



QLAC

TECHNICAL MANUAL

AIR COOLED WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS



06617645-02



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EC DECLARATION OF CONFORMITY

Herewith TEV Ltd declare that the air conditioning equipment designated below is in accordance with the essential requirements of current EC Directives.

This declaration is based on the design and construction of the equipment in the form brought onto the market by TEV Ltd. If alterations are made to the machinery without prior consultation with TEV Ltd. this declaration becomes invalid.

Relevant EC Council Directives: Machinery Directive (98/37/EC)
 EMC Directive (89/336/EEC in the versions 93/68/EEC)
 Low Voltage Directive (73/23/EEC in the version 93/68/EEC)
 Directive PED (97/23/EC)

Applied harmonised standards: EN 292-1:1991, EN 292-2:1991, EN 294:1992, EN 349:1993, EN 55014-1:2000,
 EN 55014-2:1997, EN 60335-1:2002, EN 60335-2-40:2003, EN 61000-3:1995

Basis of self attestation: BS EN ISO 9001:2000 BSI registered firm certificate no. FM671

EG KONFORMITÄTSERKLÄRUNG

Hiermit erklärt TEV Ltd, daß die unten angegebenen Klimageräte in Übereinstimmung mit den Gesundheits - und Sicherheitsbestimmungen der gültigen EG-Direktiven stehen.

Diese Erklärung bezieht sich auf die Konzeption und die Konstruktion der Geräte, die von TEV Ltd. auf den Markt gebracht werden.

Wenn Veränderungen an den Geräten ohne vorherige Absprache mit TEV Ltd. gemacht werden, so wird diese Erklärung ungültig.

Relevante EG Richtlinien: Maschinen - Richtlinien (Version 98/37/EWG)
 EMV Direktive: (89/336/EWG/EEC in den Versionen 93/68/EWG)
 Niederspannungsrichtlinie: (73/23/EWG/EEC in der Version 93/68/EWG)
 Richtlinien PED (97/23/EC)

Angewandte Standard Normen: EN 292-1:1991, EN 292-2:1991, EN 294:1992, EN 349:1993, EN 55014-1:2000,
 EN 55014-2:1997, EN 60335-1:2002, EN 60335-2-40:2003, EN 61000-3:1995

Bestätigungsgrundlage: BS EN ISO 9001:2000 Zertifikat Nr. FM 671

Model Name:
Nom du modèle:
Nombre del Modelo:


Machinebeschrijving:
Modellname:

Serial Number:
Numéro de série:
Numéro de Serie:

Serienummer:
Serienummer:

Model Part Number:
Référence du modèle:
Artikelnummer:

Modellnummer:
Número de la Parte del Modelo:

Signature of TEV Ltd. designated "responsible person":	Handtekening van de gemachtigde persoon bij TEV Ltd.:	
Signature d' TEV Ltd Le responsable:	Unterschrift von TEV Ltd. "verantwortliche Person":	
Firma de TEV Ltd. designado como "persona responsable":		

(A C HAMMERSLEY)

Position of Signatory:	MANUFACTURING DIRECTOR
Fonction du signataire:	DIRECTEUR DE FABRICATION
Cargo del firmante:	DIRECTOR FABRICACIÓN
Functie van gemachtigde	PRODUKTIE COÖRDINATOR
Position desUnterschreibenden:	PRODUKTIONS DIREKTOR



TECHNICAL FEATURES

Frame

All QLAC unit enclosures are manufactured from hot-galvanised sheet steel, painted with polyurethane powder enamel and stoved at 180°C to provide a durable, corrosion resistant finish. The frame is self-supporting with removable panels. All screws and rivets are made from stainless steel. The paint colour is RAL 7035.

Refrigerant circuit

Refrigerant is R407C. The refrigerant circuit is assembled using quality brand components and in accordance with ISO 97/23 concerning welding procedures. Model sizes 140 and upwards have multiple refrigerant circuits. Each refrigerant circuit is totally independent of the other. Failure of one circuit does not influence the other circuit. The refrigerant circuit includes:

- Liquid line manual shut-off valve
- Sight glass
- Filter drier
- Thermal expansion valve with external equalizer
- Electronic expansion valve with control to optimise efficiency in part load conditions (option)
- Reversing valve (heat pump version only)
- Non return valve (for heat pump version only)
- Liquid receiver (for heat pump version only)
- Schraeder valves for maintenance and control
- Pressure safety device (according to PED requirements)

Compressors

Scroll compressors are used, each fitted with a crankcase heater and provided with thermal overload protection via a klixon embedded in the motor winding. Compressors are mounted in a separate chamber in order to be separated from the air stream and to enable maintenance to be performed whilst the unit is still operating. The crankcase heater is always powered when the compressors are in stand-by. All compressors are in tandem configuration. This creates higher efficiencies using part load conditions compared to units with independent refrigeration circuits per compressor.

Condensers

Condensers are made of copper tubes and aluminium fins. The diameter of the copper tubes is 3/8" and the thickness of the aluminium fins is 0.1 mm. Tubes are mechanically expanded into the aluminium fins to maximise heat transfer. The geometry of these condensers guarantees a low air side pressure drop and allows the use of slow running (and low noise) fans. The condensers can be protected by a metallic filter (option).

Fans

Fans are axial type with aerofoil blades. They are statically and dynamically balanced and supplied complete with safety fan guard that complies with the requirements of EN 294. They are mounted on the unit frame using rubber anti-vibration mounts. The electric motors are 6 pole (approx. 900 rpm) in the low noise version and 8 pole (approx. 750 rpm) in the extra low noise version. The fans are directly driven and are fitted with integral overload protection. Motors have moisture protection to IP 54.



Evaporators

The plate evaporators are made of 316 stainless steel, braze-welded. Unit sizes 040 to size 130 have a single water side circuit. From unit size 140 upwards, the circuits are double "cross flow" type. The use of these types of evaporator allows a significant reduction of the refrigerant charge for the unit compared to traditional shell-in-tube evaporators and increases the efficiency of the refrigerant cycle during part load operation. The evaporators are factory insulated with flexible close-cell insulation and can be fitted with an antifreeze heater (optional). Each evaporator is provided with a temperature sensor as antifreeze protection.

Hydraulic circuit (K versions only)

QLAC chillers can be supplied with an optional built in hydraulic kit that includes:

Water tank: various capacities (depending on the size of the unit), factory insulated with flexible close-cell material and ready for installation of an antifreeze kit (option). The water tank is installed on the supplied water side (7°C) in order to minimize fluctuations in the water temperature caused by cycling of the compressors. By installing on the supply side, the supply water temperature can be maintained for some time after the compressors turn off, a situation that cannot be achieved if the water tank is installed on the return water side (12°C).

Water pump: centrifugal type, is available in single (K1) or double configuration (K2). In the K2 version, one pump is running and one pump is in stand-by. The change over can be manual (by a manual switch installed in the electric box) or automatically controlled by the microprocessor (option). The expansion vessel, safety valve and manual valves with fittings are sited in the hydraulic circuit.

Electrics enclosure

Access to the electrics enclosure is achieved by switching the mains isolator to "OFF" and removing the front cover. The electrics conform to electromagnetic compatibility norms CEE 73/23 and 89/336. Moisture protection is IP55.

All QLAC units have installed, as standard, a compressor sequence relay, which disables compressor operation if the power supply phase sequence is incorrect (scroll compressors can be damaged if they operate in reverse). The following components are also installed as standard:

Mains switch,	Magnetic-thermal switches (MCB's) for protection of pumps and fans
Compressor fuses	Control circuit automatic breakers
Compressor contactors	Fan contactors, pump contactors.

The terminal board is supplied with volt free contacts for remote ON-OFF, Heat / Cool change over (heat pumps only) and general alarms.

Microprocessors

QLAC units are supplied with microprocessor controls as standard. The specific controller used depends upon the unit size, number of features and use of optional features e.g. electronic expansion valves. The microprocessor controls the following basic functions:

- regulation of the water temperature
- antifreeze protection
- compressor timing
- compressor automatic starting sequence
- alarm reset
- volt free contact for remote common alarm
- alarms and leds.

Any microprocessor can, on request, be connected to a BMS system for remote control and management. Typically, solutions can be found for MODBUS, LONWORKS, BACNET or TREND protocols.

Control and protection devices

All units are supplied with the following control and protection devices:

- Return water temperature sensor, installed on the return water line from the plant (12°C)
- Antifreeze protection sensor installed on the outlet water temperature (7°C)
- High pressure switch with manual reset
- Low pressure switch with automatic reset
- High pressure safety valve
- Compressor thermal overload protection
- Fan thermal overload protection
- Flow switch. (std versions supplied loose, K versions factory fitted)



OTHER VERSIONS

The following versions all incorporate energy efficiency features that make a valuable contribution to enabling compliance with the European Energy Performance of Buildings Directive and the 2006 amendments to Part L of the UK Building Regulations.

Heat pump version (HP)

Heat pump versions are provided with a 4-way reversing valve and can produce hot water up to 45-50°C. They are always supplied with a second thermostatic valve and a liquid receiver to optimise the efficiency of the refrigerant cycle in heating and in cooling. The microprocessor is set for automatic defrost (for operation in severe ambient conditions) and for Heat/Cool change over by digital input.

Free cooling version (FC)

The Free Cooling option is a system designed to give important energy savings, when the cooling system is operating continuously and when ambients are low. Free cooling units use low temperature ambient air to cool down the water in the system. In some situations, chilled water can be produced without any mechanical refrigeration (compressors) with consequent large reduction of power consumption. The Free Cooling system comprises:

Free cooling coil:	Heat exchanger made of copper tubes and aluminium fins, with bleed valves.
Microprocessor control:	The "heart" of the system; it allows correct control of all parameters, leading to high efficiencies over a range of ambient conditions.
3 way valve:	An ON/OFF 3 way valve that opens/closes the free cooling circuit, depending on the signal coming from the microprocessor control.
Head pressure control:	Maintains the correct condensing pressure in the refrigerant circuit when ambient temperatures are low. In Free Cooling systems, this effect is achieved by partially closing refrigerant circuits in the condensing coil with solenoid valves: this reduces the heat transfer capacity and maintains a suitable condensing pressure.

Heat Recovery Version

A version that includes heat recovery by the addition of a de-superheater heat exchanger located between the compressor and condenser, is also available. This de-superheater can be fitted to both chiller and heat pump versions, however, in the heat pump it must be used **only** when in cooling mode. In heating mode the water circuit must be isolated. The de-superheater is capable of generating 50°C hot water for domestic use (washing etc) and can recover up to 25% of the energy removed in cooling by this manner. Such units make a valuable contribution to energy efficiency.



**WATER CHILLERS AND HEAT PUMPS
QLAC / LS (Low noise version)
TECHNICAL DATA**

MOD.		040	045	050	060	070	080	090	110
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Cooling capacity	kW	37	45,0	52,0	58,0	64,0	78,0	90,0	104,0
Compressor input power	kW	12,6	15,1	17,2	19,3	21,5	25,8	29,9	33,9
Water flow rate	l/h	6490	7910	9290	10320	11520	13590	15650	18400
Water pressure drop	KPa	26,2	32,4	31,5	23,3	30,1	30,4	27,6	26,5
Heating capacity	kW	38,5	47,0	55,0	62,0	68,0	83,0	95,0	107,0
Compressor input power	kW	12,9	15,2	17,3	19,5	21,7	26,4	30,3	34,2
Water flow rate	l/h	6630	8085	9460	10665	11695	14275	16340	18400
Water pressure drop	kPa	28,5	33,8	32,6	24,8	31,0	33,5	30,0	26,5
Total input current (K version)	A	32,4	36	37,4	40,1	42,8	52,6	62,0	67,5
Total peak current	A	121,4	148,4	154,4	194,4	194,0	235,4	265,1	275,1
Maximum input current	A	39,4	45,4	49,4	54,4	59,4	69,4	81,1	91,1
Power supply	V/Ph/Hz	400/3/50							
Airflow	m ³ /h	10800	10800	18800	18800	18000	17280	28080	27000
Fans	n° x kW	2 x 0,37	2 x 0,37	2 x 0,69	2 x 0,69	2 x 0,69	2 x 0,69	3 x 0,69	3 x 0,69
Compressors	type	Scroll							
	n°	2	2	2	2	2	2	2	2
Refrigerant circuits	n°	1	1	1	1	1	1	1	1
Control steps	n°	2	2	2	2	2	2	2	2
Sound power level ⁽¹⁾	dB(A)	77	77	79	79	80	80	82	82,5
Sound pressure level ⁽²⁾	dB(A)	49	49	51	51	52	52	54	54,5
Water pump (option)	kW	1,1	1,1	1,1	1,1	1,1	1,5	1,5	2,2
Water pump input current	A	2,9	2,9	2,9	2,9	2,9	4,3	4,3	5,3
Pump available pressure (option)	kPa	165	160	141	125	110	150	130	150
Water tank capacity (option)	l	180	180	300	300	300	300	530	530
Expansion vessel (option)	l	18	18	18	18	18	18	18	18
Length	mm	1870	1870	2608	2608	2608	2608	3608	3608
Width	mm	850	850	1105	1105	1105	1105	1105	1105
Height	mm	1406	1406	1759	1759	1759	1759	1759	1759
Weight (Standard configuration)	kg	570	590	710	725	760	810	1070	1150
Weight (with hydraulic kit)	kg	730	750	880	895	930	980	1280	1360

Performances are rated at:

Cooling: ambient air temperature 35 °C; evaporator water temperature in/out 12°C / 7 °C.

Heating: ambient air temperature 8.3 °C db, 6.1 °C wb ; condenser water temperature in/out 40°C / 45 °C.

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10m from the unit in free field conditions: direction factor Q=2 (according to ISO 3746).



**WATER CHILLERS AND HEAT PUMPS
QLAC / LS (Low noise version)
TECHNICAL DATA**

MOD.		120	130	140	160	190	210	240	260
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Cooling capacity	kW	115,5	128	142	156	181	206,1	232	256
Compressor input power	kW	38	42,1	47,3	51,7	59,7	67,8	76	84,2
Water flow rate	l/h	20640	22190	24600	27180	31990	36290	41450	45240
Water pressure drop	kPa	29,4	30,0	30,8	36,0	39,6	42,7	49,0	51,2
Heating capacity	kW	120	132	150	165	189	217	242	267
Compressor input power	kW	38,5	42,9	48,1	52,8	60,6	68,4	77,1	85,8
Water flow rate	l/h	20640	22700	25800	28380	32510	37320	41620	45920
Water pressure drop	kPa	29,4	31,3	33,8	39,2	40,9	45,1	49,4	52,7
Total input current (K version)	A	76,4	85,5	96,3	104,7	126,6	144,0	160,2	178,4
Total peak current	A	322,1	333,1	290	304	351	369	431	453
Maximum input current	A	102,1	113,1	119,9	138,3	167,6	185,6	211,6	233,6
Power supply	V/Ph/Hz	400/3/50							
Airflow	m ³ /h	25920	25920	36000	34920	55800	55800	58800	58800
Fans	n° x kW	3 x 0,69	3 x 0,69	4 x 0,69	4 x 0,69	3 x 2,0	3 x 2,0	4 x 2,0	4 x 2,0
Compressors	type	Scroll							
	n°	2	2	4	4	4	4	4	4
Refrigerant circuits	n°	1	1	2	2	2	2	2	2
Control steps	n°	2	2	4	4	4	4	4	4
Sound power level ⁽¹⁾	dB(A)	82,9	83,1	83,5	84	86	86	89	89
Sound pressure level ⁽²⁾	dB(A)	54,9	55,1	55,5	56	58	58	61	61
Water pump (option)	kW	2,2	2,2	2,2	3,0	3,0	3,0	4,0	4,0
Water pump input current	A	5,3	5,3	5,3	8,5	8,5	8,5	9,9	9,9
Pump available pressure (option)	kPa	120	130	105	180	140	110	170	155
Water tank capacity (option)	l	530	530	530	670	670	670	670	670
Expansion vessel (option)	l	18	18	18	18	18	18	18	18
Length	mm	3608	3608	4108	4108	4708	4708	4708	4708
Width	mm	1105	1105	1105	1105	1105	1105	1105	1105
Height	mm	1759	1759	2179	2179	2262	2262	2262	2262
Weight (Standard configuration)	kg	1200	1230	1650	1700	1960	2050	2160	2480
Weight (with hydraulic kit)	kg	1410	1440	1860	2000	2260	2350	2460	2780

Performances are rated at:

Cooling: ambient air temperature 35 °C; evaporator water temperature in/out 12°C / 7 °C.

Heating: ambient air temperature 8.3 °C db, 6.1 °C wb ; condenser water temperature in/out 40°C / 45 °C.

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10m from the unit in free field conditions: direction factor Q=2 (according to ISO 3746).



