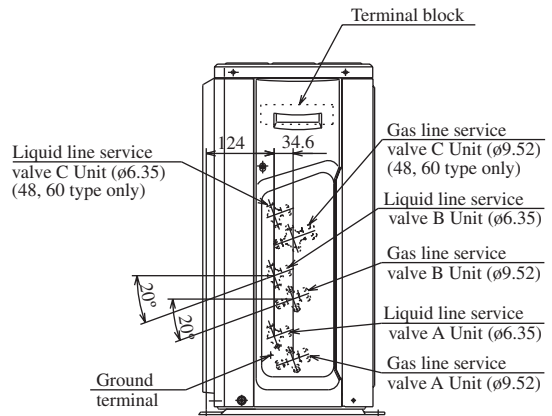
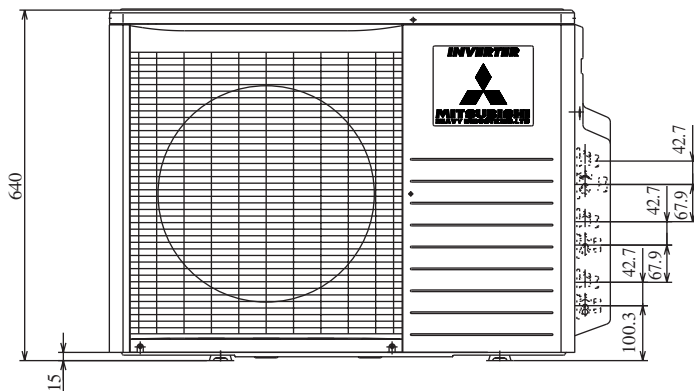
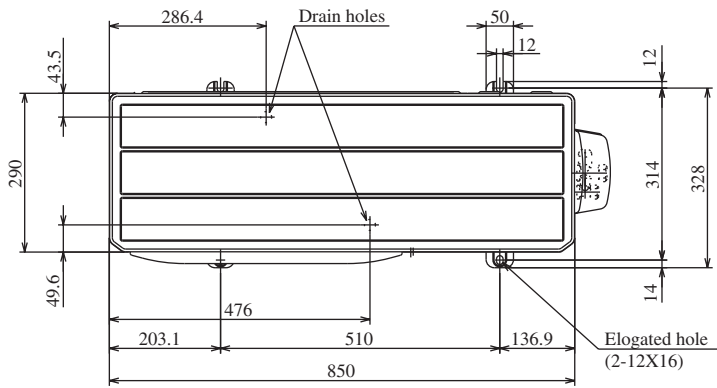


Mark	Description		
	Model	25,35ZF-S	50,60ZF-S
A	Gas pipe connecting port	ø9.52(Flare)	ø12.7(Flare)
B	Liquid pipe connecting port	ø6.35(Flare)	

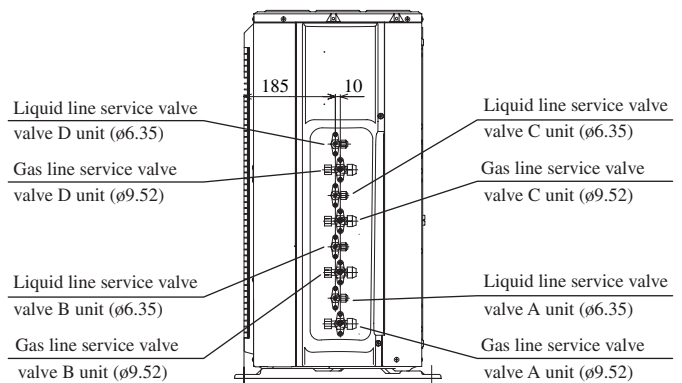
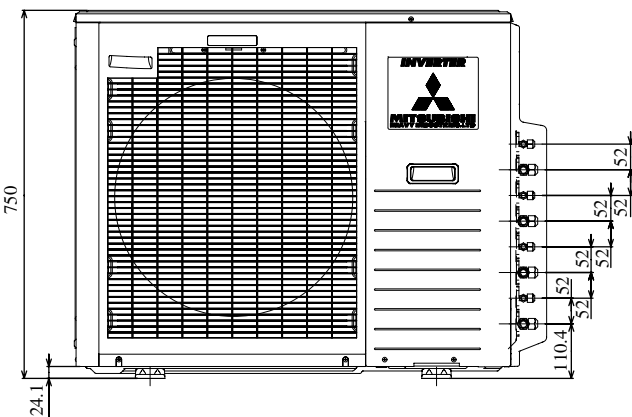
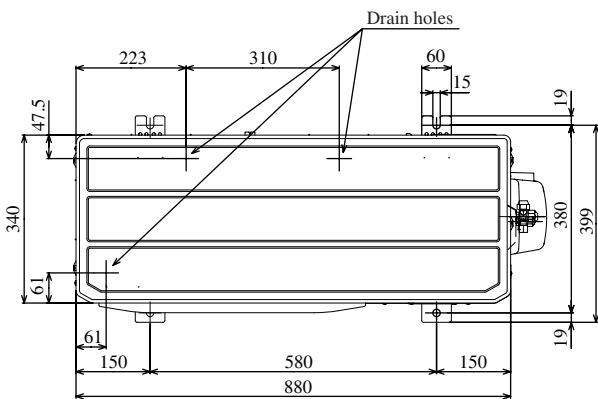
(2) Outdoor unit

Models SCM40ZG-S, 45ZG-S, 48ZG-S, 60ZG-S

Unit : mm

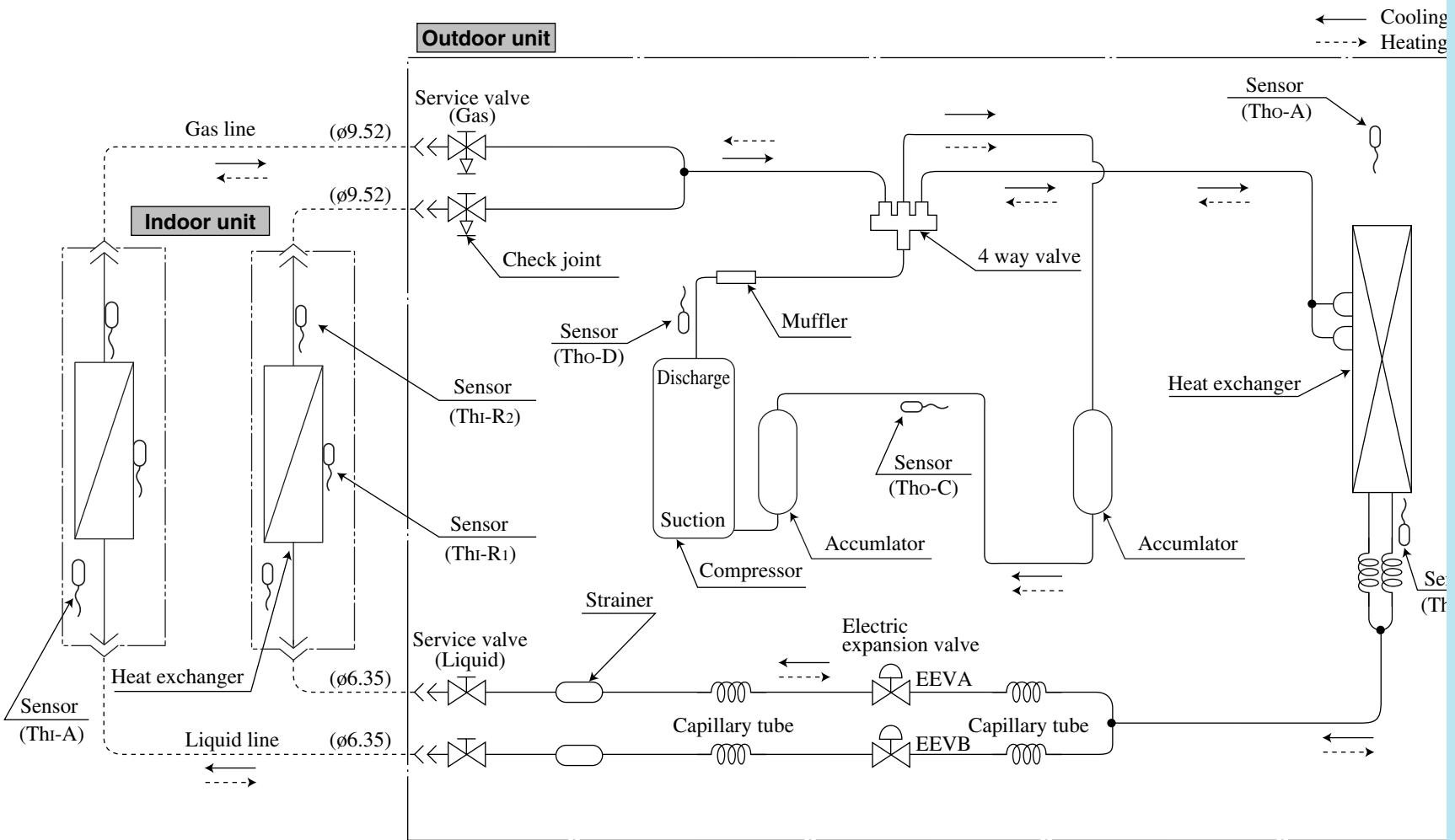


Model SCM80ZG-S

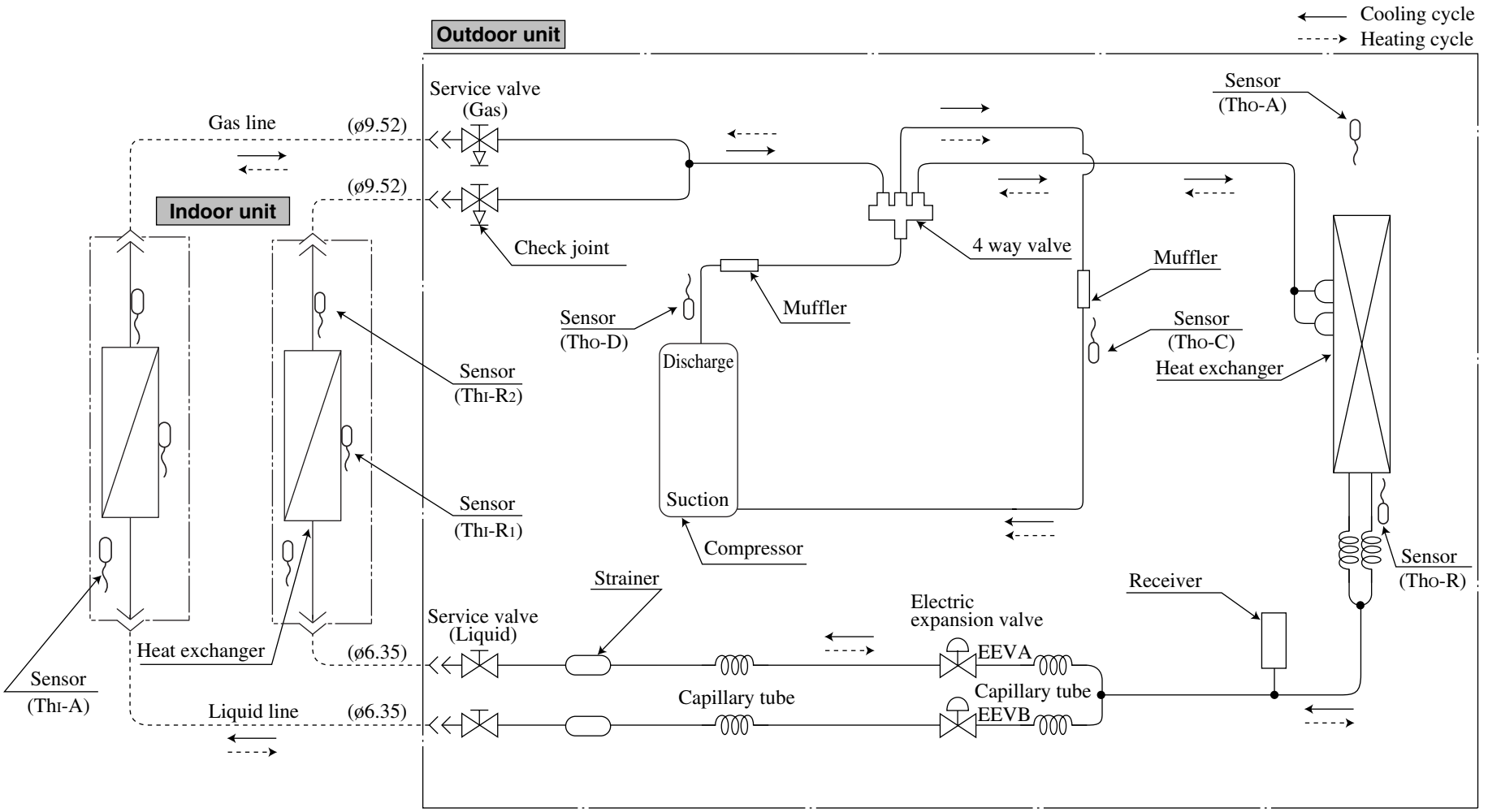


2.4 Piping system

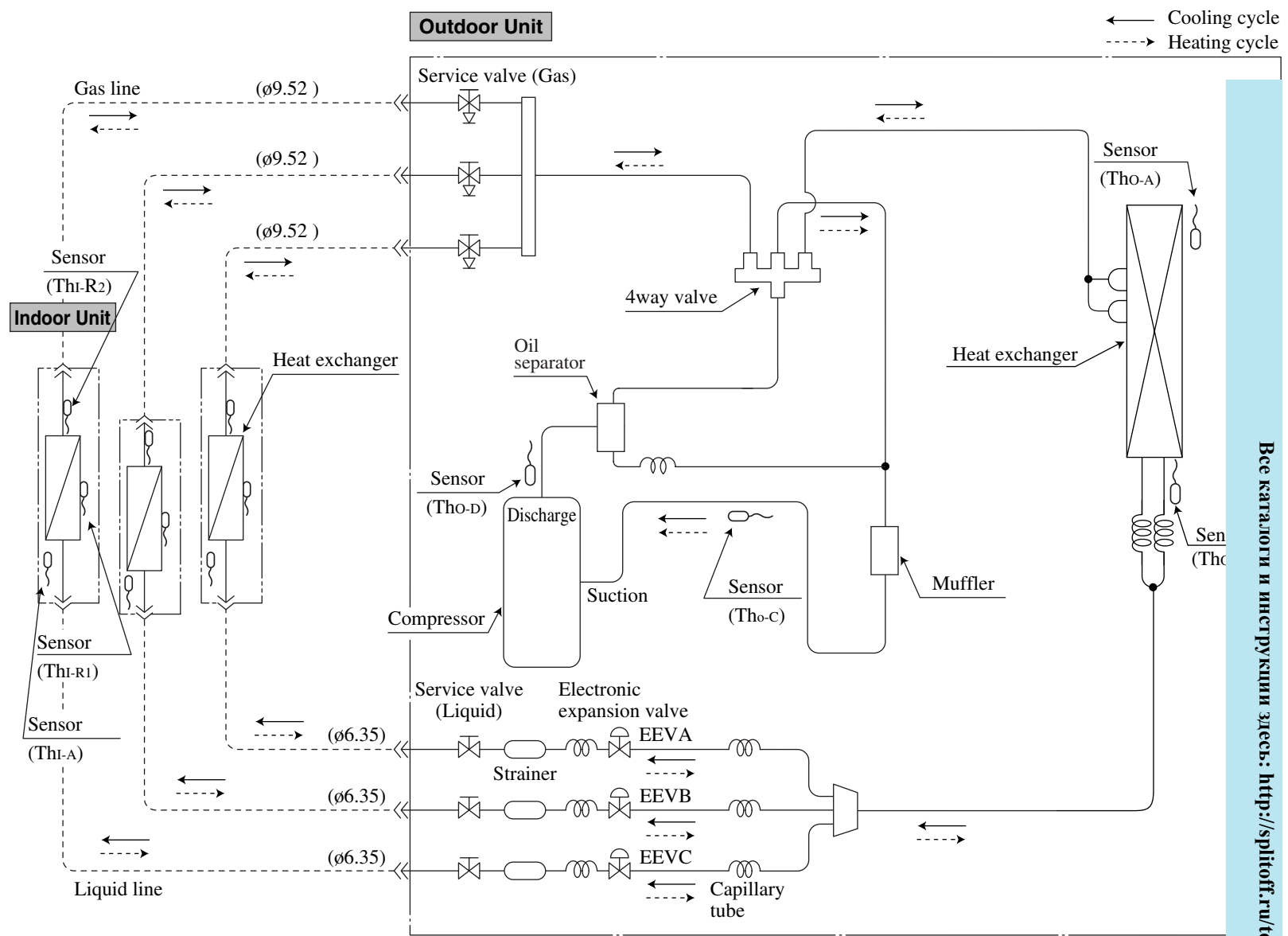
Model SCM40ZG-S



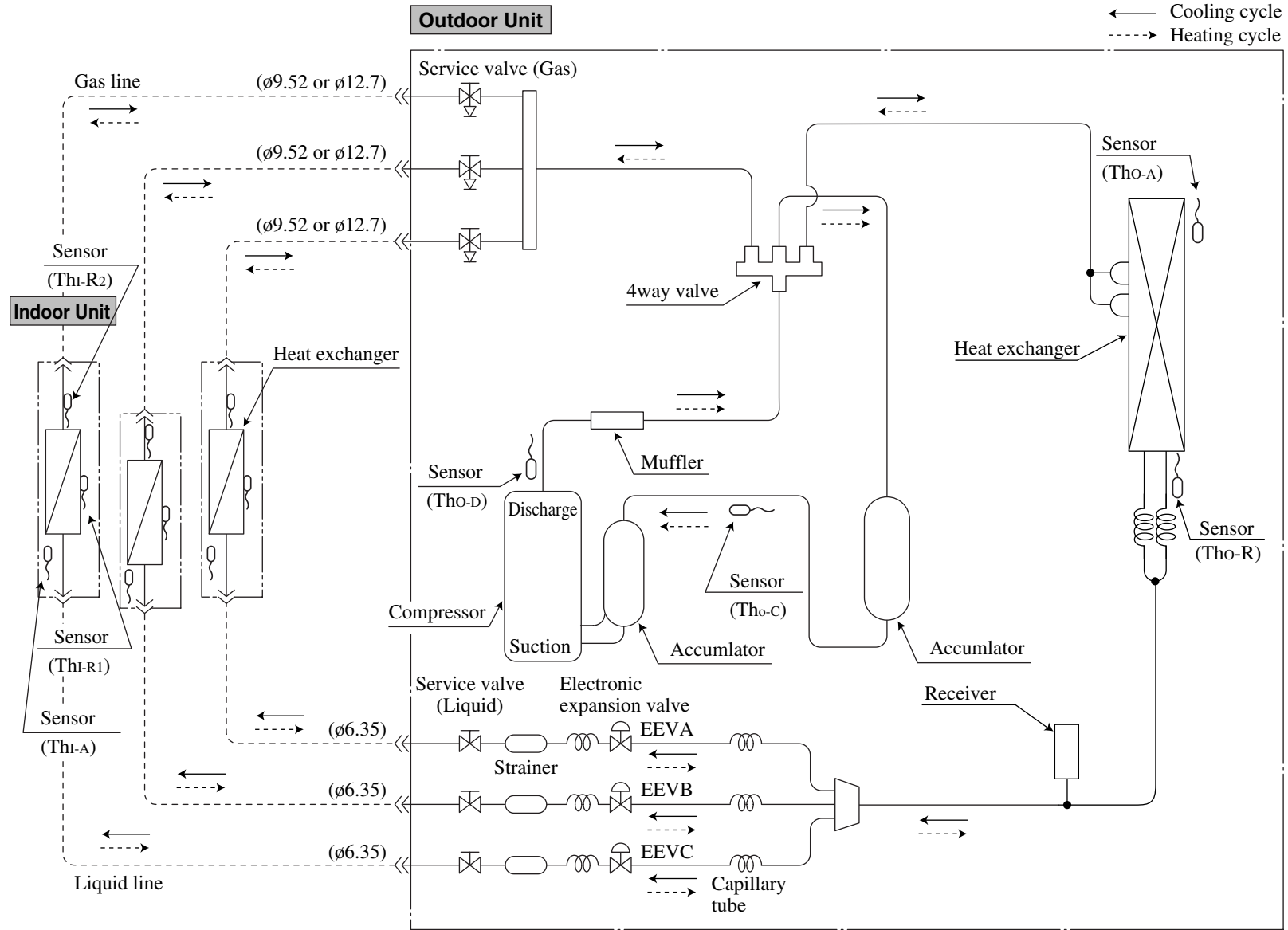
Все каталоги и инструкции здесь: <http://splitoff.ru/teh-doc.html>



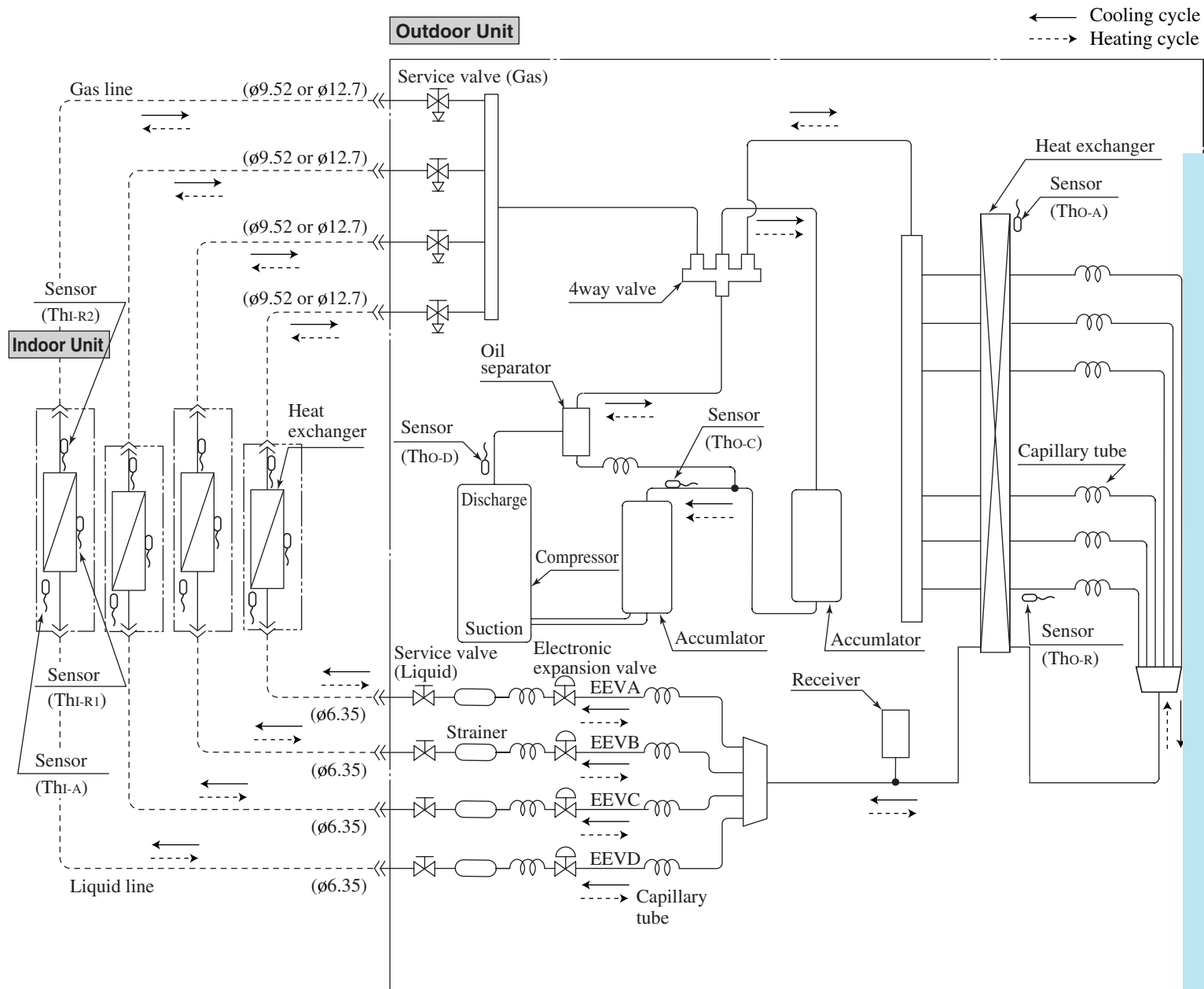
← Cooling cycle
 - - - - - Heating cycle



Все каталоги и инструкции здесь: <http://splitoff.ru/teh-doc.html>



Gas line 20, 22, 25, 28, 35 type : $\phi 9.52$
 50, 60 type : $\phi 12.7$



Gas line 20, 22, 25, 28, 35 type : ø9.52
50, 60, 71 type : ø12.7

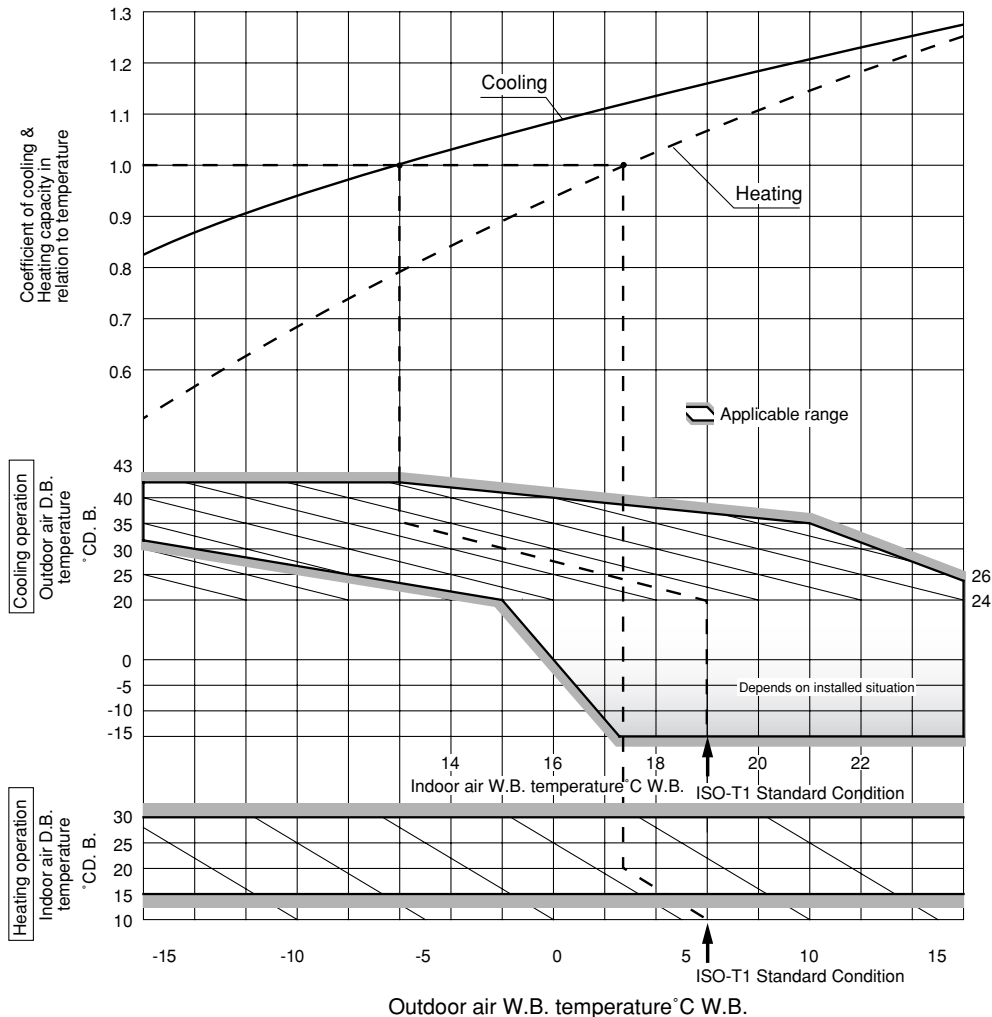
Model SCM80ZG-S

Все каталоги и инструкции здесь: <http://splitoff.ru/teh-doc.html>

2.5 Selection chart

Correct the cooling and heating capacity in accordance with the conditions as follows. The net cooling and heating capacity can be obtained in the following way.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



(2) Correction of cooling and heating capacity in relation to one way length of refrigerant piping

It is necessary to correct the cooling and heating capacity in relation to the one way piping length between the indoor and outdoor units.

Piping length [m]	7	10	15	20	25
Cooling	1.0	0.99	0.975	0.965	0.95
Heating	1.0	1.0	1.0	1.0	1.0

(3) Correction relative to frosting on outdoor heat exchanger during heating

In additions to the foregoing corrections (1), (2) the heating capacity needs to be adjusted also with respect to the frosting on the outdoor heat exchanger.

Air inlet temperature of outdoor unit in °CWB	-10	-9	-7	-5	-3	-1	1	3	5
Adjustment coefficient	0.95	0.94	0.93	0.91	0.88	0.86	0.87	0.92	1.00

3 ELECTRICAL DATA

Meaning of marks

• Outdoor Unit

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

FMo	Fan motor	Tho-R	Sensor (outdoor H.X temp.)
L	Reactor	Tho-D	Sensor (discharge pipe temp.)
EEVA ~ D	Electronic expansion valve	Tho-C	Sensor (suction pipe temp.)
20S	4 way valve (coil)		

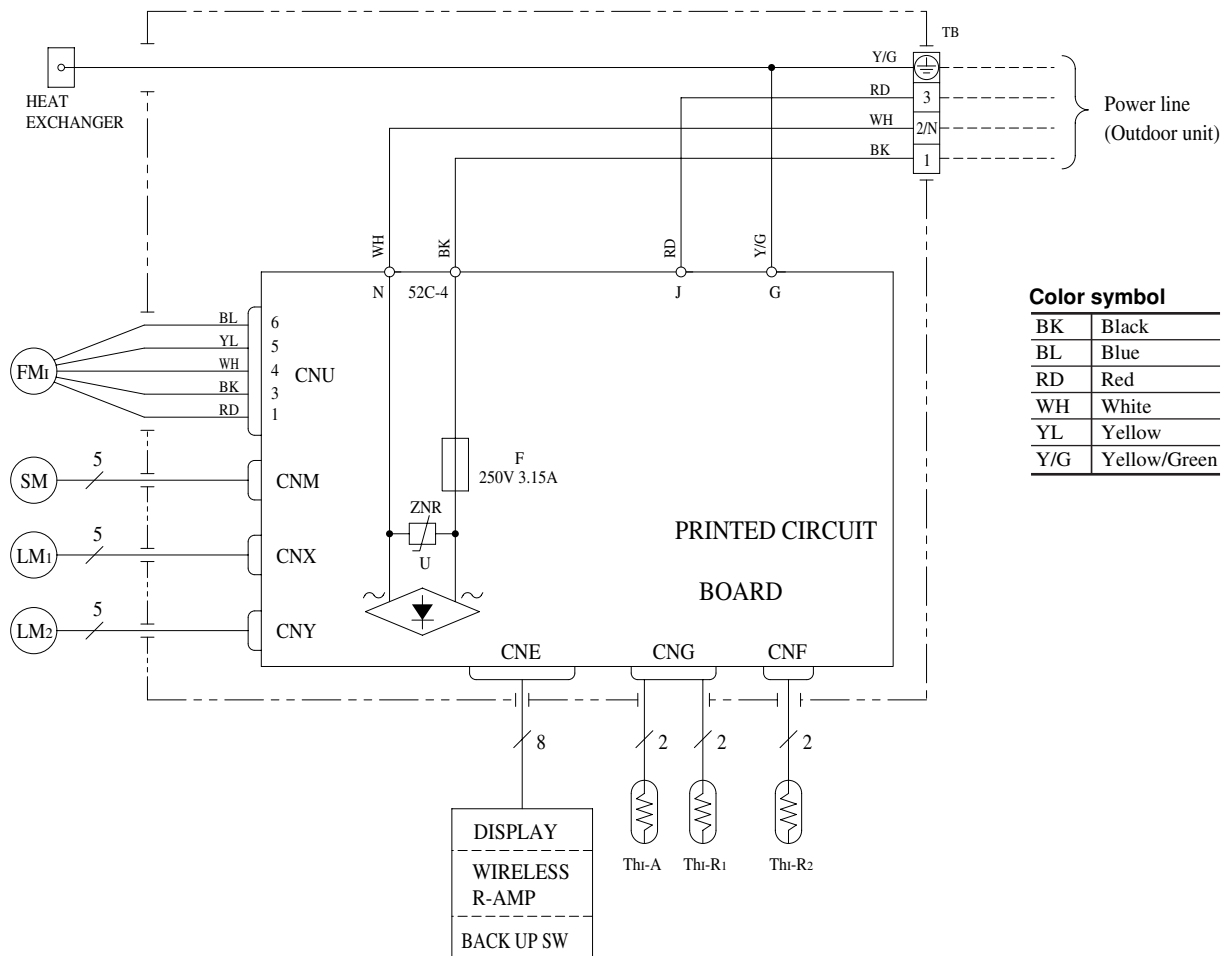
• Indoor Unit

Symbol	Parts name	Symbol	Parts name
FMI	Fan motor	FS	Float switch
SM	Flap motor	Tr	Transformer
LM1, 2	Louver motor	Thi-A	Sensor (room temp.)
ZNR	Varistor	Thi-R1	Sensor (indoor H.X temp.)
F	Fuse	Thi-R2	Sensor (indoor H.X temp.)
DM	Drain motor		

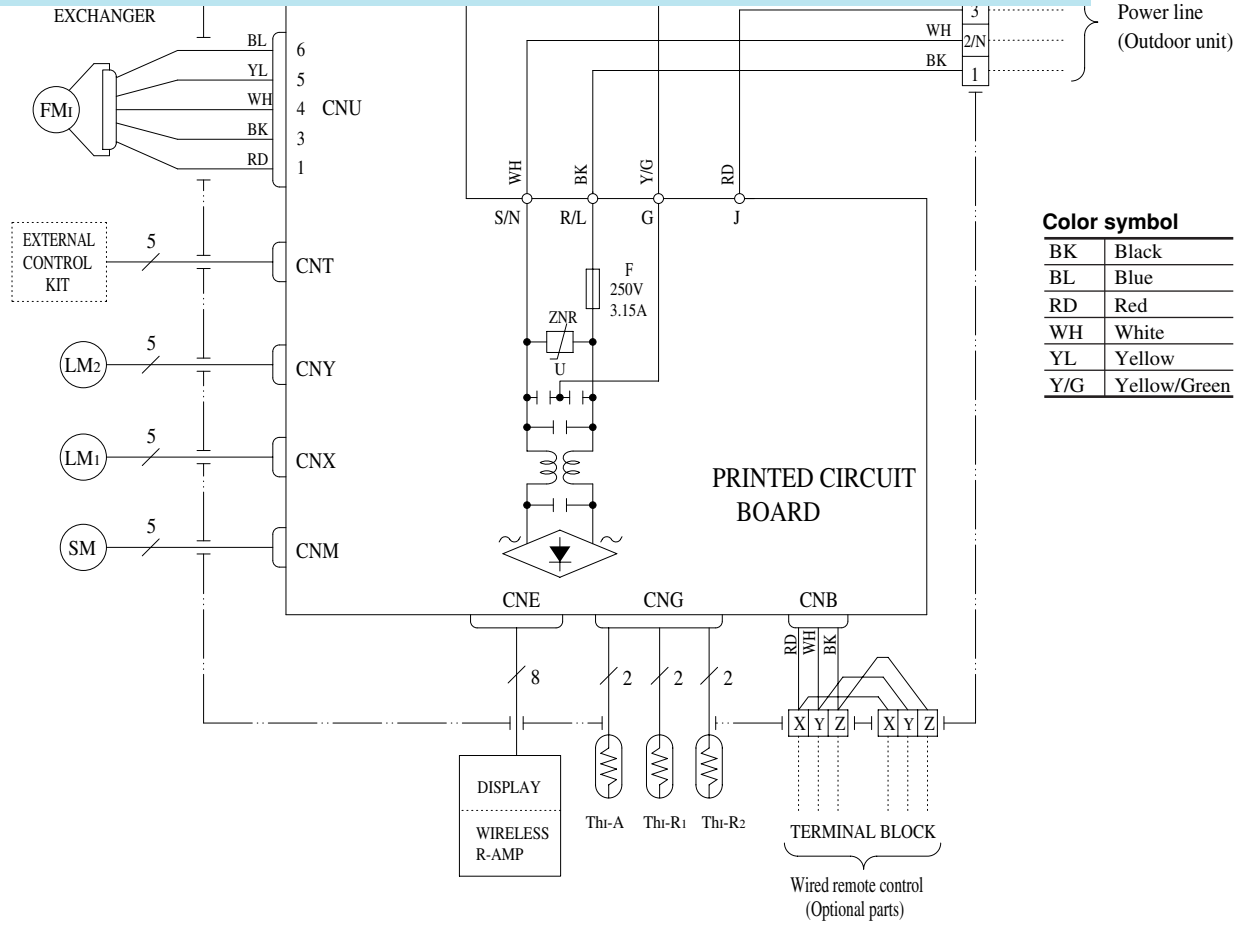
3.1 Electrical wiring

(1) Indoor unit

Models SKM20ZG-S, 22ZG-S, 25ZG-S, 28ZG-S, 35ZG-S, 50ZG-S

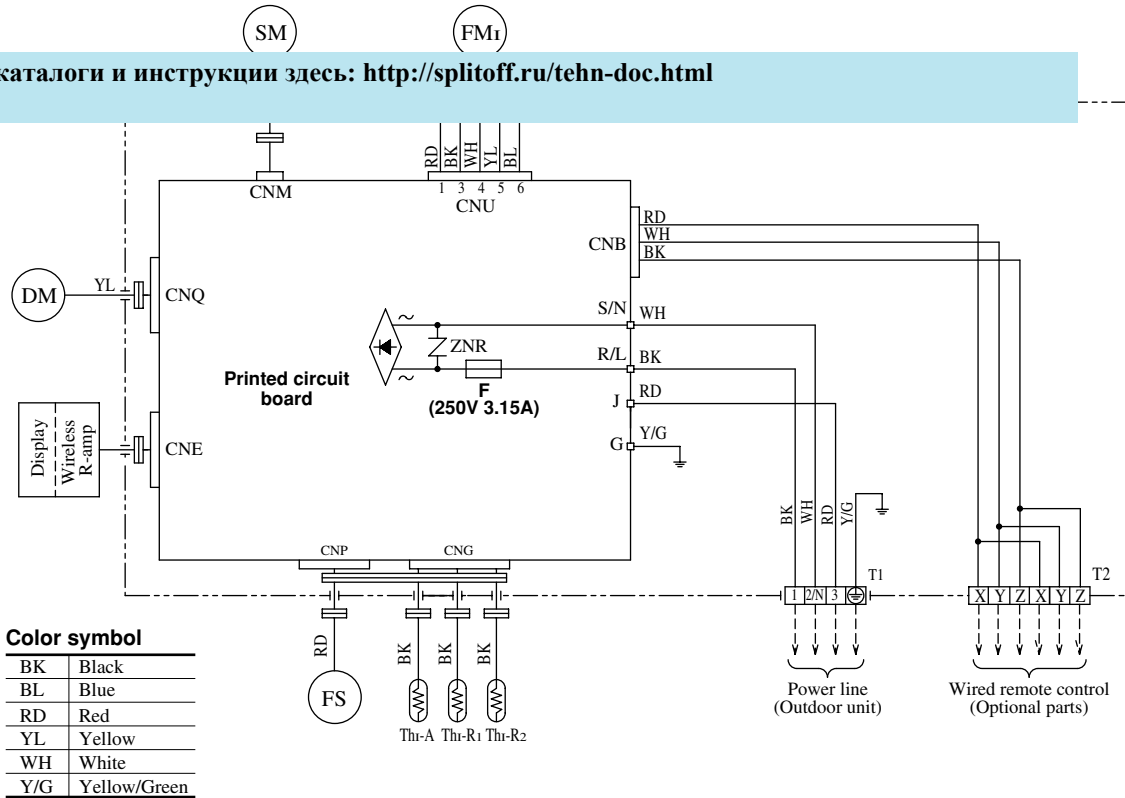


Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

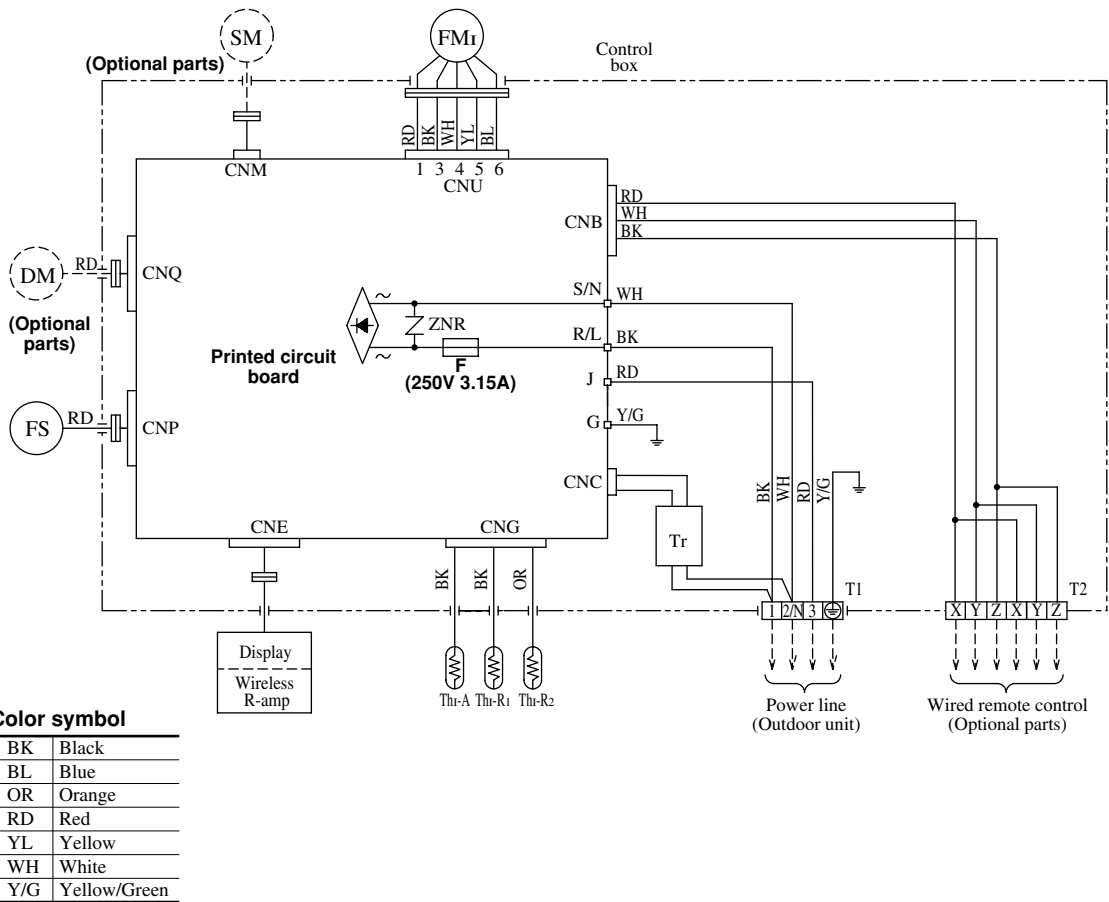


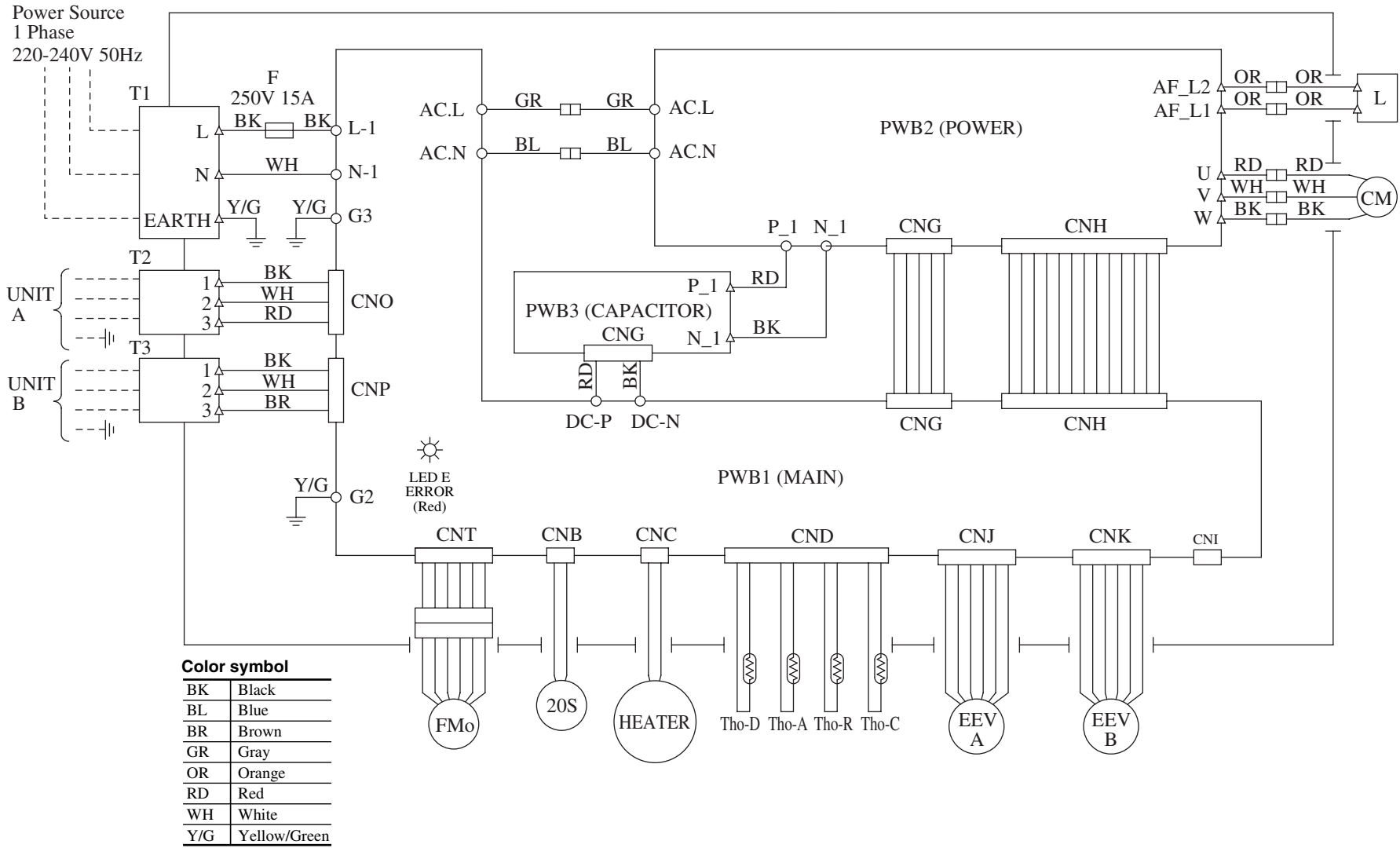
Models STM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S

