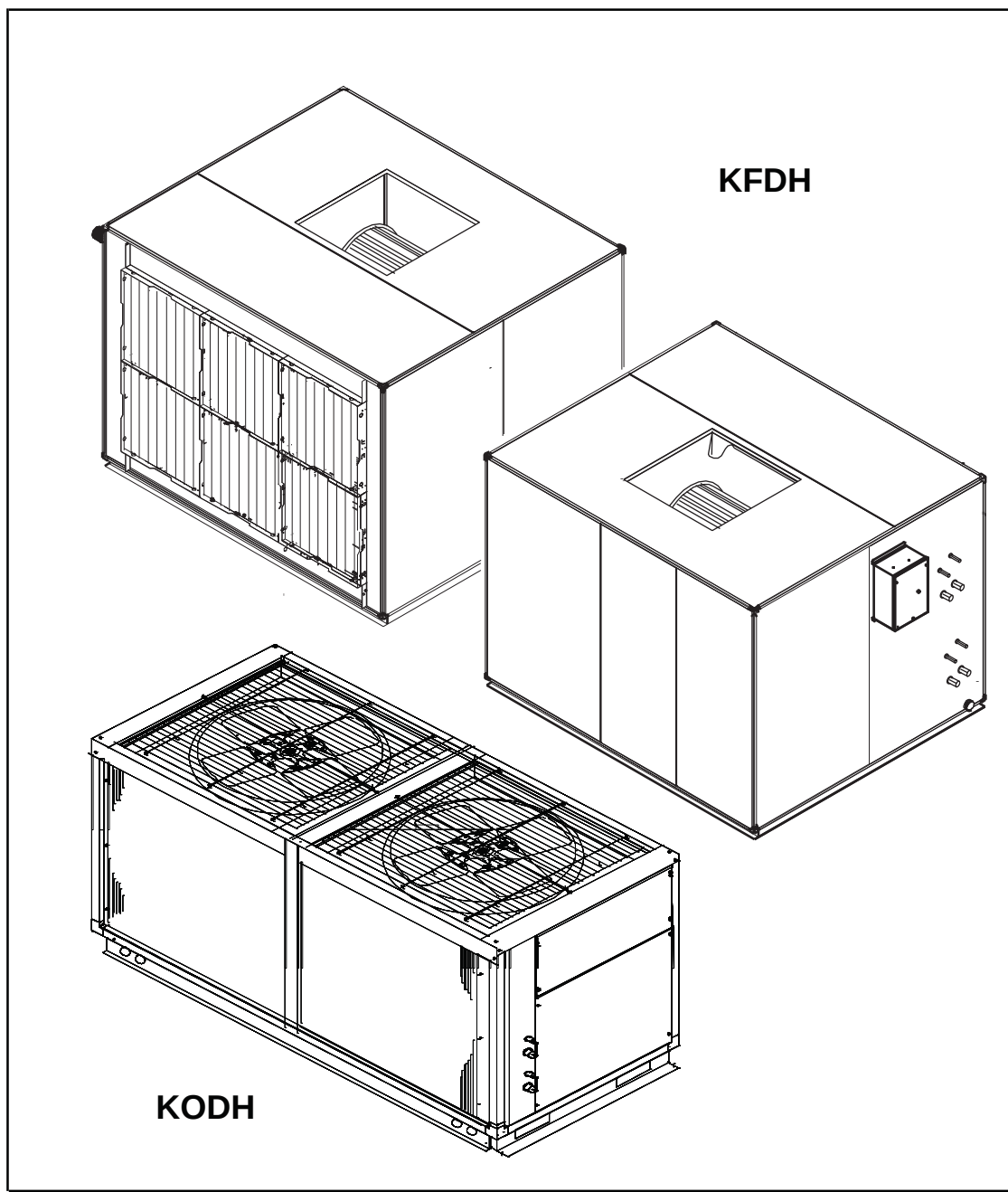


Pioneer

Technical Manual

Split System , Cooling Only 250-500



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Features

■ General

- Fabricated with a rigid galvanized steel casing.
- Standard 30mm thick infill panels are of double skinned construction from pressure injected polyurethane foam insulation with 'K' value of 0.02Watts/m C and density 40kg/m³..

■ Motor

- TEMA Cast Iron Electric Motor has been proven reliability in strength associated with its construction material.
- The motor has Class F insulation, with IP55 protection index
- The motor is designed for high efficiency .
- All motors are dynamically blanced, and shaft diameters are machined to IEC60072.

■ Drain Pan

- The drain pan is 45~50mm depth with 1.0mm thickness galvanized steel c/w internal epoxy polyester resin coating.
- The drain pan is sloped towards the drain pipe with a 2 deg. gradient.
- The drain pan has one 3/4-inch to 1-1/4-inch male pipe thread (BT) connection.
- The standard insulation material is 10mm thickness, 25kg³/m density PE foam.

- Flat type design which allows maximum utilization of storage and container loading. Modular design allows minimum space for site installation.

- All condensing units are supplied with scroll compressor, which is high in energy efficiency and quiet in operation.

Product Nomenclature

Outdoor

1 2 3 4 5 6 7 8 9
K F D H 4 0 0 U W

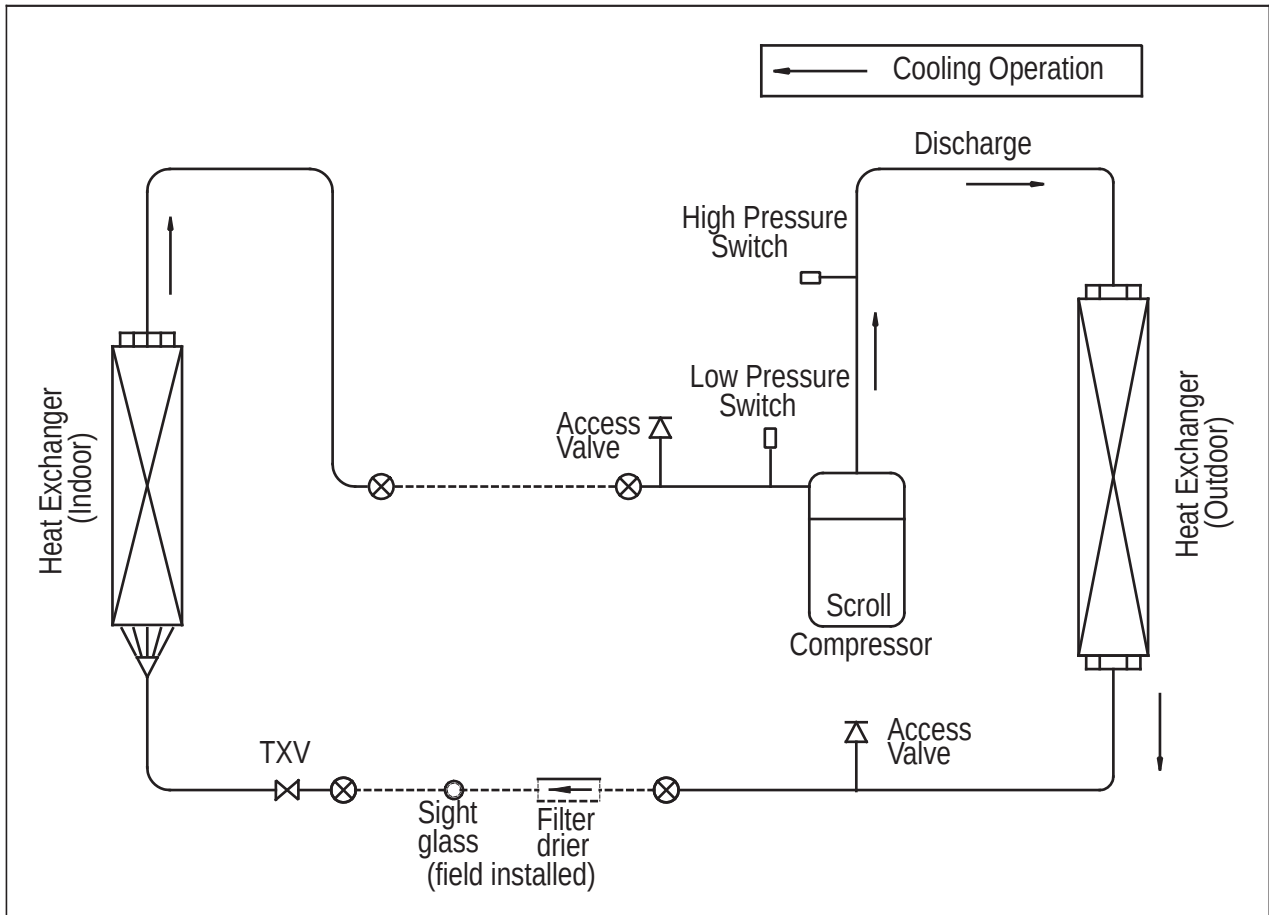
1- 4 KFDH - Ducted Fan Coil Unit
KODH - Outdoor Unit

5-7 Nominal Capacity - MBH

250 - 250,000 Btu/hr	400 - 450,000 Btu/hr
300 - 300,000 Btu/hr	500 - 500,000 Btu/hr

8-9 Generation

Refrigeration Schematic Diagram



Operation Limit

⚠ **Caution:**

Ambient temperature deg C

	Dry bulb	Wet bulb
Indoor		
Maximum	35	21
Minimum	19	14
Outdoor		
Maximum	43	-
Minimum	20**	

** For working conditions below 20 deg C head pressure control shall be installed
(Eg , Fan speed Controller , Field installed)

