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GLWC(H)-1130-4960

GLWC 1130,1140 CA2, GLWC 2330-2600 CA2, GLWC 3810-4960 CA2, GLWC 1130-4840 CA2.HE,
GLWH 1130,1140 CA2, GLWH 2320-2600 CA2, GLWH 3810-4960 CA2
TECHNICAL DATA

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FläktGroup chillers and heat pumps

G	L	W	C	2	4	8	0	C	A	2	.	H	E

FläktGroup Chiller | Condenser | Operating mode | No. of compressors | Capacity stage | Series | Refrigerant | Supply voltage | Design

FläktGroup chiller, water cooled for indoor installation
GLWC 1130-4960 CA2
GLWC 1130-4840 CA2.HE

and

FläktGroup heat pump, water cooled for indoor installation
GLWH 1130-4960 CA2

GL	FläktGroup Large
W	Water cooled (indoor installation)
C	Chiller
H	Heat pump
1	1 compressors
2	2 compressors
3	3 compressors
4	4 compressors
	Standard versions (chiller and heat pump)
130, 140	1 compressor
320, 360, 420	2 compressors
450, 480, 540	2 compressors
600	2 compressors
810, 900	3 compressors
900, 960	4 compressors
	HE versions (only chillers)
130, 140, 160	1 compressor
180, 210, 240	1 compressor
270, 300	1 compressor
280, 320, 360	2 compressors
420, 480, 540	2 compressors
720, 780, 840	4 compressors
C	Unit series C
A	R-134a
2	400 V/3~/50 Hz (+PE)
-	Standard
.HE	HE unit - high-efficiency model, only applicable to GLWC chiller type

Chiller

GLWC 1130-4960 CA2.(HE)

FläktGroup Chiller GLWC 1130-4960 CA2 (.HE):

- Refrigerant R-134a
- 2 unit models
  - Basic model
  - HE - model for energy-optimised operation
- 1 to 4 refrigeration circuits
- 1 compact screw compressor per each refrigeration circuit
- Selection between 35 units with cooling capacity from 300 to 2,415 kW
- Operating range for chilled water: -8 °C to + 15 °C
- Operating range for cooling water: 20 °C to + 50 °C (HE model)
- Compact screw compressor with continuous regulation between 25 and 100 %
- Electronic expansion valve
- Unit units have class A Eurovent certification

Heat pump

FläktGroup heat pump GLWH 1130-4960 CA2:

- R-134a as refrigerant
- 1 unit model
  - Basic model
- 1 to 4 refrigeration circuits
- 1 compact screw compressor per each refrigeration circuit
- Selection between 41 units with cooling capacity from 300 to 2,415 kW and heating capacity from 330 to 2,575 kW
- Operating range for chilled water: -8 °C to + 15 °C
- Compact screw compressor with continuous regulation between 25 and 100 %
- Electronic expansion valve

GLWH 1130-4960 CA2

All chillers of GLWC 1130-2600 CA2 and GLWC 1130-2480 CA2.HE series and heat pumps of GLWH 1130-2600 CA2 models are certified by Eurovent.

EUROVENT CERTIFIED PERFORMANCE
www.eurovent-certification.com

The following values and figures depend on the unit size and are presented in the table "General data".

EER value:

The EER value (Energy Efficiency Ratio) of a chiller indicates the relationship between cooling capacity and consumed electrical power with consideration of the following measurement conditions for water cooled units:

- Medium water
- Chilled water inlet temperature 12 °C
- Chilled water outlet temperature 7 °C
- Cooling water inlet temperature 30 °C
- Cooling water outlet temperature 35 °C
- Unit operates under full load

The higher the EER value - the more energy efficient the unit operation at 100% full load. With units that operate at full load most time of the year or the whole year around - special attention should be paid to a possibly high EER value. This is often the case in production facilities or computer and data processing centres.

GLWC 1130-4960 CA2 units are designed with consideration of maximum efficiency at full load and surpass the requirements of the Eurovent A class by many times.

COP value:

The COP value (Coefficient of Performance) of a heat pump indicates the relationship between heating capacity and consumed electrical power with consideration of the following measurement conditions for water cooled units:

- Water as medium
- Chilled water inlet temperature 10 °C
- Warm water inlet temperature 40 °C
- Warm water outlet temperature 45 °C
- Unit operates under full load
- Chilled water volume flow in heating mode corresponds to chilled water volume flow in evaporator in cooling mode

The higher the COP value - the more energy efficient the unit operation at 100% full load.

ESEER value:

The ESEER value demonstrates the energy efficiency not only in full load conditions but in part load conditions during the entire year as well (refer to section „Energy Indicies IPLV and ESEER“). In comfort air handling the focus should be placed on the ESEER value instead of EER. In this case the same rule applies that the higher the ESEER value - the more energy efficient the annual unit operation.

Sound power level:

Depending on the installation site and field conditions, quiet unit operation is critical for meeting e.g. legal standards. Due to this reason two sound-attenuated variants are optionally available in this unit series.

- Sound-attenuated casing of compressors with panels made of Peraluman and a 30 mm thick acoustic insulation. Mounted at the factory to reduce the sound power level by 14 dB(A) (option .I25)
- Sound-attenuated casing of compressors with panels performed in Peraluman and a special acoustic insulation containing 5 combined layers totalling 50 mm thickness. Mounted by the factory to reduce the sound power level by 18 dB(A) (option .I48).

In Europe increasing attention is paid to the energy consumption of air conditioning equipment. It is not only the efficiency of air-conditioning equipment under nominal conditions that has been used as a basis in the U.S. for many years. An assessment index is also used, which considers operation of the unit under partial load conditions as well as nominal conditions. In part load operating mode the refrigerant compressors operate at part load speed. The assessment index used in the USA is known as IPLV (Integrated Part Load Value) and is defined in a guideline issued by the ARI (American Refrigeration Institute).

ARI Norm: $\mathbf{IPLV_{ARI} = (1 \cdot EER_{100\%} + 42 \cdot EER_{75\%} + 45 \cdot EER_{50\%} + 12 \cdot EER_{25\%}) / 100}$

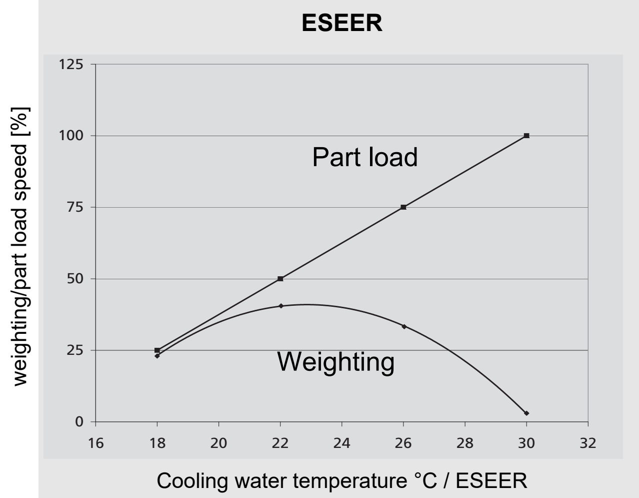
$EER_{100\%}$, $EER_{75\%}$, $EER_{50\%}$, $EER_{25\%}$ designate chiller efficiency under various part-load conditions (100 % - 75 % - 50 % - 25 %), calculated with regard to the ambient temperature conditions listed below. Chilled water temperature at the evaporator outlet is assumed at constant 6.7 °C under part-load conditions, with ΔT of 5 K at full load. The multipliers 1 %, 42 %, 45 % und 12 % are the respective percentage weightings of the efficiency levels for the different part load conditions as specified by the ARI Standard. These were determined by ARI, based on investigations of various building shapes in 29 American cities.

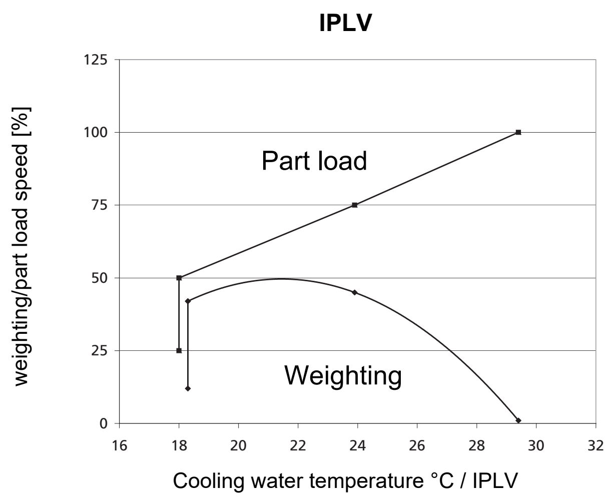
Water at the evaporator outlet:	6.7 °C			
ΔT at full load:	5 °C			
Load:	100 %	75 %	50 %	25 %
Water temperature condenser:	29.4 °C	23.9 °C	18.3 °C	18.3 °C

In Europe the EECCAC (Energy Efficiency and Certification of Central Air Conditioner) study was carried out to adapt the US-related IPLV (Integrated Part Load Value) to European climate conditions. The ESEER (European Seasonal Energy Efficiency Ratio) was developed within the framework of this guideline.

EECCAC suggestion: $\mathbf{ESEER = (3 \cdot EER_{100\%} + 33 \cdot EER_{75\%} + 41 \cdot EER_{50\%} + 23 \cdot EER_{25\%}) / 100}$

Water at the evaporator outlet:	6.7 °C			
ΔT at full load:	5 °C			
Load:	100 %	75 %	50 %	25 %
Water temperature condenser:	30 °C	26 °C	22 °C	18 °C





Load:	Water Temperature	Weighting	Water Temperature	Weighting
100 %	30 °C	3 %	29.4 °C	1 %
75 %	26 °C	33 %	23.9 °C	42 %
50 %	22 °C	41 %	18.3 °C	45 %
25 %	18 °C	23 %	18.3 °C	12 %

Using energy indices

Once the index to be used has been determined and the total energy required by the system in summer has been estimated (cooling energy in kWh), the seasonal electrical consumption (in kWh) can be derived using the formula below:

Energy consumed = required energy/efficiency index

For individual figures regarding the relevant series please refer to the following tables in Technical Data from page 20 et seq.

The actual energy can be calculated more precisely in a “dynamic” form by considering the load progression curve in relation to changes of outdoor temperatures, the installation location and the relevant number of operating hours. With this data every system operator or system designer can bring their own considerations into play depending on the type of a building, location, the type of heat load and other factors. The energy index can also be determined by using the method that best corresponds to the system requirements, compares energy aspects of similar or equal systems and uses the same reference unit.

These **FläktGroup units are water-cooled chillers or heat pumps designed for indoor installation**. In the factory, they are filled with refrigerator oil and refrigerant and a test run is performed, so that when the units are installed on site only water and electrical connections have to be established. A functional test must also be carried out.

The FläktGroup unit series are designed only to be used with the refrigerant R-134a.

Directives and regulations

Units meet the following directives and regulations:

– Directive on Machinery 2006/42/EC
– Low Voltage Directive 2006/95/EC
– Electromagnetic Compatibility 2004/108/EC
– Pressure Equipment Directive 97/23/EC according to module H1
– Certified Corporate Quality Management System ISO 9001

Components

Chillers with a high EER and heat pumps with a good COP

This new unit generation is set apart by high efficiency factors (EER and COP) and use of the refrigerant R-134A. An optimum result was achieved by carefully designing all internal components so as to fully exploit the performance characteristics of the specific refrigerant. Particular attention was paid to the surfaces of the heat exchangers and the compressors.

The newly designed condensers have larger exchange surface areas, as do the new evaporators, which enable even better and more efficient distribution of the refrigerant in a liquid and gaseous state.

The intelligent control of the chilled water outlet temperature reduces fluctuations in relation to the specified setpoint and vastly decreases time that the unit requires until it is ready for operation. The precision and rapid reaction of the intelligent control system facilitate optimum control in the event of load fluctuations which means that stable operating conditions can be achieved very quickly, even during part load operation.

A carefully dimensioned system implemented in these units produces considerable energy savings and vastly reduces operating costs.

The state-of-the-art system

The GLWC/GLWH unit series are designed for water cooling applications and are particularly suitable for small and medium-sized air conditioning systems, or for systems designed for low-water system content.

Basic construction

The base frame is made of plastic-coated robust sheet steel in RAL 7037. All components are located in a space-saving way on self-supporting base frame. In such a way good accessibility and maintenance of all components for connections by others on site is ensured.

Compressor

A newly-developed, semi-hermetic Bitzer twin-rotor compact compressor for use in water cooled chillers and heat pumps at low condensing temperatures.

The newly-developed compact screw compressors have been optimised for use at low condensing temperatures, in order to increase the energy efficiency in full and partial load operation. Consequently, the ESEER and IPLV values for the compressor are well above the usual standard for compact screw compressors.
The drive is via a 2-pin three-phase asynchronous motor integrated in the compressor casing. The electric motor is equipped for part-winding or star/delta starting (unit-dependent) and a 25 % power stage for reducing the starting currents.

The direct-driven, convex 5-stage screw (male rotor) is arranged on the motor shaft, thus driving the concave 6-stage (female rotor). The compression process takes place five times per compressor revolution, i.e. at 2950 RPM the gas discharge is approximately constant without recognisable pulsation which is typical for reciprocating compressors. The rotors are exclusively rotating parts, there are no alternating components like in piston compressors which makes compressor operation vibration-free. Vibration-free rotation of rotors, unnecessary suction and pressure valves, minimum production tolerances combined with stringent quality assurance as well as the construction with few moving parts form a basis for quiet and reliable operation of these compressors.

Rotor and bearing seats are manufactured using the newest NC controlled precision tools. The special, maintenance-free tandem axial bearings with pressure relief are rated for the compressor's entire service life.

Adequate lubrication is guaranteed by the differential pressure between the high and low pressure sides, even at the lowest differential pressures. The system can therefore forego an additional oil pump and the associated oil circuit. The integrated high performance oil separator with a 10 µm fine filter guarantees an oil ejection rate of less than 0.5 %, which ensures that oil is constantly supplied to the compressor. The non-return valve which is integrated after the oil separator prevents the reverse revolution of rotors after compressor stop.

The compressor capacity control can be achieved either 4-stage (25 %, 50 %, 75 % and 100 %) or steplessly in the range of 25 % - 100 % by using a simple adjustment on the controller. The minimum part load stage of just 25 % yields the following benefits:
- Longer compressor run time
- Greater precision in temperature control
- Reduced water system content

For units with more than one screw compressor, the 25 % capacity stage is optionally available.

Every compressor is supplied as standard with the following components:
- Thermal monitoring of the motor temperature via PTC
- Electronic motor protection unit with reset lock for malfunctions
- Rotational direction monitor
- Oil temperature sensor (PTC)
- Oil level switch
- Oil sight glass
- Oil heating with thermowell
- Oil service valve
- Large surface, fine meshed suction gas filter
- Pressure shut-off valve

Chillers in capacity stages 1130-1300 have 1 compressor in one refrigeration circuit.

Chillers in model sizes 2280-2600 have 2 compressors in two refrigeration circuits.

Chillers in model sizes 4900-4960 have 4 compressors in four refrigeration circuits.

Heat pumps in capacity stages 1130-1300 are made up of 1 compressor in one refrigeration circuit.

Heat pumps in model sizes 2280-2600 have 2 compressors in two refrigeration circuits.

Heat pumps in model sizes 4900-4960 have 4 compressors in four refrigeration circuits.

Evaporator

PED-checked shell and tube heat exchanger for dry evaporation with patented asymmetric lines which makes it possible to ensure the optimum velocity of the refrigerant in each phase of the evaporation process. The external steel shell is provided with a 10 mm thick non-permeable and abrasion-proof thermal insulating material covering the entire surface with a heat transfer of 0.33 W/mK at 0 °C. The internal tube bundle is made of seamless copper pipes that are expanded into terminal plates. In order to increase the heat exchange surface the copper pipes are finned inside. While in operation the evaporator is protected by the differential pressure switch between the chilled water inlet and outlet.

The unit can also be operated with glycol as standard with outlet temperatures of up to -8°C.

If chillers are operated with water outlet temperatures below 0 °C or with relatively high humidity, it is recommended to use enhanced heat insulation for the evaporator (option .I11).

Condenser

Shell and tube heat exchanger with external steel sheet shell and internal copper pipe bundle in flooded construction system. The heating medium flows into the copper pipes and the refrigerant from around the outside. The copper pipes are expanded into head plates at the end. The end plates can be removed for maintenance procedures. The water connections can be used for operation either with cooling towers or heat rejection units.

The internal and external ribbing of the copper pipes enlarge the heat transfer surface, thus guaranteeing optimum heat exchange.

The external steel shell of the condenser in GLWH unit series is additionally equipped with a 10 mm thick, non-permeable and abrasion-proof thermal insulating material covering the entire surface with a heat transfer of 0.33 W/mK at 0 °C.

Electronic expansion valve

An electronic expansion valve enables to reduce the condensing pressure of the unit to a minimum with the purpose to increase unit efficiency especially in part load operation. The next optimisation of capacity is reached through minimum evaporator overheating, which can only be performed with an electronic expansion valve.

Cooling and heating mode of GLWH units

The change-over from cooling into heating mode (or the other round) can be performed directly on the controller as well as using external contacts (refer to page 62 and the operation manual for controller).

As soon as the unit changes the operating mode from cooling into heating (or the other way round) - the setpoints that control and adjust the unit's capacity are changed automatically. In cooling mode it is either a sensor at inlet or outlet of the evaporator (depending on controller's configuration) that requires individual capacity stages of the unit using the microprocessor. In heating mode it is either a temperature sensor at common condenser inlet or outlet (depending on controller's configuration) that activates or deactivates individual capacity stages of the unit.