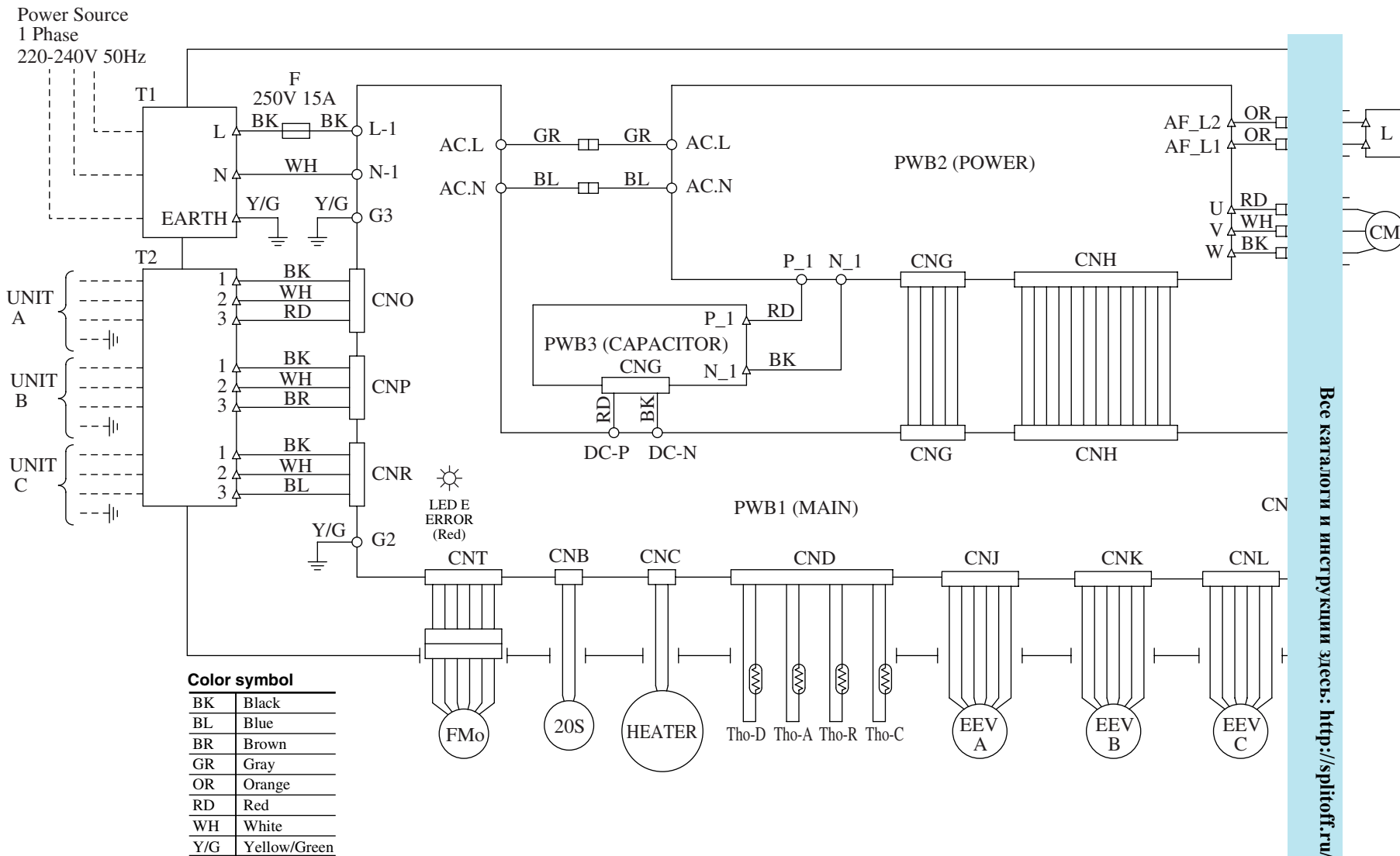
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



Models SRRM25ZF-S, 35ZF-S, 50ZF-S, 60ZF-S

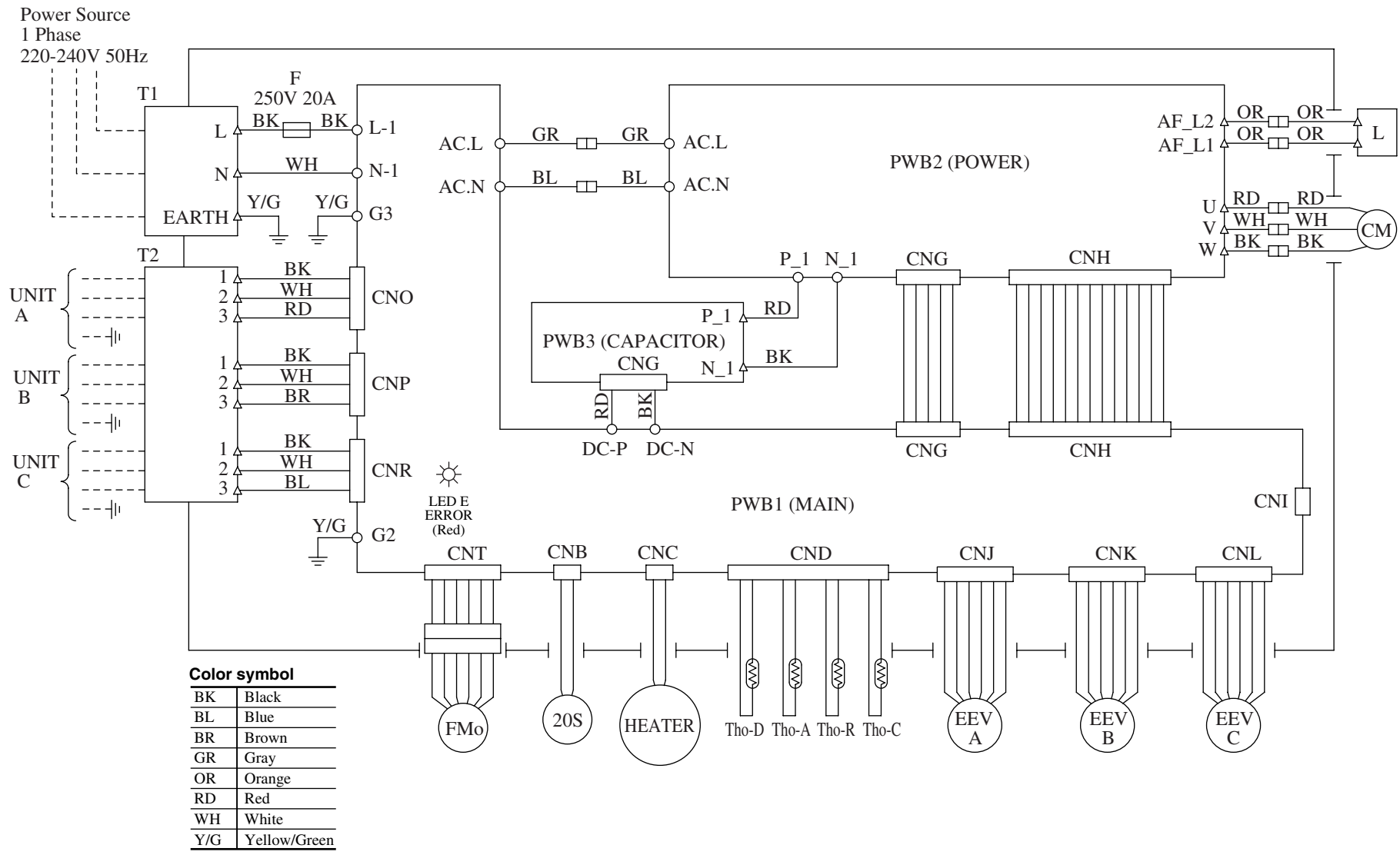






Color symbol

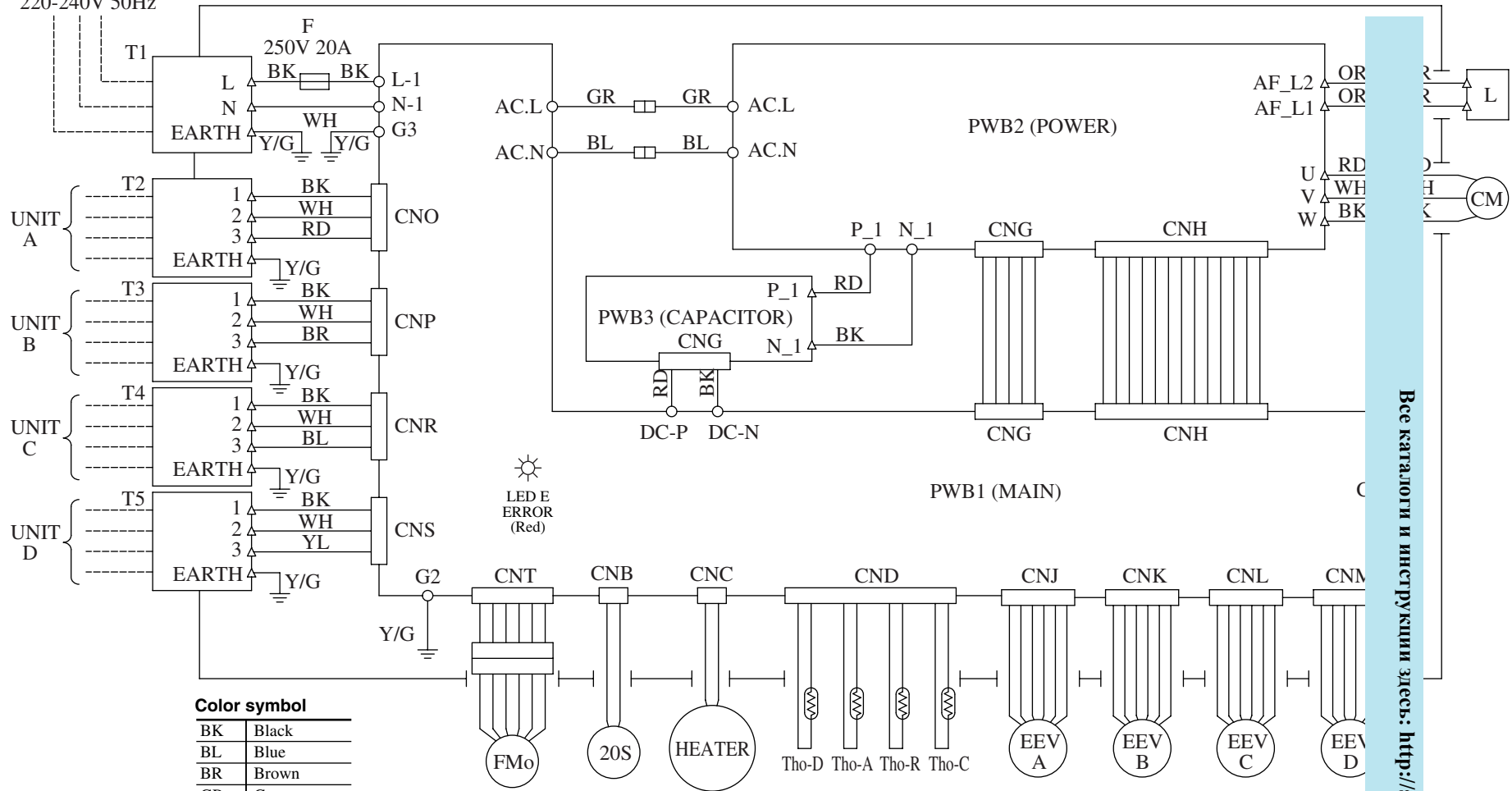
BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
Y/G	Yellow/Green



Color symbol

BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
Y/G	Yellow/Green

Power Source
1 Phase
220-240V 50Hz



Color symbol

BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
YL	Yellow
Y/G	Yellow/Green

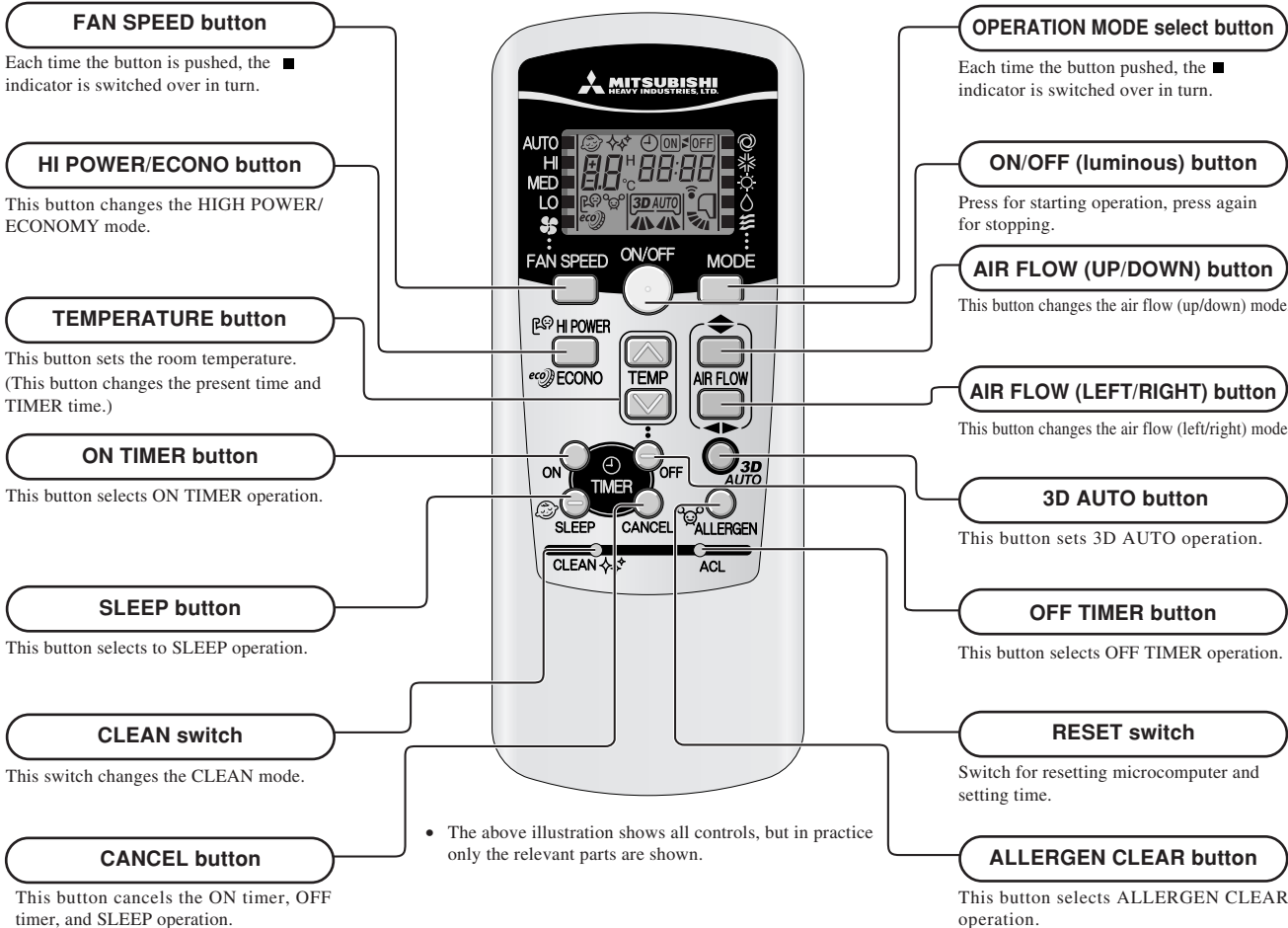
Все каталоги и инструкции здесь: <http://splitoff.ru/teh-doc.html>

4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

4.1 Operation control function by remote control switch

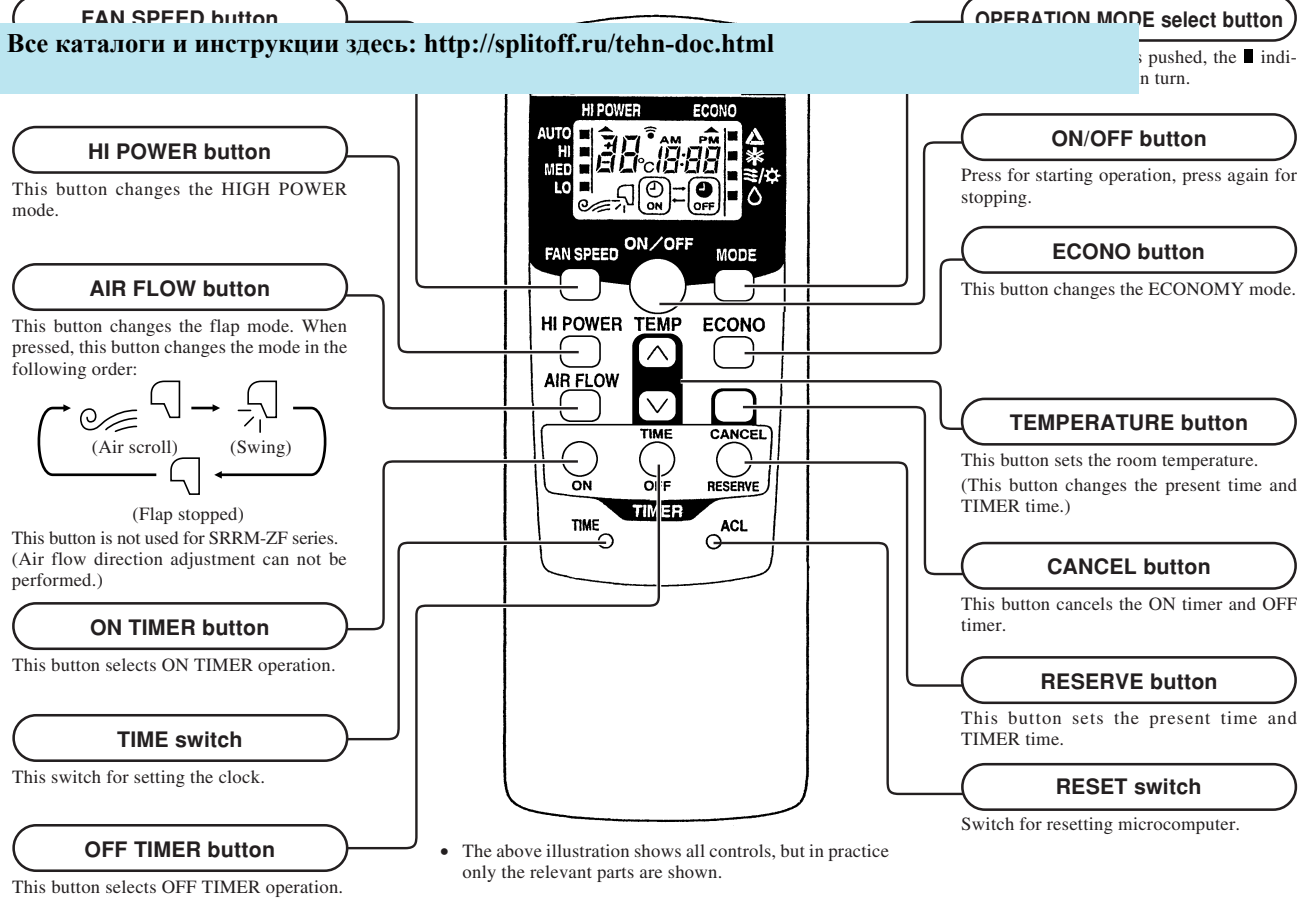
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

◆ Operation section



STM, SRRM model

◆ Operation section



Unit indication section

◆ **SKM20~50 model**

TIMER light (yellow)

HI POWER light (green)

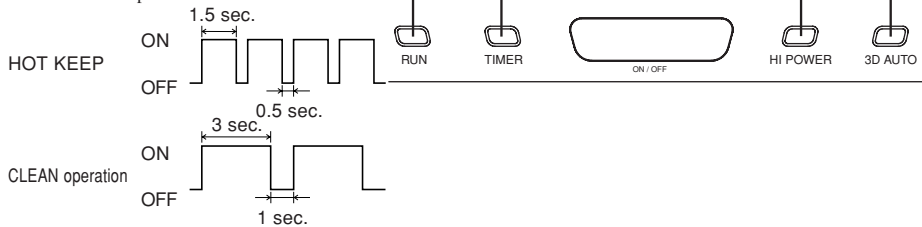
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

RUN (HOT KEEP) light (green)

3D AUTO light (green)

- Illuminates during operation.
- Blinks at air flow stop due to the 'HOT KEEP' and 'CLEAN operation'.

Illuminates during 3D AUTO operation.



◆ **SKM60-71 model**

RUN (HOT KEEP) light (green)

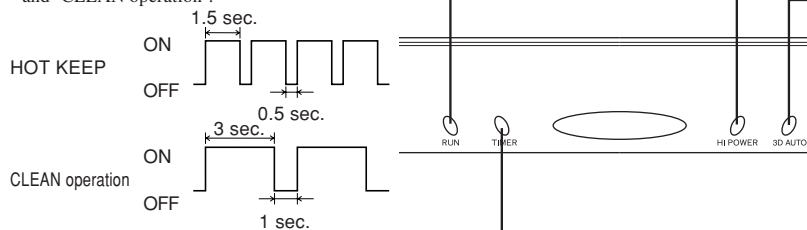
HI POWER light (green)

- Illuminates during operation.
- Blinks at air flow stop due to the 'HOT KEEP' and 'CLEAN operation'.

Illuminates during HIGH POWER operation.

3D AUTO light (green)

Illuminates during 3D AUTO operation.

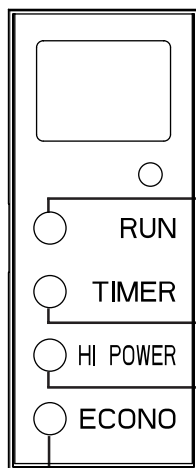


TIMER light (yellow)

Illuminates during TIMER operation.

◆ **SRRM model**

◆ **STM model**



RUN (HOT KEEP) light (green)

- Illuminates during operation.
- Blinks at air flow stop due to the 'HOT KEEP'.

TIMER light (yellow)

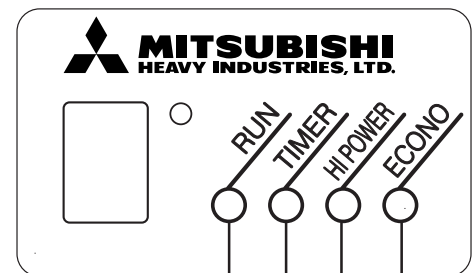
Illuminates during TIMER operation.

HI POWER light (green)

Illuminates during HIGH POWER operation.

ECONO light (orange)

Illuminates during ECONOMY operation.



4.2 Unit ON/OFF button

When the remote control batteries become weak, or if the remote control is lost or malfunctioning, this button may be used to turn the unit on and off.

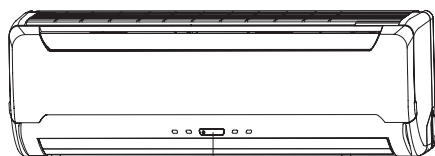
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(2) Details of operation

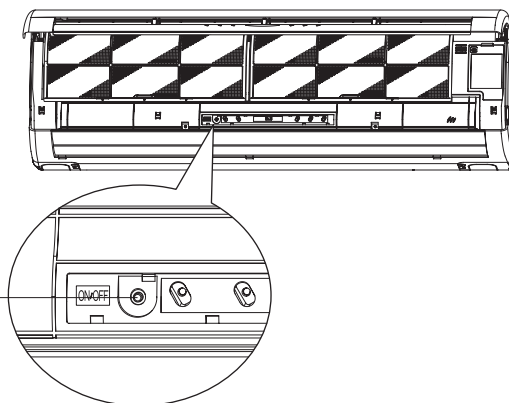
The unit will go into the automatic mode in which it automatically determines, from room temperature (as detected by sensor), whether to go into the cooling, thermal dry or heating modes.

Function Operation mode	Room temperature setting			Fan speed	Flap (SKM, STM only)	Timer switch
	SKM 20 ~ 50	SKM 60 · 71	STM, SRRM			
Cooling	About 24°C	About 24°C	About 24°C	Auto	Auto	Continuous
Thermal dry	About 24°C	About 24°C	About 24°C			
Heating	About 26°C	About 26°C	About 26°C			

◆ SKM20~50 model

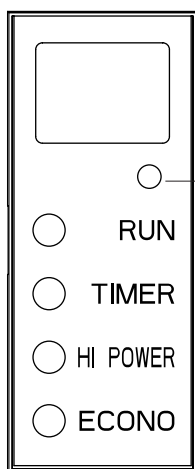


◆ SKM60-71 model

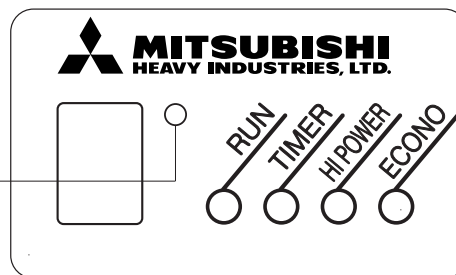


Unit ON/OFF button

◆ SRRM model



◆ STM model



Unit ON/OFF button

4.3 Drain motor forced operation functions (STM, SRRM only)

(1) Operation

- When the float switch detects drain water, please use the wireless remote control to set the operation mode to "heating",

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(2) Detail of operation

Sets the decision speed to 0 rps, stops the indoor fan motor, and only lets the drain motor run for 5 minutes. After this operation finishes, if the float switch detects drain water, it will display an error and stop operation.

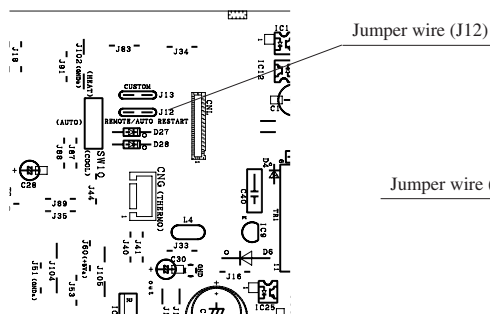
(3) Reset condition

- When the drain motor has run for 5 minutes.
- Use the remote control to set the operation mode to heating, set the temperature to 30°C, and set the timer to something other than continuous operation.

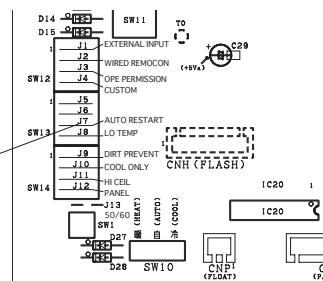
4.4 Power blackout auto restart function

- Power blackout auto restart function is that records the operational status of the air-conditioner immediately prior to it being switched off by a power cut, and then automatically resumes operations at that point after the power has been restored.
- The following settings will be cancelled:
 - Timer settings
 - High-power operations

◆ SKM20~50 model



◆ SKM60-71, STM, SRRM model



- Notes
- (1) Power blackout auto restart function is set on when the air-conditioner is shipped from the factory. Consult with your dealer if this function needs to be switched off.
 - (2) When power failure occurs, the timer setting is cancelled. Once power is resumed, reset the timer.
 - (3) If the jumper wire (J12) "REMOTE/AUTO RESTART" is cut, auto restart is disabled. (SKM 20 ~ 50 model. See the diagram at above)
 - (4) If the jumper wire (J7) "AUTO RESTART" is cut, auto restart is disabled. (SKM 60 · 71, STM, SRRM model. See the diagram at above)

4.5 Custom cord switching procedure

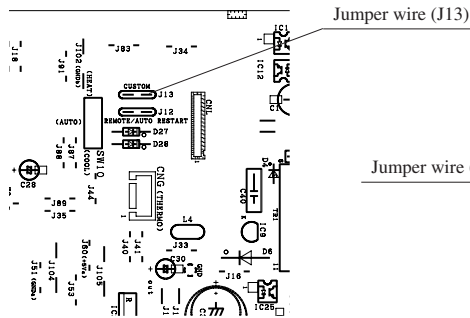
If two wireless remote controls are installed in one room, in order to prevent wrong operation due to mixed signals, please modify the printed circuit board in the indoor unit's control box and the remote control using the following procedure. Be sure to modify both

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

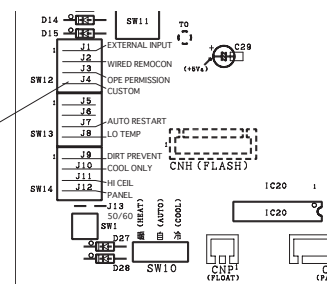
Take out the printed circuit board from the control box and cut off jumper wire (SKM20~50 model: J13 SKM60-71, STM, SRRM model: J4) using wire cutters.

After cutting of the jumper wire, take measures to prevent contact with the other the lead wires, etc.

◆ SKM20~50 model

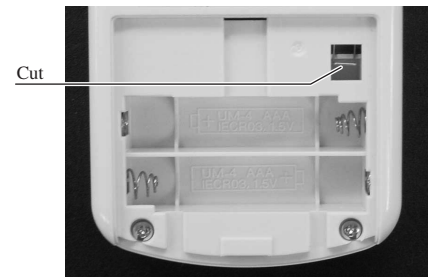


◆ SKM60-71, STM, SRRM model



(2) Modifying the wireless remote control

- (a) Remove the battery.
- (b) Cut the jumper wire shown in the figure at right.



4.6 Determining the operating mode

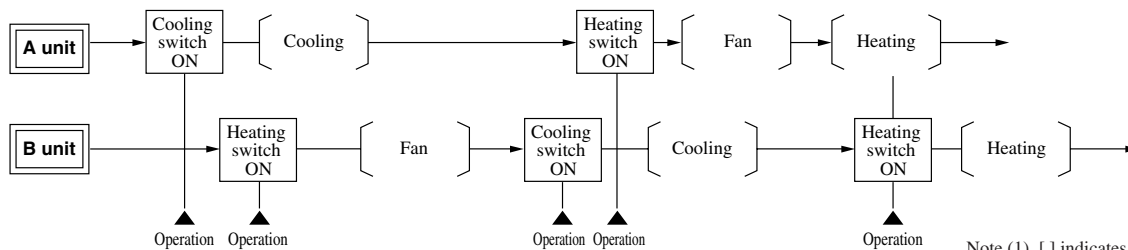
The cooling and heating operating modes are the remote control switch mode that have been previously determined.

If a mode differing from these is selected after this, the selected mode will appear in the display of the remote control, but only the fan will operate.

Example	First operation			Second operation			Notes
	Selected Mode	Remote Control Display	Operation	Selected Mode	Remote Control Display	Operation	
1	Cooling	Cooling	Cooling	Heating	Heating	Fan ⁽¹⁾	• Different mode is only fan operation.
2	Heating	Heating	Heating	Cooling	Cooling	Fan	

Note (1) If the display shows heating and the operation is fan, Hot Keep will operate.

Example of operating pattern



Note (1) [] indicates correct operation.

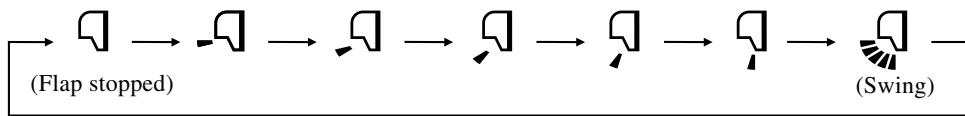
4.7 Flap and louver control (SKM, STM only)

◆ SKM model

Control the flap and louver by AIRFLOW ◆ (UP/DOWN) and ◀▶ (LEFT/RIGHT) button on the wireless remote control.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

Each time when you press the AIRFLOW ▼ (UP/DOWN) button the mode changes as follows.

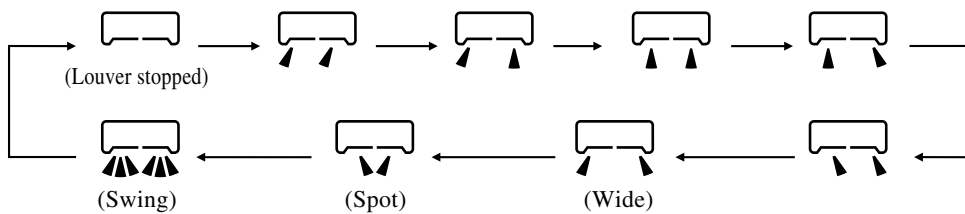


• Angle of Flap from Horizontal

Remote control display					
COOL, DRY	Approx. 10°	Approx. 20°	Approx. 30°	Approx. 45°	Approx. 60°
HEAT	Approx. 20°	Approx. 35°	Approx. 50°	Approx. 60°	Approx. 70°

(2) Louver

Each time when you press the AIRFLOW ◀▶ (LEFT/RIGHT) button the mode changes as follows.



• Angle of Louver

Remote control display					
Center installation	Left Approx. 45°	Left Approx. 20°	Center	Right Approx. 20°	Right Approx. 45°
Right end installation	Left Approx. 45°	Left Approx. 30°	Left Approx. 20°	Center	Right Approx. 20°
Left end installation	Left Approx. 20°	Center	Right Approx. 20°	Right Approx. 30°	Right Approx. 45°

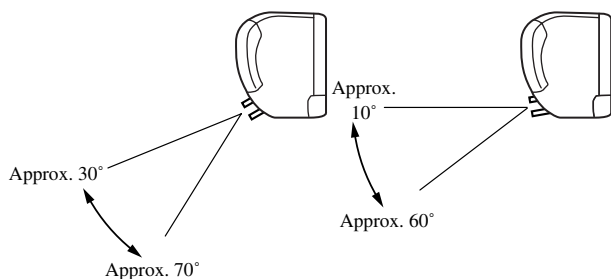
(3) Swing

(a) Swing flap

Flap moves in upward and downward directions continuously.

◆ In HEAT operation

◆ In COOL, DRY operation

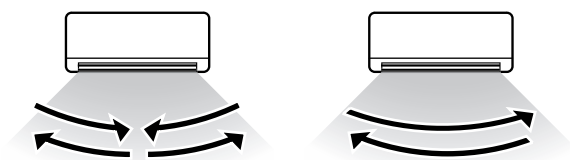


(b) Swing louver

Louver moves in left and right directions continuously.

◆ In HEAT operation

◆ In COOL, DRY operation



(4) Memory flap (Flap or Louver stopped)

When you press the AIRFLOW (UP/DOWN or LEFT/RIGHT) button once while the flap or louver is operating, it stops swinging at an angle. Since this angle is memorized in the microcomputer, the flap or louver will automatically be set at this angle when the next operation is started.

(5) When not operating

The flap returns to the position of air flow directly below, when operation has stopped.

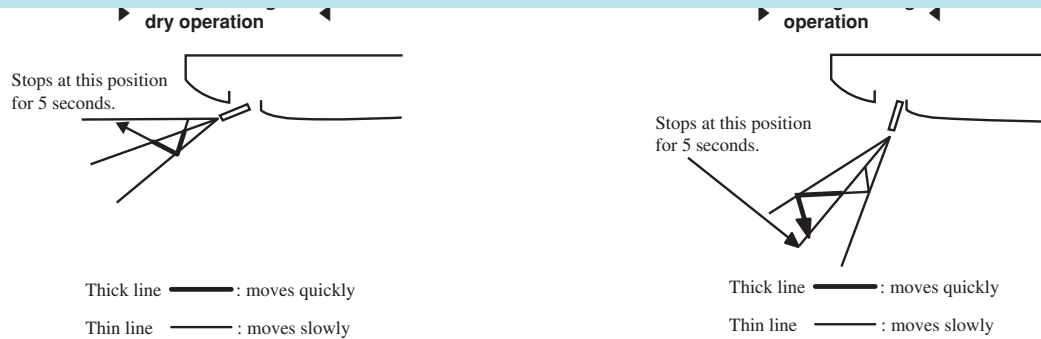
◆ STM model

Control the flap by AIRFLOW button on the wireless remote control.

(1) Air scroll

The flap will be automatically set to the angle of air flow best to operation.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



(2) Swing flap

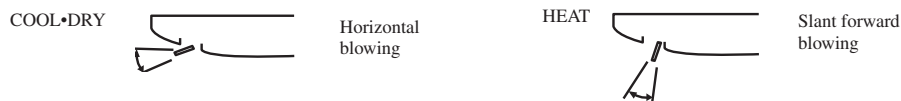
Flap moves in upward and downward directions continuously.

(3) Memory flap

While the flap is operating if the AIRFLOW button is pushed once, it stops swinging at an angle.

As this angle is memorized in the microcomputer, the flap will be automatically set to the angle when next operation is started.

- Recommendable stopping angle of the flap



(4) When not operating

The flap closes, when operation has stopped.

4.8 3D auto operation (SKM only)

Control the flap and louver by 3D AUTO button on the wireless remote control.

Air flow selection and air flow direction are automatically controlled, allowing the entire room to efficiently conditioned.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

- (a) Air flow selection is determined according to room temperature and setting temperature.

Operation mode	Air flow selection				
	AUTO		HI	MED	LO
At cooling	Room temp. – Setting temp. $>5^{\circ}\text{C}$	Room temp. – Setting temp. $\leq 5^{\circ}\text{C}$	HI	MED	LO
	HIGH POWER	AUTO			
At heating	Setting temp. – Room temp. $>5^{\circ}\text{C}$	Setting temp. – Room temp. $\leq 5^{\circ}\text{C}$	HI	MED	LO
	HIGH POWER	AUTO			

- (b) Air flow direction is controlled according to the room temperature and setting temperature.

- 1) When 3D auto operation starts

	Cooling	Heating
Flap	Up/down Swing	
Louver	Wide (fixed)	Center (fixed)

- 2) When Room temp. – Setting temp. is $\leq 5^{\circ}\text{C}$ during cooling and when Setting temp. – Room temp. is $\leq 5^{\circ}\text{C}$ during heating, the system switches to the following air flow direction control. After the louver swings left and right symmetrically for 3 cycles, control is switched to the control in 3).

	Cooling	Heating
Flap	Horizontal blowing (Fixed)	Slant forwardl blowing (Fixed)
Louver	Left/right Swing	

- 3) After the flap swings for 5 cycles, control is switched to the control in 4).

	Cooling	Heating
Flap	Up/down Swing	
Louver	Center (Fixed)	

- 4) For 5 minutes, the following air flow direction control is carried out.

	Cooling	Heating
Flap	Horizontal blowing (Fixed)	Slant forwardl blowing (Fixed)
Louver	Wide (Fixed)	

- 5) After 5 minutes have passed, the air flow direction is determined according to the room temperature and setting temperature.

Operation mode	Air flow direction control		
At cooling	Room temp. – Setting temp. $\leq 2^{\circ}\text{C}$	$2^{\circ}\text{C} < \text{Room temp. – Setting temp.} \leq 5^{\circ}\text{C}$	Room temp. – Setting temp. $> 5^{\circ}\text{C}$
	The control in 4) continues.	Control returns to the control in 2).	Control returns to the control in 1).
At heating	Setting temp. – Room temp. $\leq 2^{\circ}\text{C}$	$2^{\circ}\text{C} < \text{Setting temp. – Room temp.} \leq 5^{\circ}\text{C}$	Setting temp. – Room temp. $> 5^{\circ}\text{C}$
	The control in 4) continues.	Control returns to the control in 2).	Control returns to the control in 1).

- (2) During DRY Operation (including auto DRY operation)

Air flow selection	According to DRY operation.
Flap	Horizontal blowing (Fixed)
Louver	Wide (Fixed)

4.9 Timer operation

(1) Comfortable timer setting (ON timer)

If the timer is set at ON when the operation select switch is set at the cooling or heating, or the cooling or heating in auto mode

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

initial value of 15 (the sensor) and the

setting temperature.

(2) Sleep timer operation (SKM only)

Pressing the SLEEP button causes the temperature to be controlled with respect to the set temperature.

(3) OFF timer operation

The Off timer can be set at a specific time (in 10-minute units) within a 24-hour period.

4.10 Installation location setting (SKM only)

When the indoor unit is installed at the end of a room, control the air flow direction so that it is not toward the side walls. If you set the remote control's installation position, keep it so that the air flow is within the range shown in the following figure.

(1) Setting

① If the air conditioning unit is running, press the ON/OFF button to stop.

The installation location setting cannot be made while the unit is running.

② Press the AIR FLOW $\blacktriangle\blacktriangledown$ (UP/DOWN) button and the AIR FLOW $\blacktriangleleft\blacktriangleright$ (LEFT/RIGHT) button together for 5 seconds or more.

The installation location display illuminates.

③ Setting the air-conditioning installation location.

Press the AIR FLOW $\blacktriangleleft\blacktriangleright$ (LEFT/RIGHT) button and adjust to the desired location.

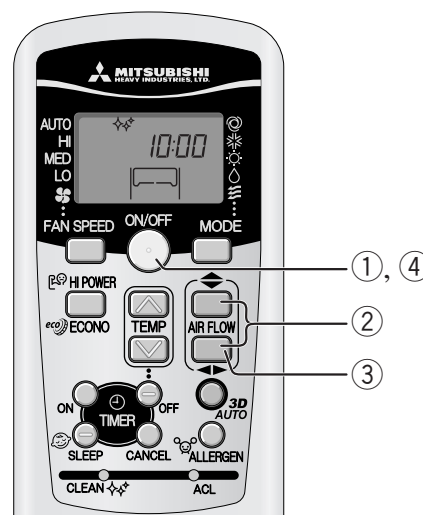
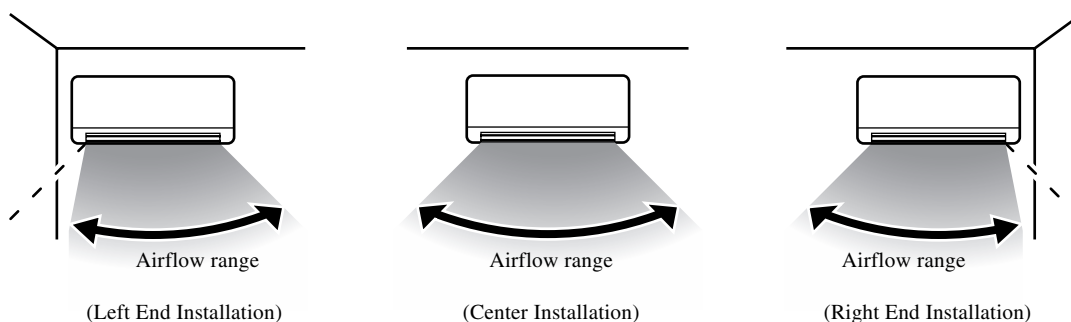
Each time the AIR FLOW $\blacktriangleleft\blacktriangleright$ (LEFT/RIGHT) button is pressed, the indicator is switched in the order of:



④ Press the ON/OFF button.

The air-conditioner's installation location is set.

Press within 60 seconds of setting the installation location (while the installation location setting display illuminates).



4.11 Outline of heating operation

(1) Summary

(a) Capacity control

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

180ZG-S

~ 9.6 kW

Capacity control is within the range shown above. If demand capacity of the indoor units exceeds the maximum capacity of the outdoor unit, the demand capacity will be proportionally distributed.

(b) Outdoor unit speed control

Indoor unit command total speed value	Decision speed
0 rps	0 rps
A rps or less	A rps
More than A rps, but B rps or less	A rps to B rps
More than B rps	B rps

● Values of A, B

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	35 rps	10 rps	10 rps	12 rps	12 rps
B	90 rps	110 rps	118 rps	95 rps	95 rps

Note (1) The indoor unit command total speed value is the total of the values from each unit in item (2).

(2) Mode switching

Within the selected mode, the unit operates using the values shown below which were obtained by multiplying a conversion coefficient to the indoor unit command speed.

(a) SCM40ZG-S, 45ZG-S, 48ZG-S

◆ SKM model

(rps)

Fan speed \ Model	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
AUTO	12 ~ 76	12 ~ 81	12 ~ 88	12 ~ 93	12 ~ 105
HI	12 ~ 76	12 ~ 81	12 ~ 88	12 ~ 93	12 ~ 105
MED	12 ~ 55	12 ~ 61	12 ~ 66	12 ~ 72	12 ~ 79
LO	12 ~ 37	12 ~ 42	12 ~ 45	12 ~ 49	12 ~ 54
HI POWER	73	87	93	105	105
ECONO	12 ~ 55	12 ~ 61	12 ~ 66	12 ~ 72	12 ~ 79

◆ STM, SRRM model

(rps)

Fan speed \ Model	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S
AUTO	12 ~ 87	12 ~ 105
HI	12 ~ 87	12 ~ 105
MED	12 ~ 63	12 ~ 78
LO	12 ~ 37	12 ~ 45
HI POWER	87	105
ECONO	12 ~ 63	12 ~ 78

(b) SCM60ZG-S**◆SKM model**

(rps)

Model Fan speed	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
					7 ~ 65
					7 ~ 65
MED	7 ~ 34	7 ~ 38	7 ~ 41	7 ~ 45	7 ~ 49
LO	7 ~ 23	7 ~ 26	7 ~ 28	7 ~ 31	7 ~ 33
HI POWER	46	54	58	65	65
ECONO	7 ~ 34	7 ~ 38	7 ~ 41	7 ~ 45	7 ~ 49

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(rps)

Model Fan speed	SKM50ZG-S	SKM60ZG-S
AUTO	9 ~ 71	12 ~ 88
HI	9 ~ 71	12 ~ 88
MED	9 ~ 55	12 ~ 64
LO	9 ~ 38	12 ~ 42
HI POWER	81	88
ECONO	9 ~ 55	12 ~ 64

◆STM, SRRM model

(rps)

Model Fan speed	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S	STM50ZF-S SRRM50ZF-S	STM60ZF-S SRRM60ZF-S
AUTO	7 ~ 54	7 ~ 65	9 ~ 75	9 ~ 81
HI	7 ~ 54	7 ~ 65	9 ~ 75	9 ~ 81
MED	7 ~ 39	7 ~ 48	9 ~ 53	9 ~ 60
LO	7 ~ 23	7 ~ 28	9 ~ 31	9 ~ 34
HI POWER	54	65	75	81
ECONO	7 ~ 39	7 ~ 48	9 ~ 53	9 ~ 60

(c) SCM80ZG-S

◆SKM model

(rps)

Model Fan speed	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
					7 ~ 65
					7 ~ 65
MED	7 ~ 34	7 ~ 38	7 ~ 41	7 ~ 45	7 ~ 49
LO	7 ~ 23	7 ~ 26	7 ~ 28	7 ~ 31	7 ~ 33
HI POWER	46	54	58	65	65
ECONO	7 ~ 34	7 ~ 38	7 ~ 41	7 ~ 45	7 ~ 49

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(rps)

Model Fan speed	SKM50ZG-S	SKM60ZG-S	SKM71ZG-S
AUTO	9 ~ 75	12 ~ 88	12 ~ 95
HI	9 ~ 75	12 ~ 88	12 ~ 95
MED	9 ~ 58	12 ~ 64	12 ~ 70
LO	9 ~ 40	12 ~ 42	12 ~ 46
HI POWER	85	88	95
ECONO	9 ~ 58	12 ~ 64	12 ~ 70

◆STM, SRRM model

(rps)

Model Fan speed	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S	STM50ZF-S SRRM50ZF-S	STM60ZF-S SRRM60ZF-S
AUTO	7 ~ 54	7 ~ 65	9 ~ 79	9 ~ 85
HI	7 ~ 54	7 ~ 65	9 ~ 79	9 ~ 85
MED	7 ~ 39	7 ~ 48	9 ~ 56	9 ~ 63
LO	7 ~ 23	7 ~ 28	9 ~ 32	9 ~ 36
HI POWER	54	65	79	85
ECONO	7 ~ 39	7 ~ 48	9 ~ 56	9 ~ 63

(3) Operation of major functional components in heating mode

Functional components	Operation	Cooling	Thermostat OFF (All indoor units)	Thermostat OFF (Some of indoor units)	Fan, stop, abnormal stop (Some of indoor units)	Failure (Outdoor unit)
Command speed		See preceding table	0 (All indoor units)	0 (Thermostat off units)	0 (Fan, stop, abnormal stop units)	0 (All units)
Indoor unit fan	Fixed	According to mode switching	Hot Keep	According to mode switching		Hot Keep
	Automatic	According to command speed	Hot Keep	According to command speed		Hot Keep
Outdoor unit fan		According to outdoor unit speed	OFF	According to outdoor unit speed		OFF
Electronic expansion valve		According to decision speed	According to stop mode	According to heating stop unit control (Thermostat off units)	According to heating stop unit control (Fan, stop, abnormal stop units)	According to stop mode
Compressor		ON	OFF	ON	ON	OFF

(4) Hot keep operation

If the hot keep operation is selected during the heating operation, the indoor fan is controlled based on the temperature of the indoor unit heat exchanger (detected with Th_i-R₁)

(5) Defrosting

(a) When the following conditions are met, the defrosting operation will start.