General Data

MODEL		Indoor Unit	KDFH	250		300	400	500
		Outdoor Unit	KODH	125	250	150 X 2	200 X 2	250 X 2
NOMINAL COOLING CAPACITY			Btu/h	250,000	250,000	300,000	400,000	500,000
			W	74,000	74,000	88,000	118,000	147,000
			kcal/h	63,000	63,000	76,000	101,000	126,000
NOMINAL INPUT POWER			W	22,800	22,800	35,500	45,000	53,000
NOMINAL RUNNING CURRENT			A	44.6	44.6	69.0	86.4	96.2
POWER SUPPLY			V/Ph/Hz	380~415V/3Ph/50Hz			380~415V/3Ph/50Hz	
INDOOR UNIT	Control			2 stage			4 stage	
	Air Flow		L/s (cfm)	3626 (7680)		4533 (9600)	4955(12000)	7080(15000)
	External Static Pressure		Pa	225		225	375	375
	Sound Pressure Level		dB-A	61		66	67	68
	Unit Dimension	Height	mm	1315		1315	1629	1782
		Length	mm	1757		1757	1929	2234
		Depth	mm	1320		1320	2169	2169
	Unit Weight		kg	335		355	665	824
Condensate Drain Pipe		mm (in)	32 (1-1/4")		32 (1-1/4")	40 (1-1/2")	40 (1-1/2")	
OUTDOOR UNIT	Air Flow		cfm	5500X2	5500X2	8000X2	5500X4	5500X4
	Sound Pressure Level		dB-A	70	70	73	74	74
	Unit Dimension	Height	mm	1085	1085	1372	1085	1085
		Width	mm	985	985	985	985	985
		Depth	mm	1220	2250	1220	2250	2250
	Weight		kg	200X2	390	310X2	340X2	390X2
	Connection (Braze Type)	Liquid	mm (in)	15.88 / 5/8	15.88 / 5/8	15.88 / 5/8	15.88 / 5/8	15.88 / 5/8
		Suction	mm (in)	34.9 / 1 3/8	34.9 / 1 3/8	34.9 / 1 3/8	28.6 / 1 1/8	34.9 / 1 3/8
Refrigerant Charge ** (R410A)			kg	8.8 x 2	8.8 x 2	10.5 x 2	7.5 x 4	8.8 x 4

Components Data

INDOOR UNIT	Casing	Material		GI			
		Coating/ Colour		Polyester , Saiver Blue (Ext)/ Bare GI (Int)			
		Insulation / Thickness		PU / 30mm (Double Skin)			
	Fan	Type / Drive / Material		DIDW Fwd Curve ; Belt ; Galvabond Steel			
		Qty		1		1	
		Diameter X Length		mm		470 X 460	560 X 710 630 X 800
	Fan Motor	Type, Qty, Poles		Induction Motor; 1 ; 4P		Induction Motor; 1 ; 4P	
		Index of Protection; Insulation		IP54; F		IP54 ; F	
		Power Source (V/Ph//Hz)		380~415V/3Ph/50Hz		380~415V/3Ph/50Hz	
		Rated Running Current		A		8	11 16 23
		Rated Output Power		W		4000	5500 7500 11000
	Coil	Tube Material, Size		mm (in)		Cu 9.52 (3/8")	
		Fin Material, Thickness		mm		Aluminum , 0.11	
		Face Area		m ² (ft ²)		1.65 (17.7)	2.51 (27.0) 2.84 (30.6)
		Row, FPI				4 X 12	4 X 14 4 X 12 4 X 12
	Filtration	Type		Washable Alu Frame Filter / G3			
		Dimension (LxWxt): Qty		mm		793 x 523 x 46 x 4	1Mx6 + 1/2Mx5 1Mx6 + 1/2Mx5
OUTDOOR UNIT	Casing	Material/Coating/ Colour		GI ; Polyester ; Saiver Blue & Silk Grey			
		Type of Discharge		Throw	Vertical	Vertical	Vertical Vertical Vertical
	Compressor	Compressor Type		Scroll		Scroll	Scroll Scroll
		Lock Rotor Amp		A	2 x 128	2 x 128	2 X 198 4 x 128 4 x 198
		Rated Running Current		A	2 x 16.9	2 x 16.9	2 x 25 4 x 16.2 4 x 16.9
		Input Power		W	2 x 9550	2 x 9550	2 x 12600 4 x 8520 4 x 9550
	Fan	Type/ Drive/ Material		Propellar/ Direct / Metal			
		Qty		2		2	2 4 4
		Diameter		mm (in)		660 (26)	660 (26) 760 (30) 660 (26) 660 (26)
	Fan Motor	Index of Protection; Insulation		IP55; F		IP55; F	IP55; F IP55; F IP55; F
		Rated Running Current		A	2X1.4	2X1.4	2x4 4x1.4 4x1.4
		Rated Output Power		W	550	2x550	2x1500 4x550 4x550
		Rated Input Power		W	670	2x670	2x2000 4x670 4x670
	Coil	Tube Material, Size		mm (in)		Cu, S.I.G.C. ,9.52 (3/8")	
		Fin Material, Thickness		mm		Aluminum, 0.11	
		Face Area		m2		2x1.67	3.37 2x2.16 2x3.37 2x3.37
		Row , FPI				2x 18	2x 18 2x 18 2x 12 2x 18

Note:-

1. All specifications are subjected to change by the manufacturer without prior notice

2. Nominal cooling capacity are based on the below conditions:-

a) Entering air temp 27 degC (80.6deg F) DB and 19deg C (66.2 deg F) WB.

b) Entering outdoor temperature 35deg C (95 deg F)

3. Component ampere rating based on 400V

4*. Capacity based on coupling fan coil unit (SDF), For coupling with AHU , value varies on selection.

5**. Charging level based on 7m copper tube connection

Performance Table

Model: 250

ID DB ^o C	ID WB ^o C	Outdoor DB ^o C											
		20		25		30		35		40		43	
		TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)
20	15	75.0	41.7	70.8	38.8	66.5	36.0	62.0	33.0	58.0	30.3	52.8	26.9
	16	80.3	38.1	75.1	35.6	69.9	33.2	64.6	30.5	59.6	28.3	53.4	25.4
24	16	80.3	52.2	75.1	49.8	69.9	47.3	64.6	44.7	59.6	42.4	53.4	39.5
	17	85.5	48.6	79.5	46.6	73.4	44.5	67.1	42.3	61.3	40.4	54.0	38.0
	18	90.8	45.0	83.8	43.4	76.8	41.7	69.7	39.9	62.9	38.4	54.6	36.4
	19	96.0	41.4	88.1	40.2	80.3	38.9	73.8	37.5	64.6	36.4	55.2	34.9
	20	101.3	37.8	92.9	36.8	84.5	35.8	75.8	34.6	67.6	33.8	57.5	32.7
27	18	90.8	59.1	83.8	57.5	76.8	55.8	69.7	54.0	62.9	52.5	54.6	50.5
	19	96.0	55.5	88.1	54.3	80.3	53.0	74.0	53.0	64.6	50.5	55.2	49.0
	20	101.3	51.9	92.9	50.9	84.5	49.9	75.8	48.7	67.6	48.0	57.5	46.8
	21	106.6	48.3	97.8	47.5	89.1	46.7	80.1	45.6	71.6	45.0	61.1	44.0
	22	111.9	44.7	102.8	44.0	93.7	43.4	84.4	42.5	75.6	42.1	64.6	41.3
	23	117.2	41.1	107.8	40.6	98.4	40.1	88.7	39.5	79.5	39.2	68.2	38.6
	24	122.5	37.4	112.8	37.1	103.0	36.9	93.0	36.4	83.5	36.3	71.8	35.9
30	20	101.3	59.0	92.9	58.0	84.5	57.0	75.8	55.8	67.6	55.0	57.5	53.8
	21	106.6	55.4	97.8	54.5	89.1	53.7	80.1	52.7	71.6	52.1	61.1	51.1
	22	111.9	51.7	102.8	51.1	93.7	50.5	84.4	49.6	75.6	49.2	64.6	48.4
	23	117.2	48.1	107.8	47.7	98.4	47.2	88.7	46.5	79.5	46.2	68.2	45.7
	24	122.5	44.5	112.8	44.2	103.0	43.9	93.0	43.4	83.5	43.3	71.8	43.0

Model : 300

ID DB ^o C	ID WB ^o C	Outdoor DB ^o C											
		20		25		30		35		40		43	
		TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)
20	15	83.1	47.9	79.3	45.4	75.5	42.9	71.5	40.3	67.8	38.0	63.2	35.0
	16	91.2	47.0	85.9	44.2	80.7	41.5	75.2	38.6	70.1	36.1	63.8	32.8
24	16	91.2	62.0	85.9	59.3	80.7	56.6	75.2	53.7	70.0	51.2	63.8	47.9
	17	99.2	61.1	92.5	58.1	85.8	55.2	78.9	52.0	72.4	49.3	64.4	45.7
	18	107.3	60.1	99.1	56.9	91.0	53.7	82.7	50.4	74.7	47.4	65.0	43.6
	19	115.3	59.1	105.8	55.7	96.2	52.3	87.8	48.7	77.0	45.5	65.5	41.4
	20	123.4	58.2	112.9	54.5	102.3	50.8	91.5	46.9	81.1	43.5	68.4	39.1
27	18	107.3	75.2	99.1	72.0	91.0	68.8	82.7	65.4	74.7	62.5	65.0	58.6
	19	115.3	74.2	105.8	70.8	96.2	67.4	88.0	64.8	77.0	60.6	65.5	56.5
	20	123.4	73.2	112.9	69.6	102.3	65.9	91.5	62.0	81.1	58.6	68.4	54.2
	21	131.6	72.3	120.3	68.3	109.0	64.4	97.5	60.2	86.4	56.5	72.8	51.7
	22	139.7	71.3	127.7	67.1	115.7	62.8	103.5	58.4	91.7	54.4	77.3	49.3
	23	147.9	70.3	135.1	65.8	122.3	61.3	109.5	56.6	96.9	52.3	81.7	46.9
	24	156.0	69.3	142.6	64.5	129.1	59.8	115.5	54.8	102.2	50.2	86.1	44.5
30	20	123.3	80.8	112.9	77.1	102.3	73.4	91.5	69.6	85.1	66.1	68.4	61.7
	21	131.6	79.8	120.3	75.9	109.0	71.9	97.5	67.8	86.4	64.0	72.8	59.3
	22	139.7	78.8	127.7	74.6	115.7	70.4	103.5	65.9	91.7	61.9	77.3	57.1
	23	147.9	77.9	135.1	73.3	122.4	68.8	109.5	64.1	96.9	59.8	81.7	54.4
	24	156.0	76.9	142.6	72.1	129.1	67.3	115.5	62.3	102.2	57.7	86.1	52.0

