



## AIR COOLED WATER CHILLERS AND HEAT PUMPS WITH AXIAL FANS

# QCPK

SERIES



### TECHNICAL MANUAL

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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

<b>Model Name:</b>	<b>Machinebeschrijving:</b>	
<b>Nom du modèle:</b>	<b>Modellname:</b>	
<b>Nombre del Modelo:</b>		
<b>Serial Number:</b>	<b>Serienummer:</b>	
<b>Numéro de série:</b>	<b>Serienummer:</b>	
<b>Numéro de Serie:</b>		
<b>Model Part Number:</b>	<b>Modellnummer:</b>	
<b>Référence du modèle:</b>	<b>Número de la Parte del Modelo:</b>	
<b>Artikelnummer:</b>		

Signature of TEV Ltd. designated "responsible person":	Handtekening van de gemachtigde persoon bij TEV Ltd.:	 <b>(A C HAMMERSLEY)</b>
Signature d' TEV Ltd Le responsable:	Unterschrift von TEV Ltd. "verantwortliche Person":	
Firma de TEV Ltd. designado como "persona responsable":		

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

This manual contains all information required for the correct and safe operation of the equipment in accordance with the requirements of Council Directive 98/37/CE and subsequent amendments.

### **AIM AND CONTENTS OF THIS MANUAL**

This manual provides basic information on the installation, operation and maintenance of the QCPK unit. It is directed at end users and will enable them to use the equipment efficiently despite not having any previous specific knowledge of it.

This manual describes the features and performance of the equipment at the time of publication and will not include product development and technical improvements introduced by TEV Ltd subsequent to that date which are introduced as a result of its constant endeavour to enhance the performance, ergonomics, safety and functionality of its products.

### **HOW TO KEEP THIS MANUAL**

The manual must always be kept with the unit to which it refers. It must be stored in a safe place, away from dust and moisture. It must be accessible to all users to enable them to consult it at any time they are in doubt with regards operation of the equipment.

TEV Ltd reserve the right to modify its products and related manuals without necessarily updating previous versions of the reference material. The customer shall store any updated copy of the manual or parts of it delivered by the manufacturer as an attachment to this manual.

TEV Ltd is prepared to provide any detailed information about this manual and to give information regarding the use and the maintenance of its own units.

### **GRAPHIC SYMBOLS**



*Indicates operations that can be dangerous for people and/or disrupts the correct operation of the equipment..*



*Indicates prohibited operations.*



*Indicates important information that the operator must follow in order to guarantee the correct operation of the equipment in complete safety*

## SAFETY LAWS

TEV Ltd equipment and its component parts have been designed in compliance with the harmonised EC standard in force and other European and national norms as required by the Council Directive (98/37 and later amendments).

The equipment is also compliant with:

- EN 292-1 e 292-2
- EN 294
- EN 378-1, 378-2, 378-3 e 378-4
- EN 418
- EN 953
- EN 1050
- EN 60204-1
- EN 61000-6-2
- EN 61000-6-4
- Community Directives 98/37/CE, 97/23/CE, 93/68/CEE, 89/336/CEE 73/23/CEE

## GENERAL SAFETY GUIDELINES

Before either installing, operating or performing maintenance operations on QCPK units, the person responsible must familiarise themselves with the functions of the equipment and its controls and must have read and understood the information contained in this manual.



**It's strictly forbidden to remove and/or tamper with any safety device.**



**Any routine or non-routine maintenance operation shall be carried out when the equipment has been shut down and disconnected from any power source.**



**Do not put your hands or insert screwdrivers, spanners or other tools into moving parts of the equipment.**



**The equipment supervisor and the maintenance engineer must receive training suitable for the performance of their tasks in safety**



**Operators must know how to use personal protective devices and must know the accident-prevention guidelines contained in national and international laws and norms.**

## WORKERS' HEALTH AND SAFETY

The European Community has adopted a number of directives on workplace health and safety, which include directives **89/391/CEE**, **89/686/CEE**, **89/655/CEE**, **86/188/CEE** and **77/576/CEE**. Every employer shall implement such provisions and ensure that workers respect them:



***Do not tamper with or replace parts of the equipment without the specific consent of the manufacturer. The manufacturer shall have no responsibility whatsoever in case of unauthorised operations.***



***Using components, expendable materials or spare parts that do not correspond to those recommended by the manufacturer and/or listed in this manual may be dangerous for the operators and/or damage the equipment***



***The operator's workplace must be kept clean, tidy and free from objects that may hamper free movements. Appropriate lighting of the work place shall be provided so as to allow the operator to carry out the required operations safely. Poor or too strong lighting can cause risks.***



***Ensure that work places are always adequately ventilated and that aspirators are working, in good condition and in compliance with the requirements of the laws in force.***

## PERSONAL PROTECTIVE EQUIPMENT

When operating and maintaining the QCPK unit, use the following personal protective equipment.



**Protective clothing:** Maintenance engineers and operators must wear protective clothing that complies with the basic safety requirements currently in force. In case of slippery floors users must wear safety shoes with non-slip soles.



**Gloves:** During maintenance or cleaning operation protection gloves must be used



**Mask and goggles:** Respiratory protection (mask) and eye protection (goggles) should be used during cleaning and maintenance operations.

## SAFETY SIGNS

The equipment incorporates the following safety signs, which must be complied with:



**General hazard**



**Electric shock hazard**

## TECHNICAL CHARACTERISTICS

### Frame

All QCPK units are made 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

The refrigerant gas used in these units is R407C. The refrigerant circuit is assembled using quality brand components and in accordance with ISO 97/23 concerning welding procedures. The refrigerant circuit includes:

- Sight glass,
- Filter drier,
- Thermal expansion valve with external equalizer,
- Reversing valve (for heat pump version only),
- Non-return valve (for heat pump version only),
- Liquid receiver (for heat pump version only),
- Schrader valves for maintenance and control,
- Pressure safety device (in accordance with PED regulation).

### Compressors

Scroll compressors are used on models 09 to 40 whilst rotary type are used on sizes 04,05 and 07. All units are fitted with a crankcase heater and are provided with thermal overload protection via a klixon embedded in the motor winding. Compressors are mounted in a separate chamber in order to separate them from the air stream and to enable maintenance to be performed whilst the unit is operating. The crankcase heater is always powered when the compressor is in stand-by.

### Condensers

Condensers are made of copper tubes with aluminium fins. The diameter of the copper tubes is 3/8" and the thickness of the aluminium fins is 0.1 mm. The tubes are mechanically expanded into the aluminium fins to maximise the 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 aluminium aerofoil blades. They are statically and dynamically balanced and supplied complete with a safety fan guard complying with EN 60335. They are mounted on the unit frame using rubber anti-vibration mounts. The electric motors are 6 pole (approx 900 rpm). The fans are directly driven and are fitted with an integrated thermal overload protection. Motors have moisture protection to IP 54.

### Evaporators

The plate evaporators are made of AISI 316 stainless steel braze-welded. The use of this type of evaporators allows a significant reduction in the refrigerant charge of the unit compared to the traditional shell-in-tube evaporators and also results in a reduction of the overall dimensions of the unit. The evaporators are factory insulated with flexible close cell material and can be equipped with antifreeze heater (optional). Each evaporator is provided with a temperature sensor as antifreeze protection.

### Electric box

The electric box is manufactured to comply with electromagnetic compatibility standards CEE 73/23 and 89/336. Access to the enclosure is achieved after removing the front panel of the unit. They have moisture protection to IP55. All QCPK units have fitted, as standard a phase failure and sequence relay that will disable the compressor in the event of the power supply phase sequence being incorrect (scroll compressors can be damaged if they rotate in reverse). The following components are also installed as standard: Main switch, Magnetic-thermal switches (MCB's) for the 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 alarm.

### **Microprocessors**

All QCPK units are supplied with microprocessor controls as standard. The microprocessor controls the following functions: regulation of the water temperature, antifreeze protection, compressor timing, compressor automatic starting sequence, alarm reset, volt free contact for remote general alarm, alarms and operation leds. Any microprocessor can, upon 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, fans thermal overload protection, flow switch.

### **Hydraulic Circuit**

All QCPK chillers are fitted as standard with a built in hydraulic kit that includes:

**Water tank:** Various Capacities (depending on the size of the unit), factory insulated with flexible close cell material fitted with an anti-freeze kit. The water tank is installed on the supply water side (7°C) in order to minimize fluctuations in the water temperature due to cycling of the compressor. By installing on the supply side, the supply water 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, suitable for chilled water operation. The pump is controlled by the microprocessor. The expansion vessel, safety valve and manual valves with fittings are sited in the hydraulic circuit.

## **Other versions**

### **Heat pump version (HP)**

Heat pump versions are provided with a 4 way reversing valve and can produce hot water up to a temperature of 45-48°C. They are always supplied with liquid receiver and a second thermostatic valve to optimize 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.

## **Accessories**

### **Fan speed control**

This device is required for operation in cooling mode in ambient temperatures below 20°C. It operates by reducing the condenser air flow thereby maintaining a constant maximum head pressure. This device can also be used to reduce unit sound levels when the ambient temperature is lower (i.e. during night time). **Fan speed control is factory pre-set. The values must never be modified.**

### **Remote control panel**

This panel connects to the main microprocessor board and allows remote monitoring and adjustment of all control parameters.

### **Rubber vibration dampers**

These are installed between the unit base and the ground in order to prevent the transmission of vibrations (and noise) to the building structure.

### **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 available for model sizes 20 to 40. 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 the 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 (hand 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.

## TECHNICAL DATA

Mod.		04	05	07	09	13	15
Refrigerant		R407C	R407C	R407C	R407C	R407C	R407C
Cooling capacity	Kw	4,0	5,2	7,3	8,8	12,9	15,1
Compressor input power	Kw	1,32	1,47	2,59	2,87	4,15	5,16
E.E.R.	W/W	2,68	3,0	2,5	2,8	2,8	2,7
Water flow	l/h	755	888	1258	1521	2214	2595
Evaporator water flow	Kpa	16,5	19,7	22,8	26,7	27,3	28,5
Heating capacity	Kw	4	4,9	7,4	8,7	12,9	15,5
Compressor input power	Kw	1,4	1,7	2,5	3,0	4,2	4,9
C.O.P.	W/W	2,4	2,5	2,6	2,7	2,8	2,9
Water flow	l/h	688	811	1243	1457	2153	2581
Condenser water pressure drops	Kpa	12,6	16,4	22,3	24,5	25,8	28,1
Nominal input current	A	11	14,8	19,9	23	13,7	14,7
Peak current	A	39,3	51,3	80,3	104,3	70,7	78,7
Maximum input current	A	14,3	15,7	21,6	27,4	16,7	16,7
Power supply	V/Ph/Hz	230/1/50			400/3+N /50		
<b>Airflow</b>	m <sup>3</sup> /h	3000	3000	3000	3000	5400	5400
Fans	n° x kW	1 x 0,28	1 x 0,28	1 x 0,28	1 x 0,28	1 x 0,37	1 x 0,37
Fans input current	A	1,25	1,25	1,25	1,25	1,7	1,7
Compressor	type	Scroll					
	n°	1	1	1	1	1	1
Refrigerant circuits	n°	1	1	1	1	1	1
Capacity steps		1	1	1	1	1	1
Sound power level <sup>(1)</sup>	dB(A)	68	68	68	68	69	69
Sound pressure level <sup>(2)</sup>	dB(A)	40	40	40	40	41	41
Water pump input power	Kw	0,25	0,25	0,25	0,25	0,37	0,37
Water pump input current	A	2,1	2,1	2,1	2,1	3	3
Water pump available static pressure	kPa	58	53	47	39	80	66
Water tank volume	l	40	40	40	40	50	50
Expansion vessel volume	l	2	2	2	2	2	2
Length	mm	920	920	1103	1103	1203	1203
Width	mm	380	380	380	380	423	423
Height)	mm	889	889	989	989	1323	1323
Weight	Kg	142	148	163	179	207	212

Performances quoted are at the following conditions:

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

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

(1): Sound power level in accordance with ISO 3746.

