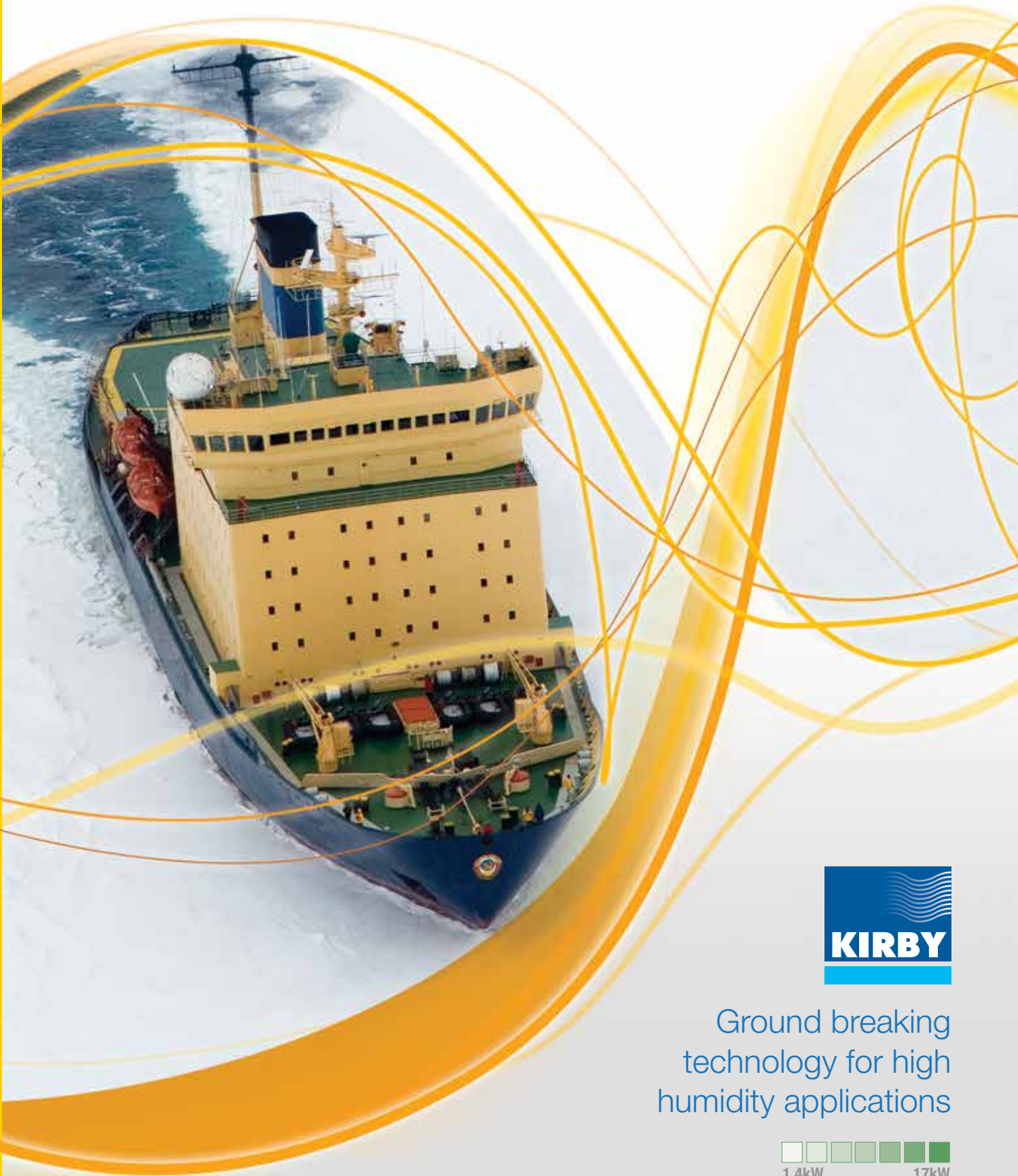


Kirby Ultra Low Frost Evaporators



Ground breaking
technology for high
humidity applications





Front Cover - Icebreaker Ship in Antarctica, Amundsen Sea

Icebreaker Ships are a special purpose vessel designed to perform in waterways where ice formation would restrict the operation of a traditional ship. Likewise the **Kirby Ultra Low Frost** range of evaporators has been designed to operate in conditions that would hamper the performance of traditional evaporators due to ice formation on the coil.