Performance Table

Model:400

ID DB ^o C	ID WB ^o C	Outdoor DB ^o C											
		20		25		30		35		40		43	
		TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)
20	15	110.6	63.6	105.5	60.3	100.4	57.0	95.3	53.7	90.2	50.3	84.1	46.4
	16	121.3	62.3	114.3	58.7	107.3	55.1	100.3	51.5	93.2	47.8	84.8	43.5
24	16	121.3	82.5	114.3	78.8	107.3	75.2	100.3	71.6	93.2	67.9	84.8	63.6
	17	132.0	81.2	123.1	77.2	114.2	73.3	105.2	69.4	96.3	65.4	85.6	60.7
	18	142.8	79.9	131.9	75.6	121.1	71.4	110.2	67.1	99.4	62.9	86.4	57.8
	19	153.5	78.6	140.7	74.0	128.0	69.5	115.2	64.9	102.5	60.4	87.1	54.9
	20	164.3	77.3	150.2	72.4	136.1	67.5	122.0	62.6	107.9	57.7	91.0	51.8
27	18	142.8	100.0	131.9	95.7	121.1	91.5	110.2	87.3	99.4	83.0	86.4	77.9
	19	153.5	98.7	140.7	94.1	128.0	89.6	116.0	85.0	102.5	80.5	87.1	75.0
	20	164.3	97.4	150.2	92.5	136.1	87.6	122.0	82.7	107.9	77.8	91.0	71.9
	21	175.2	96.1	160.1	90.8	145.1	85.6	130.0	80.3	114.9	75.0	96.9	68.7
	22	186.0	94.8	170.0	89.1	154.0	83.5	138.0	77.9	122.0	72.2	102.7	65.5
	23	196.9	93.5	179.9	87.5	162.9	81.5	146.0	75.5	129.0	69.4	108.6	62.2
	24	207.7	92.2	189.8	85.8	171.9	79.4	154.0	73.0	136.0	66.7	114.5	59.0
30	20	164.3	107.4	150.2	102.6	136.1	97.7	122.0	92.8	107.9	87.9	91.0	82.0
	21	175.2	106.1	160.1	100.9	145.1	95.6	130.0	90.3	114.9	85.1	96.9	78.8
	22	186.0	104.8	170.0	99.2	154.0	93.6	138.0	87.9	122.0	82.3	102.7	75.5
	23	196.9	103.5	179.9	97.5	162.9	91.5	146.0	85.5	129.0	79.5	108.6	72.3
	24	207.7	102.2	189.8	95.9	171.9	89.5	154.0	83.1	136.0	76.7	114.5	69.1

Model : 500

ID DB ^o C	ID WB ^o C	Outdoor DB ^o C											
		20		25		30		35		40		43	
		TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)	TC(kW)	SC(kW)
20	15	147.1	83.4	139.1	78.2	131.0	73.0	123.0	67.8	114.9	62.6	105.3	56.4
	16	158.2	76.8	148.2	72.3	138.3	67.7	128.3	63.2	118.4	58.7	106.4	53.3
24	16	158.2	103.2	148.2	98.7	138.3	94.2	128.3	89.7	118.4	85.2	106.4	79.8
	17	169.2	96.6	157.4	92.8	145.5	89.0	133.7	85.1	121.8	81.3	107.6	76.7
	18	180.3	90.0	166.5	86.9	152.8	83.7	139.0	80.6	125.3	77.4	108.8	73.6
	19	191.4	83.4	175.7	80.9	160.0	78.5	144.4	76.0	128.7	73.5	109.9	70.6
	20	202.5	76.8	185.6	74.7	168.7	72.7	151.8	70.6	134.9	68.6	114.7	66.1
27	18	180.3	116.5	166.5	113.3	152.8	110.2	139.0	107.0	125.3	103.9	108.8	100.1
	19	191.4	109.9	175.7	107.4	160.0	104.9	146.0	104.0	128.7	100.0	109.9	97.0
	20	202.5	103.2	185.6	101.2	168.7	99.1	151.8	97.1	134.9	95.0	114.7	92.6
	21	213.7	96.6	196.0	94.7	178.3	92.9	160.7	91.1	143.0	89.3	121.8	87.1
	22	224.9	89.9	206.4	88.3	188.0	86.7	169.5	85.2	151.0	83.6	128.9	81.7
	23	236.1	83.2	216.8	81.9	197.6	80.5	178.4	79.2	159.1	77.9	136.0	76.3
	24	247.3	76.5	227.3	75.4	207.2	74.3	187.2	73.2	167.2	72.1	143.1	70.8
30	20	202.5	116.4	185.6	114.4	168.7	112.3	151.8	110.3	134.9	108.2	114.7	105.8
	21	213.7	109.8	196.0	108.0	178.3	106.2	160.7	104.3	143.0	102.5	121.8	100.4
	22	224.9	103.1	206.4	101.5	188.0	100.0	169.5	98.4	151.0	96.8	128.9	94.9
	23	236.1	96.4	216.8	95.1	197.6	93.8	178.4	92.4	159.1	91.1	136.0	89.5
	24	247.3	89.8	227.3	88.7	207.2	87.6	187.2	86.5	167.2	85.4	143.1	84.1

Fan Performance Table

MODEL	AIR FLOW CFM/CMH	ESP Pa	BLOWER RPM	MOTOR POWER (KW)
KFDH 250	6800 (11560)	150	683	3
		200	725	3
		300	805	4
		400	881	4
		500	953	5.5
	8000 (13600)	600	1021	5.5
		150	719	4
		200	755	4
		225	800	4
		300	830	5.5
		400	899	5.5
		500	966	7.5
	8800 (15000)	100	714	4
		200	785	5.5
		300	853	5.5

MODEL	AIR FLOW CFM/CMH	ESP Pa	BLOWER RPM	MOTOR POWER (KW)
KFDH 300	8200	150	717	4
		200	733	4
		300	817	5.5
		400	885	5.5
		500	950	5.5
		600	1015	7.5
	9600	100	711	5.5
		200	778	5.5
		225	795	5.5
		300	843	5.5
		400	906	7.5
		500	967	7.5
	10600	100	762	7.5
		200	824	7.5
		300	884	7.5

KFDH 400	10500 (17850)	150	585	5.5
		225	640	5.5
		300	690	7.5
		375	740	7.5
		450	785	7.5
		500	815	11
		550	845	11
		600	874	11
		650	900	11
	12000 (20400)	150	604	5.5
		225	653	7.5
		300	702	7.5
		375	750	7.5
		450	794	11
		500	823	11
		550	851	11
		600	879	15
		650	893	15
	13200 (22400)	150	626	7.5
		225	670	7.5
		300	715	7.5
		375	765	11
		450	805	11
		500	832	11
		550	860	15
		600	890	15
		650	915	15

KFDH 500	13500 (23000)	150	527	5.5
		225	575	7.5
		300	620	7.5
		375	664	11
		450	705	11
		500	730	11
		550	760	11
		600	784	15
		650	808	15
	15000 (25500)	150	550	7.5
		225	594	11
		300	637	11
		375	678	11
		450	718	11
		500	743	15
		550	768	15
		600	790	15
		650	816	15
	16000 (27200)	150	565	11
		225	606	11
		300	647	11
		375	686	11
		450	725	15
		500	755	15
		550	775	15
		600	800	15
		650	822	15

Sound Data

Sound Pressure Level

Model	Connection	1/1 Octave Sound Pressure Level (dB, ref 20uPa)						Overall (dBA)	NC
		125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
KFDH250UW		55	54	64	49	47	41	34	61
KFDH300UW		64	60	64	62	57	54	48	66
KFDH400UW		66	61	62	61	58	54	43	67
KFDH500UW		68	65	65	62	60	56	47	68

Sound pressure measuring point is 1.4m below the unit surface.
(unit discharge is ducted to adjacent room)

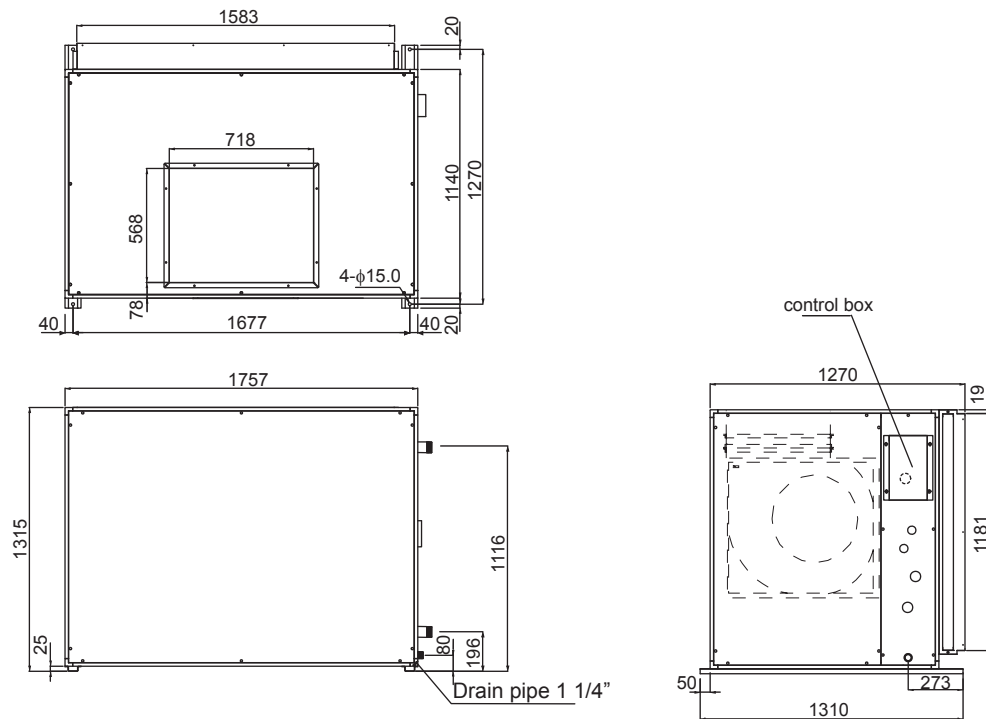
Sound Power Level

Model	Sound Power Level (dB, ref 1pW)							(dBA)
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
KFDH250UW	71	71	80	65	64	57	50	78
KFDH300UW	80	76	80	78	73	70	64	82
KFDH400UW	85	86	85	83	79	75	70	87
KFDH500UW	88	89	88	86	82	78	73	90

Unit Dimension

Model :

KFDH250,300UW

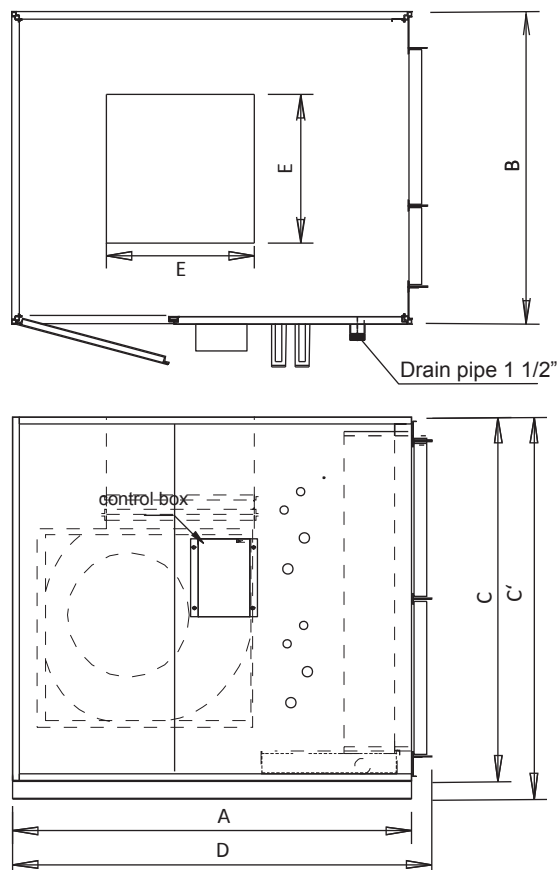


Note : All dimensions are in mm , only if otherwise specified.