(2): Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 in accordance with ISO 3746

## TECHNICAL DATA

Mod.		20	25	30	35	40
Refrigerant		R407C	R407C	R407C	R407C	R407C
Cooling capacity	Kw	19,1	23,3	27,5	32,5	40,2
Compressor input power	Kw	6,46	7,68	8,48	11,4	13,94
E.E.R.	W/W	2,7	2,8	3,0	2,7	2,7
Water flow	l/h	3285	4011	4736	5581	6910
Evaporator water flow	Kpa	28,9	32,4	33,6	30,4	33,0
Heating capacity	Kw	19,8	24,3	28,1	34,8	42,4
Compressor input power	Kw	6,4	7,6	8,7	10,9	13,2
C.O.P	W/W	2,8	2,9	3,0	3,0	3,0
Water flow	l/h	3304	4059	4694	5810	7076
Condenser water pressure drops	Kpa	29,2	33,1	32,9	32,9	34,6
Nominal input current	A	19,5	21,6	25,9	28,8	33,8
Peak current	A	105,0	129,0	134,9	174,9	205,9
Maximum input current	A	21,1	24,0	28,9	33,5	35,7
Power supply	V/Ph/Hz	400/3+N /50				
<b>Airflow</b>	m3/h	8000	8000	10800	10800	10600
Fans	n° x Kw	1 x 0,63	1 x 0,63	2 x 0,37	2 x 0,37	2 x 0,37
Fans input current	A	3,0	3,0	2 x 1,7	2 x 1,7	2 x 1,7
Compressor	Type	Scroll				
	n°	1	1	1	1	1
Refrigerant circuits	n°	1	1	1	1	1
Capacity steps		1	1	1	1	1
Sound power level <sup>(1)</sup>	dB(A)	74	74	79	79	79
Sound pressure level <sup>(2)</sup>	dB(A)	46	46	51	51	51
Water pump input power	Kw	0,37	0,37	0,55	0,55	0,55
Water pump input current	A	3	3	4,5	4,5	4,5
Water pump available static pressure	kPa	119	83	150	123	62
Water tank volume	l	60	60	180	180	180
Expansion vessel volume	l	2	2	5	5	5
Length	mm	1453	1453	1870	1870	1870
Width	mm	473	473	850	850	850
Height	mm	1423	1423	1406	1406	1406
Weight	kg	267	286	440	495	520

Performances quoted are at the following conditions:

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

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

(1): Sound power level in accordance with ISO 3746.

(2): Sound pressure level measured at 10 mt from the unit in free field conditions direction factor Q=2 in accordance with ISO 374

**QCPK**  
**COOLING CAPACITY AND COMPRESSOR INPUT POWER**

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
04	-1	3,5	3,3	3,0	2,8			0,9	1,0	1,1	1,3		
	1	3,8	3,6	3,3	3,1			0,9	1,0	1,1	1,3		
	3	4,2	3,9	3,6	3,4			0,9	1,0	1,1	1,3		
	5	4,5	4,2	3,9	3,7	3,3		0,9	1,0	1,1	1,3	1,5	
	7	4,9	4,6	4,3	4,0	3,6	3,2	0,9	1,0	1,1	1,3	1,5	1,8
	9	5,3	5,0	4,6	4,3	3,9	3,5	0,9	1,0	1,1	1,3	1,5	1,8
	11	5,7	5,3	5,0	4,7	4,3	3,9	0,9	1,0	1,1	1,3	1,5	1,7

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
05	-1	4,3	4,1	3,8	3,6			1,0	1,1	1,3	1,4		
	1	4,7	4,4	4,2	3,9			1,0	1,1	1,3	1,4		
	3	5,1	4,9	4,6	4,3			1,0	1,1	1,3	1,4		
	5	5,5	5,3	5,0	4,7	4,4		1,0	1,1	1,3	1,4	1,6	
	7	6,0	5,7	5,4	5,2	4,8	4,4	1,0	1,1	1,2	1,4	1,6	1,8
	9	6,5	6,2	5,9	5,6	5,2	4,8	1,0	1,1	1,2	1,4	1,6	1,8
	11	7,0	6,7	6,4	6,0	5,6	5,2	0,9	1,1	1,2	1,4	1,6	1,8

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
07	-1	6,2	5,8	5,4	5,			1,7	2,0	2,3	2,6		
	1	6,8	6,4	6,0	5,5			1,7	2,0	2,3	2,6		
	3	7,4	7,0	6,6	6,1			1,7	2,0	2,3	2,6		
	5	8,1	7,6	7,2	6,7	6,1		1,7	2,0	2,2	2,6	2,9	
	7	8,8	8,3	7,8	7,3	6,7	6,1	1,7	2,0	2,2	2,5	2,9	3,3
	9	9,5	9,0	8,5	7,9	7,3	6,7	1,7	2,0	2,2	2,5	2,9	3,3
	11	10,3	9,8	9,2	8,6	7,9	7,3	1,7	1,9	2,2	2,5	2,9	3,2

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
09	-1	7,5	7,0	6,6	6,1			1,9	2,2	2,5	2,9		
	1	8,2	7,7	7,2	6,7			1,9	2,2	2,5	2,9		
	3	8,9	8,4	7,9	7,4			1,9	2,2	2,5	2,8		
	5	9,7	9,2	8,7	8,1	7,4		1,9	2,2	2,5	2,8	3,2	
	7	10,5	10,0	9,4	8,8	8,1	7,4	1,9	2,2	2,5	2,8	3,2	3,6
	9	11,4	10,9	10,2	9,6	8,9	8,1	1,9	2,2	2,5	2,8	3,2	3,6
	11	12,3	11,8	11,1	10,4	9,7	8,9	1,9	2,2	2,5	2,8	3,2	3,6

**TWUE:** Evaporator outlet water temperature (°C)  
**TAMB:** Ambient temperature (°C)  
**PA:** Compressors input power (Kw)  
**PF:** Cooling capacity (Kw)

**QCPK**  
**COOLING CAPACITY AND COMPRESSOR INPUT POWER**

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
13	-1	10,8	10,2	9,6	8,9			2,9	3,2	3,6	4,0		
	1	11,9	11,2	10,5	9,8			2,9	3,2	3,6	4,1		
	3	13,0	12,3	11,5	10,7			2,9	3,2	3,6	4,1		
	5	14,1	13,4	12,6	11,7	10,9		2,9	3,2	3,6	4,1	4,6	
	7	15,3	14,6	13,7	12,9	11,9	10,9	2,9	3,3	3,7	4,1	4,6	5,1
	9	16,7	15,8	14,9	14,0	13,0	12,0	2,9	3,3	3,7	4,1	4,6	5,1
	11	18,0	17,2	16,2	15,2	14,1	13,0	2,9	3,3	3,7	4,1	4,6	5,2

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
15	-1	13,1	12,3	11,4	10,5			3,6	4,0	4,5	5,1		
	1	14,3	13,4	12,5	11,5			3,6	4,0	4,5	5,1		
	3	15,5	14,6	13,6	12,7			3,6	4,0	4,5	5,1		
	5	16,8	15,9	14,8	13,8	12,8		3,6	4,0	4,6	5,1	5,7	
	7	18,2	17,2	16,1	15,1	14,0	13,0	3,6	4,0	4,6	5,1	5,7	6,4
	9	19,7	18,6	17,4	16,3	15,2	14,2	3,6	4,1	4,6	5,1	5,7	6,4
	11	21,2	20,0	18,8	17,6	16,5	15,4	3,6	4,1	4,6	5,1	5,8	6,4

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
20	-1	16,2	15,2	14,3	13,4			4,5	5,1	5,7	6,4		
	1	17,7	16,7	15,6	14,7			4,5	5,1	5,7	6,4		
	3	19,3	18,2	17,1	16,0			4,5	5,0	5,7	6,4		
	5	21,0	19,8	18,6	17,5	16,4		4,5	5,0	5,7	6,4	7,3	
	7	22,8	21,5	20,3	19,1	17,8	16,7	4,5	5,0	5,7	6,4	7,3	8,2
	9	24,7	23,4	22,0	20,7	19,4	18,1	4,5	5,0	5,6	6,4	7,3	8,2
	11	26,7	25,3	23,9	22,5	21,1	19,7	4,5	5,0	5,6	6,4	7,3	8,2

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
25	-1	20,0	18,9	17,8	16,6			5,4	6,1	6,8	7,6		
	1	21,8	20,6	19,4	18,1			5,4	6,1	6,8	7,6		
	3	23,6	22,3	21,1	19,7			5,4	6,1	6,8	7,6		
	5	25,6	24,2	22,8	21,5	20,1		5,4	6,1	6,8	7,6	8,6	
	7	27,7	26,2	24,8	23,3	21,8	20,3	5,4	6,1	6,8	7,6	8,6	9,6
	9	29,9	28,3	26,8	25,2	23,6	22,0	5,4	6,1	6,8	7,6	8,6	9,6
	11	32,2	30,6	28,9	27,2	25,6	23,8	5,4	6,0	6,8	7,6	8,6	9,6

**TWUE:** Evaporator outlet water temperature (°C)  
**TAMB:** Ambient temperature (°C)  
**PA:** Compressors input power (Kw)  
**PF:** Cooling capacity (Kw)