1) During normal operation

When 40 minutes has passed since the last defrosting (based on cumulative operation time of compressor) and on cumulative

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

b) When the outdoor heat exchanger sensor (Tho-R) temperature is $-2\text{ }^{\circ}\text{C}$ or less for 3 continuous minutes after 37 minutes have passed.

c) Outdoor temperature sensor (Tho-A) – outdoor heat exchanger sensor (Tho-R) temperature $\geq 0.44 \times$ outdoor temperature sensor (Tho-A) temperature + A $^{\circ}\text{C}$

A = Outdoor temperature $\geq -2\text{ }^{\circ}\text{C}$: 4, outdoor temperature $< -2\text{ }^{\circ}\text{C}$: 6.

d) When the compressor is operating.

▷ Or, during heating, defrosting will start when the decision speed counts zero (0) rps for 10 times or more and all conditions in a), b) and d) above and when the outdoor air temperature is 3°C or less have been satisfied.

2) During defrosting acceleration

a) When 40 minutes has passed since the last defrosting (based on cumulative operation time of compressor).

b) When the compressor is operating.

▷ Or, during heating, defrosting will start when the decision speed counts zero (0) rps for 10 times or more and all conditions in a) and b) have been satisfied.

Note (1) Defrosting acceleration is when the finishing of the previous defrosting is according to the defrosting conditions of the 10 minutes that have passed.

3) Conditions for finishing defrosting

When any of the following conditions is met, the defrosting finishing operation will start.

① When the temperature of the outdoor heat exchanger sensor (Tho-R) is $20\text{ }^{\circ}\text{C}$ or more.

② When 10 minutes has passed after the start of defrosting.

③ When the temperature at the outdoor heat exchanger sensor (Tho-R) is $10\text{ (18)}^{\circ}\text{C}$ or higher continuously for 2 (1) minutes.

Note (1) Values in () are for 40 and 80 type.

4.12 Outline of cooling operation

(1) Summary

(a) Capacity control

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

180ZG-S

~ 9.5 kW

Capacity control is within the range shown above. If demand capacity of the indoor units exceeds the maximum capacity of the outdoor unit, the demand capacity will be proportionally distributed.

(b) Outdoor unit speed control

Indoor unit command total speed value	Decision speed
0 rps	0 rps
A rps or less	A rps
More than A rps, but B rps or less	A rps to B rps
More than B rps	B rps

● Values of A, B

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	35 rps	10 rps	10 rps	12 rps	12 rps
B	85 rps	110 rps	118 rps	95 rps	95 rps

Note (1) The indoor unit command total speed value is the total of the values from each unit in item (2).

(2) Mode switching

Within the selected mode, the unit operates using the values shown below which were obtained by multiplying a conversion coefficient to the indoor unit command speed.

(a) SCM40ZG-S, 45ZG-S, 48ZG-S

◆ SKM model

(rps)

Model	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
Fan speed					
AUTO	12 ~ 43	12 ~ 49	12 ~ 54	12 ~ 60	12 ~ 78
HI	12 ~ 43	12 ~ 49	12 ~ 54	12 ~ 60	12 ~ 78
MED	12 ~ 34	12 ~ 39	12 ~ 43	12 ~ 48	12 ~ 60
LO	12 ~ 27	12 ~ 28	12 ~ 31	12 ~ 36	12 ~ 42
HI POWER	43	45	49	57	69
ECONO	12 ~ 34	12 ~ 39	12 ~ 43	12 ~ 48	12 ~ 60

◆ STM, SRRM models

(rps)

Model	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S
Fan speed		
AUTO	12 ~ 54	12 ~ 99 (12 ~ 90)
HI	12 ~ 54	12 ~ 99 (12 ~ 90)
MED	12 ~ 40	12 ~ 70
LO	12 ~ 27	12 ~ 42
HI POWER	54	90
ECONO	12 ~ 40	12 ~ 70

Note (1) Values in () are for type SRRM.

(b) SCM60ZG-S**◆ SKM model**

(rps)

Model	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
Fan speed					
MED	7 ~ 21	7 ~ 24	7 ~ 27	7 ~ 30	7 ~ 37
LO	7 ~ 16	7 ~ 17	7 ~ 19	7 ~ 22	7 ~ 26
HI POWER	27	28	31	35	43
ECONO	7 ~ 21	7 ~ 24	7 ~ 27	7 ~ 30	7 ~ 37

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

7 ~ 48

7 ~ 48

(rps)

Model	SKM50ZG-S	SKM60ZG-S
Fan speed		
AUTO	9 ~ 62	12 ~ 84
HI	9 ~ 62	12 ~ 84
MED	9 ~ 40	12 ~ 60
LO	9 ~ 26	12 ~ 38
HI POWER	58	84
ECONO	9 ~ 40	12 ~ 60

◆ STM, SRRM model

(rps)

Model	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S	STM50ZF-S SRRM50ZF-S	STM60ZF-S SRRM60ZF-S
Fan speed				
AUTO	7 ~ 33	7 ~ 62 (7 ~ 56)	9 ~ 75	9 ~ 81
HI	7 ~ 33	7 ~ 62 (7 ~ 56)	9 ~ 75	9 ~ 81
MED	7 ~ 25	7 ~ 44	9 ~ 53	9 ~ 60
LO	7 ~ 16	7 ~ 26	9 ~ 31	9 ~ 34
HI POWER	33	56	75	81
ECONO	7 ~ 25	7 ~ 44	9 ~ 53	9 ~ 60

Note (1) Values in () are for type SRRM.

(c) SCM80ZG-S

◆ SKM model

(rps)

Model Fan speed	SKM20ZG-S	SKM22ZG-S	SKM25ZG-S	SKM28ZG-S	SKM35ZG-S
					7 ~ 48
					7 ~ 48
MED	7 ~ 21	7 ~ 24	7 ~ 27	7 ~ 30	7 ~ 37
LO	7 ~ 16	7 ~ 17	7 ~ 19	7 ~ 22	7 ~ 26
HI POWER	27	28	31	35	43
ECONO	7 ~ 21	7 ~ 24	7 ~ 27	7 ~ 30	7 ~ 37

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(rps)

Model Fan speed	SKM50ZG-S	SKM60ZG-S	SKM71ZG-S
AUTO	9 ~ 65	12 ~ 84	12 ~ 95
HI	9 ~ 65	12 ~ 84	12 ~ 95
MED	9 ~ 42	12 ~ 60	12 ~ 68
LO	9 ~ 28	12 ~ 38	12 ~ 44
HI POWER	61	84	95
ECONO	9 ~ 42	12 ~ 60	12 ~ 68

◆ STM, SRRM model

(rps)

Model Fan speed	STM25ZF-S SRRM25ZF-S	STM35ZF-S SRRM35ZF-S	STM50ZF-S SRRM50ZF-S	STM60ZF-S SRRM60ZF-S
AUTO	7 ~ 33	7 ~ 62 (7 ~ 56)	9 ~ 79	9 ~ 85
HI	7 ~ 33	7 ~ 62 (7 ~ 56)	9 ~ 79	9 ~ 85
MED	7 ~ 25	7 ~ 44	9 ~ 56	9 ~ 63
LO	7 ~ 16	7 ~ 26	9 ~ 32	9 ~ 36
HI POWER	33	56	79	85
ECONO	7 ~ 25	7 ~ 44	9 ~ 56	9 ~ 63

Note (1) Values in () are for type SRRM.

(3) Operation of major functional components in cooling mode

Functional components	Operation	Cooling	Thermostat OFF (All indoor units)	Thermostat OFF (Some of indoor units)	Fan, stop, abnormal stop (Some of indoor units)	Failure (Outdoor unit)
Command speed		See preceding table	0 (All indoor units)	0 (Thermostat off units)	0 (Fan, stop, abnormal stop units)	0 (All units)
Indoor unit fan	Fixed	According to mode switching				
	Automatic	According to command speed	According to mode switching	According to command speed		
Outdoor unit fan		According to outdoor unit speed	OFF	According to outdoor unit speed		OFF
Electronic expansion valve		According to decision speed	According to stop mode	All closed (Thermostat off units)	All closed (Fan, stop, abnormal stop units)	According to stop mode
Compressor		ON	OFF	ON	ON	OFF

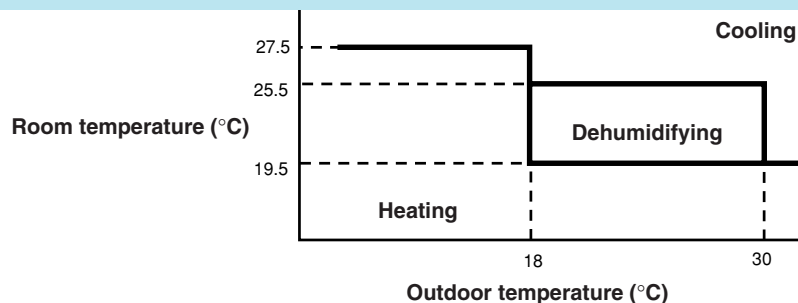
4.13 Outline of automatic operation

(1) Determination of operation mode

The unit checks the room temperature and the outdoor air temperature after operating the indoor and outdoor blowers for 20

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in the automatic



- (2) The unit checks the temperature every hour after the start of operation and, if the result of check is not same as the previous operation mode, changes the operation mode.
- (3) When the unit is started again within one hour after the stop of automatic operation or when the automatic operation is selected during heating, cooling or dehumidifying operation, the unit is operated in the previous operation mode.
- (4) Setting temperature can be adjusted within the following range. There is the relationship as shown below between the signals of the wireless remote control and the setting temperature.

◆ SKM20~50 model

		Signals of wireless remote control (Display)												
		-6	-5	-4	-3	-2	-1	±0	+1	+2	+3	+4	+5	+6
Setting temperature	Cooling	18	19	20	21	22	23	24	25	26	27	28	29	30
	Dehumidifying	18	19	20	21	22	23	24	25	26	27	28	29	30
	Heating	20	21	22	23	24	25	26	27	28	29	30	31	32

◆ SKM60·71 model

		Signals of wireless remote control (Display)												
		-6	-5	-4	-3	-2	-1	±0	+1	+2	+3	+4	+5	+6
Setting temperature	Cooling	18	19	20	21	22	23	24	25	26	27	28	29	30
	Dehumidifying	19	20	21	22	23	24	25	26	27	28	28	29	30
	Heating	20	21	22	23	24	25	26	27	28	29	30	31	32

◆ STM, SRRM model

		Signals of wireless remote control (Display)												
		-6	-5	-4	-3	-2	-1	±0	+1	+2	+3	+4	+5	+6
Setting temperature	Cooling	19	20	21	22	23	24	25	26	27	28	29	30	31
	Dehumidifying	19	20	21	22	23	24	25	26	27	28	29	30	31
	Heating	20	21	22	23	24	25	26	27	28	29	30	31	32

4.14 Operation permission/prohibition control

The air conditioner operation is controlled by releasing the jumper wire (J3) on the indoor control board and inputting the external signal into the CnT.

Note (1) Please install the separately sold Interface kit (SC-PIK-E) for SVM models 20-50. Remove the jumper wire (J1 or J3)

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(1) The operation mode is switched over between Permission and Prohibition by releasing the jumper wire (J3) on the indoor control board.

When the jumper wire (J3) is short circuited	When the jumper wire (J3) is released
<p>Normal operation is enable (when shipping)</p> <p>When CnT input is set to ON, the operation starts and if the input is set to OFF, the operation stops.</p> <p>For the CnT and remote control inputs, the input which is activated later has priority and can start and stop the operation.</p>	<p>Permission / Prohibition mode</p> <p>When Cnt input is set to ON, the operation mode is changed to permission and if input is set to OFF the operation is prohibited.</p>

(2) When the CnT input is set to ON (Operation permission)

- (a) The air conditioner can be operated or stopped by the remote control signal.
(When the "CENTER" mode is set, the operation can be controlled only by the center input.)
- (b) When the CnT input is changed from OFF to ON, the air conditioner operation mode is changed depending on the status of the jumper wire (J1) on the indoor control board.

When the jumper wire (J1) is short circuited	When the jumper wire (J1) is released
<p>The signal (a) above starts the air conditioner. (Shipping status)</p>	<p>When the CnT input is set to ON, the air conditioner starts operation. After that, the operation of the air conditioner depends on (a) above. (Local status)</p>

(3) When the CnT input is set to OFF (Prohibition)

- (a) The air conditioner cannot be operated or stopped by the remote control signal.
- (b) The air conditioner operation is stopped when the CnT input is changed from ON to OFF.

4.15 External control (remote display)/control of input signal

(1) External control (remote display) output

Following output connectors (CNT) are provided on the printed circuit board of indoor unit.

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ector (CNT) is

- **Operation output:** Power to engage DC 12V relay (provided by the customer) is outputted during operation.
- **Heating output:** Power to engage DC 12V relay (provided by the customer) is outputted during the heating operation.
- **Compressor OPERATION output:** Power to engage DC 12V relay (provided by the customer) is outputted while the compressor is operating.
- **MALFUNCTION output:** When any error occurs, the power to engage DC 12V relay (provided by the customer) is outputted.

(2) Control of input signal

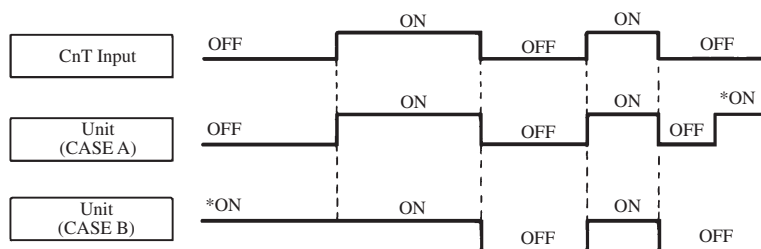
Control of input signal (switch input, timer input) connectors (CNT) are provided on the control circuit board of indoor unit.

However, when the operation of air conditioner is under the Center Mode, the remote control by CnT is invalid.

(a) Level input

If the factory settings (Jumper wire J1 EXTERNAL INPUT on the PCB of indoor unit) are set, or “LEVEL INPUT” is selected in the wired remote control’s indoor unit settings.

- 1) Input signal to CnT OFF → ON – – – – Air conditioner ON
- 2) Input signal to CnT ON → OFF – – – – Air conditioner OFF

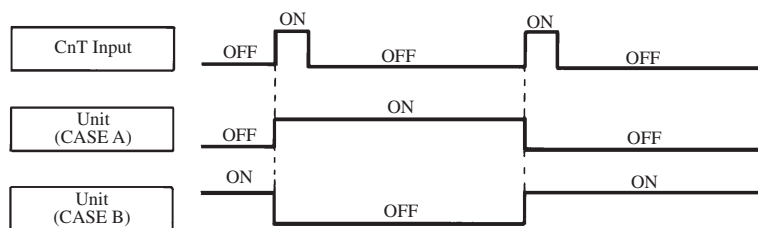


Note (1) The ON with the * mark indicates an ON operation using the remote control unit switch, etc.

(b) Pulse input

When Jumper wire J1 on the PCB of indoor unit is cut at the field or “PULSE INPUT” is selected in the wired remote control’s indoor unit settings.

Input signal to CnT becomes valid at OFF → ON only and the motion of air conditioner [ON/OFF] is inverted.



4.16 Protective control function

(1) Frost prevention for indoor heat exchanger (During cooling or dehumidifying)

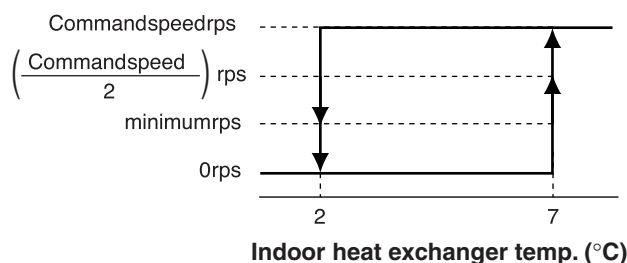
◆ <I>

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

is 2°C or lower for 1 minute continuously.

(b) Detail of operation

- 1) The indoor command speed is minimum rps for 5 minutes.
- 2) After 1) above, if the indoor heat exchanger is 2°C or lower, the speed is 0 rps.
- 3) After 1) above, if the indoor heat exchanger is more than 2°C, it returns normal operation.
- 4) After 2) above, if the indoor heat exchanger is 7°C or higher, it runs for 5 minutes at half of indoor command speed, then it returns normal operation.



◆ <II>

(a) Operating conditions (When all the conditions below are satisfied)

- ① After the indoor command speed is other than 0 rps for 8 minutes, when the indoor heat exchanger (ThI-R1) is 5°C or lower.
- ② The indoor command speed is more than minimum rps.

(b) Detail of operation

- 1) When indoor heat exchanger is 5°C or lower, the indoor command speed is reduced by 4 rps at each 20 seconds. The lower limit speed is minimum rps.
- 2) When the indoor heat exchanger is in the range of 5~7°C, if the command speed is been maintained and the operation has continued for more than 20 seconds at same speed, it returns to the normal operation.

(c) **Reset condition:** When the indoor heat exchanger (ThI-R1) is 7°C or higher.

(2) Drain water overflow prevention function (STM, SRRM type only)

(a) **Operation condition:** Float switch detects drain water for more than 3 seconds.

(b) **Detail of operation:** Sets the indoor command speed to 0 rps, stops the indoor fan motor, and only lets the drain motor run for 5 minutes. After this operation finishes, if the float switch detects drain water, it will display an error and stop operation.

(c) **Rest conditions:** After the drain motor run for 5 minutes, the float switch cannot detect water.

(3) Dew condensation prevention control for the cooling and dehumidifying operation (STM, SRRM type only)

◆ <I>

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

1) When the fan speed is set to “AUTO” or “HI”, or operation mode is set to “HI POWER”

(b) Detail of operation: The upper limit of the indoor command speed is set to the maximum number of revolutions at fan speed “MED”.

(c) Rest conditions: Any one of the following conditions.

- 1) Fan speed set to anything other than “AUTO” or “HI”, or operation mode set to something other than “HI POWER”
- 2) 50 minutes elapsed after starting (with indoor command speed something other than 0 rps)
- 3) When indoor command speed is set to 0 rps

◆ <II>

(a) Operation condition: During cooling or dehumidifying operation after starting (with indoor command speed set to something other than 0 rps), and all of the following conditions are satisfied.

- 1) When fan speed set to “AUTO” or “HI”, or operation mode to “HI POWER”.
- 2) When the indoor heat exchanger temp.(Thi-R1) rises 5°C or more relative to the lowest temperature within the first 3 minutes of operation.

(b) Detail of operation: The upper limit of the indoor command speed is set to the maximum number of revolutions at fan speed “MED”.

(c) Rest conditions: Any one of the following conditions.

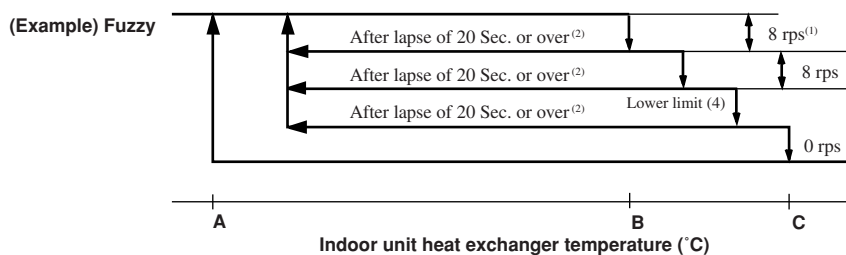
- 1) Fan speed set to anything other than “AUTO” or “HI”, or operation mode set to anything other than “HI POWER”
- 2) 30 minutes elapsed after this command starts
- 3) Indoor command speed set to 0 rps

(4) High pressure control

(a) Purpose: Prevents abnormally high pressure operation during heating.

(b) Detector: Indoor unit heat exchanger sensor (Thi-R1)

(c) Detail of operation:



- Notes
- (1) When the indoor unit heat exchanger temperature is in the range of B~C °C, the indoor command speed is reduced by 8 rps at each 20 seconds. When the temperature is C °C or over for 1 minute continuously, the compressor is stopped.
 - (2) When the indoor unit heat exchanger temperature is in the range of A~B °C, if the indoor command speed is been maintained and the operation has continued for more than 20 seconds at the same speed, it returns to the normal heating operation.
 - (3) Indoor blower retains the fan tap when it enters in the high pressure control. Outdoor blower is operated in accordance with the speed.
 - (4) SKM20~35 type: 20 rps. SKM50 type: 35 rps. SKM60-71 type: 30 rps
STM-SRRM25~35 type: 20rps. STM-SRRM50~60 type: 35 rps

● Temperature list

Unit : °C

	A	B	C
Thi-A ≤ 24	48.5	56	62
24 < Thi-A ≤ 27	47.5	53	61
27 < Thi-A	46.5	50	60

(5) Freezing cycle system protective control

- (a) **Operating conditions:** When both of following conditions have continued for more than 5 minutes later than 5 minutes after the start of operation.

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(b) Detail of operation

1) Indoor unit

The command speed is forced to operate at 16 rps.

2) Outdoor unit

For 5 minutes after the main controller starts, the outdoor unit speed is 12 (10) rps. After 5 minutes, the outdoor unit speed is 64 (30) rps, up until 8 minutes of operation. After 8 minutes, the outdoor unit speed is 12 (10) rps, up until 13 minutes of operation. After 13 minutes, the outdoor unit speed is 64 (30) rps, up until 16 minutes of operation.

- (c) **Restoration conditions:** When the condition becomes either conditions shown below

During cooling, dehumidifying: $Th1-R1(8) - Th1-R1(5) \leq -2^{\circ}\text{C}$, $Th1-R1(16) - Th1-R1(13) \leq -2^{\circ}\text{C}$

Notes (1) $Th1-R1(X)$: After this control starts, the indoor heat exchanger temperature after X minutes.

(2) This control is valid when the room air temperature is in the range of 10 to 40°C at cooling and dehumidification operation.

(3) Values in () are SCM60, SCM80.

(6) Crankcase heater

- (a) **Operating conditions** (When all the conditions below are satisfied)

- ① After the operation mode is changed to stop and the decision speed becomes 0 rps continuously for 30 minutes.
- ② When the temperature detected by the outdoor temperature sensor is 10°C or lower after the compressor stops.

(b) Detail of operation

The crankcase heater operates, warming up the compressor, then refrigerant begins circulating smoothly when the cooler starts its heating operation, and heating begins.

(c) Restoration conditions

When the temperature detected by the outdoor temperature sensor reaches 12°C or higher, or the operation mode changes from stop to cooling or heating.

(7) Inching prevention

When the compressor becomes to the thermo operation within 3 minutes since operation start or becomes dehumidifying operation, the operation is continued with the indoor command speed of minimum rps forcibly.

(8) Cooling overload protection control

During cooling operation, if the outdoor unit is operating at a decision speed other than 0 rps and the outdoor temperature is 39°C (SCM40 type: 37°C) or more for 30 continuous seconds, current safe control is performed by turning the outdoor fan motor is forcibly set on 6 th speed. Operation is restored when the outdoor temperature is 38°C (SCM40 type: 36°C) or less.

(9) Cooling low outdoor temperature protective control

◆ <I>

(a) **Operating conditions:** When the outdoor air temperature sensor (Tho-A) is 22°C or lower continues for 30 seconds while

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ature.

(c) **Reset conditions:** When the either of the following conditions is satisfied

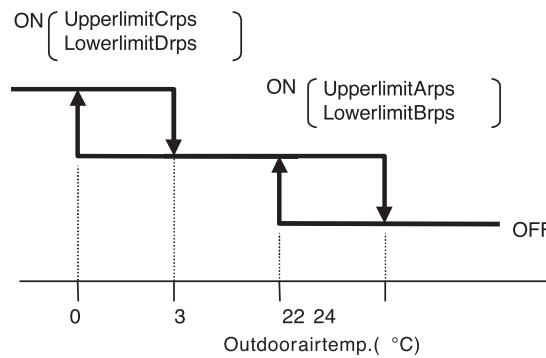
- ① When the outdoor air temperature sensor (Tho-A) becomes 24°C or higher.
- ② When the decision speed is 0 rps.

◆ <II>

(a) **Operating conditions:** When the outdoor air temperature sensor (Tho-A) is 22°C or lower continues for 30 seconds while decision speed is other than 0 rps.

(b) **Detail of operation:**

- ① The lower limit of decision speed is set to B (or D) rps and even if the speed becomes lower than B (or D) rps, the speed is kept to B (or D) rps. However, when the thermo becomes OFF, the speed is reduced to 0 rps.
- ② The upper limit of decision speed is set to A (or C) rps, the speed is kept to A (or C) rps.



● Values of A ~ D

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	80 rps	70 rps	69 rps	60 rps	60 rps
B	35 rps	29 rps	46 rps	22 rps	20 rps
C	64 rps	64 rps	64 rps	50 rps	50 rps
D	60 rps	54 rps	54 rps	30 rps	30 rps

(c) **Reset conditions:** When the either of the following condition is satisfied

- ① When the outdoor air temperature sensor (Tho-A) becomes 24°C or higher.
- ② When the decision speed is 0rps.

(10) Heating overload protection control

◆ Indoor unit side

- (a) **Operating conditions:** When the outdoor unit is heating at a decision speed other than 0 rps and the outdoor air temperature (detected by Tho-A) rose beyond 17°C for 2 minutes continuously.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

1) Indoor fan speed is raised forcibly by 1 step.

2) Taking the upper limit of control speed, if the indoor command speed exceeds the upper limit, the upper limit value is maintained.

- (c) **Reset conditions:** When the outdoor air temperature drops below 16°C.

◆ Outdoor unit side

During heating operation, if the outdoor unit is operating at a decision speed other than 0 rps and the outdoor temperature is 14°C (SCM40 type: 13°C) or more for 30 continuous seconds, current safe control is performed.

Operation is restored when the outdoor temperature is 12°C or less.

(11) Heating low temperature protection control

◆ <I>

- (a) **Operating conditions:** When the outdoor unit is heating at a decision speed other than 0 rps and the temperature of the outdoor air sensor is 4°C or lower for 5 minutes continuously.

(b) **Detail of condition:** When the decision speed is lower than A rps, the decision speed is forcibly raised to A rps.

- (c) **Reset condition:** When the temperature of the outdoor air sensor is higher than 6°C.

• Value of A

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	35 rps	22 rps	22 rps	22 rps	20 rps

◆ <II>

- (a) **Operating conditions:** When the outdoor unit is heating at a decision speed other than 0 rps and the temperature of the outdoor air sensor is 0°C (SCM45, 48 type: -2°C) or lower for 5 minutes continuously.

(b) **Detail of condition:** The outdoor fan speed is raised forcibly by 1 step.

- (c) **Reset condition:** When the temperature of the outdoor air sensor is higher than 2°C (SCM45, 48 type: 0°C).

◆ <III>

The compressor's speed is controlled in accordance with the outdoor heat exchanger temperature and outdoor air temperature.

(12) Current safe control

- (a) When converter in port current is detected at the current sensor (CT) and it exceeds the set amperage, the decision speed is reduced. This is rechecked after one second and if it still exceeds the set amperage, the decision speed is reduced 2 rps.

(b) If the decision speed operated at A rps or less, the compressor is stopped. It is restarted after a 3 minute delay.

• Values of A

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	35 rps	30 rps	30 rps	22 rps	20 rps

(13) Current cut

This detects converter output current at the shunt resistor and if it exceeds the set value, the compressor is stopped. It is restarted after a 3 minute delay.

(14) Outdoor fan motor protection

If the outdoor fan motor has operated at 75rpm or under for more than 30 seconds, the inverter and fan motor are stopped.

(15) Compressor overheat protection

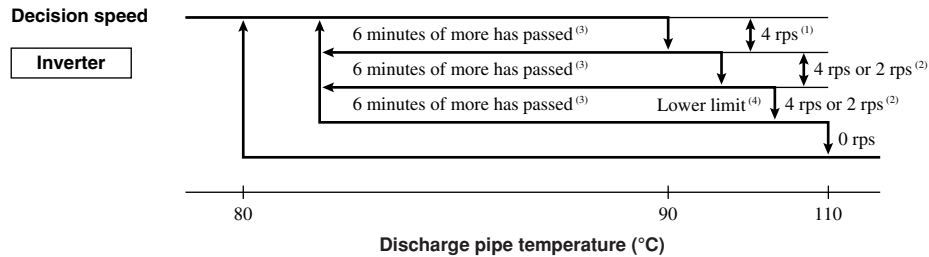
The detection temperature of the discharge pipe sensor (Tho-D) is used to prevent oil deterioration and damage to the motor wire due to overheating of the compressor.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

compressor will be
will not start on

the 3 times.

(b) When $90\text{ }^{\circ}\text{C} \leq \text{Tho-D} < 110\text{ }^{\circ}\text{C}$, the following decision speed controls are performed.



- Notes (1) If the temperature of the discharge pipe is $90\text{ }^{\circ}\text{C}$ or more and less than $110\text{ }^{\circ}\text{C}$, the decision speed is reduced by 4 rps.
 (2) After 20 seconds, if the temperature of the discharge pipe has decreased, it is lowered 2 rps. If the temperature has risen or is the same, it is lowered another 4 rps.
 (3) If the temperature of the discharge pipe is $80\text{ }^{\circ}\text{C}$ or more and less than $90\text{ }^{\circ}\text{C}$, the decision speed is maintained. If operation is maintained at the same speed for 6 minutes or more or if the temperature is $80\text{ }^{\circ}\text{C}$ or less, control is returned to normal operation.

(4)

	Lower limit speed
40 ~ 48 type	35 rps
60 type	22 rps
80 type	20 rps

(16) Power transistor overheat protection

(a) **Purpose:** In order to prevent the power transistor overheating during operation, faulty controller operations, deterioration, damage and so on occurs.

(b) **Detail of operation:**

- ① $\text{Power transistor sensor temperature} \geq 110\text{ }^{\circ}\text{C}$

The compressor is stopped immediately. When the power transistor sensor temperature is less than $80\text{ }^{\circ}\text{C}$, restart.

- ② $90\text{ }^{\circ}\text{C} \leq \text{Power transistor sensor temperature} < 110\text{ }^{\circ}\text{C}$

The decision speed drops to 4 rps. After 20 seconds, the decision speed performs the following controls, according to the power transistor sensor temperature.

If the previous sensor temperature \leq current sensor temperature	reduce by 4rps
If the previous sensor temperature $>$ current sensor temperature	reduce by 2rps

	Lower limit speed
40 ~ 48 type	35 rps
60 type	22 rps
80 type	20 rps

- ③ $80\text{ }^{\circ}\text{C} \leq \text{Power transistor sensor temperature} < 90\text{ }^{\circ}\text{C}$

Maintain the decision speed. When the rotation speed is the same for 6 minutes, or when the power transistor sensor temperature is less than $80\text{ }^{\circ}\text{C}$. The speed is raised by 2rps and kept at that speed for 1 minute. This process is repeated until the decision speed is reached.

(17) Serial transmission abnormality protection

If the compressor is operating with a decision speed other than 0 rps and a serial signal cannot be received from all indoor controls with outdoor controls having serial signals other than “stop - 0 rps” continuously for 1 minute and 55 seconds, the compressor is stopped.

After the compressor has been stopped, it will be restarted after the compressor start delay if a serial signal can be received again from the indoor control.

(18) Rotor lock

If the motor for the compressor does not turn 1/12 revolution 0.044 seconds after it has been started, it is determined that a rotor lock has occurred and the compressor is stopped.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(a) When the decision speed is other than 0 rps.

- 1) Tho-D(10)–Tho-D(0) < 8 °C, and Tho-D(10)–Tho-A(10) < 5 °C

The decision speed is set on A rps for 5 minutes. After 5 minutes, the decision speed is set on B rps for 5 minutes.

- 2) Tho-D(20)–Tho-D(15) < 5 °C :

The decision speed is set on 0 rps.

(b) Once the unit is stopped by this function, it is not restarted.

Notes (1) Tho-D(X): After compressor operation, the discharge pipe sensor temperature after X minutes.

(2) Tho-A(X): After compressor operation, the outdoor air sensor temperature after X minutes.

• Values of A, B

Model	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
A	12 rps	12 rps	12 rps	10 rps	10 rps
B	64 rps	64 rps	64 rps	40 rps	40 rps

(20) Outdoor unit failure

This is a function for determining when there is trouble with the outdoor unit during air conditioning.

The compressor is stopped if any one of the following in item (a), (b) is satisfied. Once the unit is stopped by this function, it is not restarted.

(a) When the input current is measured at 1 A or less for 3 continuous minutes or more.

(b) If the outdoor unit sends a 0 rps signal to the indoor unit 3 times or more within 20 minutes of the power being turned on.

(21) Regulation of outdoor air flow

(a) The fan operates as follows according to the decision speed. (Except during defrost.)

◆SCM40~60ZG-S

	Cooling		Heating	
	Decision speed (rps)	40 type: Less than 50 45 type: Less than 55 48 type: Less than 70 60 type: Less than 40	40 type: 50 or more 45 type: 55 or more 48 type: 70 or more 60 type: 40 or more	40 type: Less than 60 45 type: Less than 70 48 type: Less than 70 60 type: Less than 50
Outdoor fan speed	5th speed		6th speed	

◆SCM80ZG-S

	Cooling				Heating			
	Decision speed (rps)	Less than 26	More than 26 but 38 or less	More than 38 but 54 or less	54 or more	Less than 26	More than 26 but 54 or less	More than 54 but 70 or less
Outdoor fan speed	3rd speed	4th speed	5th speed	6th speed	3rd speed	4th speed	5th speed	6th speed

(b) If the outdoor unit's fan speed drops, the outdoor fan is run for 1 minute at that speed.

5 APPLICATION DATA

SAFETY PRECAUTIONS

- Please read these “Safety Precautions” first then accurately execute the installation work.


Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

the points which are listed in the




[⚠️WARNING] section. However, there is also a possibility of serious consequences in relationship to the points listed in the [⚠️CAUTION] section as well. In either case, important safety related information is indicated, so by all means, properly observe all that is mentioned.

- After completing the installation, along with confirming that no abnormalities were seen from the operation tests, please explain operating methods as well as maintenance methods to the user (customer) of this equipment, based on the owner’s manual. Moreover, ask the customer to keep this sheet together with the owner’s manual.

WARNING

- To disconnect the appliance from the mains supply this appliance must be connected to the mains by means of a circuit breaker or a switch (use a recognized 25A) with a contact separation of at least 3mm.
- The appliance shall be installed in accordance with national wiring regulations.
- This system should be applied to places as households, residences and the like. Application to inferior environment such as engineering shop could cause equipment malfunction.
- Please entrust installation to either the company which sold you the equipment or to a professional contractor. Defects from improper installations can be the cause of water leakage, electric shocks and fires.
- Execute the installation accurately, based on following the installation manual. Again, improper installations can result in water leakage, electric shocks and fires.
- For installation, confirm that the installation site can sufficiently support heavy weight. When strength is insufficient, injury can result from a falling of the unit.
- For electrical work, please see that a licensed electrician executes the work while following the safety standards related to electrical equipment, and local regulations as well as the installation instructions, and that only exclusive use circuits are used. Insufficient power source circuit capacity and defective installment execution can be the cause of electric shocks and fires.
- Accurately connect wiring using the proper cable, and insure that the external force of the cable is not conducted to the terminal connection part, through properly securing it. Improper connection or securing can result in heat generation or fire.
- Take care that wiring does not rise upward, and accurately install the lid/service panel. It’s improper installation can also result in heat generation or fire.
- When setting up or moving the location of the air conditioner, do not mix air etc. or anything other than the designated refrigerant (R410A) within the refrigeration cycle. Rupture and injury caused by abnormal high pressure can result from such mixing.
- Always use accessory parts and authorized parts for installation construction. Using parts not authorized by this company can result in water leakage, electric shock, fire and refrigerant leakage.
- Ventilate the work area when refrigerant leaks during the operation. Coming in contact with fire, refrigerant could generate toxic gas.
- Confirm after the foundation construction work that refrigerant does not leak.  If coming in contact with fire of a fan heater, a stove or movable cooking stove, etc., refrigerant leaking in the room could generate toxic gas.
- In joining pipes, do not use conventional (R22) piping flare nuts, etc. The use of conventional piping materials may lead to the rupture of piping due to higher pressure used for the refrigerant cycle and possible personal injury. (Use only piping material designed specifically for R410A)
- If the power cord becomes damaged, ask your dealer or qualified engineer to install the replacement to avoid accidents.
- Beware of the Aluminum fins, the Flare of pipes, Top screw, and etc. You could injure your fingers, etc.
- When working at high place, be careful not to drop tools.

CAUTION

- Execute proper grounding. Do not connect the ground wire to a gas pipe, waterpipe, lightning rod or a telephone ground wire.  Improper placement of ground wires can result in electric shock.
- The installation of an earth leakage breaker is necessary depending on the established location of the unit. Not installing an earth leakage breaker may result in electric shock.
- Do not install the unit where there is a concern about leakage of combustible gas.  The rare event of leaked gas collecting around the unit could result in an outbreak of fire.
- For the drain pipe, follow the installation manual to insure that it allows proper drainage and thermally insulate it to prevent condensation. Inadequate plumbing can result in water leakage and water damage to interior items.
- Do not install an outdoor unit where rodents or other small animals are likely to inhabit.  Small animals entering the unit can cause a unit breakdown or an accident involving smoke generation and/or ignition, if they touch electrical parts inside. Please ask the customer to keep its surroundings clean.

5.1 Installation of indoor unit

(1) Wall mounted type (SKM)

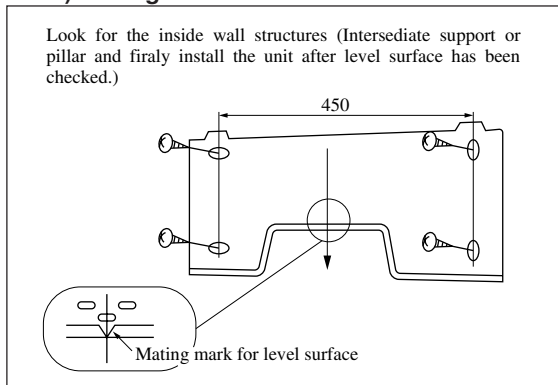
(a) Caution for installation

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

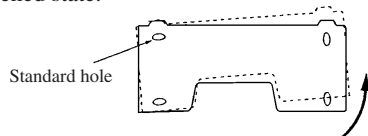
- 3) The connection to the fixed wiring of the mains supply must be made via a double pole isolating switch with a contact gap of at least 3mm in each pole.
- 4) When the outdoor unit has a possibility of being overturned or being displaced and fall from its original installation position, the outdoor unit should be fixed in its position by the use of anchor bolts or wires.

(b) Installation of indoor unit

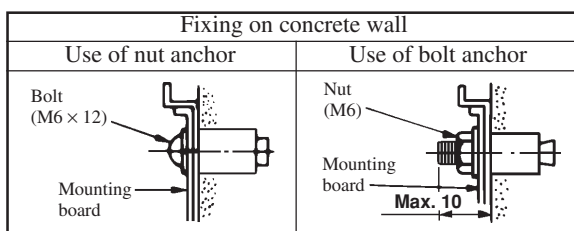
1) Fixing of installation Board



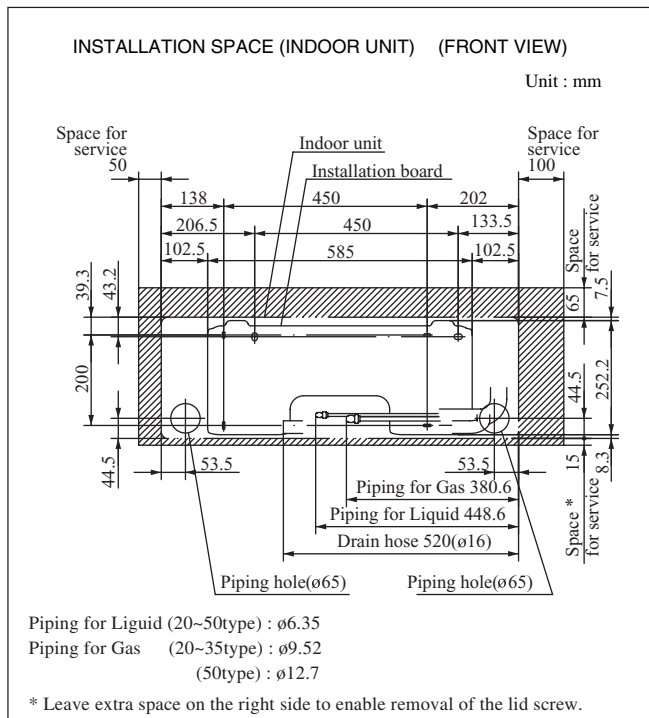
Adjustment of the installation board in the horizontal direction is to be conducted with four screws in a temporary tightened state.



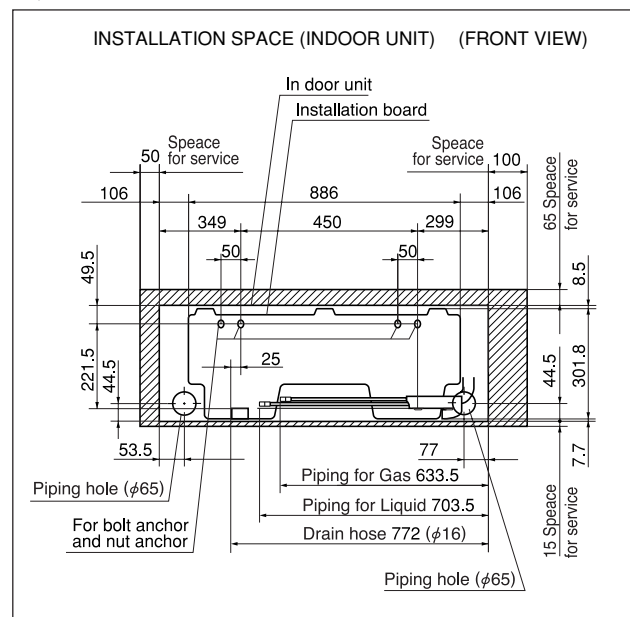
Adjust so that board will be level by turning the board with the standard hole as the center.



◆ SKM20~50 model

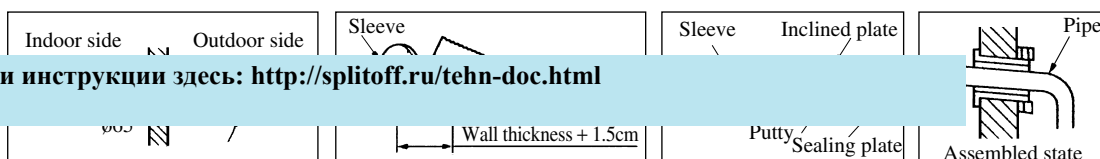


◆ SKM60~71 model



2) Drilling of holes and fixture of sleeve (Option parts)

- The connecting wires may touch the metal inside the wall and cause danger so it is necessary to always use the sleeve.



- Drill a hole with a 65 whole core drill.
- When the pipe is connected at the rear, cut off the lower and the right side portions of the sleeve collar (as shown by the broken line.)

3) Mounting of connecting wires

- Open the air inlet panel. (SKM 60-71 model)
- Remove the lid.
- Remove the wiring clamp.
- Connect the connection wire securely to the terminal block.

Use cables for interconnection wiring to avoid loosening of the wires.

CENELEC code for cables. Required field cables.

H05RNR4G1.5 (Example) or 245IEC57

H Harmonized cable type

05 300/500 volts

R Natural-and/or synth, rubber wire insulation

N Polychloroprene rubber conductors insulation

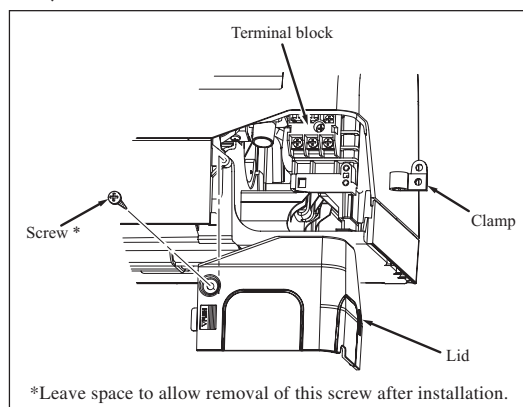
R Standed core

4or5 Number of conductors

G One conductor of the cable is the earth conductor (yellow/green)

1.5 Section of copper wire (mm²)

◆ SKM20~50 model



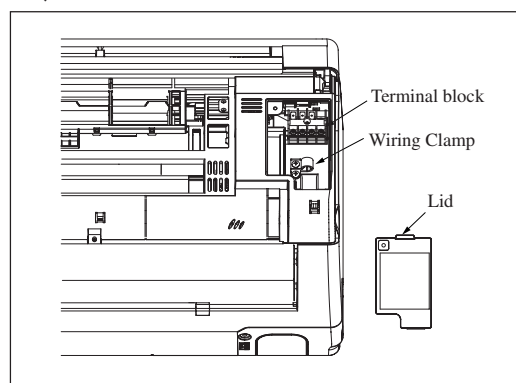
- Connect the connection wire securely to the terminal block.

If the wire is not affixed completely, contact will be poor, and it is dangerous as the terminal block may heat up and catch fire.

- Take care not to confuse the terminal numbers for indoor and outdoor connections.
- Affix the connection wire using the wiring clamp.

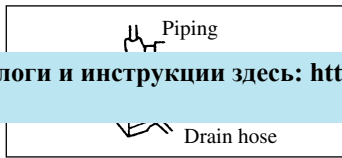
- Fix the connecting wire by wiring clamp.
- Attach the lid.
- Close the air inlet panel. (SKM 60-71 model)

◆ SKM60-71 model



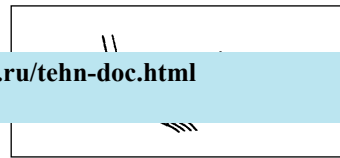
4) Installing the support of piping

[Shaping the piping]



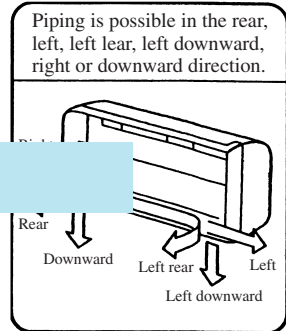
- Hold the bottom of the piping and fix direction before stretching it and shaping it.

[Taping of the exterior]



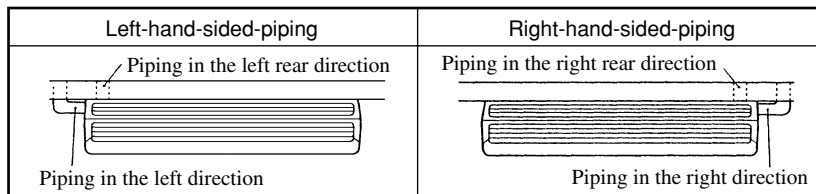
- Tape only the portion that goes through the wall. Always tape the crossover wiring with the piping.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

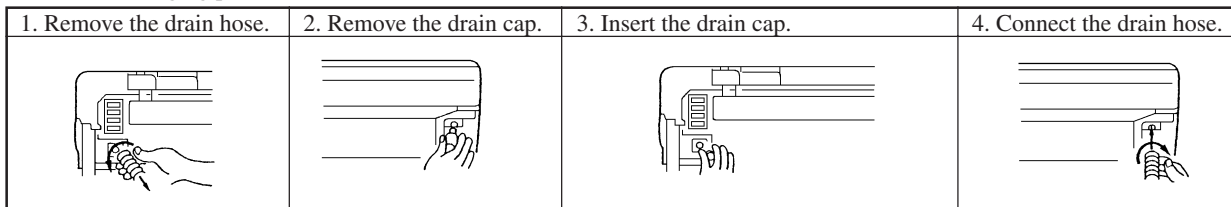


[Matters of special notice when piping from left or center/rear of the unit.]

