KELVIN
Air Conditioning System
2016

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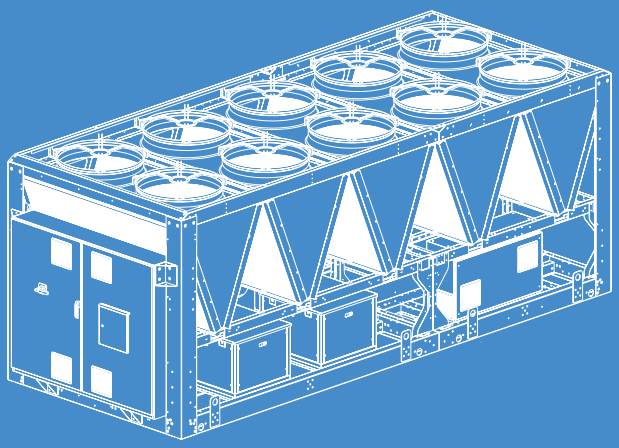
TM

bsi. ISO 9001 Quality Management | ISO 14001 Environmental Management

KELVIN Clim F358

Cooling Capacity: 402 ~ 1548 kW
Free-Cooling Capacity: 358 ~ 1180 kW



A CLASS | INVERTER | OIL FREE | R134a | A C | FLOODED | MICRO CHANNEL | FREE COOLING | EU

Packaged air cooled liquid chillers with free-cooling system in "A" class energy eff iciency for outdoor installation, equipped with oil-free centrifugal compressors with magnetic levitation bearings, flooded evaporator, microchannel condensing coils and free-cooling coils

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EUROVENT CERTIFIED PERFORMANCE Pending... www.eurovent-certification.com

KELVIN AIR CONDITIONING

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MAIN FEATURES

- Air cooled liquid chiller with free-cooling system in A class energy efficiency.
- 15 models available, for a wide selection opportunity.
- Average step of 100kW.
- EER up to 3,60.
- ESEER up to 5,76.
- Oil-free centrifugal compressors with magnetic levitation bearings driven by built-in inverter.
- R134a Refrigerant charge.
- Single refrigerant circuit.
- AC Axial fans.
- Flooded evaporator.
- Microchannel condensing coils in aluminium.
- Electronic expansion valve.
- Single air circuit.
- Modular construction.
- Suitable for outdoor installation.

MAIN BENEFITS

- Up to four centrifugal compressors with magnetic levitation bearings on the refrigerant circuit for an high efficiency.
- No need of power factor correction.
- Minimum starting current (LRA)
- Low refrigerant charge.
- Very high EER and ESEER. A Class energy efficiency.
- Quiet operation.
- Availability of double refrigerant circuit version.
- Availability of kit for further reduction of the noise.
- Availability of EC fans for a higher efficiency.
- Eurovent Certifi cation.(pending)
- Microprocessor control system with 7" touch screen display.
- Extremely easily of maintenance.
- Complete set of components dedicated to the safety of the unity.

INDIRECT FREE COOLING SYSTEM

Complete cooling of the chilled water of the existing cooling system with the outside air. The energy saving will be higher the longer the outside temperature remains below the required temperature for cooling.

A CLASS ENERGY EFFICIENCY

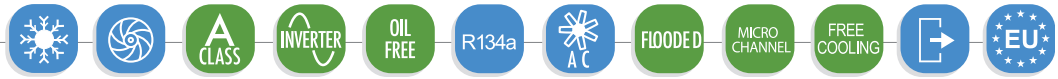
The best and most accurate components applied to the chillers.

WORKING LIMITS IN COOLING MODE

Chilled water outlet temperature: 5~15°C
Ambient temperature: -20~45°C

WORKING LIMITS IN FREE-COOLING MODE

Minimum chilled water outlet temperature: 5°C
Minimum ambient temperature: -20°C



MAIN COMPONENTS

FRAMEWORK
- Base, self supporting frame and panelling in steel plate with protective surfaces treatment in compliance with UNI ISO 9227/ASTMB117 and ISO 7253, and painted with epoxy powders.
- Colour: RAL 9002 textured.

