



Q V A N T U M

HEAT PUMPS FOR SUSTAINABLE CITIES

QVANTUM VS



Heat pumps for liquid-based heat sources

Q32-65VS

Water/Water
15 – 79 kW



High efficiency
Frequency controlled
Compact design
Flexible installation

Quantum VS – Frequency controlled heat pumps

GENERAL

Quantum VS is equipped with speed control, which means that the heat pump can regulate the heating effect continuously according to current needs. Depending on the power size, the power can be approximately regulated between 30% up to 100%. The unit for capacity control, the inverter, is internally mounted in the unit. Cooling is done with air.

Quantum VS is intended for use in systems where the brine consists of a mixture of water and antifreeze (eg horizontal, and vertical ground source, sea water systems, exhaust air system).

NOTE!

The units are equipped with an inverter that delivers "leakage current" to the mains, so a 30 mA earth fault circuit breaker can not be used. Typical levels of leakage current are 50-200mA/converter + 2mA/meter motor cable.

QVANTUM QLC-SYSTEM

The Quantum VS is equipped with the Quantum QLC control system as standard. QLC stands for Quantum Logic Controller. The unit is controlled and operated via the principal of liquid condensation or solid/half solid condensation. All control parameters, such as outdoor temperature compensated set-point curve for supply, hot water temperature, and auxiliary heat, are set via the self-instructing control system. Required protection and safety features are built into the QLC control system.

The system is managed via a 5,7" panel mounted in the heat pump. All parameters can be set via the panel. The panel displays a dynamic flow chart panel with all temperatures and operating modes measured and controlled. The QLC control system also logs temperatures and events, which facilitates setup and analysis. The system communicates via Modbus. Modbus TCP is standard. The system also has a webserver which allows the QLC control system to communicate with a web browser on a PC or cell phone.

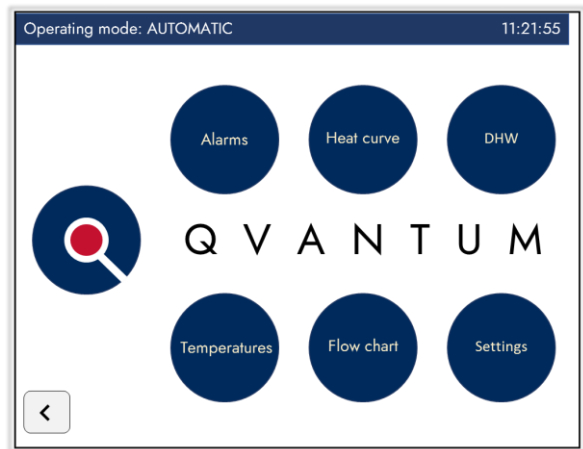


Fig 1. 5,7" panel display.

As an option, the unit can be equipped with a display that allows for dynamic flow images and extended network functionality.

The temperature to the heating system is controlled according to the selected outdoor temperature compensated curve. Hot water preparation, if such a function is required, takes place via a switching valve.

In bivalent systems, the control system switches on additional heat when necessary and after a time delay. The auxiliary heat can be selected to "take over" the hot water preparation as the first step and thereby release power from the heat pump to the heating system.

The QLC control system can control up to 8 heat pumps in sequence with automatic operating time equalization between the different heat pumps. The QLC control system is configured at commissioning depending on the selected system solution and type and number of heat pumps.

The heat pump can be configured for control via an overlaying external control system if required. Set points can be changed via Modbus so that the controller's regulators are set by the master controller. It is also possible to configure the system so that the heat pump is fully controlled by the overlaying external control system. In this case, the QLC control system is used only for alarm and protection functions.

E.g., Temperatures readable via Modbus *)

- 1: Heat pump heat carrier - in
- 2: Heat pump heat carrier - out
- 3: Heat pump hot gas temperature
- 4: Heat pump brine - in
- 5: Heat pump brine - out
- 6: Radiator circuit supply
- 7: Outdoor Temperature

*) Modbus description for complete information

All relay outputs are also readable. It is thus possible to transmit the operating status of compressors, pumps, fans etc. controlled by the heat pump.

