Application guide
Installation, operating and maintenance manual
AIRCUBE - KSCM/KSHM

• • • Providing indoor climate comfort

MIL106E-0909 09-2009

Congratulations you have made a wise choice and we feel sure that it will meet your expectations

WARNING: Read this manual before installation, and repair or maintenance work.

Lennox have been providing environmental solutions since 1895, our range of AIRCUBE continues to meet the standards that have made LENNOX a household name. Flexible design solutions to meet YOUR needs and uncompromising attention to detail. Engineered to last, simple to maintain and Quality that comes as standard.
Information on local contacts at www.lennoxeurope.com.

GENERAL DESCRIPTION

The AIRCUBE range of condensing units, cooling only and heat pump, is of the “air to air” type, and designed for commercial / industrial applications.
They are designed for outdoor installation, with a wide range of options to suit the customer requirements when being matched to other types of indoor units or Air Handling equipment.

CABINET

Made from galvanised steel sheet with an epoxy paint finish, to ensure good weatherproofing and a high resistance to corrosion. (RAL 9002 standard).
The units are constructed with metal base sections to support the weight of the units during handling and transport, and providing a sturdy base for installation.

COMPRESSORS

All units are provided with hermetically sealed compressors, scroll type, cooled by exhaust gas, with internal thermal insulation inside the engine, so no other additional protection is required. The compressor is fitted on vibration mountings both inside and outside.

FANS

The units are supplied with one, two outdoor fans, axial type, of direct coupling and motor with external rotor and excellent features on sound levels.
Two speeds in unit 112D to 246D.

ELECTRICAL PANEL

- Unit wiring in compliance with standard EN 60204-1.
- IP 54 water protection.
- Circuit breaker protection for compressor and fan.
- Compressor and fan working contactors.
- Terminal block and wiring for power supply to the unit.

COOLING & HEATING CIRCUIT

Made of welded dehumidifying copper tube.
The units are supplied with high and low pressure switches, with automatic reset.
Thermostatic expansion valve, 4-way valve, suction receiver and filter drier in heat pump version.
They are supplied charged with Nitrogen.

HEAT EXCHANGERS

Made of copper tubing with aluminum corrugated swirl fins, they are designed and specially dimensioned to obtain the maximum output. Also helping to reduce ice formation, the frequency of defrosting and ensuring maximum operating efficiency of the coil.

CONTROL

- Model: Climatic 40
- Control and check by microprocessor.
- Reading refrigerant temperatures.
- Reading of refrigerant pressure (heat pump units)
- Alarm signaling.
- Diagnostic per circuit.
- Adjustment of parameters adapted for operating conditions
- Hour counter and daily balance of operating time for each compressor by “first in/first out” permutation (units with two compressors).
- Remote alarm signal.
- Fan speed control (22E-86D)

OPTIONS	APLICATION	DESCRIPTION
ARCHITECTURAL INTEGRATION		
High pressure 250 Pa FP1.	KSCM/KSHM 112D-214D	Available static pressure for outdoor unit up to 125Pa
SECURITY		
Main switch.	KSCM/KSHM 22E-214D	Electrical box access protection.
Softstarter.	KSCM/KSHM 22E-214D	It reduces the peak compressor starting current.
Return lock three phases.	KSCM/KSHM 22E-214D	It assures that unit will not begin operation on detection of overvoltage, tage, phase reversal fault or phase failure.
Protection grill.	KSCM/KSHM 22E-214D	It prevents condenser coil against accidental impacts..
COMFORT PRECISION AND ENERGY EFFICIENCY		
Low ambient kit 0ºC	KSCM/KSHM 22E-214D	Operation of the unit in cooling mode until 0ºC. of outdoor temperature. It is a crank case heater for the compressor.
Low ambient kit -15ºC	KSCM/KSHM 22E-214D	Operation of the unit in cooling mode until -15ºC. of outdoor temperature. It allows refrigerant connection between indoor and outdoor unit until 30m.
Kit low noise.	KSCM/KSHM 22E-214D	Noise level reduction. It includes compressor jacket.
SERVICE		
Factory pre-charged.	KSCM/KSHM 22E-214D	R-410A refrigerant charge and service valves.
Service valves.	KSCM/KSHM 22E-214D	Liquid and gas service valves to make easier maintenance operations.
Drive indoor motor	KSCM/KSHM 22E-214D	It includes the contactor and thermal switch, for indoor motor.
COMMUNICATION CAPABILITIES		
ModBUS	KSCM/KSHM 22E-214D	BMS as communications protocoll.
EXTENDED LIFECYCLE		
Precoated coil	KSCM/KSHM 22E-214D	Protection from aggressive external environmetal conditions of outdoor coil.

DENOMINATION

OUTDOOR UNIT

K S — Condensing air conditioning unit with scroll compressor

C — Application: C: Cooling only; H: Heat pump

M — Type of refrigerant: M: R-410A

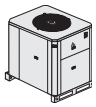
22 — Approximately capacity in kW

E — E: One circuit; D: Two circuits

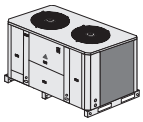
PRODUCT RANGE UNITS COOLING ONLY WITH REFRIGERANT R-410A

22E

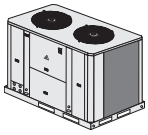
26E-43E



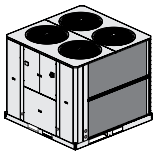
52D-86D



112D-152D



214D-246D



OUTDOOR UNIT	Ph/V/Hz	NOMINAL (*) CAPACITY kW	NOMINAL (*) CONSUMPTION kW
		COOLING	COOLING
KSCM 22E	3N~400V 50Hz	19.7	6.43
KSCM 26E	3N~400V 50Hz	24.7	8.10
KSCM 32E	3N~400V 50Hz	28.4	9.63
KSCM 38E	3N~400V 50Hz	36.1	11.9
KSCM 43E	3N~400V 50Hz	42.0	14.1
KSCM 52D	3N~400V 50Hz	49.4	16.2
KSCM 64D	3N~400V 50Hz	56.7	19.3

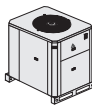
OUTDOOR UNIT	Ph/V/Hz	NOMINAL (*) CAPACITY kW	NOMINAL (*) CONSUMPTION kW
		COOLING	COOLING
KSCM 76D	3N~400V 50Hz	72.1	23.7
KSCM 86D	3N~400V 50Hz	83.9	28.3
KSCM 112D	3N~400V 50Hz	104	34.3
KSCM 128D	3N~400V 50Hz	115	37.1
KSCM 152D	3N~400V 50Hz	141	46.2
KSCM 214D	3N~400V 50Hz	197	63.4
KSCM 246D	3N~400V 50Hz	228	74.5

(*) Evaporating temperature= +7ºC / Ambient, temperature=+35ºC DB/24ºC WB.

PRODUCT RANGE UNITS HEAT PUMP WITH REFRIGERANT R-410A

22E

26E-43E



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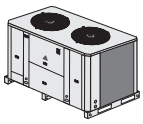

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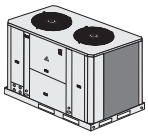

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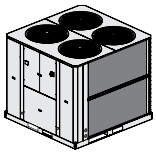


OUTDOOR UNIT	Ph/V/Hz	NOMINAL CAPACITY kW		NOMINAL CONSUMPTION kW	
		COOLING (*)	H. PUMP (**)	COOLING (*)	H. PUMP (**)
KSHM 22E	3N~400V 50Hz	19.7	19.8	6.43	6.18
KSHM 26E	3N~400V 50Hz	24.7	25.0	8.10	7.78
KSHM 32E	3N~400V 50Hz	28.4	28.6	9.63	9.18
KSHM 38E	3N~400V 50Hz	36.1	36.0	11.9	11.1
KSHM 43E	3N~400V 50Hz	42.0	40.2	14.1	12.9
KSHM 52D	3N~400V 50Hz	49.4	50.1	16.2	15.6
KSHM 64D	3N~400V 50Hz	56.7	57.1	19.3	18.4

OUTDOOR UNIT	Ph/V/Hz	NOMINAL CAPACITY kW		NOMINAL CONSUMPTION kW	
		COOLING (*)	H. PUMP (**)	COOLING (*)	H. PUMP (**)
KSHM 76D	3N~400V 50Hz	72.1	71.9	23.7	22.2
KSHM 86D	3N~400V 50Hz	83.9	80.3	28.3	25.9
KSHM 112D	3N~400V 50Hz	104	105	34.3	32.4
KSHM 128D	3N~400V 50Hz	115	114	37.1	35.6
KSHM 152D	3N~400V 50Hz	141	137	46.2	43.8
KSHM 214D	3N~400V 50Hz	197	191	63.4	59.8
KSHM 246D	3N~400V	228	218	74.5	71.2

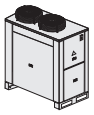
(*) Evaporating temperature= +7ºC / Ambient temperature=+35ºC DB.

(**) Condensing temperature 50ºC/Ambient temperature 6ºC WB.

DB: Dry bulb WB: Wet bulb

PHYSICAL DATA

22E



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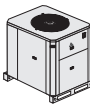

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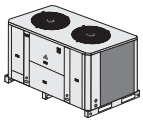

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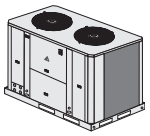

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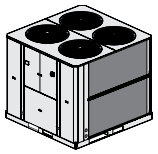


MODELS KSCM/KSHM		22E	26E	32E	38E	43E	52D	64D	76D	86D	112D	128D	152D	214D	246D
Compressor	Nr / Type	1 / Scroll					2 / Scroll				3 / Scroll			4 / Scroll	
Capacity steps	Nr	1					2				3			4	
	%	0-100%					0-55-100%				0-35-59--100%	0-38-62--100%	0-30-50--100%	0-28-50-78-100%	0-30-50-80-100%
Net weight	KSCM kg	160	210	216	233	255	443	452	481	520	632	797	906	1659	1679
	KSHM kg	168	219	221	239	258	452	463	499	537	748	828	932	1684	1704
Dimensions															
Height	mm	1375	1375	1375	1375	1375	1375	1375	1375	1375	1875	1875	1875	1975	1975
Width	mm	660	980	980	980	980	1195	1195	1195	1195	1420	1420	1420	2300	2300
Length	mm	1195	1195	1195	1195	1195	1960	1960	1960	1960	2250	2250	2250	2250	2250
Refrigerant connections															
Liquid		1/2"	5/8"	5/8"	5/8"	5/8"	2x(5/8")	2x(5/8")	2x(5/8")	2x(5/8")	3/4"+5/8"	3/4"+5/8"	2x(3/4")	2x(7/8")	2x(7/8")
Gas		7/8"	1 1/8"	1 1/8"	1 3/8"	1 3/8"	2x(1 1/8")	2x(1 1/8")	2x(1 3/8")	2x(1 3/8")	1 5/8"+1 3/8"	1 5/8"+1 3/8"	2x(1 5/8")	2x1 5/8")	2x(2 1/8")

ELECTRICAL DATA

MODELS KSCM/KSHM		22E	26E	32E	38E	43E	52D	64D	76D	86D	112D	128D	152D	214D	246D
Voltage	Ph/V/Hz	3N~400V-50Hz													
Max. absorbed power	kW	8.55	10.8	12.5	16.4	17.7	21.6	25.0	32.8	35.5	45.6	48.7	59.9	83.0	96.2
Maximum current	A	16.6	24.0	25.4	29.0	34.4	48.0	50.8	58.0	68.8	84.0	90.4	110	152	175
Start up current	A	87.5	97.4	103.7	137.7	151.0	121.4	129.0	167.0	186.0	201.0	207.0	292.0	302.9	358.0

MODELS KSCM/KSHM WITH FP1 OPTION		112D low speed/high speed	128D low speed/high speed	152D low speed/high speed	214D low speed/high speed	246D low speed/high speed
Voltage	Ph/V/Hz	3N~400V-50Hz				
Max. absorbed power	kW	47.6/51.8	50.6/54.8	60.9/65.1	88.8/97.2	98.2/106.6
Maximum current	A	87.2/93.8	93.6/100	111/118	161.2/174.4	178/191
Start up current	A	204/211	211/217	294/300	312/326	361/374

FAN PERFORMANCES

VOLTAGE OPERATING LIMITS: 342-462V

MODELS KSCM/KSHM			22E	26E	32E	38E	43E	52D	64D	76D	86D	112D	128D	152D	214D	246D
Fan type	Type		Condenser fan helicoidal													
	Ph/V/Hz		1~230V-50Hz									3~400V-50Hz				
	C1+C2	r.p.m.	900	900	900	900	900	900+900	900+900	900+900	900+900	900+700	900+700	900+900	700+700 700+700	900+900 900+900
Fan number			2	1				2							4	
Air flow	C1+C2	r.p.m.	6800	9750	11500	11300	1100	9750+ 9750	11500+ 11500	11300+ 11300	11000+ 11000	22700+ 18100	22700+ 18100	22700+ 22700	28600+ 28600	36000+ 36000

MODELS KSCM/KSHM WITH FP1 OPTION		112D FP1	128D FP1	152D FP1	214D FP1	246D FP1
Fan type	Type	Condenser high static fan				
	Ph/V/Hz	3~400V-50Hz				
	r.p.m.	900 (Low speed) / 1450 (High speed)				
Fan number		2			4	

Air flow data. FP1 option. Low speed.

MODELS:				112D-128D -152D	214D	246D
Fan type:				Axial "short case"-direct coupling 900 r.p.m.(Low speed) 3~400V		
Fan number:				2	4	
Available static pressure Pa.	50	Air flow	m3/h	19000+19000	28000+28000	
		Absorbed power	kW	5	10	
	75	Air flow	m3/h	18000+18000	24000+24000	
		Absorbed power	kW	5.1	10.2	
	100	Air flow	m3/h	17000+17000	22000+22000	N/A
		Absorbed power	kW	5.2	10.4	N/A
	125	Air flow	m3/h	15000+15000	20000+20000	N/A
		Absorbed power	kW	5.3	10.6	N/A

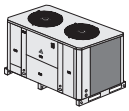
Air flow data. FP1 option. High speed.