Refrigeration circuit

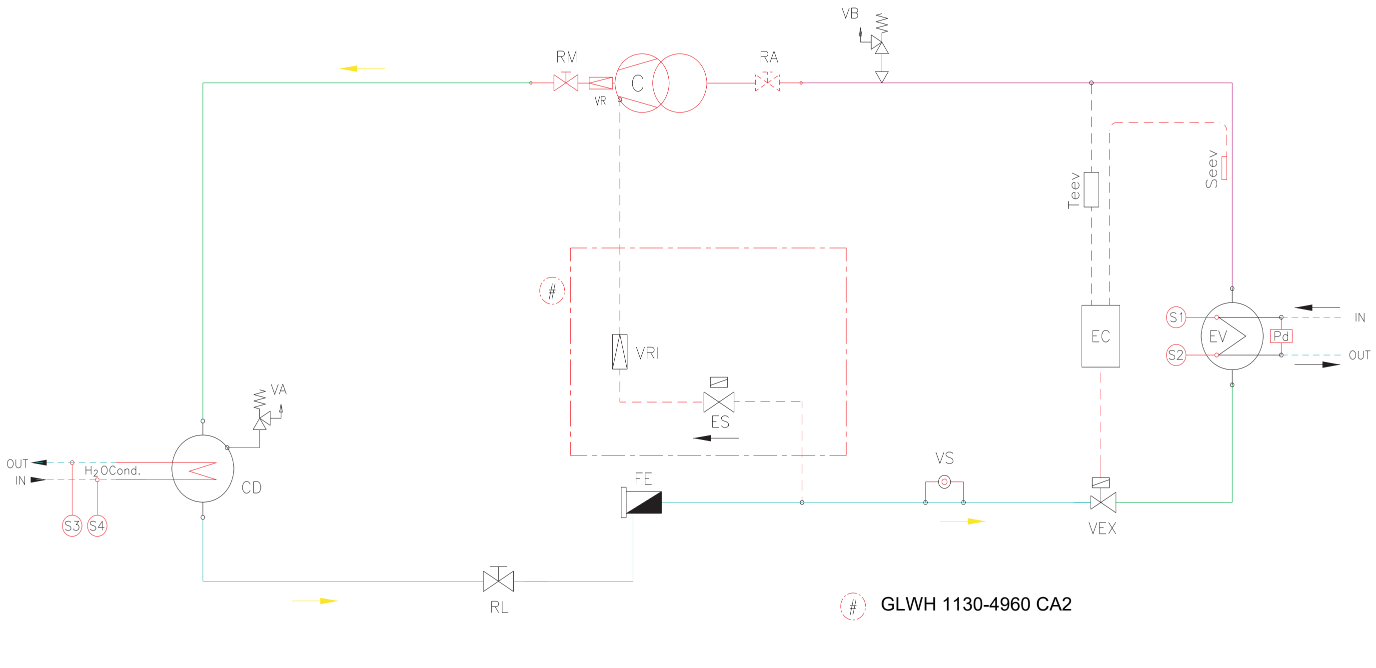


Fig. 1: F9C00500-1.dwg - Refrigeration circuit schematic GLWC(H) 1130-4960 CA2.(HE)

Acronym	Specification	Acronym	Specification
C	Compressor	S1	Temperature sensor water inlet evaporator
CD	Condenser	S2	Temperature sensor water outlet compressor
EV	Evaporator	S3	Temperature sensor water inlet evaporator (GLWH only)
EC	Controller for VEX	S4	Temperature sensor water outlet evaporator (GLWH only)
ES	Solenoid valve	Seev	Temperature sensor for VEX
VR	Non-return valve	Teev	Pressure transducer for VEX
FE	Filter drier	VA	High pressure safety valve
Pd	Differential pressure switch (water)	VB	Low-pressure safety valve
RA	Shut-off valve suction side (optional .R02)	VEX	Electronic expansion valve
RM	Shut-off valve on discharge side	VS	Sight glass with humidity indicator
RL	Shut-off valve on liquid line		

For the quantity of refrigeration circuits per unit refer to the table "General data".

Control cabinet

Control cabinet in a separate casing sealed within the unit, sub-divided into output and control parts. Manufactured according to the Directive for Electromagnetic Compatibility 2004/108/EC and Directive on Machinery 2006/42/EC, complete with:

- Door locking main isolator
- Transformer for generating control voltage
- Automatic circuit breaker for load and control current circuit
- Motor protection switch and contactors for compressor
- Phase sequence protection for the compressor
- Terminal strip control voltage
- Contact for external remote ON/OFF
- Contact for general error message
- Clip contact for flow switch
- Operation status message from compressor (option .E03)
- integrated microprocessor control
- Pump relay for controlling water pump(s) by others (option .E04, E34, .E35 or .E36)
- Change-over between cooling/heating operation using a volt free dry contact (only heat pumps)

Electronic control system

Fig. 2: Unit display

Electronic controls of the FläktGroup controller - step III features the following:

- Plain text and digit alphanumerical LCD display
- Selection of 8 different languages is possible
- Automatic self-diagnostics of electronics
- Display of all analogue recorded temperature and pressure values
- Display of faults in compressors and refrigeration circuits
- Display of general unit faults
- Selectable control of chilled water inlet or outlet temperature
- Safety times for compressor, such as compressor cycle protection, minimum downtime of the compressor or maximum start-ups per hour (depending on type of the control system)
- Operating hours counter for compressor and water pumps
- Automatic operating hours compensation for compressor
- Notification about maintenance intervals of compressors and pumps (can be adjusted)
- Read out latest 200 alarm messages
- Service possible via PC and system software
- Pump lead and overrun times for switching unit on and off safely
- Setpoint shift via an external 4-20 mA signal (option .E21)
- 2nd setpoint via dry contact (option .E22)
- Demand limit contact via dry contact (option .E23)

Accessories for controls

- Status message of compressors (option .E03)
  Volt free contacts for displaying the status of the compressor concerned.
- Pump enabling for 1st chilled water pump (option .E04), add-on card with a volt free contact for regulating field-provided chilled water pump. Unit control system performs regulation of required lead and run-on periods for pumps. Besides, the chilled water pump is periodically activated by the unit controls to prevent pump blockage.

Fig. 3: Remote control

- Second control connection for remote monitoring and regulation. Up to 10 units in the same controller family can be connected to an additional remote control. (option .E19 for remote control up to 200 meters and .E20 for remote control up to 500 meters distance).
- Variable setpoint using a field-provided 4-20 mA signal (option .E21)
  On site shifting of setpoint for chilled and warm water using field-provided 4-20 mA signal within a fixed range. Changing the setpoint, e.g. during night mode operation, enables to realize significant savings potential.
- 2nd setpoint via normally open contact by others (option .E22). Two setpoints values are changed externally by closing a volt free contact by others. Raising the setpoint, e.g. during night mode operation, enables to realize significant savings potential.
- Demand limit switch (option .E23)
  Reduction of electrical power consumption by deactivating compressors or their capacity stages (demand limit switch) by opening a volt free contact by others. This function is used, if a limited electrical power supply is temporarily available, e.g. during operation via emergency generator.

Fig. 4: Serial card for connection to a building management system or for master/slave control

- Unit information can be called up via the Internet and LAN.
- Unit connection to the building management system (BMS) using a serial card. The following protocols are used to transmit digital and analogue values:
  - Reading off fault messages
  - Reading off temperature and pressure values provided by the controller
  - Operating status of individual compressors
  - Unit enabling
  - Setpoint shift
  - Changing operating mode between heating and cooling for heat pumps

  - Modbus (RS485) (option .E14 for the unit or option .E24, if the unit should be connected to the building management system using a sequencer)
  - LonWorks® (option .E15 for the unit or option .E25, if the unit should be connected to the building management system using a sequencer).
  - BACnet via IP (option .E16).
  - BacNet via MS/TP RS485 (option .E17 for the unit or option .E27, if the unit should be connected to the building management system using a sequencer)

Fig. 5: Sequenzer

- Sequencer (option .E18) (only for GLWC units):
  Upstream master/slave control. Up to a maximum 5 units of the FläktGroup controller step I, II, III controller family can be used in a hydraulic circuit and connected to a sequencer. The sequencer is supplied in a separate switch cabinet with two temperature sensors, that must be installed in a common water inlet and outlet. Depending on the water inlet temperature, individual capacity stages or units are switched on or off. Every unit requires a serial card of Modbus type (option .E14) in order to communicate with the sequencer and own chilled water pump to be regulated by the chiller/heat pump.Units with scroll compressors are equipped with a pump relay as standard; units with screw compressors can be supplied with a pump relay as an accessory.
- Sequencer for connecting to a BMS via Modbus protocol (option .E24).
- Sequencer for connecting to a BMS via LonWorks® (option .E25).
- Sequencer with integration to a BMS via BACNet protocol (option .E27).

Electrical accessories

- Pump enabling for 2 chilled water pumps (run & standby) (option .E34), add-on card with two volt-free contacts for regulating field-provided chilled water pumps. Control is performed for one of two chilled water pumps.Change-over between pumps is done automatically and depends on the number of operating hours. Unit control system performs regulation of required lead and run-on periods for pumps. Besides, the chilled water pumps are periodically activated by the unit controls to prevent pump blockage.
- Pump enabling for 1 chilled water and 1 warm pump (option .E35), add-on card with two volt-free contacts for regulating field-provided chilled and warm water pump. Unit control system assumes regulation of required lead and run-on periods for pumps. Besides, the water pumps are periodically activated by the unit controls to prevent pump blockage.
- Pump enabling for 2 chilled and 2 warm water pumps (run & standby) (option .E36), add-on card with four volt-free contacts for regulating field-provided chilled and warm water pumps. Only one chilled and warm water pump can be connected and regulated. Change-over between pumps is performed automatically and depends on the number of operating hours. Unit control system performs regulation of required lead and run-on periods for pumps. Besides, the water pumps are periodically activated by the unit controls to prevent pump blockage.
- 0-10 Volt output signal to the field-provided high-pressure regulation (option .E37). Depending on high pressure, a 0-10 V control signal is sent to the field-provided regulation system.0-10 Volt signal can be be used as a controlled variable for the following field-provided drives.
  - Speed control of condenser/warm water pump
  - Fan speed control of heat-rejection unit
  - Control signal of a field-provided 3-way valve for cold weather start regulation
- Modulating capacity control for each compressor up to 25 % for units with 2, 3 and 4 compressors (option .E38)
  The minimum part-load speed of individual compressors can be reduced up to 25 %. The following benefits can be achieved:
  - Longer compressor run time
  - Greater precision in temperature control
  - Decreased minimum system charge

  The above option makes it possible to reduce the ESEER rating by approx. 3%. For units with 1 compressor a 25%-capacity stage is an implemented standard.

Refrigeration circuit accessories

- Shut off valve on compressor suction side (option .R02).
  Service shut off valve fitted in suction line for fast and easy maintenance.
- Safety valve in double configuration for high and low-pressure side (option .R19).
  Both safety valves are connected to the refrigerant line via a changeover valve. The changeover valve makes it possible to easily and quickly replace safety valves without loss of refrigerant.

Installation of accessories

- Rubber anti-vibration isolators for unit installation (.I02).
  Anti-vibration isolators with rubber elements for reduction of vibration transfer (supplied loose).
- Chilled water connections with flanges (option .I08)
- Flow switch with paddle for installation in hydraulic circuit at chilled water outlet (enclosed) (option .I10).
- Heavy duty thermal insulation of evaporator (option .I11). Double-layer thermal insulation of evaporator to prevent condensate formation in case of very high relative humidity of ambient air. Especially recommended at medium temperature below 0°C.

- Sound-attenuated casing for XL unit (-18dB(A) SLP) (option .I48)
  Sound-attenuated casing of compressors with panels performed in peraluman and a special acoustic insulation containing 5 combined layers totalling 50 mm thickness. Mounted by the factory to reduce the sound power level by 18 dB(A). Please consider new unit dimensions and weight.

Optionally available unit version

For chiller: Basic model and HE model

For heat pump: Basic model

HE Unit

Unit model with high energy efficiency –
for special energetic requirements and/or high ambient temperature.

Enhanced capacity rate as compared to a basic model thanks to:

- Increase of heat exchanger surface and changed mass flow of condenser
- Energy optimized system design

The following design document is intended for qualified personnel and provides guidance on the selection of a suitable FläktGroup unit to meet specific job requirements.

NOTE!
For different temperature data and/or media refer to the “Performance data” tables on page 34 et seq. For operating temperatures outside the specified ranges, please contact your FläktGroup sales representative.

To help you select your unit refer to the explanation in the following example:

EXAMPLE

	Input data		⇨	**Result**
Requirements Calculate and determine specific input data beforehand.	Noise protection requirements	→ No special requirements. Otherwise select additional sound attenuation in accessories.	→	**Basic unit** Use tables „Performance data“ on page 34 and following pages.
	Required cooling capacity	→ $\dot{Q}_e$ = 1000 kW	→	Input values for tables „Performance data“ on page 34 and on.
	Outdoor air temperature	→ T_a = 35 °C		
	Chilled water inlet temperature	→ T_{ei} = 12 °C		
	Chilled water outlet temperature	→ T_{eo} = 6 °C		
	Cool water inlet temperature	→ 40 °C		
	Cool water outlet temperature	→ 45 °C		
	Frost-safe operation of cooling water circuit	→ up to -15 °C	→	Input value for table on page 41
	Available installation location	→ 9.5 m x 3.0 m in a plant room of an industrial company	→	**see step 4**
1. Step Determine the unit type, its performance and operating data using the “Performance data” tables on page 28 et seq.	Determine your temporary unit type	→ from tables on page 28	→	**GLWC 2480 CA2**
	Q_e [kW] Cooling capacity			Q_e = 1051.5 kW
	V_e [m³/h] Chilled water volume flow			V_e = 180.7 m³/h
	Δp_e [kPa] pressure drop evaporator			Δp_e = 28.7 kPa
	Q_c [kW] condenser capacity / heating capacity			Q_c = 1332.0 kW
	P [kW] Total unit power consumption			P = 298.3 kW
	V_c [m³/h] Cooling water flow			V_c = 231.5 m³/h
	Δp_c [kPa] Pressure drop in condenser			Δp_c = 31.1 kPa
2. Step At chilled water temperature difference of $\Delta T_e \neq 5$ K determine the chilled water flow and chilled water related pressure drop in the evaporator (for pump layout) using the diagrams on page 41 and et seq.	*Is $\Delta T_e \neq 5$ °C?*	→ **$\Delta T_e = T_{ei} - T_{eo}$** *Gl. 1* ΔT_e [K] - chilled water temperature difference T_{ei} - chilled water inlet temperature T_{eo} - chilled water outlet temperature		
		ΔT_e = 12 °C - 6 °C	→	**ΔT_e = 6 °C**
	ΔTe = 6 °C $\dot{Q}_e$ = 1051.5 kW	→ Chiller water volume flow from diagram D. 1 on page 41	→	**$\dot{V}_e$ = 150.8 m³/h**
		Chilled-water side pressure drop from diagram D. 2 on page 41	→	**Δ_{pe} = 20.0 kPa**

	Input data		→	Result
3. Step If water-glycol mixture is used, the refrigeration capacity must be determined and the cool water flow rate as well as the cool water related pressure drop in the evaporator must be adjusted accordingly using the conditional equations and diagrams page 48 and following pages. This same applies to heat-rejection circuit respectively. * Check if the required cooling capacity is reached, otherwise select the next larger unit type and repeat the calculation.	Water-glycol concentration in cooling water circuit for frost protection up to -15 °C.	→ (See page 48)	→	**30 % glycol ratio**
		→ Determine cooling capacity depending on ethylene glycol content (D. 15 on page 48) according to equation Gl. 2 on page 49. $\dot{Q}_{e,G} = 0.972 \bullet 1051.5 = \underline{\underline{1022\ kW}} > 1000\ kW = \text{required } Q_e$ ✓	→	**$\dot{Q}_{e,G}$ = 1022 kW**
		Determine cooling water flow depending on ethylene glycol concentration (D. 15 on page 48) according to equation Gl. 3 on page 49. $\dot{V}_{c,G} = 1.08 \bullet 231.5 = \underline{\underline{250\ m^3/h}}$	→	**$\dot{V}_{c,G}$ = 250 m³/h**
Refer to step 1 for the required capacity of the heat-rejection unit!		Determine cooling-water side pressure drop depending on ethylene glycol concentration (D. 15 on page 48) according to equation Gl. 4 on page 49. $\Delta p_{c,G} = 1.38 \bullet 31.1\ kPa = \underline{\underline{42.9\ kPa}}$	→	**Δp_c = 42.9 kPa**
4. Step Check if the available installation location is large enough for the unit's size, including necessary clearance for maintenance and air routing (see table on page 20 and following pages).	Total space requirement = 9250 x 2950 mm (specified in tables on page 20)	→ Detailed information is provided in the operation manuals for the units.	→	**Installation possible**

Note: table contains rounded values.

NOTE ON UNIT PLANNING AND CONFIGURATION

For your individual unit design please use our web-based Aid@ unit-layout software or contact your FläktGroup sales office.