**QCPK**  
**COOLING CAPACITY AND COMPRESSOR INPUT POWER**

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
30	-1	23,7	22,5	21,1	19,8			6,0	6,7	7,5	8,4		
	1	25,7	24,4	23,0	21,5			6,0	6,7	7,5	8,4		
	3	27,9	26,4	24,9	23,4			5,9	6,7	7,5	8,4		
	5	30,1	28,6	27,0	25,4	23,7		5,9	6,7	7,5	8,4	9,5	
	7	32,5	30,9	29,2	27,5	25,7	23,9	5,9	6,6	7,5	8,4	9,5	10,6
	9	35,1	33,3	31,6	29,7	27,9	25,9	5,9	6,6	7,5	8,4	9,5	10,6
	11	37,8	35,9	34,0	32,1	30,1	28,1	5,9	6,6	7,4	8,4	9,5	10,7

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
35	-1	28,3	26,6	25,0	23,3			8,0	8,9	10,0	11,2		
	1	30,7	28,9	27,2	25,4			8,0	8,9	10,0	11,3		
	3	33,2	31,4	29,5	27,6			8,0	8,9	10,1	11,3		
	5	35,9	34,0	32,0	29,9	27,8		8,0	9,0	10,1	11,3	12,7	
	7	38,8	36,7	34,6	32,5	30,2	27,9	8,0	9,0	10,1	11,4	12,8	14,4
	9	41,9	39,6	37,4	35,1	32,7	30,3	8,0	9,0	10,1	11,4	12,8	14,4
	11	45,1	42,7	40,3	37,9	35,4	32,8	8,0	9,0	10,1	11,4	12,8	14,4

Mod.	TWUE (°C)	PF (kW)						PA (kW)					
		TAMB (°C)						TAMB (°C)					
		20	25	30	35	40	45	20	25	30	35	40	45
40	-1	34,9	32,9	30,9	28,8			9,7	11,0	12,3	13,8		
	1	37,9	35,8	33,6	31,4			9,7	10,9	12,3	13,9		
	3	41,0	38,8	36,5	34,1			9,7	10,9	12,3	13,9		
	5	44,4	42,0	39,5	37,0	34,5		9,6	10,9	12,3	13,9	15,7	
	7	47,9	45,4	42,8	40,2	37,4	34,6	9,6	10,9	12,3	13,9	15,7	17,6
	9	51,7	49,0	46,2	43,4	40,5	37,6	9,7	10,8	12,2	13,9	15,7	17,7
	11	55,7	52,8	49,9	46,9	43,9	40,7	9,7	10,8	12,2	13,8	15,7	17,7

**TWUE:** Evaporator outlet water temperature (°C)  
**TAMB:** Ambient temperature (°C)  
**PA:** Compressors input power (Kw)  
**PF:** Cooling capacity (Kw)

**QCPK / HP**  
**HEATING CAPACITY AND COMPRESSOR INPUT POWER**

Mod.	TAMB (°C)	PH kW						PA (kW)					
		TWUC (°C)						TWUC (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
04	-5	2,7	2,7					1,0	1,1				
	0	3,3	3,2	3,2				1,0	1,1	1,2			
	5	3,9	3,8	3,7	3,7			1,0	1,1	1,2	1,4		
	8	4,3	4,2	4,1	4,0	4,0		1,0	1,1	1,2	1,4	1,6	
	10	4,6	4,5	4,4	4,3	4,2		1,0	1,1	1,2	1,4	1,5	
	15	5,4	5,3	5,1	5,0	4,9		1,0	1,1	1,2	1,3	1,5	
	20	6,3	6,1	6,0	5,8	5,7		1,0	1,1	1,2	1,3	1,5	

Mod.	TAMB (°C)	PH kW						PA (kW)					
		TWUC (°C)						TWUC (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
05	-5	3,2	3,2					1,2	1,3				
	0	3,8	3,8	3,8				1,2	1,3	1,5			
	5	4,6	4,5	4,4	4,4			1,2	1,3	1,5	1,7		
	8	5,1	5,0	4,9	4,9	4,8		1,2	1,3	1,5	1,7	1,9	
	10	5,4	5,3	5,3	5,2	5,1		1,2	1,3	1,5	1,7	1,9	
	15	6,5	6,3	6,2	6,1	5,9		1,1	1,3	1,5	1,7	1,9	
	20	7,7	7,5	7,3	7,1	6,9		1,1	1,3	1,5	1,6	1,9	

Mod.	TAMB (°C)	PH kW						PA (kW)					
		TWUC (°C)						TWUC (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
07	-5	4,9	4,9					1,7	2,0				
	0	5,9	5,8	5,8				1,7	2,0	2,2			
	5	7,0	6,9	6,8	6,8			1,7	2,0	2,2	2,5		
	8	7,8	7,7	7,5	7,4	7,4		1,7	2,0	2,2	2,5	2,9	
	10	8,4	8,2	8,1	7,9	7,8		1,7	2,0	2,2	2,5	2,9	
	15	9,9	9,7	9,5	9,3	9,1		1,7	2,0	2,2	2,5	2,9	
	20	11,8	11,5	11,2	10,9	10,6		1,7	1,9	2,2	2,5	2,8	

Mod.	TAMB (°C)	PH kW						PA (kW)					
		TWUC (°C)						TWUC (°C)					
		30	35	40	45	50	55	30	35	40	45	50	55
09	-5	5,8	5,8					2,0	2,3				
	0	6,9	6,8	6,8				2,0	2,3	2,6			
	5	8,2	8,1	8,0	7,9			2,0	2,3	2,6	3,0		
	8	9,1	9,0	8,9	8,7	8,6		2,0	2,3	2,6	3,0	3,4	
	10	9,8	9,6	9,5	9,3	9,2		2,0	2,3	2,6	3,0	3,4	
	15	11,7	11,4	11,2	10,9	10,7		2,0	2,3	2,6	3,0	3,3	
	20	13,8	13,5	13,2	12,8	12,5		2,0	2,3	2,6	2,9	3,3	

**TWUC:** Condenser outlet water temperature (°C)  
**TAMB:** Ambient temperature dry bulb (°C)  
**PA:** Compressors input power (Kw)  
**PH:** Heating capacity (Kw)

**QCPK / HP**  
**HEATING CAPACITY AND COMPRESSOR INPUT POWER**

Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
13	-5	8,3	8,2	8,1				2,9	3,2	3,5				
	0	10,1	10,0	9,8	9,7			3,0	3,3	3,7	4,1			
	5	12,2	12,0	11,8	11,6			3,0	3,4	3,8	4,2			
	8	13,7	13,4	13,2	12,9	12,6		3,0	3,4	3,8	4,2	4,7		
	10	14,7	14,4	14,1	13,8	13,5	13,2	3,0	3,4	3,8	4,2	4,7	5,2	
	15	17,6	17,2	16,8	16,3	15,9	15,5	3,0	3,4	3,8	4,3	4,8	5,3	
	20	21,0	20,4	19,9	19,3	18,7	18,1	3,1	3,4	3,8	4,3	4,8	5,4	

Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
15	-5	10,3	9,9	9,4				3,4	3,8	4,2				
	0	12,5	12,2	11,8	11,3			3,5	3,9	4,3	4,8			
	5	15,0	14,7	14,3	13,9			3,5	3,9	4,4	4,9			
	8	16,7	16,3	15,9	15,5	15,1		3,5	3,9	4,4	4,9	5,5		
	10	17,9	17,4	17,0	16,6	16,2	15,9	3,5	3,9	4,4	5,0	5,5	6,2	
	15	21,1	20,6	20,0	19,5	19,1	18,8	3,5	4,0	4,4	5,0	5,6	6,2	
	20	24,9	24,2	23,5	22,8	22,3	21,8	3,5	4,0	4,4	5,0	5,6	6,3	

Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
20	-5	12,9	12,7	12,5				4,5	5,0	5,4				
	0	15,6	15,4	15,2	15,1			4,6	5,1	5,6	6,2			
	5	18,7	18,4	18,1	17,9			4,6	5,1	5,7	6,4			
	8	20,8	20,4	20,0	19,8	19,7		4,6	5,1	5,8	6,4	7,2		
	10	22,3	21,8	21,4	21,1	21,0	20,8	4,5	5,1	5,8	6,5	7,2	8,1	
	15	26,5	25,8	25,3	24,8	24,5	24,2	4,5	5,1	5,7	6,5	7,3	8,2	
	20	31,4	30,5	29,7	29,0	28,5	28,1	4,5	5,0	5,7	6,4	7,3	8,3	

Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
25	-5	16,5	16,4	16,3				5,5	6,1	6,7				
	0	19,6	19,3	19,1	19,0			5,5	6,1	6,8	7,5			
	5	23,2	22,8	22,4	22,2			5,5	6,1	6,8	7,6			
	8	25,6	25,1	24,7	24,3	24,0		5,5	6,1	6,8	7,6	8,5		
	10	27,3	26,8	26,3	25,9	25,5	25,2	5,5	6,1	6,9	7,7	8,5	9,5	
	15	32,2	31,5	30,8	30,2	29,6	29,1	5,5	6,1	6,9	7,7	8,6	9,6	
	20	37,9	36,9	36,0	35,1	34,4	33,6	5,4	6,1	6,8	7,7	8,6	9,7	

**TWUC:** Condenser outlet water temperature (°C)  
**TAMB:** Ambient temperature dry bulb (°C)  
**PA:** Compressors input power (Kw)  
**PH:** Heating capacity (Kw)

**QCPK /HP**  
**HEATING CAPACITY AND COMPRESSOR INPUT POWER**

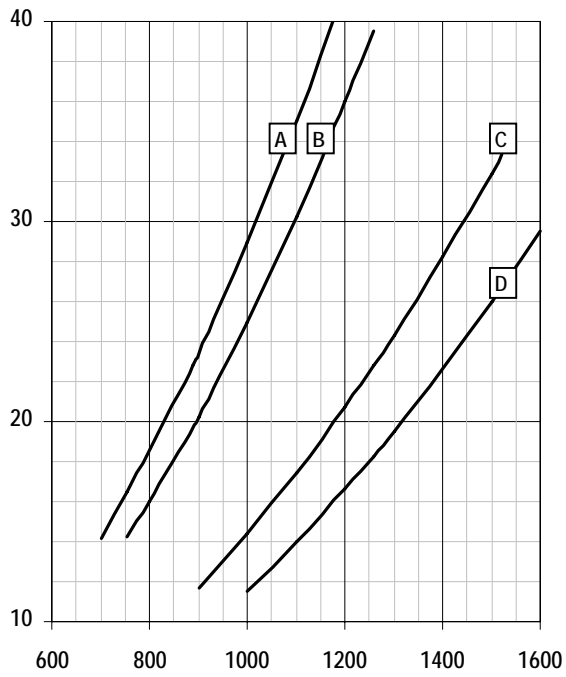
Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
30	-5	19,2	18,9	18,6				6,1	6,7	7,3				
	0	22,8	22,5	22,1	21,7			6,2	6,9	7,6	8,3			
	5	26,9	26,5	26,0	25,6			6,3	7,0	7,8	8,6			
	8	29,7	29,2	28,6	28,1	27,6		6,2	7,0	7,8	8,7	9,6		
	10	31,7	31,1	30,5	29,9	29,4	28,9	6,2	7,0	7,8	8,7	9,7	10,7	
	15	37,2	36,4	35,6	34,8	34,1	33,5	6,2	6,9	7,8	8,8	9,8	11,0	
	20	43,7	42,6	41,5	40,5	39,6	38,7	6,1	6,9	7,8	8,8	9,9	11,1	

Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
35	-5	23,8	23,5	23,2				7,6	8,3	9,2				
	0	28,1	27,7	27,4	27,1			7,7	8,5	9,5	10,5			
	5	33,2	32,6	32,1	31,7			7,7	8,6	9,6	10,8			
	8	36,6	35,9	35,3	34,8	34,3		7,7	8,7	9,7	10,9	12,1		
	10	39,1	38,3	37,6	36,9	36,4	35,9	7,7	8,7	9,7	10,9	12,2	13,7	
	15	46,0	44,9	43,9	42,9	42,1	41,4	7,8	8,7	9,8	11,0	12,3	13,9	
	20	54,0	52,5	51,2	49,9	48,8	47,8	7,8	8,7	9,8	11,0	12,4	14,0	

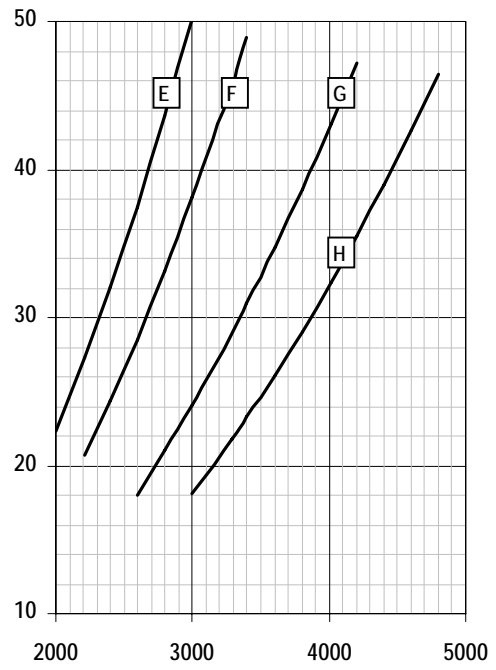
Mod.	TAMB (°C)	PH (kW)						PA (kW)						
		TWUC (°C)						TWUC (°C)						
		30	35	40	45	50	55	30	35	40	45	50	55	
40	-5	28,9	28,4	27,9				9,2	10,0	10,9				
	0	34,2	33,8	33,3	32,8			9,4	10,4	11,5	12,6			
	5	40,4	39,8	39,2	38,6			9,4	10,5	11,7	13,1			
	8	44,5	43,7	43,0	42,4	41,8		9,3	10,5	11,8	13,2	14,7		
	10	47,5	46,6	45,8	45,1	44,4	43,8	9,3	10,5	11,8	13,3	14,8	16,5	
	15	55,8	54,5	53,4	52,4	51,5	50,7	9,2	10,4	11,8	13,3	15,0	16,8	
	20	65,6	63,8	62,3	60,8	59,6	58,4	9,3	10,4	11,7	13,2	15,0	16,9	

**TWUC:** Condenser outlet water temperature (°C)  
**TAMB:** Ambient temperature dry bulb (°C)  
**PA:** Compressors input power (Kw)  
**PH:** Heating capacity (Kw)

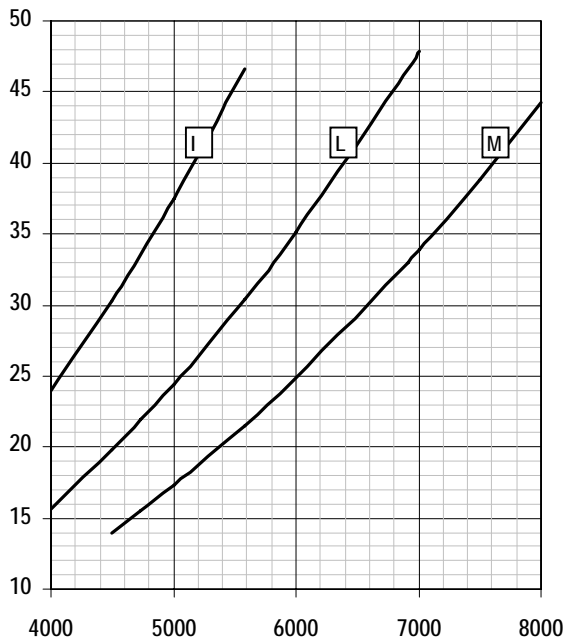
## EVAPORATOR PRESSURE DROPS



**A: QCPK 04**  
**B: QCPK 05**  
**C: QCPK 07**  
**D: QCPK 09**

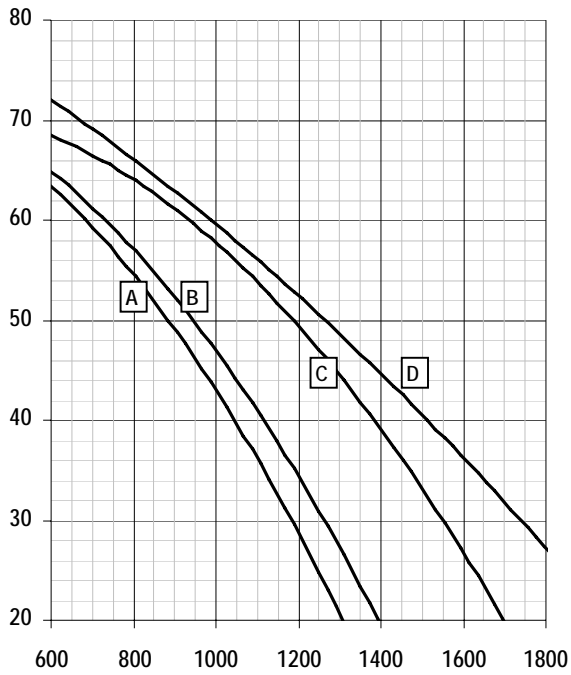


**E: QCPK 13**  
**F: QCPK 15**  
**G: QCPK 20**  
**H: QCPK 25**

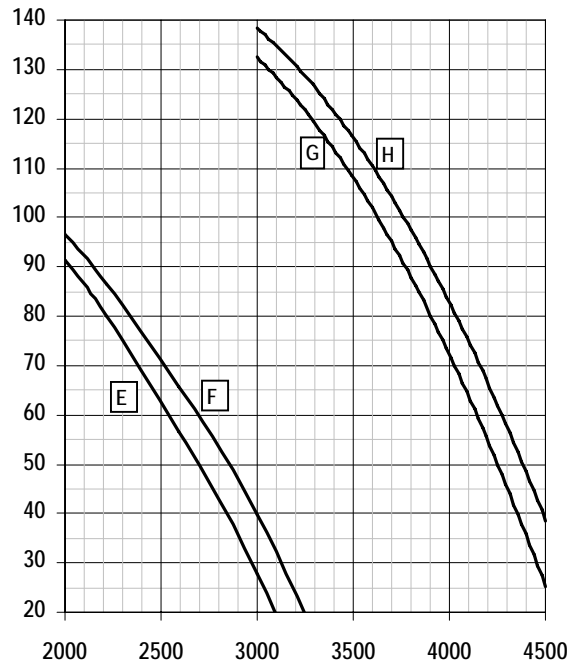


**I: QCPK 30**  
**L: QCPK 35**  
**M: QCPK 040**

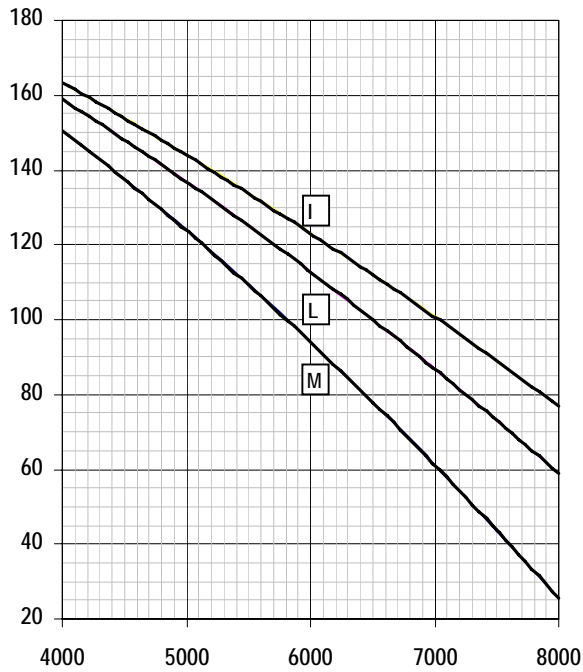
## WATER PUMPS AVAILABLE STATIC PRESSURE