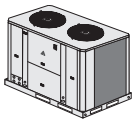
MODELS:				112D-128D -152D	214D 246D
Fan type:				Axial "short case"-direct coupling 1450 r.p.m.(High speed) 3~400V	
Fan number:				2	4
Available static pressure Pa.	150	Air flow	m3/h	22000+22000	34000+34000
		Absorbed power	kW	9.2	18.4
	200	Air flow	m3/h	20000+20000	28000+28000
		Absorbed power	kW	9.3	18.6
	250	Air flow	m3/h	18000+18000	24000+24000
		Absorbed power	kW	9.4	18.8

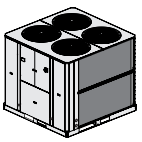
n/a: Not available

22E 

26E-43E 

52D-86D 

112D-152D 

214D-246D 

SOUND PRESSURE / SOUND POWER LEVELS FOR OUTDOOR UNIT

KSCM/KSHM			SPECTRUM PER OCTAVE BAND (dB)							Sound power Lw dB(A)	Sound pressure at 10 m Lp dB(A)
			125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz		
22E		(1)	68	71	71	71	69	67	59	76	48
		(2)	68	71	71	71	68	65	58	75	47
26E		(1)	74	70	72	70	73	70	62	78	50
		(2)	74	70	70	66	72	67	62	76	48
32E		(1)	80	72	74	75	76	71	65	81	53
		(2)	80	72	73	74	74	66	65	79	51
38E		(1)	80	72	74	75	75	69	62	80	52
		(2)	80	72	73	74	73	65	62	79	51
43E		(1)	80	72	74	76	76	68	63	81	53
		(2)	80	72	73	74	74	65	63	79	51
52D		(1)	77	73	75	73	76	73	65	81	53
		(2)	77	73	73	69	75	70	65	79	51
64D		(1)	83	75	77	78	79	74	68	84	56
		(2)	83	75	76	77	77	69	68	82	54
76D		(1)	83	75	77	78	78	72	65	83	55
		(2)	83	75	76	77	76	68	65	82	54
86D		(1)	83	75	77	79	79	71	66	84	56
		(2)	83	75	76	77	77	68	66	82	54
112D	Low speed	(1)	73	71	75	78	77	71	65	82	54
		(2)	73	71	72	75	71	63	65	78	50
	High speed	(1)	82	78	79	83	82	76	67	87	59
		(2)	82	78	78	82	81	74	67	86	58
128D	Low speed	(1)	73	71	75	78	78	72	66	83	55
		(2)	73	71	72	75	72	63	66	79	51
	High speed	(1)	82	78	79	83	82	76	68	87	59
		(2)	82	78	78	82	81	74	68	86	58
152D	Low speed	(1)	75	73	77	82	84	77	69	87	59
		(2)	75	73	74	77	76	66	69	81	53
	High speed	(1)	84	81	81	85	86	80	71	90	62
		(2)	84	81	80	84	84	77	71	88	60
214D	Low speed	(1)	76	75	78	82	84	76	66	88	60
		(2)	74	71	73	76	76	65	66	81	53
	High speed	(1)	79	77	80	84	85	76	67	89	61
		(2)	79	77	78	81	81	68	67	85	57
246D	Low speed	(1)	78	76	79	85	86	79	71	90	62
		(2)	78	76	77	80	79	68	71	84	56
	High speed	(1)	85	82	82	87	88	81	73	92	64
		(2)	85	82	81	85	85	78	73	890	62
FP1 OPTION (Low speed)	112D	(1)	84	81	81	84	81	74	68	87	59
		(2)	84	81	80	84	80	72	68	87	59
	128D	(1)	84	81	80	84	82	75	69	88	60
		(2)	84	81	80	84	80	72	69	87	59
	152D	(1)	84	81	81	85	85	78	71	90	62
		(2)	84	81	80	84	81	72	71	87	59
	214D	(1)	87	84	84	88	86	78	71	91	63
		(2)	87	84	83	87	83	75	71	90	62
	246D	(1)	87	84	84	88	88	80	73	92	64
		(2)	87	84	83	87	84	75	73	90	62
FP1 OPTION (High speed)	112D	(1)	96	94	92	93	89	86	82	97	69
		(2)	96	94	92	93	89	86	82	97	69
	128D	(1)	96	94	92	93	90	86	82	97	69
		(2)	96	94	92	93	89	86	82	97	69
	152D	(1)	96	94	92	93	90	87	82	97	69
		(2)	96	94	92	93	89	86	82	97	69
	214D	(1)	99	97	95	96	93	89	85	100	72
		(2)	99	97	95	96	92	89	85	100	72
	246D	(1)	99	97	95	96	93	90	85	100	72
		(2)	99	97	95	96	92	89	85	100	72

(1) The above data shows noise levels **without** compressor isolation (option).

(2) The above data shows noise levels **with** compressor isolation.

For units: KSCM/KSHM 112D to 246D

- Low speed: - For ambient temperatures < +35ºC and unit working on cooling mode.
- For ambient temperatures > +7ºC and unit working on heating mode.

- High speed: - For ambient temperatures ≥+35ºC and unit working on cooling mode.
- For ambient temperatures ≤ +7ºC and unit working on heating mode.

- Global sound power level measured in compliance with ISO standard 3744 and under Eurovent certification program.
- Sound pressure in dB(A) calculated at 10 m, in a free field on a reflecting surface, is given as a guide only and with a directibility of +/- 3 dBA.
- Only the sound power spectrum and the global sound power value are used in determining pressure characteristics on site.

Remark for FP1 option:

Total Lw, is global sound power level radiated for the fan motor AT FREE DISCHARGE. Sound pressure level (Lp) has to be calculated according the pressure drop introduce in the installation considering the type of the air duct, isolation class, duct length, etc ...

This value is orientative and must always consider for each installation the value of sound power level in the table to calculate the vaue of sound presure level.

MODELS KSCM **22E** **26E**

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	17.3	16.8	15.9	14.7	13.5	21.9	21.3	20.0	18.5	16.8
	Power Input	5.27	5.55	6.01	6.67	7.42	6.71	7.01	7.64	8.46	9.41
5ºC	Total Capacity	20.3	19.8	18.6	17.2	15.8	25.6	24.9	23.3	21.6	19.8
	Power Input	5.49	5.71	6.30	6.97	7.73	6.95	7.25	7.95	8.78	9.73
7ºC	Total Capacity	21.6	21.0	19.7	18.3	16.8	27.2	26.4	24.7	22.9	21.0
	Power Input	5.59	5.84	6.43	7.10	7.86	7.05	7.39	8.10	8.93	9.88
10ºC	Total Capacity	24.0	23.0	21.5	20.0	18.4	30.1	28.6	26.8	24.9	22.9
	Power Input	5.64	6.03	6.64	7.31	8.08	7.11	7.64	8.35	9.18	10.1
15ºC	Total Capacity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Power Input	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

32E **38E**

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	25.4	24.7	23.0	21.1	19.1	32.0	31.4	29.4	27.3	25.0
	Power Input	7.94	8.25	9.11	10.1	11.2	9.83	10.2	11.2	12.3	13.5
5ºC	Total Capacity	29.7	28.8	26.8	24.6	22.4	37.5	36.4	34.1	31.6	29.0
	Power Input	8.20	8.60	9.48	10.5	11.6	10.1	10.6	11.7	12.8	14.1
7ºC	Total Capacity	31.8	30.5	28.4	26.1	23.8	40.1	38.5	36.1	33.5	30.7
	Power Input	8.21	8.76	9.63	10.6	11.7	10.1	10.8	11.9	13.0	14.3
10ºC	Total Capacity	35.2	33.1	30.8	28.4	25.9	44.2	41.8	39.1	36.3	33.3
	Power Input	8.24	9.01	9.90	10.9	12.0	10.2	11.2	12.2	13.4	14.7
15ºC	Total Capacity	n/a	n/a	n/a	n/a	n/a	50.4	47.5	44.5	41.2	37.8
	Power Input	n/a	n/a	n/a	n/a	n/a	10.8	11.8	12.8	14.0	15.3

43E **52D**

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	37.5	36.6	34.3	31.8	29.1	43.8	42.5	40.0	37.0	33.7
	Power Input	11.6	12.0	13.2	14.5	16.0	13.4	14.0	15.3	16.9	18.8
5ºC	Total Capacity	44.3	42.4	39.7	36.8	33.7	51.2	49.8	46.6	43.2	39.6
	Power Input	11.8	12.6	13.9	15.2	16.7	13.9	14.5	15.9	17.6	19.5
7ºC	Total Capacity	47.4	44.9	42.0	38.9	35.7	54.5	52.7	49.4	45.8	42.0
	Power Input	11.8	12.9	14.1	15.5	17.0	14.1	14.8	16.2	17.9	19.8
10ºC	Total Capacity	51.6	48.6	45.5	42.2	38.6	60.2	57.2	53.6	49.8	45.7
	Power Input	12.2	13.3	14.6	16.0	17.5	14.2	15.3	16.7	18.4	20.3
15ºC	Total Capacity	58.6	55.2	51.6	47.7	n/a	n/a	n/a	n/a	n/a	n/a
	Power Input	12.9	14.1	15.4	16.8	n/a	n/a	n/a	n/a	n/a	n/a

64D **76D**

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	50.8	49.4	45.9	42.2	38.2	64.1	62.7	58.7	54.5	50.0
	Power Input	15.9	16.5	18.2	20.2	22.4	19.7	20.3	22.3	24.5	26.9
5ºC	Total Capacity	59.5	57.5	53.5	49.3	44.8	75.0	72.8	68.2	63.3	58.1
	Power Input	16.4	17.2	19.0	20.9	23.2	20.3	21.2	23.3	25.6	28.1
7ºC	Total Capacity	63.7	60.9	56.7	52.3	47.5	80.3	77.0	72.1	66.9	61.4
	Power Input	16.4	17.5	19.3	21.2	23.5	20.3	21.7	23.7	26.1	28.6
10ºC	Total Capacity	70.4	66.2	61.6	56.9	51.8	88.5	83.5	78.3	72.6	66.6
	Power Input	16.5	18.0	19.8	21.8	24.0	20.5	22.3	24.4	26.8	29.3
15ºC	Total Capacity	n/a	n/a	n/a	n/a	n/a	101	95.0	88.9	82.4	75.5
	Power Input	n/a	n/a	n/a	n/a	n/a	21.7	23.6	25.7	28.1	30.7

86D **112D**

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	74.9	73.3	68.6	63.6	58.3	92.0	89.1	84.1	78.0	71.5
	Power Input	23.3	24.1	26.5	29.1	31.9	28.4	29.8	32.3	35.5	39.1
5ºC	Total Capacity	88.6	84.9	79.4	73.6	67.5	108	104	97.7	90.7	83.3
	Power Input	23.6	25.3	27.7	30.5	33.4	29.1	30.7	33.7	37.0	40.6
7ºC	Total Capacity	94.8	89.7	83.9	77.8	71.3	115	110	104	96.1	88.2
	Power Input	23.7	25.8	28.3	31.0	34.0	29.3	31.3	34.3	37.6	41.3
10ºC	Total Capacity	103.2	97.3	90.9	84.3	77.2	126	120	112	104	95.8
	Power Input	24.3	26.6	29.1	31.9	35.0	30.1	32.3	35.3	38.6	42.4
15ºC	Total Capacity	117	110	103	95.5	n/a	n/a	n/a	n/a	n/a	n/a
	Power Input	25.9	28.1	30.7	33.5	n/a	n/a	n/a	n/a	n/a	n/a

n/a: Not available

COOLING CAPACITIES

MODELS KSCM 128D 152D

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	102	99.0	93.4	86.6	79.3	125	122	115	106	97.1
	Power Input	30.8	32.2	35.0	38.5	42.4	38.5	39.8	43.5	47.8	52.5
5ºC	Total Capacity	119	116	109	101	92.5	146.6	142.5	133.1	123.4	113
	Power Input	31.8	33.2	36.4	40.1	44.1	39.1	41.5	45.4	49.7	54.6
7ºC	Total Capacity	127	123	115	107	97.9	157	151	141	131	120
	Power Input	32.0	33.8	37.1	40.7	44.8	40.1	42.3	46.2	50.6	55.5
10ºC	Total Capacity	140	133	125	116	106	174	164	153	142	130
	Power Input	32.3	34.8	38.1	41.8	45.9	40.3	43.6	47.6	52.0	56.9
15ºC	Total Capacity	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Power Input	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

n/a: Not available

214D 246D

EVAPORATING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)					AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (DRY BULB)				
		25ºC	**30ºC**	**35ºC**	**40ºC**	**45ºC**	**25ºC**	**30ºC**	**35ºC**	**40ºC**	**45ºC**
0ºC	Total Capacity	174	170	160	148	136	202	195	184	172	158
	Power Input	52.7	54.6	59.4	65.3	72.0	62.5	66.0	70.7	76.7	84.0
5ºC	Total Capacity	204	199	186	173	159	238	228	215	200	183
	Power Input	54.7	56.7	62.1	68.3	75.3	64.5	68.2	73.3	79.7	87.4
7ºC	Total Capacity	218	211	197	183	168	254	242	228	212	194
	Power Input	55.1	57.9	63.4	69.6	76.6	65.3	69.3	74.5	81.0	88.9
10ºC	Total Capacity	241	229	214	199	183	277	264	248	230	210
	Power Input	55.5	59.8	65.3	71.7	78.9	66.8	70.9	76.4	83.2	91.2
15ºC	Total Capacity	277	261	244	227	210	317	302	283	263	240
	Power Input	58.3	63.3	69.0	75.5	83.0	69.6	74.1	79.9	87.1	95.5

CAPACITY PARTIALITY

KSCM/KSHM	**22E**	**26E a 43E**	**52D a 86D**	**112D**	**128D**	**152D**	**214D**	**246D**
Capacity steps %	0-100	0-100	0-55-100	0-35-59-100	0-38-62-100	0-30-50-100	0-28-50-78-100	0-30-50-80-100

CORRECTION FACTORS COOLING MODE

To find out the performances for units installed with air ducts, apply the following coefficients for capacity and consumption, over the performance tables of standard fan units without ducts.

UNITS COOLING ONLY		**VERSION**	**MODELS**	**Available static pressure Pa**	**Maximum ambient temperature ºC**	**Correction coeffcient cooling capacity**	**Correction coeffcient consumption ((1) only FP1)**
AIR AVAILABLE STATIC PRESSURE UP TO	**50Pa**	**STANDARD**	**22E-214D**	**30**	43	0.95	1.06
				50	39	0.89	1.16
	125Pa	**FP1 Low speed**	**112D-214D (246D)**	**50**	45 (38)	0.964	1.072
				75	42 (35)	0.935	1.094
				100	38 (N/A)	0.9	1.171
				125	36 (N/A)	0.856	1.269
	250Pa	**FP1 High speed**	**112D-214D (246D)**	**150**	47 (43)	1.01	0.98
				200	44 (40)	0.97	1.037
				250	41 (37)	0.94	1.099

(1) After applying correction coefficient consumption is needed to add the following power input to get total power consumption.

EXTRA POWER COMSUPTION					
MODELS	**112D**	**128D**	**152D**	**214D**	**246D**
FP1 Low speed	2	2	1	5.8	2
FP1 High speed	6.2	6.2	5.2	14.2	10.4

OPERATING LIMITS FOR (COOLING ONLY) UNITS

		MAXIMUM TEMPERATURES	MINIMUM TEMPERATURES
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32ºC DB / 23ºC WB	21ºC DB / 15ºC WB
	OUTDOOR TEMPERATURE	45ºC (22E-26E-32E-52D-64D) 47ºC (38E-43E-76D-86D-112D-128D-152D-214D-246D)	+10ºC STANDARD UNIT 0ºC (*) -15ºC (**)

DB.- Dry bulb temperature.
WB.- Wet bulb temperature.

(*) With kit low temperature 0ºC option.

(**) With kit low temperature -15ºC option.