Basic Unit
General Specifications

Capacity stage			**1130**	**1140**
Refrigeration capacity[1)]	Q_e	[kW]	306	348.3
Unit power consumption (total)	P	[kW]	60.5	68.7
EER			5.06	5.07
ESEER			5.94	5.95
Chilled water flow rate	V_e	[m³/h]	52.7	60.0
Pressure drop (chilled water)	Δp_e	[kPa]	41.9	45.0
only GLWH - CA2				
Heating capacity[2)]	Q_c	[kW]	327.6	372.8
Unit power consumption (total)	P	[kW]	76.3	86.7
COP			4.29	4.30
Warm water volume flow	V_c	[m³/h]	56.9	64.8
Pressure drop (warm water side)	Δp_c	[kPa]	29.5	28.7
Controls			FläktGroup controller - step III	
Compressor			**Bitzer CSW compact screw compressor**	
No. of compressors		n	1	1
No. of refrigeration circuits		n	1	1
Capacity stages per unit		n	25 to 100 % continuous	
Compressor type 1			CSW8583-110Y	CSW8593-125Y
Compressor type 2			-	-
Compressor type 3			-	-
Compressor type 4			-	-
Oil type			BSE170	
Oil heating		[W]	300	
Evaporator			**Shell and tube heat exchanger**	
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	32.9	37.4
Maximum chilled water volume	$V_{e,max}$	[m³/h]	68.0	79.0
Maximum chilled water side operating pressure		[bar]	10	10
Connection for evaporator inlet/outlet		["]	4	4
Connection[5)]			G	G
Condenser			**Shell and tube heat exchanger**	
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	19.5	22.2
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	73.0	90.2
Maximum warm-water side operating pressure		[bar]	10	10
Connection for condenser outlet/inlet		["]	4	4
Connection[5)]			ODS	ODS
Filling quantities				
Refrigerant R-134a[6)]		[kg]	45	44
Oil		[kg]	19	19
Water volume of evaporator		[l]	120	109
Water volume of condenser		[l]	29	35
Minimum system charge in chilled water mode		[l]	2190	2490
Minimum system charge in warm water mode		[l]	2340	2670
Min. system charge in chilled water mode with .E38 option		[l]	-	-
Min. system charge in warm water mode with .E38 option		[l]	-	-
Weight				
Transport weight		[kg]	2050	2110
Noise levels				
Sound power level[3)]		[dB(A)]	97	97
Sound pressure level[4)]		[dB(A)]	65	65

Tab. 1

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) Performance data for input parameters: chilled water temperatures (inlet/outlet) 10/5°C; warm water temperature (inlet/outlet) 40/45°C; values partially rounded off

3) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

4) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

5) Refer to chapter: legend for dimensional drawings

6) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		1130	1140
Compressor			
Maximum power consumption	[kW]	1x89	1x101.3
Maximum current consumption	[A]	1x146.8	1x168
Starting current of each compressor	[A]	1x300	1x360
Compressor start		Y / Δ	Y / Δ
Total [1,2]			
Maximum power consumption	[kW]	89	101
Maximum current consumption	[A]	147	168
Starting current of entire unit	[A]	300	360
Maximum connectable cable cross-sections [1]			
Rectangular	[mm]	20x5	20x5
Round	[mm²]	120	120
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]			
Pre-fuse	[A]	250	250
Dimensions			
A (length)	[mm]	3830	3830
B (width)	[mm]	900	900
H (height)	[mm]	1700	1700
Clearance			
R1	[mm]	900	900
R2	[mm]	900	900
R3	[mm]	1500	1500
R4	[mm]	3500	3500

Tab. 2

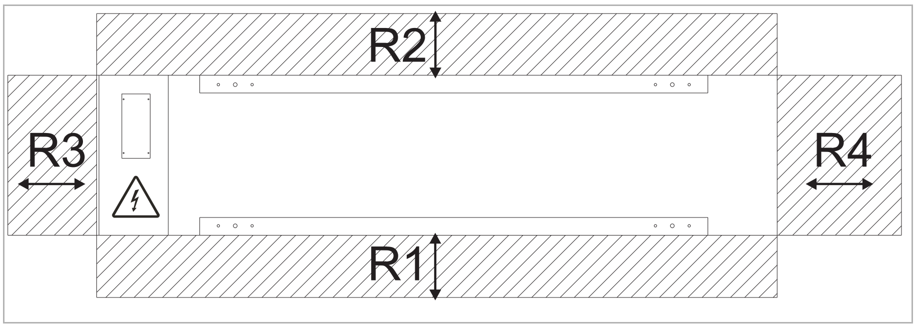


Fig. 6: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			2320	2360	2420
Refrigeration capacity[1)]	Q_e	[kW]	843.9	957.3	1071.3
Unit power consumption (total)	P	[kW]	166.7	188.8	211.6
EER			5.06	5.07	5.06
ESEER			5.87	6.14	6.08
Chilled water flow rate	V_e	[m³/h]	145.0	165.0	184.0
Pressure drop (chilled water)	Δp_e	[kPa]	45.4	46.4	30.6
only GLWH - CA2					
Heating capacity[2)]	Q_c	[kW]	890.9	1010.5	1141.1
Unit power consumption (total)	P	[kW]	206.6	234.2	262.0
COP			4.31	4.31	4.36
Warm water volume flow	V_c	[m³/h]	154.8	175.6	198.3
Pressure drop (warm water side)	Δp_c	[kPa]	27.8	27.8	27.9
Controls			FläktGroup controller - step III		
Compressor			**Bitzer CSW compact screw compressor**		
No. of compressors		n	2	2	2
No. of refrigeration circuits		n	2	2	2
Capacity stages per unit		n			
Compressor type 1			CSW9563-140Y	CSW9573-160Y	CSW9583-180Y
Compressor type 2			CSW9563-140Y	CSW9573-160Y	CSW9583-180Y
Compressor type 3			-	-	-
Compressor type 4			-	-	-
Oil type					
Oil heating		[W]			
Evaporator			**Shell and tube heat exchanger**		
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	90.7	103.0	115.0
Maximum chilled water volume	$V_{e,max}$	[m³/h]	170.0	227.0	266.0
Maximum chilled water side operating pressure		[bar]	10	10	10
Connection for evaporator inlet/outlet		["]	6	6	8
Connection[5)]			G	G	G
Condenser			**Shell and tube heat exchanger**		
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	53.8	61.0	68.3
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	202.0	236.0	270.0
Maximum warm-water side operating pressure		[bar]	10	10	10
Connection for condenser outlet/inlet		["]	2 x 5	2 x 5	2 x 5
Connection[5)]			ODS	ODS	ODS
Filling quantities					
Refrigerant R-134a[6)]		[kg]	143	141	141
Oil		[kg]	70	70	70
Water volume of evaporator		[l]	251	236	412
Water volume of condenser		[l]	82	96	108
Minimum system charge in chilled water mode		[l]	9090	10310	11540
Minimum system charge in warm water mode		[l]	9590	10880	12290
Min. system charge in chilled water mode with .E38 option		[l]	6030	6840	7660
Min. system charge in warm water mode with .E38 option		[l]	6370	7230	8160
Weight					
Transport weight		[kg]	5110	5400	6070
Noise levels					
Sound power level[3)]		[dB(A)]	99	99	99
Sound pressure level[4)]		[dB(A)]	67	67	67

Tab. 3

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) Performance data for input parameters: chilled water temperatures (inlet/outlet) 10/5°C; warm water temperature (inlet/outlet) 40/45°C; values partially rounded off

3) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

4) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

5) Refer to chapter: legend for dimensional drawings

6) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		2320	2360	2420
Compressor				
Maximum power consumption	[kW]	2x121.6	2x137.7	2x154.9
Maximum current consumption	[A]	2x197.2	2x223	2x247
Starting current of each compressor	[A]	2x318	2x436	2x465
Compressor start		Y / Δ	Y / Δ	Y / Δ
Total [1,2]				
Maximum power consumption	[kW]	243	275	310
Maximum current consumption	[A]	394	446	494
Starting current of entire unit	[A]	444	571	612
Maximum connectable cable cross-sections [1]				
Rectangular	[mm]	2x32x6	2x32x6	2x32x6
Round	[mm²]	2x185	2x185	2x185
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]				
Pre-fuse	[A]	630	630	630
Dimensions				
A (length)	[mm]	4750	4750	4750
B (width)	[mm]	1150	1150	1150
H (height)	[mm]	2050	2050	2200
Clearance				
R1	[mm]	900	900	900
R2	[mm]	900	900	900
R3	[mm]	1500	1500	1500
R4	[mm]	3000	3000	3000

Tab. 4

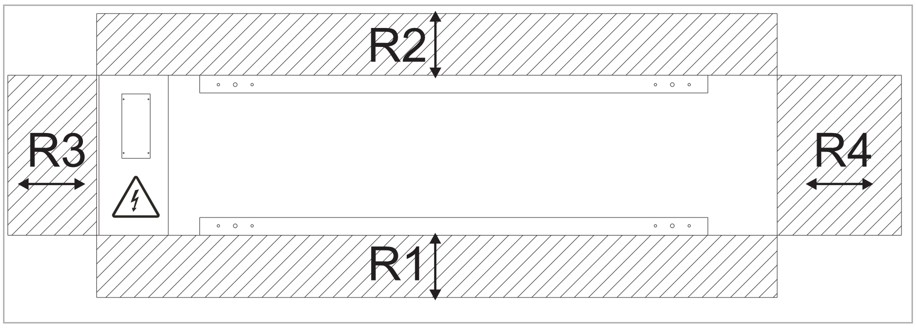


Fig. 7: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			2450	2480	2540	2600
Refrigeration capacity[1]	Q_e	[kW]	1144.7	1213.3	1348.2	1490.2
Unit power consumption (total)	P	[kW]	226.1	239.8	266.9	295
EER			5.06	5.06	5.05	5.05
ESEER			6.23	6.17	6.00	6.09
Chilled water flow rate	V_e	[m³/h]	197.0	209.0	232.0	257.0
Pressure drop (chilled water)	Δp_e	[kPa]	34.2	38.4	47.4	54.6
only GLWH - CA2						
Heating capacity[2]	Q_c	[kW]	1217.2	1290.8	1425.8	1576.9
Unit power consumption (total)	P	[kW]	279.1	296.5	326.9	360.9
COP			4.36	4.35	4.36	4.37
Warm water volume flow	V_c	[m³/h]	211.5	224.3	247.8	274.0
Pressure drop (warm water side)	Δp_c	[kPa]	28.6	29.2	27.6	29.3
Controls			FläktGroup controller - step III			
Compressor			**Bitzer CSW compact screw compressor**			
No. of compressors		n	2	2	2	2
No. of refrigeration circuits		n	2	2	2	2
Capacity stages per unit		n	25 to 100 % continuous / optional 12.5 to 100 %			
Compressor type 1			CSW9583-180Y	CSW9593-210Y	CSW95103-240Y	CSW95113-280Y
Compressor type 2			CSW9593-210Y	CSW9593-210Y	CSW95103-240Y	CSW95113-280Y
Compressor type 3			-	-	-	-
Compressor type 4			-	-	-	-
Oil type			BSE170			
Oil heating		[W]	300			
Evaporator			**Shell and tube heat exchanger**			
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	123.0	130.0	145.0	160.0
Maximum chilled water volume	$V_{e,max}$	[m³/h]	266.0	266.0	266.0	266.0
Maximum chilled water side operating pressure		[bar]	10	10	10	10
Connection for evaporator inlet/outlet		["]	8	8	8	8
Connection[5]			G	G	G	G
Condenser			**Shell and tube heat exchanger**			
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	73,0	77,0	86,0	95,0
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	287,0	304,0	384,0	412,0
Maximum warm-water side operating pressure		[bar]	10	10	10	10
Connection for condenser outlet/inlet		["]	2 x 5	2 x 5	2 x 5	2 x 5
Connection[5]		["]	ODS	ODS	ODS	ODS
Filling quantities						
Refrigerant R-134a[6]		[kg]	144	140	183	181
Oil		[kg]	70	70	76	76
Water volume of evaporator		[l]	395	395	395	386
Water volume of condenser		[l]	114	120	152	166
Minimum system charge in chilled water mode		[l]	12330	13060	14520	16050
Minimum system charge in warm water mode		[l]	13110	13900	15350	16980
Min. system charge in chilled water mode with .E38 option		[l]	8180	8680	9640	10650
Min. system charge in warm water mode with .E38 option		[l]	8700	9230	10190	11270
Weight						
Transport weight		[kg]	6120	6180	6950	7090
Noise levels						
Sound power level[3]		[dB(A)]	99	99	101	101
Sound pressure level[4]		[dB(A)]	67	67	69	69

Tab. 5

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) Performance data for input parameters: chilled water temperatures (inlet/outlet) 10/5°C; warm water temperature (inlet/outlet) 40/45°C; values partially rounded off

3) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

4) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

5) Refer to chapter: legend for dimensional drawings

6) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		2450	2480	2540	2600
Compressor					
Maximum power consumption	[kW]	1x154.9 + 1x175.1	2x175.1	2x195.5	2x216
Maximum current consumption	[A]	1x247 + 1x286	2x286	2x318	2x351
Starting current of each compressor	[A]	1x465 + 1x586	2x586	2x650	2x805
Compressor start		Y / Δ	Y / Δ	Y / Δ	Y / Δ
Total [1,2]					
Maximum power consumption	[kW]	330	350	391	432
Maximum current consumption	[A]	533	572	636	702
Starting current of entire unit	[A]	733	761	860	1025
Maximum connectable cable cross-sections [1]					
Rectangular	[mm]	2x32x6	63	63	63
Round	[mm²]	2x185	2x300	2x300	2x300
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]					
Pre-fuse	[A]	630	800	800	800
Dimensions					
A (length)	[mm]	4750	4750	4850	4850
B (width)	[mm]	1150	1150	1150	1150
H (height)	[mm]	2200	2200	2200	2200
Clearance					
R1	[mm]	900	900	900	900
R2	[mm]	900	900	900	900
R3	[mm]	1500	1500	1500	1500
R4	[mm]	3000	3000	3000	3000

Tab. 6

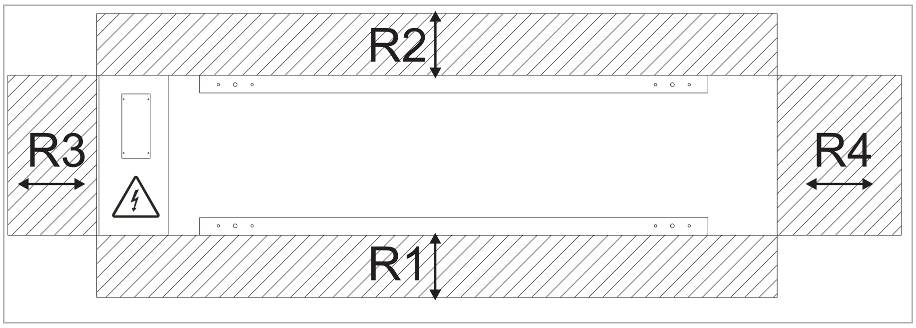


Fig. 8: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			**3810**	**3900**	**4900**	**4960**
Refrigeration capacity[1]	Q_e	[kW]	2024.4	2235.5	2278	2416.1
Unit power consumption (total)	P	[kW]	400.4	442	450.7	478.2
EER			5.06	5.06	5.05	5.05
ESEER			6.09	6.14	6.23	6.17
Chilled water flow rate	V_e	[m³/h]	349.0	385.0	392.0	416.0
Pressure drop (chilled water)	Δp_e	[kPa]	43.7	53.3	32.3	36.3
only GLWH - CA2						
Heating capacity[2]	Q_c	[kW]	2140.1	2366.4	2428.4	2576.9
Unit power consumption (total)	P	[kW]	490.4	540.9	556.9	591.8
COP			4.36	4.37	4.36	4.35
Warm water volume flow	V_c	[m³/h]	371.9	411.2	422.0	448.0
Pressure drop (warm water side)	Δp_c	[kPa]	27.7	28.7	28.5	30.1
Controls			FläktGroup controller - step III			
Compressor			**Bitzer CSW compact screw compressor**			
No. of compressors		n	3	3	4	4
No. of refrigeration circuits		n	3	3	4	4
Capacity stages per unit		n	16 to 100 % continuous / optional 8 to 100 %		12.5 to 100 % continuous / optional 6 to 100 %	
Compressor type 1			CSW95103-240Y	CSW95113-280Y	CSW9583-180Y	CSW9593-210Y
Compressor type 2			CSW95103-240Y	CSW95113-280Y	CSW9583-180Y	CSW9593-210Y
Compressor type 3			CSW95103-240Y	CSW95113-280Y	CSW9593-210Y	CSW9593-210Y
Compressor type 4			-	-	CSW9593-210Y	CSW9593-210Y
Oil type			BSE170			
Oil heating		[W]	300			
Evaporator			**Shell and tube heat exchanger**			
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	218.0	240.0	245.0	260.0
Maximum chilled water volume	$V_{e,max}$	[m³/h]	405.0	405.0	642.0	642.0
Maximum chilled water side operating pressure		[bar]	10	10	10	10
Connection for evaporator inlet/outlet		["]	10	10	10	10
Connection[5]			G	G	G	G
Condenser			**Shell and tube heat exchanger**			
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	129.0	142.0	145.0	154.0
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	576.0	618.0	574.0	608.0
Maximum warm-water side operating pressure		[bar]	10	10	10	10
Connection for condenser outlet/inlet		["]	3 x 5	3 x 5	4 x 5	4 x 5
Connection[5]		["]	G	G	ODS	ODS
Filling quantities						
Refrigerant R-134a[6]		[kg]	289	281	287	281
Oil		[kg]	114	114	140	140
Water volume of evaporator		[l]	811	811	970	970
Water volume of condenser		[l]	228	249	228	240
Minimum system charge in chilled water mode		[l]	21050	23250	24830	26330
Minimum system charge in warm water mode		[l]	22260	24610	26470	28090
Min. system charge in chilled water mode with .E38 option		[l]	14120	15590	15640	16580
Min. system charge in warm water mode with .E38 option		[l]	14930	16510	16670	17690
Weight						
Transport weight		[kg]	10170	10350	14330	14390
Noise levels						
Sound power level[3]		[dB(A)]	102	102	102	102
Sound pressure level[4]		[dB(A)]	70	70	70	70

Tab. 7

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) Performance data for input parameters: chilled water temperatures (inlet/outlet) 10/5°C; warm water temperature (inlet/outlet) 40/45°C; values partially rounded off

3) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

4) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

5) Refer to chapter: legend for dimensional drawings

6) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		**3810**	**3900**	**4900**	**4960**
Compressor					
Maximum power consumption	[kW]	3x195.5	3x216	2x154.9 + 2x175.1	4x175.1
Maximum current consumption	[A]	3x318	3x351	2x247 + 2x286	4x286
Starting current of each compressor	[A]	3x650	3x805	2x465 + 2x586	4x586
Compressor start		Y / Δ	Y / Δ	Y / Δ	Y / Δ
Total [1,2]					
Maximum power consumption	[kW]	587	648	660	700
Maximum current consumption	[A]	954	1053	1066	1144
Starting current of entire unit	[A]	1070	1245	1055	1111
Maximum connectable cable cross-sections [1]					
Rectangular	[mm]	-	-	3x50x12	3x50x12
Round	[mm²]	4x185	4x185	-	-
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]					
Pre-fuse	[A]	1250	1250	-	-
Dimensions					
A (length)	[mm]	4950	4950	4650	4650
B (width)	[mm]	1700	1700	2250	2250
H (height)	[mm]	2150	2150	2230	2230
Clearance					
R1	[mm]	900	900	900	900
R2	[mm]	900	900	900	900
R3	[mm]	1500	1500	1800	1800
R4	[mm]	3500	3500	3500	3500