Kirby Ultra Low Frost Evaporators

Tropical locations with high humidity put extra loads on evaporators in the form of latent heat and increased ice formation.

Traditional evaporators have a high primary to secondary surface ratio which causes them to remove more latent heat and moisture from the air.

In high humidity environments this leads quickly to increased ice formation which traditionally has only been resolved by increasing the fin spacing of the evaporator.

While this solution allows the evaporator to operate for longer periods between defrosts, it does come at the cost of reduced refrigeration capacity.

Specifically designed for tropical environments, the Kirby Ultra Low Frost range utilises the 9000 smart coil design, which already reduces the amount of moisture (latent heat) that is removed while cooling the air, and further improves the coils resistance to ice formation through optimised fin spacing and circuiting.

The result is an evaporator that offers exemplary performance in high humidity conditions whilst retaining strong refrigeration performance due to its high sensible cooling capacity. The all new Ultra Low Frost Range sets new performance boundaries in low frost evaporators.



Kirby KMT / KLT-ULF Series Evaporators - Nomenclature Data

KMT 121 ULF

Unit Type

ULF = Ultra Low Frost Series Evaporators For Applications Requiring Higher Humidity & Longer Frosting Build Time

Capacity

R404A Basic Capacity (kW) = Number ÷ 10

Evaporator Unit Type

KMT = Kirby M/T Evaporators For Applications With Air On Temperature $\geq +2^{\circ}\text{C}$

KLT = Kirby L/T Evaporators For Applications With Air On Temperature $< +2^{\circ}\text{C}$



Kirby Ultra Low Frost Series Evaporators

Features & Benefits

The Kirby Ultra Low Frost Series Evaporator offers:

- Optimised Model Range
- Flexible Application Range
- White Powder Coated Aluminium Casing
- Face mounted heaters provide efficient defrosting and are readily accessible for service for models where room temperature is less than +1°C
- Cabinet design features easy front opening access panel to the expansion valve and a separate panel for the electrical board
- Easy to Install and Service

Optional Accessories

Designed and built for Commercial Refrigeration Applications, we are able to supply the following options:

- Special circuiting to suit glycol, water, split circuit, liquid recirculation and special operating conditions. Project leadtimes apply
- Thermostatic expansion valve

Coil Design and Defrost

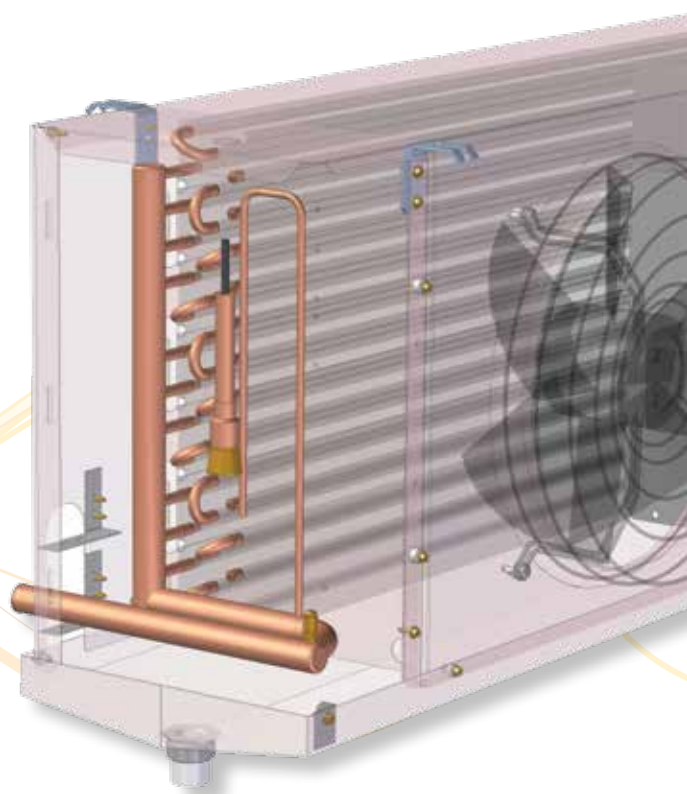
The Ultra Low Frost series coil utilises the 9000 series coil design and enhances its sensible cooling performance through optimised fin spacing and circuiting.

Traditional coil designs have a high tube surface to fin surface ratio which, while allowing them to be compact, also increases the amount of latent heat (moisture) they remove from the air when cooling it (sensible heat).