HEATING CAPACITIES

MODELS KSHM

22E

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	12.9	15.0	17.4	20.0	21.1	22.4	29.9
	Power Input	3.89	3.92	3.95	3.98	3.99	4.01	4.15
35ºC	Total Capacity	12.9	14.8	17.1	19.6	20.8	22.0	29.2
	Power Input	4.36	4.38	4.41	4.43	4.45	4.46	4.58
40ºC	Total Capacity	12.8	14.7	16.9	19.3	20.4	21.6	28.6
	Power Input	4.88	4.90	4.92	4.94	4.96	4.97	5.07
45ºC	Total Capacity	n/a	14.6	16.7	19.0	20.1	21.2	27.9
	Power Input	n/a	5.49	5.51	5.52	5.53	5.54	5.61
50ºC	Total Capacity	n/a	n/a	16.6	18.8	19.8	20.9	27.3
	Power Input	n/a	n/a	6.17	6.18	6.18	6.19	6.24
55ºC	Total Capacity	n/a	n/a	n/a	18.6	19.5	20.5	26.6
	Power Input	n/a	n/a	n/a	6.93	6.93	6.93	6.95

26E

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	16.5	19.0	22.0	25.3	26.7	28.3	37.8
	Power Input	5.22	5.22	5.21	5.20	5.19	5.20	5.29
35ºC	Total Capacity	16.3	18.8	21.7	24.9	26.3	27.9	37.0
	Power Input	5.77	5.76	5.74	5.73	5.73	5.73	5.84
40ºC	Total Capacity	16.2	18.7	21.5	24.5	25.9	27.4	36.1
	Power Input	6.41	6.38	6.35	6.32	6.32	6.32	6.41
45ºC	Total Capacity	n/a	18.5	21.2	24.1	25.5	26.9	35.2
	Power Input	n/a	7.11	7.05	7.01	6.99	6.98	7.06
50ºC	Total Capacity	n/a	n/a	20.9	23.8	25.0	26.4	34.4
	Power Input	n/a	n/a	7.88	7.80	7.78	7.76	7.79
55ºC	Total Capacity	n/a	n/a	n/a	23.4	24.6	25.9	33.5
	Power Input	n/a	n/a	n/a	8.74	8.70	8.67	8.63

32E

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	18.9	21.8	25.2	28.9	30.5	32.3	42.7
	Power Input	6.01	6.01	6.00	5.99	5.99	6.00	6.11
35ºC	Total Capacity	18.7	21.5	24.8	28.4	30.0	31.8	41.9
	Power Input	6.70	6.69	6.67	6.65	6.65	6.65	6.71
40ºC	Total Capacity	18.5	21.3	24.5	28.0	29.5	31.2	41.0
	Power Input	7.46	7.45	7.42	7.39	7.38	7.37	7.39
45ºC	Total Capacity	n/a	21.1	24.2	27.5	29.0	30.7	40.1
	Power Input	n/a	8.32	8.28	8.24	8.22	8.20	8.17
50ºC	Total Capacity	n/a	n/a	23.9	27.1	28.6	30.1	39.1
	Power Input	n/a	n/a	9.26	9.20	9.18	9.15	9.07
55ºC	Total Capacity	n/a	n/a	n/a	26.7	28.1	29.6	38.1
	Power Input	n/a	n/a	n/a	10.3	10.3	10.2	10.1

38E

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	23.9	27.4	31.5	36.0	37.9	40.0	53.1
	Power Input	7.41	7.46	7.49	7.51	7.52	7.55	7.84
35ºC	Total Capacity	23.7	27.2	31.2	35.5	37.4	39.5	52.1
	Power Input	8.10	8.19	8.24	8.25	8.26	8.27	8.45
40ºC	Total Capacity	23.5	27.0	30.9	35.1	37.0	39.0	51.2
	Power Input	8.85	8.99	9.07	9.10	9.10	9.11	9.20
45ºC	Total Capacity	23.4	26.7	30.5	34.7	36.5	38.5	50.2
	Power Input	9.65	9.86	9.98	10.0	10.1	10.1	10.1
50ºC	Total Capacity	23.2	26.5	30.2	34.2	36.0	37.9	49.1
	Power Input	10.5	10.8	11.0	11.1	11.1	11.1	11.2
55ºC	Total Capacity	23.0	26.3	29.9	33.8	35.4	37.3	48.0
	Power Input	11.4	11.8	12.1	12.2	12.3	12.3	12.4

43E

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	26.5	30.4	34.9	39.8	42.0	44.3	58.7
	Power Input	8.54	8.64	8.68	8.70	8.71	8.73	8.99
35ºC	Total Capacity	26.3	30.2	34.6	39.4	41.5	43.7	57.7
	Power Input	9.34	9.48	9.56	9.59	9.59	9.60	9.74
40ºC	Total Capacity	26.2	30.0	34.3	39.0	41.0	43.2	56.7
	Power Input	10.2	10.4	10.5	10.6	10.6	10.6	10.7
45ºC	Total Capacity	16.1	29.8	34.0	38.6	40.6	42.7	55.7
	Power Input	11.1	11.4	11.6	11.7	11.7	11.7	11.8
50ºC	Total Capacity	25.9	29.6	33.8	38.2	40.2	42.2	54.7
	Power Input	12.1	12.5	12.8	12.9	12.9	13.0	13.0
55ºC	Total Capacity	25.8	29.5	33.5	37.8	39.7	41.7	53.7
	Power Input	13.2	13.7	14.0	14.2	14.3	14.4	14.4

52D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	32.9	38.0	44.0	50.5	53.4	56.7	75.7
	Power Input	10.4	10.4	10.4	10.4	10.4	10.4	10.6
35ºC	Total Capacity	32.7	37.7	43.4	49.8	52.6	55.7	73.9
	Power Input	11.5	11.5	11.5	11.5	11.5	11.5	11.7
40ºC	Total Capacity	32.4	37.3	42.9	49.0	51.7	54.7	72.2
	Power Input	12.8	12.8	12.7	12.7	12.7	12.7	12.8
45ºC	Total Capacity	n/a	36.9	42.4	48.3	50.9	53.8	70.5
	Power Input	n/a	14.2	14.1	14.0	14.0	14.0	14.1
50ºC	Total Capacity	n/a	n/a	41.8	47.5	50.1	52.8	68.7
	Power Input	n/a	n/a	15.8	15.6	15.6	15.5	15.6
55ºC	Total Capacity	n/a	n/a	n/a	46.8	49.3	51.9	67.0
	Power Input	n/a	n/a	n/a	17.5	17.4	17.3	17.3

64D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	37.7	43.6	50.4	57.8	61.0	64.6	85.4
	Power Input	12.0	12.0	12.0	12.0	12.0	12.0	12.2
35ºC	Total Capacity	37.3	43.1	49.7	56.9	60.0	63.6	83.8
	Power Input	13.4	13.4	13.3	13.3	13.3	13.3	13.4
40ºC	Total Capacity	37.0	42.6	49.0	56.0	59.0	62.5	82.1
	Power Input	14.9	14.9	14.9	14.8	14.8	14.8	14.8
45ºC	Total Capacity	n/a	42.2	48.4	55.1	58.1	61.4	80.2
	Power Input	n/a	16.6	16.6	16.5	16.4	16.4	16.3
50ºC	Total Capacity	n/a	n/a	47.8	54.2	57.1	60.2	78.3
	Power Input	n/a	n/a	18.5	18.4	18.4	18.3	18.1
55ºC	Total Capacity	n/a	n/a	n/a	53.5	56.2	59.1	76.3
	Power Input	n/a	n/a	n/a	20.6	20.5	20.5	20.2

76D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	47.9	54.9	63.0	71.9	75.8	80.1	106
	Power Input	14.8	14.9	15.0	15.0	15.1	15.1	15.7
35ºC	Total Capacity	47.5	54.4	62.3	71.0	74.9	79.0	104
	Power Input	16.2	16.4	16.5	16.5	16.5	16.5	16.9
40ºC	Total Capacity	47.1	53.9	61.7	70.2	73.9	78.0	102
	Power Input	17.7	18.0	18.1	18.2	18.2	18.2	18.4
45ºC	Total Capacity	46.7	53.5	61.1	69.3	72.9	76.9	100
	Power Input	19.3	19.7	20.0	20.1	20.1	20.1	20.2
50ºC	Total Capacity	46.3	53.0	60.4	68.4	71.9	75.8	98.2
	Power Input	21.0	21.6	22.0	22.2	22.2	22.2	22.3
55ºC	Total Capacity	46.0	52.5	59.8	67.5	70.9	74.6	96.1
	Power Input	22.9	23.7	24.2	24.5	24.6	24.6	24.7

86D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	53.0	60.8	69.7	79.6	84.0	88.5	117
	Power Input	17.1	17.3	17.4	17.4	17.4	17.5	18.0
35ºC	Total Capacity	52.7	60.4	69.1	78.8	83.0	87.4	115
	Power Input	18.7	19.0	19.1	19.2	19.2	19.2	19.5
40ºC	Total Capacity	52.4	60.0	68.6	78.0	82.1	86.4	113
	Power Input	20.4	20.8	21.1	21.2	21.2	21.2	21.3
45ºC	Total Capacity	52.1	59.6	68.0	77.2	81.2	85.4	111
	Power Input	22.2	22.8	23.2	23.4	23.4	23.4	23.5
50ºC	Total Capacity	51.9	59.3	67.6	76.5	80.3	84.4	109
	Power Input	24.2	25.0	25.5	25.8	25.9	25.9	26.0
55ºC	Total Capacity	51.7	59.0	67.1	75.7	79.4	83.5	107
	Power Input	26.3	27.3	28.0	28.5	28.6	28.7	28.9

112D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	-6ºC	-1ºC	4ºC	6ºC	8ºC	18ºC
30ºC	Total Capacity	69.4	79.8	91.9	105	111	117	156
	Power Input	28.8	21.9	22.0	22.0	22.0	22.1	22.9
35ºC	Total Capacity	68.8	79.1	90.8	104	109	116	153
	Power Input	23.9	24.1	24.1	24.1	24.1	24.2	24.7
40ºC	Total Capacity	68.2	78.3	89.8	102	108	114	150
	Power Input	26.2	23.5	26.6	26.6	26.6	26.6	26.9
45ºC	Total Capacity	n/a	77.5	88.7	101	106	112	146
	Power Input	n/a	29.1	29.3	29.3	29.3	29.3	29.5
50ºC	Total Capacity	n/a	n/a	87.6	99.4	105	110	143
	Power Input	n/a	n/a	32.3	32.4	32.4	32.4	32.5
55ºC	Total Capacity	n/a	n/a	n/a	97.9	103	108	140
	Power Input	n/a	n/a	n/a	35.9	35.9	36.0	36.0

n/a: Not available

HEATING CAPACITIES

MODELS KSHM

128D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	**-6ºC**	**-1ºC**	**4ºC**	**6ºC**	**8ºC**	**18ºC**
30ºC	Total Capacity	75.8	87.2	100	115	121	128	170
	Power Input	23.6	23.8	23.8	23.9	23.9	24.0	24.9
35ºC	Total Capacity	75.1	86.3	99.1	113	119	126	167
	Power Input	26.0	26.2	26.3	26.3	26.3	26.3	26.9
40ºC	Total Capacity	74.5	85.5	98.0	112	118	124	163
	Power Input	28.5	28.8	29.0	29.0	29.0	29.0	29.3
45ºC	Total Capacity	n/a	84.7	96.9	110	116	122	160
	Power Input	n/a	31.8	32.0	32.1	32.1	32.1	32.2
50ºC	Total Capacity	n/a	n/a	95.8	109	114	120	156
	Power Input	n/a	n/a	35.4	35.5	35.6	35.6	35.6
55ºC	Total Capacity	n/a	n/a	n/a	107	112	118	153
	Power Input	n/a	n/a	n/a	39.4	39.4	39.5	39.4

152D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	**-6ºC**	**-1ºC**	**4ºC**	**6ºC**	**8ºC**	**18ºC**
30ºC	Total Capacity	90.7	104	120	138	146	154	205
	Power Input	29.3	29.6	29.7	29.9	30.0	30.1	30.9
35ºC	Total Capacity	90.1	103	119	136	143	152	201
	Power Input	32.2	32.4	32.6	32.7	32.8	32.9	33.5
40ºC	Total Capacity	89.7	103	118	134	141	149	197
	Power Input	35.4	35.7	35.8	36.0	36.0	36.1	36.5
45ºC	Total Capacity	n/a	102.0	116	132	139	147	192
	Power Input	n/a	39.3	39.5	39.6	39.7	39.7	40.0
50ºC	Total Capacity	n/a	n/a	115	131	137	145	188
	Power Input	n/a	n/a	43.6	43.8	43.8	43.8	44.0
55ºC	Total Capacity	n/a	n/a	n/a	129	135	142	184
	Power Input	n/a	n/a	n/a	48.5	48.5	48.5	48.7

n/a: Not available

214D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	**-6ºC**	**-1ºC**	**4ºC**	**6ºC**	**8ºC**	**18ºC**
30ºC	Total Capacity	126	145	167	191	202	213	284
	Power Input	40.0	40.3	40.6	40.9	41.0	41.2	42.4
35ºC	Total Capacity	125	143	165	188	199	210	279
	Power Input	43.7	44.1	44.4	44.7	44.8	44.9	45.9
40ºC	Total Capacity	124	142	163	186	196	207	273
	Power Input	47.9	48.4	48.7	49.0	49.1	49.2	50.0
45ºC	Total Capacity	n/a	142	162	184	193	204	267
	Power Input	n/a	53.2	53.6	54.0	54.1	54.2	54.9
50ºC	Total Capacity	n/a	n/a	161	181.7	191	201	262
	Power Input	n/a	n/a	59.3	59.7	59.8	59.9	60.5
55ºC	Total Capacity	n/a	n/a	n/a	180	189	198	256
	Power Input	n/a	n/a	n/a	66.2	66.3	66.4	67.0

246D

CONDENSING TEMPERATURE	kW	AIR ENTRY TEMPERATURE INTO THE OUTDOOR UNIT ºC (WET BULB)						
		-11ºC	**-6ºC**	**-1ºC**	**4ºC**	**6ºC**	**8ºC**	**18ºC**
30ºC	Total Capacity	146	169	194	220	231	253	328
	Power Input	48.7	49.2	49.6	50.0	50.2	50.5	51.2
35ºC	Total Capacity	145	168	192	217	228	249	322
	Power Input	52.9	53.4	53.8	54.2	54.4	54.7	55.4
40ºC	Total Capacity	145	167	190	214	224	245	315
	Power Input	57.8	58.3	58.7	59.1	59.3	59.6	60.3
45ºC	Total Capacity	145	166	188	212	221	241	309
	Power Input	63.4	63.9	64.3	64.7	64.9	65.2	65.9
50ºC	Total Capacity	145	166	187	209	218	237	303
	Power Input	69.8	70.2	70.7	71.1	71.2	71.5	72.1
55ºC	Total Capacity	146	165	185	206	215	233	297
	Power Input	76.8	77.3	77.7	78.1	78.2	78.5	79.1

CAPACITY PARTIALITY

KSCM/KSHM	**22E**	**26E a 43E**	**52D a 86D**	**112D**	**128D**	**152D**	**214D**	**246D**
Capacity steps %	0-100	0-100	0-55-100	0-35-59-100	0-38-62-100	0-30-50-100	0-28-50-78-100	0-30-50-80-100

CORRECTION FACTORS HEATING MODE

To find out the performances for units installed with air ducts, apply the following coefficients for capacity and consumption, over the performance tables of standard fan units without ducts.