[Top View]

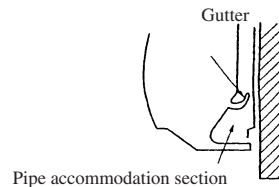


[Drain hose changing procedures]



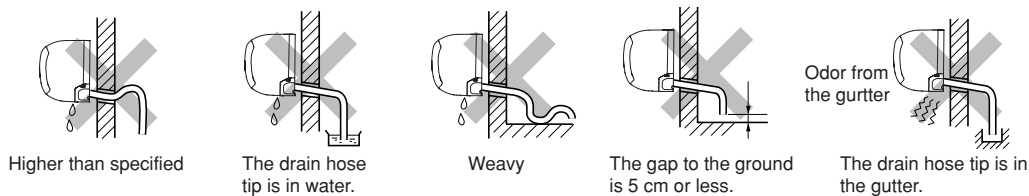
- Remove the drain hose, making it rotate.
- Remove it with hand or pliers.
- Insert the drain cap which was removed at procedure "2" securely using a hexagonal wrench, etc.
Note: Be careful that if it is not inserted securely, water leakage may occur.
- Insert the drain hose securely, making it rotate.
Note: Be careful that if it is not inserted securely, water leakage may occur.

Since this air conditioner has been designed to collect dew drops on the rear surface to the drain pan, do not attach the power cord above the gutter.

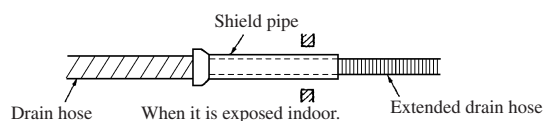


Drainage

- Arrange the drain hose in a downward angle.
- Avoid the following drain piping.



- Pour water to the drain pan located under the heat exchanger, and ensure that the water is discharged outdoor.
- When the extended drain hose is indoor, always use a shield pipe (to be arranged by the user) and ensure it is thermally insulated.

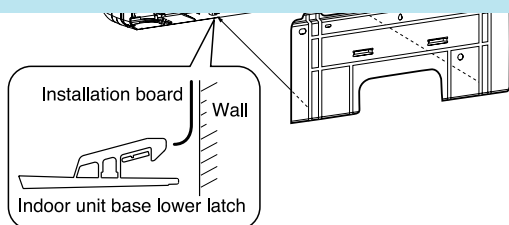


5) Fixing of indoor unit

Indoor unit

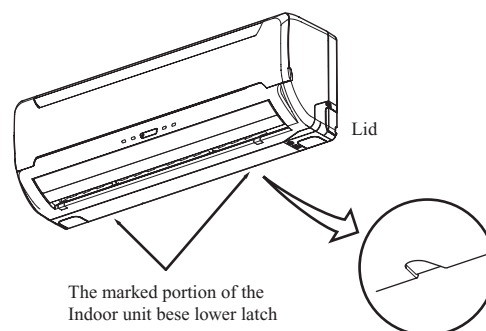
Installation

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



Installation Steps	
① Pass the pipe through the hole	
the installation board.	
② Gently push the lower part to secure the unit.	

- How to remove the indoor unit from the installation board
 - ① Push up at the marked portion of the indoor unit base lower latch, and slightly pull it toward you. (both right and left hand sides)
(The indoor unit base lower latch can be removed from the installation board)
 - ② Push up the indoor unit upward. So the indoor unit will be removed from the installation board.



(2) 4-way ceiling cassette type (STM)

(a) Caution for installation

Install at location that meets the following conditions after getting approval from the customer.

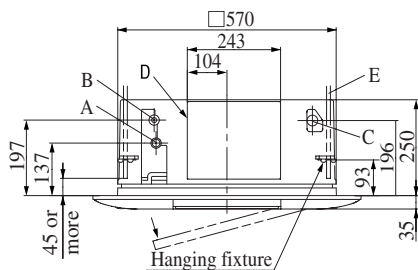
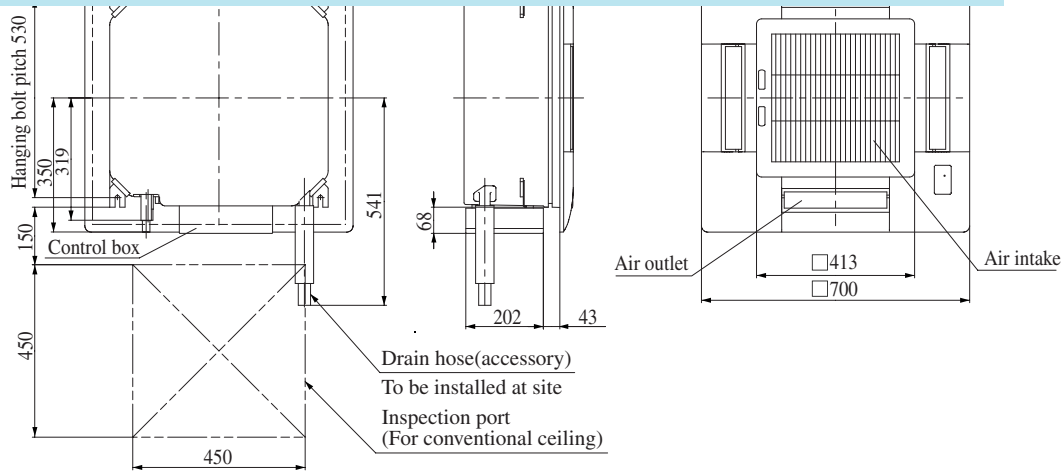
- 1) Where cool air or hot air can easily pass through.
If the height of the location exceeds 3 m, hot air will gather in the ceiling. Suggest to the customer to also install a circulator.
 - 2) Where there are no wind disturbances to the suction inlet and blowing outlet, where the fire alarm will not be set off erroneously, where no short circuits occur.
 - 3) Where there is no obstructions to the air flow and where the cooled air can be evenly distributed.
 - 4) A solid place where the unit or the wall will not vibrate.
 - 5) A place where there will be enough space for servicing.
(Where space mentioned below can be secured)
 - 6) Where wiring and the piping work will be easy to conduct.
 - 7) The place where receiving part is not exposed to the direct rays of the sun or the strong rays of the street illumination.
 - 8) When a sufficient interval cannot be secured between the unit and a wall or another unit, shut up diffusers on that side to block winds and make sure that no short-circuiting is occurring.
(A wind blocking material is available as an optional part)
- ▶ Do not use the unit in the "Lo" wind mode, when winds are blown into two or three directions.

(b) Installation of indoor unit

1) Installation dimensions

Unit: mm

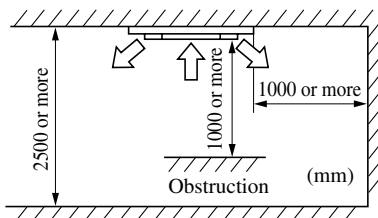
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



Mark	Description		
	Model	25, 35ZF-S	50, 60ZF-S
A	Gas tube connecting port	ø9.52 (Flare)	ø12.7 (Flare)
B	Liquid tube connecting port	ø6.35 (Flare)	
C	Drain line tube connecting port	VP25*	
D	Power intake		
E	Hanging bolt	(M10 or M8)	

* Please arrange VP25 connector sockets on the installer's part.

Installation Space (front view) (unit: mm)



2) Drilling of holes in the wall and fixture of sleeve

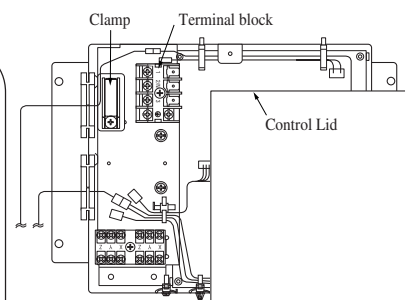
The instructions for installation is the same as the SKM type. Please refer to page 72.

3) Preparations for the Main Frame

Mounting of interconnecting wires (Field wiring)

- a) Remove the control lid.
- b) Connect the connection wire securely to the terminal block.

Use cables for interconnection wiring to avoid loosening of the wires.
 CENELEC code for cables Required field cables.
 H05RNR4G1.5 (Example)
 H Harmonized cable type
 05 300/500 volts
 R Natural-and/or synth. rubber wire insulation
 N Polychloroprene rubber conductors insulation
 R Stranded core
 4 Number of conductors
 G One conductor of the cable is the earth conductor (yellow/green)
 1.5 Section of copper wire (mm²)



- 1) Connect the connection wire securely to the terminal block. If the wire is not affixed completely, contact will be poor, and it is dangerous as the terminal block may heat up and catch fire.
- 2) Take care not to confuse the terminal numbers for indoor and outdoor connections.
- 3) Affix the connection wire using the wiring clamp.

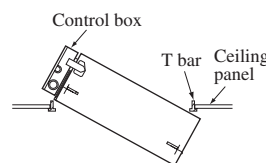
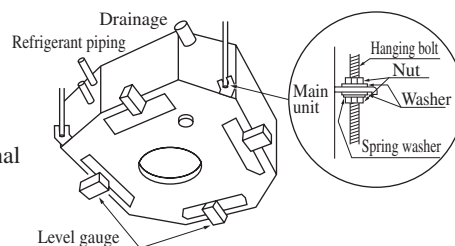
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

4) Hanging the unit

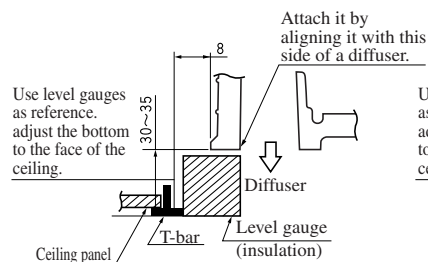
Please arrange four sets of a hanging bolt (M10 or M8), a nut matching the bolt, a flat washer and a spring washer on the installation site.

A . When hanging from the ceiling

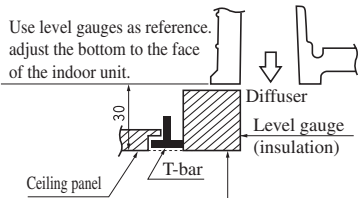
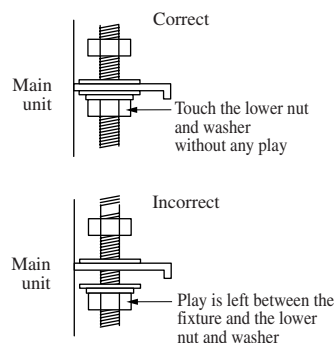
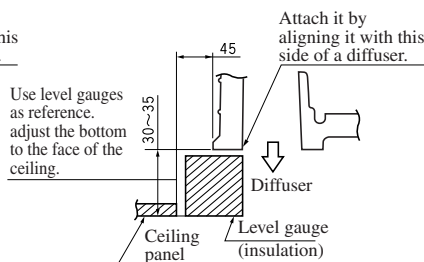
- a) When installing on a 2' x 2' grid ceiling, if necessary, please detach the T bar temporarily before you install it. When installing on a conventional ceiling, cut an installation opening (660mm x 660mm) in the ceiling. When installing on a conventional ceiling, cut an opening (Min 450 x 450) for inspection purposes.
- b) Determine the positions of hanging bolts (530 x 530).
- c) Use four hanging bolts, each fastened in such a manner that it can withstand pull force of 50kgf.
- d) Make hanging bolts to the length that leaves approximately 45 mm of them above the ceiling. In hoisting the unit main body in, temporarily fasten the four lower nuts of the hanging bolts approx. 93 mm from the ceiling and the four upper nuts at positions sufficiently far from the lower nuts so that they may not hamper installation work when the unit is hoisted in or the height is adjusted.
- e) Put in the unit on an angle.
- f) After hoisting in the unit, attach level gauges supplied as accessories and determine the unit position (height). To adjust height, use the four lower nuts with the four upper nuts left loose. Please make sure that the unit's four hanging fixtures touch the four lower nuts and washers evenly without any play.



[For 2' x 2' grid ceiling]

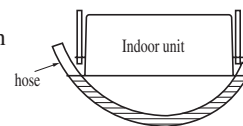


[For conventional ceiling]



When the ceiling panel comes below the T bar, align the bottom of the level gauges to the lower face of the ceiling panel.

- g) Please make sure that the unit main body is installed levelly. Level must be checked with the level gauge or a clear hose filled with water. (A tolerable height difference at an end of the unit is within 3 mm)



- h) After you have adjusted the height and level of the unit, fasten the four upper nuts to fix the unit.

Notes • Do not adjust the height with the upper nuts. It may cause deformation due to excessive force working on the unit main body, which can result in such problems that you cannot attach the panel or noises are generated from the interfering fan.

B. When embedded into ceiling

1. Determine the positions of hanging bolts (530 × 530).

The pitch center of a hanging bolt must accord with the center of the unit.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

[Notes] • When a hanging bolt exceeds 1.3 m in length, use an M10 bolt and give it reinforcements such as braces.

5) Drainage

- Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.
- The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.
- Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.
- Use VP-25 general-purpose hard PVC pipes for drain piping.
- Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.

<Adhesive must not be used>

- Glue a VP-25 joint (to be procured locally) to join it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
- Give the drain piping a descending grade (1/50 - 1/100) and never create a bump to go over or a trap.
- In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
- Do not create an air vent under any circumstances.
- When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
- Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.

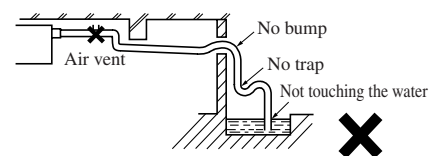
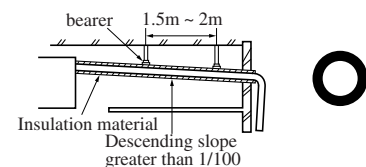
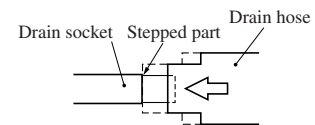
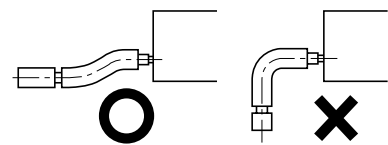
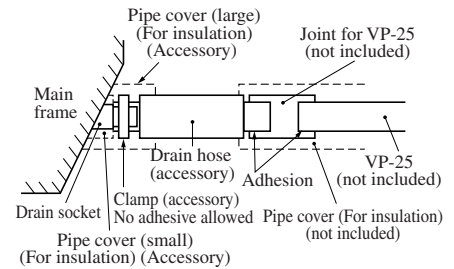
• Drain socket

After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps.

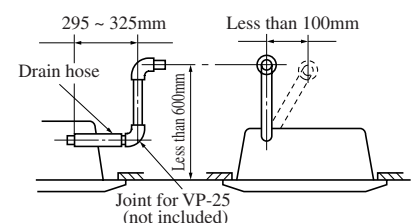
(Cut pipe covers into appropriate shapes)

• Hard PVC pipes laid indoor

- Since a drain pipe outlet can be raised up to 60 cm from the ceiling, use elbows, etc. to install drain pipes, if there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the right.
- Install the drain pipe outlet where no odor is likely to be generated.
- Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.






Trapped air will generate noises.



C. Attaching the panel

1) <Accessory items>

(It is attached to the panel.)

1	Hook		1 piece	For fixing temporarily
2	Chain		2 pieces	
3	Bolt		4 pieces	For hoisting the panel

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

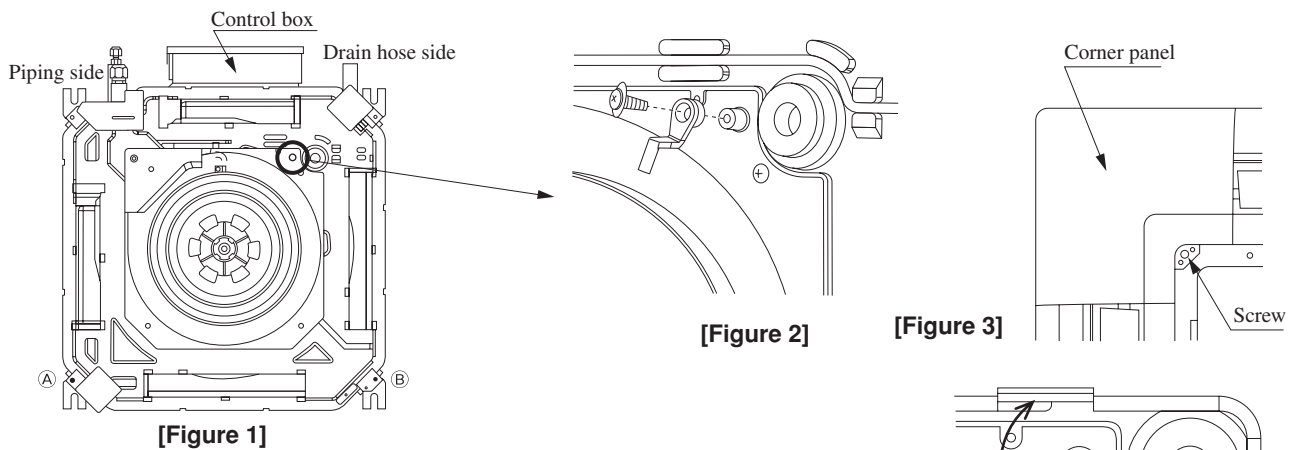
a) Make sure that the unit main body is positioned at the correct height and the opening on the ceiling is made to the correct dimensions with the level gauge supplied with the main body.
Remove the level gauge before you attach the panel.

b) Screw in two bolts out of the four supplied with the panel by about slightly less than 5mm. (mark(A)(B)) [Figure 1].

c) Attach the hook supplied with the panel to the main body with the hook fixing screw (1 screw). [figure 2]

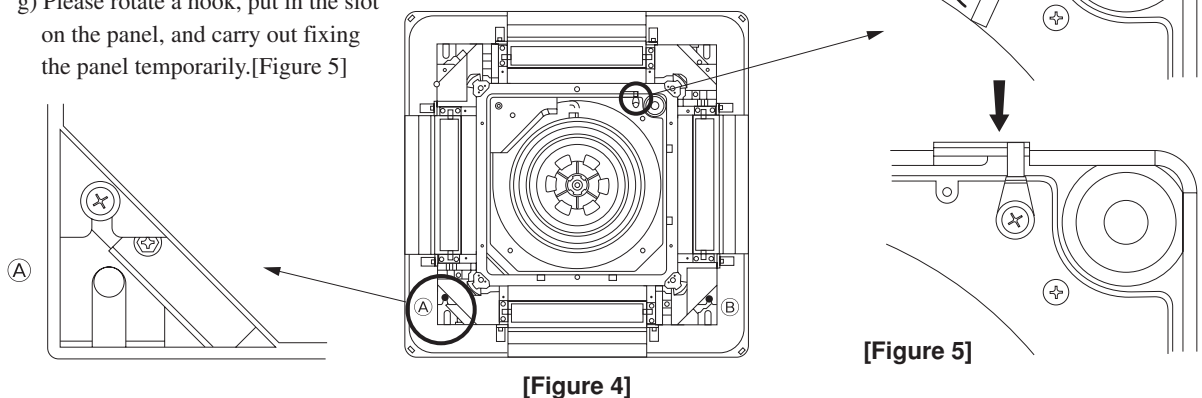
d) Open the intake grille.

e) Please remove the screw of a corner panel and remove a corner panel. (four places) [Figure 3]



f) A panel is hooked on two bolts (● mark(A)(B)). [figure 4]

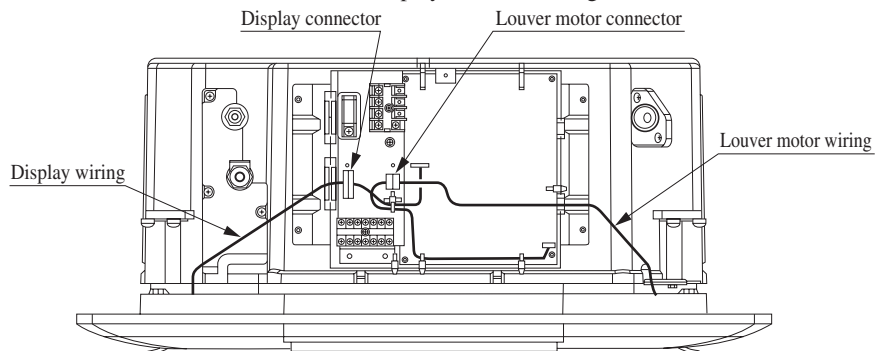
g) Please rotate a hook, put in the slot on the panel, and carry out fixing the panel temporarily. [Figure 5]



h) Tighten the two bolts used for fixing the panel temporarily and the other two.

i) Please open the lid of a control box.

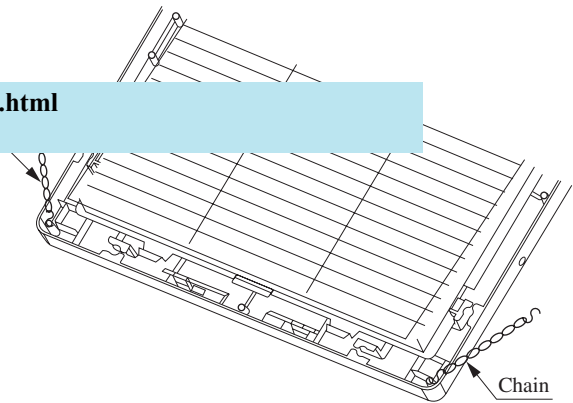
j) Please connect a louver motor connector and Display connector. [Figure 6]



[Figure 6]

- k) Attach two chains to the intake grille with two screws. [Figure 7]
- l) Replace the corner panels. Please also close a chain with a screw together then.
- m) Close the intake grille.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



[Figure 7]

(3) Ducted type (SRRM)

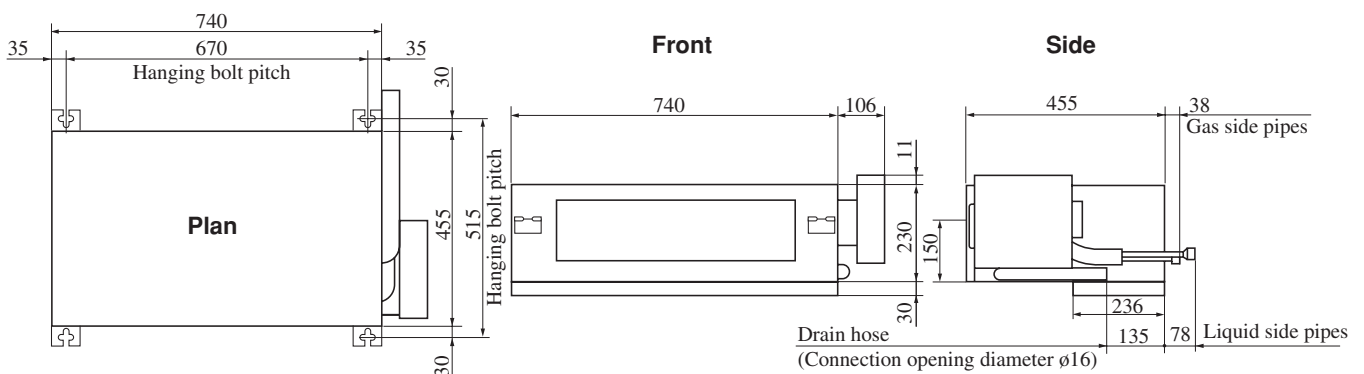
(a) Caution for installation

Install the unit with the customer's consent at location that meets the following conditions.

- 1) Where there are no barriers to the breeze, and where cool/hot air may diffuse throughout the room.
- 2) A firm location that may sustain the weight of the unit, and do not cause the unit or the ceiling to vibrate.
- 3) A location that allows room for maintenance.
- 4) Where wiring and plumbing may be performed with ease.
- 5) Where water may be drained easily.
- 6) Where the unit is not influenced by the television, stereo, radio, or the lights.
- 7) Where the unit is not influenced by high frequency equipment and wiring equipment.
- 8) Where oil splashes do not occur frequently.
- 9) Where sunlight and strong lights do not directly hit the receiver.
- 10) A flat ceiling surface (bottom of ceiling).

(b) Installation of indoor unit

1) Installation dimensions



2) Drilling of holes in the wall and fixture of sleeve

The instructions for installation is the same as the SKM type. Please refer to page 72.

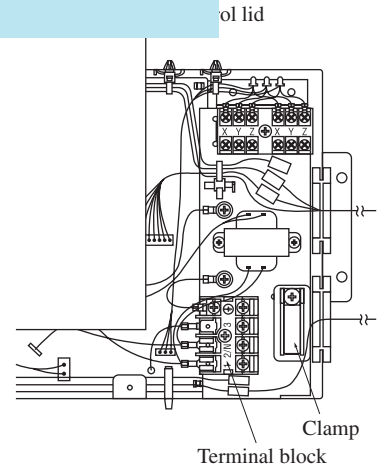
3) Preparations for the Main Frame

Mounting of interconnecting wires (Field wiring)

a) Remove the control lid.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

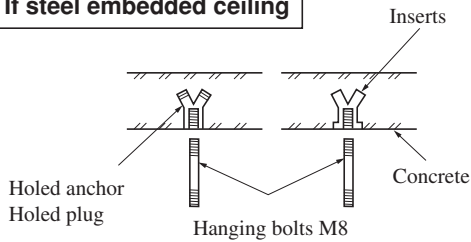
Use cables for interconnection wiring to avoid loosening of the wires.
 CENELEC code for cables Required field cables.
 H05RNR4G1.5 (Example)
 H Harmonized cable type
 05 300/500 volts
 R Natural-and/or synth. rubber wire insulation
 N Polychloroprene rubber conductors insulation
 R Stranded core
 4 Number of conductors
 G One conductor of the cable is the earth conductor (yellow/green)
 1.5 Section of copper wire (mm²)



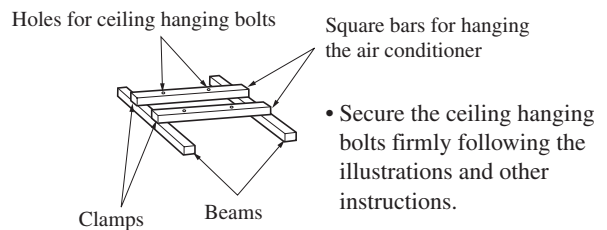
- 1) Connect the connection wire securely to the terminal block.
 If the wire is not affixed completely, contact will be poor,
 and it is dangerous as the terminal block may heat up and catch fire.
 - 2) Take care not to confuse the terminal numbers for indoor and outdoor connections.
 - 3) Affix the connection wire using the wiring clamp.
- c) Attach the control lid.

4) Securing the Ceiling Hanging Bolts

If steel embedded ceiling

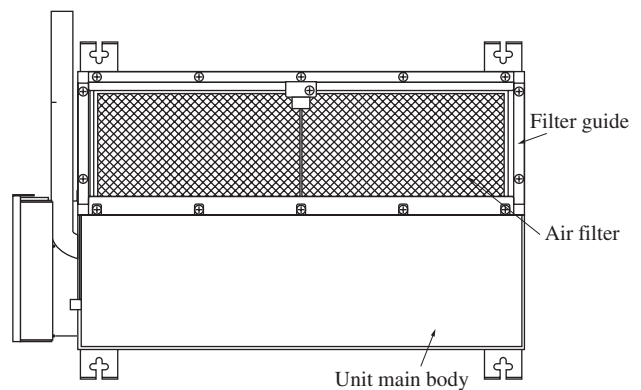


If wooden ceiling



5) About the filter guide

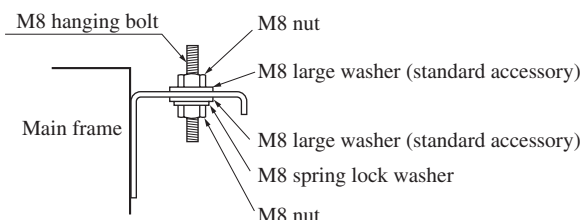
When option parts Rear inlet filter set (RBF 12) and Bottom air inlet grille set (RTS 12) are used, please remove the filter guide.



6) Installing the Main Unit

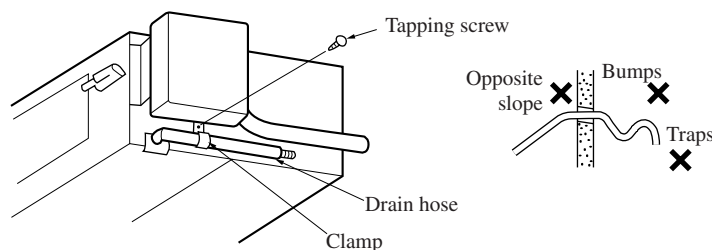
- Attach the washers and nuts to the ceiling hanging bolts.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



- If it is not leveled, the float switch may malfunction or may not start.

8) Connecting the Drain Hose

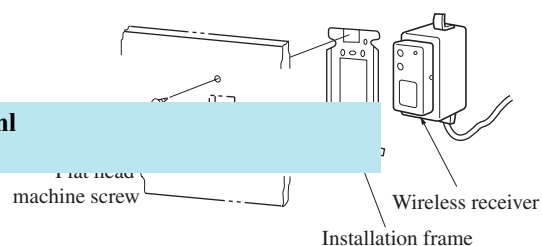


- Insert the drain hose as far as possible through the lower section of the side of the unit, and secure it with clamps.
- The drain hose should be set in a downward slope (over 1/100), and it should not have any bumps or traps along its route.
- When you are obliged to route the drain hose with a trap in its way or in an ascending gradient, please use an option part Drain up kit(RDU12E).
- The indoor drain hose must be insulated.

NOTE

Conduct the installation correctly, and ensure that the water is draining correctly. It may lead to water leaks.

7) Securing the Wireless Receiver



- With a(-)screwdriver, secure the installation frame to the grooves on either sides of the wireless receiver.
- Refer to the installation instructions for each separately sold part, regarding the installing location of the wireless receiver.

5.2 Installation of remote control

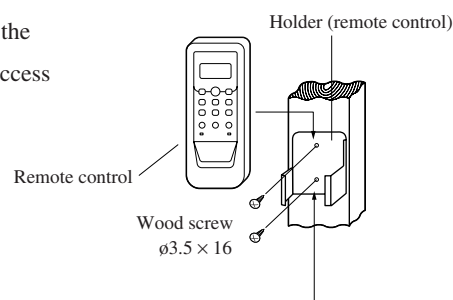
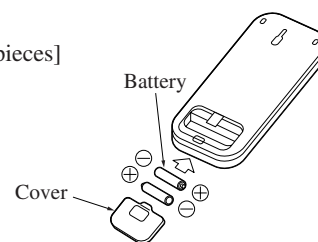
(1) Mounting method of battery

Uncover the remote control switch, and mount the batteries [R03 (AAA, Micro), × 2 pieces] in the body regularly.

(Fit the poles with the indication marks, ⊕ & ⊖ without fail)

(2) Fixing to pillar or wall

- Conventionally, operate the remote control switch by holding in your hand.
- In the case of stationary operation service as by mounting on the holder for the remote control switch, make sure that the locating place is satisfactory for access service before installing it.
- Avoid installing it on a clay wall etc.



Adjust the installation to vertical attitude.
Avoid projecting the screw head.

5.3 Installation of outdoor unit

(1) Selection of installation location

(Please install with the customer's consent in a location that follows the conditions listed below.)

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(c) Also, where the unit cannot be buried by snow.

A location which can sustain the weight of the unit, and where noises and vibrations are not enhanced.

(d) Where blasts of cold or hot air and noise do not bother the neighbors.

(e) Where the unit does not receive heat radiation from other heat sources.

(f) Where there are no obstructions (animals, plants, etc.) to the suction inlet and blowing outlet.

(g) Where water may drain out.

(h) Please avoid the following locations.

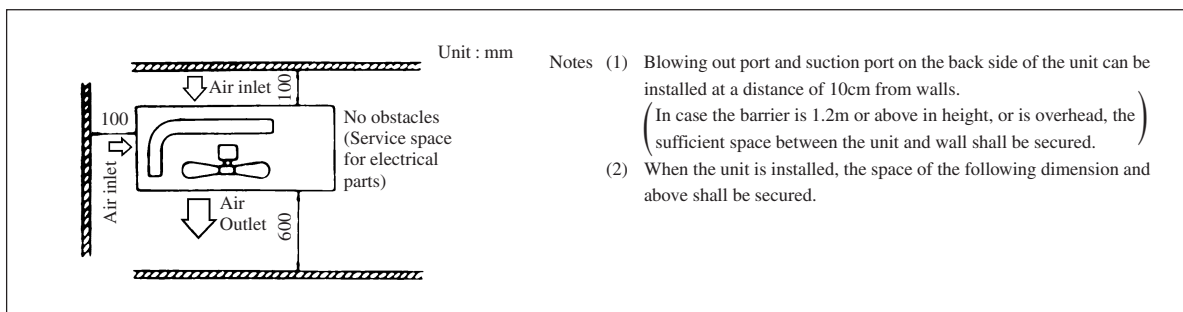
1) Where there is constant exposure to harsh winds such as the top floors of a building. Also, locations with exposure to salty air.

2) Where there are oil splashes, vapor, and smoke.

3) Where there are possibilities of flammable gas leaks.

(i) Do not install the unit near the seaside, or where there is possibility of chlorine gas generation.

(j) Installation space (on a flat surface)

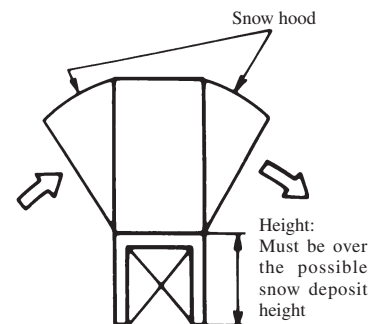


(k) In heating operation, snow deposit on the heat-exchanger of outdoor unit must be prevented for keeping the normal performance capacity.

1) Snow-hood on outdoor unit as in drawing, will reduce the frequency of defrost operation.

When installing the snow hood, take care so that the air outlet of the snow hood will not face directly into the most windy direction.

2) Design the base higher than possible snow deposit.



(2) Installation of outdoor unit

(a) Make sure that sufficient space for installation and service is secured.

(b) Fix the leg sections of the unit on a firm base which will not play.

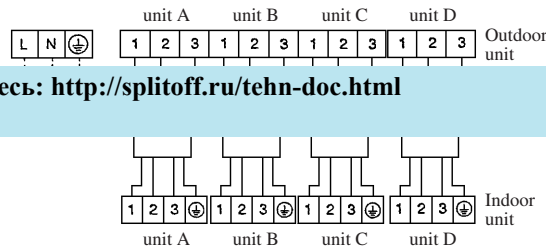
Attach cushion pads, etc. between the unit and the mounting fixtures not to transmit vibration to the building.

(c) Attach a drain elbow, etc. under the drain port of the bottom plate to guide drain water.

(Drain elbow should not be used where days when temperature drops below 0°C continue for several days. Draining may be disturbed by frozen water.)

(d) When installing the unit at a higher place or where it could be toppled with strong winds, secure the unit firmly with foundation bolts, wire, etc.

5.4 Electrical wiring



Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(1) Connection of the power lines

- (a) This multi-type room air conditioner receives its power from outside.
- (b) It is necessary to use a single phase 220/230/240 V 50 Hz for the power supply.
- (c) An earth leakage breaker and a circuit breaker must be installed.
Their capacities are 25A.
- (d) Use the power supply wires specified below. Different wires may cause heat generation and fire. Do not to use unspecified wires.
Never bundle, wind or treat the power wires. Otherwise, heat or fire may be generated.

Use cables for power supply wiring to avoid loosening of the wires.
CENELEC code for cables Required field cables.
H05RNR3G4.0 (Example)

H	Harmonized cable type
05	300/500 volts
R	Natural-and/or synth. rubber wire insulation
N	Polychloroprene rubber conductors insulation
R	Stranded core
3	Number of conductors
G	One conductor of the cable is the earth conductor (yellow/green)
4.0	Section of copper wire (mm ²)

[POWER SUPPLY CODE]

CENELEC code for cables required field cables.

H05RNR3G4.0

- (e) After connecting the power supply wires, make sure to secure the wires with wiring clamps.

(2) Connecting the outside/inside crossover wires

- (a) Ensure that crossover wiring is matched with crossover piping in A, B, C and D rooms.
- (b) Use the crossover wires specified below. Different wires may cause heat generation and fire. Do not to use unspecified wires.

[INTERCONNECTING WIRING CODE]

CENELEC code for cables required field cables.

H05RNR4G1.5

- (c) Make sure the terminal numbers on the terminal board of the indoor and outdoor connections are correct.
- (d) After connecting the crossover wires to the terminal board, use wiring clamps to secure the wiring.

5.5 Refrigerant Piping

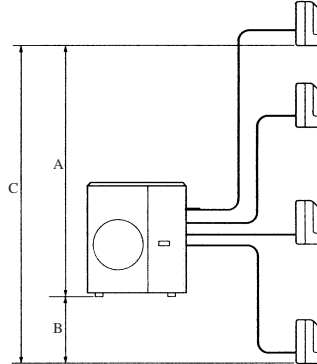
(1) Limit

The maximum permissible length of the refrigerant pipes for the outdoor units, and the maximum permissible height difference for the outdoor units are as shown below:

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

		SCM80ZG-S		
Total length for all rooms		Max. 30m	Max. 40m	Max. 70m
Difference in height between indoor and outdoor unit	When indoor unit is above outdoor unit (A)	15m		
	When indoor unit below outdoor unit (B)	15m		
	Difference in height between indoor units (C)	Max. 25m		
Length of chargeless refrigerant pipe*		30m	20m	40m
			30m	40m

* If the total length for all the rooms exceeds the length of chargeless refrigerant pipe, additionally charge with refrigerant according to the item 4.



• The diameter of the refrigerant pipe:

Class of indoor unit (kW)	2.0 · 2.2 · 2.5 · 2.8 · 3.5kW	5.0 · 6.0 · 7.1kW
Diameter of joint pipe	Liquid side	ø 6.35 · t 0.8
	Gas side	ø 9.52 · t 0.8

• Outdoor unit and the total connectable indoor units (class kW):

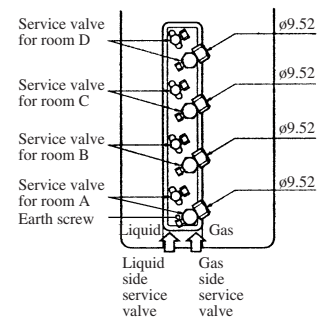
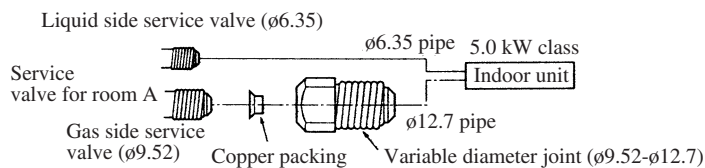
	SCM40ZG-S	SCM45ZG-S	SCM48ZG-S	SCM60ZG-S	SCM80ZG-S
Total of indoor units (class kW)	5.7kW	7.0kW	8.5kW	11.0kW	13.5kW

(2) Connection of refrigerant piping

- The service valve corresponding to each indoor unit is as illustrated in the right figure.
- Regarding the change in the sizes of gas side pipes (usage of the variable joints); if a 5.0, 6.0, 7.1 kW class indoor unit (gas side pipe 12.7) is going to be connected to the service valves (9.52), variable joints available as accessories must be applied to the gas side service valves.

[Examples of use of variable diameter joints]

Connection of indoor unit of Class 5.0 to A unit.

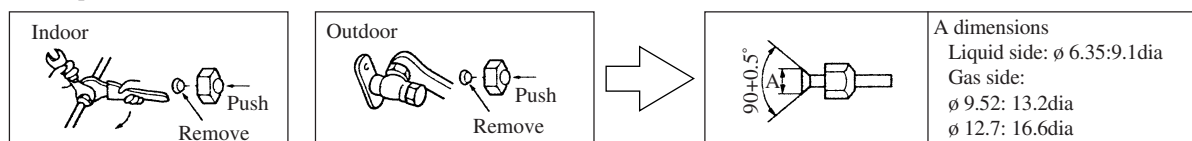


- Securely fit the copper packing between the service valve and the variable diameter joint to prevent shifting.
- Cover the pipes with tape so that dust and sand do not enter the pipe until they are connected.

[Connection of pipes]

- When connecting the pipes to the outdoor unit, be careful about the discharge of fluorocarbon gas or oil.
- Make sure to match the pipes between the indoor unit and the outdoor unit with the correct service valves.

(1) Preparations

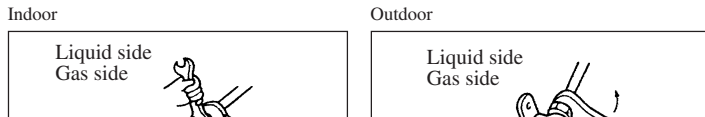


- Remove the flare nut (from both liquid and gas sides).

- Remove the flare nut (from both liquid and gas sides).

- Fit the removed flare nut to the joint pipe, and then flare it.

(2) Connection



Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

Secure the nut with a specified tightening torque to avoid any gas leaks.

- Specified tightening torques are as follows:
 - Liquid side (ø 6.35): 17mm in width across flat of the flare nut: 14.0-18.0 N·m (1.4-1.8 kgf·m)
 - Gas side (ø 9.52): 22mm in width across flat of the flare nut: 33.0-42.0 N·m (3.3-4.2 kgf·m)
 - Gas side (ø 12.7): 24mm in width across flat of the flare nut: 49.0-61.0 N·m (4.9-6.1 kgf·m)

(3) Air purging

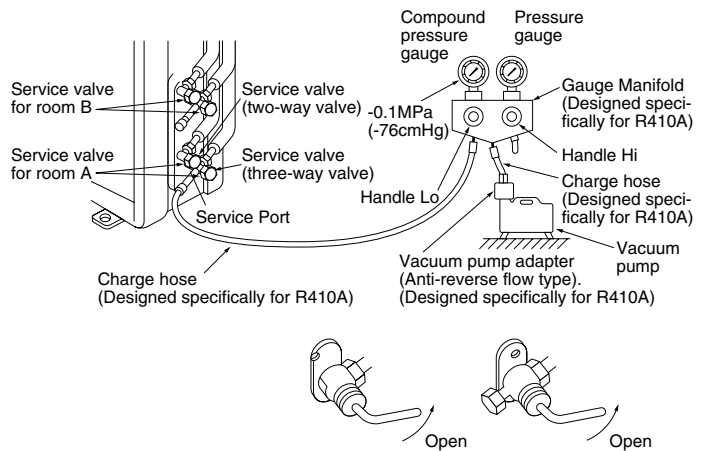
To protect the global environment, use a vacuum pump that do not release flouorocarbon gas into the atmosphere. When a vacuum pump cannot be used due to certain conditions for installation, sufficient refrigerant is available for air purging with refrigerant for the outdoor unit.

Note: Fully open the service valves (on both liquid and gas sides) after completing air purging

- Remove the cap on both gas and liquid sides before starting operation.
 - After completing the operation, do not forget to tighten the cap (gas may leak).
 - Conduct air purging for all connected indoor units.
- Since the system uses service ports differing in diameter from those found on the conventional models, a charge hose (for R22) presently in use is not applicable. Please use one designed specifically for R410A
 - Please use an anti-reverse flow type vacuum pump adapter so as to prevent vacuum pump oil from running back into the system. Oil running back into an air-conditioning system may cause the refrigerant cycle to break down.

Procedure

- Secure all flare nuts on both indoor and outdoor sides to prevent leaks from the pipes.
- Connect the service valves, charge hose, manifold valve and vacuum pump as shown in the right figure.
- Fully open the handle Lo for the manifold valve, and pump a vacuum for 15 minutes. Ensure that the meter is indicating -0.1 MPa (-76cmHg).
- After vacuuming, fully open the service valve (both liquid and gas sides) with a hexagon wrench.
- Remove the charge hose from service port.
- Repeat the above steps ① ~ ⑤ for all connected indoor units.
- Ensure that there are no gas leaks from the joints in the indoor and outdoor units.



(4) Additional refrigerant charge

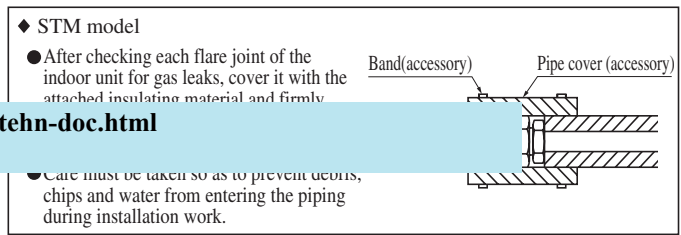
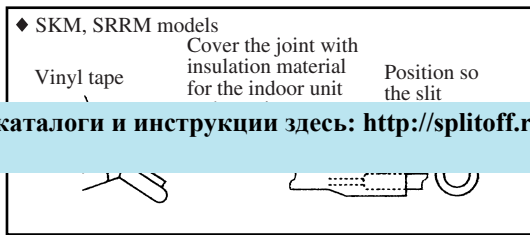
- SCM40, 48 type
Additional refrigerant charge is not required at all
- SCM45, 60, 80 type
 - When the total refrigerant pipe length for all the rooms exceeds the length of the uncharged pipe, additional refrigerant is required.
 - For this multi type room air conditioner, it is not necessary to charge the refrigerant for the total maximum length in all the rooms.

Model	Charged pipe length (Amount of uncharged refrigerant) *1	On site additional charge	Maximum total pipe length for all rooms (Maximum amount of refrigerant)
SCM45ZG-S	20m (1600g)	20g/m	30m (1800g)
SCM60ZG-S	30m (2200g)	20g/m	40m (2400g)
SCM80ZG-S	40m (3150g)	20g/m	70m (3750g)

*1: Charge amount at the time of shipment.

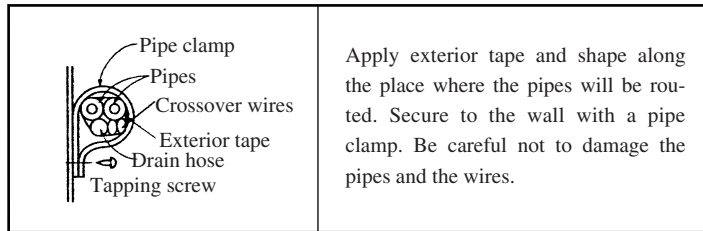
- Ensure that there are no gas leaks from the pipe joints by using a leak detector or soap water.

(5) Heat insulation for joints



Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

Finish and fixing



5.6 Test run and handling instruction

(1) Inspection

Check according to the following check items.

(2) Test run

- Conduct the test run after turning on the power for 20 minutes.
(To prevent compression of the compressor liquid.)
- If the compressor does not operate after the operation has started, wait for 5 ~ 10 minutes.
(This may be due to a delayed start.)
- Carry out the test run for each unit individually. (If 2 or 3 units are tested at the same time, wrong wiring and wrong pipe connections cannot be checked.)
- After each individual test, run the units in all the rooms simultaneously and check the units.
- Test both the cooler and the heater.

(Three-minute restart preventive timer)

When the air conditioner is restarted or when changing the operation, the unit will not start operating for approximately 3 minutes. This is to protect the unit and it is not a malfunction.