WATER CHILLERS AND HEAT PUMPS
QLAC / LS (Low noise version)
TECHNICAL DATA

MOD.		300	320	380	430	500
Refrigerant		R407C	R407C	R407C	R407C	R407C
Cooling capacity	kW	290	321	383	432	481
Compressor input power	kW	92,4	100,6	126,4	138,7	150,9
Water flow rate	l/h	49880	55200	65800	74300	82700
Water pressure drop	kPa	34	39	32	38	44
Free cooling capacity	kW	185	185	235	245	240
input power	kW	12	12	16	16	16
Water flow rate	l/h	49880	55200	65800	74300	82700
Water pressure drop	kPa	107	121	113	121	141
Total input current (K version)	A	201,4	220	279,2	301,7	324,2
Total peak current	A	510	534	582	641	672,5
Maximum input current	A	262,6	287,2	362	393,5	425
Power supply	V/Ph/Hz	400/3/50				
Airflow	m³/h	89000	88500	119000	118000	118000
Fans	n° x kW	6x2	6x2	8x2	8x2	8x2
Compressors	type	Scroll				
	n°	4	4	6	6	6
Refrigerant circuits	n°	2	2	2	2	2
Control steps	n°	4	4	6	6	6
Sound power level ⁽¹⁾	dB(A)	90	90	91	91	91
Sound pressure level ⁽²⁾	dB(A)	62	62	63	63	63
Water pump (option)	kW	4	5,5	7,5	7,5	7,5
Pump available pressure (option)	kPa	160	172	210	190	160
Water tank capacity (option)	l	670	670	670	670	670
Expansion vessel (option)	l	25	25	50	50	50
Length	mm	4108	4108	4708	4708	4708
Width	mm	2201	2201	2201	2201	2201
Height	mm	2262	2262	2262	2262	2262
Weight (Standard configuration)	kg	2750	2800	3100	3150	3210
Weight (with hydraulic kit)	kg	3150	3220	3550	3610	3690

Performances are rated at:

Cooling: ambient air temperature 35 °C; evaporator water temperature in/out 12°C / 7 °C.

Free cooling: ambient air temperature 2 °C; water inlet temperature 15°C, glycol 20%, nominal waterflow, compressors switched off

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10m from the unit in free field conditions: direction factor Q=2 (according to ISO 3746).



**WATER CHILLERS AND HEAT PUMPS
QLAC / XL (Extra Low noise version)
TECHNICAL DATA**

MOD.		040	045	050	060	070	080	090	110
Refrigerant				R407C	R407C	R407C	R407C	R407C	R407C
Cooling capacity	kW	###	###	52	58	64	78	90	104
Compressor input power	kW			17,2	19,3	21,5	25,8	29,9	33,9
Water flow rate	l/h			9290	10320	11520	13590	15650	18400
Water pressure drop	KPa			31,5	23,3	30,1	30,4	27,6	26,5
Heating capacity	kW			55,0	62,0	68,0	83,0	95,0	107,0
Compressor input power	kW			17,3	19,5	21,7	26,4	30,3	34,2
Water flow rate	l/h			9460	10665	11695	14275	16340	18400
Water pressure drop	kPa			32,6	24,8	31,0	33,5	30,0	26,5
Total input current (K version)	A			37,4	40,1	42,8	52,6	62	67,5
Total peak current	A			154,4	194,4	194	235,4	265,1	275,1
Maximum input current	A			49,4	54,4	59,4	69,4	81,1	91,1
Power supply	V/Ph/Hz	400/3/50							
Airflow	m³/h			24000	24000	24000	23600	35000	35000
Fans	n° x kW			2 x 1.23	2 x 1.23	2 x 1.23	2 x 1.23	3 x 1.23	3 x 1.23
Compressors	type	Scroll							
	n°			2	2	2	2	2	2
Refrigerant circuits	n°			1	1	1	1	1	1
Control steps	n°			2	2	2	2	2	2
Sound power level ⁽¹⁾	dB(A)			76	76	78	78	79,5	79,9
Sound pressure level ⁽²⁾	dB(A)			48	48	50	50	51,5	51,9
Water pump (option)	kW			1,1	1,1	1,1	1,5	1,5	2,2
Pump available pressure (option)	kPa			141	125	110	150	130	150
Water tank capacity (option)	l			300	300	300	300	530	530
Expansion vessel (option)	l			18	18	18	18	18	18
Length	mm			2608	2608	2608	2608	3608	3608
Width	mm			1105	1105	1105	1105	1105	1105
Height	mm			1842	1842	1842	1842	1842	1842
Weight (Standard configuration)	kg			710	725	760	810	1070	1150
Weight (with hydraulic kit)	kg			880	895	930	980	1280	1360

XL Models in these sizes are available as a special unit. Contact QUARTZ technical department for details.

Performances are rated at:

Cooling: ambient air temperature 35 °C; evaporator water temperature in/out 12°C / 7 °C.

Heating: ambient air temperature 8.3 °C db, 6.1 °C wb ; condenser water temperature in/out 40°C / 45 °C.

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10m from the unit in free field conditions: direction factor Q=2 (according to ISO 3746).



**WATER CHILLERS AND HEAT PUMPS
QLAC / XL (Extra Low noise version)
TECHNICAL DATA**

MOD.		120	130	140	160	190	210	240	260
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C		
Cooling capacity	kW	115,5	128	142	156	181	206,1	###	###
Compressor input power	kW	38	42,1	47,3	51,7	59,7	67,8		
Water flow rate	l/h	20640	22190	24600	27180	31990	36290		
Water pressure drop	kPa	29,4	30,0	30,8	36,0	39,6	42,7		
Heating capacity	kW	120	132	150	165	189	217		
Compressor input power	kW	38,5	42,9	48,1	52,8	60,6	68,4		
Water flow rate	l/h	20640	22700	25800	28380	32510	37320		
Water pressure drop	kPa	29,4	31,3	33,8	39,2	40,9	45,1		
Total input current (K version)	A	76,4	85,5	96,3	104,7	126,6	144		
Total peak current	A	322,1	333,1	290	304	351	369		
Maximum input current	A	102,1	113,1	119,9	138,3	167,6	185,6		
Power supply	V/Ph/Hz	400/3/50							
Airflow	m ³ /h	33000	33000	33000	33000	64000	62000		
Fans	n° x kW	3 x 1,23	3 x 1,23	3 x 1,23	3 x 1,23	4 x 1,25	4 x 1,25		
Compressors	type	Scroll							
	n°	2	2	4	4	4	4		
Refrigerant circuits	n°	1	1	2	2	2	2		
Control steps	n°	2	2	4	4	4	4		
Sound power level ⁽¹⁾	dB(A)	80,1	80,5	81	81,3	84	84		
Sound pressure level ⁽²⁾	dB(A)	52,1	52,5	53	53,3	58	58		
Water pump (option)	kW	2,2	2,2	2,2	3,0	3,0	3,0		
Pump available pressure (option)	kPa	120	130	105	180	140	110		
Water tank capacity (option)	l	530	530	530	670	670	670		
Expansion vessel (option)	l	18	18	18	18	18	18		
Length	mm	3608	3608	4108	4108	4708	4708		
Width	mm	1105	1105	1105	1105	1105	1105		
Height	mm	1842	1842	2262	2262	2262	2262		
Weight (Standard configuration)	kg	1200	1230	1650	1700	1960	2050		
Weight (with hydraulic kit)	kg	1410	1440	1860	2000	2260	2350		

XL Models in these sizes are available as a special unit. Contact QUARTZ technical department for details.

Performances are rated at:

Cooling: ambient air temperature 35 °C; evaporator water temperature in/out 12°C / 7 °C.

Heating: ambient air temperature 8.3 °C db, 6.1 °C wb ; condenser water temperature in/out 40°C / 45 °C.

(1): Sound power level according to ISO 3746.

(2): Sound pressure level measured at 10m from the unit in free field conditions: direction factor Q=2 (according to ISO 3746).



**QLAC / LS (LOW NOISE VERSION)
COOLING CAPACITIES AND COMPRESSOR INPUT POWER**

MOD.	TU (°C)	PF (kW)						PA (kW)					
		TA (°C)						TA (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
040	-5	26,64	24,98	23,36	21,79	---	---	9,39	10,50	11,71	13,02	---	---
	-3	29,27	27,48	25,74	24,04	---	---	9,36	10,50	11,76	13,13	---	---
	-1	32,07	30,15	28,28	26,44	---	---	9,32	10,48	11,77	13,21	---	---
	1	35,05	33,00	30,98	29,00	---	---	9,28	10,44	11,77	13,25	---	---
	3	38,23	36,02	33,85	31,73	29,65	---	9,24	10,41	11,75	13,27	14,94	---
	5	41,60	39,24	36,91	34,63	32,39	---	9,21	10,36	11,72	13,26	14,98	---
	7	45,18	42,66	40,17	37,71	35,31	32,95	9,19	10,33	11,68	13,24	15,00	16,93
	9	48,97	46,28	43,62	40,99	38,41	35,87	9,19	10,30	11,64	13,21	14,99	16,97
	11	52,99	50,12	47,28	44,48	41,71	38,98	9,21	10,28	11,60	13,17	14,97	16,98
	13	57,24	54,19	51,16	48,17	45,21	42,29	9,26	10,28	11,57	13,13	14,93	16,97
	15	61,74	58,50	55,27	52,08	48,92	45,80	9,34	10,30	11,56	13,09	14,90	16,95
045	-5	33,41	31,45	29,48	27,48	---	---	11,23	12,52	13,96	15,56	---	---
	-3	36,45	34,36	32,24	30,11	---	---	11,22	12,53	13,99	15,60	---	---
	-1	39,69	37,45	35,19	32,90	---	---	11,21	12,53	14,01	15,64	---	---
	1	43,13	40,75	38,33	35,89	---	---	11,19	12,53	14,02	15,67	---	---
	3	46,80	44,25	41,67	39,06	36,42	---	11,18	12,52	14,02	15,69	17,54	---
	5	50,69	47,98	45,23	42,44	39,63	---	11,16	12,51	14,03	15,71	17,58	---
	7	54,83	51,94	49,01	46,00	43,04	40,00	11,14	12,50	14,02	15,72	17,61	19,70
	9	59,21	56,14	53,02	49,86	46,66	43,43	11,12	12,48	14,02	15,73	17,63	19,74
	11	63,85	60,59	57,27	53,91	50,51	47,07	11,09	12,47	14,01	15,73	17,65	19,78
	13	68,77	65,30	61,78	58,21	54,60	50,95	11,07	12,45	14,00	15,73	17,66	19,80
	15	73,96	70,28	66,55	62,77	58,94	55,06	11,05	12,43	13,98	15,73	17,67	19,83
050	-5	39,58	37,29	34,94	32,53	---	---	12,52	13,96	15,50	17,15	---	---
	-3	43,08	40,64	38,14	35,57	---	---	12,50	13,98	15,58	17,30	---	---
	-1	46,80	44,21	41,54	38,82	---	---	12,47	13,98	15,63	17,41	---	---
	1	50,76	48,00	45,17	42,27	---	---	12,43	13,97	15,66	17,49	---	---
	3	54,98	52,04	49,03	45,95	42,79	---	12,38	13,94	15,66	17,54	19,58	---
	5	59,45	56,33	53,13	49,86	46,50	---	12,34	13,90	15,64	17,57	19,66	---
	7	64,19	60,88	57,49	54,00	50,46	46,82	12,29	13,85	15,62	17,57	19,71	22,03
	9	69,22	65,71	62,12	58,43	54,66	50,80	12,25	13,81	15,58	17,56	19,74	22,11
	11	74,55	70,83	67,02	63,11	59,12	55,04	12,22	13,77	15,54	17,53	19,74	22,17
	13	80,19	76,25	72,21	68,08	63,85	59,53	12,21	13,73	15,50	17,50	19,74	22,20
	15	86,14	81,97	77,70	73,34	68,87	64,31	12,22	13,70	15,46	17,46	19,71	22,21
060	-5	44,18	41,55	38,86	36,12	---	---	14,46	16,14	17,97	19,95	---	---
	-3	48,09	45,29	42,42	39,49	---	---	14,47	16,18	18,07	20,12	---	---
	-1	52,26	49,27	46,22	43,09	---	---	14,46	16,20	18,13	20,25	---	---
	1	56,69	53,51	50,26	46,93	---	---	14,45	16,21	18,18	20,35	---	---
	3	61,41	58,02	54,56	51,02	47,40	---	14,43	16,21	18,21	20,42	22,85	---
	5	66,42	62,82	59,14	55,37	51,52	---	14,42	16,20	18,22	20,47	22,95	---
	7	71,73	67,91	64,00	60,00	55,91	51,74	14,40	16,18	18,21	20,49	23,02	25,78
	9	77,37	73,31	69,16	64,91	60,58	56,15	14,40	16,17	18,21	20,51	23,07	25,88
	11	83,34	79,04	74,63	70,13	65,54	60,85	14,41	16,16	18,20	20,51	23,10	25,96
	13	89,66	85,10	80,43	75,67	70,80	65,84	14,44	16,17	18,19	20,50	23,11	26,01
	15	96,34	91,51	86,57	81,53	76,39	71,14	14,50	16,19	18,19	20,50	23,12	26,04

TU: Outlet water temperature (°C)
 TA: Ambient temperature (°C)
 PA: Compressors input power (kW)
 PF: Cooling capacity (kW)



**QLAC / LS (LOW NOISE VERSION)
COOLING CAPACITIES AND COMPRESSOR INPUT POWER**

MOD.	TU (°C)	PF (kW)						PA (kW)					
		TA (°C)						TA (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
070	-5	49,33	46,44	43,48	40,47	---	---	15,63	17,47	19,51	21,77	---	---
	-3	53,68	50,59	47,43	44,21	---	---	15,65	17,51	19,60	21,92	---	---
	-1	58,31	55,01	51,64	48,21	---	---	15,66	17,54	19,66	22,03	---	---
	1	63,23	59,72	56,13	52,47	---	---	15,66	17,56	19,71	22,12	---	---
	3	68,47	64,73	60,91	57,00	53,02	---	15,67	17,57	19,74	22,18	24,90	---
	5	74,04	70,06	65,99	61,83	57,59	---	15,69	17,58	19,76	22,23	24,99	---
	7	79,95	75,72	71,39	67,00	62,46	57,87	15,72	17,59	19,77	22,26	25,05	28,15
	9	86,21	81,72	77,12	72,43	67,64	62,76	15,76	17,62	19,79	22,28	25,10	28,24
	11	92,85	88,08	83,20	78,22	73,14	67,97	15,83	17,65	19,81	22,30	25,14	28,31
	13	99,87	94,81	89,64	84,37	78,99	73,50	15,92	17,70	19,84	22,32	25,16	28,36
	15	107,3	101,9	96,46	90,88	85,18	79,38	16,05	17,78	19,88	22,35	25,19	28,40
080	-5	58,51	55,07	51,54	47,94	---	---	19,61	21,99	24,54	27,22	---	---
	-3	63,71	60,03	56,27	52,42	---	---	19,57	22,02	24,67	27,51	---	---
	-1	69,24	65,32	61,31	57,21	---	---	19,52	22,00	24,75	27,71	---	---
	1	75,12	70,95	66,68	62,30	---	---	19,46	21,96	24,76	27,83	---	---
	3	81,38	76,94	72,39	67,73	62,97	---	19,40	21,90	24,75	27,89	31,30	---
	5	88,03	83,30	78,46	73,50	68,44	---	19,37	21,84	24,70	27,90	31,42	---
	7	95,08	90,06	84,91	79,00	74,26	68,76	19,37	21,79	24,64	27,88	31,47	35,37
	9	102,5	97,22	91,75	86,16	80,45	74,61	19,41	21,76	24,58	27,83	31,47	35,47
	11	110,5	104,8	99,02	93,08	87,02	80,84	19,52	21,77	24,54	27,77	31,45	35,51
	13	118,8	112,8	106,7	100,4	94,00	87,45	19,70	21,83	24,52	27,72	31,40	35,51
	15	127,7	121,3	114,8	108,2	101,4	94,47	19,97	21,96	24,54	27,68	31,34	35,48
090	-5	67,32	63,10	58,71	54,16	---	---	22,38	25,09	28,16	31,62	---	---
	-3	73,37	68,89	64,23	59,41	---	---	22,41	25,14	28,23	31,73	---	---
	-1	79,80	75,05	70,12	65,01	---	---	22,44	25,18	28,30	31,83	---	---
	1	86,64	81,61	76,39	70,98	---	---	22,46	25,21	28,34	31,90	---	---
	3	93,92	88,59	83,06	77,33	71,41	---	22,50	25,24	28,39	31,97	36,01	---
	5	101,6	96,00	90,15	84,10	77,84	---	22,54	25,27	28,43	32,02	36,09	---
	7	109,8	103,8	97,69	91,00	84,68	77,87	22,59	25,31	28,46	32,07	36,15	40,75
	9	118,5	112,2	105,6	98,92	91,95	84,76	22,66	25,37	28,51	32,11	36,21	40,84
	11	127,6	121,0	114,1	107,0	99,67	92,10	22,75	25,43	28,56	32,16	36,27	40,91
	13	137,4	130,3	123,1	115,6	107,8	99,88	22,86	25,51	28,62	32,21	36,32	40,97
	15	147,6	140,2	132,6	124,7	116,5	108,1	23,00	25,61	28,70	32,28	36,38	41,04
110	-5	78,60	73,67	68,49	63,05	---	---	24,07	26,92	30,28	34,24	---	---
	-3	85,65	80,44	74,96	69,23	---	---	24,17	27,00	30,31	34,21	---	---
	-1	93,15	87,65	81,87	75,82	---	---	24,28	27,10	30,38	34,23	---	---
	1	101,1	95,32	89,22	82,84	---	---	24,39	27,21	30,47	34,28	---	---
	3	109,5	103,4	97,04	90,32	83,31	---	24,50	27,33	30,59	34,36	38,76	---
	5	118,5	112,1	105,3	98,27	90,89	---	24,61	27,46	30,71	34,47	38,83	---
	7	128,1	121,3	114,1	107,0	98,96	90,90	24,69	27,58	30,85	34,60	38,92	43,93
	9	138,1	131,0	123,5	115,6	107,5	99,06	24,76	27,70	30,99	34,74	39,05	44,01
	11	148,8	141,3	133,4	125,2	116,6	107,7	24,81	27,80	31,13	34,90	39,20	44,13
	13	160,1	152,2	143,9	135,2	126,2	116,9	24,82	27,88	31,26	35,05	39,36	44,28
	15	172,0	163,7	154,9	145,9	136,4	126,6	24,80	27,94	31,38	35,21	39,53	44,44

