KD HERMETIC INSTALLATION AND OPERATING INSTRUCTIONS.

Thermofrost Cryo

REFRIGERATION & AIR CONDITIONING

Thermofrost Cryo Plc
Ernest Avenue
West Norwood
London
SE27 0DA

Installation, commissioning and maintenance.

The following has been issued to aid installation of the KD Recip range of low noise units. It is important that the following is read and understood before installation is undertaken.

In compiling the contents of this manual it is assumed that qualified and competent refrigeration and electrical engineers will carry out all installation work.

IMPORTANT NOTES:

Check that:-

1) The electrical supply available is suitable for the KD Recip unit being installed.
2) The equipment is sited correctly to ensure adequate airflow around it and that discharge air is not drawn back into the unit. (Min 300 mm from condenser face to wall is recommended.
3) Allow sufficient space around the unit for maintenance purposes.
4) If the unit is to be installed on a roof, check that the structure of the roof is able to stand the weight of the unit.
5) Ensure the location of the unit is clear of debris such as leaves, paper etc.
6) For best noise reduction mount unit onto anti-vibration mounts.

INSTALLATION.

The KD Recip is fitted with all necessary components to minimise installation time on site. The units are fitted with compressor contactor, overload, electrical isolator, start and run capacitors (if necessary), dual HP/LP switch, pressure operated fan speed controller, liquid line drier/sight glass and liquid receiver. The condenser coil is coated with a blue weatherproof coating suitable for installation in aggressive atmospheres.

Low temperature units include a fitted oil separator which is pre-charged with an additional oil charge in factory.

Installation is straightforward and should be carried out in accordance with recognised standards of refrigeration practice and in accordance with current IEE regulations and to comply with any relevant local codes of practice.

To use the units on a pump down system a link wire should be fitted between terminals 1 & 2 of the terminal rail. If you wish to use the unit on direct control, a thermostat with volt free contacts can be wired across these terminals.

Full wiring diagrams are included on the removable side panel of the units

The units are supplied with an inert gas holding charge; the unit should be fully evacuated and then charged with R404A/R452A to a clear sight glass. Where the silver label states the refrigerant type and weight (Kg), this weight is the liquid receiver volume not the total system charge. The total system charge will depend on pipe line sizing and total pipe run. The system should be charged to the expected running pressures for the refrigerant type and to a clear sight glass!

Important Note:
Moisture prevents proper functioning of the compressor and the refrigeration system. Ensure that a good quality vacuum pump is used to pull a minimum vacuum of 250 microns (0.33 mbar)

Units should be sited with a minimum clearance of 300mm from the condenser face to any obstruction.

Piping:
Pipework routes should be a short and simple as possible, avoiding low points where oil can accumulate. Pipelines should be sized to ensure the suction gas velocity is sufficient to ensure good oil return.
All copper tube should be dehydrated refrigeration grade only. Nitrogen should be passed through the pipework when brazing to avoid oxidation.
Suction line should be fully insulated and all pipework should be supported at a maximum of 2m intervals.
In vertical risers, the suction riser should be fitted with a U trap at the bottom and a P trap at the top for a rise of 3m or over.

PRE-START UP

> Important Note:
> The mains electrical supply to the condensing unit must be via a suitable motor rated circuit breaker or fuse. A mains isolator is fitted to all condensing units therefore an additional isolator is not required.

For all installations it will be necessary to set the LP switch to ensure effective control if using a pump down cycle, we suggest a setting of 1.5bar (R404A) for medium temp units and 0.1bar (R404A) for low temp units, but this will be dependant on site conditions.
The HP switch is not factory pre-set and will require adjustment to suit conditions on site, suggested maximum cut out for use with R404A/R452A is approximately 28 bar.
NOTE: The 2PAD100L3 unit is fitted with a PRV set at 24.8barg so the HP switch on this unit should be set accordingly to prevent this valve from lifting.
The RGE/XGE fan speed controller should be set to maintain a condensing temperature as shown in the tables at the end of this brochure; this will achieve the maximum duty from each unit at the desired operating conditions (ambient 32°C, R404A).
Check condenser fan(s) are free to rotate, and check all service valves are fully open.
Check all electrical wiring is sound and that the power supply is correct for the condensing unit being installed.

START UP.