Model :

KFDH400,500UW

Model	400	500
A (LENGTH)	1865	2170
B (WIDTH)	2170	2170
C	1560	1712
C' (HEIGHT)	1630	1782
D	1930	2235
E	715	800



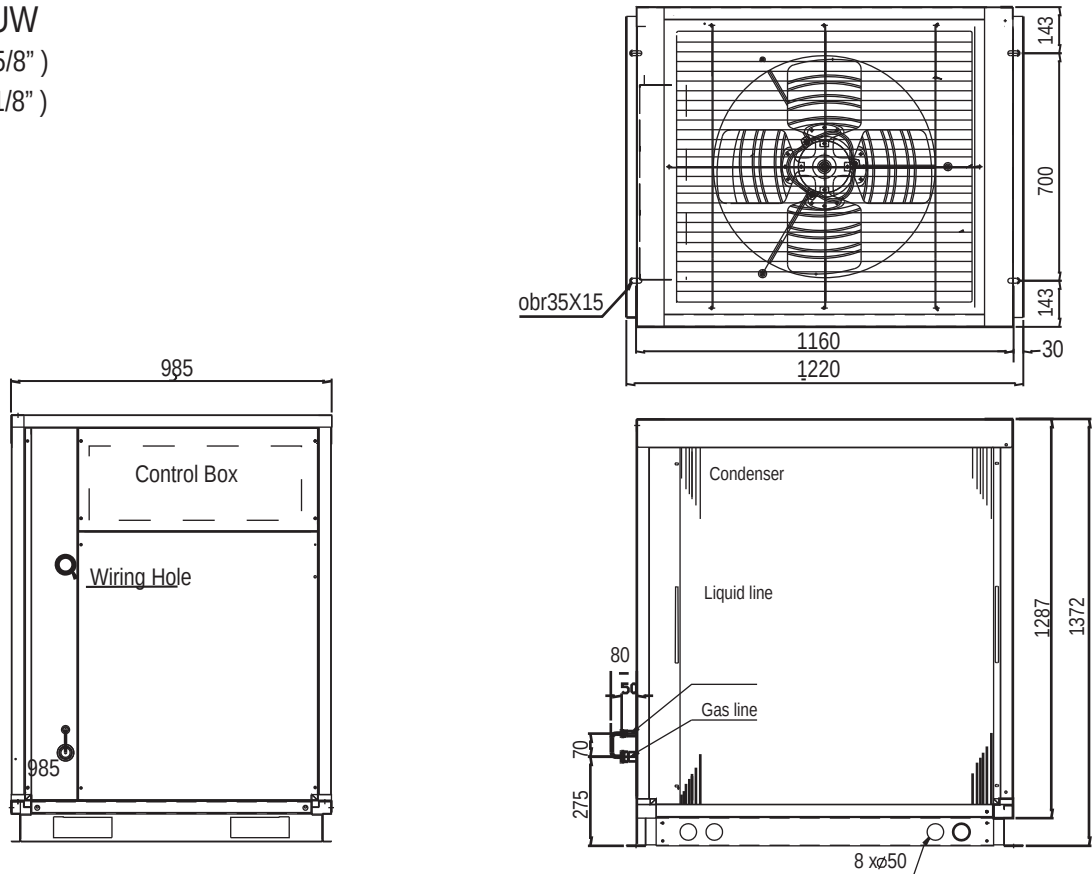
Unit Dimension

Model :

KODH150UW

Liquid line (5/8")

Gas line (1 1/8")

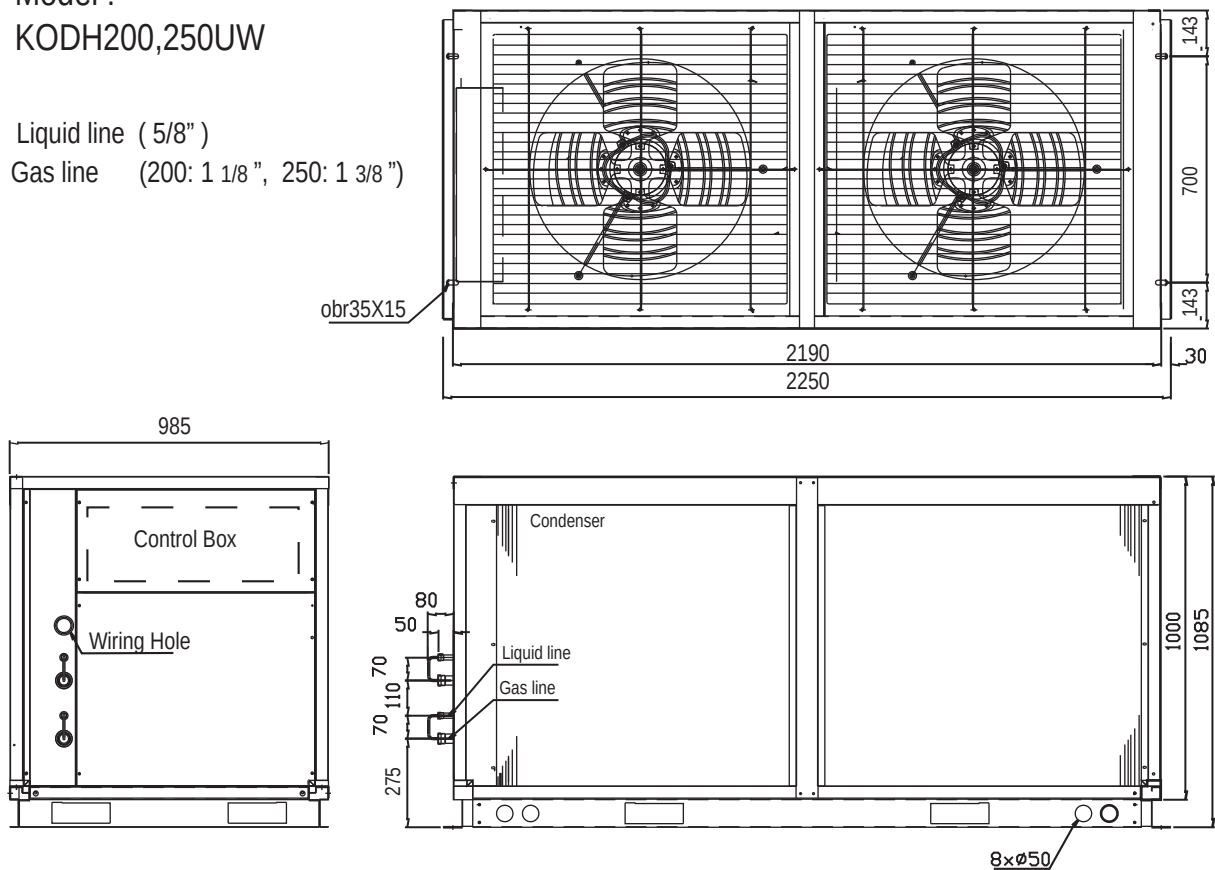


Model :

KODH200,250UW

Liquid line (5/8")

Gas line (200: 1 1/8", 250: 1 3/8")



Indoor unit Installation

- Select a location where ducting space is sufficient
- Make sure no obstruction to return and discharge air.
- Avoid installation at the following location:
 - area where flammable gas may leak or generated.
 - places where unit is frequently exposed to corrosive gas, or acidic solutions.

Service space

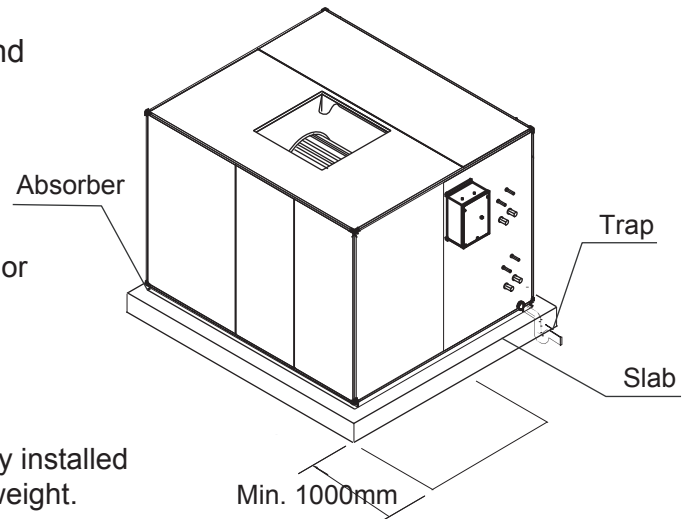
- Make sure sufficient space for service and maintenance (see figure).

Installing indoor unit

- The unit must be securely installed on slab.
- For KODH250, 300, install a rubber damper or absorber to minimize the unit vibration.

⚠ Warning:

- Hanging installation is not recommended.
- If intended to hang the unit, it must be securely installed on structure or rods which able to sustain its weight.
- Add isolator, absorber, if necessary, to minimize the vibration transmission to the ceiling or wall.



Drain pipe

- Drain pipe shall be properly installed for the drainage for the drainage of condensate water.
- Trap shall be installed (See figure)
- Make sure no leak at the connecting joint.
- Insulate the drain pipe to avoid water condensation.