TU: Outlet water temperature (°C)
 TA: Ambient temperature (°C)
 PA: Compressors input power (kW)
 PF: Cooling capacity (kW)



COOLING CAPACITIES AND COMPRESSOR INPUT POWER

MOD.	TU (°C)	PF (kW)						PA (kW)					
		TA (°C)						TA (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
120	-5	88,37	82,32	76,09	69,68	---	---	27,64	31,00	34,96	39,62	---	---
	-3	96,55	90,15	83,54	76,75	---	---	27,75	31,07	34,98	39,56	---	---
	-1	105,2	98,48	91,49	84,29	---	---	27,87	31,15	35,02	39,54	---	---
	1	114,5	107,3	99,94	92,33	---	---	28,00	31,26	35,08	39,55	---	---
	3	124,3	116,7	108,9	100,8	92,62	---	28,14	31,38	35,17	39,58	44,72	---
	5	134,8	126,8	118,5	109,9	101,2	---	28,28	31,51	35,27	39,65	44,73	---
	7	145,9	137,4	128,6	120,0	110,4	100,9	28,43	31,66	35,39	39,73	44,76	50,57
	9	157,7	148,7	139,4	129,9	120,2	110,2	28,58	31,81	35,53	39,84	44,82	50,57
	11	170,1	160,6	150,9	140,8	130,5	120,0	28,72	31,96	35,67	39,96	44,91	50,60
	13	183,3	173,3	163,0	152,4	141,5	130,4	28,86	32,11	35,83	40,10	45,01	50,66
	15	197,2	186,6	175,8	164,6	153,2	141,5	29,00	32,26	35,98	40,25	45,14	50,75
130	-5	95,43	88,46	81,36	74,17	---	---	31,38	35,29	39,89	45,26	---	---
	-3	104,5	97,10	89,57	81,92	---	---	31,48	35,34	39,88	45,17	---	---
	-1	114,1	106,3	98,31	90,19	---	---	31,61	35,41	39,88	45,11	---	---
	1	124,4	116,1	107,6	99,00	---	---	31,74	35,50	39,92	45,08	---	---
	3	135,4	126,5	117,5	108,3	99,10	---	31,90	35,61	39,97	45,06	50,98	---
	5	147,0	137,6	128,0	118,3	108,5	---	32,08	35,73	40,04	45,07	50,91	---
	7	159,4	149,4	139,2	129,0	118,5	107,9	32,27	35,88	40,13	45,11	50,88	57,52
	9	172,5	161,9	151,1	140,2	129,2	118,0	32,48	36,05	40,25	45,16	50,87	57,44
	11	186,3	175,1	163,8	152,2	140,5	128,6	32,70	36,23	40,39	45,24	50,88	57,38
	13	201,0	189,2	177,1	164,9	152,5	140,0	32,95	36,44	40,55	45,35	50,92	57,34
	15	216,5	204,0	191,3	178,4	165,3	152,0	33,21	36,66	40,73	45,47	50,98	57,34
140	-5	105,5	99,32	92,90	86,35	---	---	35,77	40,04	44,70	49,71	---	---
	-3	114,9	108,2	101,4	94,42	---	---	35,76	40,13	44,94	50,16	---	---
	-1	124,9	117,7	110,4	103,0	---	---	35,71	40,15	45,09	50,50	---	---
	1	135,5	127,9	120,1	112,1	---	---	35,66	40,14	45,17	50,72	---	---
	3	146,8	138,7	130,4	121,9	113,2	---	35,62	40,09	45,19	50,86	57,07	---
	5	158,7	150,1	141,3	132,3	123,1	---	35,59	40,04	45,17	50,93	57,29	---
	7	171,5	162,3	152,9	143,0	133,5	123,6	35,62	40,01	45,13	50,94	57,42	64,51
	9	185,0	175,2	165,3	155,1	144,7	134,1	35,70	40,00	45,08	50,93	57,48	64,71
	11	199,2	188,9	178,3	167,5	156,5	145,3	35,86	40,03	45,06	50,89	57,50	64,84
	13	214,4	203,4	192,2	180,8	169,1	157,2	36,12	40,14	45,06	50,86	57,48	64,90
	15	230,3	218,7	206,9	194,8	182,4	169,8	36,49	40,32	45,12	50,84	57,46	64,92
160	-5	115,9	109,1	102,1	95,01	---	---	39,22	43,97	49,07	54,44	---	---
	-3	126,2	118,9	111,5	103,9	---	---	39,15	44,03	49,35	55,02	---	---
	-1	137,2	129,4	121,5	113,3	---	---	39,04	44,00	49,49	55,41	---	---
	1	148,9	140,6	132,1	123,4	---	---	38,91	43,92	49,53	55,66	---	---
	3	161,3	152,4	143,4	134,2	124,8	---	38,80	43,80	49,49	55,78	62,61	---
	5	174,4	165,1	155,5	145,6	135,6	---	38,73	43,68	49,40	55,81	62,83	---
	7	188,4	178,4	168,2	158,0	147,1	136,2	38,73	43,58	49,28	55,76	62,93	70,73
	9	203,2	192,6	181,8	170,7	159,4	147,8	38,83	43,53	49,16	55,66	62,95	70,93
	11	218,9	207,7	196,2	184,4	172,4	160,2	39,04	43,55	49,07	55,55	62,89	71,02
	13	235,5	223,6	211,4	199,0	186,3	173,3	39,40	43,66	49,04	55,44	62,79	71,02
	15	253,1	240,5	227,6	214,4	200,9	187,2	39,93	43,91	49,08	55,36	62,69	70,97

TU: Outlet water temperature (°C)
 TA: Ambient temperature (°C)
 PA: Compressors input power (kW)
 PF: Cooling capacity (kW)



COOLING CAPACITIES AND COMPRESSOR INPUT POWER

MOD.	TU (°C)	PF (kW)						PA (kW)					
		TA (°C)						TA (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
190	-5	137,1	128,7	120,0	111,0	---	---	43,27	48,48	54,40	61,08	---	---
	-3	149,3	140,5	131,2	121,7	---	---	43,32	48,56	54,53	61,28	---	---
	-1	162,3	152,9	143,2	133,1	---	---	43,37	48,63	54,63	61,44	---	---
	1	176,2	166,2	155,9	145,2	---	---	43,43	48,69	54,72	61,58	---	---
	3	190,9	180,4	169,4	158,1	146,4	---	43,49	48,75	54,80	61,69	69,49	---
	5	206,5	195,4	183,8	171,8	159,4	---	43,58	48,82	54,87	61,79	69,63	---
	7	223,1	211,3	199,1	186,0	173,3	159,8	43,70	48,91	54,95	61,87	69,75	78,64
	9	240,6	228,2	215,3	201,9	188,1	173,8	43,85	49,02	55,03	61,96	69,86	78,78
	11	259,2	246,1	232,4	218,3	203,8	188,7	44,04	49,16	55,14	62,06	69,96	78,92
	13	278,9	265,0	250,6	235,7	220,4	204,6	44,29	49,34	55,28	62,17	70,07	79,04
15	299,6	285,0	269,8	254,2	238,0	221,3	44,59	49,56	55,44	62,30	70,18	79,16	
210	-5	156,5	146,1	135,1	123,7	---	---	50,88	57,06	64,35	72,97	---	---
	-3	170,6	159,7	148,1	136,1	---	---	51,06	57,18	64,37	72,83	---	---
	-1	185,8	174,2	162,0	149,3	---	---	51,27	57,35	64,45	72,79	---	---
	1	201,8	189,6	176,8	163,4	---	---	51,51	57,56	64,60	72,83	---	---
	3	218,9	206,0	192,5	178,4	163,7	---	51,74	57,80	64,80	72,95	82,44	---
	5	237,0	223,5	209,2	194,3	178,9	---	51,98	58,06	65,05	73,13	82,52	---
	7	256,3	241,9	227,0	211,0	195,1	178,2	52,20	58,33	65,32	73,37	82,67	93,43
	9	276,6	261,6	245,8	229,3	212,2	194,5	52,39	58,59	65,61	73,64	82,89	93,55
	11	298,2	282,3	265,7	248,5	230,5	211,9	52,54	58,83	65,90	73,95	83,16	93,74
	13	320,9	304,3	286,8	268,7	249,9	230,4	52,64	59,05	66,20	74,27	83,47	93,99
15	344,9	327,4	309,2	290,1	270,4	249,9	52,68	59,23	66,47	74,60	83,81	94,30	
240	-5	178,3	166,1	153,5	140,6	---	---	55,28	62,00	69,93	79,23	---	---
	-3	194,8	181,9	168,5	154,8	---	---	55,49	62,13	69,95	79,12	---	---
	-1	212,4	198,7	184,6	170,0	---	---	55,73	62,31	70,03	79,08	---	---
	1	231,1	216,6	201,6	186,3	---	---	55,99	62,52	70,16	79,09	---	---
	3	251,0	235,6	219,8	203,5	186,8	---	56,27	62,76	70,33	79,17	89,44	---
	5	272,1	255,8	239,1	221,9	204,3	---	56,56	63,03	70,55	79,30	89,46	---
	7	294,5	277,3	259,6	241,0	222,8	203,7	56,86	63,31	70,79	79,47	89,53	101,1
	9	318,2	300,1	281,4	262,2	242,5	222,4	57,16	63,61	71,06	79,68	89,65	101,1
	11	343,3	324,2	304,5	284,2	263,4	242,2	57,45	63,92	71,35	79,92	89,82	101,2
	13	369,9	349,7	328,9	307,5	285,6	263,2	57,73	64,22	71,65	80,20	90,03	101,3
15	398,0	376,7	354,7	332,2	309,2	285,6	57,99	64,53	71,97	80,49	90,28	101,5	
260	-5	194,3	180,1	165,6	151,0	---	---	62,76	70,58	79,77	90,51	---	---
	-3	212,7	197,7	182,3	166,8	---	---	62,97	70,68	79,75	90,35	---	---
	-1	232,4	216,4	200,1	183,6	---	---	63,21	70,82	79,77	90,23	---	---
	1	253,4	236,4	219,1	201,5	---	---	63,49	70,99	79,83	90,16	---	---
	3	275,7	257,6	239,3	220,6	201,7	---	63,80	71,21	79,93	90,13	101,9	---
	5	299,4	280,2	260,7	241,0	220,9	---	64,15	71,47	80,08	90,15	101,8	---
	7	324,5	304,2	283,6	263,0	241,3	219,8	64,53	71,76	80,27	90,22	101,7	115,0
	9	351,2	329,7	307,8	285,6	263,0	240,2	64,95	72,09	80,50	90,33	101,7	114,8
	11	379,4	356,6	333,5	310,0	286,1	262,0	65,41	72,47	80,78	90,49	101,7	114,7
	13	409,3	385,2	360,7	335,8	310,6	285,1	65,90	72,88	81,09	90,69	101,8	114,6
15	440,9	415,4	389,5	363,3	336,6	309,6	66,42	73,33	81,45	90,95	101,9	114,6	

TU: Outlet water temperature (°C)
 TA: Ambient temperature (°C)
 PA: Compressors input power (kW)
 PF: Cooling capacity (kW)



COOLING CAPACITIES AND COMPRESSOR INPUT POWER

MOD.	TU (°C)	PF (kW)					PA (kW)				
		TA (°C)					TA (°C)				
		20	25	30	35	40	20	25	30	35	40
300	1	275.9	258.8	240.9	221.8	201.4	65.7	73.2	81.8	91.8	103.3
	3	299.9	281.7	262.8	242.7	221.4	66.1	73.5	82.1	92.0	103.5
	5	325.5	306.1	286.0	264.9	242.5	66.5	73.8	82.3	92.2	103.6
	7	352.7	332.1	310.7	288.4	264.9	67.0	74.2	82.7	92.4	103.8
	9	381.7	359.7	337.0	313.4	288.6	67.6	74.7	83.0	92.7	103.9
	11	412.6	389.0	364.8	339.8	313.7	68.2	75.2	83.4	93.0	104.1
	13	445.4	420.2	394.5	367.9	340.3	68.9	75.8	83.9	93.3	104.4
	15	480.3	453.4	425.9	397.8	368.6	69.7	76.4	84.4	93.7	104.6
320	1	304.3	286.5	267.4	246.3	222.8	71.3	79.7	89.1	99.8	112.0
	3	330.8	311.9	291.8	269.9	245.7	71.7	80.0	89.4	100.1	112.3
	5	359.1	338.9	317.7	294.8	269.7	72.2	80.3	89.7	100.4	112.6
	7	389.3	367.7	345.1	321.1	294.9	72.7	80.7	90.0	100.6	112.8
	9	421.6	398.4	374.3	348.9	321.6	73.4	81.2	90.3	100.9	113.0
	11	456.1	431.1	405.4	378.5	349.8	74.1	81.7	90.7	101.2	113.3
	13	493.0	466.0	438.5	409.9	379.7	74.9	82.4	91.2	101.5	113.5
	15	532.3	503.3	473.8	443.4	411.5	75.9	83.1	91.7	101.9	113.8
380	1	371.3	346.7	321.5	295.9	269.9	90.0	100.0	111.8	125.7	142.0
	3	403.6	377.4	350.6	323.4	295.7	90.6	100.5	112.2	125.9	142.0
	5	437.8	410.0	381.6	352.6	323.1	91.3	101.0	112.6	126.1	142.0
	7	474.2	444.6	414.4	383.7	352.3	92.0	101.6	113.0	126.4	142.1
	9	512.8	481.4	449.3	416.7	383.4	92.8	102.3	113.5	126.8	142.3
	11	553.6	520.3	486.4	451.7	416.4	93.6	103.0	114.1	127.2	142.5
	13	596.9	561.6	525.6	488.9	451.5	94.5	103.8	114.8	127.7	142.8
	15	642.5	605.2	567.1	528.2	488.6	95.4	104.6	115.5	128.3	143.2
430	1	413.9	388.2	361.3	332.7	302.1	98.5	109.7	122.7	137.7	155.0
	3	449.9	422.6	394.2	364.1	332.1	99.1	110.2	123.1	138.0	155.2
	5	488.2	459.2	429.0	397.4	363.8	99.8	110.8	123.5	138.3	155.4
	7	529.1	498.1	466.1	432.6	397.4	100.6	111.4	124.0	138.7	155.6
	9	572.6	539.5	505.4	470.0	432.9	101.4	112.0	124.5	139.1	155.9
	11	618.9	583.5	547.3	509.7	470.6	102.4	112.8	125.1	139.5	156.2
	13	668.2	630.3	591.7	551.9	510.5	103.4	113.7	125.8	140.0	156.6
	15	720.5	680.0	638.9	596.6	552.9	104.6	114.6	126.5	140.6	157.0
500	1	456.4	429.8	401.1	369.5	334.3	107.0	119.5	133.6	149.7	168.0
	3	496.2	467.9	437.7	404.9	368.5	107.6	120.0	134.1	150.1	168.4
	5	538.6	508.4	476.5	442.1	404.5	108.3	120.5	134.5	150.5	168.8
	7	584.0	551.6	517.7	481.6	442.4	109.1	121.1	135.0	150.9	169.2
	9	632.4	597.6	561.5	523.4	482.4	110.0	121.8	135.5	151.3	169.6
	11	684.2	646.7	608.1	567.8	524.7	111.1	122.6	136.1	151.8	169.9
	13	739.5	699.1	657.8	614.9	569.6	112.4	123.5	136.8	152.3	170.3
	15	798.5	754.9	710.7	665.1	617.2	113.8	124.6	137.6	152.9	170.7

TU: Evaporator Outlet water temperature (°C)
 TA: Ambient temperature (°C)
 PA: Compressors input power (kW)
 PF: Cooling capacity (kW)

QLAC / HP / LS (LOW NOISE VERSION)