**A: QCPK 04**  
**B: QCPK 05**  
**C: QCPK 07**  
**D: QCPK 09**



**E: QCPK 13**  
**F: QCPK 15**  
**G: QCPK 20**  
**H: QCPK 25**

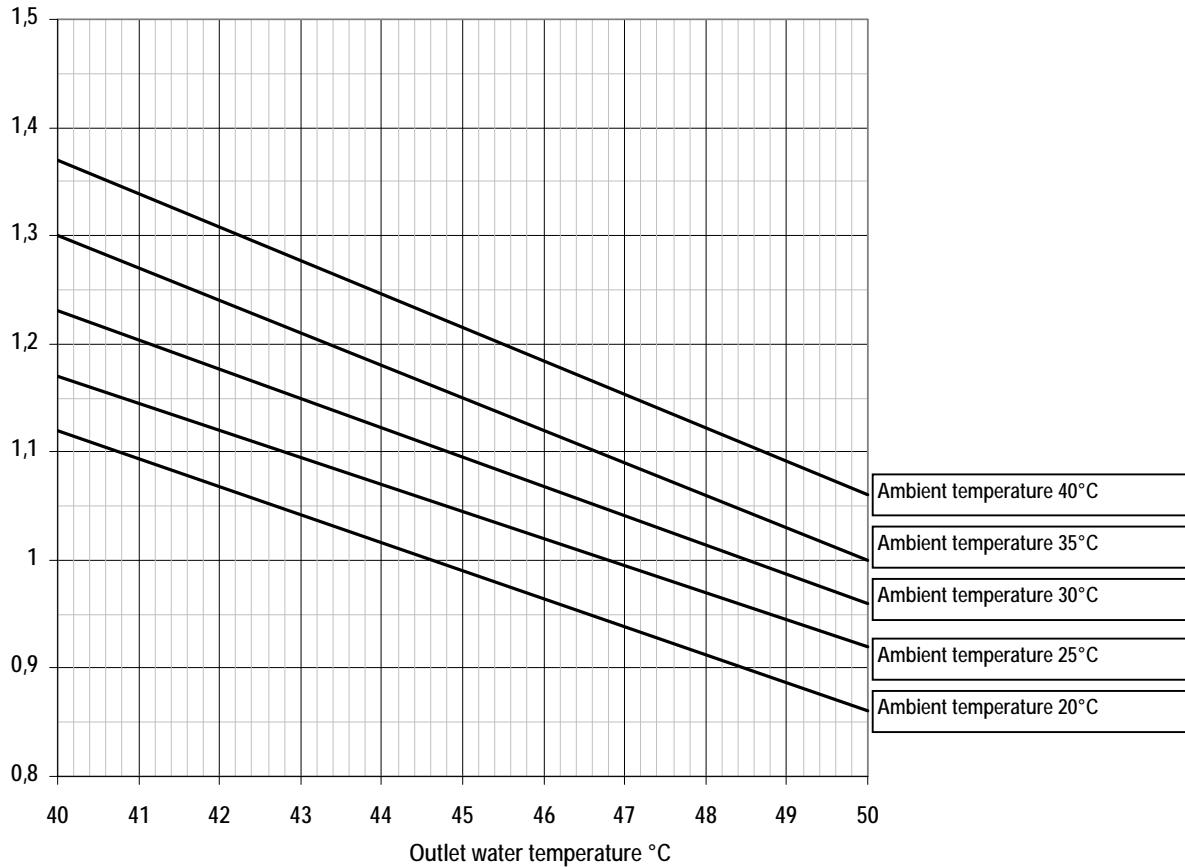


**I: QCPK 30**  
**L: QCPK 35**  
**M: QCPK 40**

## PARTIAL HEAT RECOVERY CAPACITY

Mod.		20	25	30	35	40
Partial heat recovery nominal capacity	kW	5,5	6,3	7,2	9	11,2
Water flow	l/h	950	1100	1240	1550	1930
Water pressure drops	kPa	15	18	16	19	25

The nominal value refers to an ambient temperature of 35°C and outlet water temperature of 50°C ( $\Delta t$  5°C).

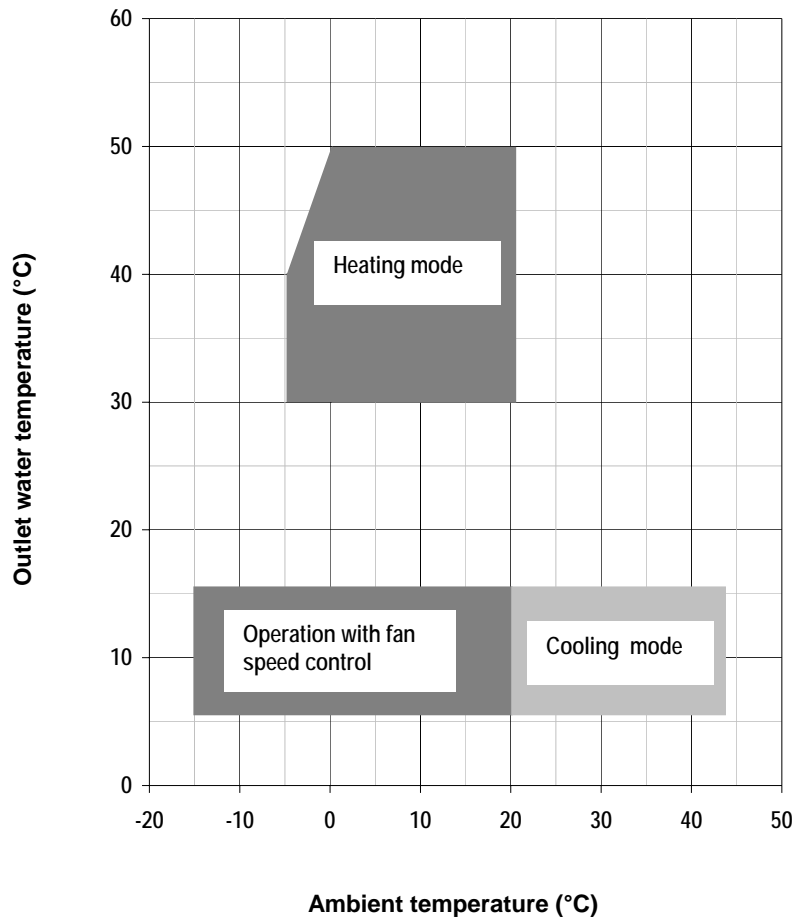


The heat recovery capacity in different conditions can be obtained multiplying the nominal capacity (See above), by the correction factor indicated in the table.



**WARNING:** the 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.

## OPERATION LIMITS



### Evaporator water flow rate

The nominal water flow rate given by TEV Ltd is based on a  $\Delta t$  of 5°C. The maximum flow rate allowed is that for a  $\Delta t$  of 3°C. Higher values may cause too high pressure drop. The minimum water flow rate permitted is that for a  $\Delta t$  of 8°C. Insufficient values can cause too low an evaporating temperature with the possibility of freezing the evaporator or tripping safety devices.

### Chilled water temperature (cooling)

The minimum temperature allowed at the evaporator outlet without glycol is 5°C. To operate below this limit glycol should be used and the unit will require control parameter modifications. Should this be required, please contact TEV Ltd Technical Services. The maximum temperature allowed at the evaporator inlet is 20°C.

### Hot water temperature (winter operation)

When steady state conditions are achieved, the water temperature at the condenser inlet should not be less than 25°C. Lower values than this can cause incorrect operation of the compressor resulting in failure. The maximum water temperature at the condenser outlet should not exceed 50°C. Values higher than this will cause safety devices to trip.

### Ambient air temperature

The units are designed and manufactured to operate in cooling, with ambient air temperature in range from 20 to 43°C. Fitting a fan speed control reduces the limit for the minimum ambient air temperature to -15°C. In heating mode (heat pumps only) the operation limit is from -5°C to 20°C.

**CORRECTION TABLES      Operation with glycol**

Glicol percentage	Freezing point (°C)	CCF	IPCF	WFCF	PDCF
10	-3,2	0,985	1	1,02	1,08
20	-7,8	0,98	0,99	1,05	1,12
30	-14,1	0,97	0,98	1,09	1,22
40	-22,3	0,965	0,97	1,14	1,25
50	-33,8	0,955	0,965	1,2	1,33

**CCF:** Capacity correction factor  
**IPCF:** Input power correction factor  
**WFCF:** Water flow correction factor  
**PDCF:** Pressure drops 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.

**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

**SOUND DATA**

SOUND LEVELS											
Mod.	Octave bands (Hz)								Lw		Lp
	63	125	250	500	1K	2K	4K	8K	dB	dB(A)	dB(A)
	dB	dB	dB	dB	dB	dB	dB	dB			
<b>04</b>	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
<b>05</b>	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
<b>07</b>	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
<b>09</b>	80,9	72,3	66,2	64,7	63,6	58,2	54,8	45,7	81,9	68,0	40,0
<b>13</b>	81,9	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69,0	41,0
<b>15</b>	81,9	73,3	67,2	65,7	64,6	59,2	55,8	46,7	82,9	69,0	41,0
<b>20</b>	86,9	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74,0	46,0
<b>25</b>	86,9	78,3	72,2	70,7	69,6	64,2	60,8	51,7	87,9	74,0	46,0
<b>30</b>	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0
<b>35</b>	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0
<b>40</b>	91,9	83,3	77,2	75,7	74,6	69,2	65,8	56,7	92,9	79,0	51,0

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.

### SAFETY DEVICE SETTING

Device	Capacity Steps				Reset Type
	1				
	Set-point	Differential			
Control thermostat (summer)	°C	12	2		...
Control thermostat (winter)	°C	40	2		...
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
Water safety valve (Optional)	Bar	6	...		...

### ELECTRIC DATA

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

\* Only sizes 04,05,07,09

Electric data may change due to product updates. Always refer to the wiring diagram inside the units.



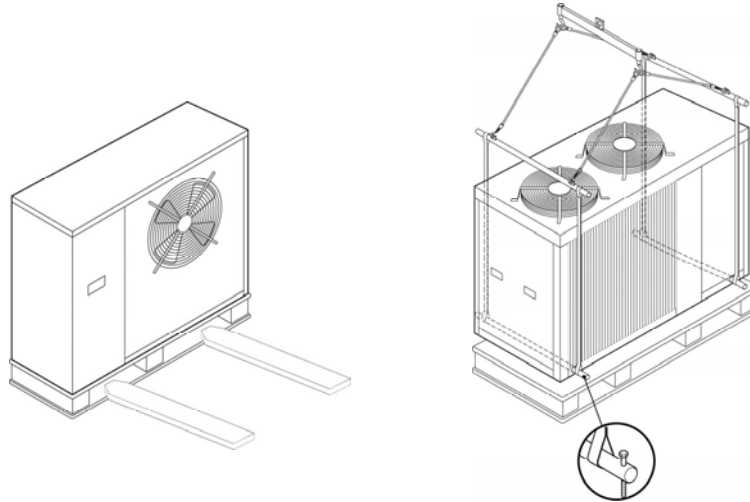
**WARNING: All operations described the following sections MUST BE PERFORMED BY TRAINED PEOPLE ONLY. Before servicing the unit, ensure that the electric supply is disconnected.**

### INSPECTION

When installing or servicing the unit the information provided should be followed, all warnings on the labels on the unit noted and all sensible precautions taken. Failure to observe the warnings given in this manual can create dangerous situations. After receiving the unit, immediately check its integrity. The unit left the factory in perfect condition; any eventual damage must be questioned to the carrier and 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 are useful.

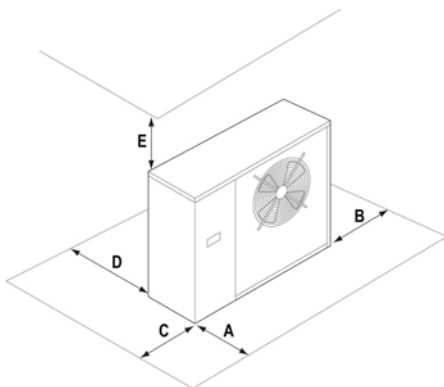
## LIFTING AND HANDLING

When unloading the unit, care must be taken to prevent damage to the refrigerant circuit, condensing coils or unit casing. Units can be lifted by using a forklift or by using straps or slings, taking care that the method of lifting does not damage the side panels or the cover. It is important to keep the unit horizontal at all time to avoid damage to the internal components. Ensure that the method of lifting does not allow the unit to slip from chains or slings, turn over or slide from lifting devices.