UNITS HEAT PUMP		**VERSION**	**MODELS**	**Available static pressure Pa**	**Maximum ambient temperature ºC**	**Correction coeffcient heating capacity**	**Correction coeffcient consumption ((1) only FP1)**
AIR AVAILABLE STATIC PRESSURE UP TO	**50Pa**	**STANDARD**	**22E-214D**	**30**	-9	0.94	1.02
				50	-8	0.89	1.03
	125Pa	**FP1 Low speed**	**112D-214D (246D)**	**50**	-10 (-8)	1	1
				75	-8 (-6)	0.94	1.02
				100	-6 (N/A)	0.89	1.03
				125	-5 (N/A)	0.87	1.04
	250Pa	**FP1 High speed**	**112D-214D (246D)**	**150**	-10 (-10)	1.01	0.99
				200	-10 (-8)	1	1
				250	-8 (-6)	0.94	1.02

(1) After applying correction coefficient consumption is needed to add the following power input to get total power consumption.

EXTRA POWER COMSUPTION					
MODELS	**112D**	**128D**	**152D**	**214D**	**246D**
FP1 Low speed	2	2	1	5.8	2
FP1 High speed	6.2	6.2	5.2	14.2	10.4

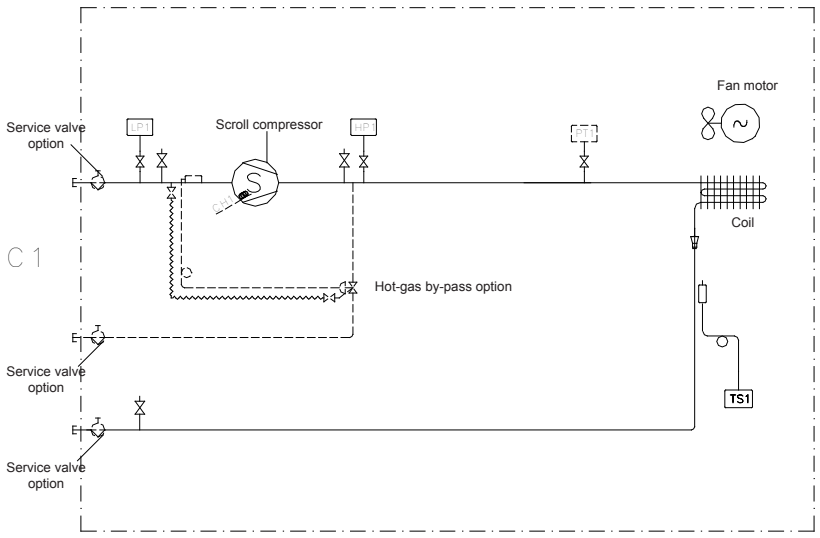
OPERATING LIMITS FOR (HEAT PUMP) UNITS

		MAXIMUM TEMPERATURE	MINIMUM TEMPERATURE
COOLING CYCLE OPERATION	INDOOR TEMPERATURE	32ºC DB / 23ºC WB	21ºC DB / 15ºC WB
	OUTDOOR TEMPERATURE	45ºC (22E-26E-32E-52D-64D) 47ºC (38E-43E-76D-86D-112D-128D-152D-214D-246D)	0ºC
HEATING CYCLE OPERATION	INDOOR TEMPERATURE	27ºC DB	15ºC DB
	OUTDOOR TEMPERATURE	DEPENDING ON MODELS (See tables for heating capacities)	-10ºC DB / -11ºC WB

DB.- Dry bulb temperature
WB.- Wet bulb temperature

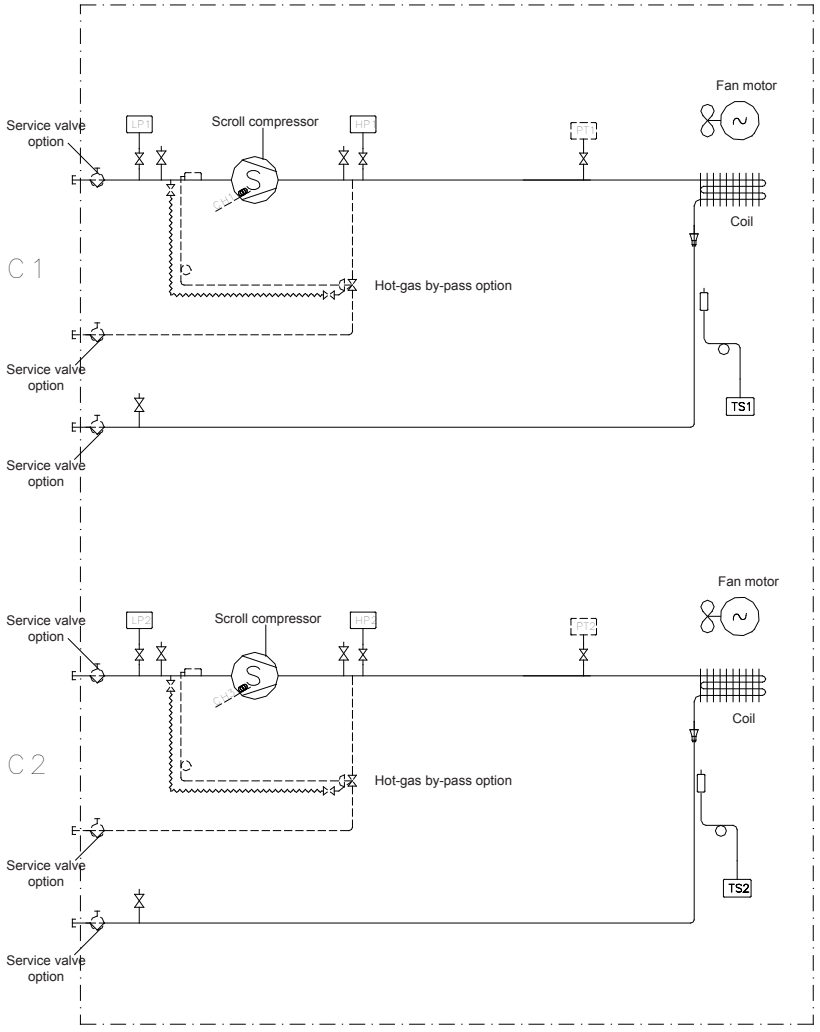
COOLING PIPING DRAWINGS

OUTDOOR UNIT
KSCM 22E/26E/32E/38E/43E



---------- OPTIONAL ELEMENT

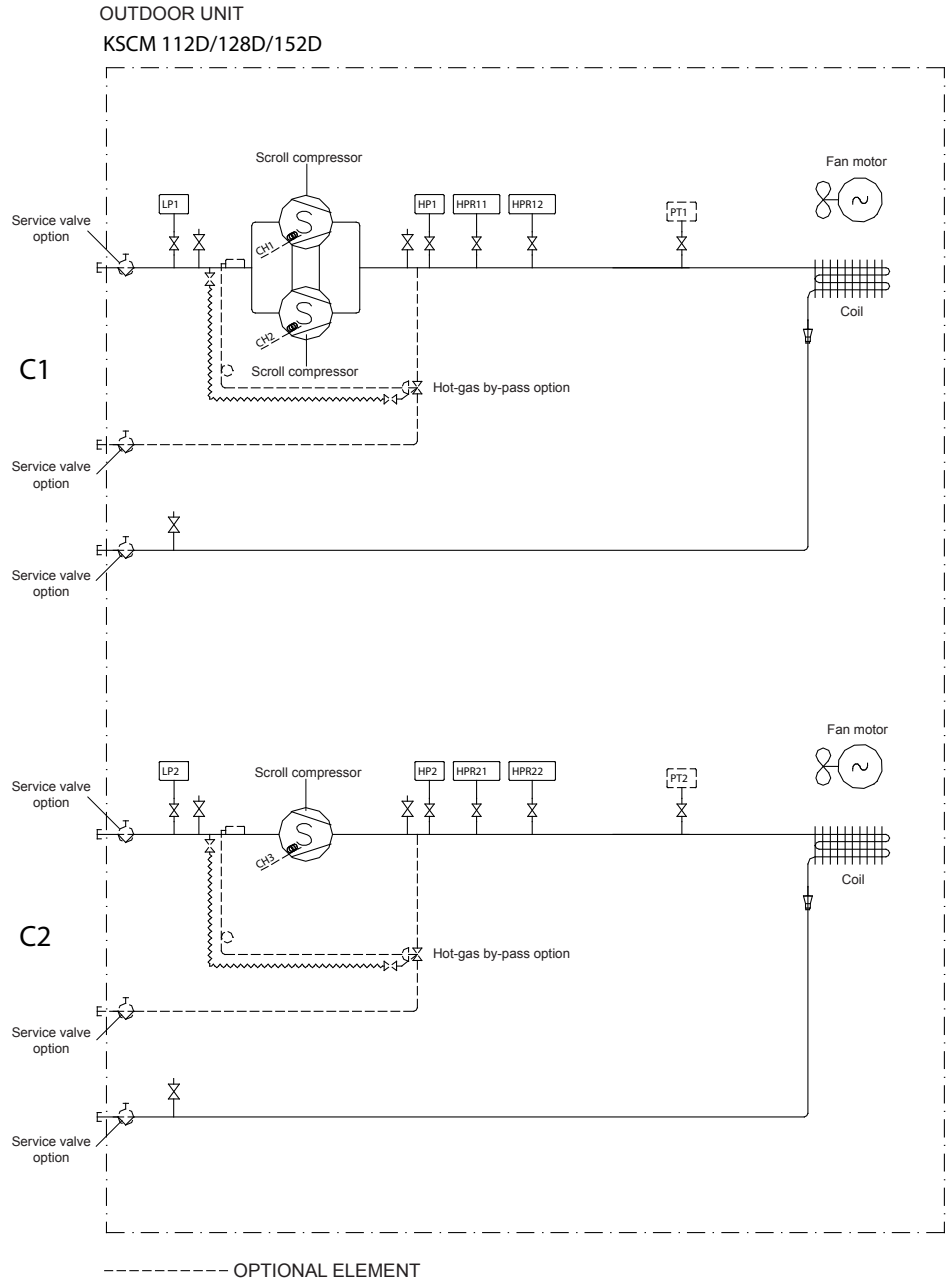
OUTDOOR UNIT
KSCM 52D/64D/76D/86D



---------- OPTIONAL ELEMENT

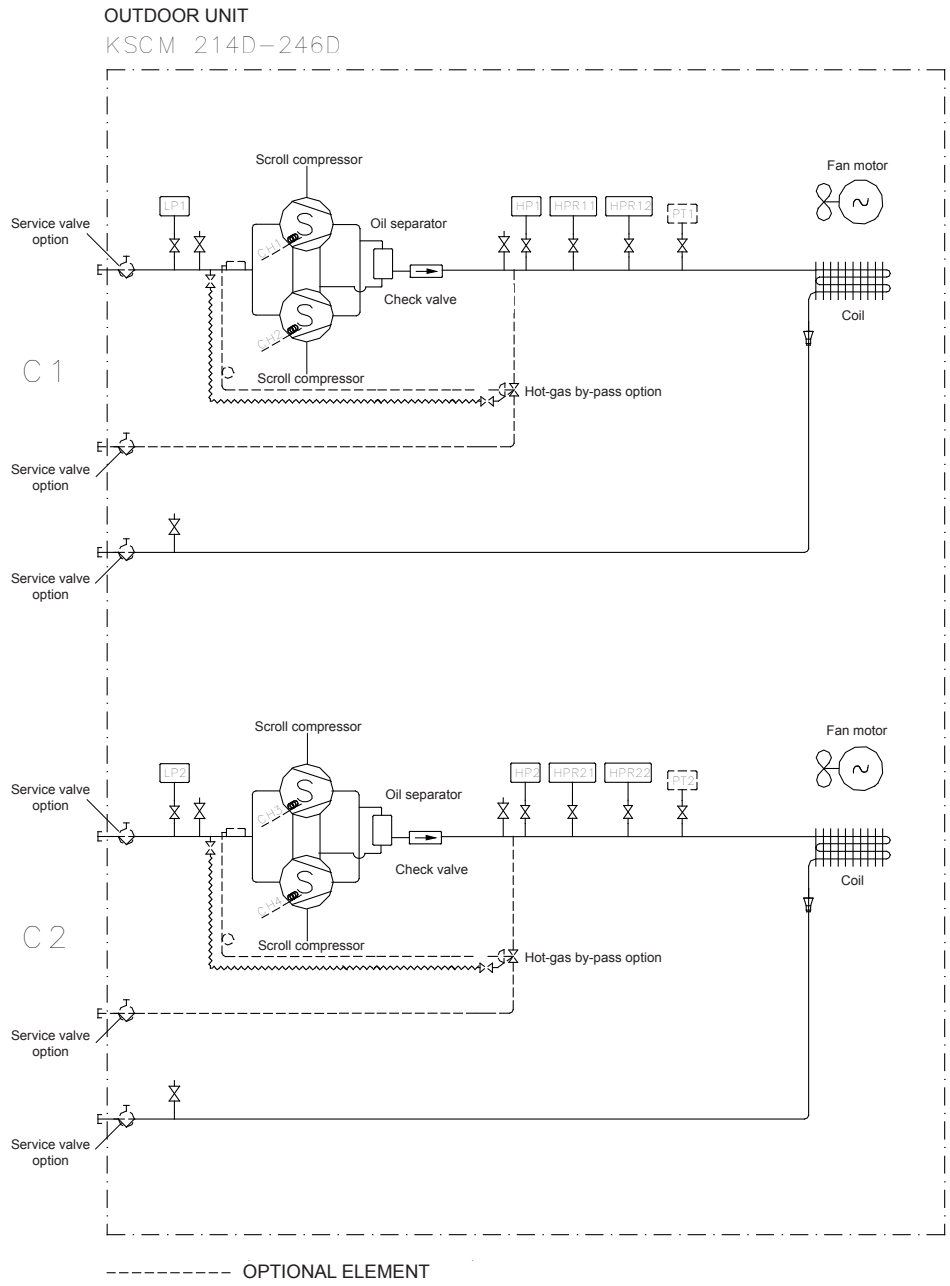
Pressure gauge. (5/16" to use by the installer).
LP1 Low pressure switch, circuit 1.
LP2 Low pressure switch, circuit 2.
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
CH1 Crank case heater. (Low ambient 0ºC option).
CH2 Crank case heater. (Low ambient 0ºC option).
PT1 Pressure transducer, circuit 1. (Low ambient -15ºC).
PT2 Pressure transducer, circuit 2. (Low ambient -15ºC).
TS1 Condensing temperature sensor, circuit 1.
TS2 Condensing temperature sensor, circuit 2.

COOLING PIPING DRAWINGS



- Pressure gauge. (5/16" to use by the installer).
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR11 Condensing pressure control ON/OFF fan motor, circuit 1.
- HPR21 Condensing pressure control ON/OFF fan motor, circuit 2.
- HPR12 Condensing pressure control low/high speed, circuit 1.
- HPR22 Condensing pressure control low/high speed, circuit 2.
- CH1 Crank case heater. (Low ambient 0ºC option).
- CH2 Crank case heater. (Low ambient 0ºC option).
- CH3 Crank case heater. (Low ambient 0ºC option).
- PT1 Pressure transducer, circuit 1. (Low ambient -15ºC).
- PT2 Pressure transducer, circuit 2. (Low ambient -15ºC).