HEATING CAPACITIES AND COMPRESSOR INPUT POWER

MOD.	TA (°C)	PC (kW)						PA (kW)					
		TU (°C)						TU (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
040	-5	25,1	---	---	---	---	---	9,1	---	---	---	---	---
	0	30,3	29,8	---	---	---	---	9,2	10,2	---	---	---	---
	5	36,2	35,6	35,1	---	---	---	9,2	10,3	11,5	---	---	---
	8	40,2	39,4	38,8	38,5	---	---	9,1	10,2	11,5	12,9	---	---
	10	43,0	42,2	41,5	41,0	40,7	---	9,1	10,2	11,5	12,9	14,5	---
	15	51,1	49,8	48,8	48,0	47,5	---	9,0	10,1	11,4	12,9	14,6	---
	20	60,5	58,8	57,3	56,1	55,2	54,5	9,0	10,0	11,3	12,9	14,6	16,6
045	-5	32,1	---	---	---	---	---	11,0	---	---	---	---	---
	0	37,9	37,5	---	---	---	---	11,0	12,2	---	---	---	---
	5	44,8	44,1	43,5	---	---	---	11,0	12,3	13,7	---	---	---
	8	49,4	48,6	47,8	47,0	---	---	11,0	12,3	13,7	15,3	---	---
	10	52,8	51,8	50,9	50,2	49,6	---	11,0	12,3	13,7	15,3	17,1	---
	15	62,1	60,8	59,5	58,4	57,4	---	10,9	12,2	13,7	15,4	17,2	---
	20	73,0	71,2	69,5	67,9	66,5	65,2	10,9	12,2	13,7	15,4	17,2	19,3
050	-5	37,3	---	---	---	---	---	12,3	---	---	---	---	---
	0	44,2	43,6	---	---	---	---	12,5	14,0	---	---	---	---
	5	52,1	51,2	50,4	---	---	---	12,5	14,0	15,6	---	---	---
	8	57,4	56,4	55,4	55,0	---	---	12,5	14,0	15,6	17,4	---	---
	10	61,2	60,1	59,0	58,0	57,0	---	12,5	14,0	15,6	17,5	19,4	---
	15	71,8	70,2	68,8	67,4	66,2	---	12,3	13,9	15,6	17,6	19,7	---
	20	84,1	82,0	80,1	78,3	76,6	75,0	12,2	13,8	15,6	17,5	19,7	22,1
060	-5	42,3	---	---	---	---	---	13,7	---	---	---	---	---
	0	50,0	49,3	---	---	---	---	13,9	15,4	---	---	---	---
	5	59,0	58,0	57,1	---	---	---	14,0	15,6	17,4	---	---	---
	8	65,0	63,8	62,7	61,7	---	---	14,0	15,7	17,5	19,5	---	---
	10	69,3	68,0	66,7	65,6	64,6	---	14,0	15,7	17,6	19,6	21,9	---
	15	81,4	79,5	77,8	76,3	74,9	---	13,9	15,6	17,6	19,8	22,2	---
	20	95,5	93,0	90,7	88,6	86,7	84,9	13,9	15,6	17,6	19,8	22,3	25,0
070	-5	46,7	---	---	---	---	---	15,1	---	---	---	---	---
	0	55,2	54,5	---	---	---	---	15,4	17,1	---	---	---	---
	5	65,1	64,0	63,1	---	---	---	15,5	17,3	19,3	---	---	---
	8	71,8	70,4	69,2	68,2	---	---	15,5	17,3	19,4	21,7	---	---
	10	76,6	75,0	73,7	72,5	71,5	---	15,5	17,3	19,5	21,8	24,4	---
	15	90,0	87,8	85,9	84,2	82,7	---	15,5	17,4	19,5	22,0	24,7	---
	20	105,6	102,8	100,2	97,8	95,7	93,8	15,6	17,4	19,6	22,0	24,8	27,9
080	-5	56,3	---	---	---	---	---	18,4	---	---	---	---	---
	0	66,8	65,9	---	---	---	---	18,7	20,8	---	---	---	---
	5	78,6	77,5	76,5	---	---	---	18,7	21,0	23,5	---	---	---
	8	86,6	85,2	83,9	82,8	---	---	18,6	21,0	23,6	26,4	---	---
	10	92,3	90,7	89,2	88,0	86,8	---	18,6	20,9	23,6	26,5	29,7	---
	15	108,4	106,0	103,9	102,1	100,5	---	18,5	20,8	23,5	26,6	30,0	---
	20	127,3	124,0	121,0	118,3	116,0	113,9	18,7	20,8	23,4	26,5	30,0	33,8
090	-5	64,7	---	---	---	---	---	21,1	---	---	---	---	---
	0	76,5	75,5	---	---	---	---	21,3	23,8	---	---	---	---
	5	90,4	88,8	87,4	---	---	---	21,4	24,0	26,9	---	---	---
	8	99,8	97,8	96,0	94,5	---	---	21,4	24,0	27,0	30,3	---	---
	10	106,5	104,3	102,3	100,5	98,9	---	21,5	24,1	27,0	30,4	34,2	---
	15	125,4	122,4	119,6	117,1	114,8	---	21,5	24,1	27,1	30,5	34,4	---
	20	147,3	143,4	139,8	136,4	133,2	130,3	21,7	24,3	27,2	30,6	34,5	39,0
110	-5	73,4	---	---	---	---	---	23,9	---	---	---	---	---
	0	86,7	85,4	---	---	---	---	23,9	26,8	---	---	---	---
	5	102,7	100,6	98,8	---	---	---	24,1	26,9	30,3	---	---	---
	8	113,6	111,0	108,7	106,7	---	---	24,2	27,0	30,3	34,2	---	---
	10	121,4	118,6	115,9	113,5	111,5	---	24,3	27,2	30,4	34,2	38,7	---
	15	143,2	139,6	136,1	132,7	129,7	---	24,6	27,5	30,7	34,5	38,8	---
	20	168,2	163,9	159,5	155,2	151,1	147,4	24,8	27,8	31,1	34,8	39,1	44,1

TU: Outlet water temperature (°C)
TA: Ambient temperature dry bulb (°C)
PA: Compressors input power (kW)
PH: Heating capacity (kW)



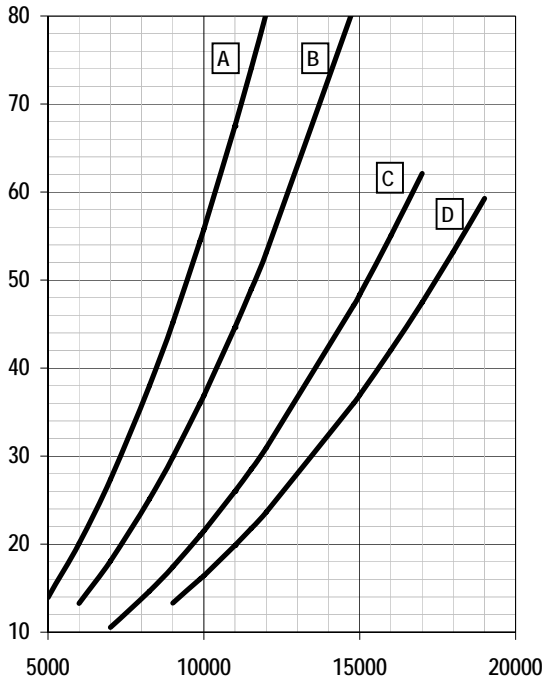
**QLAC / HP / LS (LOW NOISE VERSION)
HEATING CAPACITIES AND COMPRESSOR INPUT POWER**

MOD.	TA (°C)	PC (kW)						PA (kW)					
		TU (°C)						TU (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
120	-5	82,2	---	---	---	---	---	26,8	---	---	---	---	---
	0	97,9	96,1	---	---	---	---	26,8	30,2	---	---	---	---
	5	116,6	113,8	111,5	---	---	---	27,0	30,3	34,1	---	---	---
	8	129,3	126,0	123,0	120,4	---	---	27,2	30,4	34,2	38,6	---	---
	10	138,5	134,8	131,3	128,3	125,8	---	27,3	30,5	34,2	38,6	43,7	---
	15	164,1	159,3	154,7	150,4	146,7	---	27,7	30,8	34,5	38,7	43,7	---
	20	193,7	187,7	181,8	176,3	171,1	166,5	28,1	31,2	34,8	39,0	43,8	49,4
130	-5	89,5	---	---	---	---	---	29,6	---	---	---	---	---
	0	107,3	105,1	---	---	---	---	29,8	33,5	---	---	---	---
	5	128,2	124,9	122,2	---	---	---	30,0	33,6	38,0	---	---	---
	8	142,5	138,5	135,0	132,1	---	---	30,2	33,8	38,0	42,9	---	---
	10	152,8	148,3	144,2	140,8	138,1	---	30,3	33,9	38,0	42,9	48,6	---
	15	181,5	175,6	170,2	165,2	160,9	---	30,8	34,2	38,2	43,0	48,5	---
	20	215,0	207,5	200,4	193,8	187,9	182,6	31,3	34,6	38,6	43,2	48,5	54,7
140	-5	102,1	---	---	---	---	---	33,5	---	---	---	---	---
	0	120,8	119,3	---	---	---	---	34,1	37,9	---	---	---	---
	5	142,2	140,1	138,3	---	---	---	34,2	38,3	42,8	---	---	---
	8	156,7	154,1	151,7	149,7	---	---	34,1	38,3	43,0	48,2	---	---
	10	167,1	164,0	161,3	159,0	157,0	---	34,1	38,3	43,1	48,4	54,1	---
	15	196,2	191,8	187,9	184,5	181,5	---	34,0	38,2	43,0	48,6	54,7	---
	20	230,3	224,3	218,8	214,0	209,6	205,8	34,3	38,2	42,9	48,5	54,8	61,8
160	-5	112,0	---	---	---	---	---	36,7	---	---	---	---	---
	0	132,6	131,0	---	---	---	---	37,4	41,6	---	---	---	---
	5	156,1	153,9	152,0	---	---	---	37,4	42,0	47,0	---	---	---
	8	171,9	169,2	166,8	164,6	---	---	37,3	42,0	47,2	52,9	---	---
	10	183,3	180,1	177,3	174,8	172,6	---	37,1	41,9	47,2	53,1	59,4	---
	15	215,1	210,5	206,4	202,8	199,6	---	37,0	41,6	47,0	53,2	60,0	---
	20	252,7	246,1	240,2	235,0	230,5	226,4	37,4	41,6	46,8	52,9	59,9	67,7
190	-5	129,4	---	---	---	---	---	42,3	---	---	---	---	---
	0	153,1	150,9	---	---	---	---	42,6	47,6	---	---	---	---
	5	180,7	177,6	174,7	---	---	---	42,8	47,9	53,8	---	---	---
	8	199,5	195,6	192,1	189,0	---	---	42,9	48,0	54,0	60,7	---	---
	10	213,0	208,6	204,6	200,9	197,8	---	42,9	48,1	54,0	60,8	68,4	---
	15	250,8	244,8	239,3	234,1	229,5	---	43,1	48,3	54,2	61,1	68,8	---
	20	294,6	286,9	279,6	272,7	266,4	260,6	43,5	48,5	54,4	61,3	69,1	77,9
210	-5	149,4	---	---	---	---	---	47,8	---	---	---	---	---
	0	176,9	174,0	---	---	---	---	47,8	53,7	---	---	---	---
	5	209,6	205,2	201,3	---	---	---	48,1	53,8	60,6	---	---	---
	8	232,0	226,6	221,7	217,3	---	---	48,5	54,1	60,7	68,4	---	---
	10	248,1	242,1	236,5	231,4	227,0	---	48,7	54,3	60,8	68,5	77,5	---
	15	292,8	285,3	277,9	270,8	264,4	---	49,2	54,9	61,4	68,9	77,7	---
	20	344,3	335,1	326,0	316,9	308,4	300,4	49,6	55,5	62,1	69,6	78,2	88,1
240	-5	165,3	---	---	---	---	---	53,5	---	---	---	---	---
	0	197,1	193,4	---	---	---	---	53,7	60,4	---	---	---	---
	5	234,8	229,2	224,3	---	---	---	54,1	60,6	68,2	---	---	---
	8	260,5	253,7	247,6	242,4	---	---	54,4	60,8	68,3	77,2	---	---
	10	279,0	271,4	264,4	258,3	253,2	---	54,7	61,0	68,5	77,2	87,3	---
	15	330,7	320,8	311,5	302,9	295,2	---	55,4	61,7	68,9	77,4	87,3	---
	20	390,4	378,2	366,3	355,0	344,6	335,1	56,1	62,4	69,6	78,0	87,6	98,8
260	-5	181,2	---	---	---	---	---	59,3	---	---	---	---	---
	0	217,3	212,7	---	---	---	---	59,5	67,1	---	---	---	---
	5	259,9	253,1	247,4	---	---	---	60,0	67,3	75,9	---	---	---
	8	289,0	280,7	273,5	267,4	---	---	60,4	67,5	76,0	85,9	---	---
	10	310,0	300,7	292,3	285,1	279,3	---	60,7	67,7	76,1	85,8	97,2	---
	15	368,5	356,4	345,1	334,9	326,0	---	61,6	68,4	76,5	85,9	97,0	---
	20	436,5	421,2	406,7	393,1	380,8	369,8	62,7	69,3	77,1	86,3	97,0	109,4

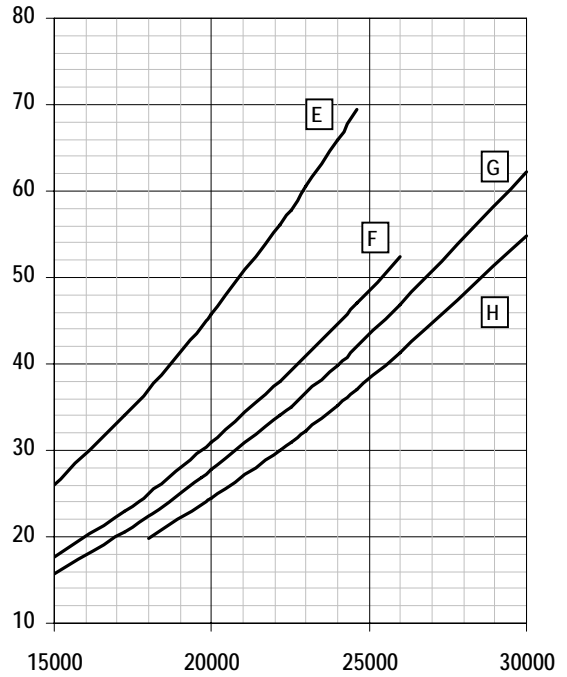
TU: Outlet water temperature (°C)
 TA: Ambient temperature dry bulb (°C)
 PA: Compressors input power (kW)
 PH: Heating capacity (kW)



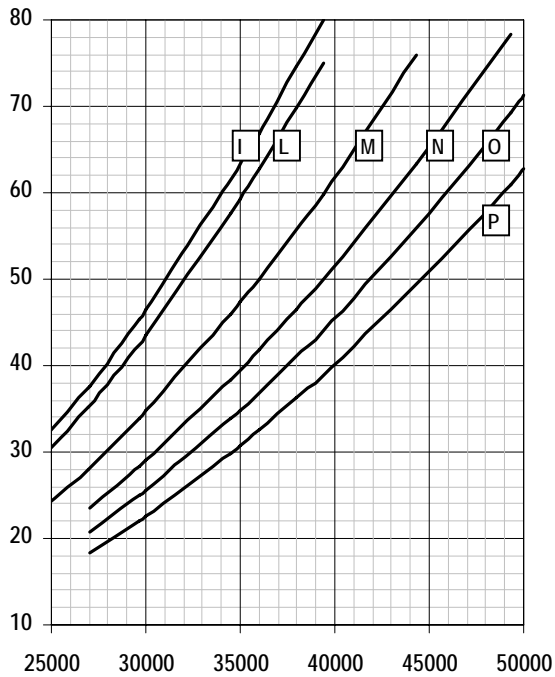
EVAPORATOR PRESSURE DROPS



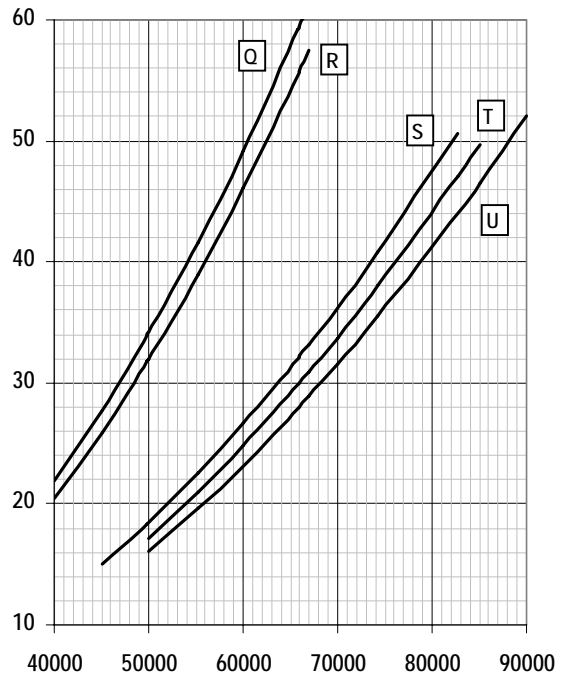
A: QLAC 040-045
B: QLAC 050
C: QLAC 060-070
D: QLAC 080



E: QLAC 090
F: QLAC 110
G: QLAC 120
H: QLAC 130



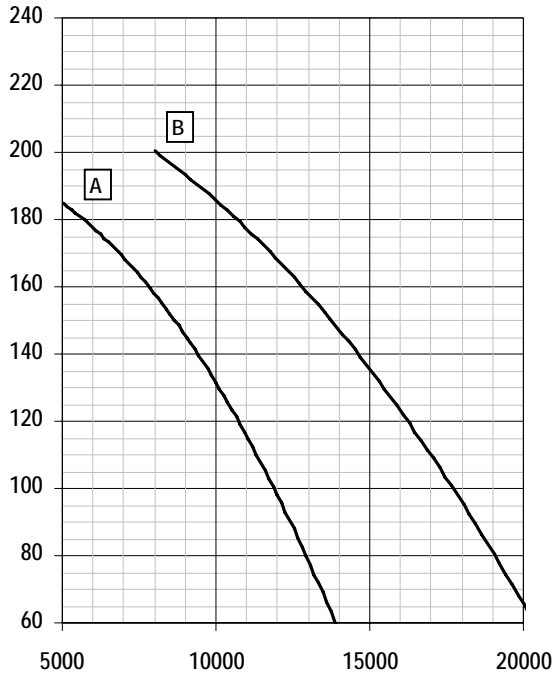
I: QLAC 140
L: QLAC 160
M: QLAC 190
N: QLAC 210
O: QLAC 240
P: QLAC 260