When applying a traditional coil in a high humidity environment it has been common practice to supply a coil with wider fin spacing to reduce the amount of latent heat removed and allow for increased ice build up. While this does allow the coil to operate for longer periods between defrosts it comes at the cost of reduced refrigeration capacity.

Tests have proven that the 9000 series coil out-performs these traditional coils with wider fin spacings in medium temperature applications due to its slower frost build up and improved cooling characteristics.

The Ultra Low Frost series is the bench mark for high humidity applications, delivering high performance with minimised ice formation in both low and medium temperature applications.



Kirby Ultra Low Frost Series Evaporators

Performance Data



High Temperature

- External rotor Ziehl/EBM motors used on all models
- High efficiency finned coils using sine wave aluminium fins and rifle bore tubing
- All fans fully wired
- White powder coated aluminium casing
- Reversible drain tray

Product Number	CAPACITY IN WATTS @ -4°C SST / 6KTD	AIR		FANS QTY	MOTORS (MAX)		REFRIGERANT CHARGE (KG)				NETT WEIGHT (KG)	SOUND POWER (dB(A))
		FLOW (L/S)	THROW (M)		240v 1 PH. 50Hz		R507	R404a	R22	R134a		
	WATTS				AMPS							
300MM FAN DIAMETER												
KMT020ULF	1425	340	6.5	1	73	0.32	1.11	1.09	1.22	1.23	11.5	68
KMT027ULF	1820	760	10.3	2	146	0.64	1.06	1.04	1.16	1.17	15.1	71
KMT038ULF	2875	680	9.3	2	146	0.64	2.11	2.08	2.31	2.33	18.7	71
KMT060ULF	4485	1020	11.5	3	219	0.96	3.10	3.05	3.39	3.42	26.0	72
KMT081ULF	5550	1360	12.9	4	292	1.28	4.12	4.05	4.51	4.54	32.4	74
350MM FAN DIAMETER												
KMT023ULF	2120	700	8.8	1	155	0.65	1.35	1.33	1.48	1.49	14.7	71
KMT063ULF	4700	1400	12.6	2	310	1.30	2.73	2.68	2.99	3.01	26.3	75
KMT071ULF	5905	1375	11.9	2	310	1.30	3.74	3.67	4.09	4.12	30.4	75
KMT093ULF	7165	2160	15.4	3	465	1.95	4.24	4.17	4.64	4.68	37.7	77
KMT121ULF	9685	1970	14.2	3	465	1.95	6.50	6.39	7.12	7.17	47.6	77
KMT140ULF	12090	2750	16.4	4	620	2.60	7.39	7.27	8.10	8.15	58.3	79
KMT198ULF	16785	3280	17.8	5	775	3.25	10.96	10.78	12.01	12.09	77.5	80

Low/Medium Temperature

- External rotor Ziehl/EBM motors used on all models
- High efficiency finned coils using sine wave aluminium fins and rifle bore tubing
- All fans fully wired
- Electric defrost elements fully wired to electrical compartment.
- White powder coated aluminium casing
- Reversible drain tray