Installation test check points

Check the following points again after completion of the installation, and before turning on the power. Conduct a test run again and ensure that the unit operates properly. At the same time, explain to the customer how to use the unit and how to take care of the unit following the instruction manual.

After installation

- The power supply voltage is correct as the rating.
- No gas leaks from the joints of the service valve.
- Power cables and crossover wires are securely inserted and fixed to the terminal board.
- Each indoor and outdoor unit is properly connected (no wrong wiring or piping).
- Service valve is fully open.
- Refrigerant has been additionally charged (when the total pipe length exceeds the refrigerant charged pipe length).
- The pipe joints for indoor and outdoor pipes have been insulated.
- Earthing work has been conducted properly.

Test run

- Air conditioning and heating are normal.
- No abnormal noise.
- Water drains smoothly.
- Protective functions are not working.
- Operation of the unit has been explained to the customer.

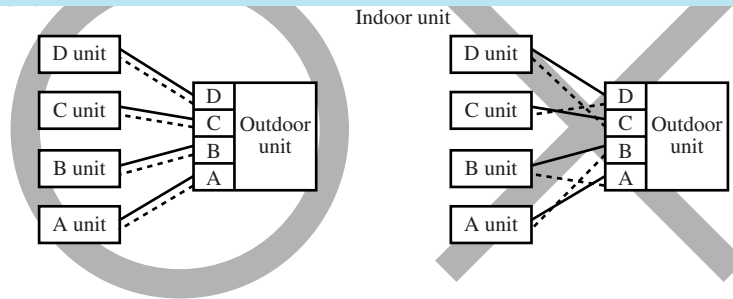
Beware of wrong connections in refrigerant piping and wiring

- Make sure to match the piping and wiring from each unit to the outdoor unit.
- Be careful because if connections are wrong, normal operation cannot be achieved and may damage the compressor.

[Correct connections]

[Example of wrong connections]

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



6 MAINTENANCE DATA

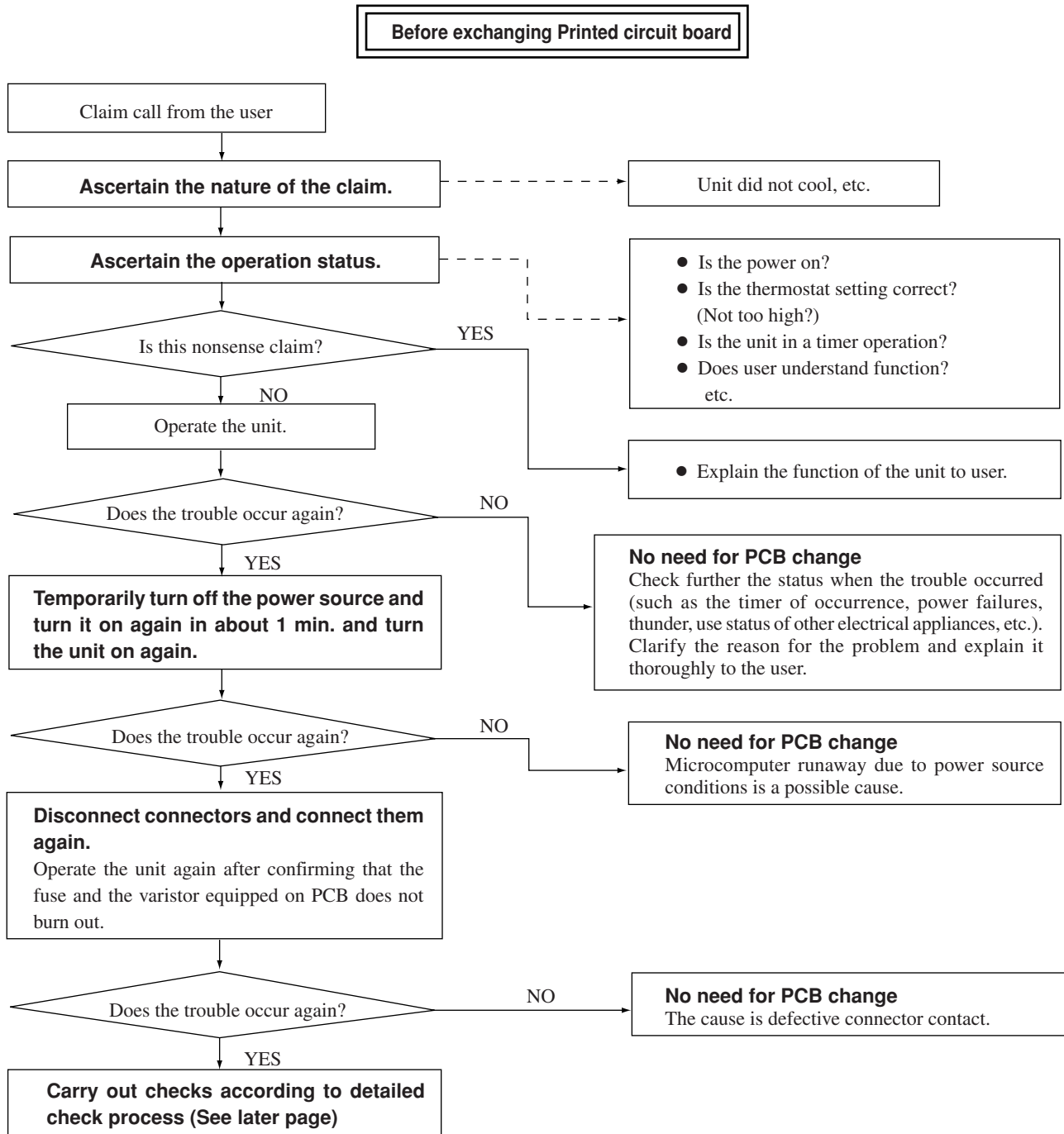
6.1 Troubleshooting procedures for electrical equipment

(1) Troubleshooting to be performed prior to exchanging PCB, (Printed circuit board) [Common to all models]

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

to customers it

is necessary to understand the function controlled by a microcomputer thoroughly, so as not to mistakenly identify correct operations as mis-operations. It is also necessary to perform the following simple checks before conducting detailed checks or exchanging printed circuit board.



(2) Indication of self diagnosis

Indoor unit indicator		Outdoor unit indicator (LED E)	Wired remote control display (optional parts)	Description of trouble	Cause	Conditions of flashing
RUN light	TIMER light					
<p>Все каталоги и инструкции здесь: http://splitoff.ru/tehn-doc.html</p>						
					<ul style="list-style-type: none"> Disconnected sensor 	<p>(1) temperature of more than 15 seconds while operation is stopped. (This is not displayed during operation.)</p>
2 time flash	Comes on	Stays off	E7	Room temperature sensor error	<ul style="list-style-type: none"> Broken room temperature sensor wire Connector poor connection 	<p>When room temperature sensor temperature of -20°C or under continued for more than 15 seconds while operation is stopped. (This is not displayed during operation.)</p>
4 time flash	Comes on	Stays off	E9	Drain abnormality (STM, SRRM only)	<ul style="list-style-type: none"> Drain at reverse gradient Float switch defective 	Float switch motion
5 time flash	Comes on	Stays off	E6	Indoor heat exchange sensor (2) error	<ul style="list-style-type: none"> Broken heat exchanger sensor (2) wire Connector poor connection Disconnected sensor 	<p>When heat exchanger sensor (2) temperature of -20°C or under continued for more than 15 seconds while operation is stopped. (This is not displayed during operation.)</p>
6 time flash	Comes on	Stays off	E16	Indoor fan motor error	<ul style="list-style-type: none"> Defective fan motor Connector poor connection 	<p>When air conditioner is operating and indoor fan motor is turned ON, indoor fan motor speed of 300 rpm or under continued for more than 30 seconds. (Air conditioner stops.)</p>
7 time flash	Comes on	Stays off	E6	Closed service valve Indoor heat exchanger sensor (1) error	<ul style="list-style-type: none"> Closed service valve Heat exchanger sensor (1) is disconnected. 	<p>After cooling starts, when the temperature difference at the indoor heat exchanger sensor (1) after 13 minutes and after 16 minutes is greater than -2°C, operation is stopped.</p>
Keeps flashing	1 time flash	Keeps flashing	E38	Outdoor air temperature sensor error	<ul style="list-style-type: none"> Broken outdoor air temperature sensor wire Poor connector connection 	<p>When outdoor air temperature sensor temperature of -20°C or under continued for more than 10 seconds while operation is stopped. (This is not displayed during operation.)</p>
Keeps flashing	2 time flash	Keeps flashing	E37	Outdoor heat exchanger sensor error	<ul style="list-style-type: none"> Broken heat exchanger sensor wire Poor connector connection 	<p>When heat exchanger sensor temperature of -20°C or under continued for more than 10 seconds while operation is stopped. (This is not displayed during operation.)</p>
Keep flashing	4 time flash	On for 4 seconds and off for 4 seconds	E39	Discharge pipe sensor error	<ul style="list-style-type: none"> Broken discharge pipe sensor wire Connector poor connection 	<p>After the decision speed has been 0 rps or more for 9 continuous minutes and the discharge pipe sensor has sent a 10 second or more broken wire signal. (Compressor is stopped.)</p>
Keep flashing	5 time flash	Keeps flashing	E53	Comp. suction sensor error	<ul style="list-style-type: none"> Broken comp. suction sensor wire Poor connector connection 	<p>When comp. suction sensor temperature of -20°C or under continued for more than 10 seconds while operation is stopped.</p>
Keep flashing	6 time flash	Keeps flashing	E41	Power transistor sensor error	<ul style="list-style-type: none"> Broken power transistor sensor wire Connector poor connection 	<p>After the decision speed has been 0 rps or more for 9 continuous minutes and the power transistor sensor has sent a 10 second or more broken wire signal. (Compressor is stopped.)</p>

Indoor unit indicator		Outdoor unit indicator (LED E)	Wired remote control display (optional parts)	Description of trouble	Cause	Conditions of flashing
RUN light	TIMER light					
					• Compressor locking	When converter output current which exceeds (Compressor stops.)
Comes on	2 time flash	2 time flash	E59	Trouble of outdoor unit	<ul style="list-style-type: none"> Defective power transistor. Broken compressor wire Compressor blockage 	When an error with the outdoor unit causes an error stop, or when the input current is measured at 1 A or less for 3 continuous minutes or more. (Compressor is stopped.)
Comes on	3 time flash	3 time flash	E58	Current safe stop	<ul style="list-style-type: none"> Overload operation Overcharge 	When the decision speed is 30 rps or less and the current save has operated. (Compressor stops)
Comes on	4 time flash	4 time flash	E41	Power transistor error	<ul style="list-style-type: none"> Broken power transistor 	When there is an emergency stop caused by trouble in the outdoor unit, or the input current value is found to be lower than the set value continuously for 3 minutes or longer. (The air conditioner stops.)
Comes on	5 time flash	5 time flash	E36	Over heat of compressor	<ul style="list-style-type: none"> Gas shortage Defective discharge pipe sensor 	When discharge pipe sensor value exceeds setting value. (Compressor Stops.)
Comes on	6 time flash	6 time flash	E5	Error of signal transmission	<ul style="list-style-type: none"> Defective power supply Broken signal wire Defective indoor/outdoor unit circuit boards. 	If serial signal cannot be sent or received for 1 minute and 55 seconds continuously.
Comes on	7 time flash	Comes on	E48	Outdoor fan motor error	<ul style="list-style-type: none"> Defective fan motor, poor connector connection 	When the outdoor unit's fan motor speed continues for 30 seconds or longer at 75 rpm or lower. (3 times) (The air conditioner stops.)
2 time flash	2 time flash	7 time flash	E60	Compressor lock	<ul style="list-style-type: none"> Defective compressor Defective outdoor PCB 	When the motor for the compressor does not turn 1/12 revolution 0.044 second after it has been started.
—	—	—	E1	Error of wired remote control wiring	<ul style="list-style-type: none"> Broken wired remote control wire Defective indoor unit boards 	The wired remote control wire Y is open. The wired remote control wires X and Y are reversely connected. Noise is penetrating the wired remote control lines. The wired remote control or indoor control PCB is faulty. (The communications circuit is faulty.)

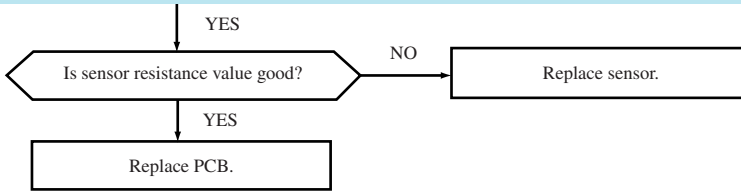
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(3) Inspection procedures corresponding to detail of trouble

Sensor error

[Broken sensor wire, connector poor connection]

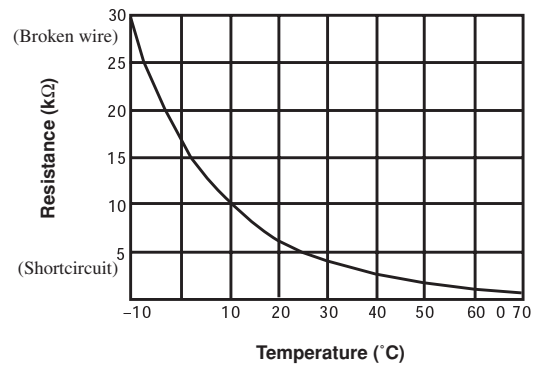
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



◆ Discharge pipe sensor temperature characteristics

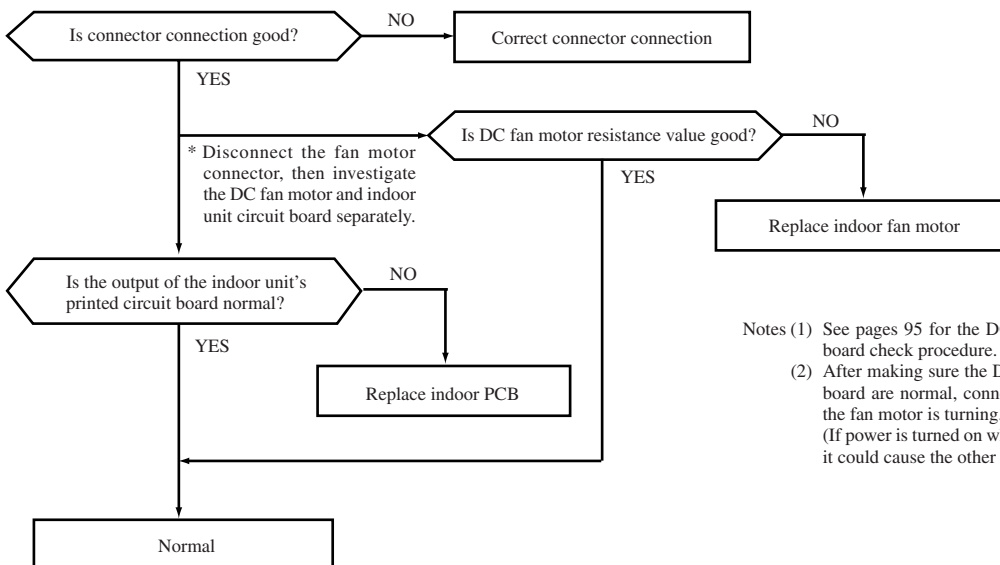
Temperature (°C)	Resistance (kΩ)	Temperature (°C)	Resistance (kΩ)
0	164	70	8.7
5	127	75	7.3
10	99	80	6.2
15	78	85	5.3
20	62	90	4.5
25	50	95	3.9
30	40	100	3.3
35	32	105	2.9
40	26	110	2.5
45	21	115	2.2
50	17	120	1.9
55	14	125	1.6
60	12	130	1.4
65	10	135	1.3

◆ Sensor temperature characteristics (Room temp., indoor unit heat exchanger temp., outdoor unit heat exchanger temp., outdoor air temp.)



Indoor fan motor error

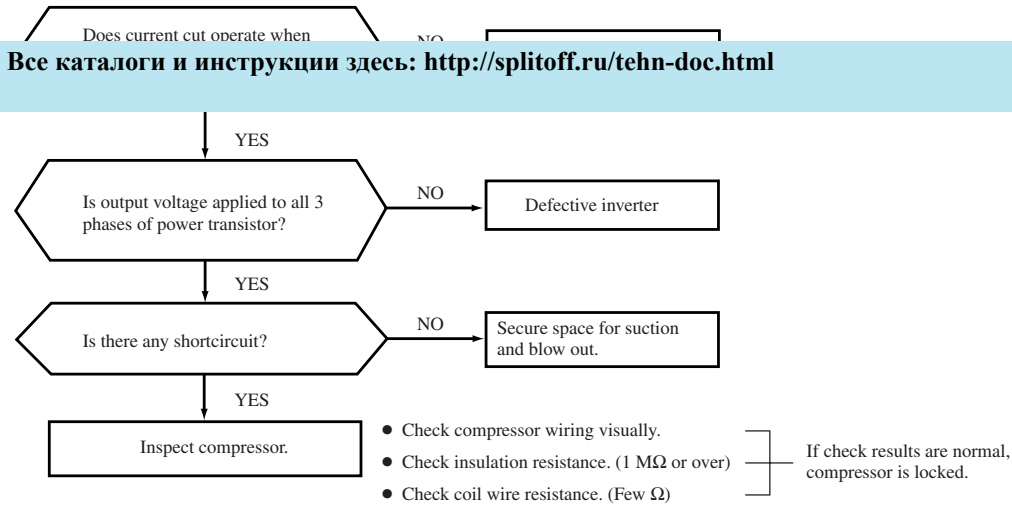
[Defective fan motor, connector poor connection, defective PCB]



Notes (1) See pages 95 for the DC fan motor and indoor unit circuit board check procedure.
 (2) After making sure the DC fan motor and indoor unit circuit board are normal, connect the connectors and confirm that the fan motor is turning.
 (If power is turned on while one or the other is broken down, it could cause the other to break down also.)

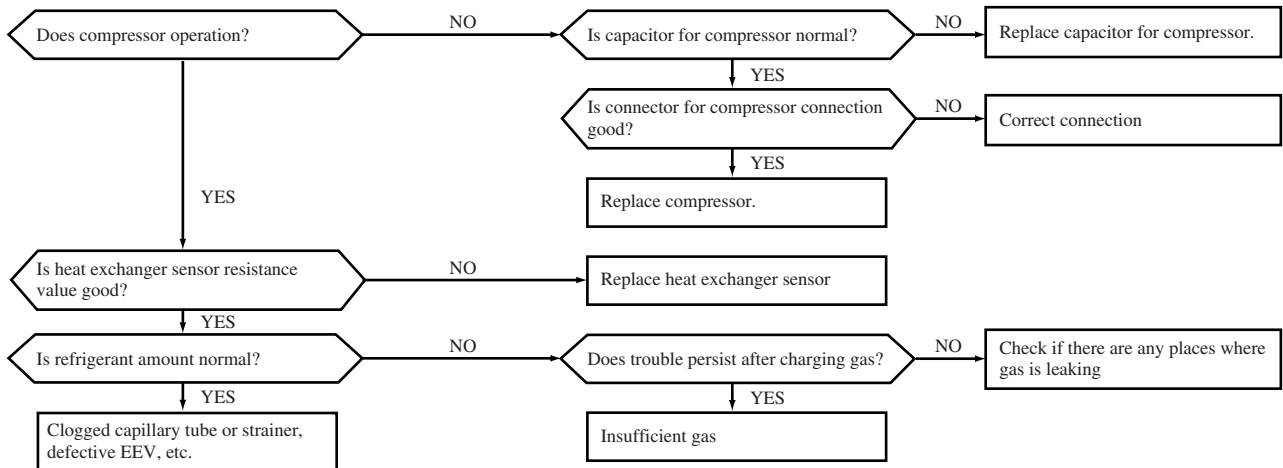
Current cut

[Open phase on compressor output terminal, compressor lock]



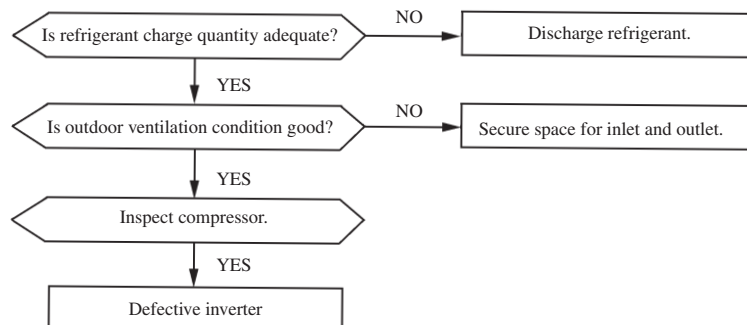
Trouble of outdoor unit

[Compressor malfunction of insufficient gas (refrigerant)]



Current safe stop

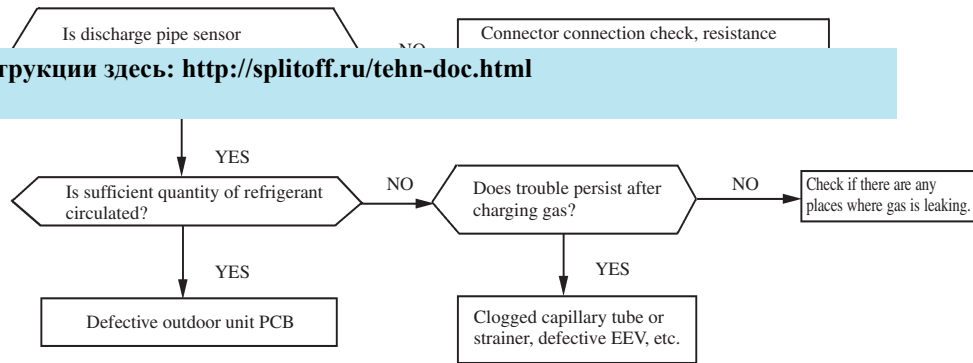
[Overload operation, compressor lock, overcharge]



Over heat of compressor

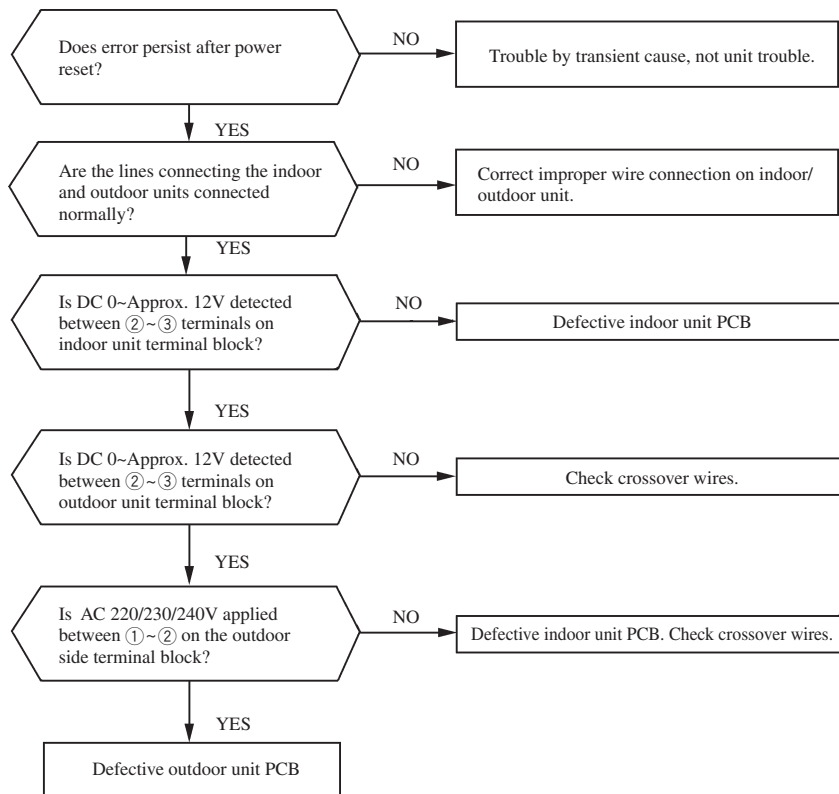
[Gas shortage, defective discharge pipe sensor]

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



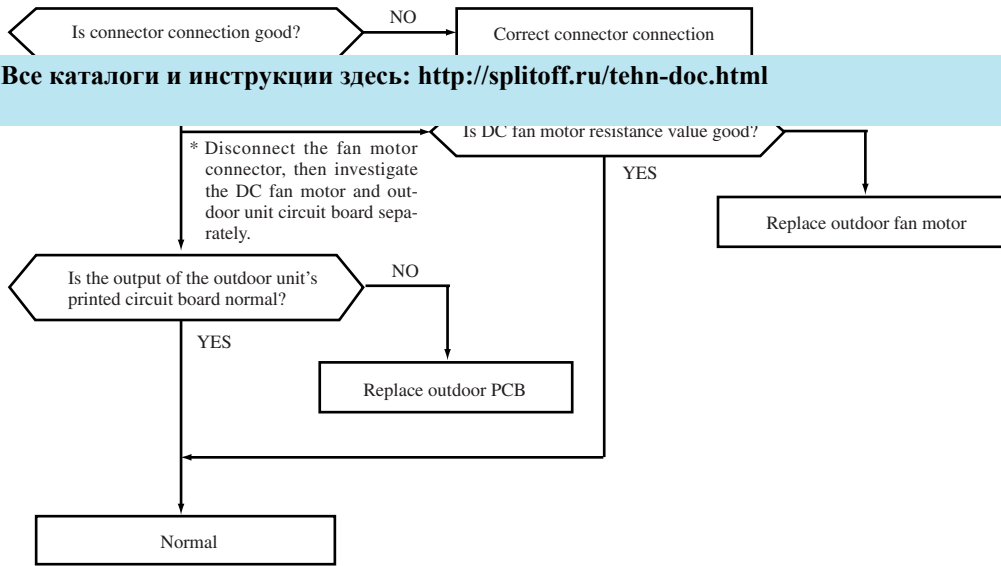
Error of signal transmission

[Wiring error including power cable, defective indoor/outdoor unit PCB]



Outdoor fan motor error

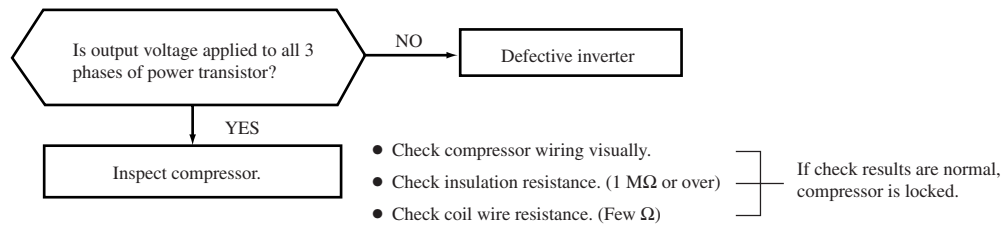
[Defective fan motor, connector poor connection, defective PCB]



Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

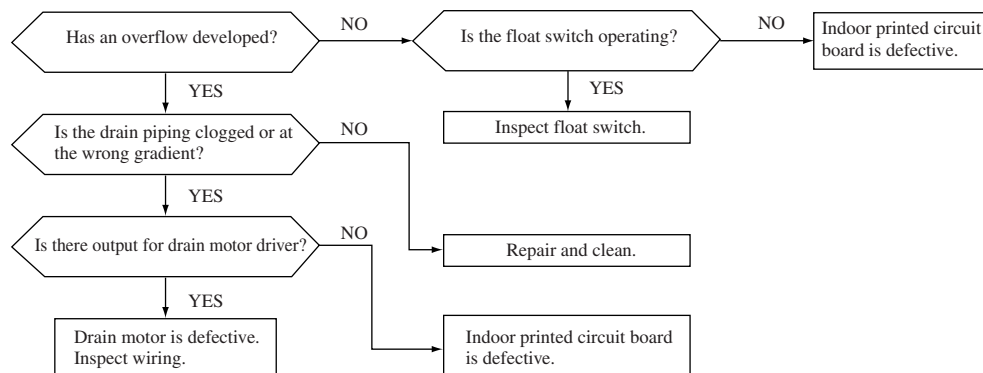
Rotor lock

[Compressor defect, outdoor unit circuit defect]



Drain abnormality (STM, SRRM only)

[Drain piping defective, pump defect]



(4) Phenomenon observed after shortcircuit, wire breakage on sensor

(a) Indoor unit

Sensor	Operation mode	Phenomenon	
		Shortcircuit	Broken wire
Room temperature sensor	Cooling	Release of continuous compressor operation command	Continuous compressor operation command is not released.
	Heating	Continuous compressor operation command is not released.	Release of continuous compressor operation command
Heat exchanger sensor	Cooling	Compressor stop. (Abnormality of outdoor unit)	Continuous compressor operation command is not released. (Anti-frosting)
	Heating	High pressure control mode	Hot keep (Indoor fan stop)

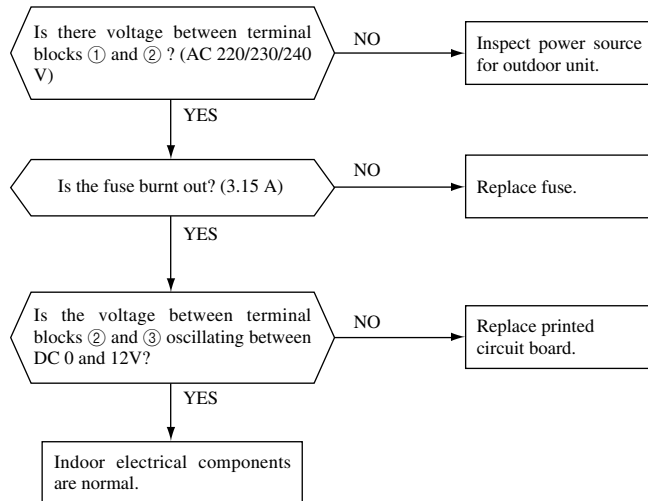
(b) Outdoor unit

Sensor	Operation mode	Phenomenon	
		Shortcircuit	Broken wire
Heat exchanger sensor	Cooling	System can be operated normally.	System can be operated normally.
	Heating	Defrosting is not performed	Defrosting is performed for 10 minutes at approx. 45 minutes.
Discharge pipe sensor	All modes	Compressor overload protection is disabled. (Can be operated.)	Compressor stop

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

(5) Checking the indoor electrical equipment

(a) Indoor unit circuit board check procedure



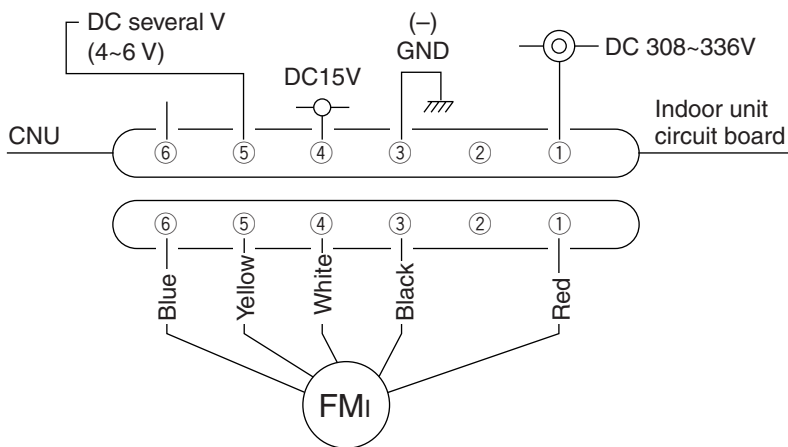
(b) Indoor unit fan motor check procedure

This is a diagnostic procedure for determining if the indoor unit's fan motor or the circuit board is broken down.

1) Indoor unit printed circuit board output check

- Turn off the power.
- Remove the front panel, then disconnect the fan motor lead wire connector.
- Turn on the power. If the unit operates when the ON/OFF button is pressed, if trouble is detected after the voltages in the following figure are output for approximately 30 seconds, it means that the circuit board is normal and the fan motor is broken down.

If the voltages in the following figure are not output at connector pins No. ①, ④ and ⑤, the indoor unit's circuit board has failed and the fan motor is normal.

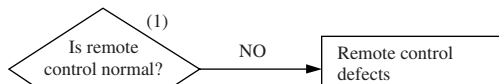


2) DC Fan motor resistance check

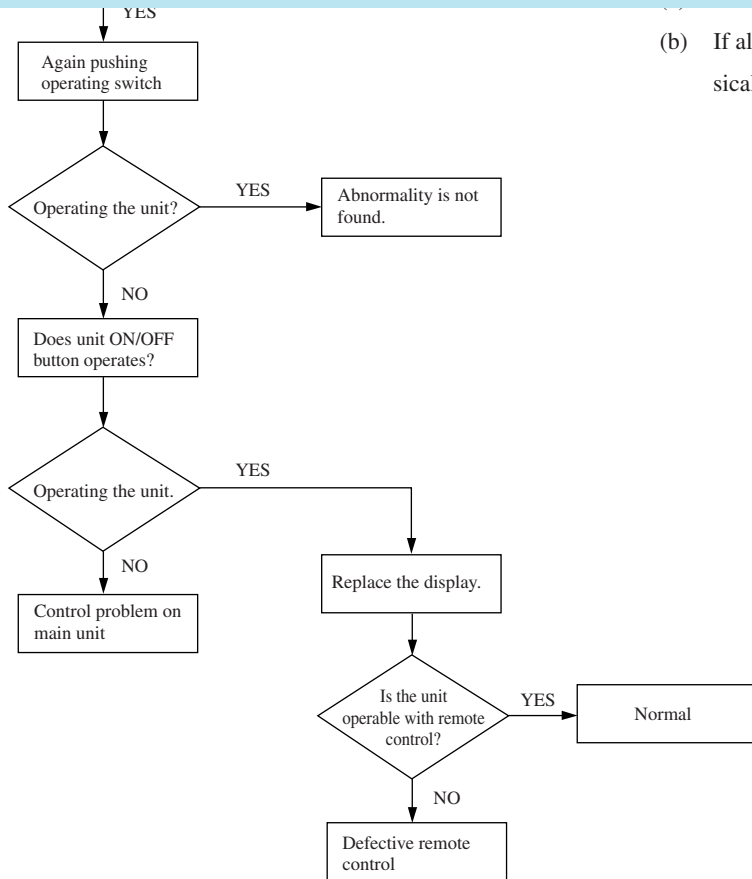
Measuring Point	Resistance when Normal
① - ③ (Red - Black)	25 MΩ or higher
④ - ③ (White - Black)	30 kΩ or higher

- Notes (1) Remove the fan motor and measure it without power connected to it.
 (2) If the measured value is below the value when the motor is normal, it means that the fan motor is faulty.

(6) How to make sure of remote control



Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

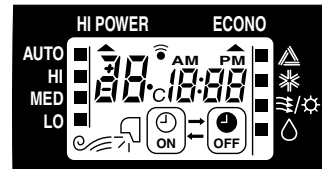


ontrol.
 (b) If all LCD are displayed after zero (1) display, it is basically normal.

◆ **SKM model**



◆ **STM, SRRM model**

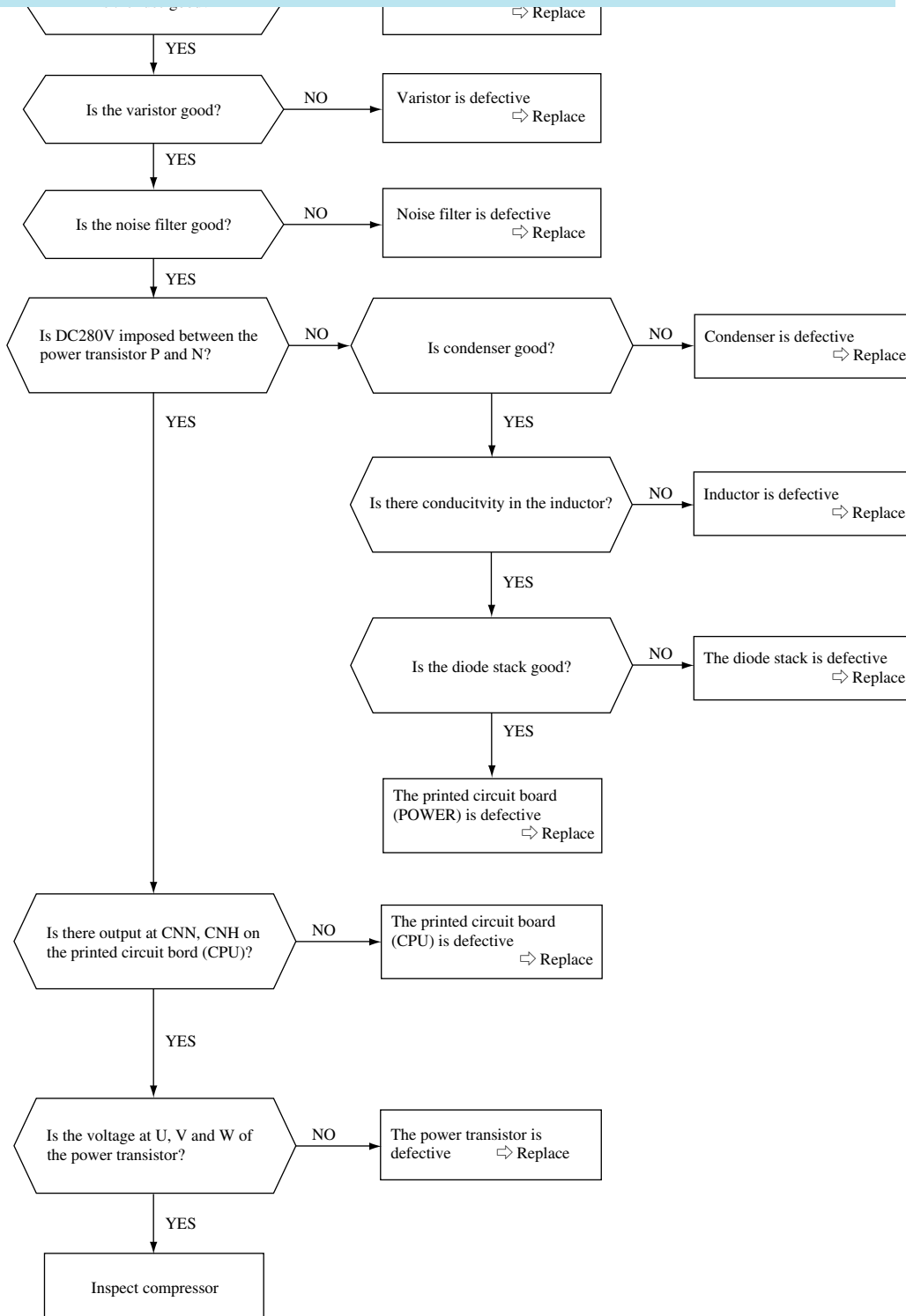


(7) Inverter failure diagnosis

If the results of the diagnosis in Item (3) indicate that the inverter is defective, perform the following inspection on the inverter.

(a) Diagnosis procedure

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>



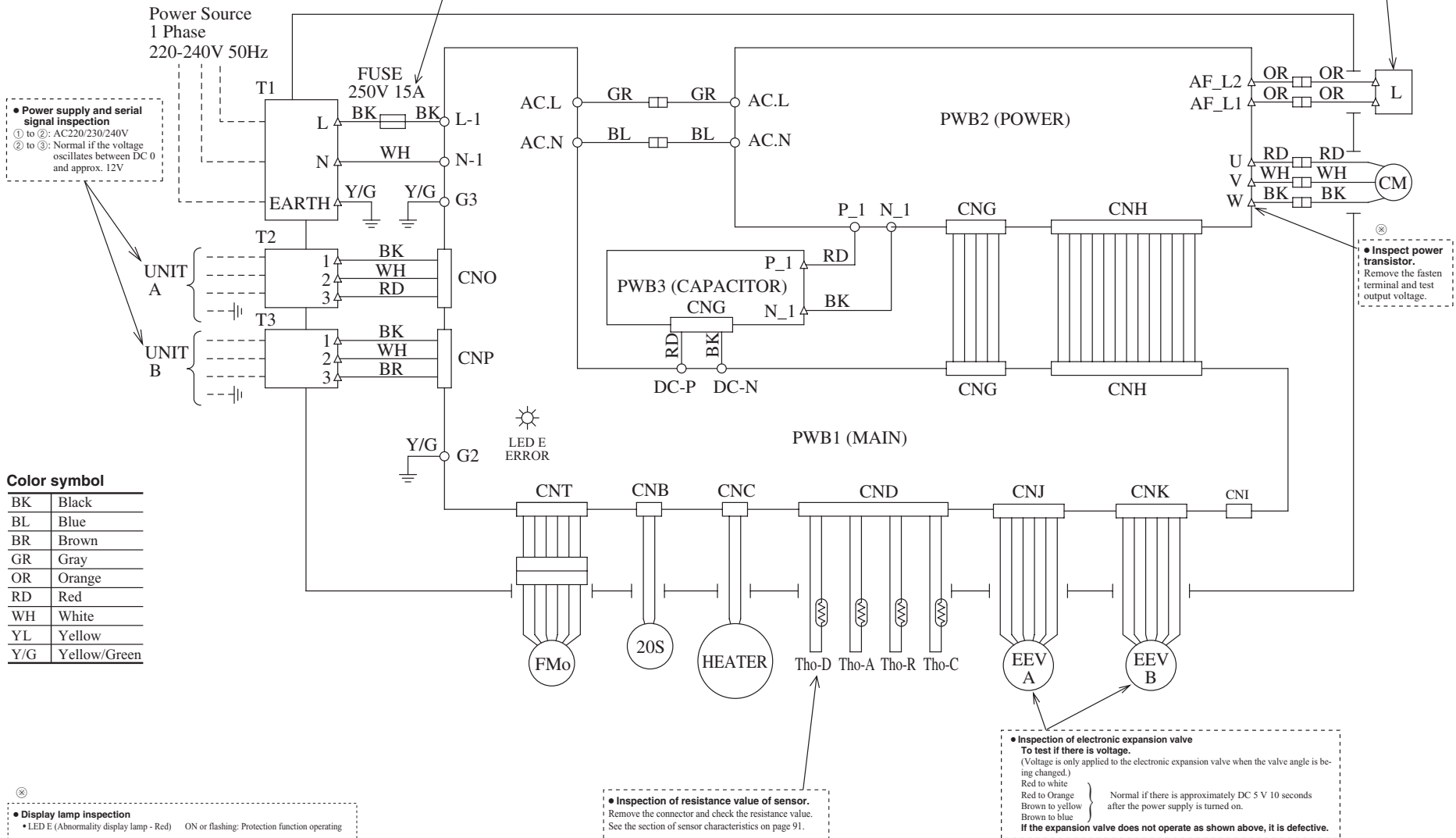
(b) Outdoor unit inspection points

◆SCM40ZG-S, 45ZG-S

CAUTION – HIGH VOLTAGE

High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

▷ ⊗ Check these points with the power supply on.



◆SCM48ZG-S

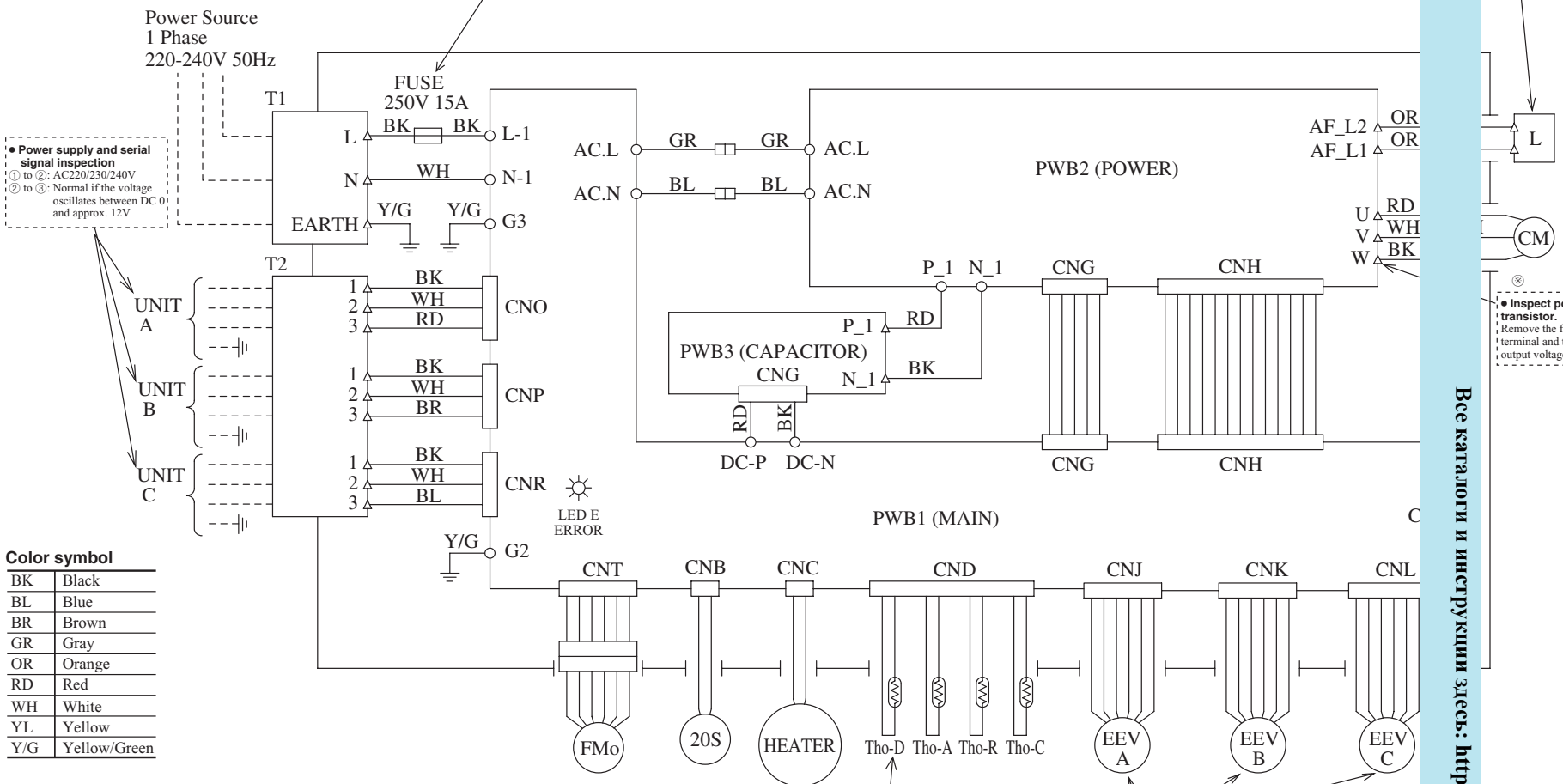
⚠ CAUTION – HIGH VOLTAGE
 High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

▷ ⊗ Check these points with the power supply on.

Check fuse. There should be conductivity.

• Inspection of inductor conductivity
 Remove the connector and check for conductivity. It must be conductive.

• Power supply and serial signal inspection
 ① to ②: AC220/230/240V
 ② to ③: Normal if the voltage oscillates between DC 0 and approx. 12V



Color symbol

BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
YL	Yellow
Y/G	Yellow/Green

⊗ **• Display lamp inspection**
 • LED E (Abnormality display lamp - Red) ON or flashing: Protection function operating

• Inspection of resistance value of sensor.
 Remove the connector and check the resistance value. See the section of sensor characteristics on page 91.

• Inspection of electronic expansion valve
To test if there is voltage.
 (Voltage is only applied to the electronic expansion valve when the valve is being changed.)
 Red to white
 Red to Orange
 Brown to yellow
 Brown to blue
 Normal if there is approximately DC 5 V 10 sec after the power supply is turned on.
If the expansion valve does not operate as shown above, it is d

⊗ **• Inspect power transistor.**
 Remove the fasten terminal and test output voltage.