Tab. 8

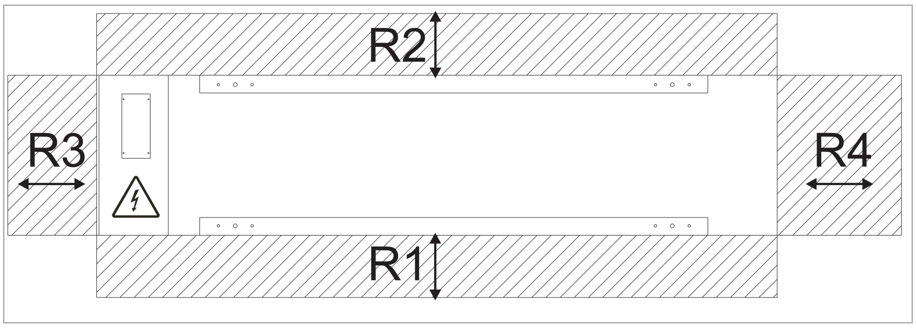


Fig. 9: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			1130	1140	1160	1180	1210	1240
Refrigeration capacity[1]	Q_e	[kW]	320.7	364.7	441.9	506.3	573.7	649.4
Unit power consumption (total)	P	[kW]	57.3	65.1	79.1	90.3	102.6	116.1
EER			5.60	5.60	5.59	5.61	5.59	5.59
ESEER			6.49	6.50	6.30	6.40	6.37	6.40
Chilled water flow rate	V_e	[m³/h]	55.2	62.8	76.1	87.2	98.8	112.0
Pressure drop (chilled water)	Δp_e	[kPa]	45.7	47.7	53.5	53.4	52.8	60.2
Controls			FläktGroup controller - step III					
Compressor			**Bitzer CSW compact screw compressor**					
No. of compressors		n	1	1	1	1	1	1
No. of refrigeration circuits		n	1	1	1	1	1	1
Capacity stages per unit		n	25 to 100 % continuous					
Compressor type 1			CSW8583-110Y	CSW8593-125Y	CSW9563-140Y	CSW9573-160Y	CSW9583-180Y	CSW9593-210Y
Compressor type 2			-	-	-	-	-	-
Compressor type 3			-	-	-	-	-	-
Compressor type 4			-	-	-	-	-	-
Oil type			BSE170					
Oil heating		[W]	300					
Evaporator			**Shell and tube heat exchanger**					
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	34.5	39.2	47.5	54.4	61.7	69.8
Maximum chilled water volume	$V_{e,max}$	[m³/h]	97.5	112.0	110.0	128.0	149.0	163.0
Maximum chilled water side operating pressure		[bar]	10	10	10	10	10	10
Connection for evaporator inlet/outlet		["]	5	5	6	6	6	6
Connection[4]			G	G	G	G	G	G
Condenser			**Shell and tube heat exchanger**					
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	20.1	22.9	27.8	31.8	36.0	40.8
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	92.4	106.8	123.2	139.6	152.0	168.4
Maximum warm-water side operating pressure		[bar]	10	10	10	10	10	10
Connection for condenser outlet/inlet		["]	4	5	5	5	5	6
Connection[4]			G	G	G	G	G	G
Charge quantities								
Refrigerant R-134a[5]		[kg]	50	49	75	73	85	94
Oil		[kg]	19	19	35	35	35	35
Water volume of evaporator		[l]	208	201	308	299	281	307
Water volume of condenser		[l]	73	92	104	116	126	145
Minimum system charge in chilled water mode		[l]	2290	2610	3160	3620	4100	4640
Minimum system charge in chilled water mode with .E38 option		[l]	-	-	-	-	-	-
Weight								
Transport weight		[kg]	2470	2770	3570	3750	3790	4230
Noise levels								
Sound power level[2]		[dB(A)]	97	97	97	97	97	97
Sound pressure level[3]		[dB(A)]	65	65	65	65	65	65

Tab. 9

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

3) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

4) Refer to chapter: legend for dimensional drawings

5) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		1130	1140	1160	1180	1210	1240
Compressor							
Maximum power consumption	[kW]	1x89	1x101.3	1x121.6	1x137.7	1x154.9	1x175.1
Maximum current consumption	[A]	1x146.8	1x168	1x197.2	1x223	1x247	1x286
Starting current of each compressor	[A]	1x300	1x360	1x404	1x436	1x465	1x586
Compressor start		Y / Δ	Y / Δ	Y / Δ	Y / Δ	Y / Δ	Y / Δ
Total [1,2]							
Maximum power consumption	[kW]	89	101.3	121.6	137.7	154.9	175.1
Maximum current consumption	[A]	146,8	168	197,2	223	247	286
Starting current of entire unit	[A]	300	360	404	436	465	586
Maximum connectable cable cross-sections [1]							
Rectangular	[mm]	20x5	20x5	20x5	2x25x5	2x25x5	2x25x5
Round	[mm²]	120	120	120	240	240	240
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]							
Pre-fuse	[A]	250	250	250	400	400	400
Dimensions							
A (length)	[mm]	4250	4250	4150	4150	4130	4350
B (width)	[mm]	900	900	900	900	900	900
H (height)	[mm]	1815	1910	1990	1990	1990	2090
Clearance							
R1	[mm]	900	900	900	900	900	900
R2	[mm]	900	900	900	900	900	900
R3	[mm]	1500	1500	1500	1500	1500	1500
R4	[mm]	3000	3000	3250	3500	3500	3000

Tab. 10

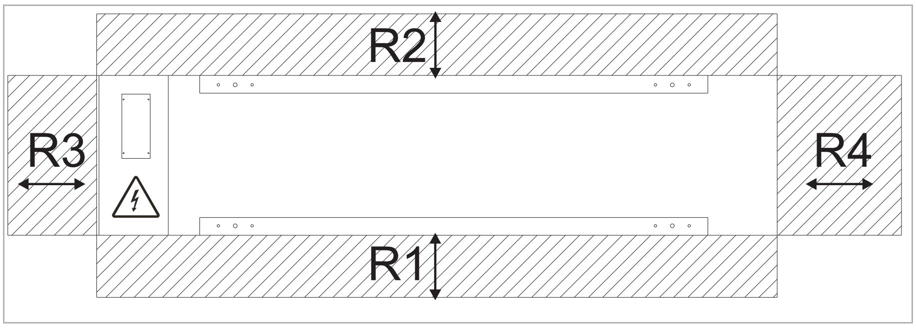


Fig. 10: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			**2280**	**2320**	**2360**	**2420**	**2480**
Refrigeration capacity[1]	Q_e	[kW]	729.4	884.2	1012.3	1146.9	1298.5
Unit power consumption (total)	P	[kW]	130.3	158.1	180.4	205.1	232.3
EER			5.60	5.59	5.61	5.59	5.59
ESEER			6.66	6.57	6.73	6.64	6.66
Chilled water flow rate	V_e	[m³/h]	126.0	152.0	174.0	197.0	224.0
Pressure drop (chilled water)	Δp_e	[kPa]	51.9	58.6	41.3	55.0	65.0
Controls			FläktGroup controller - step III				
Compressor			**Bitzer CSW compact screw compressor**				
No. of compressors		n	2	2	2	2	2
No. of refrigeration circuits		n	2	2	2	2	2
Capacity stages per unit		n	25 to 100 % continuous / optional 12.5 to 100 %				
Compressor type 1			CSW8593-125Y	CSW9563-140Y	CSW9573-160Y	CSW9583-180Y	CSW9593-210Y
Compressor type 2			CSW8593-125Y	CSW9563-140Y	CSW9573-160Y	CSW9583-180Y	CSW9593-210Y
Compressor type 3			-	-	-	-	-
Compressor type 4			-	-	-	-	-
Oil type			BSE170				
Oil heating		[W]	300				
Evaporator			**Shell and tube heat exchanger**				
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	78.4	95.1	108.8	123.3	139.6
Maximum chilled water volume	$V_{e,max}$	[m³/h]	210.0	230.0	287.0	288.0	288.0
Maximum chilled water side operating pressure		[bar]	10	10	10	10	10
Connection for evaporator inlet/outlet		["]	8	8	8	10	10
Connection[4]			G	G	G	G	G
Condenser			**Shell and tube heat exchanger**				
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	45.8	55.5	63.5	72.0	81.5
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	213.6	246.5	279.3	304.0	336.9
Maximum warm-water side operating pressure		[bar]	10	10	10	10	10
Connection for condenser outlet/inlet		["]	2 x 5	2 x 5	2 x 5	2 x 5	2 x 6
Connection[4]			G	G	G	G	G
Charge quantities							
Refrigerant R-134a[5]		[kg]	110	131	144	213	207
Oil		[kg]	38	70	70	70	70
Water volume of evaporator		[l]	473	504	535	892	884
Water volume of condenser		[l]	184	208	232	252	290
Minimum system charge in chilled water mode		[l]	7850	9520	10900	12350	13980
Minimum system charge in chilled water mode with .E38 option		[l]	5220	6320	7240	8200	9280
Weight							
Transport weight		[kg]	5390	6460	6920	7900	8560
Noise levels							
Sound power level[2]		[dB(A)]	99	99	99	99	99
Sound pressure level[3]		[dB(A)]	67	67	67	67	67

Tab. 11

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

3) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

4) Refer to chapter: legend for dimensional drawings

5) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		2280	2320	2360	2420	2480
Compressor						
Maximum power consumption	[kW]	2x101.3	2x121.6	2x137.7	2x154.9	2x175.1
Maximum current consumption	[A]	2x168	2x197.2	2x223	2x247	2x286
Starting current of each compressor	[A]	2x360	2x404	2x436	2x465	2x586
Compressor start		Y / Δ	Y / Δ	Y / Δ	Y / Δ	Y / Δ
Total [1,2]						
Maximum power consumption	[kW]	202,6	243,2	275,4	309,8	350,2
Maximum current consumption	[A]	336	394,4	446	494	572
Starting current of entire unit	[A]	456	520	560	600.2	747.8
Maximum connectable cable cross-sections [1]						
Rectangular	[mm]	2x32x6	2x32x6	2x32x6	2x32x6	63
Round	[mm²]	2x185	2x185	2x185	2x185	2x300
Maximum permissible pre-fuse ratings (fuse type gLgG) [2]						
Pre-fuse	[A]	630	630	630	630	800
Dimensions						
A (length)	[mm]	4550	4950	5170	4920	4920
B (width)	[mm]	1150	1150	1150	1150	1285
H (height)	[mm]	2050	2200	2200	2350	2430
Clearance						
R1	[mm]	900	900	900	900	900
R2	[mm]	900	900	900	900	900
R3	[mm]	1500	1500	1500	1500	1500
R4	[mm]	3000	2750	2750	2750	2750

Tab. 12

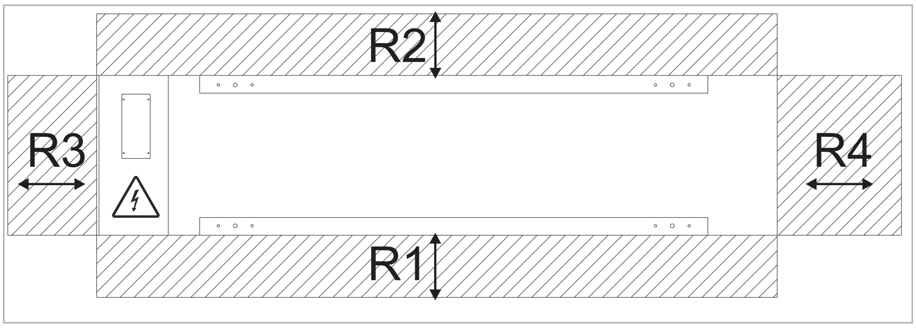


Fig. 11: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity stage			**2540**	**4720**	**4780**	**4840**
Refrigeration capacity[1]	Q_e	[kW]	1411	2025	2157	2294
Unit power consumption (total)	P	[kW]	255.6	360.7	385.5	410.3
EER			5.52	5.61	5.6	5.59
ESEER			6.66	6.75	6.64	6.65
Chilled water flow rate	V_e	[m³/h]	242.9	348.6	371.5	394.9
Pressure drop (chilled water)	Δp_e	[kPa]	46	41.3	59.3	54.6
Controls			FläktGroup controller - step III			
Compressor			**Bitzer CSW compact screw compressor**			
No. of compressors		n	2	4	4	4
No. of refrigeration circuits		n	2	4	4	4
Capacity stages per unit		n	25 to 100 % continuous / optional 12.5 to 100 %			
Compressor type 1			CSW95103-240Y	CSW9573-160Y	CSW9573-160Y	CSW9583-180Y
Compressor type 2			CSW95103-240Y	CSW9573-160Y	CSW9573-160Y	CSW9583-180Y
Compressor type 3			-	CSW9573-160Y	CSW9583-180Y	CSW9583-180Y
Compressor type 4			-	CSW9573-160Y	CSW9583-180Y	CSW9583-180Y
Oil type			BSE170			
Oil heating		[W]	300			
Evaporator			**Shell and tube heat exchanger**			
Minimum chilled water flow rate	$V_{e,min}$	[m³/h]	152.0	218.0	232.0	247.0
Maximum chilled water volume	$V_{e,max}$	[m³/h]	359.0	573.8	465.8	576.0
Maximum chilled water side operating pressure		[bar]	10	10	10	10
Connection for evaporator inlet/outlet		["]	10	10	10	10
Connection[4]			G	G	G	G
Condenser			**Shell and tube heat exchanger**			
Minimum warm water volume flow	$V_{c,min}$	[m³/h]	86.0	127.0	135.0	144.0
Maximum warm water volume flow	$V_{c,max}$	[m³/h]	384.0	559.0	583.0	608.0
Maximum warm-water side operating pressure		[bar]	10	10	10	10
Connection for condenser outlet/inlet		["]	6	5	5	5
Connection[4]			G	G	G	G
Charge quantities						
Refrigerant R-134a[5]		[kg]	220	320	348	348
Oil		[kg]	76	140	140	140
Water volume of evaporator		[l]	931	1070	1823	1784
Water volume of condenser		[l]	332	464	484	504
Minimum system charge in chilled water mode		[l]	7060	10120	10790	11470
Minimum system charge in chilled water mode with .E38 option		[l]	4710	6750	7190	7650
Weight						
Transport weight		[kg]	8850	13720	15850	16100
Noise levels						
Sound power level[2]		[dB(A)]	101	102	102	102
Sound pressure level[3]		[dB(A)]	69	70	70	70

Tab. 13

1) Performance data for input parameters: chilled water temperatures (inlet/outlet) 12/7°C; cooling water temperature (inlet/outlet) 30/35°C; values partially rounded off

2) According to Eurovent (refer to „Acoustics“ on page 58 for further details)

3) In 10 m free-field conditions (also refer to „Acoustics“ on page 58)

4) Refer to chapter: legend for dimensional drawings

5) For exact refrigerant charge volume - refer to the unit identification plate.

Capacity size		2540	4720	4780	4840
Compressor					
Maximum power consumption	[kW]	2x195.5	4x137.7	2x137.7 + 2x154.9	4x154.9
Maximum current consumption	[A]	2x318	4x223	2x223 + 2x247	4x247
Starting current of each compressor	[A]	2x650	4x436	2x436 + 2x465	4x465
Compressor start		Y / Δ	Y / Δ	Y / Δ	Y / Δ
Total [1,2]					
Maximum power consumption	[kW]	391	550.8	585.2	619.6
Maximum current consumption	[A]	636	892	940	988
Starting current of entire unit	[A]	860	840	878	907
Maximum connectable cable cross-sections [1)]					
Rectangular	[mm]	-	-	-	-
Round	[mm²]	-	-	-	-
Maximum permissible pre-fuse ratings (fuse type gLgG) [2)]					
Pre-fuse	[A]	-	-	-	-
Dimensions					
A (length)	[mm]	5200	5220	4900	4900
B (width)	[mm]	1285	2250	2250	2250
H (height)	[mm]	2440	2305	2455	2455
Clearance					
R1	[mm]	900	900	900	900
R2	[mm]	900	900	900	900
R3	[mm]	1500	1500	1500	1500
R4	[mm]	3500	3500	3500	3500

Tab. 14

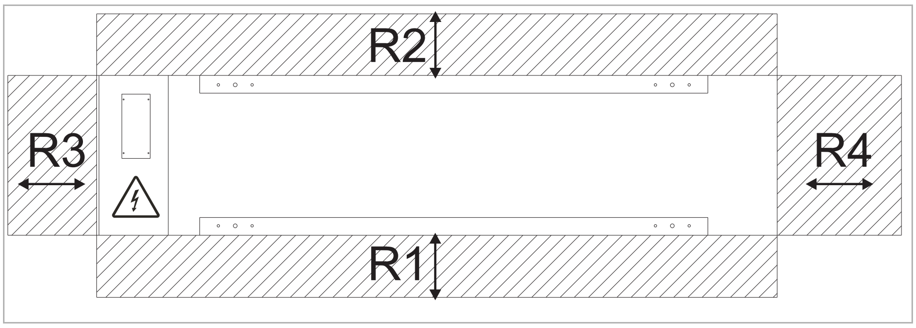


Fig. 12: Clearance

[1] *Please observe the regionally applicable safety regulations and constructional conditions relevant to the dimensioning of the supply line.*

[2] *Please observe the regionally applicable standards for cable cross sections and backup fuses.*
Voltage tolerance: max. 10%, voltage imbalance between phases: max. 3%.

NOTE!