Once the unit is running a check should be made to ensure condenser fan(s) are running correctly, drawing air through the condenser, there are no unusual noises coming from the unit, no leaks are apparent and that all readings are within expected ranges (i.e suction pressure, discharge pressure, suction superheat, current drawn etc).

Compressors should be limited to 12 starts per hour, this can be achieved by use of a delay timer or by programming a delay time into an electronic controller which gives the unit it's start signal.

SERVICE AND MAINTENANCE.

WARNING: Disconnect the main electrical supply before servicing or opening the unit.

At regular intervals the unit should be checked to ensure that there are no refrigerant or oil leaks, there is no abnormal or unusual vibration or noise from the unit.
Check compressor oil level is correct, minimum oil level is ¼ of a sight glass and maximum level should be ¾ of a sight glass.
Clean and inspect the condenser coil. Remove any obstacles that may hinder airflow.
Check all fan motors for excessive noise or vibration and check all fans run smoothly.
Check running current and voltage to the unit. Check all electrical wiring and tighten as necessary.
Safety Notice: Do not operate any device which is not stated on the user's manual for safety.

Units manufactured by: Kyung Dong Industrial Co Ltd.
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Kwangtanmyon
Paju
Kyunggido 413-855
Republic of Korea
The following table gives the design condensing temperature for each unit based on a 32℃ ambient and the desired evaporating temperature

KD Hermetic Duties

Capacities R404A, -20°C to +5°C evaporating.

Model	Capacity in Watts / Condensing temp °C					
Evap Temp °C	5	0	-5	-10	-15	-20
PAD005M1	1372/44.7	1271/42.2	1040/41.7	859/40.3	701/39.0	564/37.9
PAD008M1	2002/48.9	1691/47.3	1442/45.0	1191/43.7	987/41.9	805/40.3
PAD010M1	2486/45.9	2127/43.8	1767/42.7	1475/41.0	1215/39.5	983/38.4
PAD012M1	3736/47.7	3159/46.2	2689/44.0	2218/42.7	1827/40.9	1473/39.4

All models are single-phase

Capacities R404A, -45°C to -20°C, R404A.

Model	Capacity in Watts / Condensing temp °C					
Evap Temp °C	-20	-25	-30	-35	-40	-45
1PAD016L1	1888/42.1	1528/40.3	1207/38.8	931/37.4	688/36.5	491/35.5
1PAD018L1	2406/38.3	1876/37.0	1401/36.1	1007/35.1	675/34.2	403/33.3
1PAD018L3	2406/38.3	1876/37.0	1401/36.1	1007/35.1	675/34.2	403/33.3
1PAD023L1	3494/41.6	2811/39.8	2197/38.3	1640/37.3	1182/36.0	793/35.0
1PAD023L3	3494/41.6	2811/39.8	2197/38.3	1640/37.3	1182/36.0	793/35.0
1PAD035L3	4433/41.7	3472/39.7	2644/37.9	1923/36.9	1370/35.6	936/34.6
1PAD050L3	6291/43.5	4972/41.9	3893/39.9	2911/38.6	2120/37.0	1502/35.6
2PAD075L3	9712/43.6	7694/42.0	6032/39.9	4558/38.0	3227/36.9	2166/35.5
2PAD100L3	13411/42.9	10815/40.9	8479/39.1	6431/37.5	4643/36.5	3202/35.3

L1 models are single-phase, L3 models are three-phase.

Capacities R134a, -20°C to +5°C evaporating.

Model	Capacity in Watts / Condensing temp °C					
Evap Temp °C	5	0	-5	-10	-15	-20
PAC012M1	2600/44.7	2172/41.4	1780/39.9	1431/38.4	1122/37.2	848/36.0

Duties are quoted at 10K suction superheat with liquid subcooled to condenser limits in an ambient of 32℃