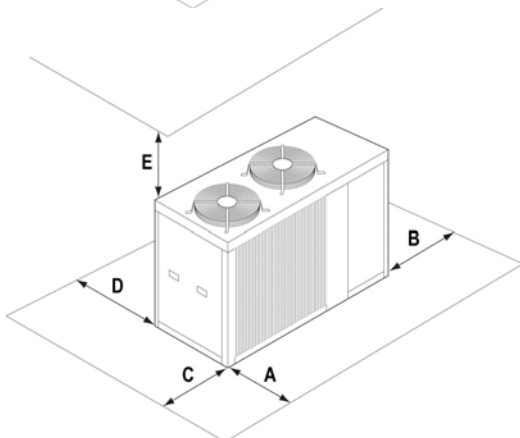


## LOCATION AND MINIMUM CLEARANCES

QCPK units are designed for external installation: any overhang or cover above the 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 however it is advisable 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. The following clearances should be maintained to ensure adequate air volume onto the condenser. Re-circulation of discharge air must be avoided; failure to observe this point will result in poor performance or activation of safety controls.



MO D	A	B	C	D	E
04	800	500	500	500	500
05	800	500	500	500	500
07	800	500	500	500	500
09	800	500	500	500	500
13	1000	500	500	500	500
15	1000	500	500	500	500
20	1500	500	500	500	500
25	1500	500	500	500	500



MO D	A	B	C	D	E
30	1000	800	800	800	3000
35	1000	800	800	800	3000
40	1000	800	800	800	3000



**WARNING:** The equipment should be installed such that maintenance and/or repair services are possible. The warranty does not cover costs due to lifting apparatus and platforms or other lifting systems in the event of warranty work/replacement being required



**WARNING:** All maintenance operations must be done by **TRAINED PERSONNEL** only.



**WARNING:** Before any service operation on the unit, be sure that the electric supply is disconnected.



**WARNING:** Moving components are present Inside the unit. Take care when working in their vicinity even if the electric supply is disconnected.



**WARNING:** The top shell and discharge line of compressor are usually at high temperature Be careful when operating in their vicinity.

**WARNING:** Aluminium coil fins are very sharp and can cause serious wounds. Be careful when operating in their vicinity



**WARNING:** After service operations, fit the unit cover panels and fix them with their locking screws

## HYDRAULIC CONNECTIONS

Unit water pipe-work must be installed in accordance with national and local regulations. Pipes can be steel , galvanized steel 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 should 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 isolate the unit from the hydraulic circuit.
- Metallic filters (strainer) to be mounted on the inlet pipe with a mesh not larger than 1 mm.
- Vent valves, expansion tank with water filling, discharge valve.



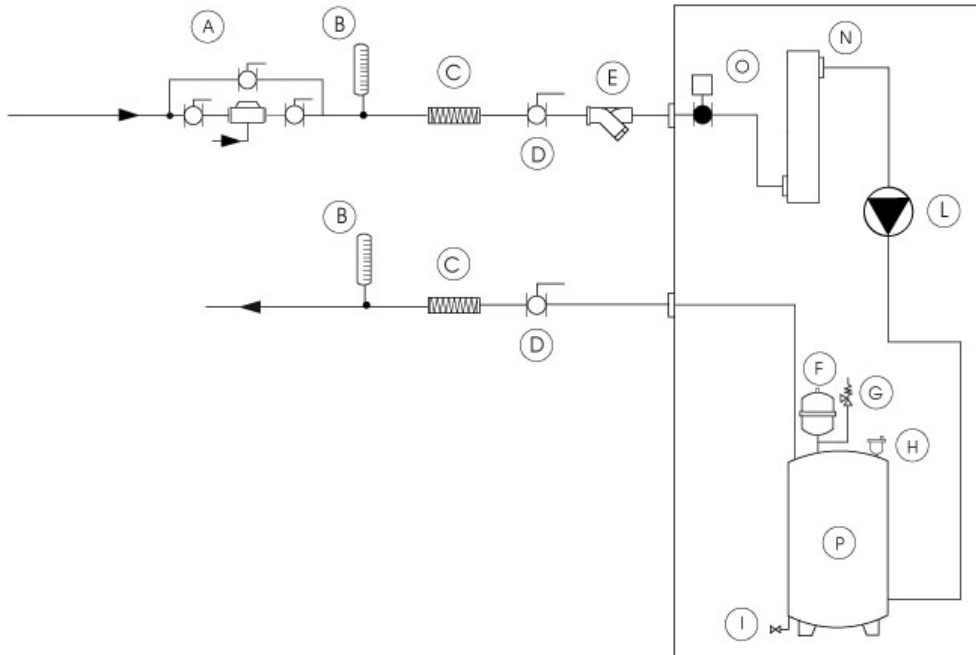
**WARNING:** Unit water inlet must be connected to the connection labelled: "USER WATER IN", otherwise the heat exchangers may freeze.

**WARNING:** It is compulsory to install on the USER WATER IN connection a metallic filter with a mesh not larger than 1 mm. The presence of the filter is to be considered mandatory, the warranty will no longer be valid if it is removed. The filter must be kept clean. It should be checked after the unit has been installed and then periodically.



**WARNING:** All units are factory fitted with the flow switch. If the flow switch is altered, removed, or if the water filter is not fitted on the unit, the warranty will be invalidated. Please refer to the wiring diagram for flow switch electric connections.

### Schematic hydraulic circuit



A	System filling group	H	Vent valve
B	Thermometer	I	Water tank Drainage valve
C	Flexible connection	L	Water pump
D	Ball shut-off valve	M	One way valve
E	Water strainer	N	Evaporator
F	Expansion vessel	O	Flow switch
G	Safety valve	P	Water tank

### ELECTRICAL CONNECTIONS

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.



**WARNING:** 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.



**WARNING:** The electric supply must be within the limits shown, if not the warranty will be invalid. Disconnect the electrical supply before undertaking any work on the unit.

**WARNING:** Never bridge the flow switch connections in the terminal board. Guarantee will be invalidated if flow switch connections are altered or not properly made.



**WARNING:** The remote control panel is connected to the chiller by 2 core 2,5 mm<sup>2</sup> cable. Power cables must be separated from remote control wires. Maximum distance 50 metres.



**WARNING:** The remote control panel must not be installed in an area were it would be subject to strong vibrations, corrosive gases, excess of dirt or high humidity level. The cooling openings must be kept clear at all times.

## 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.**



**WARNING: Crankcase heaters must be powered at least 12 hours before start up by closing the main switch (heaters are automatically energised when main switch is closed). The crankcase heaters are working properly if after some minutes the compressor crankcase temperature is about  $10\pm 15^{\circ}\text{C}$  higher than ambient temperature**

### Start up and switch off

Push  for 5 seconds to run the unit in heating mode. Push the same key for 5 seconds to switch off.

Push  for 5 seconds to run the unit in cooling mode. Push the same key for 5 seconds to switch off.



**WARNING: 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.**



**WARNING: Do not modify any internal wiring, otherwise warranty will be invalidated.**

**WARNING: In heat pump versions, the heat/cool operation must be selected at the beginning of the related season. Frequent change over of the operation mode must be avoided in order to prevent severe damage to compressors.**

## MICROPROCESSOR USER INTERFACE



### Display

The display area is divided in three parts:

**Left Upper Side** : It shows the evaporator “water IN / OUT” temperature.

**Left Lower Side** : It shows the temperature or the pressure of the condenser and the clock time.

**Right Side**: Icon area.

### Display icons

Icon	Meaning	Icon	Meaning
°C	Celsius degrees	H	High pressure Alarm
°F	Fahrenheit degrees	L	Low pressure Alarm
bar	Bar	⚡	Anti-freeze electric heater activated
PSI	Psi	📶	Infrared Transmission activated
1	Compressor 1	Flow!	Water Flow Alarm
2	Compressor 2	🕒	The display is showing a time value
Zz	Unit in Stand-by	🔑	Compressor Maintenance Request
⚠️	General Alarm	Menu	Function Menu activated

### Key function



**M** to enter the function Menu or to set the clock



**SET** allows to show and modify the set point. In programming mode it selects a parameter and confirm its value.

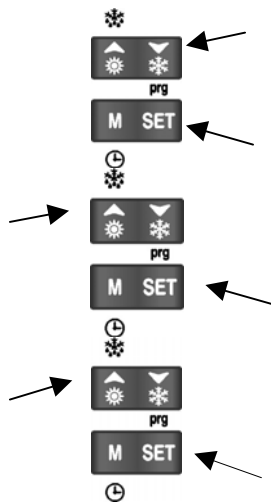


Push it for 5 s to run the unit in Chiller mode. Push and release to change the read-out between “IN/OUT water” / supplied air. In programming mode it scrolls the parameter list or increases the value of the parameter itself.



Push it for 5 s to run the unit in Heat Pump mode. Push and release to change the read-out between “outside air” / defrost temp. In programming mode it scrolls the parameter list or decreases the value of the parameter itself.

### Key combination



Press **SET** and **DOWN** key to Enter the programming.

Press **SET** and **UP** key to Exit the programming.

Push them together for more than 5 sec to start a manual defrost.

### Keyboard leds

Symbol	Led	Function	Symbol	Led	Function
	On	Heat pump		Blinking	Time delay before defrosting
	On	Chiller		On	Defrost On
	Blinking	Programming phase (It blinks with  led)		Off	Defrost Off
					Clock Set-up

### Normal condition read-out



If no alarm conditions are present, the display shows:







**Left upper side:** Evaporator water Inlet/Outlet temperature.

**Left lower side:** Condensing Temperature / Pressure; The clock .

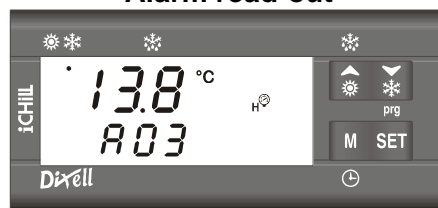
## REMOTE KEYBOARD







### Key function

	<b>M</b> allows to enter the menu or to set the clock time.
	<b>SET</b> allows to show and modify the set point. During the programming it selects a parameter and confirm its value.
	It selects the water IN / OUT or the ambient air read-outs. During the programming it scrolls the parameter code or increases its value.
	It selects the external /defrost air temperature read-out. During the programming it scrolls the parameter code or decreases its value.
	If pushed for 5s it allows to start the unit in chiller or heat pump function.
	If pushed for 5s it allows to start the unit in chiller or heat pump function.

### Alarm read-out



Starting from the normal condition (no alarms), when the instrument detects an alarm event, the left lower side shows the alarm code alternated with the probe value. The corresponding icon is illuminated. The following four icons indicate which alarm is activated.

	Generic Alarm		High pressure alarm
	Low pressure alarm		Water flow Alarm

## Silencing the buzzer

**Automatically:** just after the alarm condition is recovered.

**Manually:** push and release one of the four keys; the buzzer is stopped even if the alarm is still active.

## First start up

After giving power supply to the instrument, the left lower display can show “rtC” alternated with the probe value: **it is necessary to set the clock time.** If the probes are not connected, or they are faulty, the display shows even the corresponding alarm code. In any case it is possible to proceed with the parameter or clock setting.