COMPRESSORS
- Twin-turbine centrifugal compressor, oil-free type, optimized for R134a refrigerant. The term "oil-free" refers to the total absence of lubricating oil within the compressor.
- Magnetic levitation bearings.
- Manometric compression ratio: 1.5 ~ 5.0.
- Capacity control trough integrated inverter.
- High efficiency permanent-magnet synchronous motor with integrated Soft- Start system (starting current limited to 5A).
- Power factor motor cosφ > 0.9 for a large part of the operating range.
- Motor and electronic power section cooling by liquid refrigerant injection into the integrated cooling circuit.
- Electric motor thermal protection via internal winding temperature sensors.
- Electronic integrated control for operation and alarms status.
- Sensor on refrigerant discharge for temperature monitoring.
- Inner sensors for electronic components and inverter temperature control.
- Security system to protect the crankshaft and magnetic bearings in the event of failure of power supply.
- Installation with walls sound attenuators.
- Degree of protection: IP54.
- Electric resistance of the suction pipe, together with activated antifreeze evaporator, to prevent the migration of refrigerant inside the compressor.

EVAPORATOR
- Flooded shell and tube evaporator, optimized for R134a refrigerant.
- Version two passes, characterized by low pressure losses on the water side.
- Water tubes with a helical rifl ed internal surface.
- Integrated liquid drop separator.
- Shell, header, tube sheets made of carbon steel, tubes in Cu.
- Anticondensate insulation made of polyurethane.
- Large liquid level indicator.
- Temperature sensors on water inlet and outlet.
- Water flow switch for water flow control on water outlet towards the plant, not installed but supplied in kit.
- Large liquid level indicator.
- Antifreeze heater.
- Hydraulic connections with grooved end supplied as standard with flexible joint and adapter pipe to be welded.

CONDENSING COIL
- Microchannel condensing coil in aluminium perfectly suitable for the civil and industrial applications cooling, while the protection function of the oxide layer allows an optimum resistance to corrosion also in case of aggressive ambient conditions.
- Extremely light construction. The coil weight is only 50% compared to traditional copper pipes and aluminium fins of the same capacity.
- Low air side pressure drop and consequentially drastic reduction of the fans motors electric energy consumption.
- High heat exchange efficiency.
- Reduced internal volume capable of reducing the total refrigerant charge. At the same performances conditions, the micro-channels condensers require up-to less than 75% refrigerant when compared to the traditional heat exchangers.
- Single air circuit.
- Motorized valves for condenser partialization system.
- Frame in painted galvanized steel.

FREE-COOLING COIL
- Heat exchanger coil with copper tubes and high efficiency aluminium fins, specifically developed to provide high heat transfer and lower pressure drops. The combination of two factors, special tubes and fi ns, allow to optimally combine the following aspects:
  - Maximum capacity relative to the size of the exchanger,
  - Reduction of the air flow required for the heat exchange.
- Frame in galvanized steel.
- Motorized valves for free-cooling water circuit control.
- Intermediate free-cooling sensor.
- Temperature sensor on ambient air.

FAN SECTION
- Axial fans with sickle-shaped blades, fan guard and optimized for low noise levels.
- External rotor AC type electric motor with stepless variable speed for condensing pressure control.
- IP54 enclosure class.

REFRIGERANT CIRCUIT
Components for each refrigerant circuit:
- Capacitive level sensor connected to the driver of the expansion valve.
- Electronic expansion valve that allows high performance and system efficiency and for the refrigerant level control in the evaporator.
- By-pass valve for start-up.
- Electronic by-pass valve for compressor start.
- Non return valve on by-pass line for compressor start.
- Economizer for model 560 T2E, 810 T2E, 1070 T4E, 1120 T4E, 1200 T3E, 1500 T4E. The system includes:
  - Copper brazed plate type with cover plates, plates and connections in AISI 316 stainless steel,
  - Anticondensate insulation made of polyurethane,
  - Intermediate electronic expansion valve.
- Sight glass.
- Filter dryer on liquid line.
- Service valve on liquid line.
- Service valve on gas suction and discharge.
- Non return valve on gas discharge.
- Safety valve on low pressure side.
- Safety valve on high pressure side.
- Pressure transducers with indication, control and protection functions, on low and high refrigerant pressure.
- High pressure safety switch with manual reset.
- Refrigerant circuit with copper tubing with anticondensate insulation of the suction line.
- Plastic capillary hoses for pressure sensors connection and cooling line of the compressor
- R134a refrigerant charge.