Ecodesign Data

Model PAD005M1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-10			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	0.91	N/A	N/A	Kw
Rated power input	D_A	0.51	N/A	N/A	Kw
Rated COP	COP_A	1.77	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	1.04	N/A	N/A	Kw
Rated power input	D_A	0.49	N/A	N/A	Kw
Rated COP	COP_2	2.13	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model PAD008M1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-10			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.26	N/A	N/A	Kw
Rated power input	D_A	0.79	N/A	N/A	Kw
Rated COP	COP_A	1.59	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	1.44	N/A	N/A	Kw
Rated power input	D_A	0.77	N/A	N/A	Kw
Rated COP	COP_2	1.87	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model PAD010M1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-10			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.60	N/A	N/A	Kw
Rated power input	D_A	0.88	N/A	N/A	Kw
Rated COP	COP_A	1.81	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	1.80	N/A	N/A	Kw
Rated power input	D_A	0.84	N/A	N/A	Kw
Rated COP	COP_2	2.13	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model PAD012M1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-10			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	2.34	N/A	N/A	Kw
Rated power input	D_A	1.24	N/A	N/A	Kw
Rated COP	COP_A	1.90	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	2.68	N/A	N/A	Kw
Rated power input	D_A	1.17	N/A	N/A	Kw
Rated COP	COP_2	2.29	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model 1PAD018L1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-35			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.11	N/A	N/A	Kw
Rated power input	D_A	1.09	N/A	N/A	Kw
Rated COP	COP_A	1.01	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	1.23	N/A	N/A	Kw
Rated power input	D_A	1.10	N/A	N/A	Kw
Rated COP	COP_2	1.12	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model 1PAD018L3					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-35			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.13	N/A	N/A	Kw
Rated power input	D_A	0.99	N/A	N/A	Kw
Rated COP	COP_A	1.14	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	1.28	N/A	N/A	Kw
Rated power input	D_A	1.01	N/A	N/A	Kw
Rated COP	COP_2	1.27	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model 1PAD023L1					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-35			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.83	N/A	N/A	Kw
Rated power input	D_A	1.72	N/A	N/A	Kw
Rated COP	COP_A	1.06	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	2.09	N/A	N/A	Kw
Rated power input	D_A	1.67	N/A	N/A	Kw
Rated COP	COP_2	1.25	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model 1PAD023L3					
Refrigerant		R404A	R407F	R449A	
Item	Symbol	Value			Unit
Evaporating Temperature	t	-35			°C
Parameters at full load and ambient temperature 32°C					
Rated cooling capacity	P_A	1.85	N/A	N/A	Kw
Rated power input	D_A	1.61	N/A	N/A	Kw
Rated COP	COP_A	1.15	N/A	N/A	
Parameters at full load and ambient temperature 25°C					
Rated cooling capacity	P_A	2.19	N/A	N/A	Kw
Rated power input	D_A	1.56	N/A	N/A	Kw
Rated COP	COP_2	1.40	N/A	N/A	
Parameters at full load and ambient temperature 43°C (where applicable)					
Rated cooling capacity	P_A				Kw
Rated power input	D_A				Kw
Rated COP	COP_3				
Other items					
Capacity Control		Fixed			
Contact Details		Thermofrost Cryo Ltd			
		Ernest Avenue			
		West Norwood			
		London SE27 0DA			

Model 1PAD035L3			
Refrigerant		R404A	
Item	Symbol	Value	Unit
Evaporating Temperature	t	-35	°C
Annual Electrical Consumption	Q	10,496	KWh/a
Seasonal energy performance ratio	SEPR	1.54	
Parameters at full load and ambient temperature 32°C (Point A)			
Declared Cooling capacity	P_A	2.17	Kw
Declared power input	D_A	1.87	Kw
Rated COP	COP A	1.16	
Parameters at full load and ambient temperature 25°C (Point B)			
Declared Cooling capacity	P_A	2.58	Kw
Declared power input	D_A	1.90	Kw
Rated COP	COP B	1.35	
Parameters at full load and ambient temperature 15°C (Point C)			
Declared Cooling capacity	P_A	3.04	Kw
Declared power input	D_A	1.87	Kw
Rated COP	COP C	1.63	
Parameters at full load and ambient temperature 5°C (Point D)			
Declared Cooling capacity	P_A	3.38	Kw
Declared power input	D_A	1.72	Kw
Rated COP	COP D	1.97	
Other items			
Capacity Control	Fixed		
Degradation coefficient for fixed and staged capacity unit	Cdc	0.25	
Parameters at full low and ambient temperature 43°C (where applicable)			
Cooling capacity	P_3		
Power input	D_3		
Declared COP	COP_3		
Contact Details	Thermofrost Cryo Ltd		
	Ernest Avenue		
	West Norwood		
	London SE27 0DA		