Product Number	CAPACITY IN WATTS @ -4°C SST / 6KTD	CAPACITY IN WATTS @ -24°C SST / 6KTD	AIR		FANS QTY	MOTORS (MAX)		DEFROST HEATERS				REFRIGERANT CHARGE (KG)					NETT WEIGHT (KG)	SOUND POWER (dB(A))	
	240v 1 PH. 50Hz					240V 1 PH.		415V 3 PH.		CONNECTION									
	R404a		FLOW (L/S)	THROW (M)		WATTS	AMPS	WATTS	AMPS		WATTS	MAX AMPS/PH	R507 M/T	R404a M/T	R22 M/T	R134a M/T			R404a L/T
300MM FAN DIAMETER																			
KLT015ULF	1425	1140	340	6.0	1	73	0.32	900	3.75	-	-	PARALLEL	1.11	1.09	1.22	1.23	1.15	11.5	68
KLT018ULF	1820	1455	760	9.6	2	146	0.64	1800	7.5	-	-	PARALLEL	1.06	1.04	1.16	1.17	1.10	15.1	71
KLT028ULF	2875	2300	680	8.6	2	146	0.64	1800	7.5	-	-	PARALLEL	2.11	2.08	2.31	2.33	2.20	18.7	71
KLT042ULF	4485	3585	1020	10.6	3	219	0.96	-	-	2700	3.75	STAR	3.10	3.05	3.39	3.42	3.22	26.0	72
KLT062ULF	5550	4440	1360	11.9	4	292	1.28	-	-	3600	5	STAR	4.12	4.05	4.51	4.54	4.28	32.4	74
350MM FAN DIAMETER																			
KLT021ULF	2120	1695	700	8.1	1	155	0.65	1600	6.67	-	-	PARALLEL	1.35	1.33	1.48	1.49	1.41	14.7	71
KLT050ULF	4700	3760	1400	11.6	2	310	1.30	-	-	3200	6.67	STAR	2.73	2.68	2.99	3.01	2.84	26.3	75
KLT054ULF	5905	4720	1375	11.0	2	310	1.30	-	-	3200	6.67	STAR	3.74	3.67	4.09	4.12	3.89	30.4	75
KLT075ULF	7165	5730	2160	14.3	3	465	1.95	-	-	4800	10	STAR	4.24	4.17	4.64	4.68	4.41	37.7	77
KLT093ULF	9685	7745	1970	13.1	3	465	1.95	-	-	4800	10	STAR	6.50	6.39	7.12	7.17	6.76	47.6	77
KLT113ULF	12090	9675	2750	15.2	4	620	2.60	-	-	6400	13.33	STAR	7.39	7.27	8.10	8.15	7.69	58.3	79
KLT162ULF	16785	13430	3280	16.5	5	775	3.25	-	-	8000	16.67	STAR	10.96	10.78	12.01	12.09	11.40	77.5	80

1. KLT Models have Factory Fitted Heater Kits which includes both a 2-wire heater safety switch (Heatcraft Part # MCC126-1) and a 3-wire thermostat for the functions of defrost control and fan delay (Heatcraft Part # MCC143-1). It is **MANDATORY** that the 2-wire heater safety switch is fitted where the 3-wire thermostat is an optional fitment.
2. 80% liquid and 20% vapour by volume at -4°C SST. for M/T & 80% liquid and 20% vapour by volume at -24°C SST. for L/T
3. Unpacked Weight - Add 4% for models fitted with heater elements