Condensing unit Installation

- In order to optimize capacity, unit shall be installed as recommended requirements :-
 - a) Allow sufficient space around the unit, to avoid the recirculation of the hot discharge air.
 - b) Ensure no obstruction air flow into or out of the unit.
 - c) The location which is well ventilated
 - d) A place which protected from direct sunlight, use an awning for protection , if necessary.
 - e) A place where the hot air discharge and operating sound level will not annoy the neighbours.
 - f) A place must not be susceptible to dust or oil mist, or other corrosive chemicals

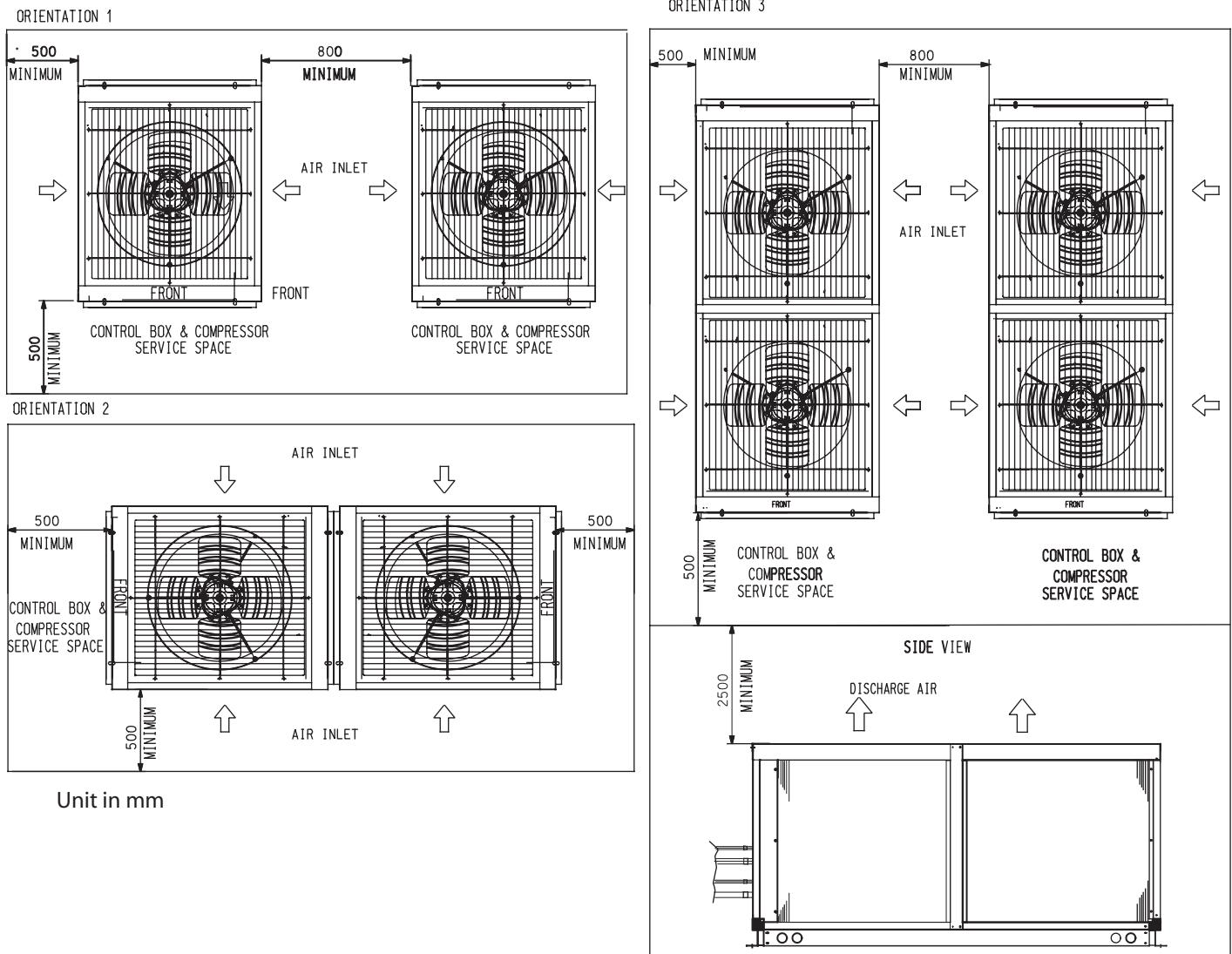
⚠ Caution: If the condensing unit is operated in an atmosphere containing oils (including machine oils), salt (coastal area), sulphide gas (near hot spring, oil refinery plant), corrosive chemicals etc may lead to failure of the unit.

Installation Space and Clearance

Orientation 1 2 X KODH150

Orientation 2 2 X KODH, 1 X KODH 200,250

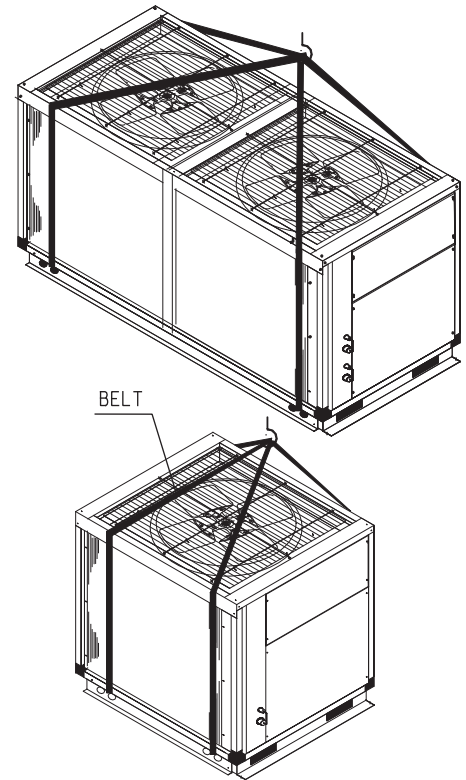
Orientation 3 4X KODH0150, 2 X KODH 200,250



Condensing unit Installation

Unit Lifting

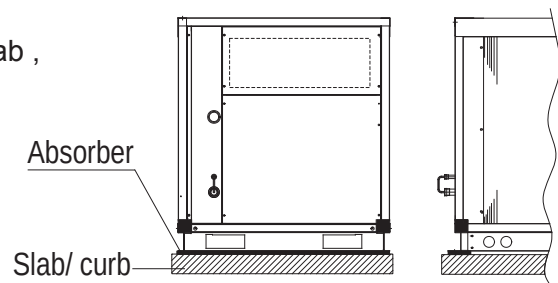
Holes at the unit base are for the lifting purpose.
Belt shall be used for lifting the unit, properly tied the belt to the holes , use shackles to tighten the belt.
Make sure the belt strenght is able to withstand the unit weight.
The length of the belt shall be adjust properly, in order to prevent the imbalance of the unit when lifting



Unit Support

Unit shall be placed on a secured base, on slab , curb or steel frame

Absorber should be installed to absorb the unit vibration during operation.



Unit Installation

Field Copper Tubing Connection

To ensure satisfactory operation and performance, the following points should be noted for the field tubing arrangements of the complete refrigerant cycle.

- a) Liquid loops or oil traps must be provided according to the position of the outdoor and the indoor units (depending on whether the indoor unit is above or below the outdoor unit).
- b) **Field supplied filter drier must be installed** as close to the expansion valve(s) of the indoor unit (evaporator) as possible.
- c) Field supplied sight glass must be assembled and mounted next to filter dryer.
- d) Pipe size shall be followed as listed in page 8.

 Caution:

- During the preparation, piping shall be properly covered to avoid the contamination of the system.
- Both indoor and outdoor are brazed connection.

 Warning:

- Make sure there is no flammable gas at the surrounding before the brazing work started.
- DO NOT charge in flammable gas.

Maximum tube length and Maximum number of Bends

When the pipe is too long, the required refrigerant quantity increases, both the capacity and reliability of compressor will drop.

When the number of bends increases, refrigerant flow resistance increases, thus lowering the cooling capacity; the excessive pressure drop might eventually cause the failure of compressor.

If height difference of evaporator and condenser is excessive, this will retard the compressor oil return and affecting the compressor efficiency

Always choose the shortest piping path with minimum bends.

Cautions: All units installation length

Max elevation	20M
Max total equivalent length	35M
Max bends	8

For operation safety, accumulator is recommended to be added for any installation more than 30m in length

Field Charging & Refrigerant Handling

Scroll compressors have a very high volumetric efficiency and quickly pump a deep vacuum if there is insufficient refrigerant in the system or if refrigerant is added too slowly. Low suction pressure will lead to high discharge temperatures.

This process will cause the scrolls are not being well-lubricated eventually leads to high friction between the scroll flanks and tips and generates additional heat.

This will cause damage to scroll bearing which can occur in less than one minute. But the failure might occur only in later of time after charging.

Other typical field charging problems include undercharging, overcharging, moisture or air in the system etc. In time each one of these problems can cause compressor failure.

Equipment

Minimal equipments are required for field charging. to do a satisfactory job is :

Set of service gauges	Hoses ,	Vacuum pump,	Charging Cylinder
	Scales	Thermometer	Vacuum gauge

Unit Installation

Charging Hose

Most field-charging is done using standard service hoses. Hoses are made in different colors with different working pressures and with different leak rates but the most important point is the presence or absence of hoses

This slows evacuation and vapor charging dramatically. In most cases the Shredder depressor can be removed but it is simpler to have one set of hoses with and one set without Shredder depressors

Hose selection is important depending whether the system is being evacuated or charged. Charging liquid from the cylinder into the liquid line should be carried out using an open hose connected to an unrestricted fitting. This will reduce charging time.

How much refrigerant?

The proper refrigerant charge should follow the volume as recommended by manufacturer , additional charge for extended length installation can follow general guideline below.

If the installer cannot find the correct charge but the system must be started, refrigerant should be carefully added to the system until reasonable sub-cooling is measured in the liquid line and reasonable suction superheat is measured at the compressor suction. Suction and discharge pressures must be monitored carefully during the charging process.

Additional Chage

Based on liquid pipe size per meter length:

Liquid line size	kg
1/2"	0.10
5/8"	0.17
3/4"	0.26
7/8"	0.37

Above is the recommendation, actual charge level may be different due to the different application and ambient condition.

Refrigerant R410A : special precaution

R410A is HFC refrigerant which has Zero Ozone Depletion Potential (ODP = 0). The working pressure of this refrigerant is 1.6 times higher than refrigerant (R22), thus proper installation / servicing is essential

i) Characteristic

Mixture of composition by weight : R32(50%) and R125(50%)

R410A liquid and vapor components have different compositions when the fluid evaporates or condenses. Hence, when leak occurs and only vapor leaks out, the composition of the refrigerant mixture left in the system will change and subsequently affect the system performance.

It is NOT recommended to add new refrigerant to leaked system.

System shall be evacuated thoroughly and recharging with liquid refrigerant (original mixture composition of R410A).

Polyol-ester (POE) oil is used as lubricant for R410A compressor. As the water will react with POE oil and become acid.**Extra precaution** must be taken to avoid exposing the R410A system to moist air.