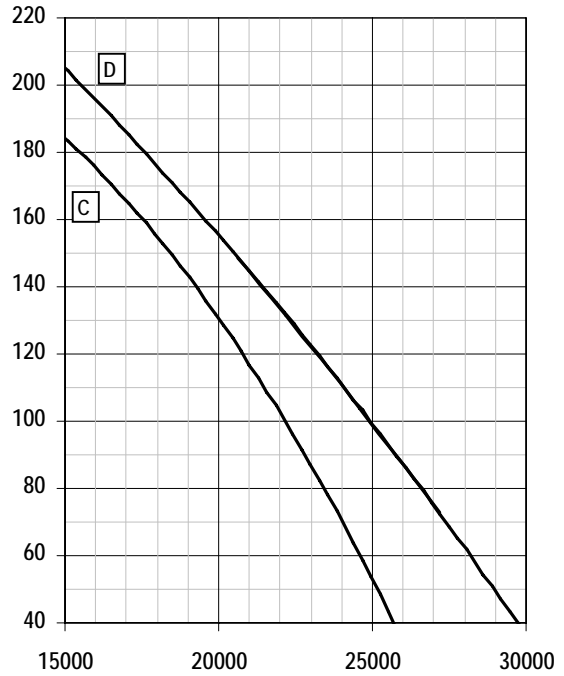
Q: QLAC 300
R: QLAC 320
S: QLAC 380
T: QLAC 430
U: QLAC 500



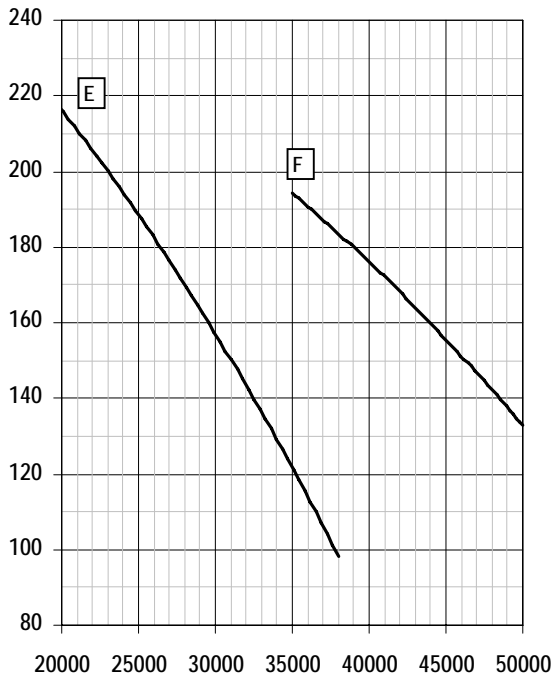
WATER PUMPS AVAILABLE STATIC PRESSURE



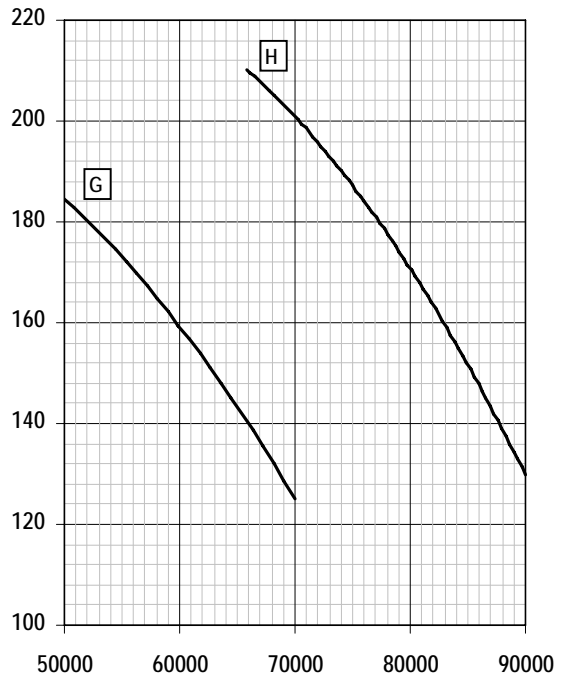
A: QLAC 040,045,050,060,070
B: QLAC 080, 090



C: QLAC 110, 120
D: QLAC 130, 140



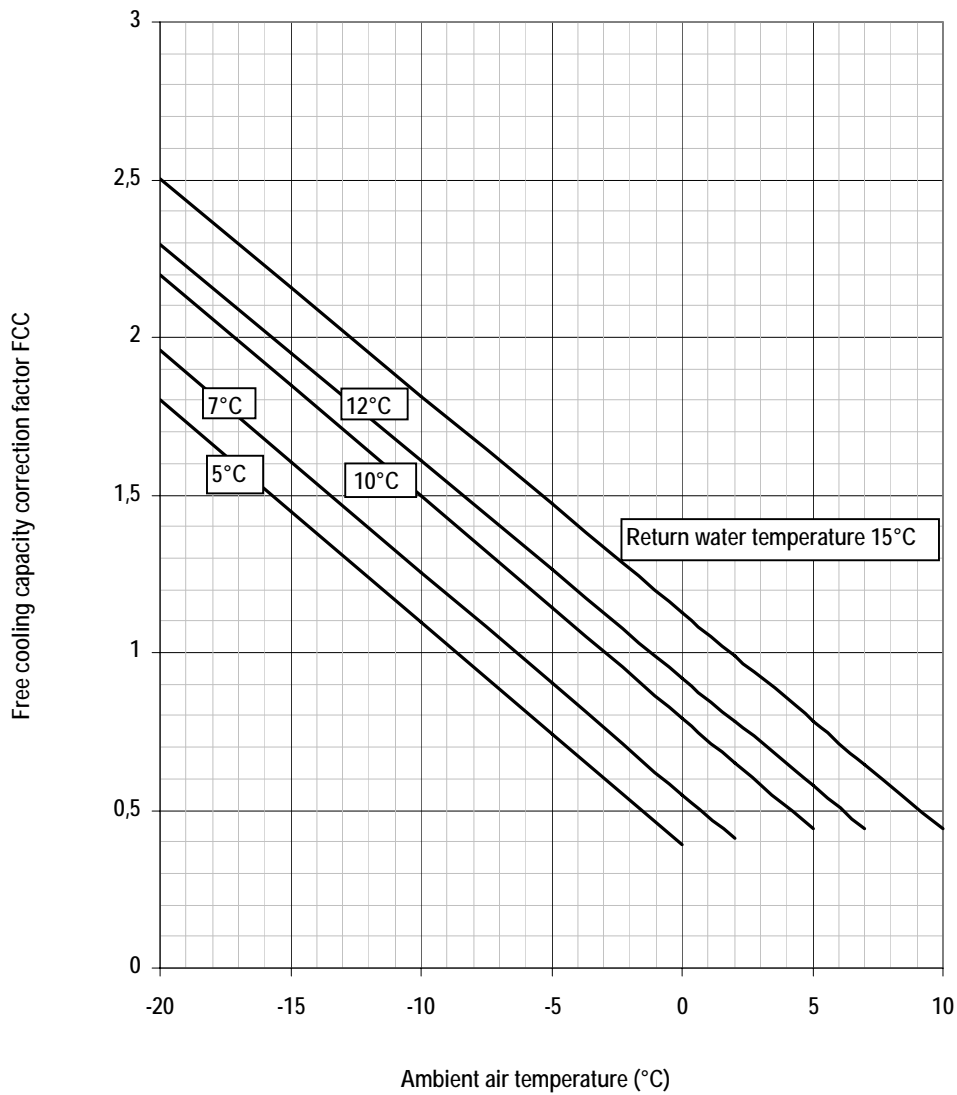
E: QLAC 160,190,210
F: QLAC 240, 260



G: QLAC 300, 320
H: QLAC 380, 430, 500



FREE COOLING CAPACITY



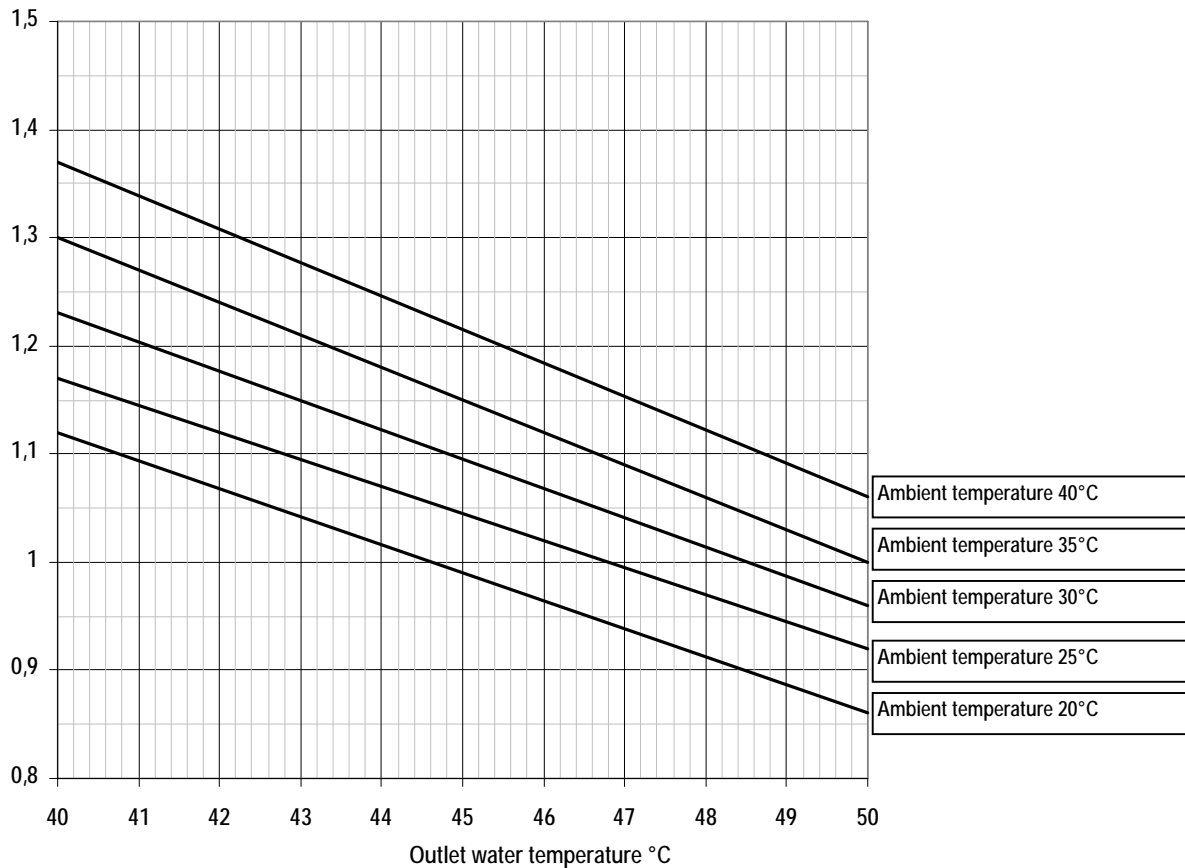
Mod.		040	045	050	060	070	080	090	110
Nominal Free cooling capacity	kW	---	---	43	43	43	45	70	72
Mod.		120	130	140	160	190	210	240	260
Nominal Free cooling capacity	kW	72	72	94	94	110	115	135	135
Mod.		300	320	380	430	500			
Nominal Free cooling capacity	kW	185	185	235	245	240			

The nominal Free Cooling capacity is obtained when all compressors are OFF, the return water temperature from the system is 15°C and the ambient temperature is 2°C. To calculate the free cooling capacity in different conditions please refer to the above diagram. To obtain free cooling duty multiply the nominal Free Cooling capacity by the CFC factor obtained.

PARTIAL HEAT RECOVERY CAPACITY

Mod.		040	045	050	060	070	080	090	110
Partial heat recovery nominal capacity	kW	9,5	12,8	13,0	15,0	15,3	18,5	21,5	24,8
Water flow	l/h	1635	2200	2240	2580	2630	3190	3700	4270
Water pressure drops	kPa	10	14	11	15	16	18	11	15
Mod.		120	130	140	160	190	210	240	260
Partial heat recovery nominal capacity	kW	27,5	30,0	34,0	37,0	43,0	49,0	55,0	61,5
Water flow	l/h	4730	5160	5850	6360	7400	8430	9460	10570
Water pressure drops	kPa	13	18	18	25	11	15	19	25
Mod.		300	320	380	430	500			
Partial heat recovery nominal capacity	kW	69,0	76,0	91,5	102,8	114			
Water flow	l/h	11850	13000	15750	17700	19600			
Water pressure drops	kPa	20	25	25	29	35			

The nominal value refers to an ambient temperature 35°C and outlet water temperature 50°C (Dt 5°C).



The heat recovery capacity in different conditions can be obtained multiplying the nominal capacity (See above), by the correction factor indicated in the table.



Warning Partial heat recovery can only work in cooling mode. In the heat pump version it is necessary to isolate the heat recovery circuit when in heating mode to prevent damage. Failure to comply with this will invalidate the warranty.



COMPRESSORS CAPACITY STEP CONTROLS

Mod.	Number of compressors					
	1	2	3	4	5	6
040	50%	50%				
045	50%	50%				
050	50%	50%				
060	44%	56%				
070	50%	50%				
080	50%	50%				
090	43%	57%				
110	50%	50%				
120	45%	55%				
130	50%	50%				
140	22,5%	22,5%	27,5%	27,5%		
160	25%	25%	25%	25%		
190	21,5%	21,5%	28,5%	28,5%		
210	25%	25%	25%	25%		
240	22,5%	22,5%	27,5%	27,5%		
260	25%	25%	25%	25%		
300	22%	22%	28%	28%		
320	25%	25%	25%	25%		
380	16,66%	16,66%	16,66%	16,66%	16,66%	16,66%
430	14,66%	14,66%	14,66%	18,66%	18,66%	18,66%
500	16,66%	16,66%	16,66%	16,66%	16,66%	16,66%

CORRECTION TABLE Operation with glycol

Water temp.	Glycol	WFCF	PDCF
7	10%	1,012	1,125
	20%	1,048	1,32
	35%	1,109	1,62
3	10%	0,870	0,85
	20%	0,875	0,92
	35%	0,925	1,13
-2	10%	0,710	0,64
	20%	0,730	0,85
	35%	0,770	1,05
-5	10%	---	---
	20%	0,600	0,56
	35%	0,625	0,7

WFCF = Water flow correction factor PDCF = Pressure drop correction factor

The water flow rate and pressure drop correction factors are to be applied directly to the values given for operation without glycol. The water flow rate correction factor is calculated in order to maintain the same temperature difference as that which would be obtained without glycol. The pressure drop correction factor takes into account the different flow rate obtained from the application of the flow rate correction factor. When the new flow rate is determined the capacity can be calculated using the formula $Q=4.19m \Delta T$, where Q is the duty in kw, m is the flow rate in kg/s and ΔT is the fluid temperature difference.

CORRECTION TABLES Different DT

Water temperature difference	3	5	8
CCCP	0,99	1	1,02
IPCF	0,99	1	1,01

CCCP = Cooling capacity correction factor IPCF = Input power correction factor

CORRECTION TABLES Different Fouling factors

Fouling factor	0,00005	0,0001	0,0002
CCCP	1	0,98	0,94
IPCF	1	0,98	0,95

CCCP = Cooling capacity correction factor IPCF = Input power correction factor



ELECTRICAL DATA

Model		040	045	050	060	070	080	090	110
Power line fuses	A	50	63	63	80	100	100	125	125
Power line cable section	mm ²	10	10	16	16	25	25	25	35
Model		120	130	140	160	190	210	240	260
Power line fuses	A	160	200	200	200	250	250	350	400
Power line cable section	mm ²	50	50	50	50	70	95	120	150

Power supply	V/~ /Hz	400 / 3 / 50		Control board	V/~ /Hz	24 / 1 / 50
Auxiliary circuit	V/~ /Hz	230 / 1 / 50		Fans power supply	V/~ /Hz	400 / 3 / 50

Electrical data varies depending on specification. Always refer to the wiring diagram supplied in the unit.