## How to set the clock rtc

Push the **M** key for some seconds and wait until the “Hour” label appears. Release the M key. Now push **SET**: the hour value starts blinking. Use the **UP** and **DOWN** key to change the value. Confirm by pushing **SET**; After some seconds the controller will show the next parameter (Min).

Repeat the operation to set the other parameters:

**Min:** Minutes (0÷60)

**UdAy** Weekday (**Sun** Sunday, **Mon** Monday, **tuE** Tuesday, **UEd** Wednesday, **tHu** Thursday, **Fri** Friday, **SAt** Saturday).

**dAy** Day of the month(0÷31)


**MntH** Month (1÷12)

**yEAR** Year (00÷99)

## Display read-out when remote on/off

The digital input configured as remote OFF: if activated it turns off the controller (also for condensing units), upper display shows “OFF” the decimal point led is blinking. This remote on/off command overrides the instrument keyboard commands. The keyboard commands are active only when the digital input is not active. When the remote off is not activated the controller automatically restarts.

## Stand- by function

Each time the Chiller or Heat Pump cycles are stopped, the unit goes in stand-by and the  icon turns on. The controller stand-by allows to:  
Show the probe values using key arrows.  
Show and manage the alarm events.

## “M key” the function menu

Entering the function Menu allows to:  
Show and reset the active alarms.  
Show and reset the time running hour counters of the loads.  
Enable the infra-red communication device.  
Show the time delay to achieve and start the defrost (only for Heat Pump).  
Upload the parameters from the controller to the Hot Key (see 10.2).  
Show the alarm log.  
Reset the alarm log.  
During the Menu operations the “menu” icon is on.

## Access to function menu

Push and release the **M** key. The “menu” icon is on. Push and release the **M** key or wait the time out. The “menu” icon disappears.

## How to show the alarm events

Enter the function Menu:  
Use **UP** or **DOWN** keys to find the “ALrM” label.  
Push and release the **SET** key.  
Use **UP** or **DOWN** keys to scroll the alarm list.  
To exit the function Menu push and release the **M** key or wait the time-out. The “menu” icon disappears.

## How to reset an alarm event

Enter the function Menu.  
Use **UP** or **DOWN** keys to find the “ALrM” label.  
Push and release the **SET** key, the lower display shows the alarm code.

Upper display: **rSt** label if the alarm can be reset, **NO** label if it is not possible.

Use **UP** or **DOWN** keys to scroll the alarm list.

Push **SET** key, when **rSt** is lighted, to reset the alarm, after a while the read-out move to next alarm.

To exit the function menu push and release the **M** key or wait the time-out. The “menu” icon disappears.

#### Time running hour counter of the loads


Enter the function Menu.

Use **UP** or **DOWN** keys to find on the lower display:

**C1Hr** (Compressor n°1 hour counter),

**C2Hr** (Compressor n°2 hour counter),

**PFHr** (Water pump or supply fan hour counter).

The upper display shows the time running hour value. The clock icon  is lighted.

#### Reset the hour counters

Enter the function Menu.


Use **o** or **n** keys to find on the lower display the **C1Hr**, **C2Hr** or **PFHr**.

Push **SET** key for 3seconds: the upper display turns to 0 indicating the reset.

To exit the function menu push and release the **M** key or wait the time-out. The “menu” icon disappears.

#### Show the time delay to start the defrost

Enter the function Menu.

Use **o** or **n** keys to find, on the upper display, the **dEF** (defrost) label, the lower display shows the time delay to reach and start the defrost (minutes and seconds), the icon  is blinking.

To exit the function menu push and release the **M** key or wait the time-out. The “menu” icon disappears.

#### How to see the alarm log

Enter the function Menu.

Use **o** or **n** keys to find **ALOG** label.

Push **SET** key: the lower display shows the alarm code, the upper display shows “**n**” followed by the progressive number.

With **o** or **n** scroll the alarm list.

To exit from **ALOG** function push **M** key or wait the time-out delay is expired.

The memory contains **50** alarm events structured in a FIFO list. Each new alarm will take the place of the oldest alarm contained in the FIFO list. ( the read-out is ordered from the oldest to the newest)

#### How to reset the alarm log

Enter the function Menu.

Select the **ALOG** label showed on the lower display.

Push **SET** key.

Select with **o** or **n** keys the **ArSt** (Alarm reset) label on the lower display, the upper display is **PAS**.

Push **SET** key and then enter the password **PAS**, upper display shows **0** blinking.

Write the right password number.

The **ArSt** label starts blinking for **5s**, to confirm the alarm logging data is reset.

After finishing the display restarts from normal condition.

#### How to see the set point value

Push and release the **SET** key.

Lower display shows: **SetC** set of chiller mode; **SetH** set of heat pump mode.

The upper display shows the corresponding set value. (SetH is available only if configured for Heat Pump).

## How to change the set point value


Push **SET** key for more than 3 seconds.

The setpoint value is now blinking.

Use **UP** or **DOWN** keys to increase or decrease the new value.

When finishing, push and release **SET** key again or wait for the time-out to exit the programming.

## Maintenance function

**CO14** for 1<sup>st</sup> compressor, **CO15** for 2<sup>nd</sup> compressor and **CO16** for water pump or supplied air fan (air/air) are the maximum time running hours to signal a maintenance request, the icon  is blinking. The icon only indicates the need of a check: **nothing else happens**. It stops blinking just after resetting the hour counter under the function Menu.

## Black out

After a black-out: The controller restarts from the previous status; The defrost cycle is stopped; All the working time delay will be reloaded.

## 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.

## 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.

## MAINTENANCE AND PERIODIC CHECKS



**WARNING: All operations described in this chapter MUST BE PERFORMED BY TRAINED PERSONNEL ONLY. Before servicing the unit, ensure that the electric supply is disconnected. The top shell and discharge line of compressor are usually at high temperature level. Be careful when operating in their vicinity. Aluminium coil fins are very sharp and can cause serious wounds. Be careful when operating in their vicinity. After servicing, fit the cover panels and, fix them with their locking screws.**

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

- **Check that safety and control devices work correctly as previously described (monthly).**
- **Check all the terminals on the electric board and on the compressor are tight.**
- **Check and clean the terminals of the contactors.**
- Check refrigerant charge by sight glass; check leakages from compressor (monthly).
- Check water leakages in the hydraulic system (monthly).
- If the unit is to be stopped for a long period, the hydraulic circuit, including all internal pipework and heat exchanger should be emptied. This operation is compulsory if, during seasonal shutdown, the ambient temperature is expected to go below the freezing point of the fluid in the hydraulic circuit (typical seasonal operation).
- Check the flow switch operation, clean strainer on water piping (monthly).
- Check compressor crankcase heater proper supply and functioning (monthly).
- Clean condenser coil metallic filters with compressed air in the opposite direction of the air flow. If filters should be fully clogged, clean them with a water jet (monthly).
- -Check mounting of fan blades and their balancing (every 4 months).
- Check the colour of the sight glass core (green=no moisture, yellow=moisture present): if it has a yellow colour, change the refrigerant filter (every 4 months)

## 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.



**WARNING: Never use oxygen instead of nitrogen: explosions may occur.**

## ENVIRONMENT PROTECTION

### 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.**

## DECOMMISSIONING

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.

## FAULT FINDING

Cod	Meaning	Cause / Origin	Reset
<i>P1</i>	Pb1 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
<b>P2</b>	Pb2 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
<b>P3</b>	Pb3 probe alarm	Missing, faulty probe or resistance /current exceeding value	<b>Automatic</b> if the probe value recovers
<b>P4</b>	Pb4 probe alarm	Missing, faulty probe or resistance exceeding value	<b>Automatic</b> if the probe value recovers
<b>A01</b>	High pressure switch alarm	Digital input for high pressure activated	<b>Manual</b> after the alarm event expires, proceed with manual reset.
<b>A02</b>	Low pressure switch alarm	Digital input for low pressure activated	<b>Manual</b> after the alarm event expires, proceed with manual reset.

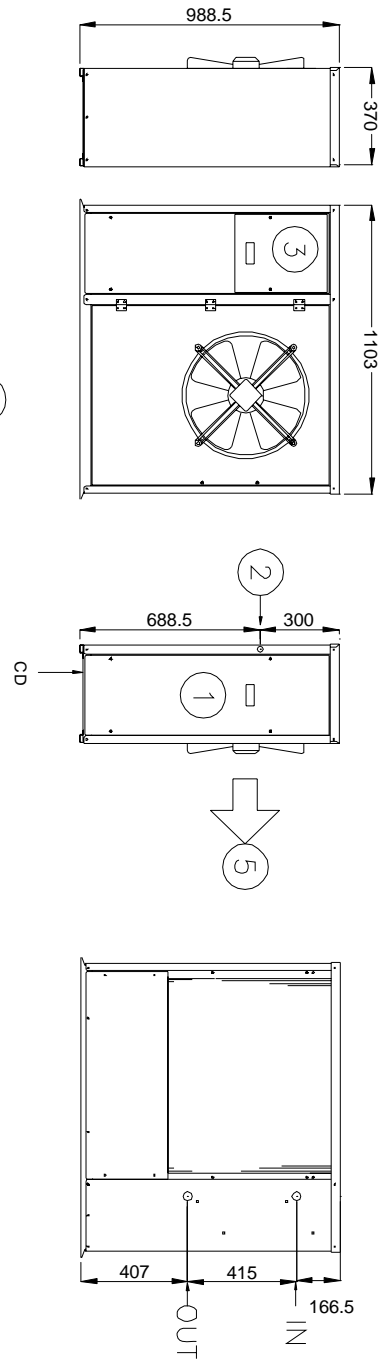
<b>Cod</b>	<b>Meaning</b>	<b>Cause / Origin</b>	<b>Reset</b>
A07	Anti freeze alarm	Digital input active anti freeze probe	<b>Manual</b> proceed with manual reset.
<b>A08</b>	Water flow alarm	Digital input active for AL06 duration.	<b>Automatic</b> It turns to manual after 3 events in 1 hour.
<b>A09</b>	Compressor 1 thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
A10	Compressor 2 thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
<b>A11</b>	Condenser fan thermal protection alarm	Digital input active	<b>Manual</b> the event expires, then proceed with manual reset.
<b>A12</b>	Defrost error alarm	Max defrost time	<b>Automatic</b> with next proper defrost cycle. Proceed with manual reset.
<b>A13</b>	Compressor 1 maintenance warning	Running hour > CO14	<b>Manual</b> Proceed with the hour reset procedure.
<b>A14</b>	Compressor 2 maintenance warning	Running hour > CO15	<b>Manual</b> Proceed with the hour reset procedure
A15	Water pump maintenance Warning	Running hour warning	<b>Manual</b> Proceed with the hour reset procedure
<b>rtC</b>	Clock alarm	Need to set the clock time	<b>Manual</b> Set the clock and then proceed with manual reset.
<b>rtF</b>	Clock alarm	Faulty clock control	<b>Manual</b> Proceed with manual reset, if nothing happens change the clock.
<b>EE</b>	EEPROM error alarm	Possible data losing	<b>Manual</b> Proceed with manual reset., if nothing happens the controller is locked, no regulation available.
<b>ACF1</b>	Configuration alarm	Heat pump configured without reversing valve	<b>Automatic</b> After parameter proper debug.
<b>ACF2</b>	Configuration alarm	without condensing probe control configuration	<b>Automatic</b> After parameter proper debug.
<b>ACF3</b>	Configuration alarm	Two digital inputs having the same function	<b>Automatic</b> After parameter proper debug.
<b>FErr</b>	Functioning alarm	Two digital inputs activated at the same time	<b>Manual</b> after the alarm event expires, proceed with manual reset.
<b>AFr</b>	Frequency alarm	The frequency of power supply is out of range	<b>Automatic</b> After the frequency becomes normal