COOLING PIPING DRAWINGS

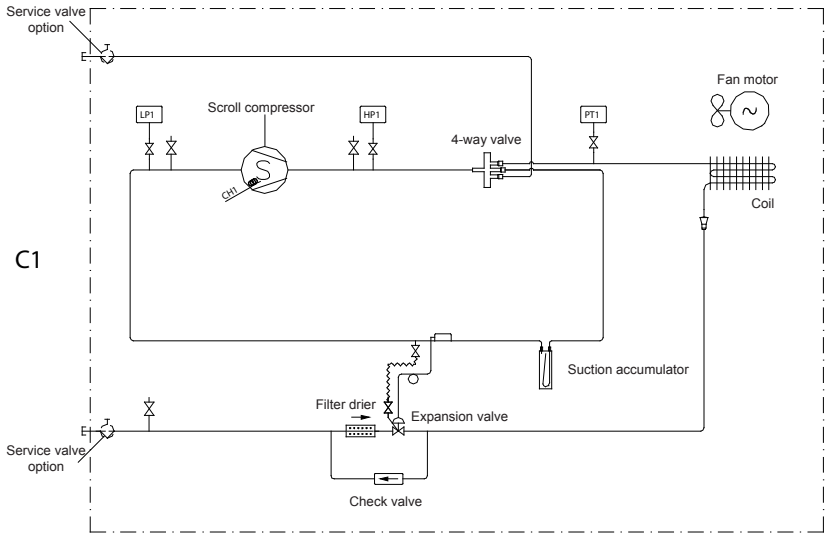


- Pressure gauge. (5/16" to use by the installer).
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR11 Condensing pressure control ON/OFF fan motor, circuit 1.
- HPR21 Condensing pressure control ON/OFF fan motor, circuit 2.
- HPR12 Condensing pressure control low/high speed, circuit 1.
- HPR22 Condensing pressure control low/high speed, circuit 2.
- CH1 Crank case heater. (Low ambient 0ºC option).
- CH2 Crank case heater. (Low ambient 0ºC option).
- CH3 Crank case heater. (Low ambient 0ºC option).
- CH4 Crank case heater. (Low ambient 0ºC option).
- PT1 Pressure transducer, circuit 1. (Low ambient -15ºC).
- PT2 Pressure transducer, circuit 2. (Low ambient -15ºC).

HEATING PIPING DRAWINGS

OUTDOOR UNIT

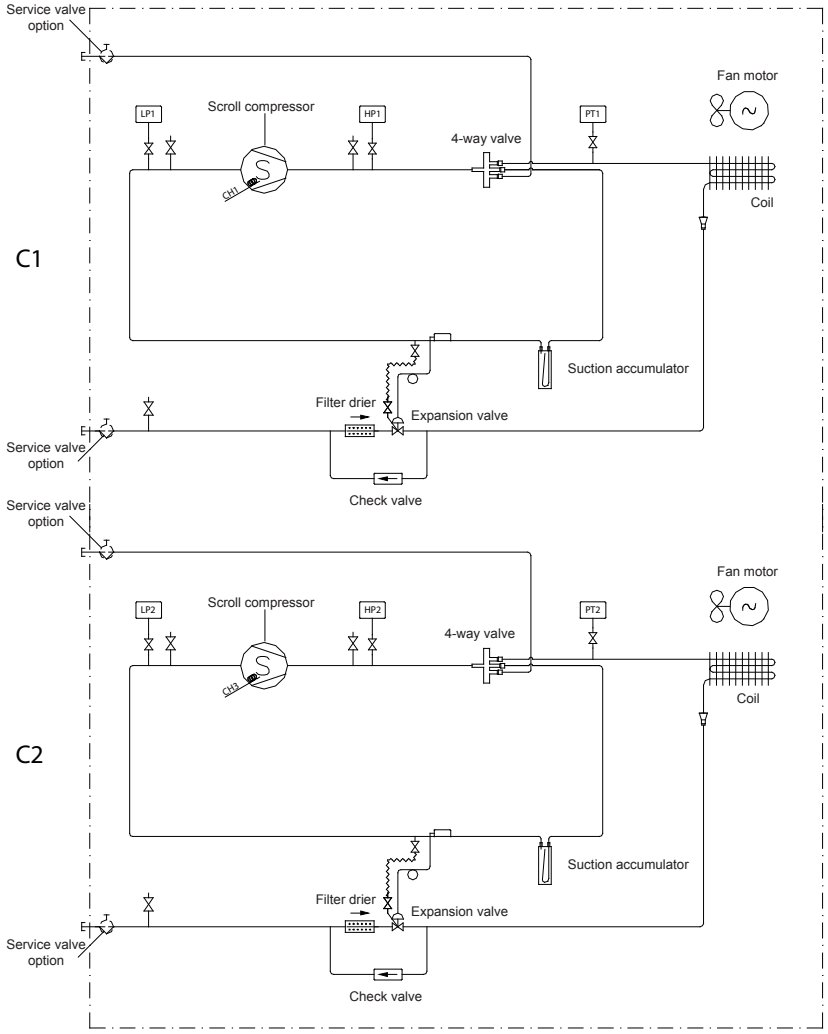
KSHM 22E/26E/32E/38E/43E



---------- OPTIONAL ELEMENT

OUTDOOR UNIT

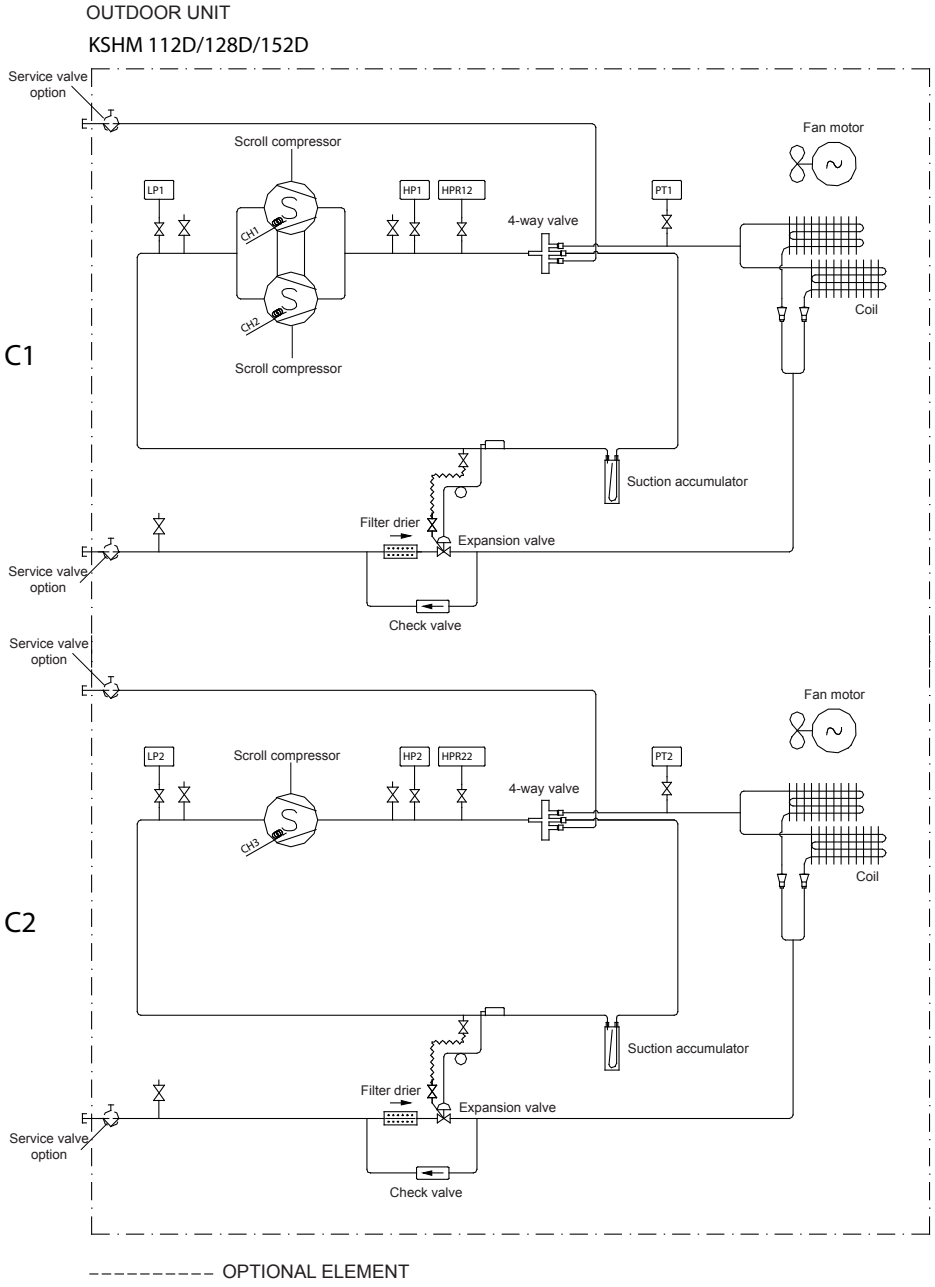
KSHM 52D/64D/76D/86D



---------- OPTIONAL ELEMENT

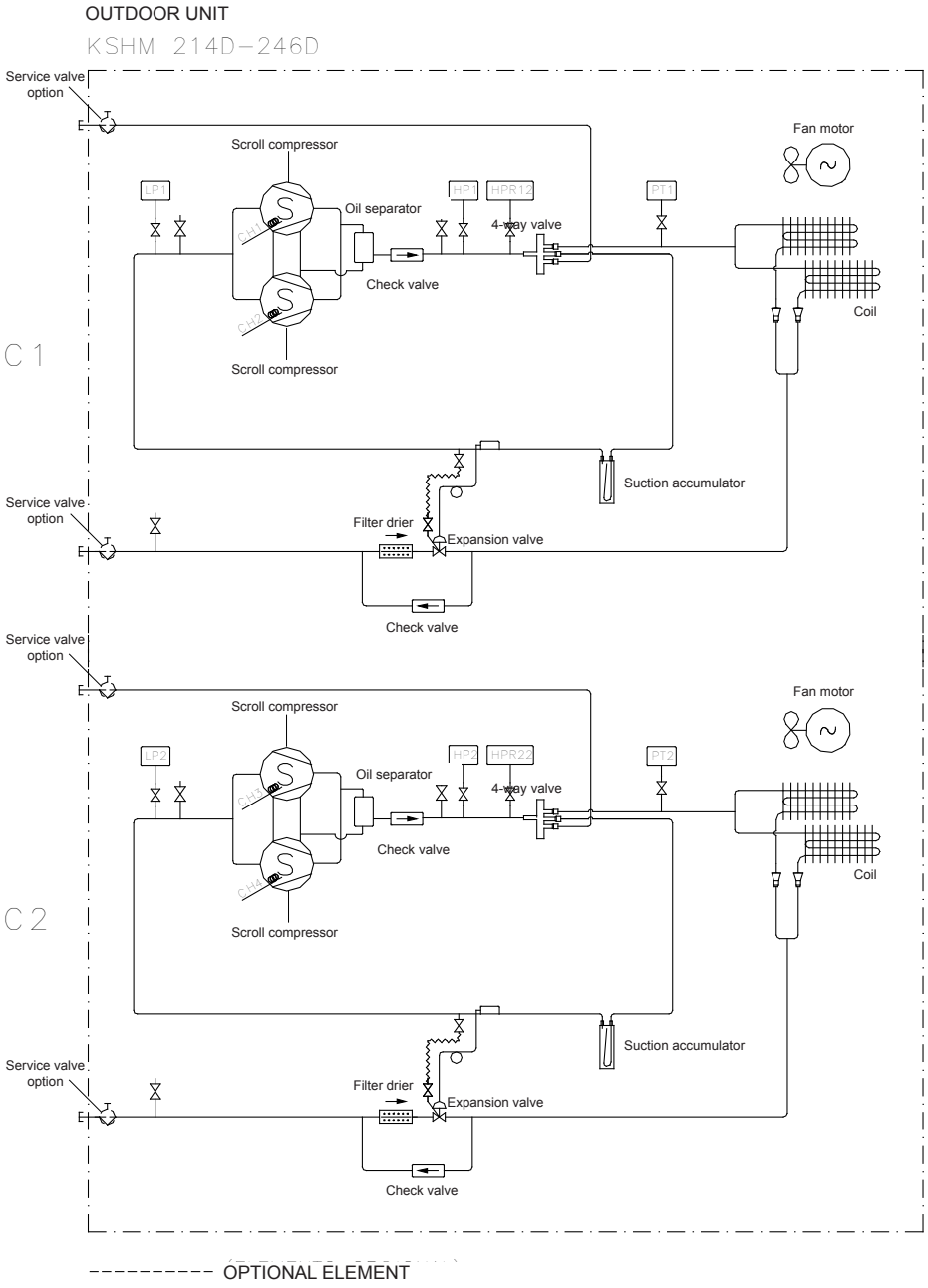
Pressure gauge. (5/16" to use by the installer).
LP1 Low pressure switch, circuit 1.
LP2 Low pressure switch, circuit 2.
HP1 High pressure switch, circuit 1.
HP2 High pressure switch, circuit 2.
CH1 Crank case heater.
CH2 Crank case heater.
CH3 Crank case heater.
PT1 Pressure transducer, circuit 1.
PT2 Pressure transducer, circuit 2.

HEATING PIPING DRAWINGS



- Pressure gauge. (5/16" to use by the installer).
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR12 Condensing pressure control low/high speed, circuit 1.
- HPR22 Condensing pressure control low/high speed, circuit 2.
- CH1 Crank case heater.
- CH2 Crank case heater.
- CH3 Crank case heater.
- PT1 Pressure transducer, circuit 1.
- PT2 Pressure transducer, circuit 2.

HEATING PIPING DRAWINGS

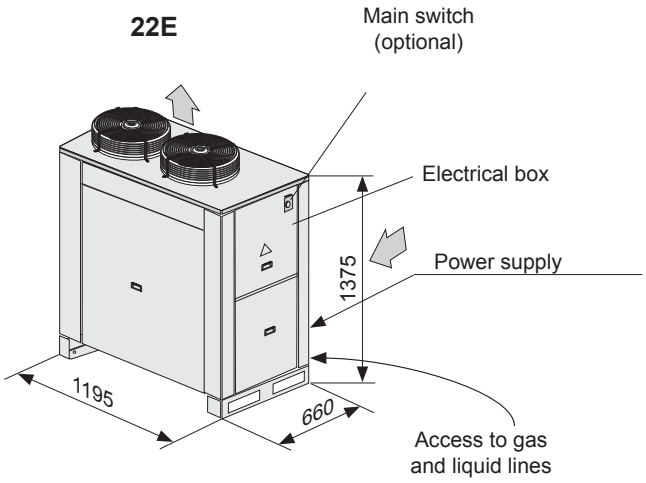


- Pressure gauge. (5/16" to use by the installer).
- LP1 Low pressure switch, circuit 1.
- LP2 Low pressure switch, circuit 2.
- HP1 High pressure switch, circuit 1.
- HP2 High pressure switch, circuit 2.
- HPR12 Condensing pressure control low/high speed, circuit 1.
- HPR22 Condensing pressure control low/high speed, circuit 2.
- CH1 Crank case heater.
- CH2 Crank case heater.
- CH3 Crank case heater.
- CH4 Crank case heater.
- PT1 Pressure transducer, circuit 1.
- PT2 Pressure transducer, circuit 2.