SOUND LEVELS LOW NOISE VERSION											
Model	Octave bands (Hz)								Lw		Lp
	63 dB	125 dB	250 dB	500 dB	1K dB	2K dB	4K dB	8K dB	dB	dB(A)	dB(A)
040/LS	90.1	91.3	75.2	73.3	72.6	67.2	63.8	54.7	90.9	77.0	49
045/LS	90.1	91.3	75.2	73.3	72.6	67.2	63.8	54.7	90.9	77.0	49
050/LS	92.1	83.3	77.2	75.7	74.6	69.2	65.8	56.7	92.9	79.0	51
060/LS	92.1	83.3	77.2	75.7	74.6	69.2	65.8	56.7	92.9	79.0	51
070/LS	93.1	84.3	78.2	76.7	75.6	70.2	66.8	57.7	93.9	80.0	52
080/LS	93.1	84.3	78.2	76.7	75.6	70.2	66.8	57.7	93.9	80.0	52
090/LS	95.1	86.3	80.2	78.7	77.6	72.2	68.8	59.7	95.9	82.0	54
110/LS	95.6	86.8	80.7	79.2	78.1	72.7	69.3	60.2	96.4	82.5	54.5
120/LS	96.0	87.2	81.1	79.6	78.5	73.1	69.7	60.6	96.8	82.9	54.9
130/LS	96.2	87.4	81.3	79.8	78.7	73.3	69.9	60.8	97.0	83.1	55.1
140/LS	96.6	87.8	81.7	80.2	79.1	73.7	70.3	61.2	97.4	83.5	55.5
160/LS	97.1	88.3	82.2	80.7	79.6	74.2	70.8	61.7	98.0	84.0	56
190/LS	99.1	90.3	84.2	82.7	81.6	76.2	72.8	63.7	99.9	86.0	58
210/LS	99.1	90.3	84.2	82.7	81.6	76.2	72.8	63.7	99.9	86.0	58
240/LS	102.1	93.3	87.2	85.7	84.6	79.2	75.8	66.7	102.9	89.0	61
260/LS	102.1	93.3	87.2	85.7	84.6	79.2	75.8	66.7	102.9	89.0	61
300/LS	103.1	94.3	88.2	86.7	85.6	80.2	76.8	67.7	103.9	90.0	62
320/LS	103.1	94.3	88.2	86.7	85.6	80.2	76.8	67.7	103.9	90.0	62
380/LS	104.1	95.3	89.2	87.7	86.6	81.2	77.8	68.7	104.9	91.0	63
430/LS	104.1	95.3	89.2	87.7	86.6	81.2	77.8	68.7	104.9	91.0	63
500/LS	104.1	95.3	89.2	87.7	86.6	81.2	77.8	68.7	104.9	91.0	63

SOUND LEVELS EXTRA LOW NOISE VERSION											
Model	Octave bands (Hz)								Lw		Lp
	63 dB	125 dB	250 dB	500 dB	1K dB	2K dB	4K dB	8K dB	dB	dB(A)	dB(A)
040/XL	---	---	---	---	---	---	---	---	---	---	---
045/XL	---	---	---	---	---	---	---	---	---	---	---
050/XL	89.1	80.3	74.2	72.7	71.6	66.2	62.2	53.7	89.9	76.0	48
060/XL	89.1	80.3	74.2	72.7	71.6	66.2	62.2	53.7	89.9	76.0	48
070/XL	91.1	82.3	76.2	74.7	73.6	68.2	64.8	55.7	91.9	78.0	50
080/XL	91.1	82.3	76.2	74.7	73.6	68.2	64.8	55.7	91.9	78.0	50
090/XL	92.6	83.8	77.7	76.2	75.1	69.7	66.3	57.2	93.4	79.5	51.5
110/XL	93.0	84.2	78.1	76.6	75.5	70.1	66.7	57.6	93.8	79.9	51.9
120/XL	93.2	84.4	78.3	76.8	75.7	70.3	66.9	57.8	94.0	80.1	52.1
130/XL	93.6	84.8	78.7	77.2	76.1	70.7	67.3	58.2	94.4	80.5	52.5
140/XL	94.1	85.3	79.2	77.7	76.6	71.2	67.8	58.7	95.0	81.0	53
160/XL	94.4	85.6	79.5	78.0	76.9	71.5	68.1	59.0	95.3	81.3	53.3
190/XL	97.1	88.3	82.2	80.7	79.6	74.2	70.8	61.7	98.0	84.0	58
210/XL	97.1	88.3	82.2	80.7	79.6	74.2	70.8	61.7	98.0	84.0	58
240/XL	---	---	---	---	---	---	---	---	---	---	---
260/XL	---	---	---	---	---	---	---	---	---	---	---
300/XL	---	---	---	---	---	---	---	---	---	---	---
320/XL	---	---	---	---	---	---	---	---	---	---	---
380/XL	---	---	---	---	---	---	---	---	---	---	---
430/XL	---	---	---	---	---	---	---	---	---	---	---
500/XL	---	---	---	---	---	---	---	---	---	---	---

--- (not available)

Lw – Sound power level according to ISO 3746.

Lp – Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q = 2 according to ISO 3746.

Installation Instructions – General

- When installing or servicing the unit, you must follow the instructions given in this manual and on labels attached to the unit.
- As the chiller is charged with refrigerant under pressure and unauthorised access to the electrical components provides a shock hazard, any work performed on the unit must be **by suitably trained personnel** only.
- Failure to observe the instructions provided in this manual, or any modification of the unit without explicit previous authorisation, will invalidate the warranty.

Attention: before servicing the unit ensure that the electric supply is disconnected.

Inspection

After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage must be reported to the carrier and be recorded on the Delivery Note before it is signed. TEV Ltd must be informed, within 8 days, of the extent of the damage. The customer should prepare a written statement of any severe damage: digital photos of any damage is useful.

Lifting and site handling

When unloading the unit, care **must** be taken to prevent damage to the refrigerant circuit, condensing coils or unit casing.

When using a crane, pass bars through the base frame lifting holes (marked with yellow arrows) and attach the cable or chains to these bars. Ensure that they are clamped firmly. Protect the sides of the chiller with boarding or material of a similar nature.

Forklift forks must be inserted in the base pallet: care must be taken to prevent them hitting the base or panels. Keep the unit horizontal to avoid damage to the internal components.

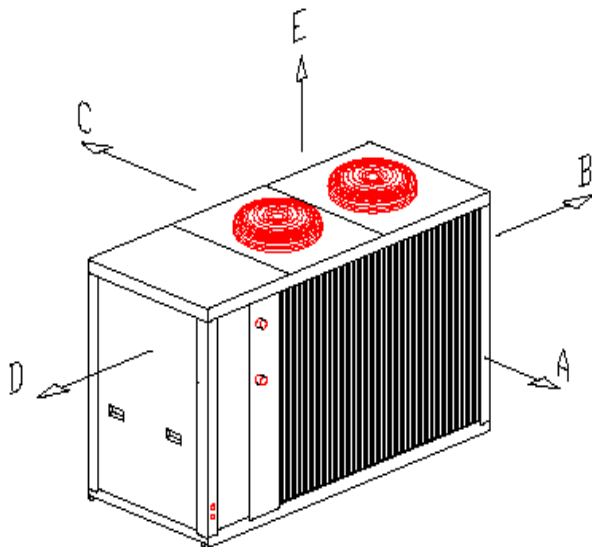
IMPORTANT: be sure that the method of lifting does not allow the unit to slip from chains or slings, turn over or slide from lifting devices.

Unpacking

When unpacking, be careful not to damage the unit. The packing is made up of different materials: wood, cardboard, polythene etc. We recommend that they are sent to a re-cycling centre in order to reduce their environmental impact.

LOCATION AND MINIMUM CLEARANCES

QLAC units are designed for external installation. Any overhang or cover above the unit should be avoided as this can cause air re-circulation. It is advisable to create a firm base for the unit, with a size similar to unit foot-print. Normal unit vibration levels are very low: it is good practice, however, to fit a rigid rubber interface between base and unit frame. Where desirable, fit anti-vibration mounts (spring or rubber), to keep vibration to a minimum. For future maintenance, these clearances are recommended:-



Mod.	A	B	C	D	E
040	1000	800	800	800	3000
045	1000	800	800	800	3000
050	1500	800	800	800	3000
060	1500	800	800	800	3000
070	1500	800	800	800	3000
080	1500	800	800	800	3000
090	1500	1000	1000	1000	3000
110	1500	1000	1000	1000	3000
120	1500	1000	1000	1000	3000
130	1500	1000	1000	1000	3000
140	1500	1000	1000	1000	4000
160	1500	1000	1000	1000	4000
190	2000	1000	1000	1000	4000
210	2000	1000	1000	1000	4000
240	2000	1000	1000	1000	4000
260	2000	1000	1000	1000	4000
300	2000	1000	2000	2000	5000
320	2000	1000	2000	2000	5000
380	2000	1000	2000	2000	5000
430	2000	1000	2000	2000	5000
500	2000	1000	2000	2000	5000

Warning: The unit should be installed such that there is suitable access for maintenance and/or repair.

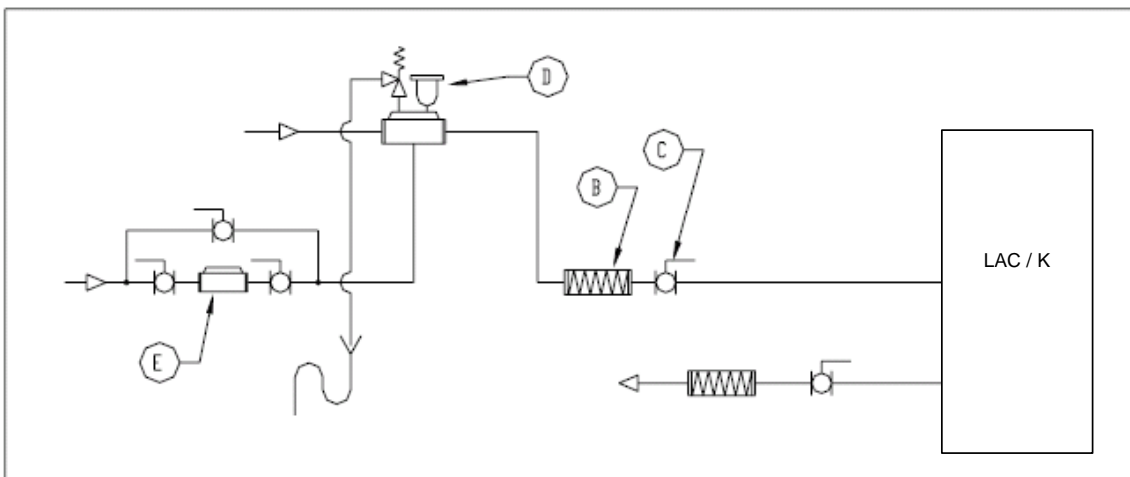
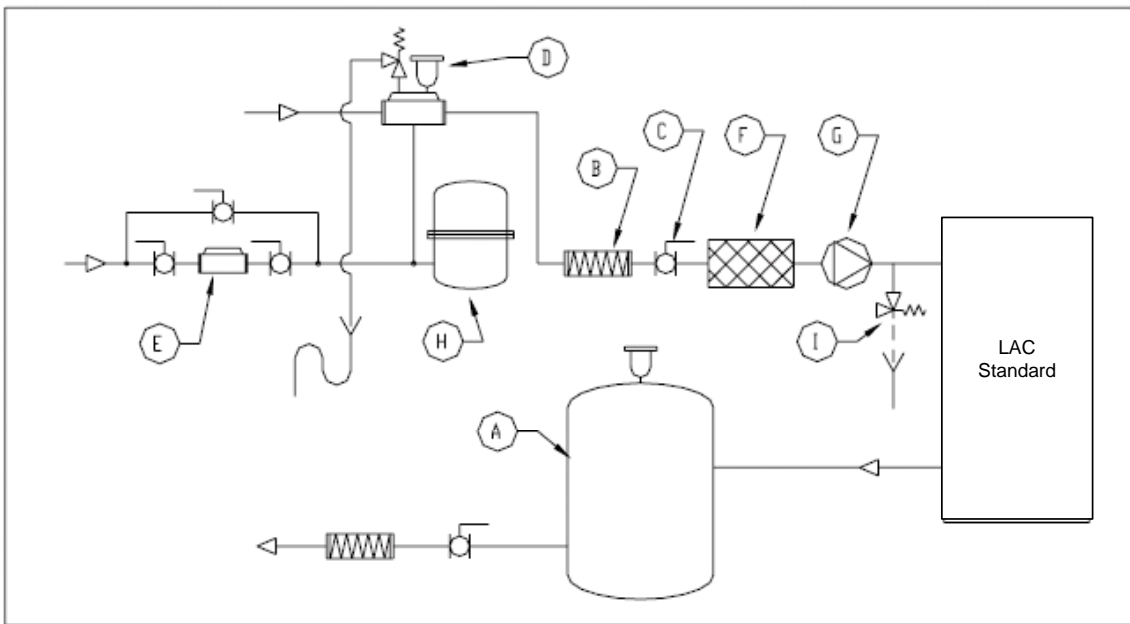
HYDRAULIC CONNECTIONS

Unit water pipe-work must be installed in accordance with national and local regulations. Pipes can be steel, galvanized steel, copper or PVC. Pipes have to be designed depending on the nominal water flow and the hydraulic pressure drops of the system. All pipes must be insulated with closed-cell material of adequate thickness. The chiller must be connected to the pipework using flexible joints. Piping should include:

- Temperature and pressure gauges for maintenance or servicing operations.
- Manual shut-off valves to separate the unit from the hydraulic circuit.
- Metallic supply water filter to be sited at the inlet pipe, with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.

The water inlet must correspond with the connection labelled "USER WATER INLET", otherwise the evaporator may freeze.

You must fit a metallic filter with a mesh not larger than 1 mm at the 'USER WATER INLET' connection. If the flow switch is altered or the water filter is not fitted, the warranty will be invalidated. All units are supplied with flow switch, on 'K' versions it is factory installed, on standard versions it is supplied loose. The flow switch **MUST be installed on the water outlet pipe. Please refer to the wiring diagram for the flow switch electrical connections**



A	Water tank	F	Water strainer
B	Flexible connection	G	Water pump
C	Ball shut-off valve	H	Expansion vessel
D	Vent valve	I	Safety valve
E	System filling group		



(QLAC / FC FREE COOLING VERSION)
FREE COOLING SYSTEMS MUST ALWAYS BE FILLED WITH GLYCOL SOLUTION

The free cooling versions can operate in 3 different operating modes. The free-cooling coil is installed in series with the water chiller evaporator; the 3 way valve controls the water flow through the coil. When the ambient temperature is lower than the return water temperature, the microprocessor allows the water flow to pass through the free-cooling coil first, then through the evaporator.

Cooling mode (Summer operation) Ambient temperature is higher than the return water temperature. In this case, the ambient conditions are not suitable to allow Free Cooling operation; the 3 way valve is closed and the water flows to the evaporator, where it is cooled. The compressors, fans, and the water pump are activated; the unit operates like a normal liquid cooler.

Free cooling mode (Winter operation) Ambient temperature is much lower than the return water temperature. In this case, the ambient conditions are suitable to allow Free Cooling operation; the 3 way valve opens and the water flows into the free cooling coil, where the ambient conditions are sufficient to give the total required load. In this case the pump and the fans are in operation, while the compressors are stopped. In this case, the free cooling system works in substitution of the water chiller.

Cooling mode + Free cooling (Mid-season operation) Ambient temperature is lower than the return water temperature. In this case, the ambient conditions are suitable to allow Free Cooling operation; the 3 way valve opens and water flow passes into the free cooling coil although the ambient conditions are not sufficiently low to give the total required load. The microprocessor control activates the compressors (pump and fans are already in operation) to satisfy the required load. In this case the free cooling system works in conjunction with the water chiller. In these circumstances the head pressure control device is activated.

CONDENSING PRESSURE CONTROL (optional)

If unit operation below 20°C is expected, a condensing pressure control must be fitted in the unit. This device will allow unit operation under low ambient temperature, by reducing condenser air flow and obtaining acceptable operating parameters. This device modulates the fan speed in proportion to the condensing pressure measured by the pressure transducer.

This device is factory pre-set. The values must never be modified.

OPERATIONAL LIMITS

Evaporator water flow rate

The nominal water flow rates are based on a delta T ($W_{in} - W_{out}$) of 5 °C. The maximum flow rate allowed is that achieved with a delta T of 3 °C: higher values may cause too high pressure drop. The minimum water flow rate allowed is that achieved with a delta T of 8 °C. Insufficient values cause too low evaporating temperatures, tripping safety devices which stop the unit.

Chilled water temperature (summer operation)

The minimum temperature allowed at the evaporator outlet is 5 °C. To work below this limit, the unit requires modification - please contact TEV Ltd. The maximum temperature allowed at the evaporator inlet is 20 °C.

Hot water temperature (winter operation)

Once the system is at temperature, the water temperature at the condenser inlet should not be less than 23 °C: lower values could cause incorrect working operation of the compressor and compressor failure may occur. The maximum water temperature at the condenser outlet should not exceed 48 °C: higher values will cause safety devices to trip and stop operation.

Ambient air temperature

The units are designed and manufactured to operate, in cooling, with ambient air temperature between 20°C to 42 °C. If a fan speed control is installed then the minimum ambient air temperature is -10°C. In winter operation (heat pump cycle) operates from -5°C to 20°C.



ELECTRICAL CONNECTIONS

**Disconnect the electrical supply before undertaking any work on the unit.
All electrical work must be undertaken by suitably qualified personnel.**

The electrical supply must match the nominal electrical data (voltage, phase, frequency) shown on the label in the front panel of the unit. Power connections must be made in accordance to the wiring diagram enclosed with the unit and in accordance current local and national regulations. Power cable and line protection must be sized according to the specification stated on the wiring diagram enclosed with the unit.

The variation in line voltage must not be more than $\pm 5\%$ of the nominal value, whilst the voltage imbalance between phases must not exceed 2%. If those tolerances are likely to be exceeded, please contact TEV Ltd., as further protection devices are required.