Unit Installation

Charging Hose

Refrigerant R410A : special precaution

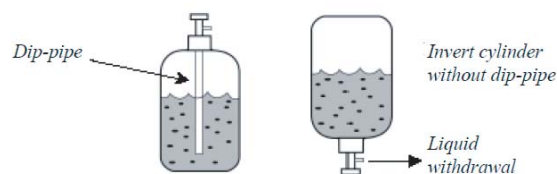
ii) Check List Before Installation / Servicing

- Tubing -Refrigerant R410A is more easily affected by dust or moisture compared with R22, make sure to temporarily cover the ends of the tubing prior to installation
 - Compressor oil - No additional charge of compressor oil is permitted.
 - Tools - Tools used for R410A only (must not be share with other refrigerant)
- Gauge manifold and charging hose ,Refrigerant cylinder/charging cylinder
Vacuum pump c/w adapter, Refrigerant recovery machine etc

iii) Handling and Installation Guidelines

Like R22 systems, the handling and installation of R410A system are closely similar. All precautionary measures; such as ensuring no moisture, no dirt or chips in the system, clean brazing using nitrogen, and thorough leak check and vacuuming are equally important requirements. However, due to its hydroscopic POE oil, additional precautions must be taken to ensure optimum and trouble-free system operation.

- a) During installation or servicing, avoid prolong exposure of the internal part of the refrigerant system to moist air. Residual POE oil in the piping and components can absorb moisture from the air.
- b) Ensure that the compressor is not expose to open air for more than the recommended time specified by its manufacturer (typically less than 10 minutes). Removed the seal-plugs only when the compressor is about to be brazed.
- c) The system should be thoroughly vacuumed to 1.0 Pa (700mmHg) or lower. This vacuuming level is more stringent than R22 system so as to ensure no incompressible gas and moisture in the system.
- d) When charging R410A, ensure that only liquid is being withdrawn from the cylinder or can. This is to ensure that only the original composition of R410A is being delivered into the system. The liquid composition can be different from the vapor composition.



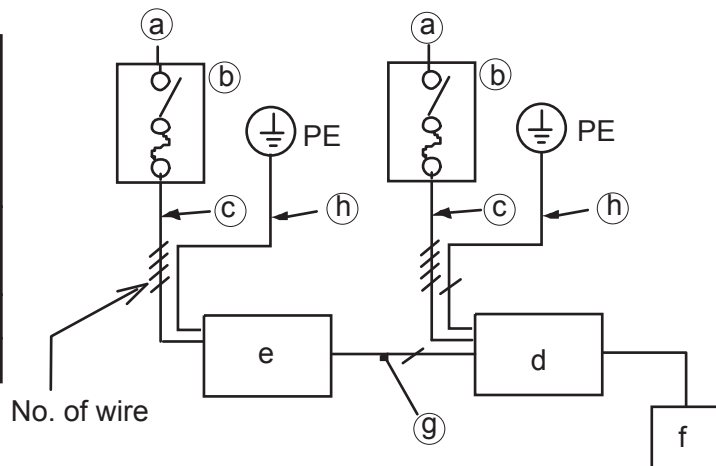
- e) Normally, the R410A cylinder or can is being equipped with a dip-pipe for liquid withdrawal. However, if the dip-pipe is not available, invert the cylinder or can so as to withdraw liquid from the valve at the bottom.

Electrical Wiring

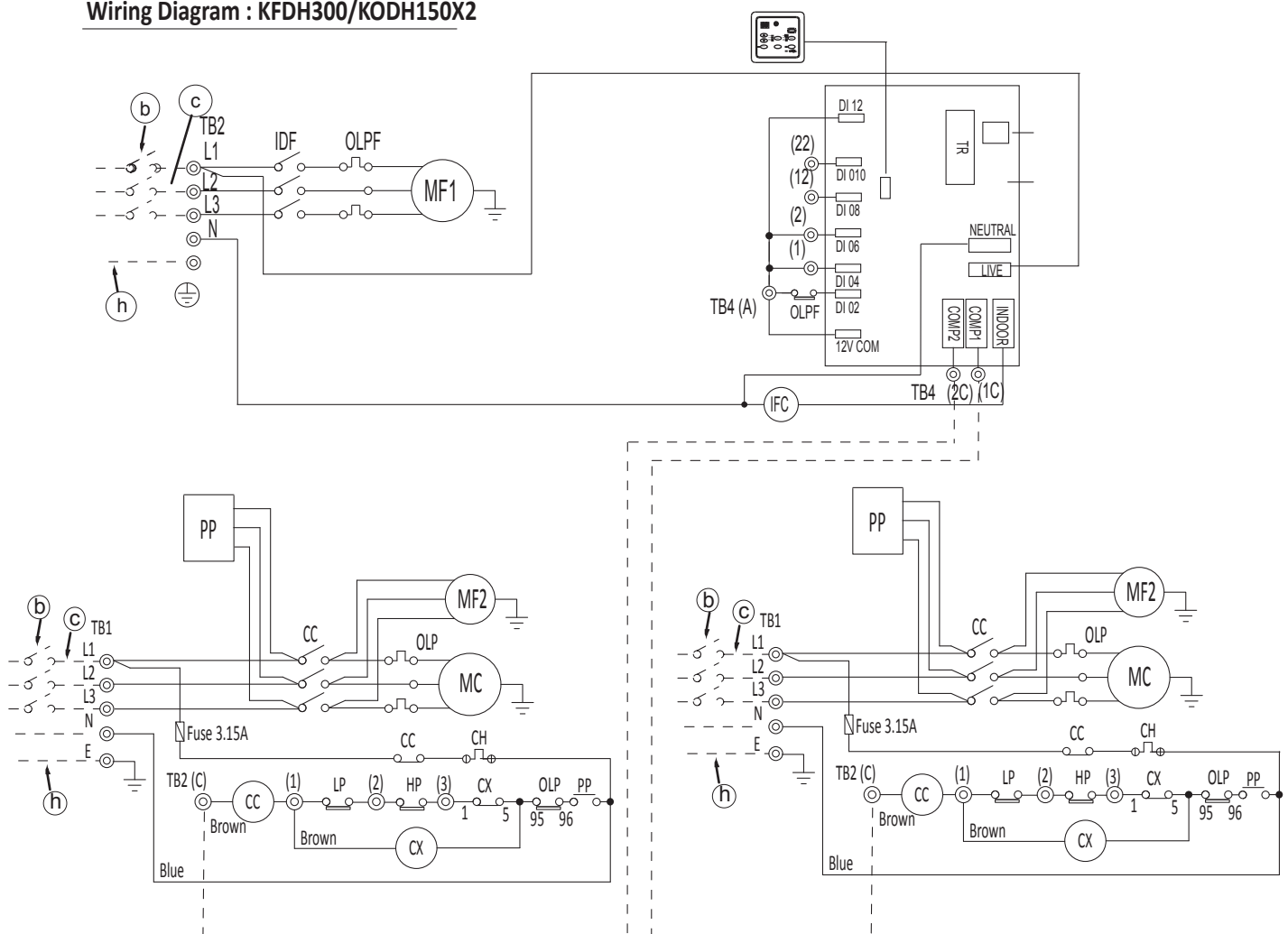
⚠ Caution:

- Field-installed wirings must comply with local codes and regulations. Voltage tolerance should be kept at rated voltage $\pm 10\%$.
- Check if the main power supply matches the nameplate rating before installation takes place.
- Each air-conditioning unit should be installed with independent circuit breaker (Field installed)
- Unit must be properly GROUNDED.
- Entire unit wiring diagram.

a.	Power supply
b.	Circuit Breaker (field supply)
c.	Power supply wiring for unit
d.	indoor unit
e.	outdoor unit
f.	Wired remote controller
g.	Unit interconnecting wire
h.	Earth

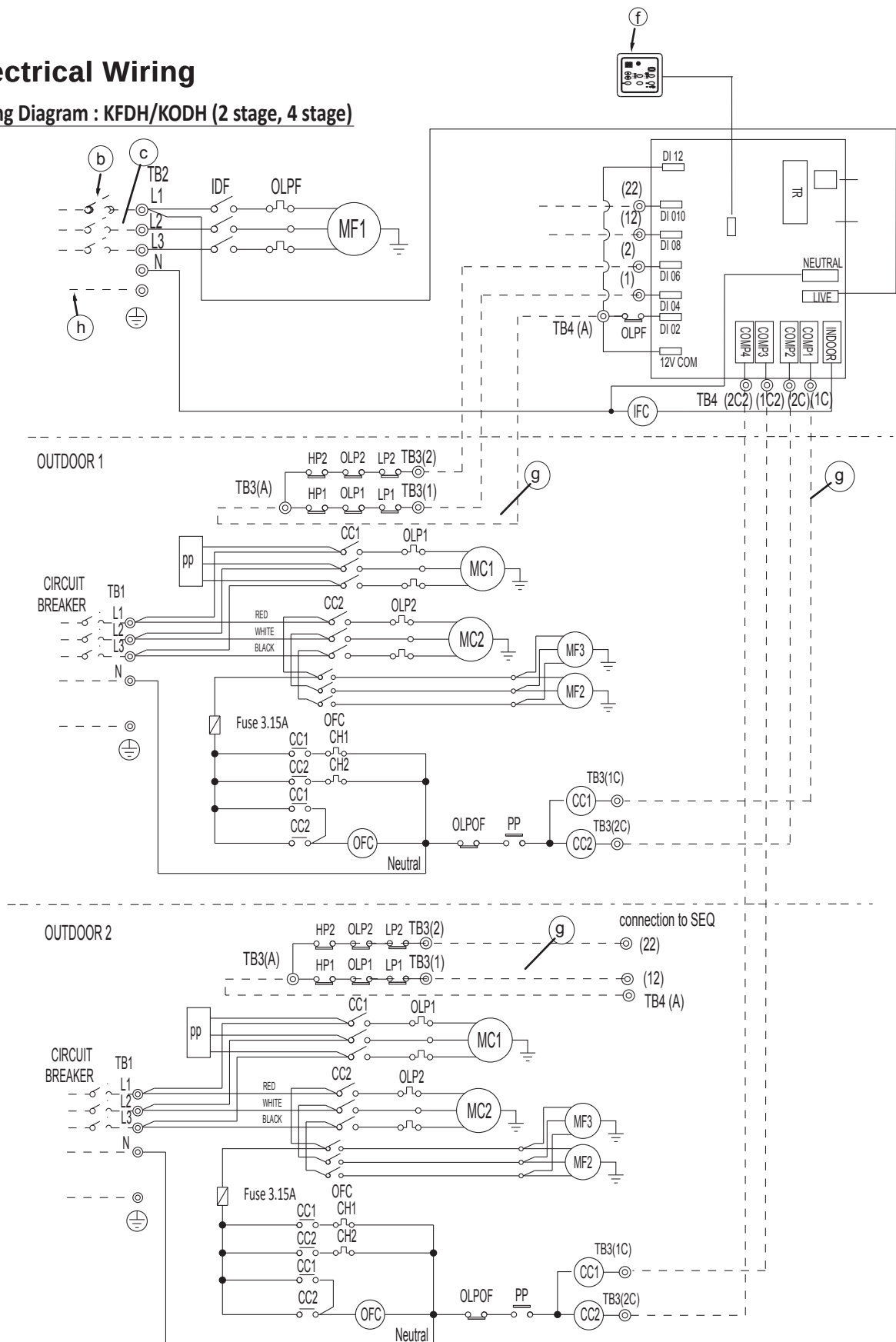


Wiring Diagram : KFDH300/KODH150X2



Electrical Wiring

Wiring Diagram : KFDH/KODH (2 stage, 4 stage)



- Recommended field installed minimum wire size (90deg C insulation).