For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Capacity Data – Basic Unit
GLWC(H) 1130-1180 CA2

GLWC/H 1130 CA2							
Tco	**Teo**	**5**	**6**	**7**	**10**	**12**	**15**
26	Q_e	**309,2**	**320,3**	**331,5**	**365,6**	**388,8**	**424,2**
	V_e	53,1	55,0	57,0	62,9	66,9	73,1
	Δp_e	42,6	45,7	49,0	59,7	67,6	80,7
	Qc	**354,4**	**365,7**	**377,1**	**411,7**	**435,1**	**470,8**
	Vc	61,2	63,1	65,1	71,1	75,1	81,3
	Δp_c	34,1	36,3	38,6	46,0	51,4	60,1
	P	48,1	48,3	48,5	49,0	49,3	49,6
30	Q_e	**298,6**	**309,4**	**320,4**	**353,8**	**376,5**	**411,2**
	V_e	51,3	53,2	55,0	60,8	64,8	70,9
	Δp_e	39,7	42,7	45,8	55,9	63,4	75,8
	Qc	**348,4**	**359,5**	**370,7**	**404,6**	**427,6**	**462,7**
	Vc	60,2	62,2	64,1	70,0	73,9	80,0
	Δp_c	33,0	35,2	37,4	44,5	49,8	58,3
	P	53,1	53,3	53,5	54,1	54,4	54,8
35	Q_e	**284,9**	**295,4**	**306,0**	**338,5**	**360,6**	**394,4**
	V_e	48,9	50,8	52,6	58,2	62,1	68,0
	Δp_e	36,2	38,9	41,7	51,2	58,2	69,7
	Qc	**341,2**	**352,0**	**362,9**	**396,0**	**418,4**	**452,7**
	Vc	59,1	61,0	62,9	68,6	72,5	78,4
	Δp_c	31,8	33,8	35,9	42,8	47,8	55,9
	P	60,0	60,2	60,5	61,1	61,5	62,0
40	Q_e	**270,6**	**280,9**	**291,2**	**322,6**	**344,1**	**376,9**
	V_e	46,5	48,3	50,0	55,5	59,2	64,9
	Δp_e	32,6	35,2	37,8	46,5	53,0	63,7
	Qc	**334,3**	**344,8**	**355,3**	**387,5**	**409,3**	**442,7**
	Vc	58,0	59,8	61,6	67,2	71,0	76,8
	Δp_c	30,6	32,6	34,6	41,1	45,9	53,7
	P	67,7	68,0	68,3	69,0	69,4	70,0
45	Q_e	**255,9**	**265,8**	**275,7**	**306,2**	**326,9**	**358,8**
	V_e	44,0	45,7	47,4	52,7	56,3	61,8
	Δp_e	29,2	31,5	33,9	41,9	47,8	57,7
	Qc	**327,6**	**337,8**	**348,0**	**379,2**	**400,4**	**432,8**
	Vc	56,9	58,7	60,5	65,9	69,6	75,2
	Δp_c	29,5	31,4	33,3	39,5	44,1	51,5
	P	76,3	76,6	76,9	77,6	78,1	78,8
48	Q_e	**246,9**	**256,5**	**266,2**	**296,0**	**316,4**	**347,6**
	V_e	42,4	44,1	45,7	50,9	54,5	59,9
	Δp_e	27,2	29,3	31,6	39,1	44,8	54,2
	Qc	**323,7**	**333,7**	**343,7**	**374,3**	**395,1**	**427,0**
	Vc	56,3	58,1	59,8	65,1	68,7	74,3
	Δp_c	28,9	30,7	32,5	38,6	43,0	50,2
	P	81,8	82,1	82,4	83,2	83,7	84,4

GLWC/H 1140 CA2							
Tco	**Teo**	**5**	**6**	**7**	**10**	**12**	**15**
26	Q_e	**351,9**	**364,6**	**377,3**	**416,2**	**442,6**	**483,0**
	V_e	60,5	62,6	64,8	71,6	76,2	83,2
	Δp_e	45,7	49,0	52,5	64,0	72,5	86,6
	Qc	**403,3**	**416,2**	**429,2**	**468,6**	**495,3**	**536,0**
	Vc	69,6	71,9	74,1	80,9	85,5	92,5
	Δp_c	33,2	35,3	37,6	44,8	50,0	58,6
	P	54,7	54,9	55,1	55,7	56,0	56,4
30	Q_e	**339,8**	**352,2**	**364,7**	**402,7**	**428,6**	**468,2**
	V_e	58,4	60,5	62,7	69,3	73,8	80,7
	Δp_e	42,6	45,8	49,1	60,0	68,0	81,3
	Qc	**396,5**	**409,1**	**421,8**	**460,5**	**486,7**	**526,7**
	Vc	68,6	70,7	72,9	79,6	84,2	91,1
	Δp_c	32,1	34,2	36,4	43,4	48,4	56,7
	P	60,3	60,5	60,8	61,5	61,8	62,3
35	Q_e	**324,2**	**336,2**	**348,3**	**385,3**	**410,5**	**449,0**
	V_e	55,7	57,8	59,8	66,3	70,7	77,4
	Δp_e	38,8	41,7	44,8	54,9	62,4	74,8
	Qc	**388,3**	**400,5**	**412,9**	**450,6**	**476,2**	**515,3**
	Vc	67,2	69,4	71,5	78,0	82,5	89,2
	Δp_c	30,9	32,9	35,0	41,7	46,5	54,5
	P	68,1	68,4	68,7	69,5	69,9	70,5
40	Q_e	**308,0**	**319,7**	**331,4**	**367,3**	**391,7**	**429,1**
	V_e	52,9	54,9	56,9	63,2	67,4	73,9
	Δp_e	35,0	37,7	40,5	49,9	56,8	68,3
	Qc	**380,4**	**392,3**	**404,3**	**440,9**	**465,8**	**503,9**
	Vc	66,0	68,1	70,1	76,5	80,8	87,4
	Δp_c	29,8	31,7	33,7	40,0	44,7	52,3
	P	76,9	77,3	77,6	78,4	78,9	79,5
45	Q_e	**291,3**	**302,5**	**313,9**	**348,5**	**372,2**	**408,5**
	V_e	50,0	52,0	53,9	59,9	64,1	70,4
	Δp_e	31,3	33,8	36,3	44,9	51,3	61,9
	Qc	**372,8**	**384,3**	**396,0**	**431,5**	**455,6**	**492,6**
	Vc	64,8	66,8	68,8	75,0	79,2	85,6
	Δp_c	28,7	30,5	32,4	38,5	42,9	50,1
	P	86,7	87,0	87,4	88,3	88,8	89,5
48	Q_e	**281,0**	**292,0**	**303,0**	**337,0**	**360,2**	**395,8**
	V_e	48,3	50,2	52,1	58,0	62,0	68,2
	Δp_e	29,1	31,4	33,9	42,0	48,0	58,1
	Qc	**368,4**	**379,7**	**391,1**	**425,9**	**449,6**	**485,9**
	Vc	64,1	66,1	68,0	74,1	78,2	84,5
	Δp_c	28,1	29,9	31,7	37,6	41,9	48,9
	P	93,0	93,3	93,7	94,6	95,2	95,9

Q_e [kW] Chilled water capacity
V_e [m³/h] Chilled water volume flow
Δp_e [kPa] Chilled water pressure drop
P [kW] Unit power consumption (total)
T_{eo} [°C] Chilled water outlet temperature

Q_c [kW] Warm water capacity
V_c [m³/h] Warm water volume flow
Δp_c [kPa] Warm water pressure drop
– Operation outside operating limits
T_{co} [°C] Warm water outlet temperature

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

GLWC/H 2320 CA2							
Tco	Teo	5	6	7	10	12	15
	Q_e	**853,5**	**884,4**	**915,6**	**1010,6**	**1075,2**	**1173,9**
	V_e	146,6	151,9	157,3	173,8	185,0	202,3
	Δp_e	46,2	49,6	53,2	64,9	73,6	88,0
26	**Qc**	**979,5**	**1011,1**	**1042,9**	**1139,6**	**1205,1**	**1304,9**
	Vc	169,1	174,6	180,1	196,8	208,1	225,3
	Δp_c	33,2	35,4	37,6	44,9	50,2	58,9
	P	134,1	134,8	135,4	137,2	138,2	139,4
	Q_e	**824,2**	**854,5**	**885,0**	**978,2**	**1041,6**	**1138,6**
	V_e	141,6	146,8	152,0	168,2	179,3	196,2
	Δp_e	43,1	46,3	49,7	60,8	69,1	82,7
30	**Qc**	**962,4**	**993,4**	**1024,7**	**1119,7**	**1184,2**	**1282,5**
	Vc	166,4	171,8	177,2	193,6	204,7	221,7
	Δp_c	32,1	34,2	36,4	43,5	48,6	57,0
	P	147,1	147,9	148,6	150,6	151,7	153,1
	Q_e	**784,8**	**814,2**	**843,9**	**934,5**	**996,2**	**1090,8**
	V_e	134,8	139,9	145,0	160,7	171,5	188,0
	Δp_e	39,1	42,1	45,2	55,5	63,2	76,0
35	**Qc**	**939,9**	**970,1**	**1000,6**	**1093,3**	**1156,3**	**1252,5**
	Vc	162,8	168,0	173,3	189,4	200,3	216,9
	Δp_c	30,7	32,8	34,8	41,6	46,5	54,6
	P	165,0	165,9	166,7	169,0	170,3	172,0
	Q_e	**742,3**	**770,7**	**799,4**	**887,3**	**947,2**	**1039,1**
	V_e	127,5	132,4	137,3	152,6	163,0	179,0
	Δp_e	35,0	37,7	40,6	50,1	57,1	68,9
40	**Qc**	**916,1**	**945,4**	**975,0**	**1065,2**	**1126,6**	**1220,5**
	Vc	158,9	164,0	169,2	184,8	195,5	211,7
	Δp_c	29,3	31,2	33,2	39,6	44,3	52,0
	P	184,9	185,8	186,7	189,3	190,9	193,0
	Q_e	**696,7**	**724,1**	**751,8**	**836,5**	**894,4**	**983,4**
	V_e	119,7	124,4	129,2	143,9	153,9	169,4
	Δp_e	30,8	33,3	35,9	44,5	50,9	61,7
45	**Qc**	**890,9**	**919,3**	**947,9**	**1035,4**	**1095,0**	**1186,3**
	Vc	154,8	159,8	164,7	179,9	190,3	206,2
	Δp_c	27,8	29,6	31,5	37,6	42,0	49,3
	P	206,6	207,7	208,7	211,6	213,4	215,9
	Q_e	**667,9**	**694,6**	**721,6**	**804,3**	**860,9**	**948,0**
	V_e	114,7	119,3	124,0	138,3	148,2	163,3
	Δp_e	28,3	30,6	33,0	41,1	47,2	57,4
48	**Qc**	**875,2**	**902,9**	**931,0**	**1016,6**	**1075,1**	**1164,7**
	Vc	152,3	157,1	162,0	176,9	187,0	202,6
	Δp_c	26,9	28,6	30,4	36,3	40,6	47,6
	P	220,5	221,6	222,7	225,9	227,8	230,6

GLWC/H 2360 CA2							
Tco	Teo	5	6	7	10	12	15
	Q_e	**968,2**	**1003,3**	**1038,7**	**1146,5**	**1219,8**	**1331,9**
	V_e	166,3	172,4	178,4	197,2	209,9	229,5
	Δp_e	47,3	50,8	54,5	66,5	75,4	90,1
26	**Qc**	**1110,9**	**1146,8**	**1182,9**	**1292,6**	**1367,0**	**1480,4**
	Vc	191,8	198,0	204,2	223,2	236,0	255,6
	Δp_c	33,1	35,3	37,5	44,8	50,1	58,8
	P	151,8	152,6	153,4	155,4	156,5	157,9
	Q_e	**934,9**	**969,3**	**1004,0**	**1109,8**	**1181,7**	**1291,8**
	V_e	160,6	166,5	172,5	190,8	203,4	222,6
	Δp_e	44,1	47,4	50,9	62,3	70,7	84,7
30	**Qc**	**1091,4**	**1126,7**	**1162,1**	**1270,1**	**1343,3**	**1455,0**
	Vc	188,7	194,8	200,9	219,6	232,3	251,6
	Δp_c	32,1	34,2	36,3	43,4	48,6	57,0
	P	166,5	167,4	168,2	170,5	171,9	173,6
	Q_e	**890,2**	**923,6**	**957,3**	**1060,2**	**1130,3**	**1237,6**
	V_e	152,9	158,7	164,5	182,3	194,5	213,2
	Δp_e	40,0	43,1	46,3	56,8	64,7	77,8
35	**Qc**	**1065,9**	**1100,2**	**1134,8**	**1240,1**	**1311,7**	**1421,0**
	Vc	184,6	190,5	196,5	214,8	227,2	246,1
	Δp_c	30,7	32,7	34,8	41,5	46,5	54,5
	P	186,9	187,8	188,8	191,4	193,0	195,1
	Q_e	**842,0**	**874,3**	**906,9**	**1006,6**	**1074,6**	**1178,9**
	V_e	144,7	150,2	155,8	173,1	184,9	203,1
	Δp_e	35,8	38,6	41,5	51,2	58,5	70,6
40	**Qc**	**1038,9**	**1072,2**	**1105,8**	**1208,3**	**1278,0**	**1384,6**
	Vc	180,2	186,0	191,8	209,6	221,7	240,2
	Δp_c	29,2	31,1	33,1	39,5	44,2	51,9
	P	209,4	210,5	211,6	214,5	216,3	218,8
	Q_e	**790,4**	**821,5**	**852,9**	**949,0**	**1014,7**	**1115,7**
	V_e	135,8	141,1	146,5	163,2	174,6	192,2
	Δp_e	31,5	34,1	36,7	45,6	52,2	63,2
45	**Qc**	**1010,5**	**1042,7**	**1075,2**	**1174,4**	**1242,1**	**1345,7**
	Vc	175,6	181,2	186,9	204,1	215,9	233,9
	Δp_c	27,8	29,6	31,4	37,5	41,9	49,2
	P	234,2	235,4	236,5	239,8	241,8	244,6
	Q_e	**757,7**	**788,0**	**818,7**	**912,5**	**976,8**	**1075,6**
	V_e	130,2	135,4	140,6	156,9	168,1	185,3
	Δp_e	29,0	31,3	33,8	42,1	48,3	58,7
48	**Qc**	**992,8**	**1024,3**	**1056,1**	**1153,2**	**1219,5**	**1321,1**
	Vc	172,7	178,2	183,7	200,6	212,2	229,9
	Δp_c	26,9	28,6	30,4	36,2	40,5	47,6
	P	250,1	251,3	252,6	256,1	258,2	261,2

GLWC/H 2420 CA2							
Tco	Teo	5	6	7	10	12	15
	Q_e	**1081,6**	**1120,8**	**1160,4**	**1281,0**	**1362,9**	**1488,1**
	V_e	185,8	192,6	199,3	220,3	234,6	256,4
	Δp_e	31,1	33,4	35,8	43,7	49,5	59,2
26	**Qc**	**1241,0**	**1281,2**	**1321,7**	**1444,8**	**1528,2**	**1655,2**
	Vc	214,3	221,2	228,2	249,5	263,9	285,8
	Δp_c	32,6	34,8	37,0	44,2	49,4	58,0
	P	169,6	170,6	171,6	174,3	175,9	177,8
	Q_e	**1044,6**	**1083,0**	**1121,6**	**1239,6**	**1319,8**	**1442,5**
	V_e	179,5	186,0	192,7	213,2	227,1	248,5
	Δp_e	29,0	31,2	33,4	40,9	46,4	55,6
30	**Qc**	**1219,6**	**1259,1**	**1298,8**	**1419,6**	**1501,5**	**1626,3**
	Vc	210,9	217,7	224,6	245,4	259,6	281,2
	Δp_c	31,6	33,7	35,8	42,8	47,9	56,1
	P	186,2	187,3	188,5	191,5	193,3	195,6
	Q_e	**996,6**	**1033,8**	**1071,3**	**1185,7**	**1263,7**	**1383,0**
	V_e	171,2	177,6	184,0	203,9	217,5	238,3
	Δp_e	26,4	28,4	30,5	37,4	42,6	51,1
35	**Qc**	**1193,2**	**1231,5**	**1270,2**	**1387,9**	**1467,8**	**1589,7**
	Vc	206,6	213,3	220,0	240,4	254,2	275,3
	Δp_c	30,3	32,3	34,4	41,0	45,9	53,8
	P	209,1	210,4	211,6	215,1	217,1	219,9
	Q_e	**946,7**	**982,6**	**1018,9**	**1129,7**	**1205,2**	**1321,0**
	V_e	162,6	168,8	175,0	194,3	207,4	227,6
	Δp_e	23,8	25,7	27,6	34,0	38,7	46,6
40	**Qc**	**1167,0**	**1204,2**	**1241,8**	**1356,2**	**1433,9**	**1552,7**
	Vc	202,5	208,9	215,4	235,3	248,8	269,4
	Δp_c	29,1	31,0	33,0	39,3	43,9	51,5
	P	234,4	235,8	237,2	241,0	243,3	246,4
	Q_e	**894,8**	**929,4**	**964,4**	**1071,3**	**1144,3**	**1256,4**
	V_e	153,7	159,7	165,7	184,2	196,9	216,5
	Δp_e	21,3	22,9	24,7	30,6	34,9	42,2
45	**Qc**	**1141,1**	**1177,1**	**1213,5**	**1324,4**	**1399,8**	**1515,1**
	Vc	198,3	204,6	210,9	230,2	243,3	263,3
	Δp_c	27,9	29,7	31,6	37,6	42,0	49,2
	P	262,0	263,6	265,1	269,2	271,8	275,3
	Q_e	**862,7**	**896,5**	**930,6**	**1035,2**	**1106,6**	**1216,3**
	V_e	148,2	154,0	159,9	178,0	190,5	209,6
	Δp_e	19,8	21,4	23,0	28,5	32,6	39,5
48	**Qc**	**1125,7**	**1161,0**	**1196,6**	**1305,2**	**1379,2**	**1492,4**
	Vc	195,8	202,0	208,2	227,1	240,0	259,6
	Δp_c	27,2	29,0	30,8	36,6	40,9	47,9
	P	279,8	281,4	282,9	287,3	290,0	293,7

Q_e [kW] Chilled water capacity
V_e [m³/h] Chilled water volume flow
Δp_e [kPa] Chilled water pressure drop
P [kW] Unit power consumption (total)
T_{eo} [°C] Chilled water outlet temperature

Q_c [kW] Warm water capacity
V_c [m³/h] Warm water volume flow
Δp_c [kPa] Warm water pressure drop
– Operation outside operating limits
T_{co} [°C] Warm water outlet temperature