Electrical supply must be as described, otherwise warranty will be invalid.

START UP

Before start-up

- Check that all power cables are connected in the correct sequence and that all terminals are tight.
- The voltage measured at the R Y B phase clamps must be $400\text{ V} \pm 5\%$ (or the value given on the rating plate for special voltages). If the voltage is incorrect, **do not proceed**.
- Check for any refrigerant leaks using a leak detector. Should a leak be found **do not proceed**. All leaks must be rectified and the unit re-charged by trained personnel.
- Check that the crankcase heaters are energised.

Crankcase heaters must be energised at least 12 hours before start up by switching on the unit at the main switch.

- Verify that heaters are working correctly. After a short warm up period, the compressor crankcase must be warm to the touch and must have a temperature at least 10K higher than ambient temperature.
- Check that all hydraulic connections have been made correctly and that all information given on the unit's labels have been observed.
- The system must be filled with water and bled to eliminate any air.

Caution: before starting the unit up, check that all cover panels are correctly located and securely fastened.

Start up

Please refer to the microprocessor manual enclosed with the unit.

If the unit fails to start:

- Check that the control thermostat is set to the correct value.
- **Do not modify any internal wiring, otherwise warranty will be invalidated.**

Controls during unit operation

- Check the rotation of the fans. If the rotation is incorrect, disconnect the main switch and change over any two phases of the incoming main supply to reverse motor rotation:
- Check that water temperature at evaporator inlet is near to the set point of the control thermostat.
- For "K" version units (units with pumps and storage tank) if the motor driven pump is noisy, slowly close the discharge shut-off valve until normal working conditions are restored.
This trouble may occur when system pressure drop is significantly different from pump available pressure.



Refrigerant charge checking

- A few minutes after start up, working on cooling operating mode, check that condensing temperature, is approximately 15 °C higher than condenser inlet air temperature. Also check that the evaporation temperature is about 5 °C lower than the evaporator outlet temperature.
- When the unit has stabilised, check that the sight glass core shows green: if the core is yellow, moisture is present in the circuit. In this case it is necessary to dehydrate the circuit (qualified personnel only). Check at the sight glass that there are no continuous vapour bubbles present. If so, additional refrigerant charge may be required. (A few vapour bubbles are acceptable).
- Check that refrigerant superheat on the evaporator is about 5-7 °C
- Check if refrigerant sub-cooling on the condenser is about 5-7 °C.

Unit switch OFF

Please refer to the microprocessor manual enclosed with the unit.

Caution: For temporary stops (night time, weekend etc.) never switch off the unit by opening the mains switch: this should only be used to disconnect the unit from the power supply when current is not passing through it, i.e. when the unit is in 'OFF' mode. Additionally, with no supply to the crankcase heater, the compressor could be seriously damaged at unit start up.

CONTROL AND SAFETY DEVICE SETTINGS

Control devices - factory settings

CAPACITY STEPS		2		4	
CONTROL DEVICE		Set-point	Differential	Set point	Differential
Control thermostat (cooling)	°C	10	2	9	3
Control thermostat (heating)	°C	42	2	43	3

Safety devices - factory settings

CONTROL DEVICE		SET POINT	DIFFERENTIAL	RESET TYPE
Anti-freeze thermostat	°C	4	6	Manual
Electric heater thermostat	°C	4	6	Manual
High pressure switch	bar	28	7	Manual
Low pressure switch	bar	0,7	1	Manual
End defrosting pressure	bar	18	--	Automatic
Defrosting set-point	bar	16	2	Automatic
Water safety valve (Optional)	bar	6	--	--



MAINTENANCE AND PERIODIC CHECKS

All maintenance and service operations **MUST BE CARRIED OUT BY TRAINED PERSONNEL.**

Disconnect the electrical supply before undertaking any work on the unit. (Any servicing performed when the supply is connected will need a suitable risk assessment).

The compressor casing and discharge line of the compressor are usually hot. Care should be taken when working in this area. Aluminium coil fins are very sharp and can cause serious wounds. Care should be taken when working in this area. After any servicing operation ensure that all covers are replaced and fastened with their locking screws.

It is strongly recommended that regular maintenance checks are performed to maintain correct operation of the unit:-

Every three months:

- Check that safety and control devices work correctly as previously described.
- Check all the terminals on the electric board and on the compressor are tight. Periodic cleaning of the terminals of the contactors should be done: if any damage is found, please replace the contactors.

- Verify refrigerant charge by checking the sight glass.
- Check that there is no oil leakage from the compressor.
- Check that there is no water leakage from the hydraulic system.

- If the unit is to be stopped for a long period, the unit hydraulic circuit, including all internal pipework and heat exchanger, should be emptied. This operation is compulsory if, during a seasonal shutdown, the ambient temperature is expected to go below the freezing point of the fluid in the hydraulic circuit (typical seasonal operation).
- Check hydraulic circuit water level.
- Check the flow switch operation .

- Check the compressor crankcase heater power supply and operation.
- Check defrosting procedure.

- Clean drain pan and pipeline.
- Clean mesh on water strainers.
- Clean the finned coils metallic filters with compressed air. This should be in the opposite direction of the normal air flow. If filters become fully clogged, clean them with a water jet.

Every six months:

- Check the colour of the sight glass core (green = no moisture, yellow = moisture present).
If it is yellow, the refrigerant circuit should be dehydrated and the refrigerant filter/drier changed.
- Check the unit noise level.
- Check mounting of fan blades and their balancing, check the tension and the wear of the belt.

REFRIGERANT CIRCUIT REPAIR

If the refrigerant circuits need to be evacuated,, all the refrigerant must be recovered using suitable equipment. The system must be charged with nitrogen, using a gas bottle with a pressure reducing valve, until 15 bar pressure is reached. Search for leaks with a bubble leak finder. If bubbles appear, discharge the circuit before repairing by brazing with a suitable braze alloy. **Never use oxygen instead of nitrogen: explosions may occur.**



Environmental Protection

European legislation regarding the use of ozone depleting substances forbids the release of refrigerants to the atmosphere. They must be reclaimed and returned to the vendor, or to authorised re-cyclers at the end of their operating life.

R407C refrigerant is deemed to be a controlled substance and is therefore subject to this legislation.

Particular care is required during servicing operations in order to prevent refrigerant loss.

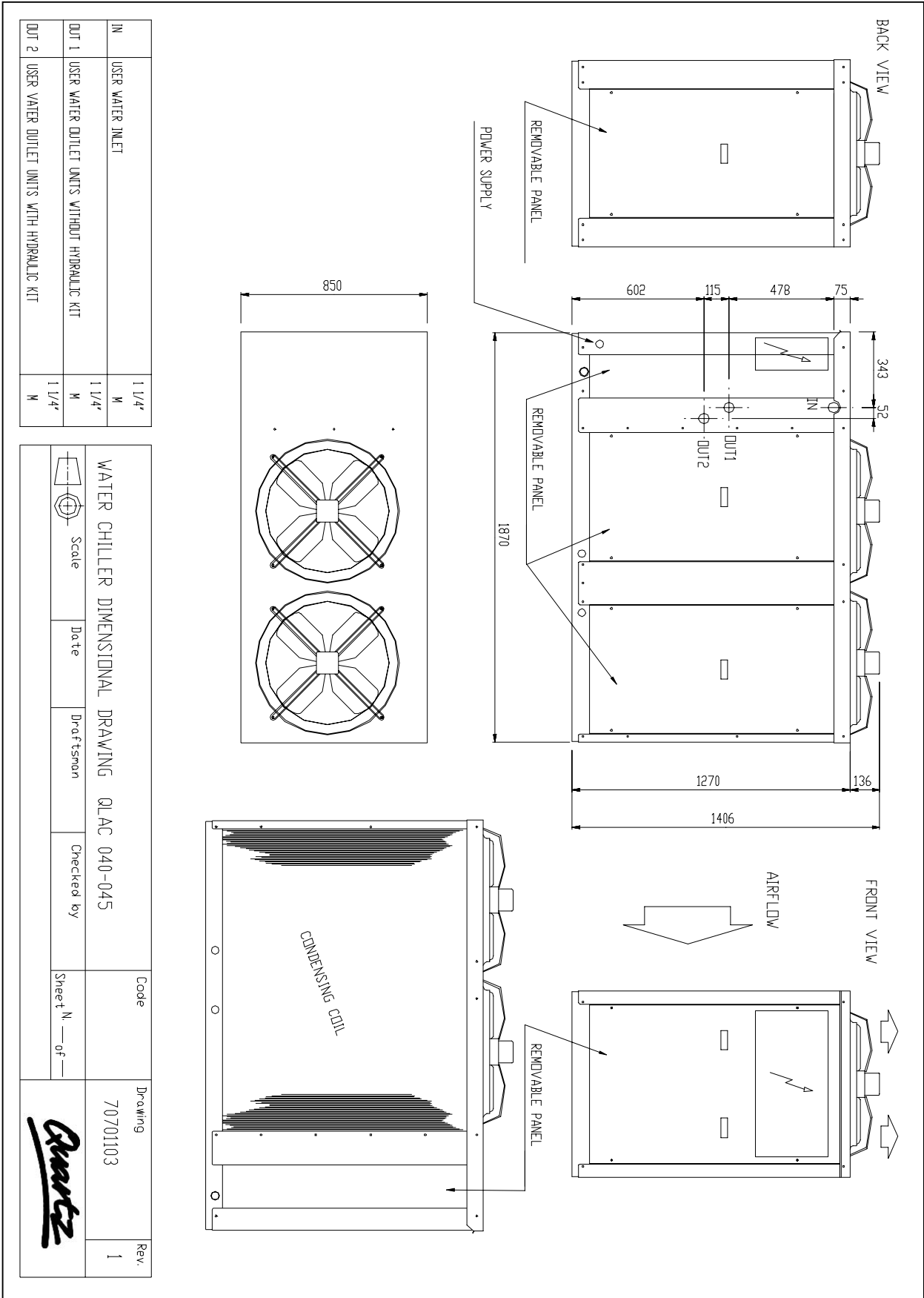
De-commissioning

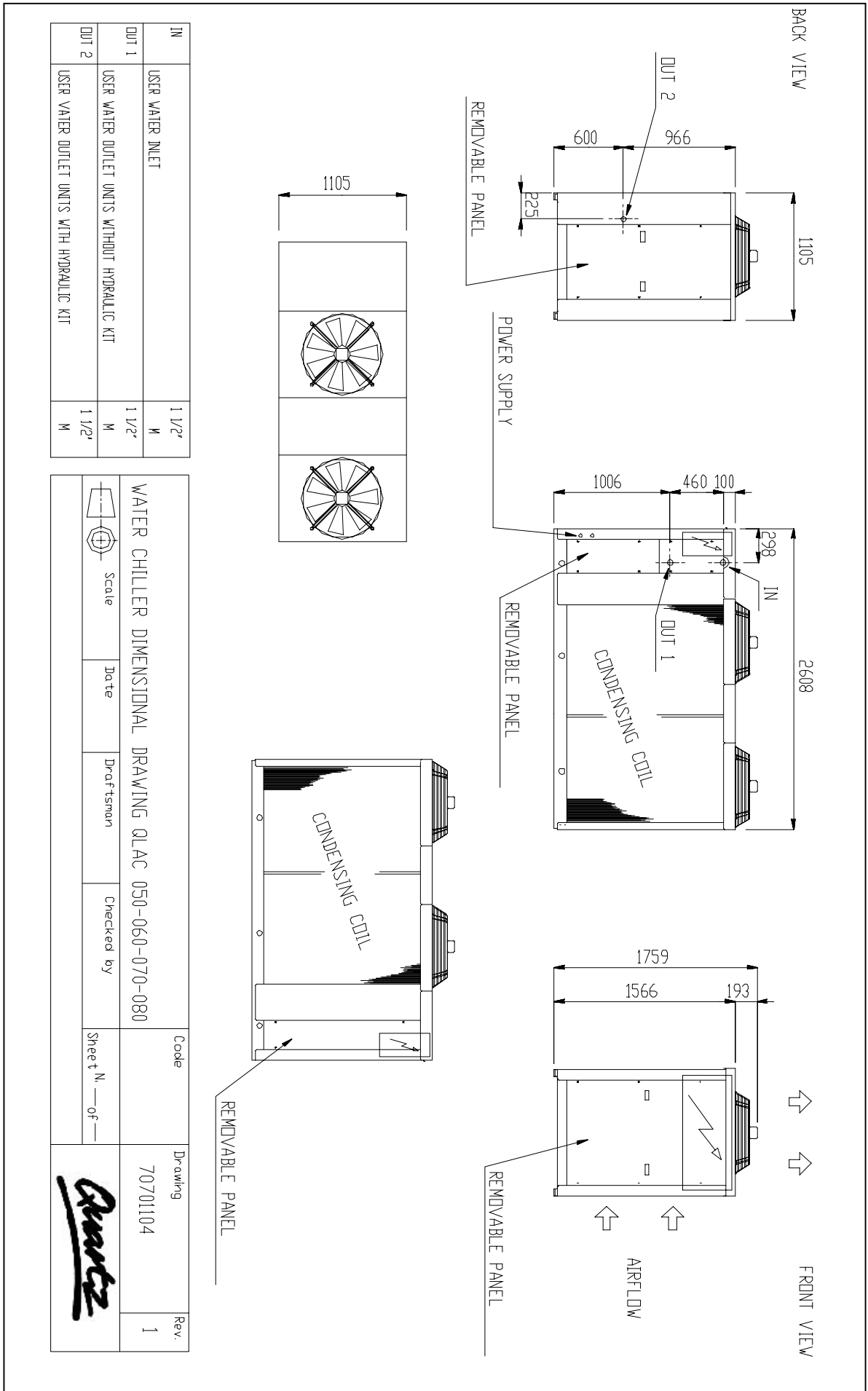
When the unit reaches the end of its service life and requires removal or replacement, the following operations are recommended:-

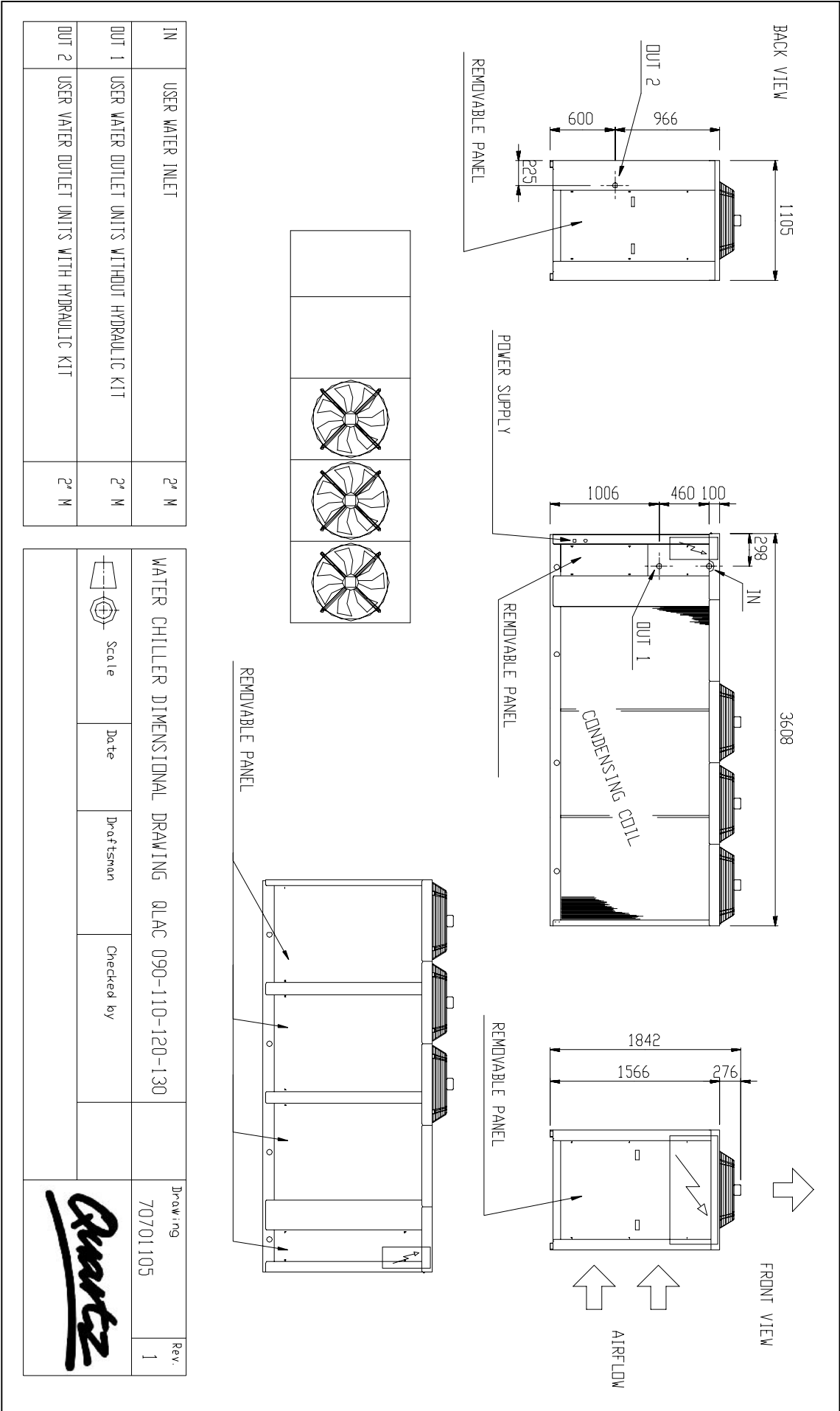
- the unit refrigerant must be reclaimed by trained personnel and returned to an authorised re-cycling centre
- compressor lubricating oil should be recovered and sent to an authorised re-cycling centre
- the unit frame, coil, heat exchanger etc, should be dismantled and subdivided into material type; bear in mind that copper and aluminium are present in substantial quantities in the unit.