	Model	250	300	400	500
Power Supply		380V/3ph/50Hz ~N			
Supply 5 × size (mm ²)	Indoor	1.5	2.5	4	5.5
	Outdoor	13.3	2 X 8	2 X 13.3	
Interconnecting, No x 0.75mm ²		5 x	2 x	2 x 5 x	

Controller Operation

2, 4 stages controller

System Operation & Functions

Upon the power on, the unit is at the standby mode.

The unit able operates at Cool or Fan mode , the operation mode can be changed via Mode button.

Default setting of the controller : Cool mode, high fan, 24°C

NO	Fan mode on sequence	Remarks
1	Wall pad on	
2	External interlock (remote on/off) contact close	Should the contact is opened, system enter into standby mode.
3	Turn on indoor fan,	If there be indoor fan failure (OLP fan motor open), indoor fan can not be turned on and system enters standby mode.
4	On cycle completed	

NO	Cool mode on sequence	Remarks
1	Wall pad on	
2	External interlock (remote on/off) contact close	Should the contact is opened, system enter into standby mode.
3	Turn on indoor fan, delay 15 sec	If there be indoor fan failure (OLP fan motor open) , indoor fan can not be turned on and system enters standby mode.
4	Check return air temperature, delay 15sec.	If setting temp not met, continue checking.
5	Turn on compressor	Use equal loading logic to turn on the compressor with the shortest cumulative run time. (lead-lag function)
6	Check for loading equirement.	If further loading is required, proceed with loading control.
7	On cycle completed	

Controller Operation

NO	Cool mode off sequence	Remarks
1	Wallpad off or remote on/off contact open	
2	Off compressor 1	If compressor 1 is not running, jump to step 4
3	Delay 3 sec	
4	Off compressor 2	If compressor 2 is not running, jump to step 6
5	Delay 3 sec	
6	Off compressor 3	If compressor 3 is not running, jump to step 8
7	Delay 3 sec	
8	Off compressor 4	
9	Delay 30 sec	
10	Off indoor fan	
11	Off cycle complete	

2 Wallpad

2.1 Wallpad Dimension, Figure 1

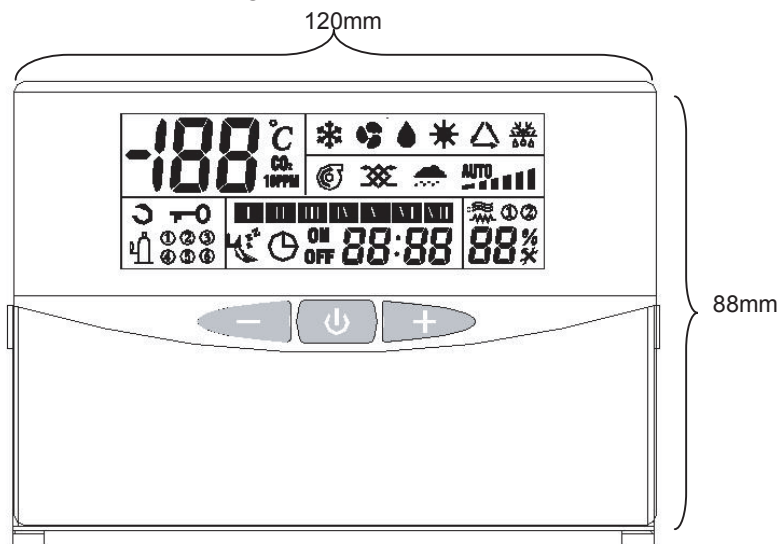


Figure 1

22 Button/key Description (Details refer to operation guide) Figure 2

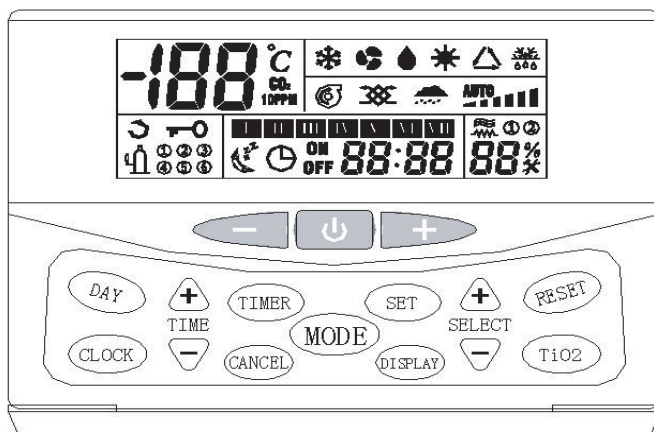


Figure 2

DAY : Set day of week
 TIME+/- : Adjust clock
 CLOCK : Set clock
 CANCEL: Cancel timer
 TIMER : Set on/off timer
 MODE: Set operation mode
 SET: Set parameter
 DISPLAY: Browse temperature
 SELECT+/- : Menu selection
 RESET : Reset fault
 TiO2:TiO2on/off

Controller Operation

2.3 LCD Display Description Figure 3

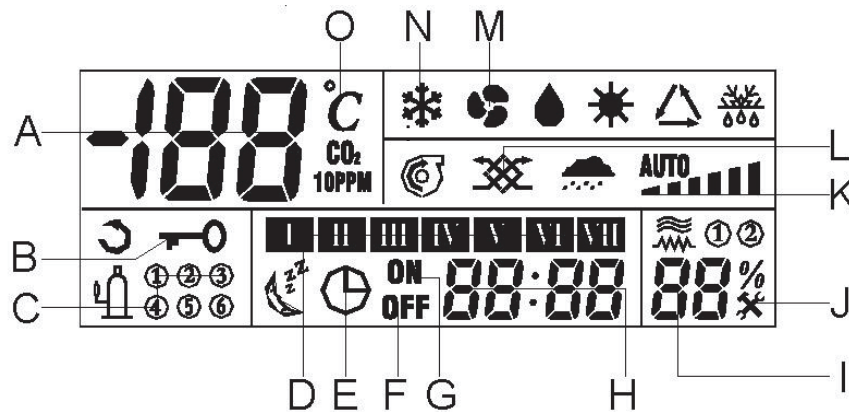


Figure 3

- A: Return air or set temperature display section. This section has no indication if system in standby mode and backlight is off.
- B: Wallpad key lock symbol. Symbol appears if wallpad keypad is locked and vice versa.
- C: Compressor status indication. Symbol will lights up if its corresponding compressor is running.
- D: Day display from Monday to Sunday
- E: On/Off timer setting symbol. During on/off timer setting mode, this symbol and F or G symbol flashing. In none timer setting mode, this symbol will light up should there be any on/off timer being set.
- F: Off symbol. During off timer setting mode, this symbol and D symbol flashing. In none off timer setting mode, this symbol will light up should be unexecuted off timer for the current day.
- G: On symbol. During on timer setting mode, this symbol and D symbol flashing. In none on timer setting mode, this symbol will light up should be unexecuted on timer for the current day.
- H: Clock display. In temperature browsing mode, it shows the temperature being searched. In parameter setting mode, it shows the set parameter.
- I: It shows the error code if there is system failure. It shows the menu number in temperature browsing or parameter setting mode.
- J: Error symbol flashes if there is system failure and vice versa.
- K: Indoor fan status indication. This symbol lights up if indoor fan is running and vice versa.
- L: TiO2 status indication. This symbol lights up if TiO2 is on and vice versa.
- M: Symbol lights up in Fan mode and vice versa.
- N: Symbol lights up in Cool mode and vice versa.
- O: Symbol flashes in temperature setting mode.

2.4 Wallpad Operation Guide

2.4.1 On/Off Control

Press  button to control the system on/off. If the unit is off, press  will turn on the system with two beeping sounds. If the unit is on, press  to turn off the unit with one beeping sound.

Controller Operation

2.4.2 Temperature Setting

Press  or  button to adjust the temperature setting from 16 oC to 30 oC.

2.4.3 Mode Setting

Press <MODE> button to select Cool or Fan mode.

2.4.4 Clock Setting

System has an inbuilt real time clock for time indication and on/off timer control. Press <CLOCK> button to enter into clock setting mode and second indication stop flashing. Press <TIME+/-> button to adjust the system clock. Press <CLOCK> button once more to exit the clock setting mode. Second indication resume flashing.

2.4.5 Day Setting

This wallpad supports the day indication. Day indication can be used for normal day display and on/off timer setting. Day display section shows the current day. Use the <DAY> button to adjust the day setting accordingly.

2.4.6 On/Off Timer Setting

The system supports 7 groups of on/off timer setting, ie 7 days weekly timer.

- a) Press <TIMER> button once, timer symbol flashes. Press <TIMER> button again, timer and On symbols flashing, system is now in on timer setting mode. The day display section shows the day of the corresponding on timer setting. If clock display section shows --:--, it means the current timer is null. Pressing <TIMER+/-> button will activate this timer. If there is time being displayed, it means the current timer is already activated. Press <TIME+/-> button to adjust the timer setting. Press <CANCEL> button will cancel this setting and the display will be shown as --:--.
- b) Press <TIMER> button again, On symbol is off while timer and Off symbols flashing, system is now in on timer setting mode. The day display section shows the day of the corresponding off timer setting. If clock display section shows --:--, it means the current timer is null. Pressing <TIME+/-> button will activate this timer. If there is time being displayed, it means the current timer is already activated. Press <TIME+/-> button to adjust the timer setting. Press <CANCEL> button will cancel this setting and the display will be shown as --:--.
- c) Press <TIMER> button again, Off symbol off and timer symbol flashing. Pressing button will exit on/off timer setting.
- d) Press <TIMER> button again to repeat steps a) and b).
- e) Press <DAY> button to adjust different day of on/off timer setting.
- f) In normal operation, timer symbol will light up should there be any on/off timer being set. Should there be unexecuted on or off timer for the current day, its corresponding On or Off symbol will light up.
- g) In on/off timer setting mode, pressing <CANCEL> button for 5 sec will cancel all on/off timer settings.