ELECTRICAL PANEL
In accordance with EN60204-1 norms, suitable for outdoor installation, complete with:
- Main switch with door lock safety.
- Fuses for each compressor.
- Magnetothermic switches for fans or water pumps (if scheduled).
- Contactors for each load.
- Transformer for auxiliary circuit and microprocessor supply.
- Panel with machine controls.
- Power supply 400/3/50.

CONTROL SYSTEM
- Microprocessor system with "Touch Screen" graphic display for control and monitor of operating and alarms status. The system includes:
  - Voltage free contact for remote general alarm.
  - Voltage free contact for external alarm. The inlet is associable with refrigerant gas leak detector (optional accessory).
  - Main components hour-meter.
  - Recording of the last 24 occurred alarms.
  - Non-volatile "Flash" memory for data storage.
  - Menu with protection password.

OPTIONAL ACCESSORIES

KELVIN Clim F358 SIZE	410 T2 VT4	490 T560 VT4	2 T2E VT5	680 T810 VT6	2 T2E VT7	740 T820 VT6	3 T900 VT7	3 T1200 VT8	3 T3E VT10	980 T1070 VT8	4 T4E VT9
150 - LNO kit (noise reduction)	●	●	●	●	●	●	●	●	●	●	●
Active filters for containment of the harmonic distortion	●	●	●	●	●	●	●	●	●	●	●
172 - Rubber support (kit)	●	●	●	●	●	●	●	●	●	●	●
79 - Electrical panel heating system	●	●	●	●	●	●	●	●	●	●	●
179 - Double refrigerant circuit	●	●	●	●	●	-	-	-	-	●	-
101 - EC fan	●	●	●	●	●	●	●	●	●	●	●
350 -Kit TK PRO corrosion resistant painting treatment	●	●	●	●	●	●	●	●	●	●	●
351 - Free-cooling coils with pre-painted fins	●	●	●	●	●	●	●	●	●	●	●
1003 - Analogic flowmeter	●	●	●	●	●	●	●	●	●	●	●
1005 - Power supply analyzer	●	●	●	●	●	●	●	●	●	●	●
1009 - Multimeter kit	●	●	●	●	●	●	●	●	●	●	●
Refrigerant gas leak detector	●	●	●	●	●	●	●	●	●	●	●
943 - Data Logger	●	●	●	●	●	●	●	●	●	●	●
923 - KELVIN-Com MBUS/JBUS Serial board	●	●	●	●	●	●	●	●	●	●	●
926 - LON Serial board	●	●	●	●	●	●	●	●	●	●	●
931 - BACnet Ethernet - SNMP - TCP/IP Serial board	●	●	●	●	●	●	●	●	●	●	●
932 - BACnet MS/TP Serial board	●	●	●	●	●	●	●	●	●	●	●
942 - Serial card for GSM Modem	●	●	●	●	●	●	●	●	●	●	●
962 - Kit modem GSM	●	●	●	●	●	●	●	●	●	●	●
957 - Plantwatch without modem	●	●	●	●	●	●	●	●	●	●	●
930 - Remote graphic terminal kit	●	●	●	●	●	●	●	●	●	●	●
889 - Master plant SEQUENCER	●	●	●	●	●	●	●	●	●	●	●
KELVIN CLOUD PLATFORM	●	●	●	●	●	●	●	●	●	●	●

KELVIN Clim F358 SIZE	1120 T4E VT10	1360 T1380 VT11	4 T1500 VT12	4 T4E VT12
150 - LNO kit (noise reduction)	●	●	●	●
Active filters for containment of the harmonic distortion	●	●	●	●
172 - Rubber support (kit)	●	●	●	●
79 - Electrical panel heating system	●	●	●	●
179 - Double refrigerant circuit	●	-	●	●
101 - EC fan	●	●	●	●
350 -Kit TK PRO corrosion resistant painting treatment	●	●	●	●
351 - Free-cooling coils with pre-painted fins	●	●	●	●
1003 - Analogic flowmeter	●	●	●	●
1005 - Power supply analyzer	●	●	●	●
1009 - Multimeter kit	●	●	●	●
Refrigerant gas leak detector	●	●	●	●
943 - Data Logger	●	●	●	●
923 - KELVIN-Com MBUS/JBUS Serial board	●	●	●	●
926 - LON Serial board	●	●	●	●
931 - BACnet Ethernet - SNMP - TCP/IP Serial board	●	●	●	●
932 - BACnet MS/TP Serial board	●	●	●	●
942 - Serial card for GSM Modem	●	●	●	●
962 - Kit modem GSM	●	●	●	●
957 - Plantwatch without modem	●	●	●	●
930 - Remote graphic terminal kit	●	●	●	●
889 - Master plant SEQUENCER	●	●	●	●
KELVIN CLOUD PLATFORM	●	●	●	●