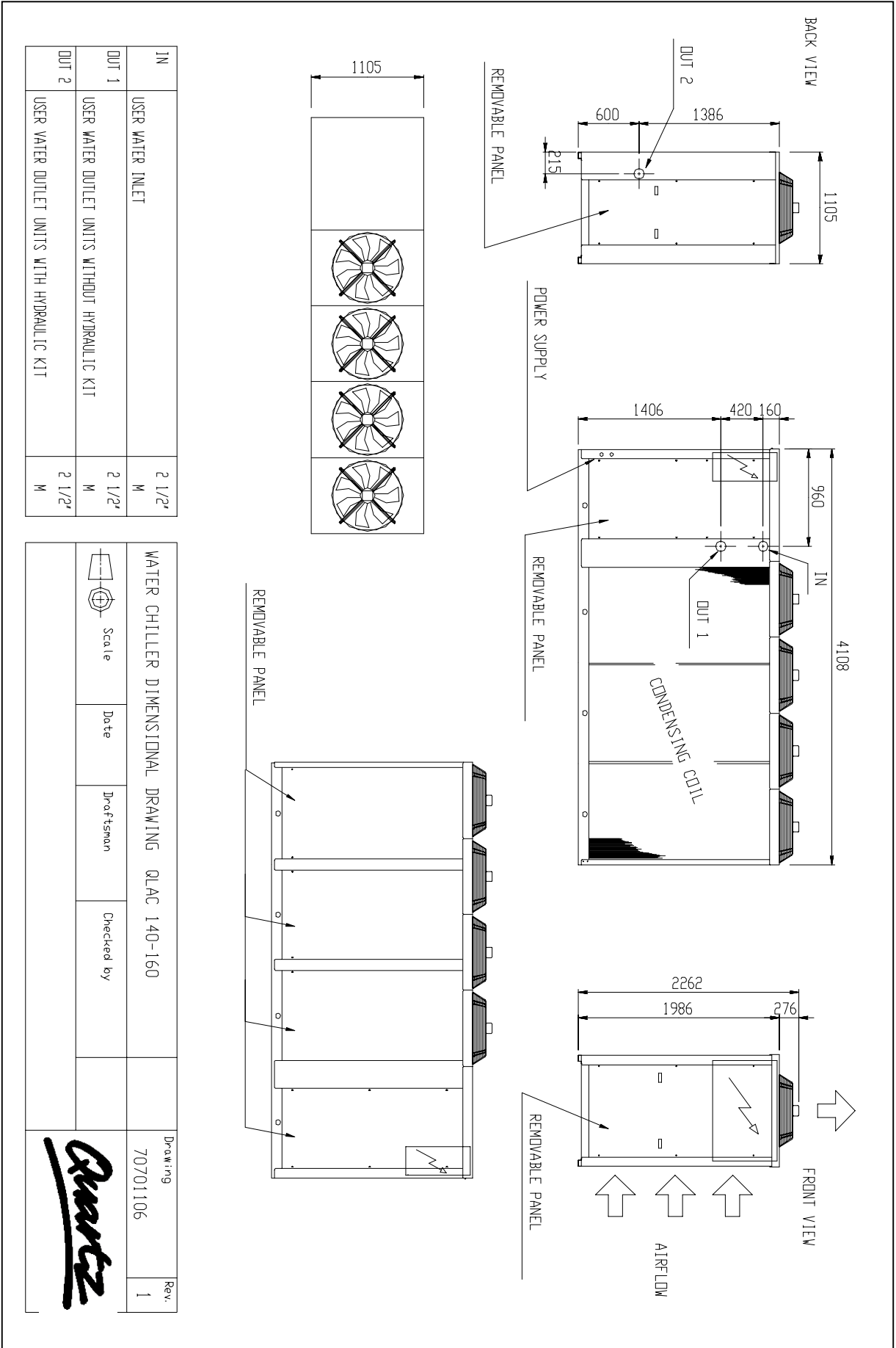
These operations aid material recovery and recycling processes, reducing environmental impact.

DIMENSIONS





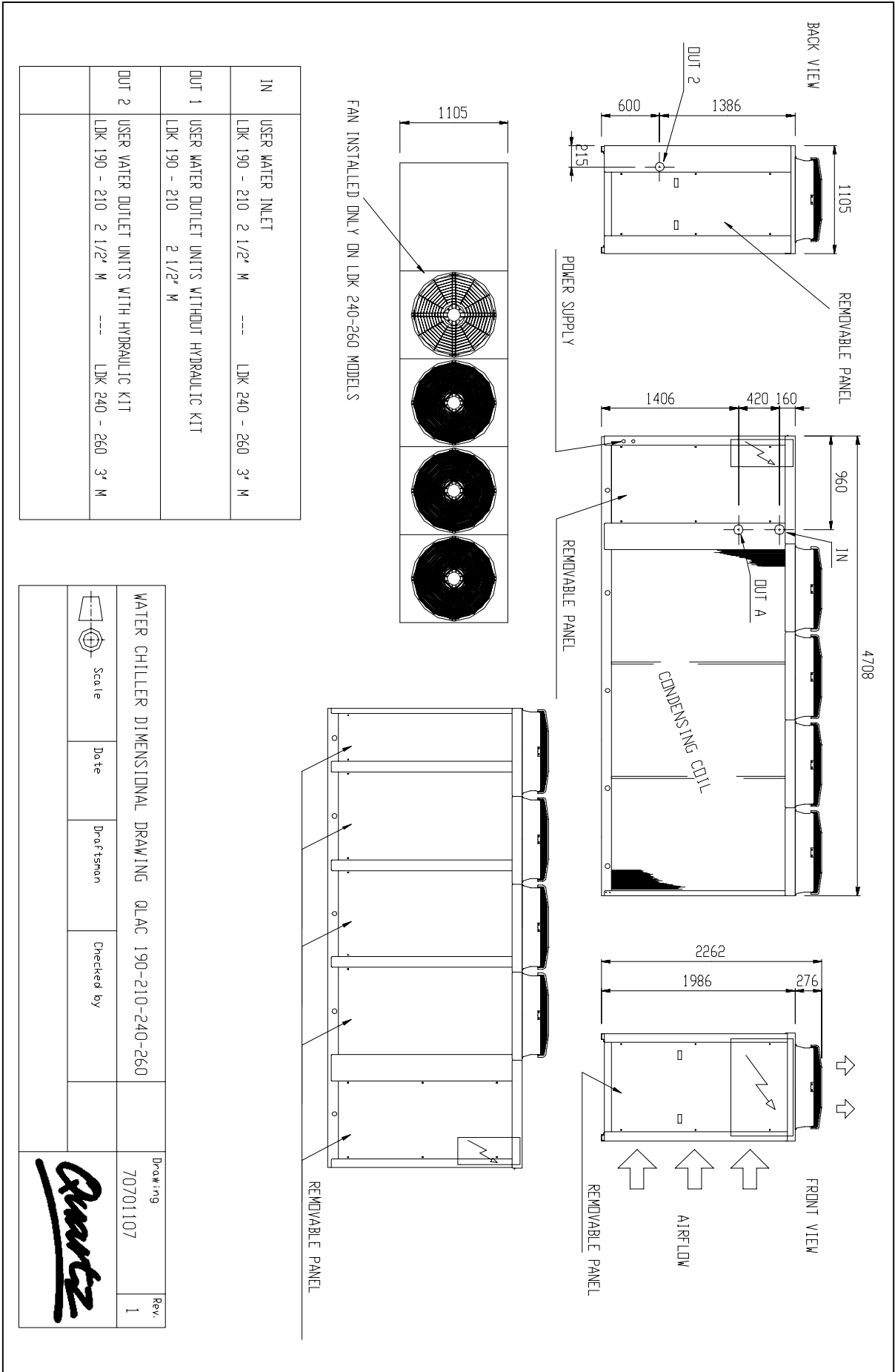


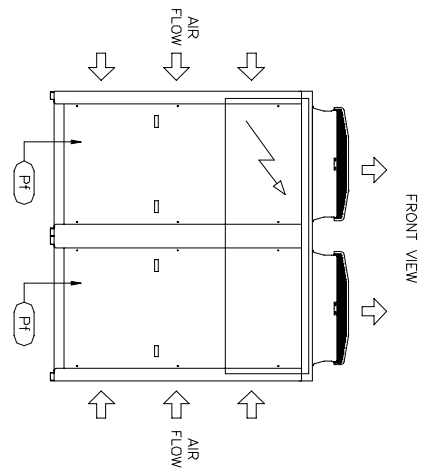
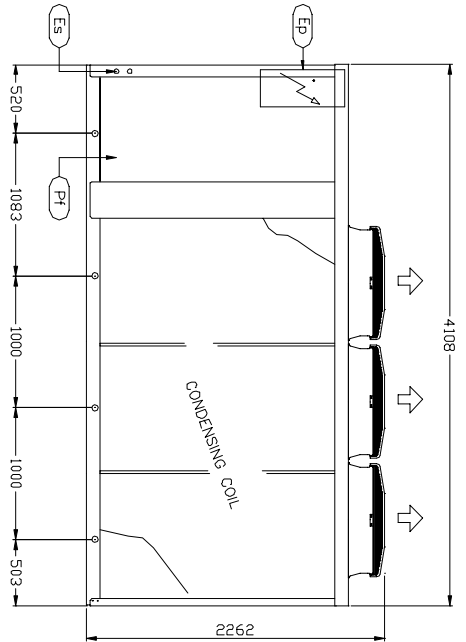
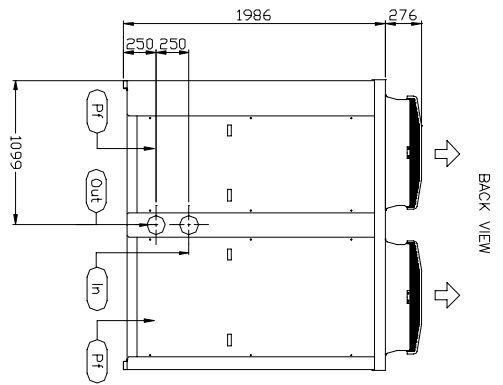




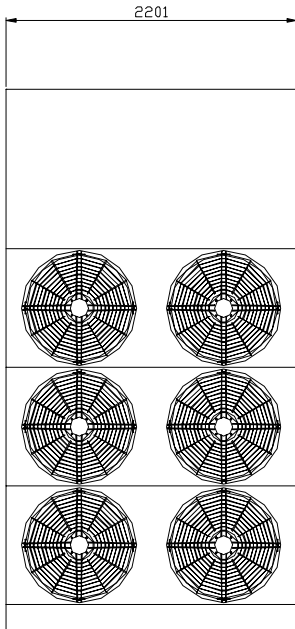
IN	USER WATER INLET	2 1/2"	M
DOUT 1	USER WATER OUTLET UNITS WITHOUT HYDRAULIC KIT	2 1/2"	M
DOUT 2	USER WATER OUTLET UNITS WITH HYDRAULIC KIT	2 1/2"	M

WATER CHILLER DIMENSIONAL DRAWING QAC 140-160				Drawing	Rev.
Scale	Date	Draftsman	Checked by	70701106	1
					

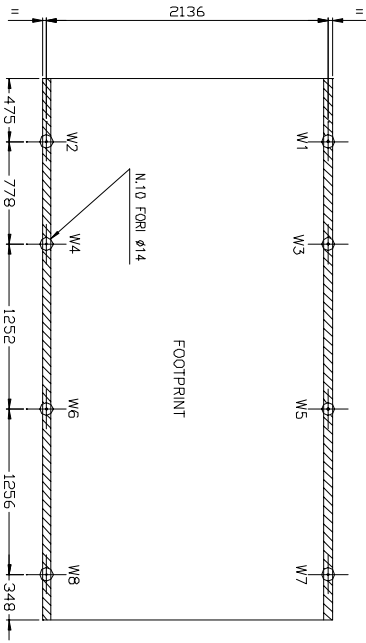




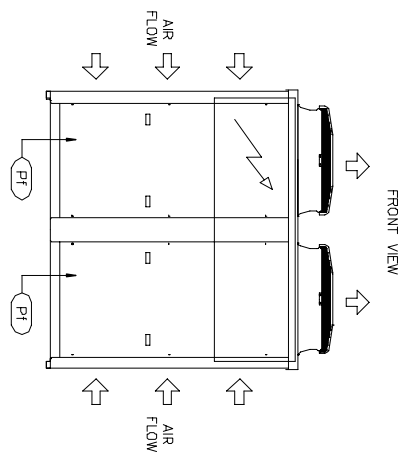
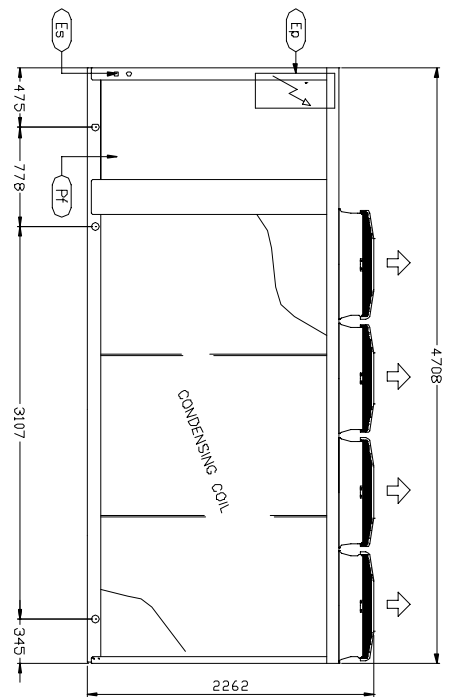
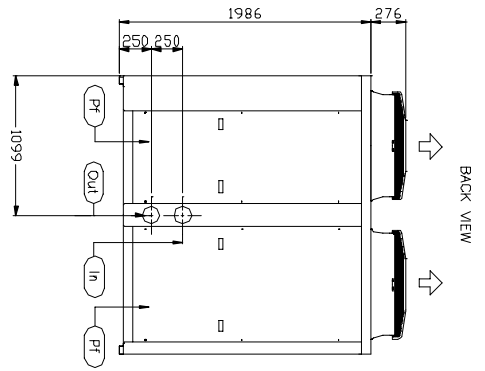
WEIGHT DISTRIBUTION								
Pos.	W1	W2	W3	W4	W5	W6	W7	W8
WEIGHT (KG)	375	375	375	375	315	315	315	315
TOTAL WEIGHT ~ KG	2730							



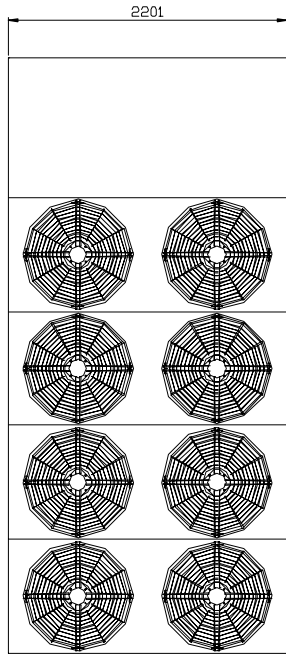
Ep	ELECTRICAL PANEL	
Es	ELECTRICAL SUPPLY INLET	
Pf	PANEL FRAME	
In	USER WATER INLET	4" G
Out	USER WATER OUTLET	4" G



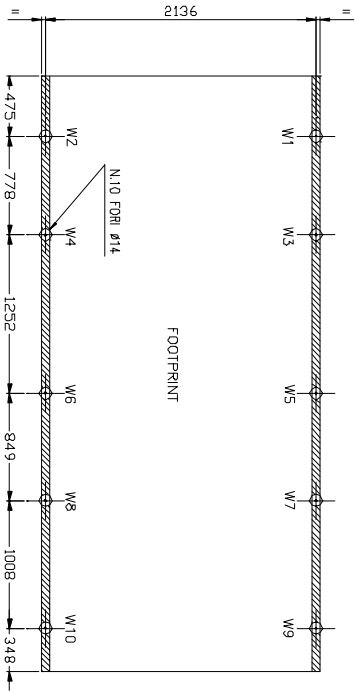
Denomination		Drawing	
DIMENSIONAL DRAWING QLAC 300-320		70701113	
Scale		Rev.	01
		Quartz	



WEIGHT DISTRIBUTION										
Pos.	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10
WEIGHT (KG)	420	420	420	420	245	245	245	245	245	245
TOTAL WEIGHT - kg	3150									



Ep	ELECTRICAL PANEL	
Es	ELECTRICAL SUPPLY INLET	
Pf	PANEL FRAME	
In	USER WATER INLET	5" G
Out	USER WATER OUTLET	5" G



Denomination	DIMENSIONAL DRAWING QLAC 380-430-500		Drawing	7070114	Rev.	01
Scale						