2.4.7 TiO2 Control

Press <TiO2> button to start or stop TiO2 control.

Controller Operation

2.4.8 Temperature Browsing

In normal operation, press <DISPLAY> button to enter into temperature browsing menu. Press <SELECT ▲/▼> button to select the menu as follow:

Menu Shown in error code display section	Value Shown clock display section	Unit	Remarks
C0	Main board DIP switch setting	unit	Shows number of outdoor unit connected
C1	Indoor coil 1 temperature	C	
C2	Indoor coil 2 temperature	C	
C3	Indoor coil 3 temperature	C	If main board is configured as dual circuits, C3 and C4 can not be selected.
C4	Indoor coil 4 temperature	C	If main board is configured as three circuits, C4 can not be selected.

Press < DISPLAY> button again to exit.

2.4.9 Keylock

System is equipped with keylock function to prevent mischief. Press  and  buttons for 5 sec to activate keylock mode. Keylock symbol will light up, likewise to exit keylock mode.

Only  button will be responded in keylock mode.

2.4.10 Key Validity

There are some buttons that will be acknowledged in certain function only. The valid key press will be responded with the beeping sound.

2.4.11 Parameter Setting

In normal mode, press < SET> button for 5 sec to enter into parameter setting menu. Press <SELECT ▲/▼> button the select the menu. Press  or  button to edit the parameter as follow:

Menu Shown in error code display section	Parameter Shown clock display section	Characteristic	Remarks
d0	Recover to the state before power failure.	Display as En: Recover Display as Dn: Not recover	
d1	Service password 1	0~99, default 0	
d2	Service password 2	0~99, default 0	
d3	Indoor coil anti freeze	-10~2degC, default 0degC	
d4	Compressor consecutive cut in interval	3~8 min, default 5min	
d5	Thermostatic control cycle	30~240 sec, default 90 sec	
d6	Recover to default setting	Display as En: Recover Display as Dn: Not recover	

Controller Operation

Note:

- 1 Upon enter to parameter setting menu, "READ" wording will be shown, indicates retrieving the data from the main board.
- 2 At menu d1, a password of "16" is required to proceed to menu d2. If the password is incorrect, system will exit parameter edit mode.
- 3 At menu d2, a password of "32" is required to proceed to menu d3. If the password is incorrect, system will exit parameter edit mode.
- 4 Upon completion of parameter editing, press <SET> button to exit in order for the new settings to take effect.

2.4.12 Error Display

Should there be error occurred, backlight will turn to red colour. Error display section shows the corresponding error code as follow:

Error Code	Description	Remarks
1	Indoor fan failure (power off to reset)	Display error, stop the system for protection Power off and on to restart. [check motor overload]
2	Indoor return air sensor failure (auto reset)	Display error, resume upon recovered, default at 26degC [check sensor connection]
3	Indoor coil 1 sensor failure (auto reset)	Display error, system continue to operate, bypassed anti freeze. [check sensor connection]
4	Indoor coil 2 sensor failure (auto reset)	Display error, system continue to operate, bypassed anti freeze.[check sensor connection]
5	Indoor coil 3 sensor failure (auto reset)	Display error, system continue to operate, bypassed anti freeze.[check sensor connection]
6	Indoor coil 4 sensor failure (auto reset)	Display error, system continue to operate, bypassed anti freeze.[check sensor connection]
7	Outdoor unit 1 power protection, comp overload trip, compressor 1 high/low pressure trip (manual reset)	Display error, stop the outdoor unit, manual reset required, should the failure be occurred 5 times consecutively, pressing of "RESET" will not be able to reset the unit. Needs power off and on to restart the unit.
8	Indoor coil 1 anti freeze (auto reset)	Display error, Resume upon recovered . [check coil]
9	Circuit 1 no cooling (power off to reset)	Display error. [check outdoor unit 1]

Controller Operation

Error Code	Description	Remarks
10	Outdoor unit 2 power protection, comp overload trip, compressor 2 high/low pressure trip (manual reset)	same as 7
11	Indoor coil 2 anti freeze (auto reset)	same as 8
12	Circuit 2 no cooling (power off to reset)	same as 9
13	Outdoor unit 3 power protection, comp overload trip, compressor 3 high/low pressure trip (manual reset)	same as 7
14	Indoor coil 3 anti freeze (auto reset)	same as 8
15	Circuit 3 no cooling (power off to reset)	same as 9
16	Outdoor unit 4 power protection, comp overload trip, compressor 4 high/low pressure trip (manual reset)	same as 7
17	Indoor coil 4 anti freeze (auto reset)	same as 8
18	Circuit 4 no cooling (power off to reset)	same as 9

Note:

- 1 Failure of any circuit will not affect the operation of other circuits.
- 2 During system failure, press <RESET> button for 3 sec to reset the fault.

Controller Operation

Phase Protector /Phase Failure Relay

Phase protector is installed on each condensing unit.

Function of phase protector

1. Phase reversal
2. Over or under voltage
3. Multiple type of fault auto recovery and lock function

Hardware Configuration

There is a 8 way DIP switch to program the 3 phase monitor according to the table below:

SW1 SW2	SW3 SW4	SW5	SW6	SW7 SW8
Fault time delay	Voltage tolerance	Reserved	Voltage measuring	3 phase input
00 - 5sec 01 - 10sec 10 - 15sec 11 - 20sec	00 - 5% 01 - 10% 10 - 15% 11 - 20%		0 - Monitor 1 - Bypassed	00 - 380V 01 - 400V 10 - 415V 11 - 440V
To select time delay to confirm fault	Check according to SW7 SW8 settings		When set to ' 1' , no under / over voltage checking will be done.	When set to ' 1' , no under / over voltage checking will be done.

DIP setting has been default set. User only recommended to set SW7 SW8 to local voltage supply. (Default setting 00 – 380V)

“ 0” – off “ 1” - on

Upon power up, the controller will blink the red LED quickly indicating at warm up stage. This process may take a few seconds [0~20 sec depends on the voltage supply and monitor settings]. Red LED will be off once the power supply is stable. Green LED and relay will turn on 5 sec later.

Should the controller is unable to read the healthy 3 phase supply after 20 seconds, it will lock the error and flash the red LED according to the alarm code.

It will check the power supply again 280 sec later. Upon confirmation of healthy 3 phase supply, system will monitor the power supply constantly according to the DIP switch settings. Should there be failure occurred, system will flash the red LED slowly until the error delay time out and relay will be turn off. If the power supply is recovered before the error delay time out, red LED will be off and system operate as normal.

System will lock the error if this failure happens ≥ 5 times within 2 hours. This fault can be reset by manually turn off the power supply only.

Controller Operation

When there is fault occurred, red LED will blink according to the following error code:

Fault Error code

Over voltage	Blink 8 times, off 3 sec
Under voltage	Blink 7 times, off 3 sec
R phase failure	Blink 6 times, off 3 sec
S phase failure	Blink 5 times, off 3 sec
T phase failure	Blink 4 times, off 3 sec
Phase reversal	Blink 3 times, off 3 sec

When one of the error occur, check the power supply and supply wire connection to the unit.

CAUTION: DO NOT CHANGE THE WIRE POSITION WHICH IS ORIGINALLY CONNECTED IN THE CONTROLLER ITSELF. For eg. wire from TB1 to PP.

Display error code on the wall pad (refer 3.4.12: 9, 12, 15 Or 18).

Other Protection Device

Over current protector (OLP), High pressure switch and low pressure switch are installed for compressor protection. When activated, compressor will be cut off, error will be displayed on the wall pad. Check the system accordingly.

Service and Maintenance

Item	Maintenance Procedure	Frequency
Air Filter	Remove any dust adhered on the filter by using a vacuum cleaner or wash in lukewarm water (below 40°C) with neutral cleaning detergent Rinse well and dry the filter before placing it back onto the unit. Do not use gasoline, volatile substances or chemical to clean the filter.	Once every 2 weeks. More frequently if necessary
External panel surface	Clean any dust or dust on the grille or panel by wiping it using soft cloth soaked in lukewarm water (below 40°C) with neutral cleaning detergent Do not use gasoline, volatile substances or chemical to clean the unit	Once every 2 weeks. More frequently if necessary
Coil	Check and remove any dirt clogged between fins. Check and remove any obstacles that hinder air flowing into and out of the unit.	Monthly
Power supply	Check the voltage and current of the indoor unit. Check the electrical wiring for any faulty contacts caused by loose connections, foreign matters, etc. Tighten the wires onto the terminal block if necessary	Every 2 months
Drain pan & pipe	Check its cleanliness and clean it if necessary.	Once every 3 months
Fan & Motor	Check for any abnormal noise.	Only when necessary

⚠ Warning:

- Disconnect power supply before servicing
- Do not place flammable objects close to unit, when the unit is operating.
- Do not attempt to disassemble or repair the unit upon unit operation failure.
Contact your nearest dealer immediately.

⚠ Caution:

- Disconnect main power supply when the unit is not operating for long period of time Unit should be heated up for 24 hours before operating if it has not been operating for long period of time.
- Do not switch On/Off of the controller too frequent or in short interval time.
- Do not damage coil fins.
- Do not operate the unit at cooling mode when outdoor ambient below 20°C, this might causes failure to compressor.

Trouble Shooting

In case of malfunction, perform the following preliminary check , before asking for repair service.

Problem	Cause	Trouble Shooting/ Remedy
Unit cannot operate	The power supply is turned OFF.	Turn the power supply ON.
	The fuse in the PCB is gone or blown.	Replace fuse.
Air flow too small	Reverse rotation (model 125/150)	Switch the phase for power line
At Cooling Mode, no cold air is delivered	The set temperature is higher than room temperature	Lower the set temperature.
	The room temperature is excessively low for cooling	Can not operate as it is out of temperature control range.
	a Phase protector open (condensing unit) b High pressure switch open	refer to page 28 Check if any i. air blockage on outdoor unit. ii. outdoor fan motor malfunction iii. refrigerant overcharge. iv. outdoor ambient above operating limit.
	c Low pressure switch open d comp overload protector open	Check if any i. refrigerant gas leakage Check if any i. refrigerant overcharge.
Cooling , but not cold enough	The unit is just started the cooling mode	Wait for a while
	High infiltration through door, windows	Close the door ,windows
	Low refrigerant level	check suction, discharge pressure and temperature
Water discharge from the unit	Air flow too high	Change fan speed
	Drain pipe is clogged, water overflow	Clear the drain pipe