Model 1PAD050L3			
Refrigerant		R404A	
Item	Symbol	Value	Unit
Evaporating Temperature	t	-35	°C
Annual Electrical Consumption	Q	15,304	KWh/a
Seasonal energy performance ratio	SEPR	1.63	
Parameters at full load and ambient temperature 32°C (Point A)			
Declared Cooling capacity	P_A	3.34	Kw
Declared power input	D_A	3.02	Kw
Rated COP	COP A	1.11	
Parameters at full load and ambient temperature 25°C (Point B)			
Declared Cooling capacity	P_A	3.92	Kw
Declared power input	D_A	3.02	Kw
Rated COP	COP B	1.30	
Parameters at full load and ambient temperature 15°C (Point C)			
Declared Cooling capacity	P_A	4.74	Kw
Declared power input	D_A	2.86	Kw
Rated COP	COP C	1.65	
Parameters at full load and ambient temperature 5°C (Point D)			
Declared Cooling capacity	P_A	5.51	Kw
Declared power input	D_A	2.41	Kw
Rated COP	COP D	2.28	
Other items			
Capacity Control	Fixed		
Degradation coefficient for fixed and staged capacity unit	Cdc	0.25	
Parameters at full low and ambient temperature 43°C (where applicable)			
Cooling capacity	P_3		
Power input	D_3		
Declared COP	COP_3		
Contact Details	Thermofrost Cryo Ltd		
	Ernest Avenue		
	West Norwood		
	London SE27 0DA		

Model 2PAD075L3			
Refrigerant		R404A	
Item	Symbol	Value	Unit
Evaporating Temperature	t	-35	°C
Annual Electrical Consumption	Q	23,146	KWh/a
Seasonal energy performance ratio	SEPR	1.66	
Parameters at full load and ambient temperature 32°C (Point A)			
Declared Cooling capacity	P_A	5.16	Kw
Declared power input	D_A	4.37	Kw
Rated COP	COP A	1.18	
Parameters at full load and ambient temperature 25°C (Point B)			
Declared Cooling capacity	P_A	6.07	Kw
Declared power input	D_A	4.34	Kw
Rated COP	COP B	1.40	
Parameters at full load and ambient temperature 15°C (Point C)			
Declared Cooling capacity	P_A	7.14	Kw
Declared power input	D_A	4.06	Kw
Rated COP	COP C	1.76	
Parameters at full load and ambient temperature 5°C (Point D)			
Declared Cooling capacity	P_A	7.68	Kw
Declared power input	D_A	3.59	Kw
Rated COP	COP D	2.14	
Other items			
Capacity Control	Fixed		
Degradation coefficient for fixed and staged capacity unit	Cdc	0.25	
Parameters at full low and ambient temperature 43°C (where applicable)			
Cooling capacity	P_3		
Power input	D_3		
Declared COP	COP_3		
Contact Details	Thermofrost Cryo Ltd		
	Ernest Avenue		
	West Norwood		
	London SE27 0DA		

Model 2PAD100L3			
Refrigerant		R404A	
Item	Symbol	Value	Unit
Evaporating Temperature	t	-35	°C
Annual Electrical Consumption	Q	31,609	KWh/a
Seasonal energy performance ratio	SEPR	1.72	
Parameters at full load and ambient temperature 32°C (Point A)			
Declared Cooling capacity	P_A	7.28	Kw
Declared power input	D_A	5.83	Kw
Rated COP	COP A	1.25	
Parameters at full load and ambient temperature 25°C (Point B)			
Declared Cooling capacity	P_A	8.35	Kw
Declared power input	D_A	5.68	Kw
Rated COP	COP B	1.47	
Parameters at full load and ambient temperature 15°C (Point C)			
Declared Cooling capacity	P_A	9.72	Kw
Declared power input	D_A	5.34	Kw
Rated COP	COP C	1.82	
Parameters at full load and ambient temperature 5°C (Point D)			
Declared Cooling capacity	P_A	10.69	Kw
Declared power input	D_A	4.93	Kw
Rated COP	COP D	2.17	
Other items			
Capacity Control	Fixed		
Degradation coefficient for fixed and staged capacity unit	Cdc	0.25	
Parameters at full low and ambient temperature 43°C (where applicable)			
Cooling capacity	P_3		
Power input	D_3		
Declared COP	COP_3		
Contact Details	Thermofrost Cryo Ltd		
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