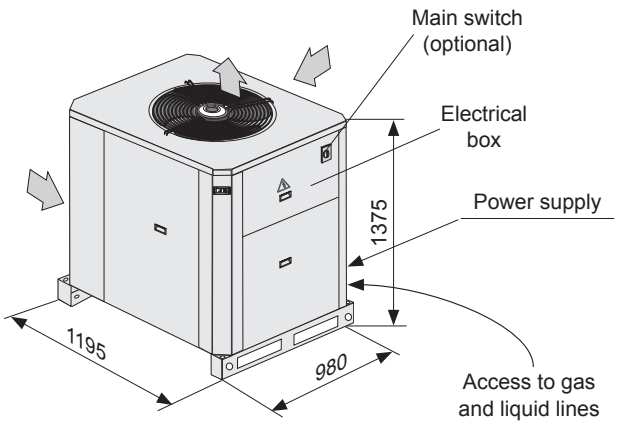
UNIT DIMENSIONS

MODELS KSCM/KSHM

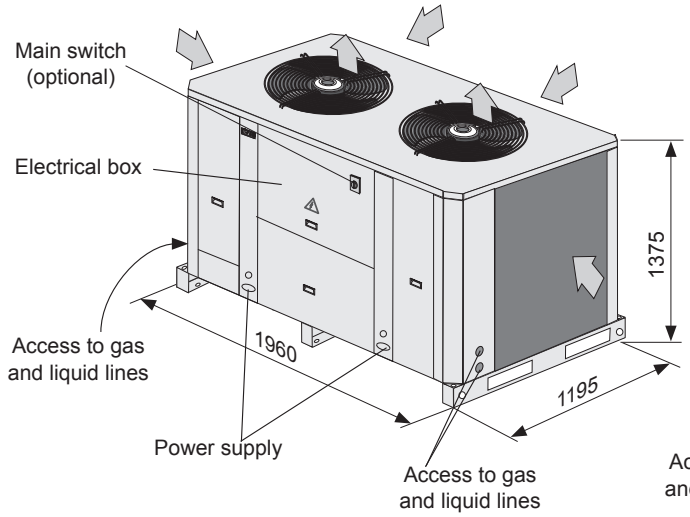
22E



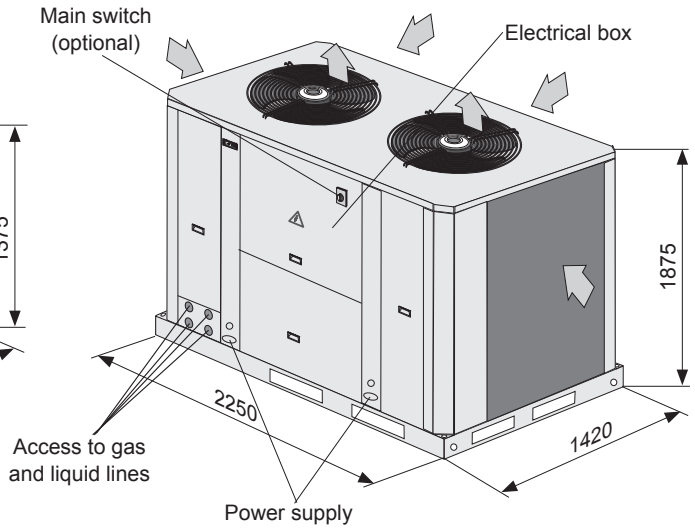
26E-32E-38E-43E



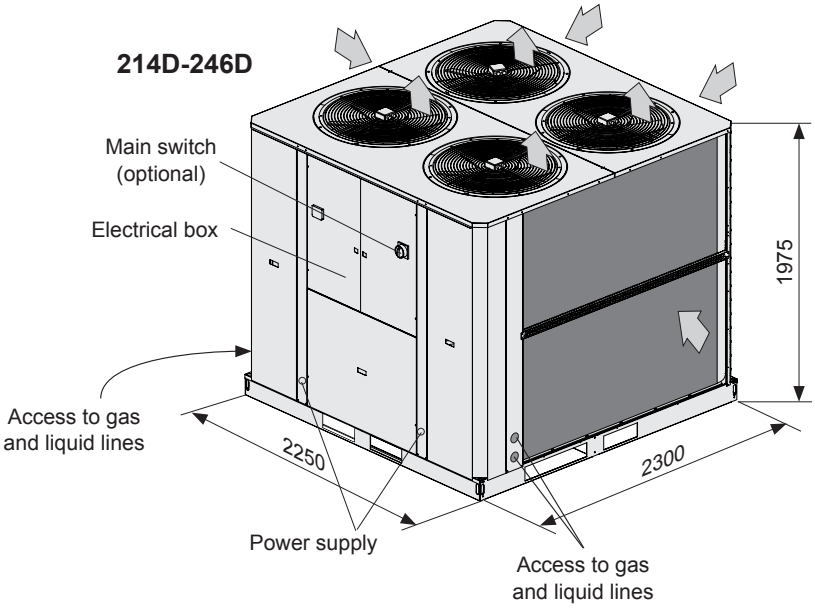
52D-64D-76D-86D



112D-128D-152D



214D-246D

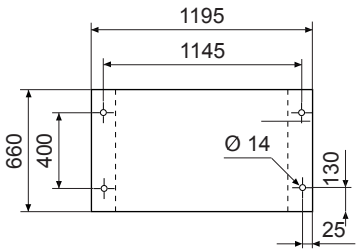


NOTE: As an option, service valves are available for liquid and gas lines with welded connection.

UNIT INSTALLATION

MOUNTING PLATES

22E



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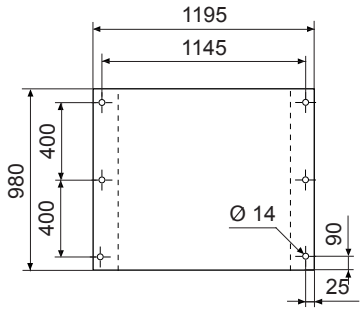

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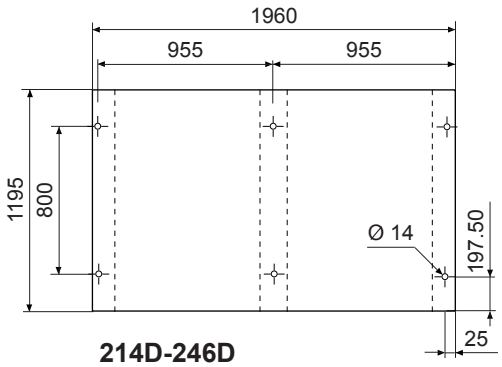
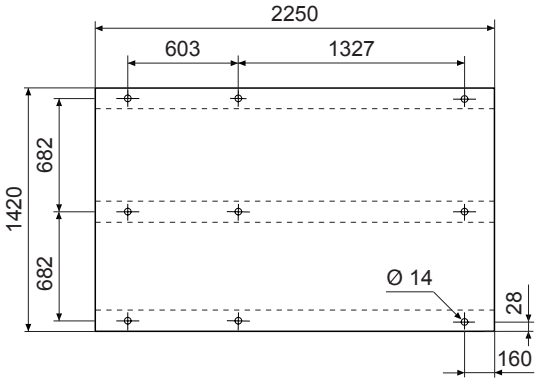
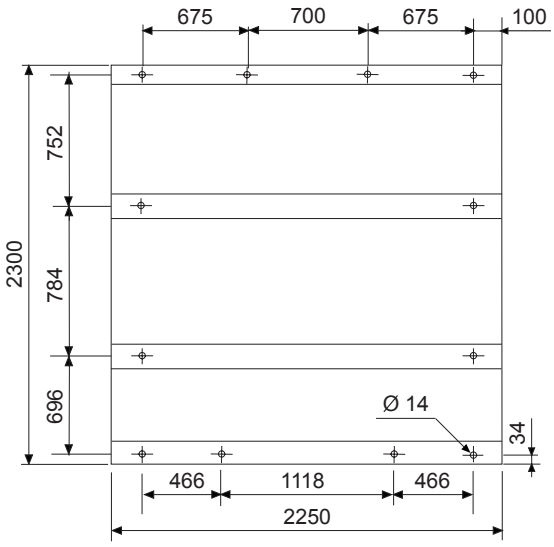


112D-128D-152D



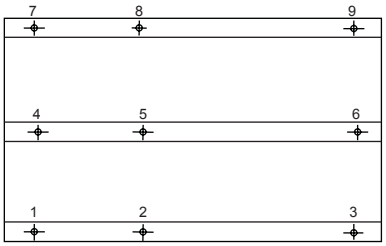
214D-246D



Sizes in mm.

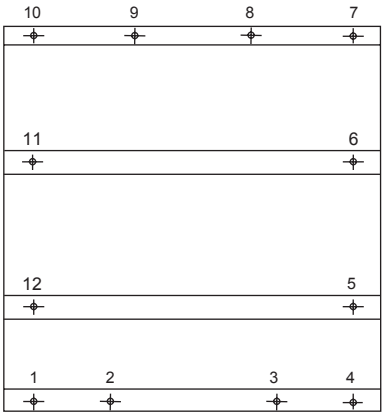
DETAILING SPRING ANTI-VIBRATION POSITION KSCM/KSHM

112D-128D-152D



POSITION Nr.	ANTIVIBRATION TYPE
1	350
2	350
3	350
4	350
5	350
6	350
7	250
8	250
9	250

214D-246D

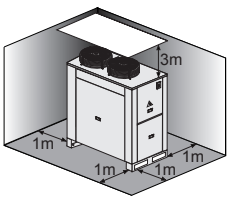


POSITION Nr.	ANTIVIBRATION TYPE
1	350
2	500
3	500
4	500
5	500
6	500
7	500
8	350
9	350
10	350
11	350
12	350

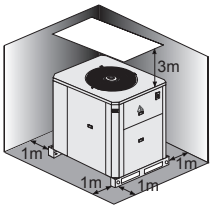
SERVICE SPACE

Space should be left free for access and servicing, and for intake and discharge air flow as well.

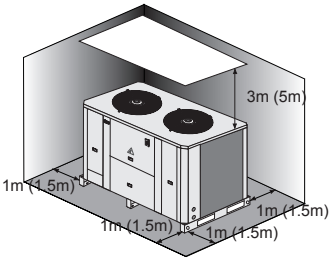
22E



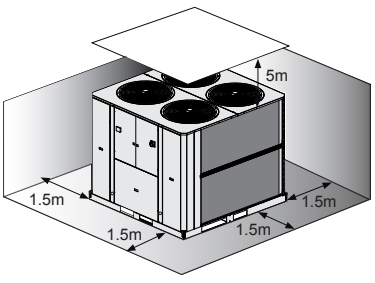
26E/43E



52D-64D-76D-86D=1m
112D-128D-152D ( )=1.5m

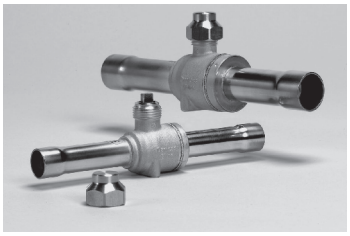


214D-246D



PIPE CONNECTIONS

REFRIGERANT CONNECTIONS

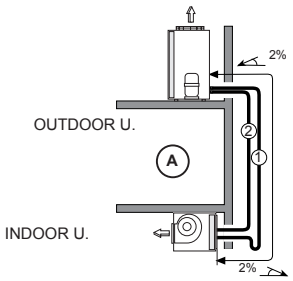


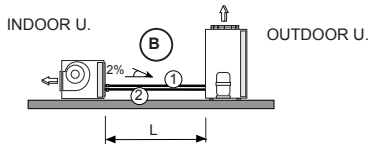
Refrigerant connections on outdoor unit
NOTE: The unit is supplied with welded connections.
As an option, service valves are available for liquid and gas lines with welded connection.
As an option, refrigerant factory precharged kit is available (this option includes service valves).
SEE OPTION SECTION IN THIS MANUAL (pg. 23)

Piping connection lines
For calculating piping connection lines between outdoor and indoor units, distance and drop between lines are very important aspects.
To achieve the best features for the units, take special care about:
- The gas line must be always insulated.
- The horizontal lines must be sloped at least 2% toward the outdoor unit .
- The minimum speed suction must not be below 6 m/s on the vertical line of the gas line, and siphons must be installed every few meters upward to assure the oil returns to the compressor properly.
- The maximum speed inside lines should not be higher than 15m/s.

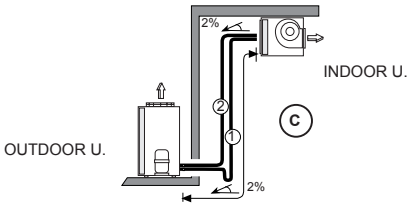
RECOMMENDATIONS FOR REFRIGERANT LINES CONNECTIONS

To locate the outdoor and the indoor units, refer to the following recommendations





A,B,C : Unit positions
L : Total length
1 = Gas line
2 = Liquid line



POSITION A : A siphon suction must be installed on the vertical line of the gas line, and siphons must be installed every 8 meters upward. The minimum speed suction must not be below 6m/s. Maximum vertical length 16m.
POSITION B : Tip the lines toward the outdoor unit. Make special attention to line length longer than 10m, and avoid collapse on pipe lines installation.
POSITION C : Install a siphon at the base of the vertical of the gas line, no more siphons are necessary. Maximum vertical length 6m.

TABLE 1: REFRIGERANT LINES SELECTION

REFRIGERANT LINES				UNIT - MODEL												
				22E	26E	32E	38E	43E	52D	64D	76D	86D	112D	128D	152D	214D	246D
Length between indoor and outdoor unit.	0 to 30 m. (Standard connection of unit)	Ø Liquid	C1	1/2”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	3/4”	3/4”	3/4”	7/8”	7/8”
			C2	n/a	n/a	n/a	n/a	n/a	5/8”	5/8”	5/8”	5/8”	5/8”	5/8”	3/4”	7/8”	7/8”
		Ø Gas	C1	7/8”	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 5/8”	1 5/8”	1 5/8”	1 5/8”	2 1/8”
			C2	n/a	n/a	n/a	n/a	n/a	1 1/8”	1 1/8”	1 3/8”	1 3/8”	1 3/8”	1 3/8”	1 5/8”	1 5/8”	2 1/8”
		Max. Nr. of bends		6	12	8	18	12	12	8	18	12	12	12	12	12	12

Maximum refrigerant piping length: 30m

PIPE CONNECTIONS

The units are factory pre-charged with Nitrogen (N_2). The installer should remove this gas and charge the units with refrigerant R-410A.