Все каталоги и инструкции здесь: <http://splitoff.ru/ehd-doc.html>

◆SCM60ZG-S

⚠ CAUTION – HIGH VOLTAGE

High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

▷ ⊗ Check these points with the power supply on.

Check fuse. There should be conductivity.

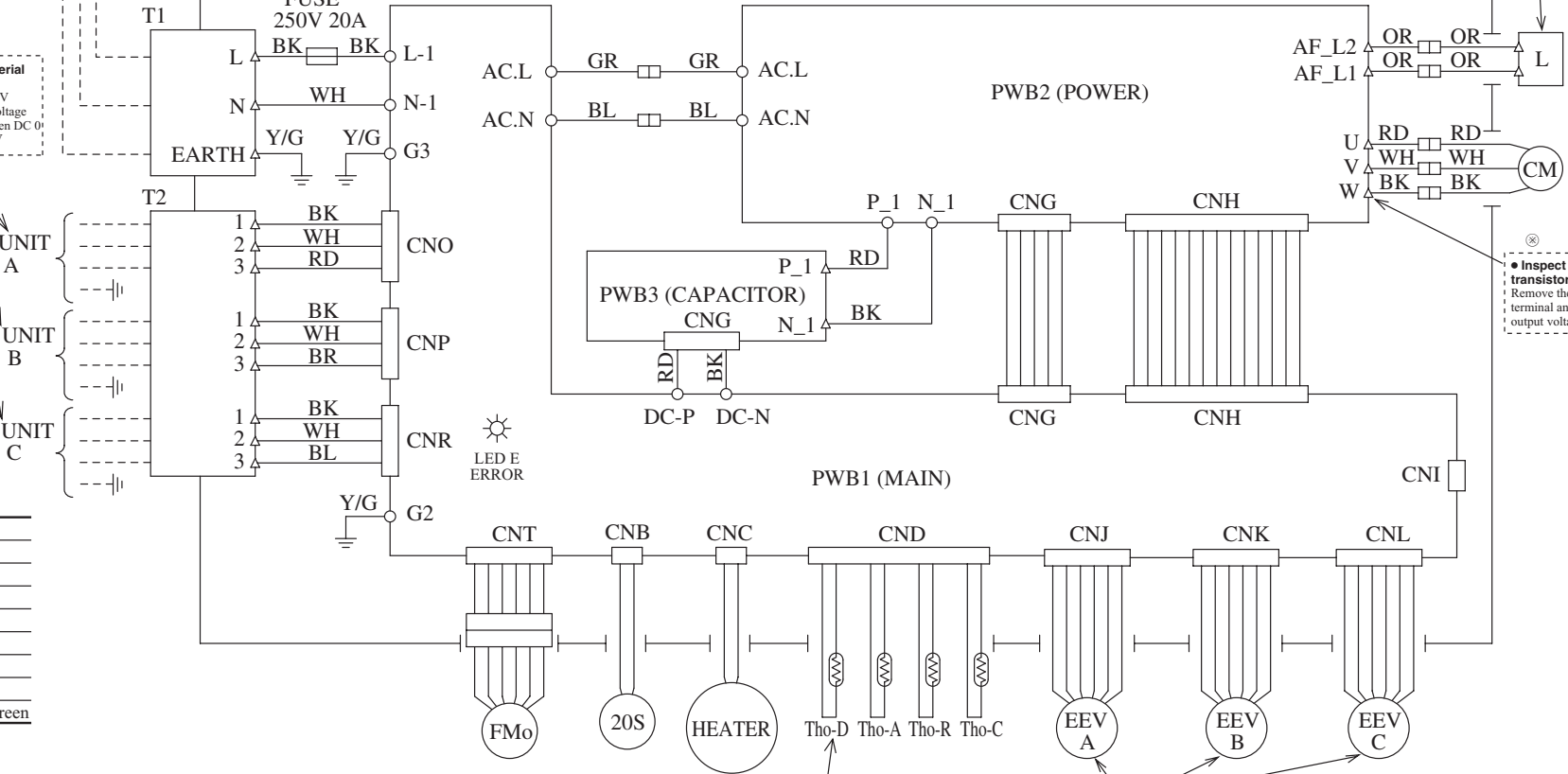
• Inspection of inductor conductivity
Remove the connector and check for conductivity. It must be conductive.

• Power supply and serial signal inspection
① to ②: AC220/230/240V
② to ③: Normal if the voltage oscillates between DC 0 and approx. 12V

Color symbol

BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
YL	Yellow
Y/G	Yellow/Green

Power Source
1 Phase
220-240V 50Hz



⊗ Inspect power transistor.
Remove the fasten terminal and test output voltage.

• Inspection of resistance value of sensor.
Remove the connector and check the resistance value.
See the section of sensor characteristics on page 91.

• Inspection of electronic expansion valve
To test if there is voltage.
(Voltage is only applied to the electronic expansion valve when the valve angle is being changed.)
Red to white
Red to orange
Brown to yellow
Brown to blue
Normal if there is approximately DC 5 V 10 seconds after the power supply is turned on.
If the expansion valve does not operate as shown above, it is defective.

⊗ Display lamp inspection
• LED E (Abnormality display lamp - Red) ON or flashing: Protection function operating

◆SCM80ZG-S

⚠ CAUTION – HIGH VOLTAGE
 High voltage is produced in the control box. Don't touch electrical parts in the control box for 5 minutes after the unit is stopped.

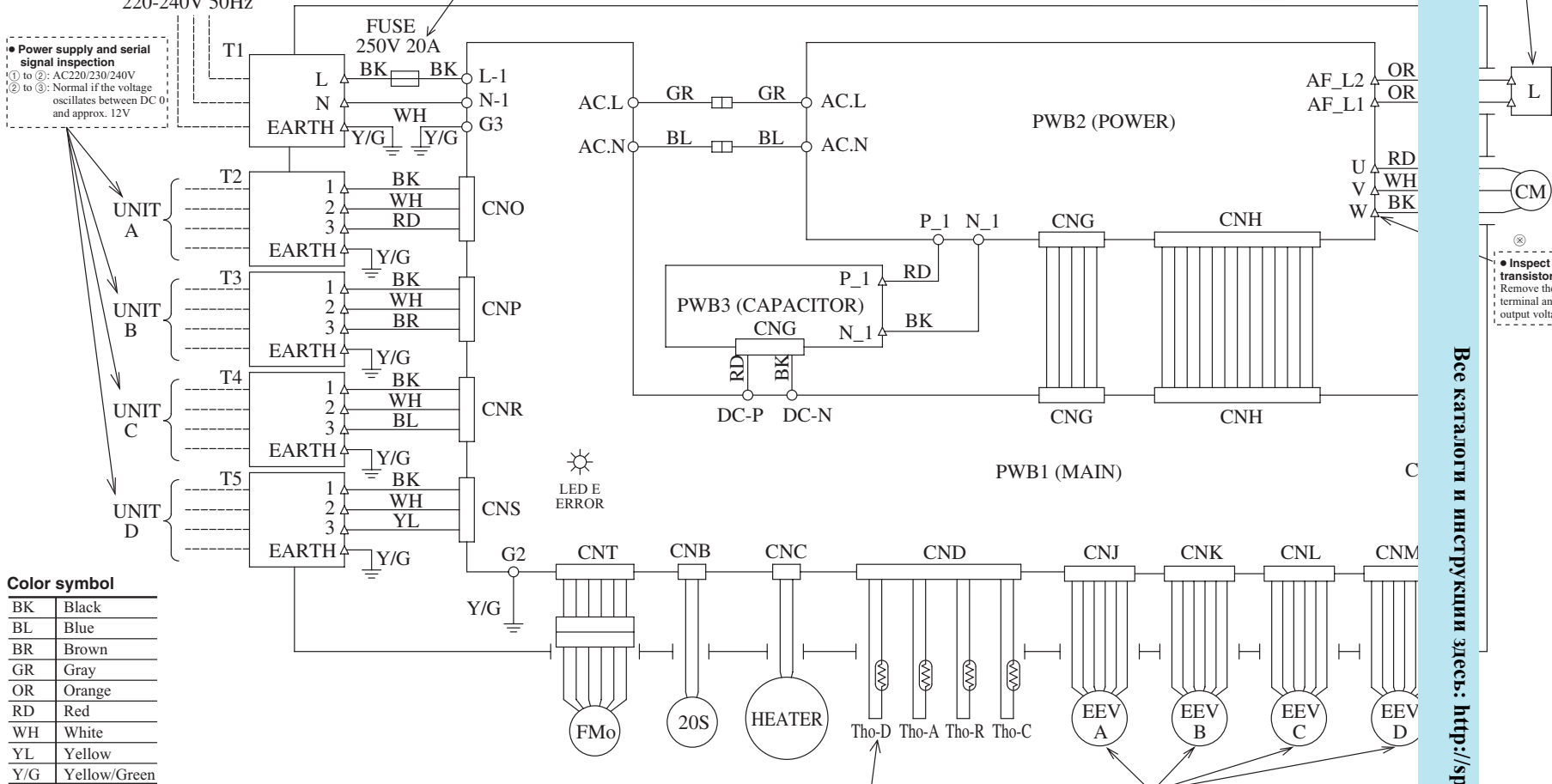
▷ ⊗ Check these points with the power supply on.
 Power Source
 1 Phase
 220-240V 50Hz

• Power supply and serial signal inspection
 ① to ②: AC220/230/240V
 ② to ③: Normal if the voltage oscillates between DC 0V and approx. 12V

Check fuse. There should be conductivity.

• Inspection of inductor conductivity
 Remove the connector and check for conductivity. It must be conductive.

⊗ Inspect power transistor.
 Remove the fasten terminal and test output voltage.



Color symbol

BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
YL	Yellow
Y/G	Yellow/Green

⊗ **Display lamp inspection**
 • LED E (Abnormality display lamp - Red) ON or flashing: Protection function operating

• Inspection of resistance value of sensor.
 Remove the connector and check the resistance value. See the section of sensor characteristics on page 91.

• Inspection of electronic expansion valve
To test if there is voltage.
 (Voltage is only applied to the electronic expansion valve when the valving changed.)
 Red to white } Normal if there is approximately DC 5 V 10 sec after the power supply is turned on.
 Red to Orange }
 Brown to yellow }
 Brown to blue }
If the expansion valve does not operate as shown above, it is

Все каталоги и инструкции здесь: <http://splitoff.ru/ehh-doc.html>

◆ **Power transistor inspection procedure**

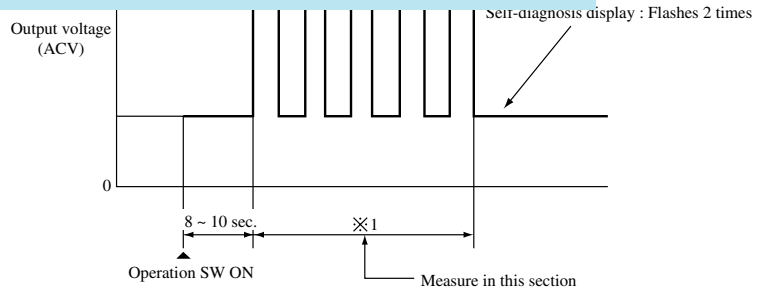
[Use a tester with a needle indicator for the inspection. (Do not use a digital tester. Check in the AC 300 volt range.)]

- 1) If there is a self-diagnosis display, inspect the compressor system (burns, wiring mistakes, etc.). If no problems are found, check the output of the power transistor.

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

sor. If an output such as the one shown in the figure on the right can be measured, the power transistor and the circuit board for the outdoor unit are normal.

* For about 50 seconds. After being switched on, there will be a delay of approximately one minute depending on the conditions.



6.2 Servicing

(1) Evacuation

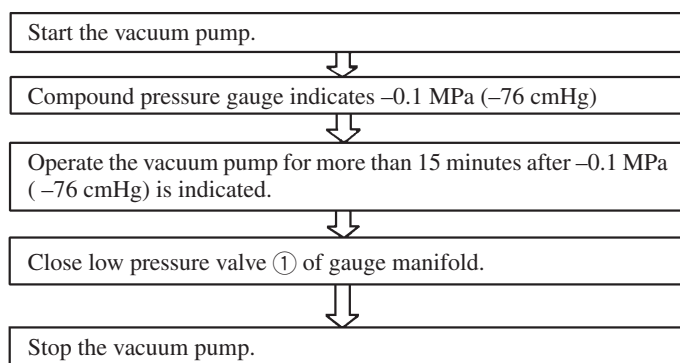
The evacuation is an procedure to purge impurities noncondensable gas, air, moisture from the refrigerant equipment by using

Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

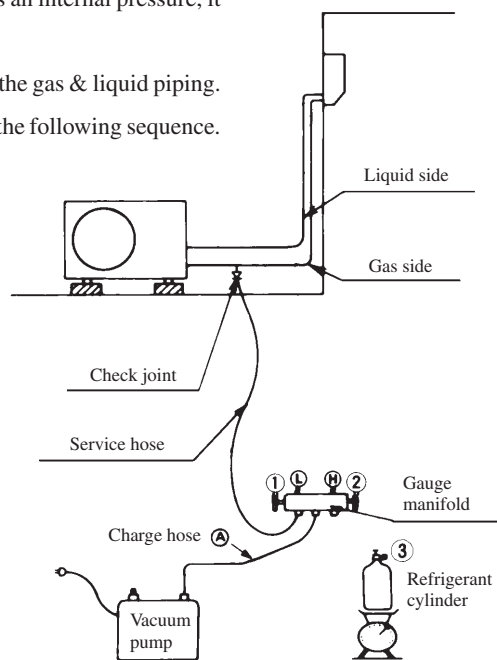
in the refrigerant

- Evacuation procedure

- Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relieved through the check joint.
- Connect the service hoses of the gauge manifold to the check joint of the gas & liquid piping.
- Connect a vacuum pump to the charge hose (A). Repeat evacuation in the following sequence.



- Notes
- (1) Do not use the refrigerant pressure to expel air.
 - (2) Do not use the compressor for evacuation.
 - (3) Do not operate the compressor in the vacuum condition.



(2) Refrigerant charge

- Discharge refrigerant entirely from the unit and evacuate the unit.

Note: Addition of refrigerant without evacuation is unreasonable, because it will result in low charge or overcharge.

- Keep the gauge manifold and connect a refrigerant cylinder to the unit.
- Record the weight of the refrigerant cylinder on the balance. This is necessary for making sure of the charged refrigerant amount.
- Purge air from the charge hose (A)
 - Firstly loose the connecting portion of the charge hose (A) at the gauge manifold side and open the valve (3) for a few seconds, and then immediately retighten it after observing that gas is blow out from the loosened portion.
- Open the valve (1) and (3) after discharging air from the charge hose (A), then the liquid refrigerant begins flowing from the cylinder into the unit. Be sure to erect the refrigerant cylinder upright to let liquid refrigerant flow into the unit.
- When refrigerant has been charged into the system to some extent, refrigerant flow becomes stagnant, when that happens, start the compressor in cooling cycle until the unit is filled with refrigerant to the specified weight.
- Making sure of the refrigerant amount, close the valve (3).
- Disconnect the charge hose from the unit. Cover the valve ports of the refrigerant piping with caps and tighten them securely.
- Check for gas leakage applying a gas leak detector along the piping line.
- Start the air conditioner and make sure of its operating condition high side and low side pressures and temperature difference between return air and supply air.

7 OPTIONAL PARTS

7.1 Interface kit (SKM20~50 type only)

(1) Applicable model

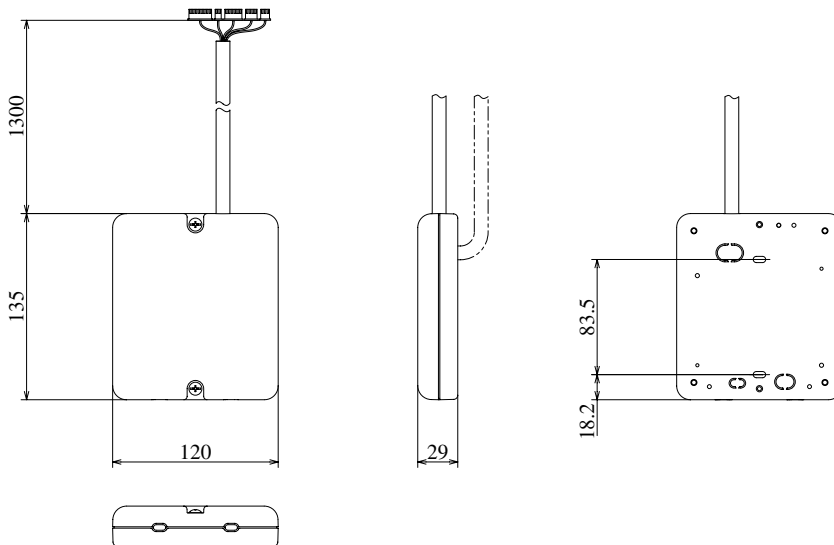
Все каталоги и инструкции здесь: <http://splitoff.ru/tehn-doc.html>

Interface kit	SC-BIK-E	SKM20ZG-S, 22ZG-S, 25ZG-S SKM28ZG-S, 35ZG-S, 50ZG-S
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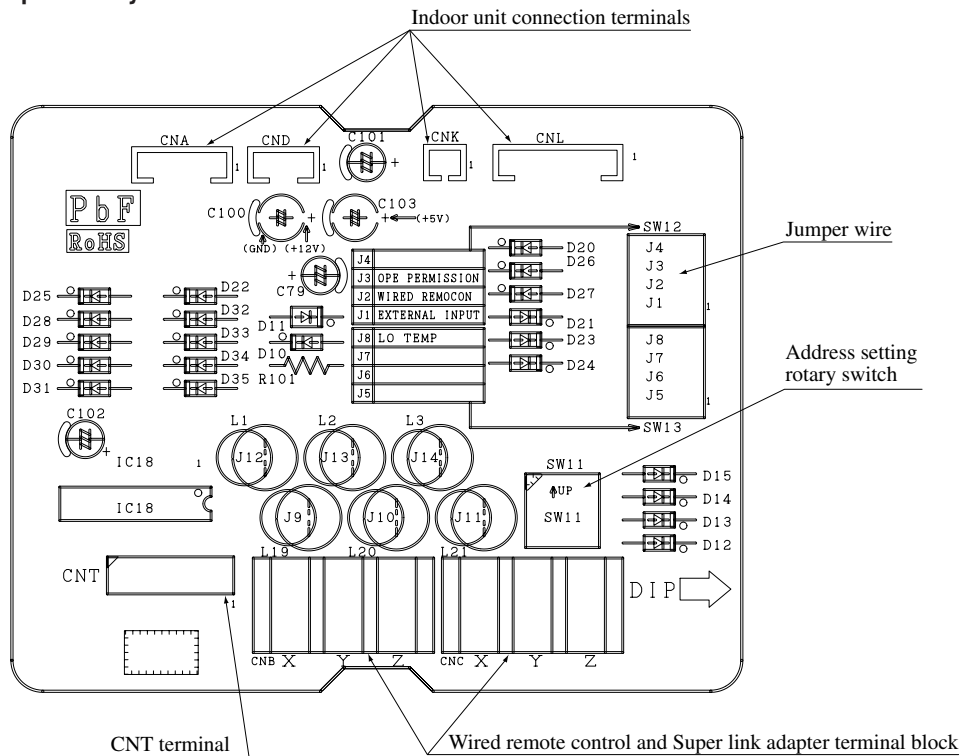
(2) List of connectable devices

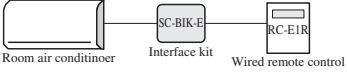
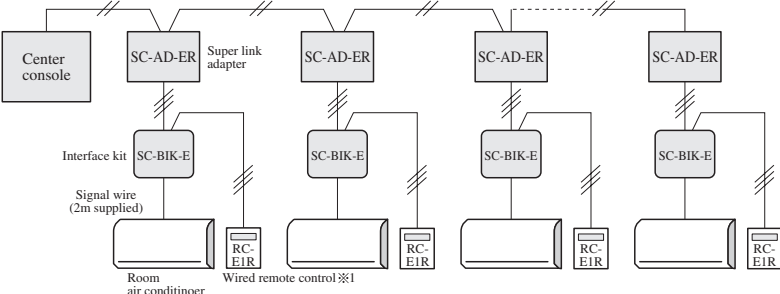
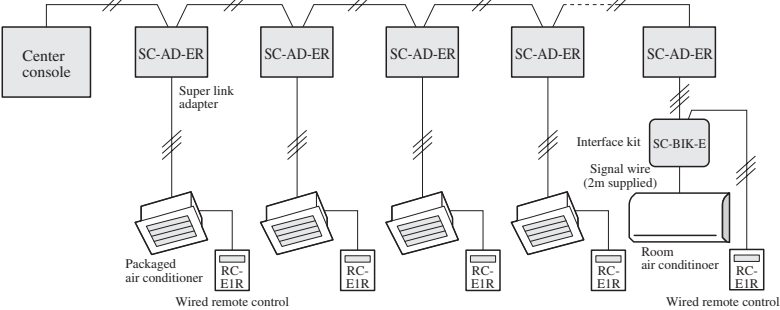
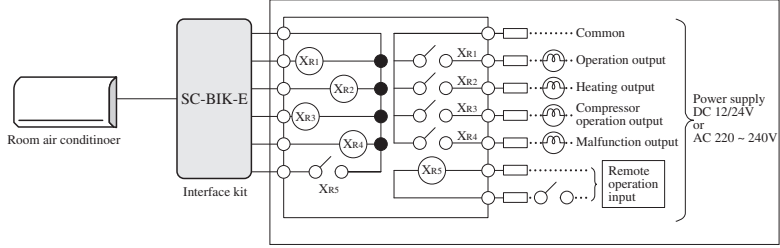
Name	Type
Wired remote control	RC-E1R
Super link adapter	SC-AD-ER
Center console	SC-SLA1-ER, SC-SLA2A-ER, SC-SLA3-ER

(3) Exterior dimensions



(4) Circuit board component layout



System configuration	Control contents	Use	Parts used
<p>① Wired remote control system</p> 	<p>Using the wired remote control system, users can run and stop the unit, switch operations, adjust the temperature, fan speed and air flow direction (up or down), and control timer operation .</p>	<p>Use a wired remote control for retirement homes, school classrooms and similar locations.</p>	<ul style="list-style-type: none"> • Wired remote control (RC-E1R) • Interface kit (SC-BIK-E)
<p>② Control of multiple units with a remote control</p> 	<p>Multiple units (16units~144units) can be controlled with a single remote control.</p>	<p>For hotels and similar facilities with multiple units installed, the remote control is used to turn multiple air conditioning units ON or OFF.</p>	<ul style="list-style-type: none"> • Interface kit (SC-BIK-E) • Super link adapter (SC-AD-ER) • Center console (SC-SLA1-ER, SC-SLA2A-ER, SC-SLA3-ER) • Wired remote control (RC-E1R)
	<p>Multiple units (16units~144units) can be controlled with a single remote control.</p>	<p>For users who want to exercise central control together with a package air conditioning system, such as an office.</p>	<p>※ 1 The wireless remote control supplied with one unit cannot be used. If it is necessary to control each room separately, use the wired remote control.</p>
<p>③ Remote operation</p> 	<ul style="list-style-type: none"> • Using the remote start/stop switch timer, etc., the unit can be started and stopped by inputting level or by inputting pulses. • The run signal, heating signal, compressor ON signal and check signal can be received by non-voltage contacts. 	<p>Remote start and stop and remote monitoring.</p>	<ul style="list-style-type: none"> • Interface kit (SC-BIK-E) • Remote ON/OFF monitor kit (Customer arrangements)

(6) Installation of interface kit

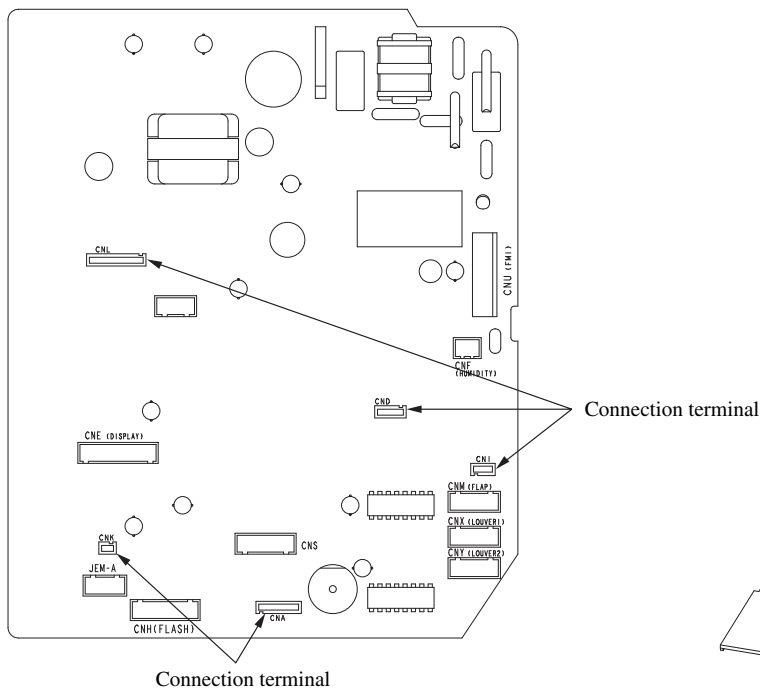
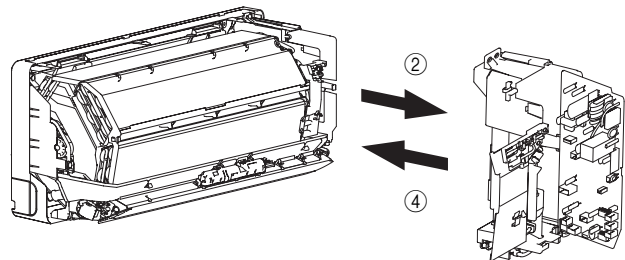
Accessories included in package

Please check to make sure all the accessories have been included.

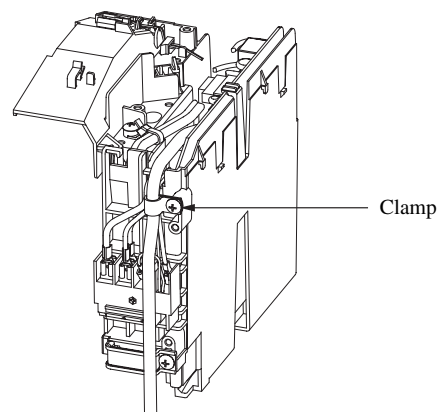
Part name	Quantity
Indoor unit connection cable (total cable length: 2 m)	1
Wood screws (for mounting the interface: $\phi 4 \times 25$)	2
Tapping screws (for mounting the clamp and interface mounting bracket)	3
Interface mounting bracket	1
Clamp (for the indoor unit)	1

Connecting the interface and indoor unit

- Remove the air inlet panel, lid and front panel.
- Take the indoor control board out of the control box.
- There are five terminals (respectively marked with CNA, CND, CNI, CNK, and CNL) for the indoor control board. In connecting an interface, connect to the respective terminals securely with the connection harness supplied with an optional "Interface connection kit SC-BIK-E".

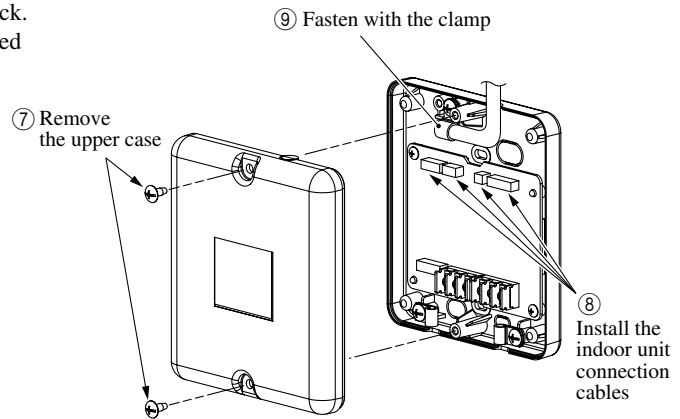


- House the indoor unit control board in the control box.
- Fasten the connection harness onto the indoor control box with clamp supplied with the kit.
- Reinstall the front panel, lid and air inlet panel.

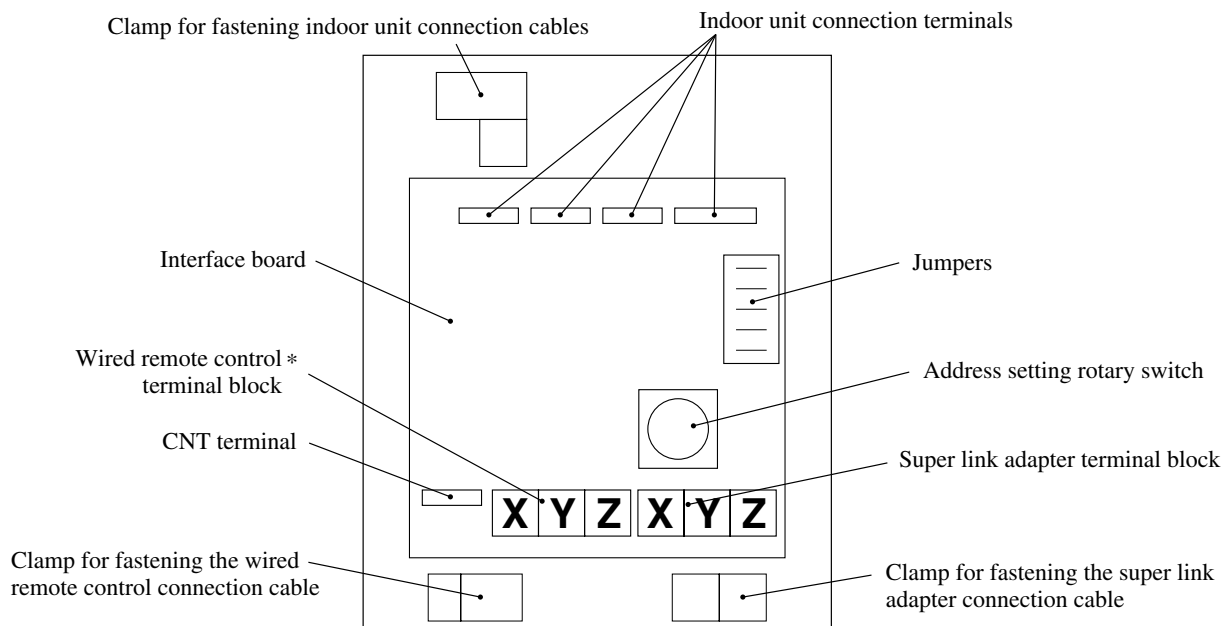


Connecting the interface and the indoor unit

- ⑦ Remove the upper case of the interface.
 - Take out the 2 screws in the interface case.
- ⑧ Install the indoor unit's connection cables in the interface.
 - Connect the connectors of the indoor unit connection cables to the connectors on the interface's circuit board. (4 places)
- ⑨ Fasten the indoor unit connection cables using clamps.
 - Cables can be brought in from the top or from the back.
 - Use side cutters, etc. to cut out the thin knockouts used to run wires into the case.



Names of each part of the interface unit



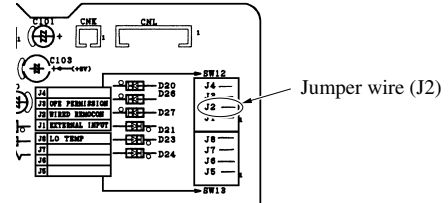
* Either the super link adapter cable or the wired remote control connection cable can be connected.

Wired remote control connection

Please see the instructions in the wired remote control's manual concerning connections to the wired remote control.

① Cut jumper wire "J2" on the circuit board.

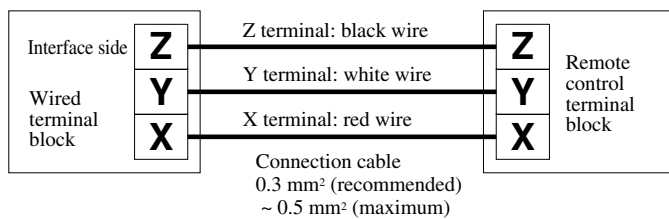
Caution: Both the wired remote control and the wireless remote control supplied with the indoor unit cannot be used together.



② Connect the interface and remote control.

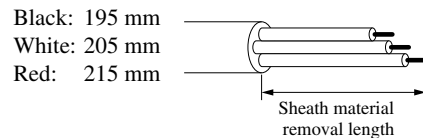
The terminals have polarity, so be sure to connect the wires to the corresponding terminal on each end.

Be sure to strip off the only the proper length of sheath material from each connection cable in the interface unit.



Strip off the sheath material from the connection cable wires inside the wired remote control case.

The length of wire with the sheathing removed should be as shown below for each wire.



Cautions when extending the connection cable length

- The maximum total length should be 600 m.
- Be sure to use shielded cable. (Type: 0.3 mm² × 3 cores)
- If the extended length exceeds 100m, change the wire size to the following sizes. However, inside the remote control case, the maximum wire size should be 0.5 mm² or less. Change the wire size in accordance with the wires connected near the outside.

Within 100 ~ 200 m	0.5 mm ² × 3 cores
Within 300 m	0.75 mm ² × 3 cores
Within 400 m	1.25 mm ² × 3 cores
Within 600 m	2.0 mm ² × 3 cores

③ Fasten the connection cables with clamps.

● Control of multiple units with a remote control

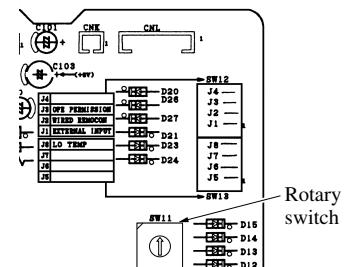
Multiple units (up to 16 units) can be controlled with a single remote control.

① For group control, install connection cables between the unit and package air conditioner indoor units.

- Connect the cables to terminals X, Y and Z in the interface unit. Each terminal has polarity, so be sure to connect wires to the corresponding terminals at each end.
- Use cables with a size of 0.5 mm² or larger. (cables that are large enough to endure the routing required)
- Keep the total length of connection cables and remote control wiring to within 600 m.

② Set the address in each unit.

Set the address of using the rotary switch on the circuit board inside each unit. ("0" ~ "F")
Set the addresses in each group so that there is no overlapping of addresses.
After turning on the power, the indoor unit's address is displayed when the Air Conditioner No. button on the remote control is pressed, so check if the indoor unit addresses is displayed in the remote control's display when the ▲ and ▼ buttons are pressed to select each unit.

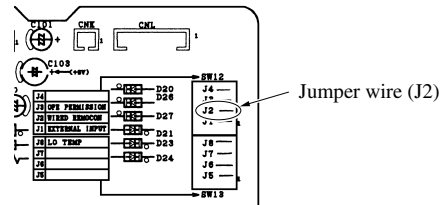


Super link adapter connection

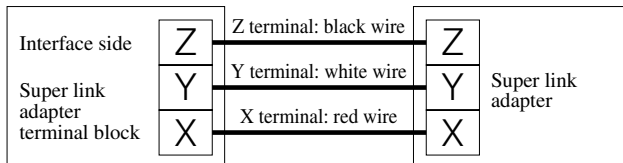
See the super link adapter's manual concerning connections to the super link adapter.

- 1 Cut jumper wire (J2) on the circuit board.

Caution: This device cannot be used together with the wireless remote control which is supplied with the indoor unit.



- 2 Connections between the interface and super link adapter



No.	Names of recommended signal wires
1	Shielded wire
2	Vinyl cabtyre round cord
3	Vinyl cabtyre round cable
4	Vinyl insulated wire/vinyl sheathed cable for control

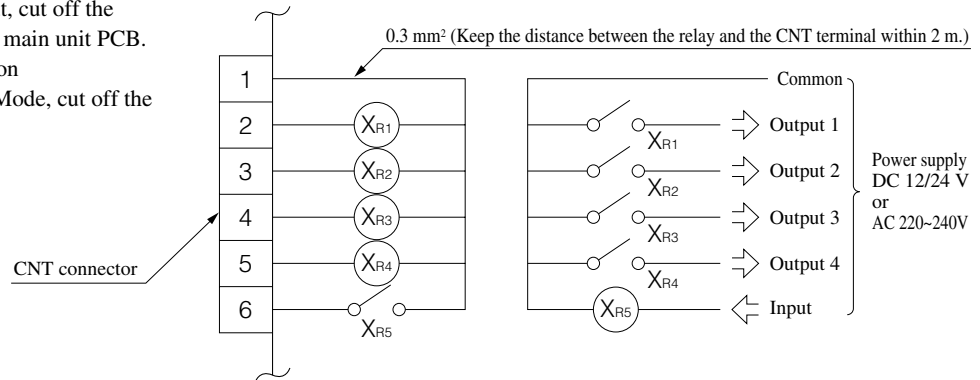
Within 200 m 0.5 mm² × 3 cores
 Within 300 m 0.75 mm² × 3 cores
 Within 400 m 1.25 mm² × 3 cores
 Within 600 m 2.0 mm² × 3 cores

- 3 Fasten the super link adapter cable with clamps.

CNT connector functions

Turning the contacts ON/OFF, the off/running status of the air conditioner can be monitored from the External control unit (remote display).

- 1 Connect a locally procured remote control unit to the CNT terminal.
- 2 In case of the pulse input, cut off the jumper wire "J1" on the main unit PCB.
- 3 When setting at Operation permission/prohibition Mode, cut off the jumper wire "J3".

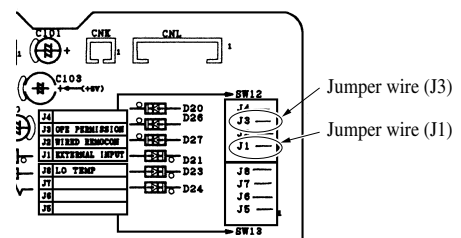


- XR1~4 are for the DC 12V relay
- XR5 is a DC 12/24 or AC 220~240V relay
- CNT connector (local) maker, model

Connector	Molex	5264-06
Terminals	Molex	5263T

Input/Output	Content
Output 1	Operation output ON output (XR1 = ON) during air conditioner operation
Output 2	Heating output ON output (XR2 = ON) during heating operation
Output 3	Compressor operation output ON output (XR3 = ON) during compressor operation
Output 4	Malfunction output ON output (XR4 = ON) during an abnormal stop
Input	Level input (At shipment) External control XR5 OFF ⇒ ON Air conditioner ON XR5 ON ⇒ OFF Air conditioner OFF
	Level input (At shipment) Operation permission/prohibition (J3 cut) XR5 OFF ⇒ ON Air conditioner OFF XR5 ON ⇒ OFF Air conditioner OFF
	Pulse input (J1 cut) External control (At shipment) XR5 Air conditioner ON/OFF is inverted depending on the pulse signal at OFF ⇒ ON.
	Pulse input (J1 cut) Operation permission/prohibition (J3 cut) XR5 Air conditioner ON/OFF is inverted depending on the pulse signal at OFF ⇒ ON.

In the operation permitted/prohibited mode, remote control operations are allowed only when the input is turned ON.



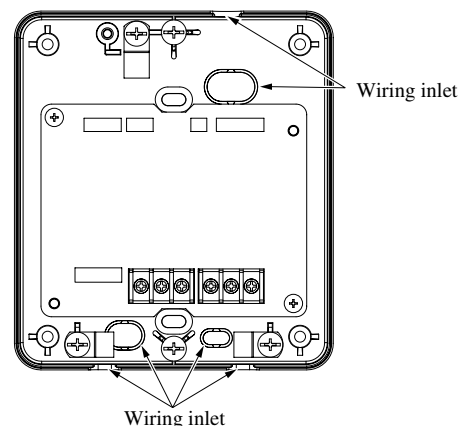
Interface installation

Install the interface so that the connection cable can reach the indoor unit (approximately 1.3 m).

If the connection cable is extended, operation will be faulty, so do not extend the cable.

Fasten the unit to a wall, pillar or similar location.

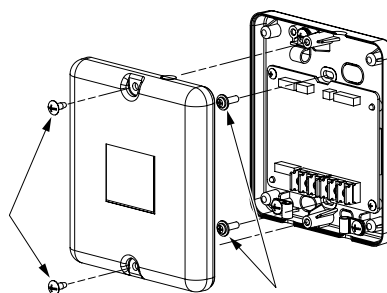
Use a side cutter or similar tool to open the thin knockouts in the case for running wires.



If the unit is mounted directly to a wall

- ① Mount the lower case of the interface unit to a flat surface using the wood screws supplied with the unit.
- ② Mount the upper case.

② Mount the upper case

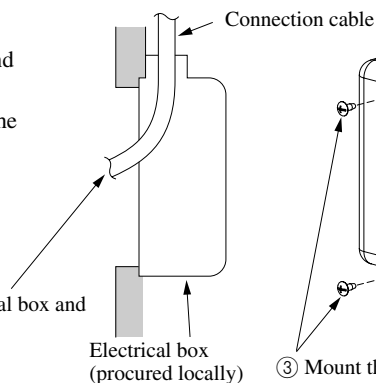


- ① Fasten it to a wall or pillar
- ② wood screws

Recessing the unit in a wall

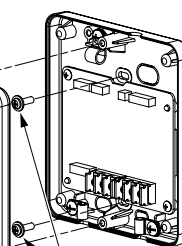
- ① Recess the electrical box (procured locally) and each connection cable inside the wall.
- ② Fasten the lower case of the interface unit to the electrical box using screws (M4 screws, procured locally).
- ③ Mount the upper case to the lower case.

① Recess the electrical box and connection cables



Electrical box (procured locally)

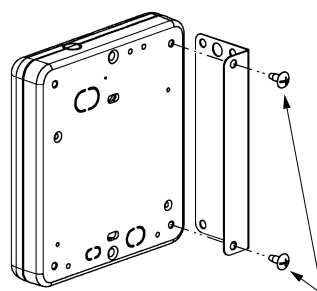
③ Mount the upper case



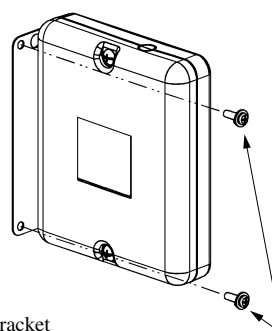
- ② Fasten it to the electrical box. 2 M4 screws (procured locally)

Mounting with the mounting bracket

- ① Mount the interface unit's upper case.
- ② Mount the mounting bracket to the interface unit using the tapping screws supplied with the unit.
- ③ Mount the mounting bracket to a wall surface, etc. using the wood screws provided.



② Mount the mounting bracket on the interface unit. (② tapping screws)



③ Mount the bracket on a wall or pillar (② wood screws)

7.2 Wired remote control

The figure below shows the remote control with the cover opened. Note that all the items that may be displayed in the liquid crystal display area are shown in the figure for the sake of explanation.

Characters displayed with dots in the liquid crystal display area are abbreviated.

Note (1) The SKM, STM, SRRM models don't support the switches and functions displayed in [].

Pull the cover downward to open it.

Central control display

Displayed when the air conditioning system is controlled by the option controller.

Timer operation display

Displays the settings related to timer operation.

Temperature setting switches

These switches are used to set the temperature of the room.

TIMER switch

This switch is used to select a timer mode.
(The comfortable timer or sleep operation cannot be selected.)

Timer setting switches

These switches are used to set the timer mode and time.

[GRILL switch]

Cannot be used.

AIR CON No. (Air conditioning system No.) switch

Displays the number of the connected air conditioning system.

[CHECK switch]

Cannot be used.

TEST switch

This switch is used during drain motor forced operation (STM, SRRM only)

[Vent Indicator]

Cannot be used.

Weekly timer display

Displays the settings of the weekly timer.

Operation setting display area

Displays setting temperature, airflow volume, operation mode and operation message.

Operation/Check indicator light

During operation: Lit in green
In case of error: Flashing in red

Operation/Stop switch

This switch is used to operate and stop the air conditioning system. Press the switch once to operate the system and press it once again to stop the system.

MODE switch

This switch is used to switch between operation modes.
(The clean operation cannot be selected.)

FAN SPEED switch

This switch is used to set the airflow volume.
(AUTO, HI POWER or ECONO cannot be selected.)

[VENT switch]

Cannot be used.

LOUVER switch

This switch is used to operate/stop the swing louver.
(Up/down swing only)
This button is not used for SRRM-ZF series.
(Air flow direction adjustment can not be performed.)

SET switch

This switch is used to apply the timer operation setting.
This switch is also used to make silent mode operation settings.

[RESET switch]

Cannot be used.

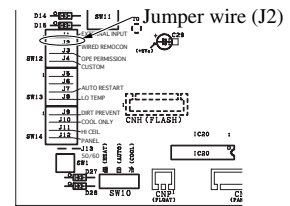
* If you press any of the switches above and "INVALID OPER" is display, the switch has no function.
But it does not mean a failure.

(1) Wired remote control connection

Please see the instructions in the wired remote control's manual concerning connections to the wired remote control.
 Note (1) Refer to "7.1 Interface kit" when connecting the wired remote control to SKM models 20 - 50.

- ① Cut jumper wire "J2 (WIRED REMOCON)" on the indoor unit's printed circuit board.

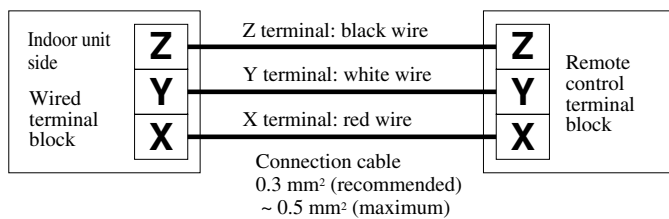
Caution: Both the wired remote control and the wireless remote control supplied with the indoor unit cannot be used together.



- ② Connect the indoor unit's printed circuit board and remote control.

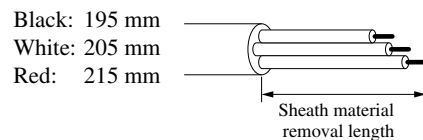
The terminals have polarity, so be sure to connect the wires to the corresponding terminal on each end.

Be sure to strip off the only the proper length of sheath material from each connection cable in the interface unit.



Strip off the sheath material from the connection cable wires inside the wired remote control case.

The length of wire with the sheathing removed should be as shown below for each wire.



Cautions when extending the connection cable length

- The maximum total length should be 600 m.
- Be sure to use shielded cable. (Type: 0.3 mm² × 3 cores)
- If the extended length exceeds 100m, change the wire size to the following sizes. However, inside the remote control case, the maximum wire size should be 0.5 mm² or less. Change the wire size in accordance with the wires connected near the outside.
 - Within 100 ~ 200 m 0.5 mm² × 3 cores
 - Within 300 m 0.75 mm² × 3 cores
 - Within 400 m 1.25 mm² × 3 cores
 - Within 600 m 2.0 mm² × 3 cores

- ③ Fasten the connection cables with clamps.

● Control of multiple units with a remote control

Multiple units (up to 16 units) can be controlled with a single remote control.

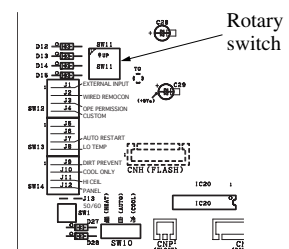
- ① For group control, install connection cables between the unit and package air conditioner indoor units.
 - Connect the cables to terminals X, Y and Z in the indoor unit. Each terminal has polarity, so be sure to connect wires to the corresponding terminals at each end.
 - Use cables with a size of 0.5 mm² or larger. (cables that are large enough to endure the routing required)
 - Keep the total length of connection cables and remote control wiring to within 600 m.

- ② Set the address in each unit.

Set the address of using the rotary switch on the indoor unit's printed circuit board inside each unit. ("0" ~ "F")

Set the addresses in each group so that there is no overlapping of addresses.