● available accessory; - not available accessory

TECHNICAL DATA KELVIN Clim F358

	KELVIN Clim F358		410 T2	490 T2	560 T2E	680 T2	810 T2E	740 T3	820 T3	900 T3
	SIZE		VT4	VT4	VT5	VT6	VT7	VT6	VT7	VT8
STANDARD	**Cooling capacity (1)**	**kW**	**402**	**510**	**597**	**716**	**852**	**771**	**856**	**929**
	Unit power input	kW	111,7	153,6	177,7	219,0	263,0	215,4	253,3	261,0
	Free-Cooling capacity (2)	**kW**	**358**	**392**	**479**	**575**	**675**	**589**	**676**	**758**
	Total water flow rate (*)	m³/h	71,9	91,3	107,0	128,0	152,0	138,0	153,0	166,0
	Total pressure drop (*)	kPa	92	144	128	128	132	146	134	120
	Compressors		centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal
	Quantity	n.	2	2	2	2	2	3	3	3
	Cooling capacity control	%	37...100%	33...100%	28...100%	30...100%	26...100%	25...100%	23...100%	22...100%
	Axial fans	n.	8	8	10	12	14	12	14	16
	Total air flow	m³/h	170360	170360	212950	255540	298130	255540	298130	340720
	Air circuits	n.	1	1	1	1	1	1	1	1
	Refrigerant		R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
	Total refrigerant charge (optional excluded)	kg	135	157	164	229	237	229	237	365
	Gas circuits	n.	1	1	1	1	1	1	1	1
	Power supply	V/Ph/Hz	50/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/400
	Max unit operating current (FLA)	A	316,2	316,2	324,4	490,1	498,3	474,3	482,5	727,0
	Unit starting current (LRA)	A	41,2	41,2	49,0	56,8	61,8	64,6	69,6	77,4
	EER (1)	kW/kW	3,60	3,32	3,36	3,27	3,24	3,58	3,38	3,56
	ESEER		5,07	5,05	5,15	5,35	5,47	5,34	5,03	5,23
	Sound power level [Lw] (3)	dB(A)	94,8	94,8	95,6	96,4	97,0	96,5	97,1	97,8
	Average sound pressure level [LPm] (4)	dB(A)	74,8	74,8	75,1	75,4	75,6	75,5	75,7	76,1
	Net weight	kg	3768	4063	4705	5681	6341	5866	6471	7602
	Hydraulic connections									
	Evaporator IN/OUT - OD (5)	Ø mm	168,3	168,3	168,3	168,3	168,3	168,3	168,3	168,3
LNO KIT %100	**Cooling capacity (1)**	**kW**	**402**	**510**	**597**	**716**	**852**	**771**	**856**	**929**
	Unit power input	kW	111,7	153,6	177,7	219,0	263,0	215,4	253,3	261,0
	Free-Cooling capacity (2)	**kW**	**358**	**392**	**479**	**575**	**675**	**589**	**676**	**758**
	Total air flow	m³/h	170360	170360	212950	255540	298130	255540	298130	340720
	EER (1)	kW/kW	3,60	3,32	3,36	3,27	3,24	3,58	3,38	3,56
	Sound power level [Lw] (3)	dB(A)	93,7	93,7	94,5	95,3	95,9	95,4	96,0	96,7
	Average sound pressure level [LPm] (4)	dB(A)	73,7	73,7	74,0	74,3	74,5	74,4	74,6	75,0
LNO KIT %85	**Cooling capacity (1)**	**kW**	**376**	**484**	**562**	**683**	**805**	**770**	**813**	**883**
	Unit power input	kW	105,9	151,3	172,4	211,5	263,1	227,8	247,9	266,0
	Free-Cooling capacity (2)	**kW**	**348**	**385**	**468**	**565**	**661**	**589**	**664**	**744**
	Total air flow	m³/h	144806	144806	181007	217209	253410	217209	253410	289612
	EER (1)	kW/kW	3,55	3,20	3,26	3,23	3,06	3,38	3,28	3,32
	Sound power level [Lw] (3)	dB(A)	92,6	92,6	93,4	94,2	94,8	94,3	94,9	95,6
	Average sound pressure level [LPm] (4)	dB(A)	72,6	72,6	72,9	73,2	73,4	73,3	73,5	73,9
LNO KIT %70	**Cooling capacity (1)**	**kW**	**380**	**446**	**520**	**626**	**737**	**713**	**754**	**796**
	Unit power input	kW	109,8	142,0	162,5	195,0	233,2	216,1	233,4	249,5
	Free-Cooling capacity (2)	**kW**	**349**	**374**	**454**	**546**	**639**	**574**	**645**	**713**
	Total air flow	m³/h	119252	119252	149065	178878	208691	178878	208691	238504
	EER (1)	kW/kW	3,46	3,14	3,20	3,21	3,16	3,30	3,23	3,19
	Sound power level [Lw] (3)	dB(A)	90,9	90,9	91,7	92,5	93,1	92,6	93,2	93,9
	Average sound pressure level [LPm] (4)	dB(A)	70,9	70,9	71,2	71,5	71,7	71,6	71,8	72,2