Kirby Ultra Low Frost Series Evaporators

Dimensions and Data

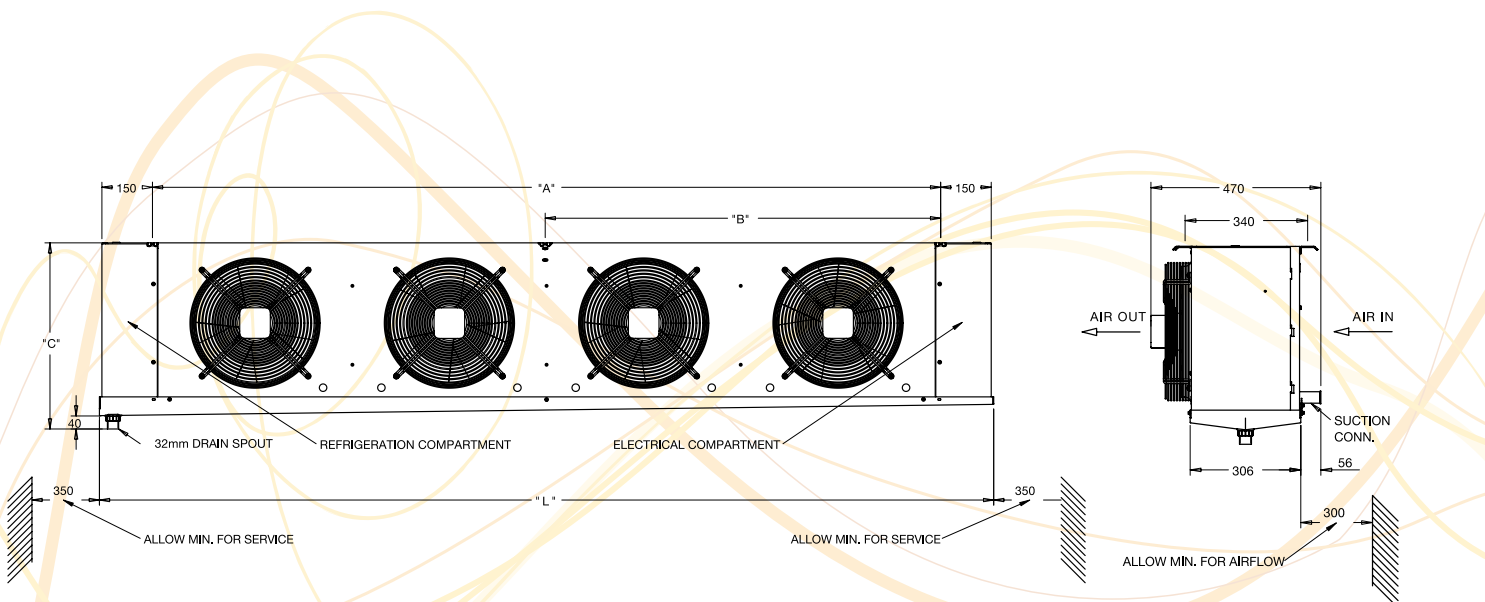


Product Number	A	B	L (Length)	H (Height)	CONNECTIONS (MM)				Coil Rows	TX VALVES SELECTION		
					MAIN DISTRIB. CONN.	LIQUID (Pipe) *	MAIN SUCTION CONN.	SUCTION (Pipe) *		R404a / R507	R22	R134a
300MM FAN DIAMETER												
KMT020ULF	440	-	750	430	12.7	9.5	12.7	12.7	4	TUAE (#4)	TUAE (#3)	TUAE (#3)
KMT027ULF	845	-	1155	430	12.7	9.5	12.7	12.7	2	TUAE (#5)	TUAE (#3)	TUAE (#4)
KMT038ULF	845	-	1155	430	12.7	9.5	15.9	15.9	4	TUAE (#6)	TUAE (#5)	TUAE (#5)
KMT060ULF	1250	-	1560	430	12.7	12.7	19.1	19.1	4	TUAE (#7)	TUAE (#6)	TUAE (#7)
KMT081ULF	1660	-	1970	430	12.7	12.7	22.2	22.2	4	TUAE (#8)	TUAE (#7)	TUAE (#8)
350MM FAN DIAMETER												
KMT023ULF	540	-	850	545	12.7	9.5	12.7	12.7	3	TUAE (#5)	TUAE (#4)	TUAE (#4)
KMT063ULF	1175	-	1485	545	12.7	12.7	22.2	22.2	3	TUAE (#8)	TUAE (#6)	TUAE (#7)
KMT071ULF	1175	-	1485	545	12.7	15.9	22.2	22.2	4	TUAE (#8)	TUAE (#6)	TUAE (#7)
KMT093ULF	1745	-	2060	545	12.7	15.9	25.4	25.4	3	TUAE (#9)	TUAE (#7)	TUAE (#8)
KMT121ULF	1745	-	2060	545	12.7	19.1	25.4	25.4	5	TUAE (#9)	TUAE (#8)	TUAE (#9)
KMT140ULF	2320	1165	2630	545	15.9	19.1	28.6	28.6	4	TCAE (#2)	TUAE (#8)	TUAE (#9)
KMT198ULF	2890	1735	3200	545	15.9	22.2	31.8	31.8	5	TCAE (#2)	TCAE (#1)	TCAE (#3)

Product Number	A	B	L (Length)	H (Height)	CONNECTIONS (MM)				Coil Rows	TX VALVES SELECTION
					MAIN DISTRIB. CONN.	LIQUID (Pipe) *	MAIN SUCTION CONN.	SUCTION (Pipe) *		R404a / R507
300MM FAN DIAMETER										
KLT015ULF	440	-	750	430	12.7	9.5	12.7	12.7	4	TUAE (#4)
KLT018ULF	845	-	1155	430	12.7	9.5	12.7	12.7	2	TUAE (#5)
KLT028ULF	845	-	1155	430	12.7	9.5	15.9	15.9	4	TUAE (#7)
KLT042ULF	1250	-	1560	430	12.7	12.7	19.1	19.1	4	TUAE (#8)
KLT062ULF	1660	-	1970	430	12.7	12.7	22.2	22.2	4	TUAE (#8)
350MM FAN DIAMETER										
KLT021ULF	540	-	850	545	12.7	9.5	12.7	12.7	3	TUAE (#6)
KLT050ULF	1175	-	1485	545	12.7	12.7	22.2	22.2	3	TUAE (#8)
KLT054ULF	1175	-	1485	545	12.7	15.9	22.2	22.2	4	TUAE (#9)
KLT075ULF	1745	-	2060	545	12.7	15.9	25.4	25.4	3	TUAE (#9)
KLT093ULF	1745	-	2060	545	12.7	19.1	25.4	25.4	5	TCAE (#1)
KLT113ULF	2320	1165	2630	545	15.9	19.1	28.6	28.6	4	TCAE (#2)
KLT162ULF	2890	1735	3200	545	15.9	22.2	31.8	31.8	5	TCAE (#2)

* Suggested liquid & suction piping sizes are for R404A only.