Amount of refrigerant charge R-410A for the installation

The amount of refrigerant R-410A for the system will depend on the size of connecting line between indoor and outdoor unit and on the expansion system of the indoor unit. Prior to charging the unit, a proper vacuum must be done.
Finally, it is necessary to adjust the expansion system, with the unit already charged, to achieve the best features for the units, such as evaporating temperature, condensing temperature, discharge, etc.

PRECAUTIONS TO BE TAKEN IN THE USE OF R-410A Refrigerant:

R-410A Refrigerant is used in the unit; therefore, the following precautions characteristic of this gas should be taken:

- **The Vacuum Pump must have a Check Valve or Solenoid Valve.**
- **Pressure Gauges and Hoses for the exclusive use with R-410A Refrigerant should be used.**
- **The charge should be carried out in the Liquid Phase.**
- **Always use scales to weight-in charge**
- **Use the Leak Detector exclusive for R-410A Refrigerant.**
- **Do not use mineral oil, only synthetic oil to ream, expand or make connections.**
- **Keep pipes wrapped before using them and be very thorough about any possible dirt (dust, filings, burrs, etc.).**
- **When there is a leak, gather what is left of the charge, create a vacuum in the unit and completely recharge with new R-410A Refrigerant.**
- **Brazing should always be carried out in a nitrogen atmosphere.**
- **Reamers should always be well sharpened.**

TABLE 2: RECOMMENDATIONS FOR WEIGHT OF REFRIGERANT R-410A PER METER OF LINE

Liquid	Gas	gr/m
1/2”	7/8”	108
5/8”	1 1/8”	177
5/8”	1 3/8”	182
3/4”	1 3/8”	265
3/4”	1 5/8”	271
7/8”	1 5/8”	374

TABLE 3: RECOMMENDATIONS FOR CHARGE OF REFRIGERANT

Charge of refrigerant (gr) R-410A for 0 meters of line KNCM+indoor unit (Cooling only)														
	22E	**26E**	**32E**	**38E**	**43E**	**52D**	**64D**	**76D**	**86D**	**112D**	**128D**	**152D**	**214D**	**246D**
C1	5155	5315	5700	7950	9745	6250	5775	7870	9800	12130	15585	15500	23100	24250
C2	------	------	------	------	------	6250	5775	7870	9800	10450	10045	15400	23100	24250

Charge of refrigerant (gr) R-410A for 0 meters of line KNHM + indoor unit (Heat pump)														
	22E	**26E**	**32E**	**38E**	**43E**	**52D**	**64D**	**76D**	**86D**	**112D**	**128D**	**152D**	**214D**	**246D**
C1	5725	5900	6330	8835	10830	6940	6420	8740	10900	13480	17315	17230	25660	26950
C2	------	------	------	------	------	6940	6420	8740	10900	11600	11160	17100	25660	26950

Refrigerant charge estimated. Adjust in the installation.

PIPE CONNECTIONS

CHARGE OF REFRIGERANT FOR THE SET:

EXAMPLE:

To install a KNHM 32E + indoor unit, with 22m refrigerant line length between outdoor and indoor unit, then the refrigerant charge must be calculated as follow:

1.-TABLE 1 (pg.18), for 22m of line length between indoor unit and outdoor unit, the line sizes are: liquid 5/8" and gas 1 1/8".

2.-TABLE 2 (pg.19), for line sizes of 5/8"-1 1/8", the charge per meter line is: 177 gr/m x 22m = 3894 gr.

3.-TABLE 3 (pg.19), charge of refrigerant for the set with 0m of line length is: 6330 gr.

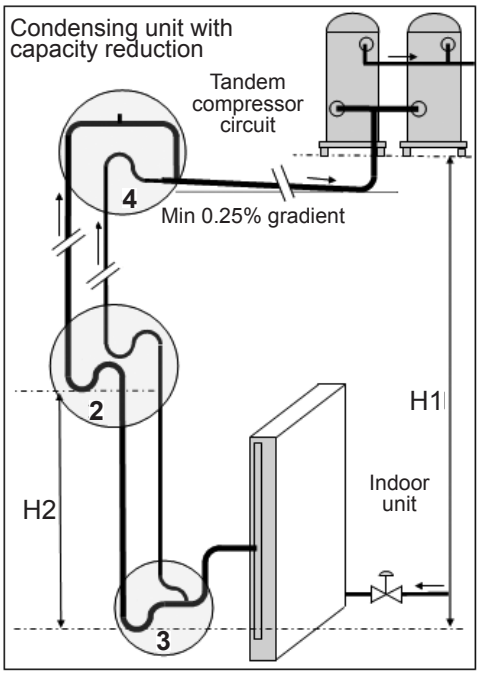
4.-To determine the carge of the set:

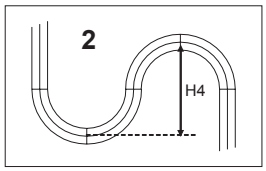
Add charge of the refrigerant lines + charge of refrigerant indoor unit and outdoor unit.

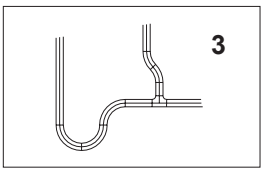
Total charge for the set: 3894 + 6330 = 10224 gr

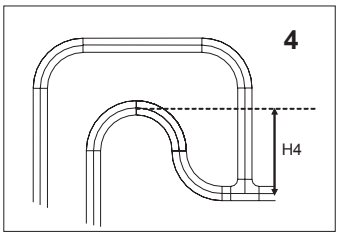
Note: If the outdoor unit includes factory pre-charged kit, only take care of weight of refrigerant per meter of line in TABLE 2.

112D to 152D units with 3 compressors are working using three capacity steps and 214D-246D with 4 capacity steps. See the picture below for the installation in the case of units with tandem compressor circuit. An additional gas line has to be used to assure the correct operation of the system.









H1: 15m Max
H2: 5m Max
H4: 0,15m Min

2 - Coupled trap.
3 - Lower trap with double tubes.
4 - Higher trap with double tubes.

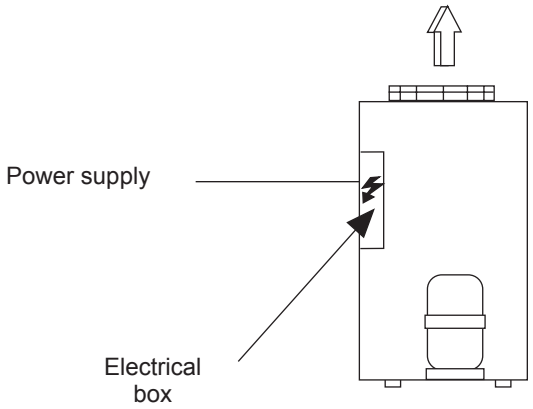
Models with tandem compressor

112D	128D	152D	214D	246D
Circuit 1	Circuit 1	Circuit 1	Circuits 1 & 2	Circuits 1 & 2

ELECTRICAL CONNECTIONS

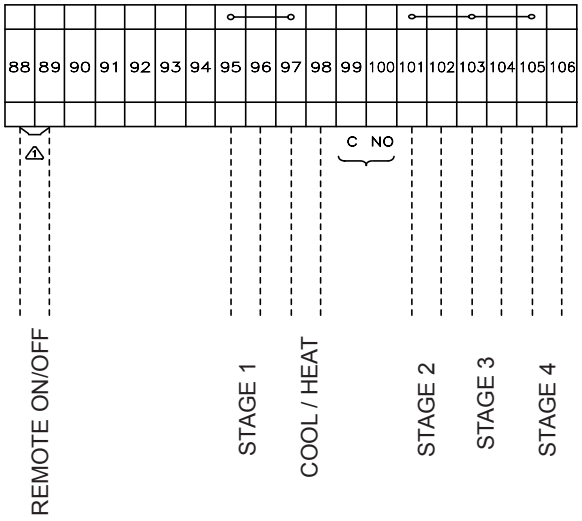
- BEFORE MAKING ANY ELECTRICAL CONNECTIONS, BE SURE THAT ALL CIRCUIT BREAKES ARE OPEN.
- IN ORDER TO CARRY OUT ELECTRICAL CONNECTIONS, FOLLOW THE ELECTRICAL DIAGRAM SUPPLIED WITH THE UNIT.

CONDENSING UNITS



	Power supply
KSCM/ KSHM 22E	5 x 4 mm2
KSCM/ KSHM 26E	5 x 6 mm2
KSCM/ KSHM 32E	5 x 6 mm2
KSCM/ KSHM 38E	5 x 6 mm2
KSCM/ KSHM 43E	5 x 10 mm2
KSCM/ KSHM 52D	5 x 16 mm2
KSCM/ KSHM 64D	5 x 16 mm2
KSCM/ KSHM 76D	3 x 25 + 2 x 16 mm2
KSCM/ KSHM 86D	3 x 25 + 2 x 16 mm2
KSCM/ KSHM 112D	3 x 35 + 2 x 16 mm2
KSCM/ KSHM 128D	3 x 35 + 2 x 16 mm2
KSCM/ KSHM 152D	3 x 50 + 2 x 25 mm2
KSCM/ KSHM 214D	3 x 70 + 2 x 35 mm2
KSCM/ KSHM 246D	3 x 95 + 2 x 50 mm2

ELECTRICAL CONNECTION "REMOTE SIGNALS"



1 REMOVE LINK FOR REMOTE ON/OFF OPERATION

REMOTE ON/OFF: When contact is closed, unit is on.

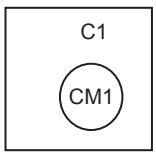
COOL/HEAT: When contact is closed unit is running in cooling mode and when contact is openned unit is running in heating mode.

STAGE 1,2 3 and 4: Stage is activated when contact is closed.

	STAGE 1	STAGE 2	STAGE 3	STAGE 4
26E-43E	X			
52D-86D	X	X		
112D-152D	X	X	X	
214D-246D	X	X	X	X

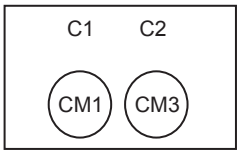
COMPRESSOR SEQUENCE ACTIVATION

26E-43E



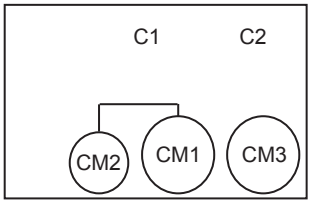
First step: Compressor 1

52D-86D



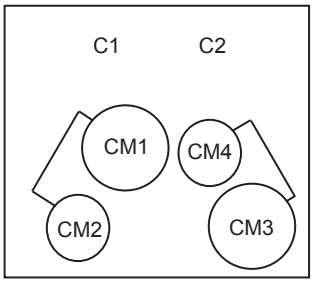
First step: Compressor 1
Second step: Compressor 3
Automatic sequence changeover

112D-152D



First step: Compressor 1
Second step: Compressor 2
Third step: Compressor 3

214D-246D

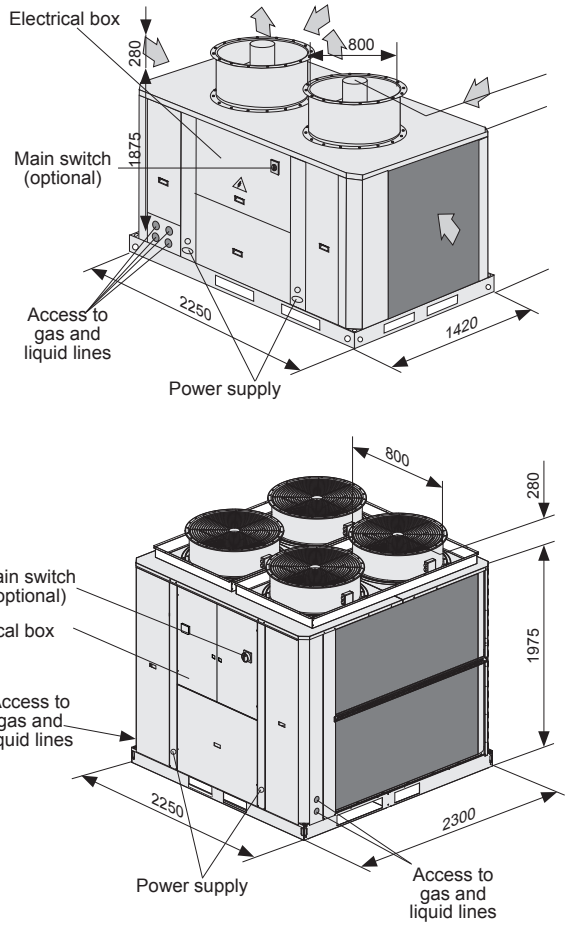


First step: Compressor 1
Second step: Compressor 2
Third step: Compressor 3
Fourth step: Compressor 4

OPTIONS

1.- ARCHITECTURAL INTEGRATION

HIGH PRESSURE 250Pa FP1
(Only available for units 112D to 246D).
Units with high pressure fans.
Available static pressure up to 250Pa.



2.- SECURITY

MAIN SWITCH
The main switch is located on the access panel to the electrical box. It is equipped with a clutch gadget, which allows opening the panel of the electrical box, when it is on OFF position.

"SOFT STARTER" COMPRESSOR STARTING CURRENT CONSTRAINED.
It is an electronic element, which reduces the peak compressor starting current up to 40% (see pages of electrical data without soft starter).

RETURN LOCK THREE PHASES.
Located at electrical box of the unit. It assures that unit will not begin operation on detection of overvoltage, undervoltage, phase reversal fault or phase failure.

PROTECTION GRILL
The condenser coil protection grill prevents light damage to the coil when shipping and when installed.

3.- COMFORT, PRECISION AND ENERGY EFFICIENCY

LOW AMBIENT KIT 0º (COOLING UNITS ONLY, THE SERIES OF HEATING PUMP)
It is a crank case heater for the compressor which allows unit operation in cooling mode until 0ºC of outdoor temperature. The purpose of the crank case heater is while the compressor is stopped, so that it can be properly lubricated when starts again.

LOW AMBIENT KIT -15ºC (Only available for KSCM units).
It regulates the fan speed with a pressure transducer, in order to control condensing temperature. This option also includes a crankcase heater.
Thus the unit will be able to operate in the cooling cycles when the outdoor temperature is below 19ºC (until -15ºC).
A solenoid valve has to be fitted by the installer in the liquid line (indoor unit) to prevent liquid return to the compressor.
See electrical diagram supplied with the unit for the connection.

KIT LOW NOISE
Each compressor is fitted with a compressor acoustic jacket this provides attenuation of the compressor noise that radiates from the unit.

RUBBER ANTI-VIBRATION MOUNTS
To install under the unit to avoid transmission of vibrations to the floor where unit is installed, while unit is operating. They are designed for low sensibility zones to vibration.

4.- SERVICE

FACTORY PRECHARGED
This option includes service valves and R-410A refrigerant charged in outdoor unit (for 0 meters of connection lines).

SERVICE VALVES
As an option, the unit is fitted with gas and liquid service valves in order to make easier installation and maintenance operations.
- Valves for gas and liquid lines inside the units with welded connection for 22E to 246D.

DRIVE INDOOR FAN MOTOR OPTION
It includes the contactor and thermal switch, for indoor fan motor.