1. Referred to glycol solution temperature 15/10°C; 20% Ethylene glycol solution; ambient temperature 35°C. Fouling factor of the exchangers 0,043 m²°K/kW.
2. Referred to glycol solution inlet temperature 15°C; 20% Ethylene glycol solution; ambient temperature 3°C. Fouling factor of the exchangers 0,043 m²°K/kW.
3. Sound power level [Lw] according to ISO EN 9614 – 2.
4. Average sound pressure level [LPm] 1m far according to ISO EN 3744.
5. Hydraulic connection with grooved end, supplied as standard with flexible joint and adapter pipe.

(*) Referred to the entire unit: evaporator + free-cooling system.

TECHNICAL DATA KELVIN Clim F358

	KELVIN Clim F358 SIZE		1200 T3E VT10	980 T4 VT8	1070 T4E VT9	1120 T4E VT10	1360 T4 VT11	1380 T4 VT12	1500 T4E VT12
STANDARD	**Cooling capacity (1)**	**kW**	**1261**	**1021**	**1125**	**1194**	**1429**	**1453**	**1548**
	Unit power input	kW	390,4	308,5	337,8	351,2	438,3	426,1	463,5
	Free-Cooling capacity (2)	**kW**	**976**	**784**	**876**	**958**	**1084**	**1155**	**1180**
	Total water flow rate (*)	m³/h	226,0	183,0	201,0	214,0	256,0	260,0	277,0
	Total pressure drop (*)	kPa	142	144	138	128	150	130	148
	Compressors		centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal	centrifugal
	Quantity	n.	3	4	4	4	4	4	4
	Cooling capacity control	%	18...100%	16...100%	15...100%	14...100%	15...100%	15...100%	14...100%
	Axial fans	n.	20	16	18	20	22	24	24
	Total air flow	m³/h	425900	340720	383310	425900	468490	511080	511080
	Air circuits	n.	1	1	1	1	1	1	1
	Refrigerant		R134a	R134a	R134a	R134a	R134a	R134a	R134a
	Total refrigerant charge (optional excluded)	kg	415	402	408	426	436	442	441
	Gas circuits	n.	1	1	1	1	1	1	1
	Power supply	V/Ph/Hz	50/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/400
	Max unit operating current (FLA)	A	743,4	632,5	640,7	648,9	972,0	980,2	980,2
	Unit starting current (LRA)	A	82,4	90,2	98,0	93,0	105,8	113,6	113,6
	EER (1)	kW/kW	3,23	3,31	3,33	3,40	3,26	3,41	3,34
	ESEER		5,35	5,20	5,27	5,31	5,56	5,76	5,60
	Sound power level [Lw] (3)	dB(A)	98,6	97,8	98,2	98,6	99,1	99,5	99,5
	Average sound pressure level [LPm] (4)	dB(A)	76,2	76,1	76,1	76,2	76,4	76,5	76,5
	Net weight	kg	9056	7895	8584	9189	10062	10667	10777
	Hydraulic connections								
	Evaporator IN/OUT - OD (5)	Ø mm	219,1	219,1	219,1	219,1	219,1	219,1	219,1
LNO KIT %100	**Cooling capacity (1)**	**kW**	**1261**	**1021**	**1125**	**1194**	**1429**	**1457**	**1548**