After turning on the power, the indoor unit's address is displayed when the Air Conditioner No. button on the remote control is pressed, so check if the indoor unit addresses is displayed in the remote control's display when the ▲ and ▼ buttons are pressed to select each unit.



(2) Installation of wired remote control

(a) Selection of installation location

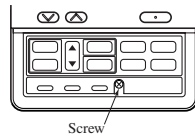
Avoid the following locations

- 1) Direct sunlight.
- 2) Close to heating device.
- 3) Highly humid or water splashing area.
- 4) Uneven surface.

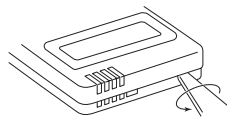
(b) Installation procedure

1) Exposed fitting

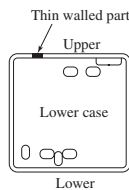
- a) Open the remote control cover and unscrew the screw located beneath the switch.



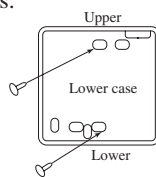
- b) Open the remote control case.



- Put a screw driver (flat-head) into the concavity made on the upper part of a remote control and twist it lightly to open the casing.
- c) The cord of a remote control can only be pulled out in the upward direction.

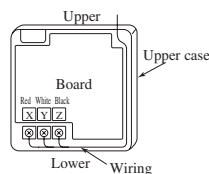


- Cut off with nippers or a knife a thin-walled part made on the upper end of the remote control bottom casing, and then remove burrs with a file or the like.
- d) Fix the remote control bottom casing onto a wall with two wood screws supplied as accessories.



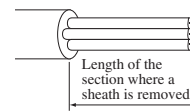
- e) Connect the remote control to the terminal block. Connect the terminals of the remote control to the indoor unit (SKM20~50 : interface kit) with the same numbers. Because the terminal block has polarity, the device becomes inoperative if there are wrong connections.

Terminals: (X) Red wire, (Y) White wire, (Z) Black wire



- Use a cord of 0.3mm² (recommended) - 0.5mm² (maximum) for a remote control cord. Remove a sheath of the remote control cord for the section laid within the remote control casing.

The length of each wire that should be left after a sheath is removed is as follows:



Black: 195mm, White: 205mm, Red: 125mm

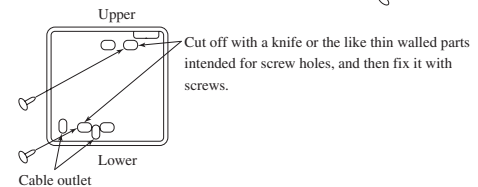
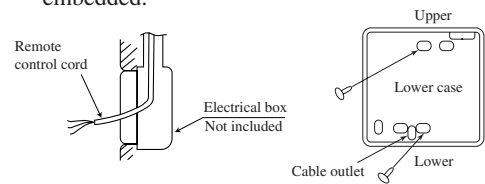
- f) Replace the top casing as before.

- g) Use a cord clamp to attach the remote control cord to the wall.

- h) Set the functions according to the types of indoor unit. (Refer to 112 page).

2) Recessed fitting

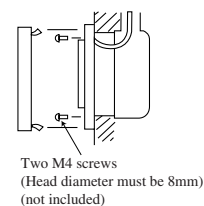
- a) The Electrical box and remote control (shield wire must be used in case of extension) are first embedded.



- b) Remove the upper case to the remote control.
- c) Attach the lower case to the Electrical box with two M4 screws. (Head diameter must be 8 mm). Choose either of the following two positions in fixing it with screws.
- d) Connect the remote control cord to the remote control.

Refer to [Exposed fitting].

- e) Installation work is completed by replacing the top casing onto the bottom casing as before.
- f) Set the function switch according to the type of the indoor unit. (Refer to 112 page)



Precaution in Extending the Remote control cord

- ▶ Maximum total extension 600m.

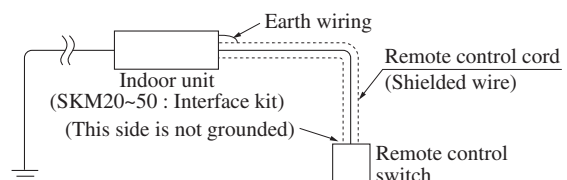
The cord should be a shielded wire.

- For all types : 0.3mm² × 3 cores

Note (1) Use cables up to 0.5mm² (maximum) for those laid inside the remote control unit casing and connect to a different size cable at a vicinity point outside the remote control unit, if necessary.

Within 100-200m.....	0.55 mm ² × 3 cores
Within 300m.....	0.75 mm ² × 3 cores
Within 400m.....	1.25 mm ² × 3 cores
Within 600m.....	2.05 mm ² × 3 cores

- The shielded wire should be grounded at one side only.

























(3) Setting functions using the wired remote control




- (a) The default settings of this unit's functions are as follows: If you want to change a setting, follow the procedure found in the installation manual and set to your desired setting.

For the method of setting, please refer to the installation manual of a remote control unit.

① Remote control unit functions ( FUNCTION ▼)

② Indoor unit functions (I/U FUNCTION ▲)

Function number (A)	Function description (B)	Setting (C)	Default setting
[01]	GRILLE ↑↓ SET (Grille lift panel setting)	↑↓ INVALID 50Hz AREA ONLY 60Hz AREA ONLY	○
02	AUTO RUN SET	AUTO RUN ON AUTO RUN OFF	○
03	 TEMP S/W	 VALID  INVALID	○
04	 MODE S/W	 VALID  INVALID	○
05	 ON/OFF S/W	 VALID  INVALID	○
06	 FANSPEED S/W	 VALID  INVALID	○
07	 LOUVER S/W	 VALID  INVALID	○
08	 TIMER S/W	 VALID  INVALID	○
[09]	 SENSOR S/W (Remote control sensor setting)	 SENSOR OFF (Invalid)  SENSOR ON (Valid)	○
10	POWER FAILURE COMPENSATION SET	INVALID VALID	○ *
[11]	VENTI SET	NO VENTI VENTI LINK SET NO VENTI LINK	○ ○ ○
12	TEMP RANGE SET	DISP CHANGE NO DISP CHANGE	○ ○
13	I/U FAN SPEED (Indoor unit fan speed setting)	3 FAN SPEED 2 FAN SPEED 1 FAN SPEED	○ ○ ○
14	MODEL TYPE	HEAT PUMP COOLING ONLY	○ ○
15	EXTERNAL CONTROL SET	INDIVIDUAL OPERATION SAME OPERATION FOR ALL UNITS	○ ○
16	ERROR DISP SET	ERROR DISP NO ERROR DISP	○ ○
17	 POSITION (Louver control setting)	FIX (1 OF 4) (4 position stop) IN MOTION (Free stop)	○ ○
[18]	°C/°F SET	°C °F	○ ○

Function number (A)	Function description (B)	Setting (C)	Default setting
[01]	Hi CEILING SET	STANDARD (Mild mode) Hi CEILING 1 (Powerful mode)	*
[03]	FILTER SIGN SET	NO DISPLAY AFTER 180H AFTER 600H AFTER 1000H 1000H→STOP	*
04	 POSITION (Louver control setting)	FIX (1 OF 4) (4 position stop) IN MOTION (Free stop)	○
05	EXTERNAL INPUT SET	LEVEL INPUT PULSE INPUT	○
06	OPERATION PERMISSION PROHIBITED	NORMAL OPERATION VALID	○
[07]	 ROOM TEMP OFFSET (Heating room temperature offset)	NORMAL OPERATION TEMP SHIFT +3°C	○
[08]	 FAN CONTROL (Heating fan control)	LOW FAN STOP→LOW FAN (Intermittent operation)	*
[09]	FREEZE PREVENT TEMP	TEMP Hi TEMP Lo	○
[10]	FREEZE PREVENT CONTROL	FAN CONTROL ON FAN CONTROL OFF	○



Notes(1) Setting marked with [○] are the default setting.

(2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.

(3) The SKM, STM, SRRM model cannot set the items described in [] in the function number (A).

Notes(1) Setting marked with [○] are the default setting.

(2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.

(3) When Item 17 : “  POSITION ” is changed, please also change Item 04 “  POSITION ” setting found in “Indoor unit functions”.

(4) The SKM, STM, SRRM model cannot set the items described in [] in the function number (A).

(b) Function setting method

- 1) Stop the air conditioner
- 2) Press the SET and MODE buttons simultaneously for 3 seconds or longer.

The screen display will be switched as follows:

“SELECT ITEM” →

“SET” →

“FUNCTION SET ▼”



- 3) Press the SET button.

The unit will enter the function setting mode. The screen display will change to “FUNCTION ▼”.

- 4) Check which category your desired setting belongs to, “FUNCTION ▼ (Remote control unit function)” or “I/U FUNCTION ▲” (Indoor unit function).

- 5) Press either ▲ or ▼ button.

Select either “FUNCTION ▼” or “I/U FUNCTION ▲”.



- 6) Press the SET button.

When “FUNCTION ▼” is selected.

- ① “DATA LOADING” (blinking) → “FUNCTION” →

“01 GRILLE ↑↓ SET” (Function number: A, Function description: B)

The screen display will be switched like this.

- ② Press either ▲ or ▼ button.

“Function number: A, Function description: B” from the list of remote control unit functions will be displayed one by one. Select a desired function.

- ③ Press the SET button.

The screen display will be switched as follows:

“SETTING” → “Setting: C” (ex. “AUTO RUN ON”)

- ④ Press either ▲ or ▼ button.

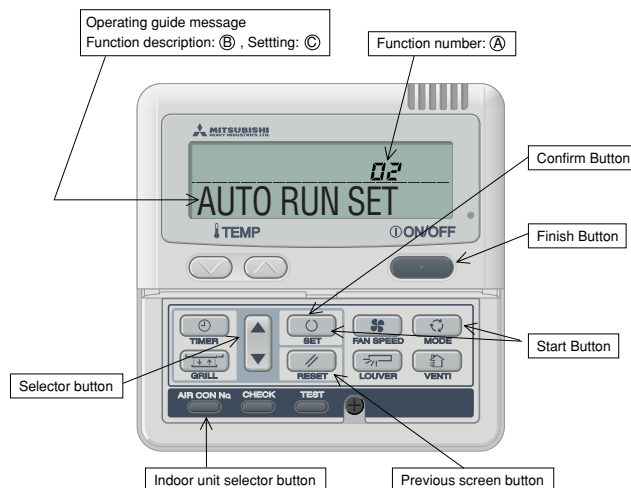
A list of “Settings: C” will be displayed one by one. Select your desired setting.

- ⑤ Press the SET button.

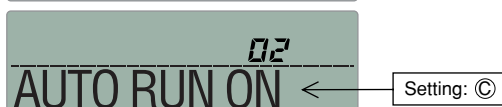
The selected setting is displayed for 2 seconds, then followed by “SET COMPLETE” and the function setting process is completed.

Then the screen display will be switched to “Function number: A, Function description: B,” so if you want to continue to set another function, repeat the steps as explained above.

To finish the function setting process, please proceed to Step 7).



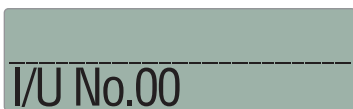
* When “02 AUTO RUN SET” is selected.



When "I/U FUNCTION ▲" is selected.

- ① The screen display will be switched as follows:

"◀ I/U SELECT" → "○ SET" → "I/U No.00" (blinking)



- ② Press either ▲ or ▼ button.

Select the indoor unit number that you want to change settings. If only one indoor unit is connected, the indoor unit number will not change, so please proceed to Step ③.

If "ALL I/U ▼" is selected while indoor group control is in effect, you can set all units to the same settings.

- ③ Press the SET button.

Indoor unit number indication will change from blinking to lit continuously, The screen display will be switched as follows:

"DATA LOADING" (blinking for about 2 to 23 seconds) → "◀ FUNCTION" → "05 EXTERNAL INPUT SET"
(Function number: Ⓐ, Function description: Ⓑ)

* When "05 EXTERNAL INPUT SET" is selected.

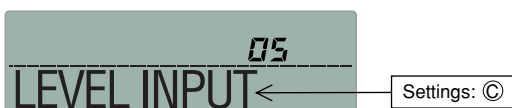


- ④ Press either ▲ or ▼ button.

"Function number: Ⓐ, Function description: Ⓑ" from the list of indoor unit functions will be displayed one by one. Select a desired function.

- ⑤ Press the SET button.

The screen display will be switched as follows: "◀ SETTING" → "Setting: Ⓒ" (ex. "LEVEL INPUT")



- ⑥ Press either ▲ or ▼ button.

A list "Setting: Ⓒ" will be displayed one by one. Select your desired setting.

- ⑦ Press the SET button.

The selected setting is displayed for 2 seconds, then followed by "SET COMPLETE" and the function setting process is completed.

Then the screen display will be switched to "Function number: Ⓐ, Function description: Ⓑ" so if you want to continue to set another function, repeat the steps as explained above. To finish the function setting process, please proceed to Step 8.

- ⑧ Press AIR CON No. button.

The screen display will go back to the indoor unit selection screen (ex. "I/U No.00").

- 7) Press the ON/OFF button.

This ends a function setting process. Even if a function setting process is not completed, this ends the process.

Please note that any setting that is not completed will become void.

- **Pressing the RESET button during a function setting process will allow you to go back the previous step. Please note that any setting that is not completed will become void.**

- **Method of checking the current setting**

While following the above mentioned step, the setting that appears when the SET button is pressed for each "Function number: Ⓐ, Function description: Ⓑ" is the current setting "Sting: Ⓒ". (When "ALL I/U ▼" is selected, the setting of the indoor unit with the lowest number is displayed)

- **Settings are stored in the controller and not lost even a power outage occurs.**

(c) Changing the remote control set temperature range

- 1) It is possible to change the set temperature range using the remote control.
 - a) The upper and lower set temperature limits can be set from the remote control.

Upper limit value setting: Effective during heating. The temperature can be set within a range of 20~30°C.

Lower limit value setting: Effective when running in modes other than the heating mode (AUTO, COOL, FAN, DRY): The temperature can be set within a range of 18~26°C.
 - b) If the upper and lower limits are set using this function, the following controls are active.
- 2) When and ②TEMP RANGE SET under “FUNCTION” the function setting mode is DISP CHANGE
 - a) If you are setting the upper limit,
 - ① If a temperature that is greater than the upper limit during heating is set from the remote control.

The unit runs for 30 minutes at the set temperature, then it automatically transmits the upper limit temperature. The display on the remote control also approaches that temperature.
 - ② During heating, if the upper limit value is set at a temperature below the upper limit value:

The set temperature is transmitted.
 - b) If the lower limit is set
 - ① If a temperature that is lower than the lower limit value is set from the remote control. When running in an operation mode other than the heating mode: the unit runs at the set temperature for 30 minutes, then it automatically transmits the lower limit temperature.
 - ② If a temperature that is higher than the lower limit value is set when running in a mode other than the heating mode:

It transmits the set temperature.
- 3) When and ②TEMP RANGE SET under the “FUNCTION” the function setting mode is NO DISP CHANGE.
 - a) If the upper limit is set
 - ① During heating, if a temperature that is higher than the upper limit is set from the remote control:

The upper limit value is transmitted. However, the remote control display does not approach the upper limit value, but remains on the set temperature.
 - ② During heating, if the temperature is set at a value lower than the upper limit value:

The set temperature is transmitted.
 - b) If the lower limit is set
 - ① When in an operating mode other than the heating mode, if a temperature that is lower than the lower limit value is set from the remote control:

The lower limit value is transmitted. However, the remote control display does not approach the lower limit value, but remains on the set temperature.
 - ② When in an operating mode other than the heating mode, if a temperature that is higher than the lower limit value is set:

The set temperature is transmitted.
- 4) Setting the upper and lower limit values
 - a) Stop the air conditioner, then press the SET and MODE buttons simultaneously for 3 seconds or longer. If you press “SELECT ITEM” → “○ SET” → “FUNCTION SET ▼” the display changes.
 - b) Press the ▼ button, then change the “TEMP RANGE ▲” display.
 - c) Press the SET button and enter the temperature range setting mode.
 - d) Using the ▲ ▼ buttons, select the “Hi LIMIT SET ▼” or “Lo LIMIT SET ▲,” then fix it by pressing SET.
 - e) If you selected “Hi LIMIT SET,” (enabled during heating)
 - ① “(✓) (△) SET UP” → “Hi LIMIT 28°C (△)” (blinking) is displayed.
 - ② Using the “(✓) (△)” temperature setting buttons, select the upper limit value. Display Example: “Hi LIMIT 26°C (△)” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Hi LIMIT 26°C” (lights up for 2 seconds)

After the fixed upper limit value lights up for 2 seconds, the display returns to the “Hi LIMIT SET ▼” display in item d).
 - f) If “Lo LIMIT SET ▲” was selected (enabled during COOL, DRY and FAN)
 - ① “(✓) (△) SET UP” → “Lo LIMIT 20°C (✓)” (blinking) is displayed.
 - ② Using the “(✓) (△)” temperature setting buttons, select the lower limit. Display example: “Lo LIMIT 24°C (✓) (△)” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Lo LIMIT 24°C” (lights up for 2 seconds)

After the fixed lower limit value lights up for 2 seconds, the display returns to the “Lo LIMIT SET ▲” display in item d).
 - g) Pressing the ON/OFF button stops the operation.

(Operation stops even if the ON/OFF button is pressed during setting, and the stopped state returns. However, if setting is not completed, it is not valid, so use caution.)
- ◆ If the RESET button is pressed during setting, the previous setting screen is displayed.

- If the RESET button is pressed during a setting operation, the display returns to the previously displayed setting screen. However, settings which have not been fixed become invalid, so exercise caution.
- * If “NO DISP CHANGE” is selected in No. 12, “TEMP RANGE SET” of the remote control’s functions, of the function setting modes, the remote control’s display does not change even if the temperature range has been changed.

(Example) If the upper limit is set at 28°C

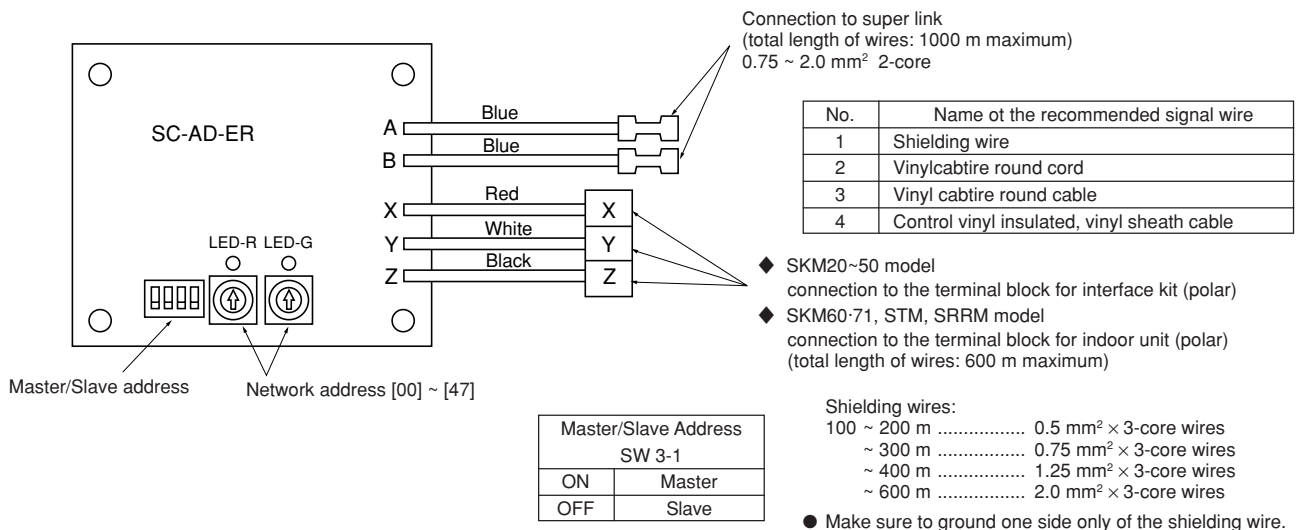
Function No. A	Function Contents B	Setting Contents C	Control Contents
12	TEMP RANGE SET	DISP CHANGE	The remote control’s display and sent data upper limit changes to 28°C.
		NO DISP CHANGE	The remote control’s display upper limit remains at 30°C and only the upper limit of the sent data is changed to 28°C.

7.3 Super link adapter (SC-AD-ER)

(1) Functions

- Transmits the settings from the Super link option to the indoor units.
- Returns the priority indoor unit data in response to a data request from the Super link option.
- Inspects the error status of connected indoor units and transmits the inspection codes to the Super link option.
- A maximum of 16 units can be controlled (if in the same operation mode).

(2) Wiring connection diagram



- Set the super link network address with SW1 (10-position) and SW2 (1-position).
- Without a remote control (no wired remote control and no wireless remote control), set SC-AD-ER SW3-1 to ON (Master).

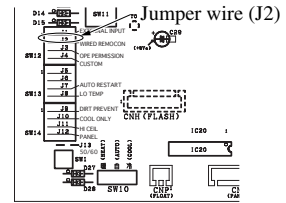
(3) Super link adapter connection

See the super link adapter's manual concerning connections to the super link adapter.

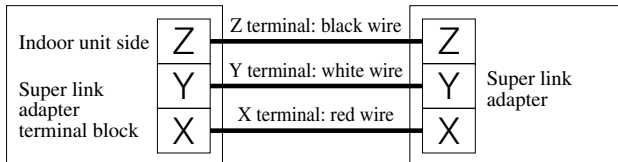
Note (1) Refer to "7.1 Interface kit" when connecting the super link adapter to SKM models 20 - 50.

① Cut jumper wire (J2) on the indoor unit's printed circuit board.

Caution: This device cannot be used together with the wireless remote control which is supplied with the indoor unit.



② Connections between the indoor unit's printed circuit board and super link adapter

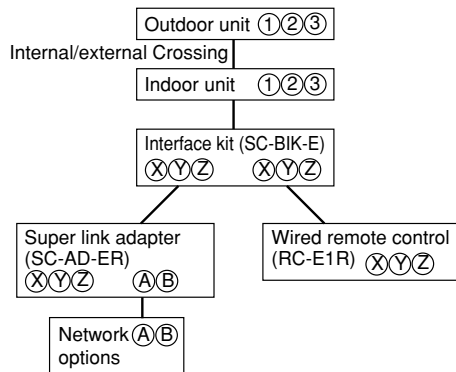


No.	Names of recommended signal wires
1	Shielded wire
2	Vinyl cabtyre round cord
3	Vinyl cabtyre round cable
4	Vinyl insulated wire/vinyl sheathed cable for control

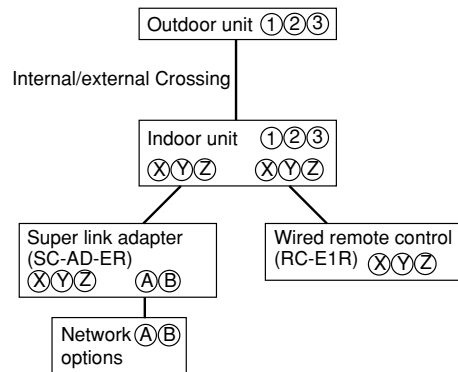
Within 200 m 0.5 mm² × 3 cores
 Within 300 m 0.75 mm² × 3 cores
 Within 400 m 1.25 mm² × 3 cores
 Within 600 m 2.0 mm² × 3 cores

③ Fasten the super link adapter cable with clamps.

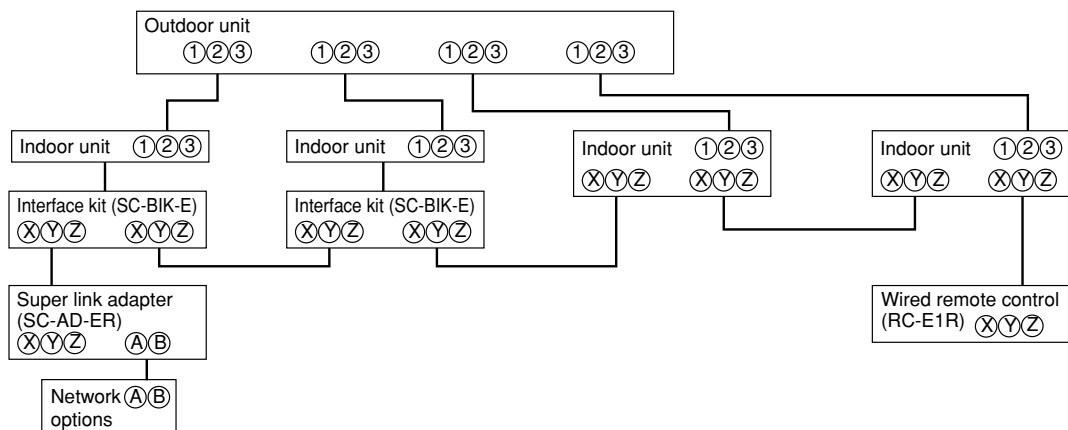
Basic Connections (SKM20 ~ 50 model)



Basic Connections (SKM60-71, STM, SRRM model)



Example Connections of SCM model (for 4 room)

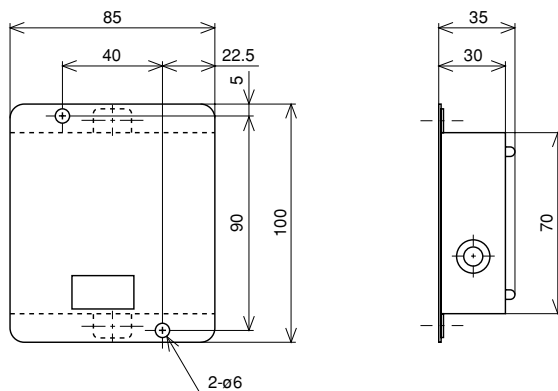


(4) Installation

(a) Accessories

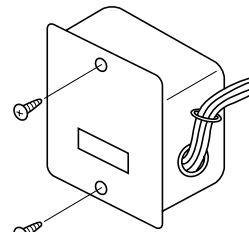
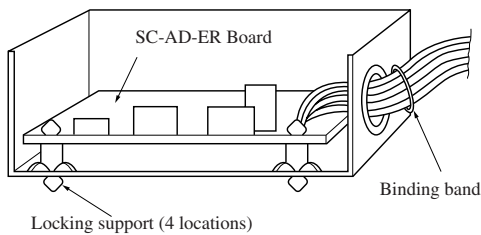
Printed circuit board	Metal box	Metal cover	Insulating rubber sheet
Pan head screw ø4 × 8 l 2 units	Locking support for fixing the printed circuit board made of nylon 4 units	Band for binding wires, 5 pieces	Binding band

(b) Metal box dimension

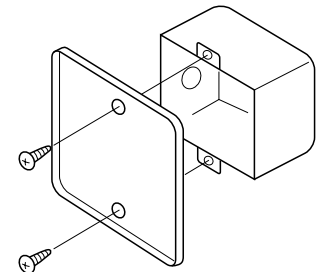


(c) Installation Outline

- Secure the installing board to the metal box with the locking supports.
- The wires are put through a grommet and bound into a bundle with a binding band.
- Attaching to the outside of a indoor unit.
- Attaching to the back of a wired remote control.



► In this case, attach the metal cover.



► In this case, attach directly to the lower case of the wired remote control.

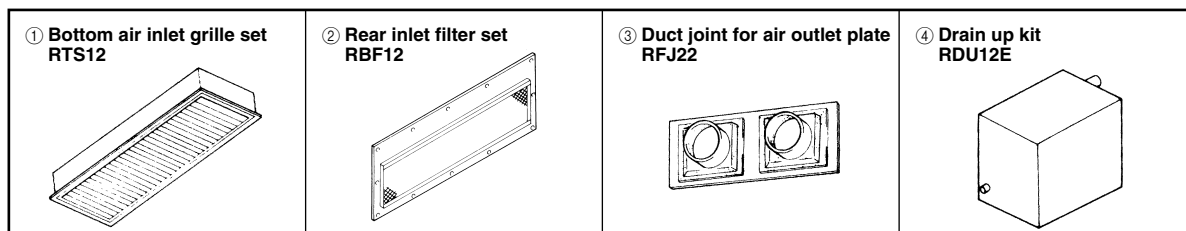
(5) Inspection Displays

Check the green LED and red LED flashing at the SC-AD-ER board.

SC-AD-ER board LED		Inspection mode	Display on the central control device of the network
Red	Green		
light off	flashing	Normal communication	
light off	light off	<ul style="list-style-type: none"> Open circuit at the wired remote control signal wire (X) or (Z). Short circuit at the wired remote control signal wire. (between X - Z) Power source of the indoor wired remote control is out of order. 	
1 flashing	flashing	<ul style="list-style-type: none"> Open circuit at the super link signal wire (A) or (B). Short circuit at the super link signal wire. (between A - B) The super link circuit is out of order. 	
2 flashings	flashing	Poor SC-AD-ER board address setting. (setting at No. 48 or 49)	
3 flashings	flashing	<ul style="list-style-type: none"> Open circuit at the wired remote control signal wire (Y). Short circuit at the wired remote control signal wire. (between X - Y or between X - Z) In the case of opening without a wired remote control, SC-AD-ER board "Master" setting is not performed. The wired remote control signal circuit is out of order. 	E1
4 flashings	flashing	The address is repeated in the SC-AD-ER board and the indoor unit connected to the link network.	E2
flashings	flashing	The address is repeated in the SC-AD-ER board and the outdoor unit connected to the link network.	E31

7.4 Ducted type (SRRM) optional parts

■ Table of optional parts



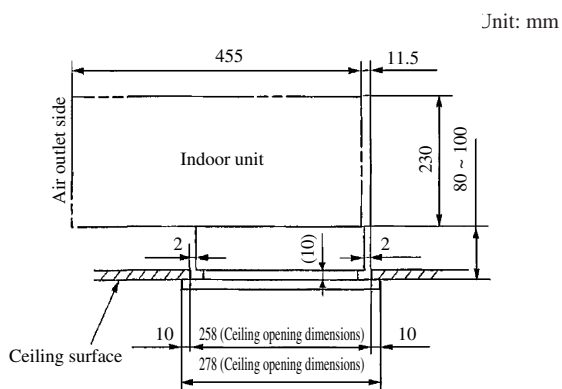
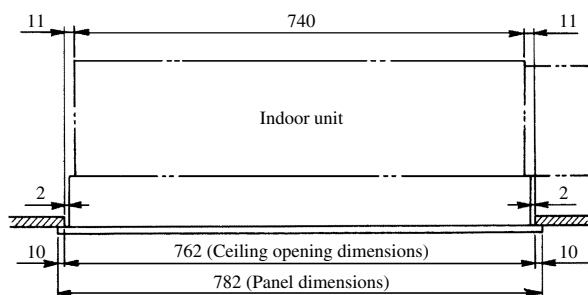
(1) Bottom air inlet grille set

(a) Part No.: RTS12

(b) Parts list

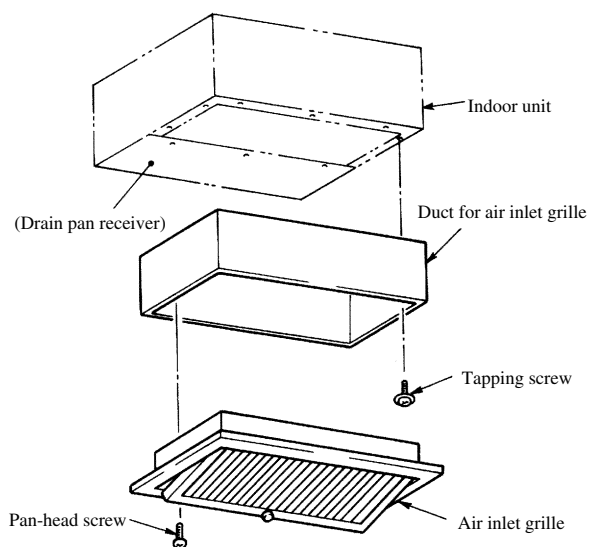
Name	Qty.
Air inlet grille	1
Duct for air inlet grille	1
Tapping screw	10
Pan-head screws	4

(c) Installation



(d) Installation procedure

- 1) Mount the duct for the air inlet grille to the indoor unit using the 10 tapping screws provided. The tapping screws on the drain pan receiver side are also used for mounting the duct for the air inlet grille. They must first be removed and reinstalled after the duct for the air inlet grille is in place. A guideline for the height is to secure the assembly so that the lower surface of the duct for the intake grille is approximately 10 mm above the bottom surface of the ceiling.
- 2) Remove the center screw for the air inlet grille and open the grille as shown in the illustration. Next, insert the air inlet grille into the duct for the air inlet grille and secure it with the pan-head screws (the long screws).
- 3) Use the pan-head screws to make the small adjustments in height. The height dimension on the installation diagram allows for adjustment within range of 80 to 100 mm. If the pan-head screws are completely tightened, the height will be 80 mm.



(2) Rear inlet filter set

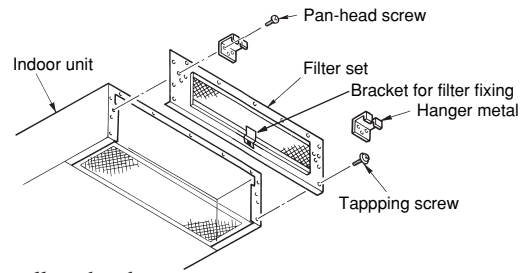
(a) Part No.: RBF12

(b) Installation

Do not use this filter set alone.

There are two inlet ports: lower inlet port (normal) and rear inlet port.

- 1) Detach the rear panel and the hanger metal screwad onto the rear panel from an indoor unit.
- 2) Attach the removed hanger metal to the frame of the filter set with small panhead screws. (One screw each on the right and left sides of the frame is designed to fasten them together onto the main unit).
- 3) Attach the filter set onto the point where the rear panel was attached with tapping screws. (The rear panel will become of no use anymore)



(3) Duct joint for air outlet plate

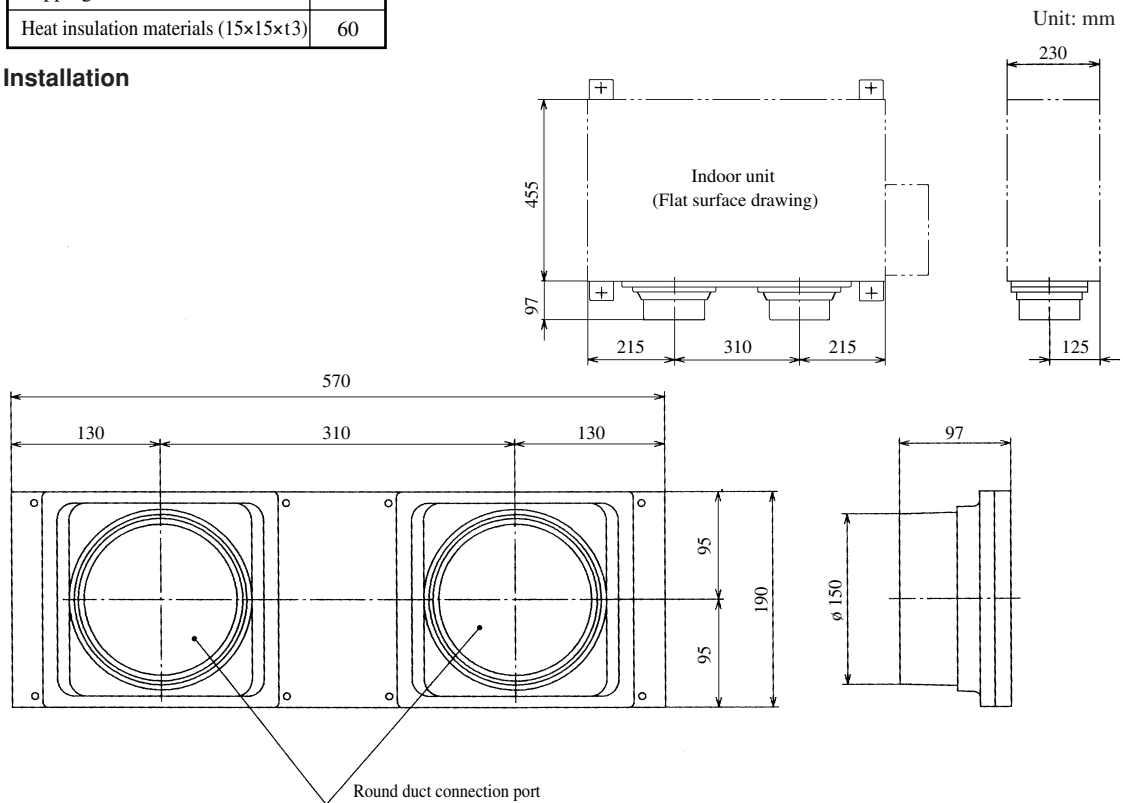
(a) Part No.: RFJ22

This duct joint is to be used for the connection of a round duct (ø 150 mm) to an indoor unit.

(b) Part list

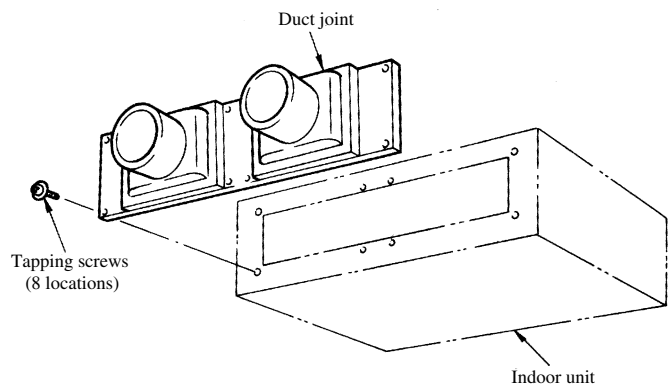
Name	Qty.
Duct joint	1
Tapping screws	8
Heat insulation materials (15x15x13)	60

(c) Installation

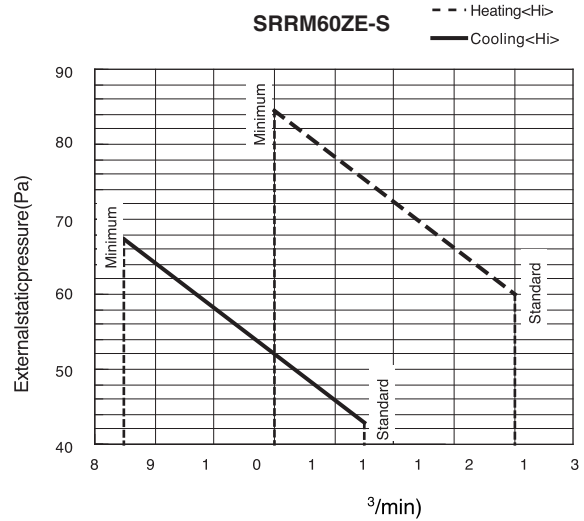
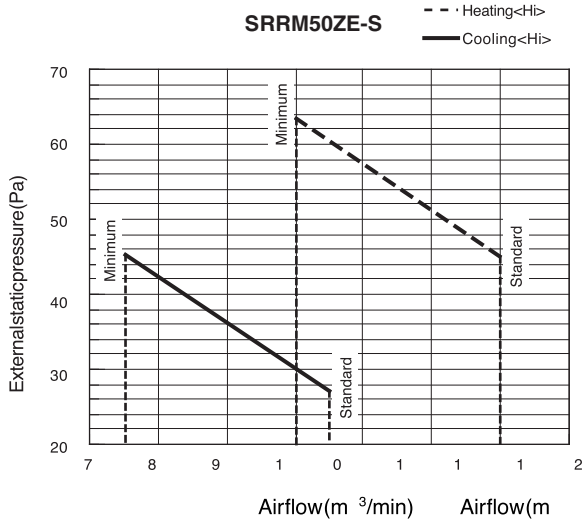
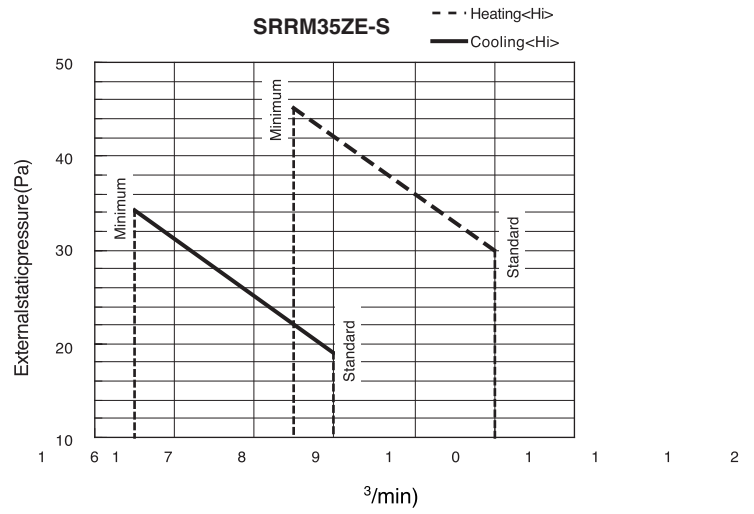
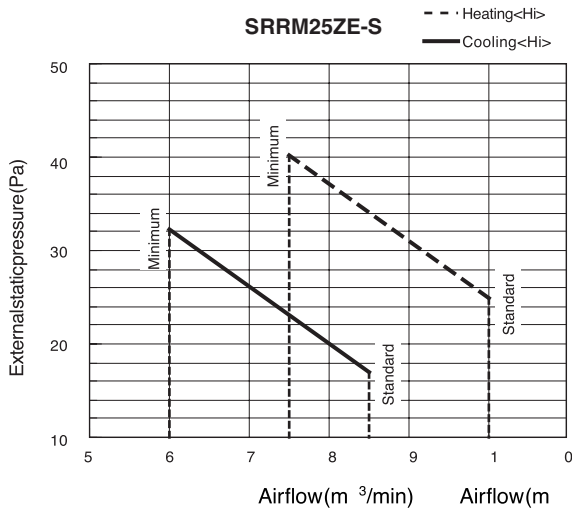


(d) Installation procedure

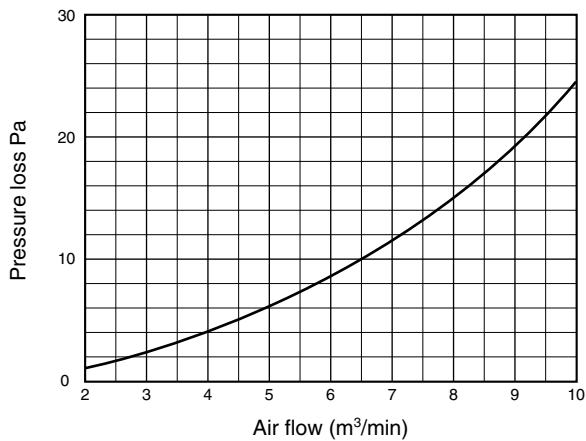
Use the tapping screws to mount the duct joint to the front of the indoor unit. Use care to prevent gaps from forming at the joining surfaces with the indoor unit. Use insulation at the connecting areas between a round duct and the duct joint to prevent condensation.



◆ Air flow and external static pressure characteristics (Heating: Hi)



◆ Air inlet grille air flow and friction loss characteristics (Part No.: RTS12)



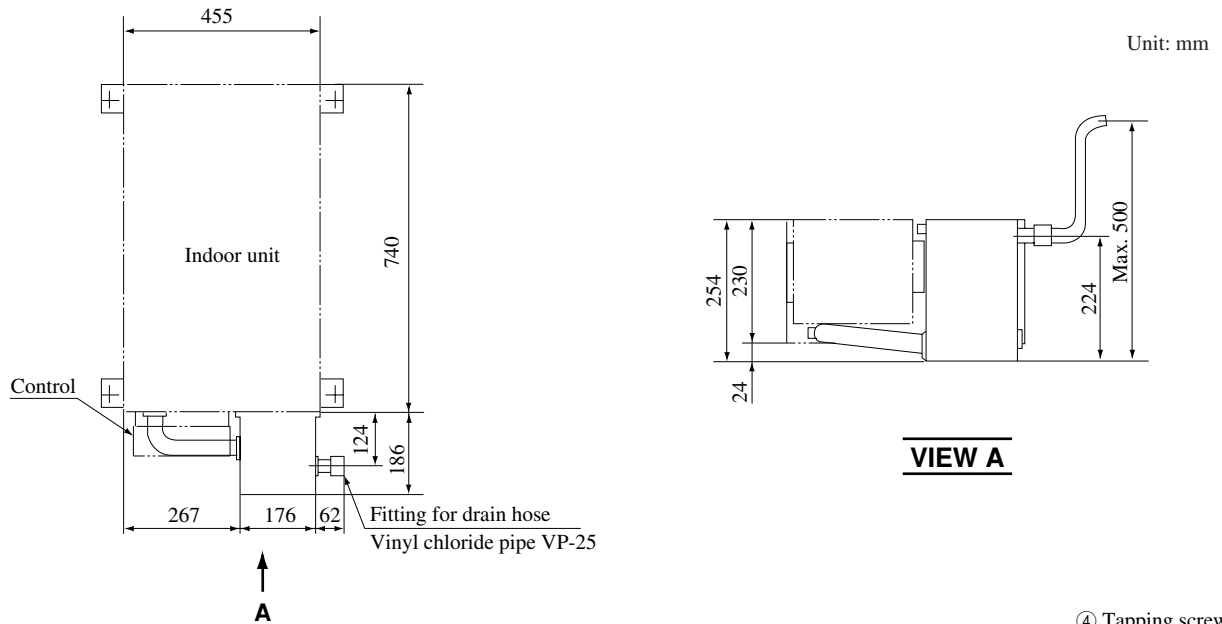
(4) Drain up kit

(a) Part No. : RDU12E

(b) Accessories

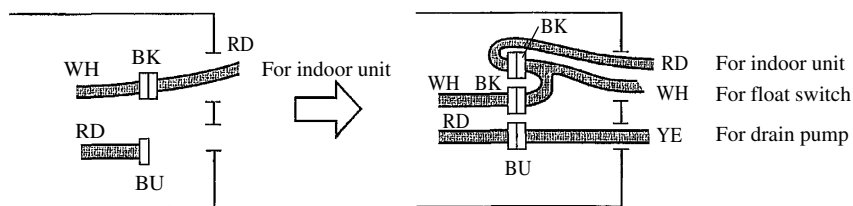
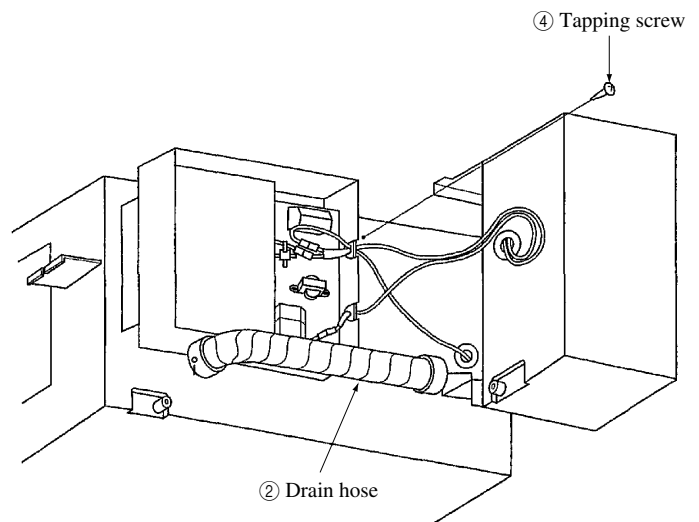
No.	Name	Qty.
①	Drain pump	1
②	Drain hose	1
③	Hose clamp	1
④	Tapping screw	4

(c) Installation of drain up kit

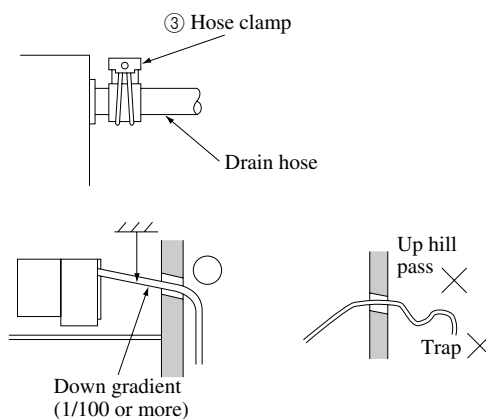


(d) Installation of drain up kit

- 1) Fix the drain up kit on the right side of the inside unit with tap screws.
- 2) Insert the drain hose fully and securely to the drain sockets of the inside unit and the drain up kit.
- 3) Connect the drain up kit's connectors for the drain pump (red color 2P) and the float switch (black 2P) to the connectors of the control box. (The control box's connectors for the drain pump and the float switch are also red and black respectively.) Note that the control's connector for the float switch is already connected to the inside unit's connector for the float switch, so disconnect them and connect it to the drain up kit's connector for the float switch.