1. TX VALVE SELECTION - Based on coil capacity at 40°C liquid, 6KTD, & -4°C SST for M/T, -24°C SST for L/T respectively.



Kirby Ultra Low Frost Series Evaporators

Capacity Correction Factor



Capacity Factor and Application Limits

CORRECTION FACTORS	R507 M/T	R22 M/T	R134a M/T	R507 L/T
Refrigerants Based On R404a Capacity	1.04	0.87	0.83	1.03

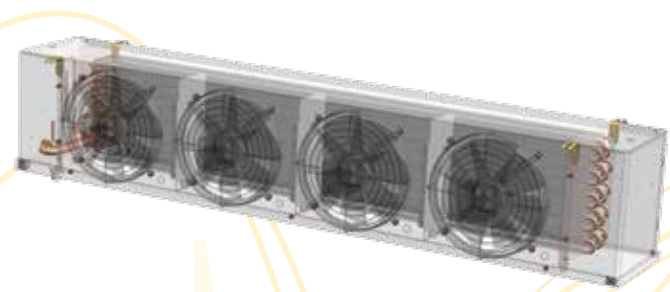
CAPACITY FACTORS BASED ON MEDIUM TEMPERATURE RATINGS. APPLY TO KMT & KLT - ULF MED TEMP RATINGS ABOVE.											
SUCTION TEMP.	-10	-8	-4	-2	0	2	4	6	9	12	12
FACTOR	0.97	0.98	1.00	1.01	1.01	1.02	1.03	1.05	1.07	1.10	1.10
MIN. KTD	9	10	10	10	10	10	10	10	10	10	10
MAX. KTD	4	4	4	4	5	5	5	5	6	6	6

CAPACITY FACTORS BASED ON LOW TEMPERATURE RATINGS. APPLY TO KLT-ULF LT RATINGS ONLY.									
SUCTION TEMP.	-42	-36	-30	-24	-18	-12	-	-	-
FACTOR	0.62	0.75	0.87	1.00	1.09	1.18	-	-	-
MAX. KTD	9	10	10	10	10	10	-	-	-
MIN. KTD	4	4	4	4	4	4	-	-	-

"KLT-ULF" MODELS REQUIRED FOR SHADED AREAS						
KTD	-42	-10	-8	-6	-4	-2
4						
6						
8						
10						

NOTES:

1. Shaded areas are the applications where room temperature is less than +2°C.
2. For "KLT" capacity factors between -4 & -12 sst, use the medium temp temp rating and capacity factor as given above.
3. Capacity factor applies to SST @ 1KTD. Actual capacity = capacity @ 1KTD x factor x KTD.
4. The limits on this chart are intended to indicate the maximum application range of standard ULF coils.
5. For applications outside these limits, consult your nearest Heatcraft outlet. Distributors and/or circuiting may be unsuitable outside these limits.



Performance Rating Basis

1. **CAPACITY** — Based on industry guidelines at 40°C entering liquid (inherent subcooling), 6KTD, +2°C, air on for M/T, -18°C, air on for L/T. Capacity figure is total capacity in watts (rated with wet fin surfaces). KTD is conditions of entering air temperature - leaving refrigerant saturation temperature.
2. **AIRFLOW** — Rated at standard air conditions (20°C dry air, 101.35kPa atmospheric pressure).
3. **AIRTHROW** — Based on industry guidelines. Measurements taken at 0.5, 0.75, and 1m from the ceiling at 20°C air. The distance at which the average of the 3 values equals 0.5m/s is taken as the limit of airtthrow. Correction for +2°C room (0.94) is included.
4. **SOUND POWER** — Tests were done with a Sound Intensity meter generally in accordance with the methods of ISO9614-1:1993 (measured at discrete points). Tests were conducted at 20°C ambient temp with only the fan(s) running & no refrigerant flow. Actual results may vary due to refrigerant flow noise & other factors. Sound pressure level at 3m distance from the unit can be estimated using various deductions depending on the location of the unit in the room.