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

Capacity Data – Basic Unit
GLWC(H) 2460-2800 CD2

GLWC/H 2450 CA2

Tco	Teo	5	6	7	10	12	15
26	**Q_e**	**1156,0**	**1198,3**	**1241,0**	**1371,0**	**1459,3**	**1594,4**
	V_e	198,6	205,9	213,2	235,8	251,2	274,7
	Δp_e	34,7	37,3	40,0	48,9	55,5	66,4
	Qc	**1326,1**	**1369,7**	**1413,5**	**1546,7**	**1636,9**	**1774,5**
	Vc	229,0	236,5	244,1	267,1	282,6	306,4
	Δp_c	33,6	35,8	38,1	45,7	51,1	60,1
	P	181,0	182,3	183,5	186,9	189,0	191,6
30	**Q_e**	**1116,1**	**1157,4**	**1199,0**	**1326,0**	**1412,4**	**1544,5**
	V_e	191,7	198,8	206,0	228,0	243,1	266,1
	Δp_e	32,4	34,8	37,3	45,8	52,0	62,3
	Qc	**1302,9**	**1345,5**	**1388,4**	**1519,0**	**1607,5**	**1742,5**
	Vc	225,3	232,6	240,1	262,6	277,9	301,3
	Δp_c	32,5	34,6	36,9	44,1	49,4	58,1
	P	198,7	200,1	201,5	205,3	207,6	210,6
35	**Q_e**	**1064,4**	**1104,3**	**1144,7**	**1267,7**	**1351,5**	**1479,7**
	V_e	182,9	189,7	196,6	218,0	232,6	255,0
	Δp_e	29,4	31,7	34,0	41,8	47,6	57,2
	Qc	**1274,0**	**1315,4**	**1357,2**	**1484,2**	**1570,5**	**1702,1**
	Vc	220,7	227,8	235,1	257,1	272,0	294,8
	Δp_c	31,2	33,2	35,4	42,3	47,4	55,6
	P	223,0	224,6	226,1	230,4	233,0	236,6
40	**Q_e**	**1010,6**	**1049,2**	**1088,1**	**1207,0**	**1288,1**	**1412,3**
	V_e	173,6	180,3	186,9	207,6	221,7	243,3
	Δp_e	26,5	28,6	30,8	37,9	43,3	52,1
	Qc	**1245,5**	**1285,6**	**1326,1**	**1449,5**	**1533,3**	**1661,3**
	Vc	216,1	223,0	230,1	251,5	266,0	288,2
	Δp_c	29,9	31,8	33,9	40,5	45,3	53,2
	P	249,8	251,5	253,2	257,9	260,8	264,9
45	**Q_e**	**954,9**	**992,0**	**1029,5**	**1144,0**	**1222,2**	**1342,1**
	V_e	164,0	170,4	176,9	196,7	210,3	231,3
	Δp_e	23,7	25,6	27,5	34,1	38,9	47,1
	Qc	**1217,2**	**1256,1**	**1295,2**	**1414,6**	**1495,8**	**1620,1**
	Vc	211,5	218,3	225,1	245,8	260,0	281,6
	Δp_c	28,6	30,5	32,4	38,7	43,3	50,7
	P	279,1	280,9	282,7	287,9	291,1	295,7
48	**Q_e**	**920,5**	**956,7**	**993,2**	**1105,1**	**1181,4**	**1298,8**
	V_e	158,1	164,3	170,6	190,0	203,3	223,8
	Δp_e	22,0	23,8	25,6	31,8	36,4	44,1
	Qc	**1200,4**	**1238,4**	**1276,7**	**1393,7**	**1473,3**	**1595,1**
	Vc	208,9	215,5	222,1	242,5	256,3	277,5
	Δp_c	27,9	29,7	31,6	37,6	42,1	49,3
	P	297,8	299,7	301,6	307,0	310,4	315,2

GLWC/H 2480 CA2

Tco	Teo	5	6	7	10	12	15
26	**Q_e**	**1225,0**	**1269,8**	**1315,1**	**1452,9**	**1546,7**	**1690,0**
	V_e	210,4	218,2	225,9	249,9	266,2	291,2
	Δp_e	39,0	41,9	44,9	54,9	62,4	74,6
	Qc	**1405,6**	**1451,6**	**1497,9**	**1638,8**	**1734,3**	**1879,8**
	Vc	242,7	250,6	258,6	283,0	299,5	324,6
	Δp_c	34,2	36,4	38,8	46,4	52,0	61,1
	P	192,1	193,3	194,5	197,7	199,6	201,9
30	**Q_e**	**1182,8**	**1226,6**	**1270,8**	**1405,5**	**1497,2**	**1637,5**
	V_e	203,2	210,7	218,3	241,7	257,7	282,1
	Δp_e	36,3	39,1	41,9	51,4	58,4	70,1
	Qc	**1381,1**	**1426,1**	**1471,5**	**1609,6**	**1703,3**	**1846,2**
	Vc	238,8	246,6	254,4	278,3	294,5	319,2
	Δp_c	33,1	35,3	37,6	44,9	50,3	59,1
	P	210,9	212,3	213,6	217,2	219,3	222,0
35	**Q_e**	**1128,1**	**1170,5**	**1213,3**	**1343,9**	**1432,9**	**1569,3**
	V_e	193,8	201,1	208,4	231,1	246,6	270,4
	Δp_e	33,1	35,6	38,2	47,0	53,5	64,3
	Qc	**1350,7**	**1394,5**	**1438,7**	**1573,1**	**1664,4**	**1803,8**
	Vc	233,9	241,5	249,2	272,5	288,3	312,4
	Δp_c	31,7	33,8	36,0	43,1	48,2	56,6
	P	236,8	238,4	239,8	243,9	246,3	249,5
40	**Q_e**	**1071,2**	**1112,1**	**1153,5**	**1279,8**	**1366,0**	**1498,2**
	V_e	184,0	191,1	198,2	220,1	235,1	258,1
	Δp_e	29,8	32,1	34,6	42,6	48,6	58,6
	Qc	**1320,6**	**1363,1**	**1406,0**	**1536,6**	**1625,3**	**1761,0**
	Vc	229,1	236,5	243,9	266,6	282,0	305,5
	Δp_c	30,5	32,4	34,5	41,2	46,1	54,1
	P	265,4	267,0	268,6	273,1	275,9	279,6
45	**Q_e**	**1012,1**	**1051,5**	**1091,4**	**1213,2**	**1296,4**	**1424,1**
	V_e	173,9	180,7	187,5	208,6	223,1	245,4
	Δp_e	26,6	28,7	30,9	38,3	43,8	53,0
	Qc	**1290,9**	**1332,0**	**1373,4**	**1499,9**	**1585,9**	**1717,7**
	Vc	224,3	231,5	238,7	260,7	275,6	298,5
	Δp_c	29,2	31,1	33,0	39,4	44,1	51,7
	P	296,5	298,3	300,1	305,0	308,1	312,3
48	**Q_e**	**975,6**	**1014,1**	**1053,0**	**1172,0**	**1253,3**	**1378,3**
	V_e	167,6	174,2	180,9	201,5	215,7	237,5
	Δp_e	24,7	26,7	28,8	35,7	40,9	49,6
	Qc	**1273,1**	**1313,3**	**1353,9**	**1477,8**	**1562,2**	**1691,5**
	Vc	221,5	228,5	235,6	257,1	271,8	294,3
	Δp_c	28,5	30,3	32,2	38,3	42,8	50,2
	P	316,5	318,3	320,2	325,4	328,6	333,1

GLWC/H 2540 CA2

Tco	Teo	5	6	7	10	12	15
26	**Q_e**	**1366,2**	**1415,8**	**1465,9**	**1618,3**	**1721,8**	**1880,0**
	V_e	234,7	243,2	251,8	278,3	296,3	323,9
	Δp_e	48,5	52,1	55,8	68,2	77,3	92,3
	Qc	**1568,0**	**1619,1**	**1670,4**	**1826,3**	**1931,7**	**2092,1**
	Vc	270,7	279,6	288,4	315,3	333,5	361,2
	Δp_c	33,0	35,2	37,4	44,8	50,1	58,7
	P	214,7	216,2	217,6	221,2	223,3	225,7
30	**Q_e**	**1317,7**	**1366,1**	**1414,9**	**1563,6**	**1664,6**	**1819,1**
	V_e	226,4	234,7	243,1	268,9	286,5	313,4
	Δp_e	45,1	48,5	52,0	63,6	72,2	86,5
	Qc	**1538,9**	**1588,8**	**1639,1**	**1791,7**	**1895,0**	**2052,4**
	Vc	266,1	274,7	283,4	309,8	327,7	354,9
	Δp_c	31,9	34,0	36,1	43,2	48,3	56,7
	P	235,3	236,9	238,5	242,7	245,1	248,2
35	**Q_e**	**1254,4**	**1301,1**	**1348,2**	**1491,9**	**1589,6**	**1739,1**
	V_e	215,5	223,5	231,6	256,6	273,6	299,7
	Δp_e	40,9	44,0	47,2	57,9	65,9	79,0
	Qc	**1501,8**	**1550,3**	**1599,1**	**1747,4**	**1847,8**	**2000,9**
	Vc	260,1	268,5	277,0	302,6	320,0	346,5
	Δp_c	30,4	32,4	34,5	41,2	46,1	54,0
	P	263,2	265,1	266,9	271,8	274,7	278,5
40	**Q_e**	**1188,0**	**1232,9**	**1278,2**	**1416,5**	**1510,7**	**1655,0**
	V_e	204,1	211,8	219,6	243,6	260,0	285,2
	Δp_e	36,7	39,5	42,4	52,2	59,5	71,6
	Qc	**1464,1**	**1511,0**	**1558,2**	**1701,7**	**1799,0**	**1947,4**
	Vc	254,0	262,1	270,3	295,2	312,1	337,9
	Δp_c	29,0	30,9	32,9	39,2	43,8	51,4
	P	293,8	295,8	297,8	303,4	306,7	311,1
45	**Q_e**	**1118,5**	**1161,5**	**1204,9**	**1337,5**	**1428,0**	**1566,6**
	V_e	192,2	199,5	207,0	230,0	245,8	269,9
	Δp_e	32,5	35,0	37,7	46,6	53,2	64,1
	Qc	**1425,8**	**1470,9**	**1516,4**	**1654,7**	**1748,6**	**1892,0**
	Vc	247,8	255,6	263,5	287,6	303,9	328,8
	Δp_c	27,6	29,4	31,3	37,2	41,6	48,7
	P	326,9	329,1	331,3	337,4	341,1	346,2
48	**Q_e**	**1075,4**	**1117,2**	**1159,4**	**1288,4**	**1376,4**	**1511,5**
	V_e	184,7	191,9	199,2	221,6	236,9	260,4
	Δp_e	30,0	32,4	34,9	43,2	49,4	59,7
	Qc	**1402,5**	**1446,5**	**1490,8**	**1625,9**	**1717,7**	**1857,8**
	Vc	244,0	251,7	259,4	282,9	298,8	323,2
	Δp_c	26,8	28,5	30,3	36,0	40,2	47,0
	P	348,0	350,3	352,6	359,1	363,0	368,3

GLWC/H 2600 CA2

Tco	Teo	5	6	7	10	12	15
26	**Q_e**	**1510,1**	**1564,7**	**1619,6**	**1786,8**	**1900,3**	**2073,6**
	V_e	259,4	268,8	278,2	307,3	327,1	357,3
	Δp_e	55,9	60,0	64,3	78,4	88,8	106,0
	Qc	**1733,2**	**1789,3**	**1845,7**	**2016,8**	**2132,5**	**2308,5**
	Vc	299,3	309,0	318,7	348,2	368,2	398,6
	Δp_c	34,9	37,2	39,6	47,3	52,9	62,0
	P	237,3	239,0	240,6	244,7	247,0	249,8
30	**Q_e**	**1456,9**	**1510,0**	**1563,6**	**1726,7**	**1837,6**	**2006,9**
	V_e	250,3	259,4	268,6	296,9	316,3	345,8
	Δp_e	52,0	55,9	59,9	73,2	83,0	99,2
	Qc	**1701,3**	**1756,2**	**1811,4**	**1979,0**	**2092,4**	**2265,0**
	Vc	294,2	303,6	313,2	342,2	361,8	391,6
	Δp_c	33,7	36,0	38,3	45,7	51,0	59,8
	P	260,0	261,9	263,6	268,4	271,1	274,6
35	**Q_e**	**1387,2**	**1438,5**	**1490,3**	**1648,0**	**1755,2**	**1919,2**
	V_e	238,3	247,1	256,0	283,4	302,1	330,7
	Δp_e	47,1	50,7	54,4	66,7	75,7	90,8
	Qc	**1660,6**	**1713,9**	**1767,5**	**1930,4**	**2040,7**	**2208,6**
	Vc	287,6	296,8	306,1	334,3	353,4	382,5
	Δp_c	32,3	34,4	36,6	43,6	48,7	57,1
	P	290,9	293,0	295,0	300,5	303,7	307,9
40	**Q_e**	**1314,1**	**1363,5**	**1413,3**	**1565,2**	**1668,6**	**1826,8**
	V_e	225,8	234,2	242,8	269,2	287,2	314,8
	Δp_e	42,3	45,5	48,9	60,1	68,5	82,2
	Qc	**1619,1**	**1670,7**	**1722,6**	**1880,3**	**1987,2**	**2150,1**
	Vc	280,9	289,8	298,8	326,2	344,7	373,0
	Δp_c	30,8	32,8	34,8	41,5	46,4	54,3
	P	324,5	326,8	329,0	335,2	338,9	343,9
45	**Q_e**	**1237,6**	**1284,9**	**1332,6**	**1478,4**	**1577,7**	**1729,8**
	V_e	212,6	220,7	228,9	254,2	271,5	298,0
	Δp_e	37,5	40,4	43,5	53,7	61,2	73,7
	Qc	**1576,9**	**1626,5**	**1676,5**	**1828,7**	**1931,9**	**2089,4**
	Vc	274,0	282,7	291,4	317,8	335,7	363,1
	Δp_c	29,3	31,2	33,1	39,4	44,0	51,4
	P	360,9	363,4	365,8	372,7	376,8	382,5
48	**Q_e**	**1190,1**	**1236,1**	**1282,5**	**1424,3**	**1521,0**	**1669,3**
	V_e	204,5	212,4	220,3	244,9	261,8	287,6
	Δp_e	34,7	37,4	40,3	49,8	56,9	68,7
	Qc	**1551,1**	**1599,6**	**1648,4**	**1797,0**	**1897,9**	**2051,9**
	Vc	269,9	278,3	286,8	312,6	330,2	357,0
	Δp_c	28,4	30,2	32,1	38,1	42,5	49,7
	P	384,0	386,7	389,2	396,5	400,9	407,0

Q_e [kW] Chilled water capacity
V_e [m³/h] Chilled water volume flow
Δp_e [kPa] Chilled water pressure drop
P [kW] Unit power consumption (total)
T_{eo} [°C] Chilled water outlet temperature

Q_c [kW] Warm water capacity
V_c [m³/h] Warm water volume flow
Δp_c [kPa] Warm water pressure drop
– Operation outside operating limits
T_{co} [°C] Warm water outlet temperature

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

☐ Values from example on page 18

GLWC/H 3810 CA2

Tco	Teo	5	6	7	10	12	15
	Q_e	**2051,4**	**2126,1**	**2201,3**	**2430,5**	**2586,3**	**2824,2**
	V_e	352,4	365,2	378,2	418,0	445,1	486,6
	Dp_e	44,7	48,0	51,5	62,9	71,3	85,2
26	**Qc**	**2354,3**	**2431,0**	**2508,2**	**2742,6**	**2901,2**	**3142,5**
	Vc	406,5	419,8	433,1	473,6	500,9	542,6
	Dpc	33,1	35,2	37,5	44,9	50,2	58,9
	P	322,2	324,4	326,5	332,0	335,0	338,7
	Q_e	**1978,6**	**2051,3**	**2124,7**	**2348,2**	**2500,2**	**2732,5**
	V_e	339,9	352,4	365,0	403,8	430,3	470,8
	Dp_e	41,6	44,7	48,0	58,7	66,7	79,8
30	**Qc**	**2310,4**	**2385,5**	**2461,0**	**2690,6**	**2845,9**	**3082,6**
	Vc	399,5	412,5	425,5	465,2	492,1	533,0
	Dpc	31,9	34,0	36,2	43,3	48,4	56,8
	P	353,0	355,5	357,8	364,2	367,8	372,4
	Q_e	**1883,4**	**1953,6**	**2024,4**	**2240,4**	**2387,3**	**2612,2**
	V_e	323,6	335,6	347,8	385,3	410,9	450,1
	Dp_e	37,7	40,6	43,5	53,4	60,8	72,9
35	**Qc**	**2254,6**	**2327,5**	**2400,8**	**2623,7**	**2774,8**	**3005,0**
	Vc	390,5	403,1	415,8	454,4	480,6	520,4
	Dpc	30,5	32,5	34,6	41,3	46,2	54,2
	P	395,0	397,8	400,4	407,8	412,2	417,9
	Q_e	**1783,5**	**1851,1**	**1919,2**	**2127,1**	**2268,7**	**2485,6**
	V_e	306,4	318,0	329,7	365,8	390,5	428,3
	Dp_e	33,8	36,4	39,1	48,2	54,9	66,0
40	**Qc**	**2197,9**	**2268,3**	**2339,2**	**2555,0**	**2701,3**	**2924,4**
	Vc	381,3	393,5	405,8	443,3	468,6	507,4
	Dpc	29,1	31,0	32,9	39,3	43,9	51,5
	P	440,8	443,9	446,9	455,2	460,2	466,9
	Q_e	**1679,1**	**1743,7**	**1809,0**	**2008,3**	**2144,2**	**2352,6**
	V_e	288,5	299,6	310,8	345,4	369,0	405,4
	Dp_e	30,0	32,3	34,8	42,9	49,0	59,2
45	**Qc**	**2140,1**	**2207,9**	**2276,3**	**2484,2**	**2625,4**	**2840,9**
	Vc	371,9	383,7	395,6	431,7	456,3	493,7
	Dpc	27,7	29,5	31,3	37,3	41,6	48,8
	P	490,4	493,8	497,1	506,3	511,9	519,4
	Q_e	**1614,3**	**1677,1**	**1740,5**	**1934,4**	**2066,7**	**2269,8**
	V_e	277,3	288,1	299,0	332,7	355,7	391,1
	Dp_e	27,7	29,9	32,2	39,8	45,6	55,1
48	**Qc**	**2105,0**	**2171,2**	**2237,8**	**2440,9**	**2578,7**	**2789,4**
	Vc	366,2	377,7	389,3	424,7	448,7	485,3
	Dpc	26,8	28,5	30,3	36,1	40,3	47,1
	P	522,1	525,6	529,1	538,8	544,7	552,7