5.- COMUNICATION CAPABILITIES

MODBUS
It is possible to connect several units with a communication system (MOD BUS Protocol).

6.- EXTENDED LIFECYCLE

PRECOATED COIL
Special protection of the aluminum condenser coil fins, to protect it from aggressive external environmental conditions.

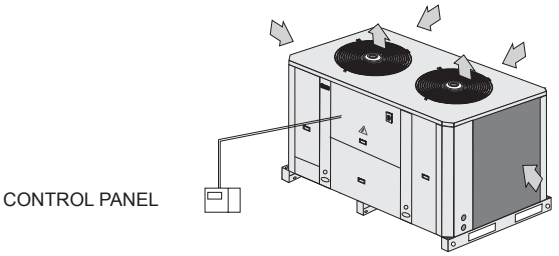
PRELIMINARY CHECKS BEFORE FIRST OPERATION

- Check that the **power supply** is the same as stated on the Rating Plate which is in agreement with the electrical diagram for the unit and that cable sizes are correct.
- Check that **tightness of the electrical connections to their terminals and to ground**.
- Check the **control panel connections.**

(If the connection is wrong, the unit will not operate and the control panel display will not light).

- Check with your hand that the **fans turn freely.**

FIGURE FOR THE STANDARD UNIT CONFIGURATION FOR MODELS:
52D-64D-76D-86D



CHECK COMPRESSOR OIL LEVEL

- Part of the compressor oil is pumped to the system when the compressor start, so for splits systems part of the oil can be placed in the system: piping lines, siphons, evaporator, etc.
- Oil quantity in the system depends on refrigerant charge. The compressor can not work either refrigerant defect nor with an excessive amount of this one.
- Depending on piping length, it can be necessary to add oil to the system.

In case of having to add oil, remember the type of oil is synthetic POE.
Original oil charge in the compressor is ICI Emkarate RL32-3MAF. This type of oil has to be used too in case of replacing the oil completely.
On the other hand to add oil RL32-3MAF or Mobil EAC Artic 22C can be used.

PRELIMINARY CHECKS AT FIRST OPERATION

To start the unit, **follow the instructions given in the User Manual for the control** supplied with the unit (requesting operation in any of the modes, cooling, heating, or automatic).
After a time lapse, the unit will start.
With unit operating, check that the **fans are turning freely and in the proper direction.**

COMPRESSOR SHOULD BE CHECKED THAT ROTATES IN THE CORRECT DIRECTION.

- If you have return return lock three phases as option check through it the correct rotation.
- If you do not have return lock three phases, check the correct direction of rotation. The pressure on the suction side decreases and the pressure on the discharge side increases when the compressor is activated.
- If the connection is wrong, the rotation will be reversed causing a a high noise level and a reduction in the amount of current consumed. If this occurs, the compressor's internal protection system will operate in shutting down the unit. The solution is to disconnect, switch the wires between two of the phases and connect the three again.

ASTP Protection is included with the unit compressors. See "Failure diagnosis" for more information.

WITH UNIT OPERATING, CHECK:

- Low pressure and high pressure.
- Evaporating and liquid temperature to calculate superheat and subcooling.
- Adjust according this values refrigerant charge and/or expansion valve in case it can be neccessary.

COMPRESSOR OIL LEVEL

Oil level has always to be checked. When the compressor stops the level should be between 1/4 and 3/4 in the sight glass, while during operation the level should be between 3/4 and full.
In case of having to add oil, remember the type of oil is synthetic POE.
Original oil charge in the compressor is ICI Emkarate RL32-3MAF. This type of oil has to be used too in case of replacing the oil completely.
On the other hand to add oil RL32-3MAF or Mobil EAC Artic 22C can be used.

PREVENTIVE MAINTENANCE

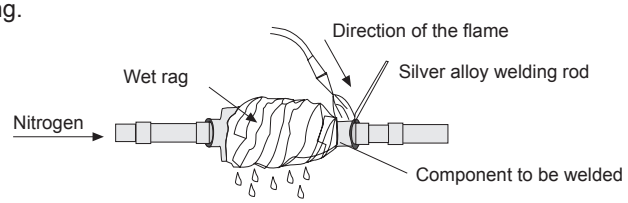
PREVENTIVE MAINTENANCE PREVENTS COSTLY REPAIRS.
BECAUSE OF THIS PERIODIC INSPECTIONS ARE REQUIRED:

- GENERAL STATE OF THE CASING:
Furniture, paint, deterioration due to bumps, rust spots, leveling and supporting, state of the shock absorbers, if installed, screwed panels, etc.
- ELECTRICAL CONNECTIONS:
State of hoses, tightness of screws, grounding, current draw of the compressor and fans and checking that the unit is receiving the correct voltage.
- COOLING CIRCUIT:
Check that pressure values are correct and that there are no leaks. Check that there is no damage to the pipe insulation, that the state of the coils is correct and that there are no chips or clogs retained by the air flow, etc.
- COMPRESSOR:
Inspect the oil level, if sight glass is present.
Inspect the state of the silent block fixtures.
- FANS:
Check that fans turn freely and in the correct direction without excessive noises.
- CONTROL:
Check Set Points and normal operation.

CORRECTIVE MAINTENANCE

IMPORTANT
MAKE SURE THAT THE UNIT IS COMPLETELY DISCONNECTED FROM THE POWER SUPPLY WHEN CARRYING OUT ANY TYPE OF WORK ON THE MACHINE.

If some component in the cooling circuit must be replaced, follow these recommendations:
- Always use original replacement parts.
- Remove the entire refrigerant charge from the unit through the schrader valves located in the outdoor section. Create a slight vacuum as a safety measure.
- Regulation prohibits the release on the refrigerant into the atmosphere.
- If cuts must be made in the pipe work, use pipe cutters. Do not use saws or any other tools that produce filings.
- All brazing must be carried out in a nitrogen atmosphere to prevent corrosion from forming.
- Use silver alloy brazing rod.
- Take special care that the flame from the torch is aimed in the opposite direction from the component to be welded and is covered with a wet rag in order to avoid overheating.



- Take very special care if 4-way check valves are to be replaced since these have internal components that are very heat-sensitive such as plastic, teflon, etc.
- If a compressor must be replaced, disconnect it electrically and un-braze the suction and discharge lines. Remove the securing screws and replace the old compressor with the new one. Check that the new compressor has the correct oil charge, screw it to the base and connect the lines and electrical connections.
- Carry out the vacuum above and below through the schrader valves of the outdoor unit until -750 mm Hg is reached. Once this level of vacuum has been reached, keep the pump in operation for at least one hour.
DO NOT USE THE COMPRESSOR AS A VACUUM PUMP.
- Charge the unit with refrigerant according to the data on the Rating Plate for the unit and **check that there are no leaks.**

PRECAUTIONS TO BE TAKEN IN THE USE OF R-410A Refrigerant:
R-410A Refrigerant is used in the unit; therefore, the following precautions characteristic of this gas should be taken:
- The Vacuum Pump must have a Check Valve or Solenoid Valve.
- Pressure Gauges and Hoses for the exclusive use with R-410A Refrigerant should be used.
- The charge should be carried out in the Liquid Phase.
- Always use scales to weight-in charge
- Use the Leak Detector exclusive for R-410A Refrigerant.
- Do not use mineral oil, only synthetic oil to ream, expand or make connections.
- Keep pipes wrapped before using them and be very thorough about any possible dirt (dust, filings, burrs, etc.).
- When there is a leak, gather what is left of the charge, create a vacuum in the unit and completely recharge with new R-410A Refrigerant.
- Brazing should always be carried out in a nitrogen atmosphere.
- Reamers should always be well sharpened.

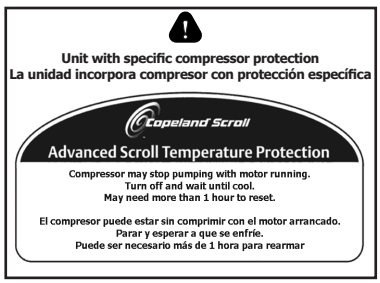
FAILURE DIAGNOSIS

In case of failure or malfunction of the unit, the display on the control panel will show an error or alarm warning explained in the control panel manual. Nevertheless, whenever there is a unit failure, the unit should be shut down and our service thecnicians consulted.

FAILURE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
UNIT DOES NOT START	Failure in the power supply or insufficient voltage.	Connect the power supply or check the voltage.
	Circuit breakers have opened.	Reset.
	Power cable or control panel cable is defective.	Inspect and correct.
UNIT STOPS DUE TO HIGH PRESSURE DURING THE COOLING CYCLE	High pressure switch is defective.	Check cut-off pressure or change. Pressure switch if necessary.
	Outdoor fan is not working.	Check for voltage, inspect the motor and turbine or replace if necessary..
	Outdoor fan turns in the wrong direction.	Switch the power phases.
	Outdoor coil is dirty or clogged for passing air.	Inspect and clean.
	Excess charge of the refrigerant.	Remove the charge and charge according to the data on the rating plate.
UNIT STOPS DUE TO HIGH PRESSURE DURING THE HEATING CYCLE	The same causes and solutions as the cold cycle but with reference to the coils and indoor fan.	
UNIT STOPS DUE TO LOW PRESSURE	Low pressure switch defective.	Check the cut-off pressure with a pressure gauge and change the pressure switch if necessary.
	Indoor fan is not working.	Check for voltage and inspect the motor, turbine and replace if necessary.
	Indoor fan turns in the wrong direction.	Switch the power phases.
	Lack of refrigerant. Leak.	Correct leak, crate vacuum and charge.
	Dirty air filter.	Inspect and clean
	Clogged cooling circuit. Dirty filter drier.	Inspect and correct or change the filter drier.
UNIT STARTS AND STOPS IN SHORT CYCLES	Compressor overcharged.	Inspect suction and discharge pressure values and correct.
	Compressor cuts off due to Klixon.	Inspect input voltage and voltage drop.
	Lack of refrigerant.	Correct leak and replace.
LOAD AND ABNORMAL NOISE IN THE COMPRESSOR (SCROLL)	Power supply phases inverted (three-phase compressor).	Inspect and switch power phases.

SAFETY DEVICES

ASTP Protection:
This device protects the compressor against high discharge temperatures.
When the temperature reaches critical values, ASTP protection causes "Scrolls" are separated.
Compressor may stop pumping with motor running.



- Occasionally, when compressor stops and starts, there is a metallic noise because of spirals of the compressor. This is normal.
- Connect high and low pressure gauges and check that operating pressure values are normal.
- Measure electrical consumption for the unit and check that it is near what is indicated on the specification plate.
- Check the electrical consumption of the compressor and the fans with what is specified in the physical data sheets.
- In the case of a Heat Pump unit, make a cycle change on the Control Panel checking that the 4-way valve makes the change correctly. Check the pressure values in the new cycle.

- Remember the low pressure switch is reset automatically and the high pressure switch is reset manually.
- Remember that low pressure switch is automatic reset, if it has 3 operations in one hour, it will be a manual reset, through the control of the unit.

COOLING ONLY KSCM UNITS

22E to 43E							52D to 86D							112D to 246D								
	STD UNIT			COOLING LAK -15ºC				STD UNIT			COOLING LAK-15ºC				STD/FP1 UNIT			COOLING LAK -15ºC			COOLING LAK -15ºC (FP1)		
	Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset		Cycle	Set	Reset	Cycle	Set	Reset	Cycle	Set	Reset
LP	cooling	3,5	4,5	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	cooling	3,5	4,5	cooling	3,5	4,5
							LP2	cooling	3,5	4,5	cooling	3,5	4,5	**LP2**	cooling	3,5	4,5	cooling	3,5	4,5	cooling	3,5	4,5
HP		43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	**HP1**	cooling	43	34	cooling	43	34	cooling	43	34
							HP2	cooling	43	34	cooling	43	34	**HP2**	cooling	43	34	cooling	43	34	cooling	43	34
														HPR11	cooling	22	28	FSC1 (6A)			FSC1 (12A) (112÷152) FSC1 (20A) (214-246)		
														HPR12	cooling	37	30						
PT	n/a			(*)			**PT1**	n/a			(*)			**PT1**	n/a			(*)			(*)		
														HPR21	cooling	22	28	FSC2 (6A)			FSC2 (12A) (112÷152) FSC2 (20A) (214-246)		
														HPR22	cooling	37	30						
							PT2	n/a			(*)			**PT2**	n/a			(*)			(*)		

Tables values in bar.

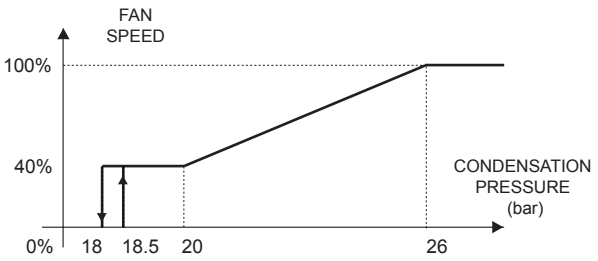
HEAT PUMP KSHM UNITS

22E to 43E				52D to 86D				112D to 246D			
	STD UNIT				STD UNIT				STD/FP1 UNIT		
	Cycle	Set	Reset		Cycle	Set	Reset		Cycle	Set	Reset
LP	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5	**LP1**	cooling	3,5	4,5
				LP2	cooling	3,5	4,5	**LP2**	cooling	3,5	4,5
HP	C/H	43	34	**HP1**	cooling	43	34	**HP1**	cooling	43	34
				HP2	cooling	43	34	**HP2**	cooling	43	34
								HPR12	cooling	37	30
PT	(*)			**PT1**	(*)			**PT1**	(*)		
								HPR22	cooling	37	30
				PT2	(*)			**PT2**	(*)		
								OT1	heating	6°C differential 2,3	

Tables values in bar.

(*) REGULATION WITH CONTROL CLIMATIC 40

1.- FAN SPEED REGULATION KSCM+KIT -15ºC AND KSHM 22E-86D



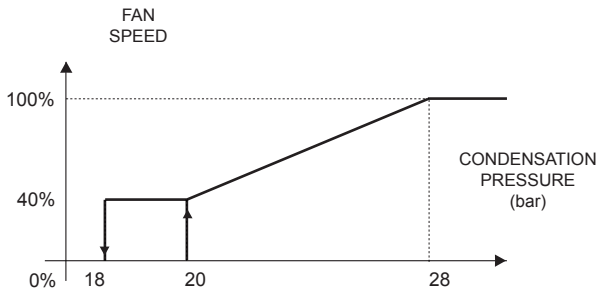
2.- DEFROST (PT/PT1/PT2)
- Start: 5,7 bars, during 60 seconds.
- End: 25 bars or passed 8 minutes, from the beginning of defrost.

1.- FAN SPEED REGULATION (PT1/PT2) KSHM STANDARD (with option FP1)

- Fan start-up 28 bar.
- Cut off 22 bar.

2.- DEFROST (PT1/PT2)
Start: 5,7 bars, during 60 seconds.
End: 25 bars or passed 8 minutes, from the beginning of defrost.

3.- FAN SPEED REGULATION WITH PROPORTIONAL CONTROL (FSC1/FSC2)(PT1/PT2)



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