- 4) Use hard PVC general purpose pipes VP-25 sold in the market for drain pipes after draining up.
- 5) Tighten the PVC pipe securely with the attached clamp after inserting it in the drain socket.
- 6) The drain pipe must have downward inclination gradient of 1/100 or more, and take care not to make a trap or uphill pass.
- 7) When connecting the drain pipe, take care not to apply force on the pipe of the unit, and clamp the pipe as close as possible to the unit.
- 8) Don't attach air purge pipe, because the drain might spout.
- 9) Be sure to provide heat insulation to the indoor side drain pipe.



8 REFRIGERANT PIPING INSTALLATION/SERVICING MANUAL FOR AIR CONDITIONERS USING R410A

(These materials are extracted from document issued by The Japan Refrigeration and Air Conditioning Industry Association)

8.1 Outline

8.1.1 Refrigerant R410A

(1) Adoption of R410A in air conditioners

In 1974, it was pointed out that the ozone layer in the upper stratosphere (about 20 ~ 40 km above ground) might have been damaged by the ozone depleting substances such as CFC (chlorofluorocarbon) and HCFC (hydrochlorofluorocarbon). Since that time, many countries across the world have endeavored to take countermeasures against the ozone depletion.

As a refrigerant belonging to the HCFCs, the conventional refrigerant (R22) used in air conditioners also tends to deplete the ozone layer. Therefore, complying with the provisions of the international regulations (i.e. Montreal Protocol concerning the Ozone Depleting Substances) and national laws & Regulations concerned, it is necessary to replace R22 with other types of refrigerant which do not deplete the ozone layer.

A refrigerant composed of hydrogen (H), fluorine (F) and carbon (C), is called an HFC and does not deplete the ozone layer. One HFC's is R410A whose pressure is about 1.6 times higher than R22 and whose energy efficiency is almost comparable to that of R22 at the same refrigerant temperature.

(2) Chemical characteristics of R410A

a) Chemical stability

Like R22, R410A is a chemically stable, less toxic and non-flammable refrigerant. However, as in the case of R22, the specific gravity of its vapour is larger than that of air and should it leak in an airtight room it may stay at a low level and cause an oxygen starvation accident. It may also, should it come in direct contact with fire, cause a poisonous gas to occur, so be sure to handle it only in a well ventilated area.

b) Composition changes (Pseudo-azeotropic characteristics)

R410A is a pseudo-azeotropic mixed refrigerant composed of two constituents - R32 and R125. "Quasi-azeotropic" condition refers to a state in which the dew-point curve and boiling-point curve - gas-liquid equilibrium curves (pressure constant) - almost lie on top of each other, and a multi-constituent refrigerant having this chemical characteristic incurs less composition changes even when evaporation (or condensation) as a phase change occurs. Consequently, even when refrigerant leaks from the gas phase somewhere in the piping installation, the composition of circulated refrigerant incurs less changes.

Therefore, R410A can be treated in almost a same manner as a mono-constituent refrigerant like R22 is treated. When actually charging R410A, however, do so from the liquid phase side by taking into account the phenomenon that, when put in a cylinder, the composition changes a little between gas and liquid phases.

c) Pressure characteristics

As shown in Table 2, since R410A's vapor pressure is about 1.6 times higher than that of R22 at the same temperature, perform installation/service with special tools and materials which are exclusive for R410A and can withstand high pressure.

Table 1. Comparison of thermophysical properties of R410A and R22

	R410A	R22
Composition (wt%)	R32/R125 (50/50)	R22 (100)
Molecular weight	72.6	86.5
Boiling point (°C)	-51.4	-40.8
Vapor pressure (25°C, MPa)	1.56	0.94
Saturated vapor density (25°C, kg/m ³)	64.0	44.4
Inflammability	Nonflammable	Nonflammable
Ozone depletion potential (ODP)	0	0.055
Global warming potential (GWP)	1730	1700

Source: List of thermophysical properties compiled by the Japan society of refrigeration and air conditioning, NIST REFPROP V5.10, etc.

Table 2. Comparison of saturated vapor pressure of R410A and R22 unit: MPa

Refrigerant Temperature (°C)	R410A	R22
-20	0.30	0.14
0	0.70	0.40
20	1.35	0.81
40	2.32	1.43
60	3.73	2.33
65	4.15	2.60

Source: List of thermophysical properties compiled by the Japan society of refrigeration and air conditioning, NIST REFPROP V5.10, etc.

(3) Lubricating oils for R410A

As the lubricating oils for R22, mineral oils, alkylbenze synthetic oils, etc. have so far been used. As R410A features less solubility with these conventional lubricating oils such as mineral oils, the lubricating oils tend to stay within the refrigeration cycle. As the lubricating oils highly soluble with R410A, ester, ethereal and other synthetic oils are available. However, as these synthetic oils are very hygroscopic, they must be treated even more carefully than the conventional lubricating oils. Furthermore, if these synthetic oils are mixed with mineral oils, alkylbenzene synthetic oils, etc., they may deteriorate, and block the capillary tubes, or cause the compressor to fail. So, never mix these synthetic oils.

8.1.2 Safety during installation/servicing

As R410A's pressure is about 1.6 times higher than that of R22, improper installation/servicing may cause a serious trouble. By using tools and materials exclusive for R410A, it is necessary to carry out installation/servicing safely while taking the following precautions into consideration.

- 1) Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A.
- 2) If a refrigeration gas leakage occurs during installation/servicing, be sure to ventilate fully.
If the refrigerant gas comes into contact with fire, a poisonous gas may occur.
- 3) When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused.
- 4) After completion of installation work, check to make sure that there is no refrigeration gas leakage.
If the refrigerant gas leaks into the room, coming into contact with fire in the fan driven heater, space heater, etc., a poisonous gas may occur.
- 5) When an air conditioning system charged with a large volume of refrigerant (e.g. multi type air conditioner) is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level.
If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result.
- 6) Be sure to carry out installation or removal according to the installation manual.
Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc.
- 7) Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician.
Improper repair's may result in water leakage, electric shock and fire, etc.

8.2 Refrigerant piping installation

8.2.1 Piping materials and joints used

For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants.

(1) Copper pipes

It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using R22, it is necessary to choose adequate materials. Thicknesses of copper pipes used with R410A are as shown in Table 3. Never use copper pipes thinner than 0.8 mm even when it is available on the market.

Table 3. Thicknesses of annealed copper pipes

Nominal diameter	Outer diameter (mm)	Thickness (mm)	
		R410A	[ref.] R22
1/4	6.35	0.80	0.80
3/8	9.52	0.80	0.80
1/2	12.70	0.80	0.80
5/8	15.88	1.00	1.00

(2) Joints

For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants.

a) Flare joints

Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm. In such a case, socket joints can be used.

Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 5~8 (see on page 129, 130) below. Also, union, half union, Tee-type union and elbow-type union shapes are generally used (see Fig 1).

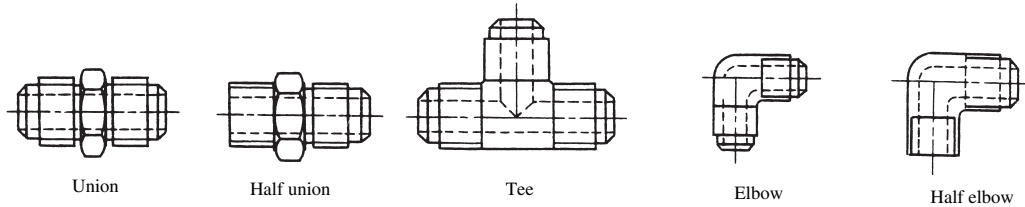


Fig.1 Flare joints

b) Socket joints

Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm. Thicknesses of socket joints are as shown in Table 4. Socket, elbow-type and tee-type shapes are generally used (see Fig. 2).

Table 4. Minimum thicknesses of socket joints

Nominal diameter	Reference outer diameter of copper pipe jointed (mm)	Minimum joint thickness (mm)
1/4	6.35	0.50
3/8	9.52	0.60
1/2	12.70	0.70
5/8	15.88	0.80

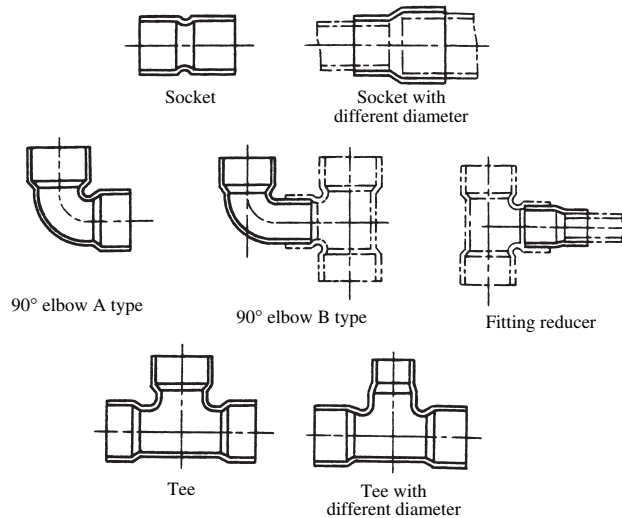


Fig.2 Socket joints

8.2.2 Processing of piping materials

When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil other than lubricating oils used in the installed air conditioner is used, and that refrigerant does not leak. When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover.

(1) Flare processing procedures and precautions

a) Cutting the pipe

By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing burrs and chips

If the flared section has chips or burrs, refrigerant leakage may occur. Carefully remove all burrs and clean the cut surface before installation.

c) Insertion of flare nut

d) Flare processing

Make certain that a clamp bar and copper pipe have been cleaned.

By means of the clamp bar, perform the flare processing correctly.

Use either a flare tool for R410A or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool. Be careful. When using a conventional flare tool, be sure to secure "dimension A" by using a gage for size adjustment.

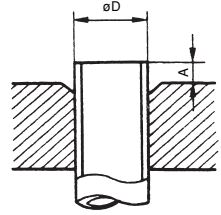


Fig.3 Flare processing dimensions

Table 5. Dimensions related to flare processing for R410A

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A Clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0~0.5	1.0~1.5	1.5~2.0
3/8	9.52	0.8	0~0.5	1.0~1.5	1.5~2.0
1/2	12.70	0.8	0~0.5	1.0~1.5	2.0~2.5
5/8	15.88	1.0	0~0.5	1.0~1.5	2.0~2.5

Table 6. Dimensions related to flare processing for R22

Nominal diameter	Outer diameter (mm)	Thickness (mm)	A (mm)		
			Flare tool for R410A Clutch type	Conventional flare tool	
				Clutch type	Wing nut type
1/4	6.35	0.8	0~0.5	0.5~1.0	1.0~1.5
3/8	9.52	0.8	0~0.5	0.5~1.0	1.0~1.5
1/2	12.70	0.8	0~0.5	0.5~1.0	1.5~2.0
5/8	15.88	1.0	0~0.5	0.5~1.0	1.5~2.0

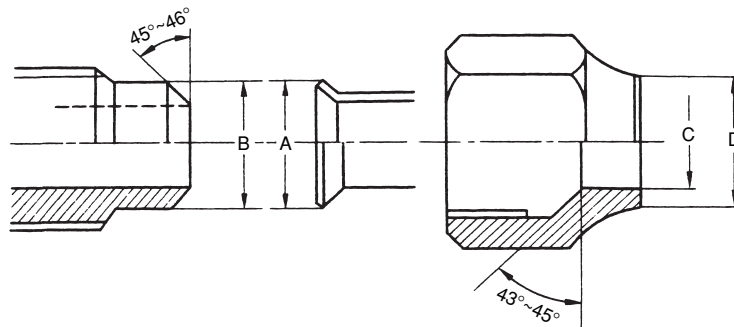


Fig.4 Relations between flare nut and flare seal surface

Table 7. Flare and flare nut dimensions for R410A

[unit: mm]

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width
			A	B	C	D	
1/4	6.35	0.8	9.1	9.2	6.5	13	17
3/8	9.52	0.8	13.2	13.5	9.7	20	22
1/2	12.70	0.8	16.6	16.0	12.9	23	26
5/8	15.88	1.0	19.7	19.0	16.0	25	29

Table 8. Flare and flare nut dimensions for R22

[unit: mm]

Nominal diameter	Outer diameter (mm)	Thickness (mm)	Dimension (mm)				Flare nut width
			A	B	C	D	
1/4	6.35	0.8	9.0	9.2	6.5	13	17
3/8	9.52	0.8	13.0	13.5	9.7	20	22
1/2	12.70	0.8	16.2	16.0	12.9	20	24
5/8	15.88	1.0	19.4	19.0	16.0	23	27

(2) Flare connecting procedures and precautions

- a) Make sure that the flare and union portions do not have any scar or dust, etc.
- b) Correctly align the processed flare surface with the union axis.
- c) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur. When it is strong, the flare nut may crack and may be made nonremovable. When choosing the tightening torque, comply with values designated by manufacturers.

Table 9 shows reference values.

Note : When applying oil to the flare surface, be sure to use oil designated by the manufacturer. If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

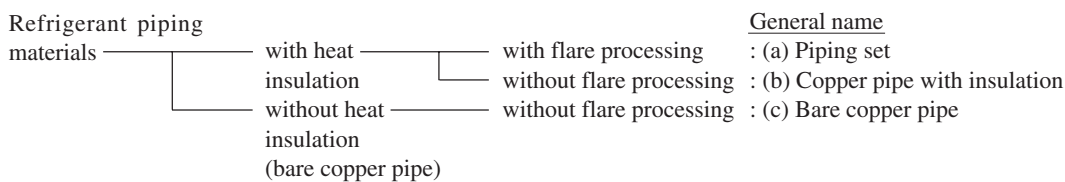
Table 9. Tightening torque of flare for R410A [Reference values]

Nominal diameter	Outer diameter (mm)	Tightening torque N·m (kgf·cm)	Tightening torque of torque wrenches available on the market N·m (kgf·cm)
1/4	6.35	14~18 (140~180)	16 (160), 18 (180)
3/8	9.52	33~42 (330~420)	42 (420)
1/2	12.70	50~62 (500~620)	55 (550)
5/8	15.88	63~77 (630~770)	65 (650)

8.2.3 Storage of piping materials

(1) Types and storage of piping materials

Refrigerant piping materials for air conditioners are broadly classified into the following types.



As R410A features pressure about 1.6 times higher than R22, it is necessary to use a copper pipe which has a thickness stated in Table 3 (see on page 127) and which contains less contaminants. It is necessary to carefully treat/store copper pipes so that they are not collapsed, deformed or damaged. Due care must also be exercised so that foreign matters such as dust and water do not enter the pipe interior.

A piping set's open end is sealed with a cap, etc. When storing it, make sure that it is sealed securely. When storing a clad copper pipe or bare copper pipe, securely seal the opening with pinching, taping, etc.

(2) Identification

a) Piping set

A copper pipe as piping set for R410A must have a thickness as stated in Table 3 (see on page 125), and, as shown in Tables 5 and 6 (see on page 127), it also differs from R22 in flare processing and flare nut dimensions. So, it is necessary to choose a piping set suitable for R410A.

b) Copper pipe with insulation

Before using a copper pipe with insulation, make sure that it has a thickness designated for R410A.

c) Bare copper pipe

It is necessary to use a bare copper pipe which has a thickness designated in Table 3 (see on page 127) and contains less contaminants. As the bare copper pipe surface is naked, it is necessary to treat it with exceeding care and adopt a means for identification to prevent improper usage by making it easily discriminable from other piping materials.

(3) Precautions before installation

Observe the following precautions when performing the piping connection at the site.

a) Keep any open ends of pipes be sealed with a cap, etc. until connected with the equipment.

b) Exercise great care when performing piping installation on a rainy day.

When water enters into the piping, the lubricating oil may deteriorate and cause the equipment to fail.

c) Carry out the piping connection in as short a time as possible.

If the piping is left open for a long period, fully purge the interior with nitrogen gas or dry it with a vacuum pump.

8.2.4 Brazing

(1) Processing the connected parts

As brazing is molten between the joined surfaces to yield high adhesive strength, it is necessary to secure a wide enough space to be joined and also an adequate clearance between the joined surfaces. Copper pipe joints' minimum insertion depths, outer pipe diameters and clearances between outer and inner pipe diameters are as shown in Table 10. In the case of bronze brazing filler, when the clearance is about 0.05~0.1mm, the pipes can be connected most strongly.

Table 10. Copper pipe joints' minimum insertion depths and clearances

Outer pipe diameter D (mm)	Minimum insertion depth B (mm)	Clearance (A-D) × 1/2 (mm)
5~8	6	0.05~0.35
8~12	7	0.05~0.35
12~16	8	0.05~0.45

* When joining the pipes, either the pipe ends are processed, or pipes are connected by brazing with a socket joint.

(2) Brazing filler metal

a) Alloy brazing filler

An alloy mainly composed of silver and copper is used to join iron, copper or copper alloy. Although it excels in solderability, it is relatively expensive.

b) Phosphor bronze brazing filler

Phosphor bronze brazing filler is generally used to join copper or copper alloy.

c) Low temperature solder

An alloy of tin and lead. An ordinary type of solder. Since it is weak in adhesive strength, it should not be used for refrigerant pipe brazing.

* Cautions:

- 1) BCuP tends to react with sulphur and produce a fragile compound water solution, which may cause a gas leakage. So, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint.
- 2) When performing brazing again at the time of servicing, use the same type of brazing filler.

(3) Flux

a) Reasons for the use of flux

- By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler.
- In the brazing process, it prevents the metal surface from being oxidized.
- By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal.

b) Properties required for flux

- Temperature at which flux is active coincides with the brazing temperature.
- Due to a wide effective temperature range, flux is hard to carbonize.
- It is easy to remove slag after brazing.
- The corrosive action to the treated metal and brazing filler is negligible.
- Excels in coating performance and is harmless to the human body.

As the flux works in a complicated manner as described above, it is necessary to choose an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc.

c) Types of flux

- Incorruptible flux

Generally, it is a compound of borax and boric acid.

Effective in cases where the brazing temperature is higher than 800°C.

- Activated flux

Most of fluxes generally used for silver brazing fall under this type.

It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride, to the borax-boric acid compound.

* Cautions:

- ① Remove the flux after brazing.
- ② When chlorine contained in the flux stays within the pipe, the lubricating oil deteriorates. So, use a flux which does not contain chlorine.
- ③ When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water).

(4) Brazing

As brazing requires sophisticated techniques and experiences, it must be performed by a qualified person.

In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry nitrogen gas (N₂) flow.

<Brazing method for preventing oxidation>

- a) Attach a reducing valve to the nitrogen gas cylinder
- b) Use a copper pipe to direct the nitrogen gas into the piping, and attach a flowmeter to the nitrogen gas cylinder.
- c) Apply a seal onto the clearance between the piping and inserted pipe for the nitrogen gas in order to prevent the nitrogen gas from flowing backward.
- d) When the nitrogen gas is flowing, be sure to keep the piping end open.
- e) Adjust the flow rate of nitrogen gas so that it is lower than 0.05m³/h, or 0.02MPa (0.2kgf/cm²) by means of the reducing valve.
- f) After taking the steps above, keep the nitrogen gas flowing until the piping cools down to a certain extent (i.e. temperature at which pipes are touchable with finger).
- g) Completely remove the flux after brazing.

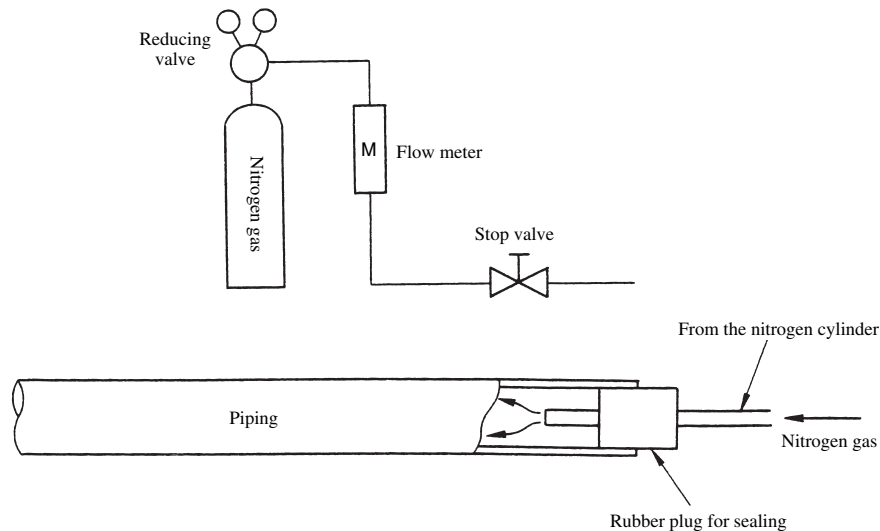


Fig.5 Prevention of oxidation during brazing

* Cautions during brazing

① General cautions

- 1) The brazing strength should be high as required.
- 2) After operation, airtightness should be kept under a pressurized condition.
- 3) During brazing do not allow component materials to become damaged due to overheating.
- 4) The refrigerant pipe work should not become blocked with scale or flux.
- 5) The brazed part should not restrict the flow in the refrigerant circuit.
- 6) No corrosion should occur from the brazed part.

② Prevention of overheating

Due to heating, the interior and exterior surfaces of treated metal may oxidize. Especially, when the interior of the refrigerant circuit oxidizes due to overheating, scale occurs and stays in the circuit as dust, thus exerting a fatally adverse effect. So, make brazing at adequate brazing temperature and with a minimum of heating area.

③ Overheating protection

In order to prevent components near the brazed part from overheating damage or quality deterioration due to flame or heat, take adequate steps for protection such as (1) by shielding with a metal plate, (2) by using a wet cloth, and (3) by means of heat absorbent.

④ Movement during brazing

Eliminate all vibration during brazing to protect brazed joints from cracking and breakage.

⑤ Oxidation preventive

In order to improve the brazing efficiency, various types of antioxidant are available on the market. However, the constituents of these are widely varied, and some are anticipated to corrode the piping materials, or adversely affect HFC refrigerant, lubricating oil, etc. Exercise care when using an oxidation preventive.

8.3 Installation, removal and servicing

8.3.1 Tools for R410A

In the case of an air conditioner using R410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3-way valve) has been changed. Also, to increase the pressure resisting strength, flare processing dimensions and sizes of opposite sides of flare nuts (for copper pipes with nominal diameters 1/2 and 5/8) have been changed. During installation/service, therefore, prepare tools exclusive for R410A shown in (1) on page 134 and general tools shown in (2) on page 135.

(1) Tools exclusive for R410A

a) Gauge manifold

- As R410A is characterized by high pressure, conventional tools cannot be used.

Table 11. Differences between conventional high/low pressure gauges and those for R410A

	Conventional gauges	Gauges exclusive for R410A
High pressure gauge (red)	-0.1~3.5MPa -76 cmHg~35 kgf/cm ²	-0.1~5.3MPa -76 cmHg~53 kgf/cm ²
Compound gauge (blue)	-0.1~1.7MPa -76 cmHg~17 kgf/cm ²	-0.1~3.8MPa -76 cmHg~38 kgf/cm ²

- In order to prevent any other refrigerant from being charged accidentally, each port of the manifold has been changed in shape.

Table 12. Differences in port size between conventional manifold and that for R410A

	Conventional manifold	Manifold for R410A
Port size	7/16 UNF 20 threads per inch	1/2 UNF 20 threads per inch

b) Charge hose

- As R410A is characterized by high pressure, the pressure resistance of the charge hose has been increased. The material has also been changed to an HFC resistant type, and, as in the case of each port of the manifold, the hose cap size has been changed. Furthermore, for prevention of gas pressure reaction, a charge hose with a valve placed near the cap is also available.

Table 13. Differences between conventional charge hose and that for R410A

		Conventional charge hose	Charge hose for R410A
Pressure resistance	Normal pressure	3.4 MPa (34 kgf/cm ²)	5.1 MPa (51 kgf/cm ²)
	Breaking pressure	17.2 MPa (172 kgf/cm ²)	27.4 MPa (274 kgf/cm ²)
Engineering material		NBR rubber	HNBR rubber internally coated with nylon
Cap size		7/16 UNF 20 threads per inch	1/2 UNF 20 threads per inch

c) Electronic balance for refrigerant charging

- As R410A belonging to the HFCs features high pressure and high evaporating speed, when R410A is charged by using a charging cylinder, R410A in the cylinder cannot be kept in a liquefied state and gasified refrigerant bubbles in the charging cylinder, it becomes difficult to read values. Therefore, it is advisable to adequately use an electronic balance for refrigerant charging.
- An electronic balance for refrigerant charging has higher strength due to its structure with four points of support for refrigerant cylinder weight detection. As the charge hose connecting part has two ports-one for R22 (7/16 UNF 20 threads per inch) and the other for R410A (1/2 UNF 20 threads per inch) - it can also be used for charging the conventional refrigerant.
- Two types of electronic balance for refrigerant charging are available - one for 10kg cylinder and the other for 20kg cylinder.
 - Electronic balance for 10kg cylinder precision $\pm 2g$
 - Electronic balance for 20kg cylinder precision $\pm 5g$
- Refrigerant is charged manually by opening/closing the valve.

d) Torque wrench (for nominal diameters 1/2 and 5/8)

- Along with changes in flare nut sizes for enhanced pressure resisting strength, torque wrenches for R410A differ in opposite side size.

Table 14. Differences between conventional wrenches and those for R410A

	Conventional torque wrench	Torque wrench for R410A
For 1/2 (opposite side \times torque)	24mm \times 55N·m (550 kgf·cm)	26mm \times 55N·m (550 kgf·cm)
For 5/8 (opposite side \times torque)	27mm \times 65N·m (650 kgf·cm)	29mm \times 65N·m (650 kgf·cm)

- e) Flare tool (clutch type)
 - A flare tool for R410A is provided with a large clamp bar receiving hole so that the projection of the copper pipe from the clamp bar can be set at 0~0.5 mm in flare processing, and also features higher spring strength for increased expansion pipe torque. This flare tool can also be used for R22 copper pipe.
- f) Gauge for projection adjustment (used when flare processing is made by using conventional flare tool [clutch type])
 - A gauge 1.0 mm in thickness which helps in easily setting the projection of the copper pipe from the clamp bar at 1.0~1.5 mm.
- g) Vacuum pump adapter
 - It is necessary to use an adapter for preventing vacuum pump oil from flowing back to the charge hose. The charge hose connecting part has two ports - one for conventional refrigerant (7/16 UNF 20 threads per inch) and the other for R410A. If the vacuum pump oil (mineral) mixes with R410A, a sludge may occur and damage the equipment.
- h) Refrigerant cylinder
 - A refrigerant cylinder exclusive for R410A comes identified with refrigerant name and is coated with pink paint as designated by the ARI, U.S.A.
- i) Charge port and packing for refrigerant cylinder
 - According to the charge hose's cap size, a charge port with 1/2 UNF 20 threads per inch and corresponding packing are required.
- j) Gas leakage detector
 - A high sensitivity gas leakage detector exclusive for HFC refrigerant is used. In the case of R410A, the detection sensitivity is about 23g per year.

(2) General tools

- a) Vacuum pump
- b) Torque wrench
 - for 1/4: opposite side 17 mm × $\begin{matrix} (16 \text{ N}\cdot\text{m}) \\ (160 \text{ kgf}\cdot\text{cm}) \end{matrix}$
 - for 1/4: opposite side 17 mm × $\begin{matrix} (18 \text{ N}\cdot\text{m}) \\ (180 \text{ kgf}\cdot\text{cm}) \end{matrix}$
 - for 3/8: opposite side 22 mm × $\begin{matrix} (42 \text{ N}\cdot\text{m}) \\ (420 \text{ kgf}\cdot\text{cm}) \end{matrix}$
- c) Pipe cutter
- d) Reamer
- e) Screwdriver (+, -)
- f) Hacksaw
- g) Hole core drill (ø65 or 70)
- h) Hexagonal wrench (opposite side 4 or 5 mm)
- i) Spanner, or monkey wrench
- j) Tape measure
- k) Thermometer
- l) Clamping ampere meter
- m) Insulation resistance tester (mega tester)
- n) Electro circuit tester
- o) Pipe bender

(3) Applicability of R410A tools to R22 model

Table 15. Applicability of R410A tools to R22 model

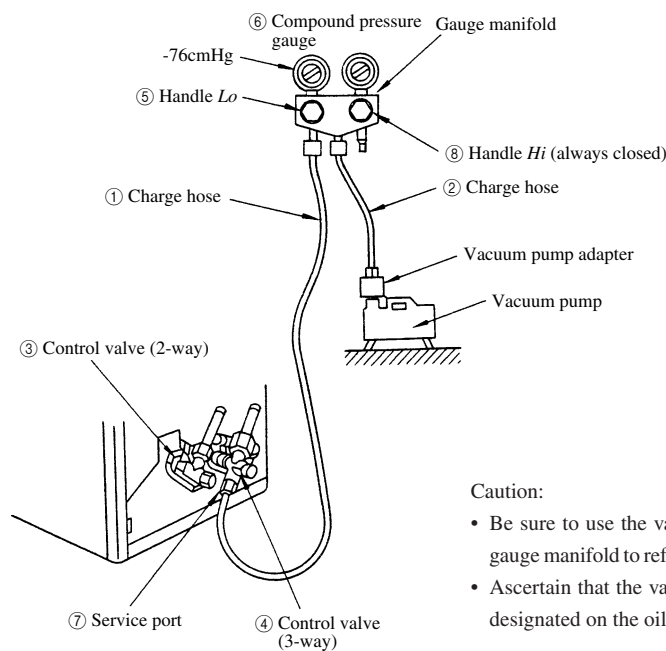
	Tools for R410A	Applicable to R22 model
a)	Gauge manifold	×
b)	Charge hose	×
c)	Electronic balance for refrigerant charging	○
d)	Torque wrench (nominal diameter 1/2, 5/8)	×
e)	Flare tool (clutch type)	○
f)	Gauge for projection adjustment*	○
g)	Vacuum pump adapter	○
h)	Refrigerant cylinder	×
i)	Charge port and packing for refrigerant cylinder	×
j)	Gas leakage detector	×

* Used when conventional flare tool (clutch type) is used.

Note: For inquiry, contact your agent.

8.3.2 New installation work (when using new refrigerant piping)

- (1) Air purge by vacuum pump and gas leakage inspection (see Fig. 6)
 - a) Connect the charge hose to the outdoor unit. ①
 - b) Connect the charge hose to the vacuum pump adapter. ②
At this time, keep the control valves in the fully closed position. ③ ④
 - c) Place the handle *Lo* in the fully opened position ⑤, and turn on the vacuum pump's power switch.
During this step, perform evacuating (about 10 ~ 15 minutes); for the evacuating time, refer to the equipment manufacturer's manual.
 - d) When the compound gauge's pointer has indicated -0.1 MPa (-76 cmHg) ⑥, place the handle *Lo* in the fully closed position ⑤, and turn OFF the vacuum pump's power switch
Keep this state for 1~2 minutes, and ascertain that the compound gauge's pointer does not return.
 - e) Fully open the control valves. ③ ④
 - f) Detach the charge hoses. ① ②
 - g) Tightly secure the cap on the service port. ⑦
 - h) After securing the caps on the control valves, check the caps' periphery if there is any gas leakage. ③ ④ ⑦



Caution:

- Be sure to use the vacuum pump, vacuum pump adapter and gauge manifold to refer to their instruction manuals beforehand.
- Ascertain that the vacuum pump is filled with oil to the level designated on the oil gauge.

Fig.6 Configuration of air purge by vacuum pump

- (2) Additional refrigerant charging required for refrigerant piping length longer than standard length (The following steps should be taken following the step e) in (1) above. See Fig. 7)
 - a) Set the refrigerant cylinder to the electronic balance, and connect the connecting hoses on the cylinder and electronic balance's connecting port.
* Caution:
Be sure to make setting so that liquid can be charged. When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down.
 - b) Connect the gauge manifold's charge hose to the electronic balance's connecting port. ③ ②
 - c) Open the refrigerant cylinder's valve, and, after opening the charging valve a little, close it. ① ②
 - d) After making zero (0) adjustment, open the charging valve and, by opening the gauge manifold's valve *Lo*, charge the liquid refrigerant. ② ⑤
(Before handling the electronic balance, refer to its instruction manual).
 - e) When the designated amount of refrigerant could not be charged, make additional charging bit by bit by cooling operation (for the amount of each addition, follow the instruction manual prepared by the equipment manufacturer). If the first additional charging was not enough, make the second additional charging after about one minute in the same manner as the first additional charging.
* Caution:
Be sure never to charge a large amount of liquid refrigerant at once to the unit in cooling mode, since liquid is charged from the gas side.

- f) After charging liquid refrigerant into the air conditioner by closing the charging valve, stop operation by fully closing the gauge manifold's valve Lo. ② ⑤
- g) Quickly remove the charge hose from the service port. ⑥
When stopped halfway, refrigerant being cycled will be released.
- h) After securing the caps on the service port and control valve, check the caps' periphery to see if there is any gas leakage. ⑥ ⑦

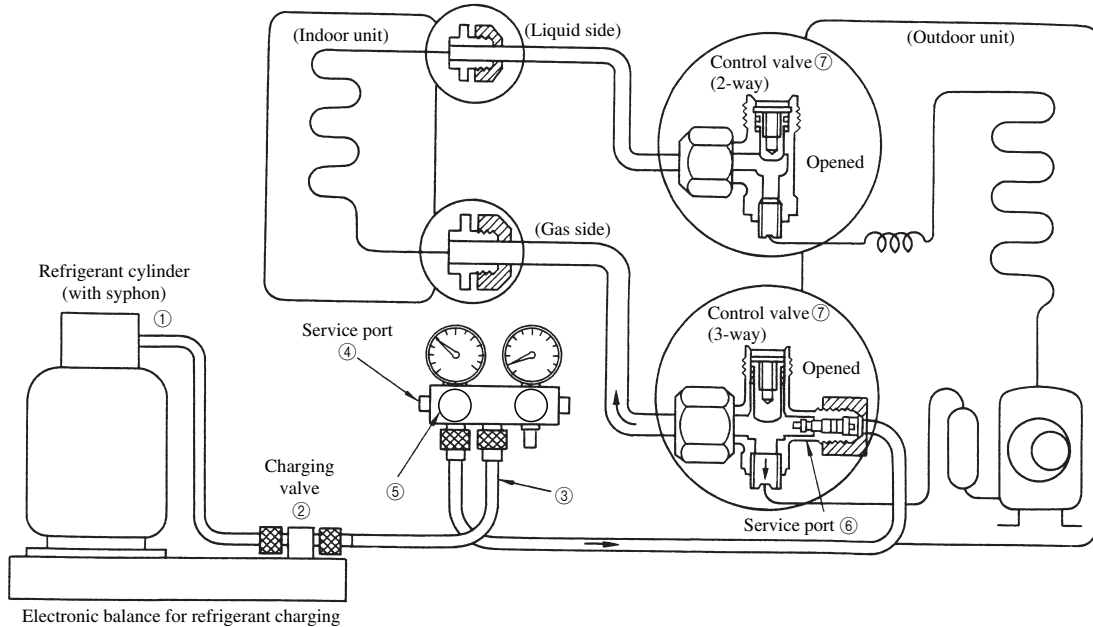


Fig.7 Configuration of additional refrigerant charging

8.3.3 Removal (When using new refrigerant piping)

- (1) Removing the unit
 - a) Recovery of refrigerant from the outdoor unit by pump down
 - At the time of pump down, use a gauge manifold exclusive for R410A.
 - Operating the unit in forced cooling mode, recover refrigerant from the outdoor unit.
(For details of reclaiming steps and precautions, see the instruction manual prepared by the equipment manufacturer)

* Caution:

In the case of an outdoor unit which is incapable of pump down, use a refrigerant recovery unit.
 - b) Removing the indoor/outdoor units
 - Remove the piping and wiring between the indoor and outdoor units.
 - Tighten the outdoor unit's control valves and service port with the specified torque.
 - Tighten the capped flare nuts at the indoor/outdoor units connecting part with the specified torque.
 - Remove the indoor/outdoor units.

* Caution:

When storing the indoor unit piping in its original position, be careful not to break the piping.

- (2) Installing the unit
 - a) Proceed with the installation following the steps described in "8.3.2 New installation work".

8.3.4 Replacing the unit (Never use the existing refrigerant piping)

Use a brand-new refrigerant piping (1) when replacing the air conditioner using the conventional refrigerant (R22) with an air conditioner using the alternative refrigerant (R410A) or (2) even when replacing the air conditioner using the alternative refrigerant (R410A) with another air conditioner using R410A, as a problem may occur due to differences in pressure characteristics of refrigerant or differences in type of lubricating oil (air conditioners using R410A do not always use the same type of the lubricating oils).

8.3.5 Retrofitting

Do not operate the air conditioner which has used the conventional refrigerant (R22) by charging the alternative refrigerant (R410A). Otherwise, the equipment may cease to function normally and go wrong, or even cause serious problems such as rupture of the refrigeration cycle.

8.3.6 Refrigerant recharging at servicing

When it becomes necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps.

(For details, see the instruction manual prepared by the equipment manufacturer)

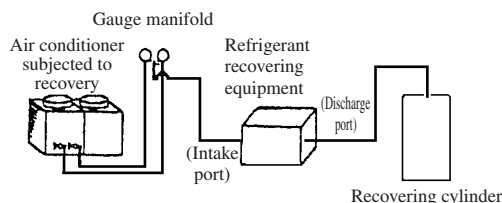
- 1) Connect the charge hose to the outdoor unit's service port.
- 2) Connect the charge hose to the vacuum pump adapter. At this time, keep the control valves in the fully opened position.
- 3) Place the handle *Lo* in the fully opened position, and turn ON the vacuum pump's power source. (For the evacuating time, refer to the equipment manufacturer's manual)
- 4) When the compound gauge's pointer has indicated -0.1 MPa (-76 cmHg), place the handle *Lo* in the fully closed position, and turn OFF the vacuum pump's power source. Keep this state for 1 ~ 2 minutes, and ascertain that the compound gauge's pointer does not return.
- 5) Charge liquid refrigerant by using the electronic balance according to the steps described in Section 8.3.2 (2) (pages 136, 137).

8.4 Refrigerant recovery

8.4.1 Recovering procedures

The following procedures for refrigerant recovery represent general procedures, and they may differ between actual cases depending upon the type of refrigerant recovering equipment. The connecting and handling methods for different type of refrigerant recovering equipment may also differ. So, ascertain the details by referring to the respective instruction manuals, etc.

- (1) Checks prior to recovering procedures
 - a) Checking the refrigerant recovering equipment
 - ① Gas leakage [If there is any malfunction, repair it].
 - ② Oil separator [Drain the residual oil].
 - ③ Recovering equipment weighing function, overcharge preventing function (float switch), moisture indicator, drier and other accessory functions [should be adjusted or replaced where necessary].
 - ④ Electrical circuit
 - b) Checking the accessories to the refrigerant recovering equipment
- (2) Preparations for recovering procedures
 - a) Installation of refrigerant recovering equipment
Install the equipment in a place which satisfies the following requirements as much as possible.
 - ① Ambient temperature is higher than 0°C and lower than 40°C.
 - ② A flat and dry floor.
 - ③ A place as close to the air conditioner as possible.
 - b) Preparation of recovering cylinder
A recovering cylinder should be such that it does not go against prohibitions, and is suitable for refrigerant recovered.
 - c) Connect to the power source
 - d) Preparations for air conditioner subjected to refrigerant recovery
 - ① When it is possible to run the air conditioner subjected to refrigerant recovery, perform pump down operation so that refrigerant is contained in the outdoor unit (condenser side).
 - Carry out the pump down operation after confirming the specification of the air conditioner subjected to refrigerant recovery.
 - ② If there is any clogging part (ex. the electronic expansion valve, etc.), fully open such part.



- (3) Connection of refrigerant recovering equipment
 - a) Connect the air conditioner subjected to refrigerant recovery to the refrigerant recovering equipment.
 - ① When there is a service port (port for recovery):
Make connection to the service port (port for recovery) by using a gauge manifold and charge hose.
 - ② When there is no service port (port for recovery):
Make connection in a manner similar to ① above by using a piercing valve.
 - b) Connect the refrigerant recovering equipment to the recovering cylinder.

- (4) Recovering procedures
- a) According to the instructions for handling the refrigerant recovering equipment (described in the attached instruction manual), operate the equipment to recover refrigerant.
 - b) During the operation, take care of the following cautions.
 - ① Ascertain that the refrigerant recovering equipment is running as required and always monitor the state of operation so that adequate steps can be taken in an emergency.
 - ② During the operation, remain at work site to ensure safety.
 - ③ If you have to leave your work site for any unavoidable reason, stop the operation after ascertaining that the recovering cylinder is not overcharged.
 - c) During the operation, if the refrigerant recovering equipment's overcharging prevention mechanism operates and the equipment stops automatically, replace the recovering cylinder with an empty one.
 - d) If the pressure gauge's reading increases after a short time from the accomplishment of recovery and automatic stoppage of the refrigerant recovering equipment, restart the equipment and, if it stops again, finish the recovery.
- (5) Procedures after recovery
- a) Close the valves on the air conditioner subjected to refrigerant recovery, the refrigerant recovering equipment and the recovering cylinder.
 - b) Detach the recovering cylinder charged with refrigerant and store it as required by law.

8.4.2 Accessories/tools

In order to carry out R410A recovery, a variety of accessories/tools are required.

Shown below are standard accessories.

(1) Recovering cylinder

- Use a recovering cylinder designated by the equipment manufacturer.
- A detachable cylinder must be such that it complies with the laws and regulations concerned.
- Do not use an ordinary cylinder as a recovering cylinder.

Note 1: A cylinder available when R410A was purchased, is a borrowed one.

Note 2: As a cylinder available when R410A was purchased, is provided with a check valve, it cannot be used as a recovering cylinder.

- Types (by function)

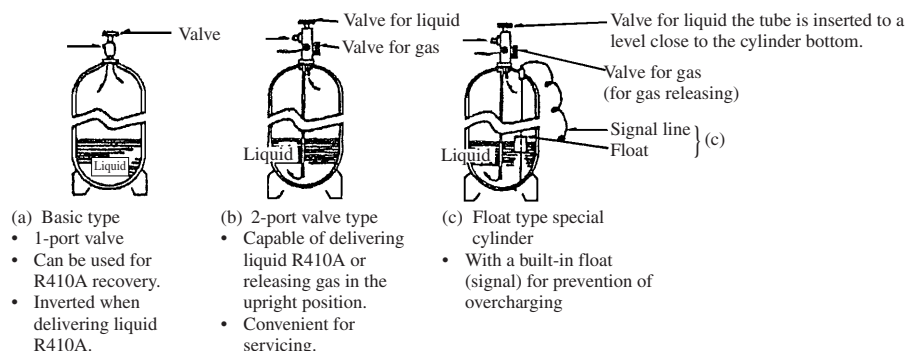


Fig.8 Cylinder types

- Caution

It is prohibited by law to recover R410A into a throw-away service can or one-way cylinder.

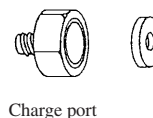
(2) Drier

- A desiccant container for removing the water content of R410A.
- A drier should be prepared as expendables.
- Keep the drier sealed just before fitting it.
- Required to protect the R410A recovering equipment.

(3) Connection hose

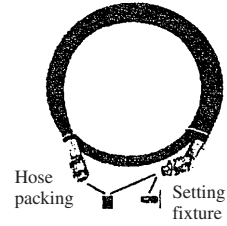
a) Charge port and charge port packing

- Usually, it is sold independently of a refrigerant cylinder.
- In the case of a two-port cylinder, the diameter may be special. Inquire the manufacture for confirmation.
- A packing is expendables.



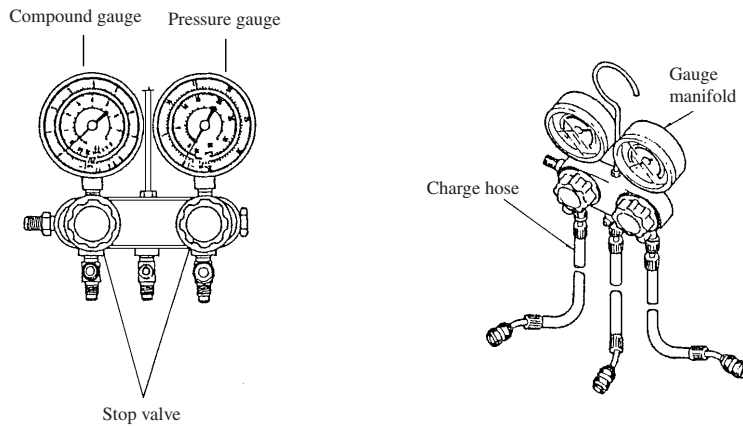
b) Charge hose (pressure resistant hose for fluorocarbon) and packing

- It is 1/4B in thickness and available in various lengths, etc.
- Use a hose whose pressure resisting performance is higher than 5.2 MPa (52 kg/cm²G).
- Generally, a setting fixture is provided only on one end.



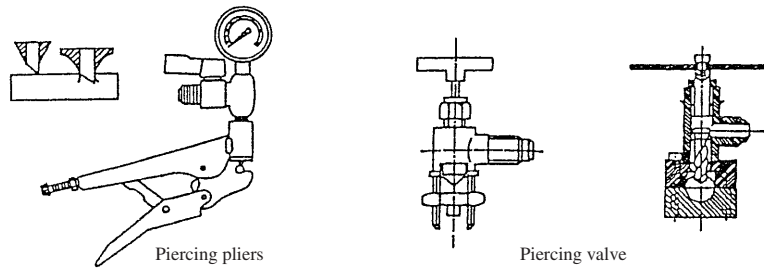
(4) Gauge manifold

- The most important service tool for refrigeration and air conditioner.
- Widely used when charging/recovering R410A while checking gas pressure.



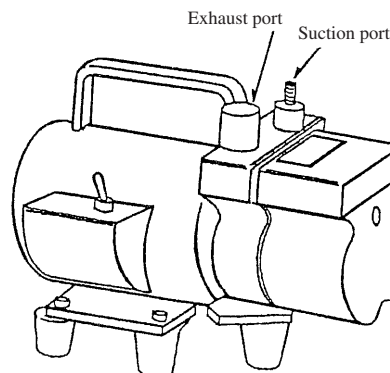
(5) Tube piercing valve

- A tool used to make a hole for recovery in the copper pipe when recovering R410A from equipment which has no port for charging or recovering gas. Various types are available on the market and given various names.
- As the piercing edge tends to wear, it is necessary to treat this valve as semi-expendables.
- As vacuum rises, air tends to be inhaled from the hole. So, care must be exercised.



(6) Vacuum pump

Used to evacuate the recovering equipment and recovering cylinder.



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