GLWC/H 3900 CA2

Tco	Teo	5	6	7	10	12	15
	Q_e	**2265,2**	**2346,6**	**2428,6**	**2678,2**	**2847,5**	**3106,0**
	V_e	389,1	403,1	417,2	460,6	490,1	535,2
	Dp_e	54,5	58,5	62,7	76,4	86,5	103,1
26	**Qc**	**2599,5**	**2683,3**	**2767,5**	**3022,8**	**3195,4**	**3457,8**
	Vc	448,9	463,3	477,8	521,9	551,7	597,0
	Dpc	34,3	36,5	38,8	46,3	51,8	60,6
	P	355,7	358,1	360,5	366,7	370,1	374,3
	Q_e	**2185,6**	**2265,0**	**2345,0**	**2588,6**	**2754,0**	**3006,6**
	V_e	375,5	389,1	402,9	445,2	474,0	518,0
	Dp_e	50,8	54,5	58,4	71,3	80,9	96,6
30	**Qc**	**2551,9**	**2633,9**	**2716,4**	**2966,6**	**3135,8**	**3393,2**
	Vc	441,2	455,4	469,7	512,9	542,2	586,7
	Dpc	33,1	35,3	37,5	44,7	50,0	58,5
	P	389,7	392,5	395,1	402,2	406,2	411,3
	Q_e	**2081,5**	**2158,2**	**2235,5**	**2471,1**	**2631,2**	**2876,0**
	V_e	357,6	370,8	384,0	425,0	452,8	495,5
	Dp_e	46,0	49,5	53,1	65,0	73,8	88,4
35	**Qc**	**2491,3**	**2570,9**	**2651,0**	**2894,3**	**3058,9**	**3309,5**
	Vc	431,5	445,3	459,1	501,3	529,8	573,2
	Dpc	31,7	33,7	35,8	42,7	47,7	55,9
	P	436,0	439,1	442,0	450,2	455,0	461,2
	Q_e	**1972,3**	**2046,1**	**2120,5**	**2347,5**	**2502,0**	**2738,4**
	V_e	338,8	351,5	364,3	403,7	430,6	471,8
	Dp_e	41,3	44,5	47,8	58,7	66,8	80,1
40	**Qc**	**2429,5**	**2506,5**	**2584,0**	**2819,7**	**2979,3**	**3222,5**
	Vc	421,5	434,8	448,3	489,2	516,9	559,1
	Dpc	30,2	32,2	34,2	40,7	45,4	53,1
	P	486,4	489,8	493,1	502,3	507,8	515,1
	Q_e	**1857,9**	**1928,7**	**2000,0**	**2217,9**	**2366,3**	**2593,7**
	V_e	319,2	331,3	343,6	381,4	407,3	446,9
	Dp_e	36,7	39,5	42,5	52,4	59,7	71,9
45	**Qc**	**2366,4**	**2440,7**	**2515,4**	**2742,8**	**2897,0**	**3132,3**
	Vc	411,3	424,2	437,2	476,7	503,5	544,4
	Dpc	28,8	30,6	32,5	38,6	43,1	50,4
	P	540,9	544,7	548,3	558,4	564,6	573,0
	Q_e	**1786,9**	**1855,6**	**1925,1**	**2137,2**	**2281,8**	**2503,5**
	V_e	307,0	318,8	330,7	367,5	392,7	431,3
	Dp_e	33,9	36,6	39,4	48,6	55,5	67,0
48	**Qc**	**2328,0**	**2400,4**	**2473,4**	**2695,6**	**2846,4**	**3076,6**
	Vc	405,0	417,6	430,3	469,0	495,2	535,3
	Dpc	27,9	29,7	31,5	37,4	41,7	48,7
	P	575,7	579,6	583,4	594,1	600,7	609,7

GLWC/H 4900 CA2

Tco	Teo	5	6	7	10	12	15
	Q_e	**2300,2**	**2383,1**	**2466,6**	**2720,9**	**2893,5**	**3157,1**
	V_e	395,2	409,4	423,8	467,9	498,0	544,0
	Dp_e	32,8	35,2	37,7	46,0	52,1	62,1
26	**Qc**	**2639,5**	**2724,7**	**2810,5**	**3071,0**	**3247,2**	**3515,5**
	Vc	455,8	470,5	485,3	530,3	560,7	607,0
	Dpc	33,2	35,4	37,7	45,0	50,3	59,0
	P	360,9	363,4	365,8	372,4	376,2	381,2
	Q_e	**2222,0**	**2303,0**	**2384,6**	**2633,2**	**2802,2**	**3060,3**
	V_e	381,7	395,6	409,7	452,8	482,3	527,3
	Dp_e	30,6	32,9	35,2	43,1	48,8	58,4
30	**Qc**	**2594,4**	**2678,0**	**2762,0**	**3017,6**	**3190,6**	**3454,2**
	Vc	448,6	463,0	477,6	521,7	551,7	597,2
	Dpc	32,2	34,3	36,5	43,6	48,7	57,1
	P	396,2	398,9	401,6	408,9	413,3	419,1
	Q_e	**2120,4**	**2198,9**	**2278,0**	**2519,3**	**2683,4**	**2934,4**
	V_e	364,3	377,8	391,3	433,2	461,8	505,6
	Dp_e	27,9	30,0	32,2	39,4	44,8	53,7
35	**Qc**	**2538,5**	**2619,8**	**2701,7**	**2950,7**	**3119,5**	**3376,9**
	Vc	439,7	453,7	467,9	511,0	540,3	584,9
	Dpc	30,9	32,9	35,0	41,8	46,7	54,7
	P	444,8	447,8	450,7	458,9	463,9	470,7
	Q_e	**2014,7**	**2090,6**	**2167,1**	**2400,6**	**2559,6**	**2803,0**
	V_e	346,1	359,1	372,3	412,8	440,5	483,0
	Dp_e	25,2	27,1	29,1	35,8	40,8	49,0
40	**Qc**	**2483,2**	**2562,1**	**2641,6**	**2883,6**	**3047,9**	**3298,6**
	Vc	430,8	444,5	458,3	500,3	528,8	572,3
	Dpc	29,7	31,6	33,6	40,0	44,7	52,4
	P	498,3	501,6	504,8	513,9	519,5	527,2
	Q_e	**1904,9**	**1978,0**	**2051,7**	**2277,0**	**2430,6**	**2666,2**
	V_e	327,3	339,8	352,5	391,6	418,3	459,4
	Dp_e	22,5	24,3	26,1	32,2	36,8	44,3
45	**Qc**	**2428,4**	**2504,8**	**2581,8**	**2816,4**	**2975,8**	**3219,4**
	Vc	422,0	435,3	448,7	489,5	517,2	559,5
	Dpc	28,5	30,3	32,2	38,3	42,8	50,1
	P	556,9	560,4	563,9	573,8	579,9	588,5
	Q_e	**1837,1**	**1908,4**	**1980,4**	**2200,6**	**2350,9**	**2581,4**
	V_e	315,6	327,8	340,2	378,4	404,6	444,8
	Dp_e	20,9	22,6	24,3	30,1	34,4	41,5
48	**Qc**	**2395,8**	**2470,6**	**2546,0**	**2776,0**	**2932,3**	**3171,4**
	Vc	416,8	429,8	443,0	483,0	510,2	551,8
	Dpc	27,8	29,6	31,4	37,3	41,6	48,7
	P	594,4	598,1	601,7	612,1	618,6	627,6

GLWC/H 4960 CA2

Tco	Teo	5	6	7	10	12	15
	Q_e	**2439,2**	**2527,0**	**2615,5**	**2884,9**	**3067,9**	**3347,3**
	V_e	419,0	434,1	449,3	496,1	528,0	576,7
	Dp_e	36,9	39,6	42,4	51,7	58,5	69,9
26	**Qc**	**2799,3**	**2889,4**	**2980,0**	**3255,3**	**3441,6**	**3725,3**
	Vc	483,3	498,9	514,5	562,1	594,2	643,2
	Dpc	35,0	37,3	39,7	47,4	53,0	62,1
	P	383,1	385,5	387,8	394,0	397,6	402,0
	Q_e	**2356,4**	**2442,2**	**2528,7**	**2792,4**	**2971,6**	**3245,5**
	V_e	404,8	419,6	434,4	480,2	511,4	559,2
	Dp_e	34,4	37,0	39,6	48,4	54,9	65,7
30	**Qc**	**2751,9**	**2840,2**	**2929,1**	**3199,2**	**3382,2**	**3661,0**
	Vc	475,8	491,1	506,4	553,1	584,8	633,0
	Dpc	34,0	36,2	38,5	45,9	51,3	60,1
	P	420,7	423,4	425,9	432,8	436,8	442,0
	Q_e	**2248,9**	**2332,1**	**2416,1**	**2672,1**	**2846,3**	**3113,0**
	V_e	386,3	400,6	415,1	459,5	489,9	536,4
	Dp_e	31,3	33,7	36,2	44,3	50,4	60,4
35	**Qc**	**2693,0**	**2779,0**	**2865,6**	**3128,9**	**3307,5**	**3579,8**
	Vc	466,4	481,3	496,3	541,9	572,8	620,0
	Dpc	32,6	34,8	37,0	44,1	49,2	57,7
	P	472,5	475,4	478,2	486,0	490,6	496,6
	Q_e	**2137,0**	**2217,5**	**2298,7**	**2546,6**	**2715,6**	**2974,5**
	V_e	367,1	380,9	394,9	437,9	467,4	512,5
	Dp_e	28,3	30,5	32,8	40,3	45,9	55,2
40	**Qc**	**2634,7**	**2718,2**	**2802,3**	**3058,4**	**3232,2**	**3497,6**
	Vc	457,1	471,6	486,2	530,6	560,7	606,8
	Dpc	31,3	33,4	35,5	42,2	47,2	55,2
	P	529,5	532,7	535,8	544,4	549,6	556,6
	Q_e	**2020,6**	**2098,2**	**2176,5**	**2416,0**	**2579,4**	**2830,1**
	V_e	347,1	360,5	373,9	415,5	443,9	487,6
	Dp_e	25,3	27,3	29,4	36,3	41,4	49,9
45	**Qc**	**2576,9**	**2657,7**	**2739,2**	**2987,6**	**3156,4**	**3414,5**
	Vc	447,8	461,9	476,1	519,2	548,6	593,4
	Dpc	30,1	32,0	34,0	40,4	45,1	52,8
	P	591,8	595,3	598,6	608,1	613,9	621,7
	Q_e	**1948,7**	**2024,4**	**2101,0**	**2335,1**	**2495,1**	**2740,6**
	V_e	334,8	347,8	360,9	401,6	429,4	472,2
	Dp_e	23,5	25,4	27,4	33,9	38,7	46,8
48	**Qc**	**2542,4**	**2621,6**	**2701,5**	**2945,0**	**3110,7**	**3364,1**
	Vc	442,3	456,1	470,0	512,4	541,2	585,3
	Dpc	29,4	31,2	33,1	39,4	43,9	51,4
	P	631,7	635,3	638,8	648,8	654,9	663,3

Q_e	*[kW]*	*Chilled water capacity*	Q_c	*[kW]*	*Warm water capacity*
V_e	*[m³/h]*	*Chilled water volume flow*	V_c	*[m³/h]*	*Warm water volume flow*
Δp_e	*[kPa]*	*Chilled water pressure drop*	Δp_c	*[kPa]*	*Warm water pressure drop*
P	*[kW]*	*Unit power consumption (total)*	–		*Operation outside operating limits*
T_{eo}	*[°C]*	*Chilled water outlet temperature*	T_{co}	*[°C]*	*Warm water outlet temperature*

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

GLWC 1130 CA2.HE							
Tco	Teo	5	6	7	10	12	15
	Qe	**322,8**	**335,2**	**347,8**	**386,3**	**412,6**	**453,1**
	Ve	55,5	57,6	59,7	66,4	71,0	78,1
	Δpe	46,1	49,7	53,5	66,2	75,6	91,4
26	**Qc**	**365,7**	**378,2**	**390,9**	**429,7**	**456,1**	**496,6**
	Vc	63,1	65,3	67,5	74,2	78,8	85,7
	Δpc	45,9	49,1	52,4	63,3	71,3	84,5
	P	45,7	45,8	45,9	46,2	46,3	46,3
	Qe	**311,5**	**323,7**	**335,9**	**373,5**	**399,2**	**438,8**
	Ve	53,5	55,6	57,7	64,2	68,7	75,6
	Δpe	43,0	46,4	50,0	61,9	70,8	85,7
30	**Qc**	**358,8**	**371,1**	**383,5**	**421,4**	**447,2**	**486,9**
	Vc	62,0	64,2	66,3	72,9	77,3	84,2
	Δpc	44,3	47,4	50,6	61,1	68,8	81,5
	P	50,3	50,5	50,6	51,0	51,1	51,2
	Qe	**297,1**	**308,8**	**320,7**	**357,0**	**382,0**	**420,3**
	Ve	51,0	53,1	55,1	61,4	65,7	72,4
	Δpe	39,1	42,2	45,5	56,6	64,8	78,7
35	**Qc**	**350,6**	**362,5**	**374,5**	**411,3**	**436,4**	**475,0**
	Vc	60,7	62,8	64,9	71,2	75,6	82,3
	Δpc	42,4	45,3	48,4	58,4	65,7	77,8
	P	57,0	57,1	57,3	57,7	57,9	58,1
	Qe	**282,2**	**293,5**	**304,9**	**340,1**	**364,2**	**401,3**
	Ve	48,5	50,4	52,4	58,5	62,7	69,2
	Δpe	35,2	38,1	41,2	51,3	58,9	71,7
40	**Qc**	**342,7**	**354,2**	**365,8**	**401,5**	**425,8**	**463,3**
	Vc	59,5	61,5	63,5	69,7	73,9	80,4
	Δpc	40,7	43,4	46,3	55,8	62,8	74,3
	P	64,4	64,6	64,8	65,3	65,6	65,9
	Qe	**266,8**	**277,7**	**288,7**	**322,6**	**345,8**	**381,7**
	Ve	45,8	47,7	49,6	55,5	59,5	65,8
	Δpe	31,5	34,1	36,9	46,2	53,1	64,9
45	**Qc**	**335,1**	**346,2**	**357,5**	**391,9**	**415,4**	**451,7**
	Vc	58,2	60,2	62,1	68,1	72,2	78,5
	Δpc	39,0	41,6	44,4	53,3	60,0	70,9
	P	72,7	72,9	73,1	73,7	74,0	74,4
	Qe	**251,0**	**261,4**	**272,0**	**304,6**	**326,9**	**361,5**
	Ve	43,1	44,9	46,7	52,4	56,3	62,3
	Δpe	27,9	30,3	32,8	41,2	47,5	58,2
50	**Qc**	**327,9**	**338,6**	**349,4**	**382,6**	**405,3**	**440,3**
	Vc	57,1	59,0	60,8	66,6	70,6	76,7
	Δpc	37,5	40,0	42,6	51,0	57,3	67,6
	P	81,8	82,1	82,3	83,0	83,4	83,8

GLWC 1140 CA2.HE							
Tco	Teo	5	6	7	10	12	15
	Qe	**367,1**	**381,3**	**395,6**	**439,3**	**469,2**	**515,2**
	Ve	63,1	65,5	68,0	75,6	80,8	88,8
	Δpe	48,1	51,9	55,9	69,1	78,9	95,4
26	**Qc**	**415,9**	**430,2**	**444,6**	**488,7**	**518,7**	**564,7**
	Vc	71,8	74,3	76,8	84,4	89,6	97,5
	Δpc	44,2	47,3	50,5	61,0	68,7	81,5
	P	51,9	52,1	52,2	52,5	52,6	52,6
	Qe	**354,3**	**368,1**	**382,1**	**424,8**	**454,0**	**499,0**
	Ve	60,9	63,2	65,6	73,1	78,1	86,0
	Δpe	44,8	48,4	52,1	64,6	73,9	89,4
30	**Qc**	**408,1**	**422,1**	**436,2**	**479,3**	**508,7**	**553,8**
	Vc	70,6	73,0	75,4	82,9	88,0	95,8
	Δpc	42,7	45,6	48,7	58,9	66,3	78,6
	P	57,2	57,4	57,6	58,0	58,1	58,3
	Qe	**337,9**	**351,2**	**364,7**	**406,1**	**434,4**	**478,0**
	Ve	58,1	60,3	62,7	69,8	74,8	82,4
	Δpe	40,8	44,1	47,5	59,0	67,6	82,1
35	**Qc**	**398,7**	**412,3**	**425,9**	**467,8**	**496,3**	**540,2**
	Vc	69,1	71,4	73,8	81,0	86,0	93,6
	Δpc	40,9	43,7	46,6	56,2	63,3	75,0
	P	64,7	64,9	65,1	65,6	65,9	66,2
	Qe	**321,0**	**333,8**	**346,8**	**386,8**	**414,2**	**456,4**
	Ve	55,1	57,4	59,6	66,5	71,3	78,6
	Δpe	36,8	39,8	43,0	53,5	61,5	74,8
40	**Qc**	**389,7**	**402,8**	**416,0**	**456,6**	**484,3**	**526,9**
	Vc	67,6	69,9	72,2	79,2	84,0	91,4
	Δpc	39,2	41,9	44,6	53,8	60,5	71,6
	P	73,2	73,4	73,6	74,2	74,5	74,9
	Qe	**303,5**	**315,9**	**328,4**	**366,9**	**393,3**	**434,1**
	Ve	52,1	54,3	56,4	63,1	67,7	74,8
	Δpe	32,9	35,6	38,5	48,2	55,5	67,7
45	**Qc**	**381,1**	**393,7**	**406,5**	**445,7**	**472,4**	**513,7**
	Vc	66,2	68,4	70,7	77,5	82,1	89,3
	Δpc	37,6	40,1	42,8	51,4	57,8	68,3
	P	82,6	82,9	83,1	83,8	84,2	84,6
	Qe	**285,5**	**297,4**	**309,4**	**346,4**	**371,9**	**411,2**
	Ve	49,1	51,1	53,2	59,6	64,0	70,8
	Δpe	29,1	31,6	34,2	42,9	49,6	60,7
50	**Qc**	**372,9**	**385,1**	**397,4**	**435,0**	**460,9**	**500,7**
	Vc	64,9	67,0	69,2	75,7	80,2	87,2
	Δpc	36,1	38,5	41,0	49,2	55,2	65,1
	P	93,0	93,3	93,6	94,3	94,7	95,2