# DIMENSIONS

1	INSPECTION PANEL
2	POWER SUPPLY INLET
3	ELECTRICAL BOX
4	SUCTION
5	AIR OUTLET
IN	USER WATER INLET
OUT	USER WATER OUTLET
CD	CONDENSATE DRAIN

Denomination  
**WATER CHILER DIMENSIONAL DRAWING QCPK 04-05**

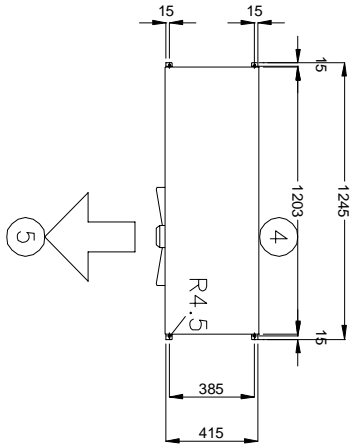
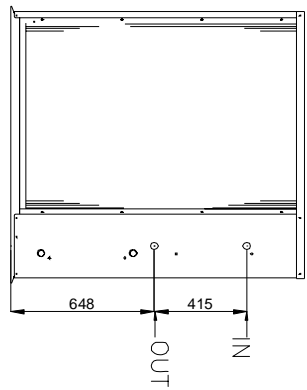
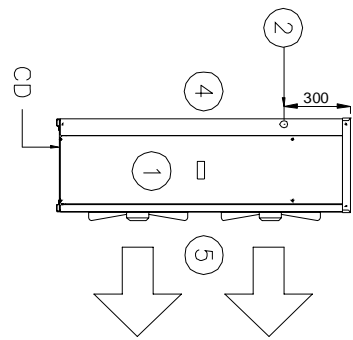
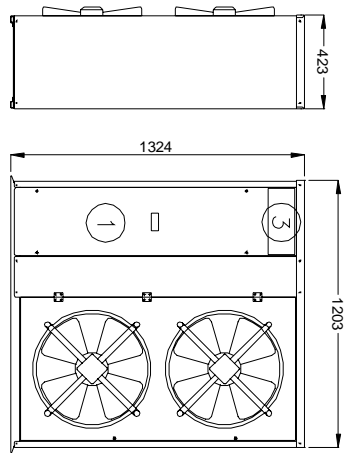
Drawing	Rev.	Date	Scale	Form.		Order
70701115	01					
Replace draw.						



1	INSPECTION PANEL
2	POWER SUPPLY INLET
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4	SUCTION
5	AIR OUTLET
IN	USER WATER INLET
OUT	USER WATER OUTLET
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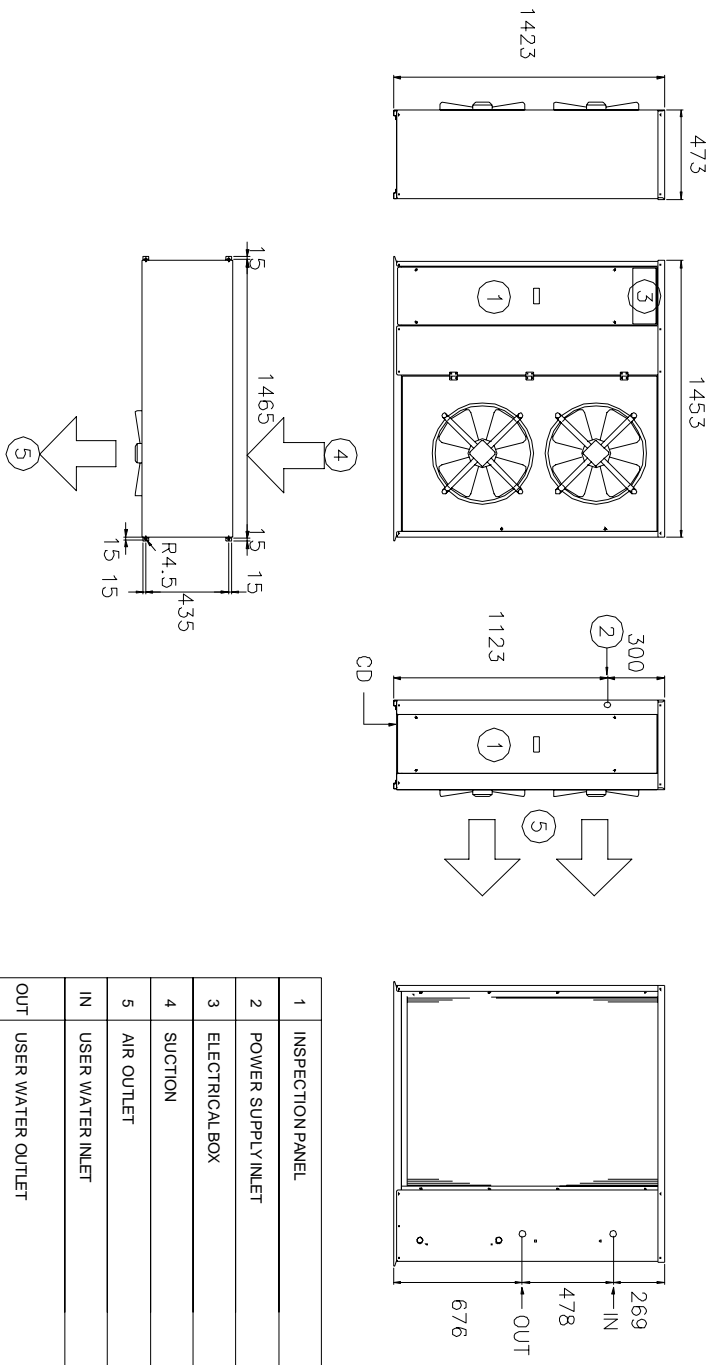
Denomination  
**WATER CHILER DIMENSIONAL DRAWING QCPK 07-09**

Drawing	Rev.	Date	Scale	Form.	Checked by	Order
70701116	01					
Replace draw.						



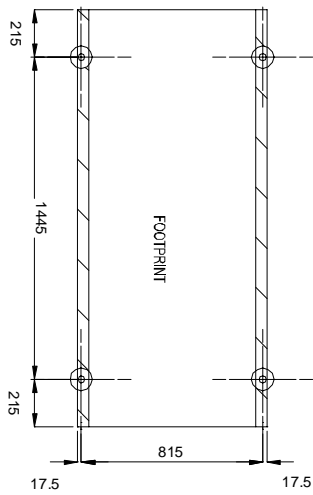
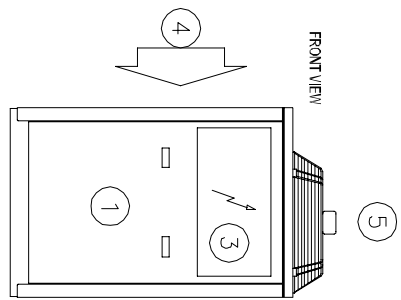
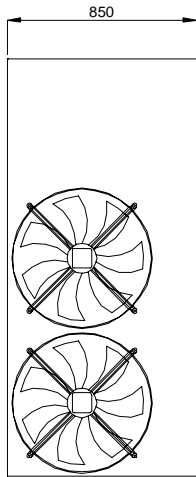
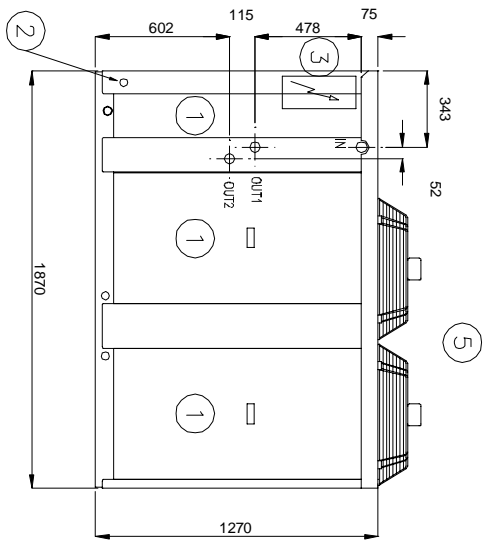
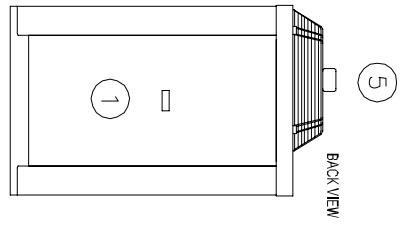
1	INSPECTION PANEL
2	POWER SUPPLY INLET
3	ELECTRICAL BOX
4	SUCTION
5	AIR OUTLET
IN	USER WATER INLET
OUT	USER WATER OUTLET
CD	CONDENSATE DRAIN

Determination				
<b>WATER CHILLER DIMENSIONAL DRAWING QCPK 13-15</b>				
Drawing	Rev.	Date	Scale	Form.
70701117	01			
Replace draw.	Draftsman	Checked by	Order	



Denomination				
WATER CHILER DIMENSIONAL DRAWING QCPK 20-25				
Drawing	Rev.	Date	Scale	Form.
70701118	01			
Replace draw.			Draftsman	Checked by
				Order

1	INSPECTION PANEL
2	POWER SUPPLY INLET
3	ELECTRICAL BOX
4	SUCTION
5	AIR OUTLET
IN	USER WATER INLET R 1 1/4"
OUT1	USER WATER OUTLET R 1 1/4"
OUT2	USER WATER OUTLET UNITS R 1 1/4"



Denomination				
WATER CHILER DIMENSIONAL DRAWING QCPK 30-35-40				
Drawing	Rev.	Date	Scale	Form.
70701119	01			
Replace draw.		Draftsman	Checked by	Order