Unit Locations	Location 1	Location 2	Location 3	Location 4
Lw - Lp (dB(A)) (3m)	20.5	17.5	14.5	11.5

- Location 1:** Unit located with no hard surfaces to reflect the sound, such as suspended in mid air.
- Location 2:** Unit located with 1 hard surface to reflect the sound, such as mounted on ceiling.
- Location 3:** Unit located with 2 hard surfaces to reflect the sound, such as mounted on ceiling & close to a wall.
- Location 4:** Unit located with 3 hard surfaces to reflect the sound, such as mounted on ceiling & close to 2 walls.

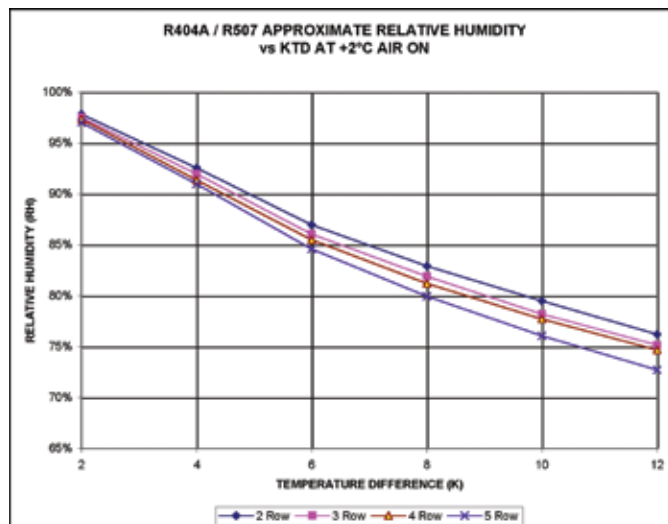
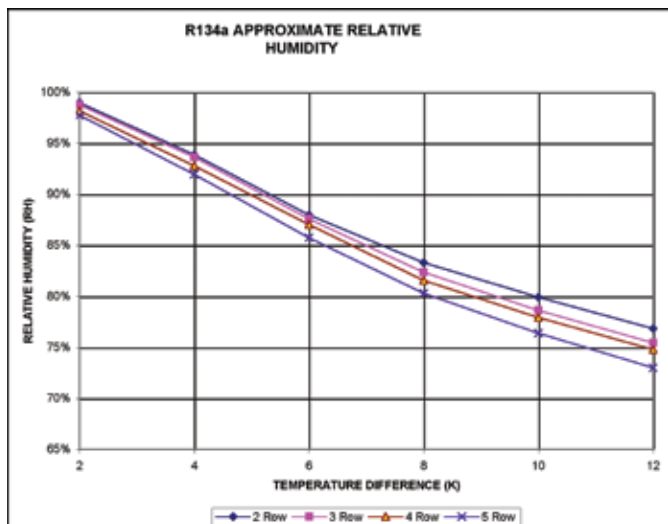
Lw: Sound power level, dB(A).
Lp: Sound pressure level, dB(A).

Important: All data is approximate, and to be used only as a guide.

Kirby Ultra Low Frost Series Evaporators

Cool Room Evaporator

Relative Humidity Data



Notes: relative humidity graphs

1. The relative humidity is an expression of the condition maintained in the room when the coil balances the room sensible and latent heat loads, and when the product is at desired temperature. It is not a measure of the condition of the air coming off the coil surface.
2. These graphs are approximate, as factors such as outside conditions, door usage, leakage etc will affect the conditions achieved.
3. To approximate RH for R22, decrease the R134a RH by 1% below 6KTD, and by 2% above 6KTD.
4. To approximate RH for R22, decrease the R134a RH by 1% below 6KTD, and by 2% above 6KTD.
5. The graph and corrections are only directly applicable at the given air on condition. Corrections are required for other air on conditions for accurate results. Refer to Kirby refrigeration technical manual.



ULF Optional Air Straightener

Air Straightener available for 350mm fans.

Use of a 350mm air straightener will increase air flow by approximately +30% for a single fan evaporator and +45% for a two fan evaporator.



Comparison

Air straighteners provide good benefits to axial fans for delivering cooling air to a greater distance, covering more cooling spaces. Air straighteners are suitable for applications requiring a long airthrow to cover the majority of the cooling space.



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