	Unit power input	kW	390,4	308,5	337,8	351,2	438,3	421,1	463,5
	Free-Cooling capacity (2)	**kW**	**976**	**784**	**876**	**958**	**1084**	**1156**	**1180**
	Total air flow	m³/h	425900	340720	383310	425900	468490	511080	511080
	EER (1)	kW/kW	3,23	3,31	3,33	3,40	3,26	3,46	3,34
	Sound power level [Lw] (3)	dB(A)	97,5	96,7	97,1	97,5	98,0	98,4	98,4
	Average sound pressure level [LPm] (4)	dB(A)	75,1	75,0	75,0	75,1	75,3	75,4	75,4
LNO KIT %85	**Cooling capacity (1)**	**kW**	**1189**	**966**	**1064**	**1122**	**1359**	**1378**	**1468**
	Unit power input	kW	386,0	302,8	332,5	340,0	423,4	412,6	454,5
	Free-Cooling capacity (2)	**kW**	**956**	**769**	**859**	**936**	**1066**	**1133**	**1159**
	Total air flow	m³/h	362015	289612	325813	362015	398216	434418	434418
	EER (1)	kW/kW	3,08	3,19	3,20	3,30	3,21	3,34	3,23
	Sound power level [Lw] (3)	dB(A)	96,4	95,6	96,0	96,4	96,9	97,3	97,3
	Average sound pressure level [LPm] (4)	dB(A)	74,0	73,9	73,9	74,0	74,2	74,3	74,3
LNO KIT %70	**Cooling capacity (1)**	**kW**	**1082**	**892**	**976**	**1037**	**1243**	**1273**	**1330**
	Unit power input	kW	347,9	284,1	310,8	319,1	376,7	381,1	446,3
	Free-Cooling capacity (2)	**kW**	**923**	**747**	**831**	**907**	**1032**	**1099**	**1118**
	Total air flow	m³/h	298130	238504	268317	298130	327943	357756	357756
	EER (1)	kW/kW	3,11	3,14	3,14	3,25	3,30	3,34	2,98
	Sound power level [Lw] (3)	dB(A)	94,7	93,9	94,3	94,7	95,2	95,6	95,6
	Average sound pressure level [LPm] (4)	dB(A)	72,3	72,2	72,2	72,3	72,5	72,6	72,6

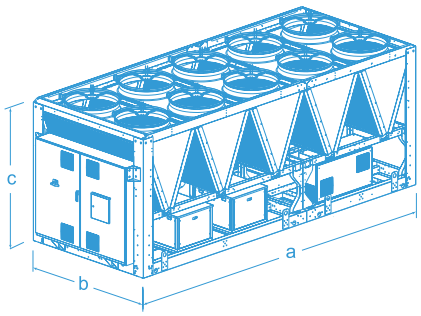
1. Referred to glycol solution temperature 15/10°C; 20% Ethylene glycol solution; ambient temperature 35°C. Fouling factor of the exchangers 0,043 m²°K/kW.
2. Referred to glycol solution inlet temperature 15°C; 20% Ethylene glycol solution; ambient temperature 3°C. Fouling factor of the exchangers 0,043 m²°K/kW.
3. Sound power level [Lw] according to ISO EN 9614 – 2.
4. Average sound pressure level [LPm] 1m far according to ISO EN 3744.
5. Hydraulic connection with grooved end, supplied as standard with flexible joint and adapter pipe.

(*) Referred to the entire unit: evaporator + free-cooling system.

DIMENSIONS (mm)

KELVIN Clim F358

SIZE VT	a	b	c
VT4	4780	2260	2304
VT5	5894	2260	2304
VT6	7014	2260	2304
VT7	8134	2260	2304
VT8	9254	2260	2304
VT9	10368	2260	2304
VT10	11488	2260	2304
VT11	12608	2260	2304
VT12	13728	2260	2304




KELVIN
Air Conditioning System