Set points for hot water temperature and control curve for radiator circuit can be read and adjusted. From the expansion valve control unit, the current evaporating temperature, pressure, overheating, the degree of opening of the expansion valve can be monitored via Modbus.

ELECTRONIC EXPANSION VALVE

Quantum VS heat pumps are equipped with an electronic expansion valve. The expansion valve has its own electronic control unit with display that shows evaporating pressure, temperature, superheat, etc. Via Modbus these variables can be transferred to a higher-level control system.

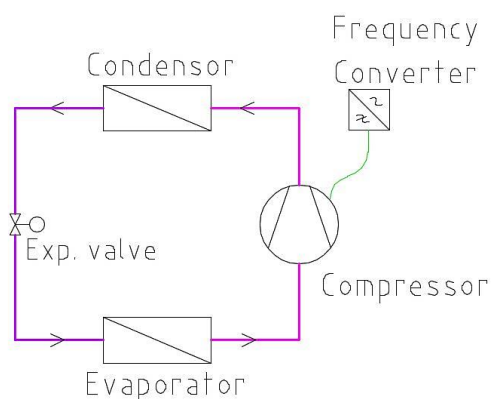


Fig 2. Principal layout showing the refrigerant circuit.

REFRIGERANT

Quantum VS heat pumps are available in two different versions with respect to refrigerants:

- refrigerant R-407C (supply temperature max +55°C)
- refrigerant R-134a (supply temperature max +65°C).

BRINE CIRCUIT

Quantum VS are as standard configured for water. As an option, however, the unit can be configured for brine with antifreeze, e.g. bioethanol.

PIPE CONNECTIONS

Q32VS – Q65VS has top connections. See drawing Q-VS-32-65-001.

CONSTRUCTION

The unit is built on a robust stand of galvanized square tubes and covered with an effective sound-absorbing casing, consisting of powder-coated plates with sound-absorbing material on the inside. The top plate is made of patterned aluminum. The top and bottom are also covered with sound-absorbing material. The stand rests on adjustable rubber feet.

ACCESS

The unit is constructed so that all components inside the heat pump are easily available by removing the cover plates, both for maintenance and replacement.

OPTIONS

The following options are available:

- Bioethanol as brine.
- Connecting QLC to network.
- Hot gas heat exchanger.
- Reversible function.

EQUIPMENT

The units are equipped with a fully hermetic piston compressor designed for speed control and a refrigerant circuit.

The units are equipped with a built-in air-cooled inverter, 3-phase 400V.

Heat exchanger

- The evaporator is a brazed plate heat exchanger in stainless steel, insulated with Armaflex insulation.
- The condenser is a brazed plate heat exchanger in stainless steel.
- Hot gas heat exchanger (option) brazed plate heat exchanger in stainless steel, insulated with Armaflex insulation.

Refrigerant circuit

- Drying filter
- Sight glass with moisture indication
- Electronic expansion valve, pressure transmitter, control equipment with display (Modbus)
- High- and low-pressure switch, manual reset
- Service valves for pressure measurement
- Rotalock valves
- Pressure protection equipment, high and low pressure

TESTING

The units are test run and calibrated under design conditions using ClimaCheck.

TECHNICAL DATA

See separate document "Quantum VS – Technical data" for more information.



Solution and Heat Pump Experts

Qvantum was founded 1993 with a vision to develop innovative high quality heat pumps. Today Qvantum continues on this path developing the solutions needed for decarbonization of our cities.

Qvantum is also a company with leading experts in the design of the next generation (5th) district heating and cooling solutions for dense urban areas.

By combining these competence areas, Qvantum can provide solutions that will make it easier for Engineering consultants, Installers, Project developers and Utilities, to decarbonize the heating and cooling of our cities.