GLWC 1160 CA2.HE							
Tco	Teo	5	6	7	10	12	15
	Qe	**444,4**	**461,6**	**478,9**	**532,0**	**568,3**	**624,1**
	Ve	76,3	79,3	82,3	91,5	97,8	107,5
	Δpe	53,9	58,2	62,6	77,4	88,5	107,0
26	**Qc**	**504,1**	**521,5**	**539,1**	**592,7**	**629,2**	**685,2**
	Vc	87,1	90,1	93,1	102,3	108,7	118,3
	Δpc	48,9	52,3	55,9	67,6	76,1	90,3
	P	63,6	63,8	64,0	64,6	64,8	65,0
	Qe	**429,3**	**446,1**	**463,1**	**515,1**	**550,7**	**605,5**
	Ve	73,8	76,6	79,6	88,6	94,8	104,3
	Δpe	50,3	54,3	58,5	72,6	83,1	100,7
30	**Qc**	**494,9**	**512,0**	**529,2**	**581,8**	**617,7**	**672,8**
	Vc	85,6	88,5	91,5	100,6	106,8	116,3
	Δpc	47,2	50,5	54,0	65,3	73,6	87,3
	P	69,8	70,1	70,3	71,0	71,3	71,6
	Qe	**409,2**	**425,4**	**441,9**	**492,4**	**527,0**	**580,3**
	Ve	70,3	73,1	75,9	84,7	90,7	100,0
	Δpe	45,7	49,4	53,3	66,3	76,1	92,5
35	**Qc**	**482,9**	**499,5**	**516,2**	**567,5**	**602,5**	**656,3**
	Vc	83,6	86,5	89,4	98,3	104,3	113,7
	Δpc	45,1	48,3	51,6	62,3	70,2	83,3
	P	78,4	78,8	79,1	79,9	80,3	80,8
	Qe	**387,4**	**403,2**	**419,1**	**467,9**	**501,5**	**553,2**
	Ve	66,6	69,3	72,0	80,5	86,3	95,3
	Δpe	41,0	44,4	47,9	59,9	68,9	84,0
40	**Qc**	**470,2**	**486,3**	**502,5**	**552,3**	**586,3**	**638,7**
	Vc	81,6	84,4	87,2	95,8	101,7	110,8
	Dpc	42,9	45,9	49,0	59,2	66,7	79,2
	P	88,1	88,4	88,8	89,7	90,3	91,0
	Qe	**364,2**	**379,3**	**394,6**	**441,7**	**474,1**	**524,0**
	Ve	62,6	65,2	67,8	76,0	81,6	90,3
	Δpe	36,2	39,3	42,5	53,4	61,6	75,4
45	**Qc**	**456,9**	**472,4**	**488,1**	**536,3**	**569,3**	**620,1**
	Vc	79,4	82,1	84,8	93,2	98,9	107,8
	Δpc	40,7	43,5	46,4	56,0	63,1	74,9
	P	98,6	99,1	99,5	100,6	101,3	102,2
	Qe	**339,5**	**353,9**	**368,6**	**413,7**	**444,8**	**492,9**
	Ve	58,3	60,8	63,3	71,1	76,6	84,9
	Δpe	31,5	34,2	37,1	46,8	54,2	66,7
50	**Qc**	**443,0**	**458,0**	**473,1**	**519,4**	**551,3**	**600,5**
	Vc	77,1	79,7	82,4	90,4	96,0	104,5
	Δpc	38,4	41,0	43,8	52,8	59,4	70,5
	P	110,2	110,7	111,2	112,5	113,3	114,4

GLWC 1180 CA2.HE							
Tco	Teo	5	6	7	10	12	15
	Qe	**509,2**	**528,9**	**548,8**	**609,7**	**651,3**	**715,3**
	Ve	87,5	90,9	94,3	104,8	112,1	123,3
	Δpe	53,8	58,0	62,5	77,3	88,3	106,8
26	**Qc**	**577,4**	**597,4**	**617,5**	**679,0**	**720,9**	**785,1**
	Vc	99,7	103,2	106,6	117,2	124,5	135,6
	Δpc	49,9	53,4	57,1	69,0	77,8	92,3
	P	72,6	72,9	73,1	73,8	74,0	74,2
	Qe	**491,9**	**511,2**	**530,6**	**590,3**	**631,1**	**693,9**
	Ve	84,5	87,8	91,2	101,5	108,6	119,6
	Δpe	50,2	54,2	58,4	72,4	82,9	100,5
30	**Qc**	**566,8**	**586,4**	**606,1**	**666,5**	**707,7**	**770,9**
	Vc	98,0	101,4	104,8	115,2	122,4	133,3
	Δpc	48,2	51,6	55,1	66,7	75,2	89,2
	P	79,7	80,0	80,3	81,1	81,5	81,9
	Qe	**468,8**	**487,5**	**506,4**	**564,3**	**604,0**	**665,1**
	Ve	80,5	83,7	87,0	97,0	103,9	114,6
	Δpe	45,6	49,3	53,2	66,2	76,0	92,3
35	**Qc**	**553,0**	**572,0**	**591,2**	**650,0**	**690,2**	**752,0**
	Vc	95,8	99,1	102,4	112,6	119,5	130,2
	Δpc	46,0	49,3	52,6	63,6	71,7	85,2
	P	89,5	89,9	90,3	91,2	91,8	92,4
	Qe	**443,9**	**462,0**	**480,2**	**536,3**	**574,7**	**634,0**
	Ve	76,3	79,4	82,5	92,2	98,9	109,2
	Δpe	40,9	44,3	47,8	59,8	68,8	83,9
40	**Qc**	**538,5**	**556,9**	**575,5**	**632,6**	**671,7**	**731,8**
	Vc	93,4	96,6	99,8	109,8	116,5	127,0
	Δpc	43,8	46,9	50,0	60,5	68,2	80,9
	P	100,5	101,0	101,4	102,5	103,2	104,1
	Qe	**417,4**	**434,7**	**452,2**	**506,2**	**543,3**	**600,6**
	Ve	71,7	74,7	77,7	87,1	93,5	103,5
	Δpe	36,1	39,2	42,4	53,3	61,5	75,3
45	**Qc**	**523,3**	**541,1**	**559,1**	**614,3**	**652,1**	**710,4**
	Vc	90,9	94,0	97,2	106,8	113,3	123,5
	Δpc	41,5	44,4	47,4	57,2	64,5	76,5
	P	112,7	113,2	113,7	115,0	115,8	116,8
	Qe	**389,0**	**405,6**	**422,4**	**474,1**	**509,8**	**564,9**
	Ve	66,8	69,7	72,6	81,5	87,7	97,3
	Δpe	31,4	34,1	37,0	46,7	54,1	66,6
50	**Qc**	**507,4**	**524,5**	**541,8**	**595,0**	**631,5**	**687,8**
	Vc	88,4	91,3	94,3	103,6	109,9	119,7
	Δpc	39,2	41,9	44,7	53,9	60,7	72,0
	P	126,0	126,5	127,1	128,5	129,4	130,7

Q_e [kW] Chilled water capacity
V_e [m³/h] Chilled water volume flow
Δp_e [kPa] Chilled water pressure drop
P [kW] Unit power consumption (total)
T_{eo} [°C] Chilled water outlet temperature

Q_c [kW] Warm water capacity
V_c [m³/h] Warm water volume flow
Δp_c [kPa] Warm water pressure drop
– Operation outside operating limits
T_{co} [°C] Warm water outlet temperature

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

Capacity Data – HE Unit
GLWC 1210-2320 CA2.HE

Tco	Teo	5	6	7	10	12	15
GLWC 1210 CA2.HE							
	Q_e	**577,1**	**599,5**	**622,1**	**691,4**	**738,8**	**811,7**
	V_e	99,1	103,0	106,9	118,9	127,1	139,9
	Δp_e	53,2	57,4	61,8	76,5	87,5	105,8
26	**Qc**	**654,4**	**677,1**	**700,1**	**770,2**	**817,9**	**891,2**
	Vc	113,0	116,9	120,9	133,0	141,2	153,9
	Δp_c	51,5	55,1	58,9	71,3	80,4	95,4
	P	82,2	82,6	83,0	83,8	84,2	84,6
	Q_e	**557,1**	**579,0**	**601,0**	**668,6**	**714,9**	**786,1**
	V_e	95,7	99,5	103,3	115,0	123,0	135,4
	Δp_e	49,6	53,5	57,7	71,5	81,9	99,2
30	**Qc**	**642,0**	**664,3**	**686,7**	**755,3**	**802,1**	**873,9**
	Vc	111,0	114,9	118,7	130,6	138,7	151,1
	Δp_c	49,7	53,2	56,8	68,7	77,5	92,0
	P	90,3	90,8	91,2	92,3	92,8	93,4
	Q_e	**531,3**	**552,4**	**573,7**	**639,1**	**683,9**	**753,0**
	V_e	91,3	94,9	98,6	109,9	117,7	129,7
	Δp_e	45,1	48,7	52,6	65,4	75,0	91,1
35	**Qc**	**626,8**	**648,4**	**670,1**	**736,8**	**782,3**	**852,1**
	Vc	108,6	112,3	116,1	127,6	135,5	147,6
	Δp_c	47,5	50,8	54,3	65,6	74,0	87,8
	P	101,6	102,1	102,6	103,9	104,6	105,5
	Q_e	**504,6**	**524,9**	**545,5**	**608,6**	**651,9**	**718,6**
	V_e	86,7	90,2	93,7	104,7	112,2	123,8
	Δp_e	40,7	44,0	47,5	59,3	68,1	82,9
40	**Qc**	**611,8**	**632,7**	**653,7**	**718,3**	**762,4**	**830,3**
	Vc	106,1	109,8	113,4	124,6	132,3	144,0
	Δp_c	45,4	48,6	51,8	62,6	70,5	83,6
	P	114,0	114,6	115,2	116,7	117,6	118,8
	Q_e	**476,9**	**496,4**	**516,2**	**576,9**	**618,6**	**683,0**
	V_e	81,9	85,3	88,7	99,2	106,5	117,7
	Δp_e	36,3	39,4	42,5	53,3	61,3	74,9
45	**Qc**	**597,0**	**617,2**	**637,5**	**699,9**	**742,6**	**808,2**
	Vc	103,8	107,3	110,8	121,6	129,1	140,5
	Δp_c	43,4	46,4	49,5	59,6	67,1	79,5
	P	127,8	128,4	129,1	130,8	131,8	133,2
	Q_e	**448,3**	**467,0**	**485,9**	**544,2**	**584,3**	**646,2**
	V_e	77,0	80,2	83,5	93,6	100,6	111,3
	Δp_e	32,1	34,8	37,7	47,4	54,7	67,1
50	**Qc**	**582,5**	**601,9**	**621,4**	**681,5**	**722,6**	**786,0**
	Vc	101,4	104,8	108,2	118,7	125,8	136,9
	Δp_c	41,5	44,3	47,2	56,7	63,8	75,5
	P	142,7	143,5	144,1	146,1	147,2	148,8

Tco	Teo	5	6	7	10	12	15
GLWC 1240 CA2.HE							
	Q_e	**653,3**	**678,5**	**704,0**	**782,2**	**835,7**	**917,9**
	V_e	112,2	116,6	121,0	134,5	143,8	158,2
	Δp_e	60,7	65,5	70,5	87,2	99,7	120,6
26	**Qc**	**740,7**	**766,4**	**792,3**	**871,5**	**925,4**	**1008,1**
	Vc	127,9	132,3	136,8	150,5	159,8	174,1
	Δp_c	53,3	57,1	61,0	73,8	83,2	98,8
	P	93,0	93,5	93,9	94,9	95,5	95,9
	Q_e	**630,7**	**655,3**	**680,2**	**756,5**	**808,7**	**889,0**
	V_e	108,4	112,6	116,9	130,1	139,2	153,2
	Δp_e	56,6	61,1	65,8	81,6	93,4	113,1
30	**Qc**	**726,8**	**751,9**	**777,3**	**854,7**	**907,5**	**988,5**
	Vc	125,7	130,0	134,4	147,8	156,9	170,9
	Δp_c	51,5	55,1	58,9	71,2	80,3	95,2
	P	102,3	102,8	103,3	104,5	105,1	105,8
	Q_e	**601,5**	**625,3**	**649,4**	**723,2**	**773,8**	**851,7**
	V_e	103,3	107,4	111,6	124,4	133,2	146,7
	Δp_e	51,5	55,6	60,0	74,6	85,5	103,8
35	**Qc**	**709,6**	**734,0**	**758,6**	**833,8**	**885,1**	**963,9**
	Vc	122,9	127,1	131,4	144,4	153,3	166,9
	Δp_c	49,2	52,7	56,3	68,0	76,6	90,9
	P	115,0	115,6	116,2	117,6	118,4	119,4
	Q_e	**571,3**	**594,3**	**617,5**	**688,7**	**737,6**	**812,9**
	V_e	98,2	102,1	106,1	118,4	126,9	140,1
	Δp_e	46,4	50,2	54,2	67,6	77,7	94,6
40	**Qc**	**692,7**	**716,3**	**740,1**	**812,9**	**862,7**	**939,2**
	Vc	120,2	124,3	128,4	141,0	149,7	162,9
	Δp_c	47,1	50,3	53,7	64,8	73,0	86,6
	P	129,1	129,8	130,4	132,1	133,1	134,4
	Q_e	**540,1**	**562,1**	**584,4**	**653,0**	**700,1**	**772,7**
	V_e	92,8	96,6	100,4	112,3	120,5	133,1
	Δp_e	41,5	45,0	48,6	60,8	70,0	85,4
45	**Qc**	**676,0**	**698,7**	**721,7**	**792,1**	**840,3**	**914,4**
	Vc	117,5	121,4	125,4	137,7	146,0	158,9
	Δp_c	45,0	48,1	51,3	61,8	69,5	82,3
	P	144,6	145,4	146,1	148,0	149,2	150,7
	Q_e	**507,7**	**528,9**	**550,2**	**616,0**	**661,3**	**731,2**
	V_e	87,2	90,9	94,5	105,9	113,8	126,0
	Δp_e	36,7	39,8	43,1	54,1	62,4	76,5
50	**Qc**	**659,5**	**681,4**	**703,5**	**771,4**	**817,9**	**889,4**
	Vc	114,8	118,6	122,5	134,3	142,4	154,9
	Δp_c	43,0	45,9	48,9	58,8	66,1	78,2
	P	161,5	162,3	163,1	165,3	166,6	168,4

Tco	Teo	5	6	7	10	12	15
GLWC 2280 CA2.HE							
	Q_e	**734,3**	**762,5**	**791,1**	**878,6**	**938,5**	**1030,5**
	V_e	126,1	131,0	135,9	151,1	161,5	177,6
	Δp_e	52,4	56,5	60,8	75,1	85,8	103,7
26	**Qc**	**832,0**	**860,6**	**889,4**	**977,5**	**1037,5**	**1129,6**
	Vc	143,7	148,6	153,6	168,8	179,1	195,0
	Δp_c	44,2	47,3	50,5	61,0	68,7	81,4
	P	104,0	104,3	104,5	105,1	105,3	105,4
	Q_e	**708,7**	**736,3**	**764,1**	**849,6**	**908,0**	**998,0**
	V_e	121,7	126,5	131,3	146,1	156,3	172,0
	Δp_e	48,8	52,6	56,7	70,2	80,4	97,3
30	**Qc**	**816,4**	**844,3**	**872,5**	**958,6**	**1017,4**	**1107,7**
	Vc	141,2	146,0	150,9	165,8	175,9	191,5
	Δp_c	42,6	45,6	48,7	58,8	66,2	78,5
	P	114,6	114,9	115,2	116,0	116,4	116,7
	Q_e	**675,8**	**702,5**	**729,5**	**812,2**	**868,8**	**956,1**
	V_e	116,1	120,7	125,3	139,7	149,5	164,7
	Δp_e	44,3	47,9	51,7	64,2	73,6	89,3
35	**Qc**	**797,6**	**824,6**	**852,0**	**935,6**	**992,8**	**1080,6**
	Vc	138,1	142,8	147,6	162,0	171,9	187,2
	Δp_c	40,8	43,7	46,6	56,2	63,3	75,0
	P	129,5	129,9	130,3	131,3	131,9	132,5
	Q_e	**641,9**	**667,6**	**693,7**	**773,6**	**828,4**	**912,9**
	V_e	110,3	114,7	119,2	133,0	142,6	157,3
	Δp_e	40,0	43,3	46,7	58,2	66,9	81,4
40	**Qc**	**779,6**	**805,7**	**832,2**	**913,2**	**968,7**	**1053,9**
	Vc	135,2	139,8	144,4	158,4	168,1	182,8
	Δp_c	39,1	41,8	44,6	53,7	60,4	71,5
	P	146,5	146,9	147,4	148,6	149,2	150,0
	Q_e	**607,0**	**631,7**	**656,8**	**733,8**	**786,7**	**868,3**
	V_e	104,3	108,5	112,8	126,2	135,4	149,6
	Δp_e	35,8	38,8	41,9	52,4	60,3	73,6
45	**Qc**	**762,4**	**787,6**	**813,2**	**891,5**	**945,0**	**1027,5**
	Vc	132,5	136,9	141,3	154,9	164,2	178,6
	Δp_c	37,6	40,1	42,7	51,4	57,7	68,2
	P	165,3	165,9	166,4	167,7	168,5	169,4
	Q_e	**571,0**	**594,8**	**618,8**	**692,8**	**743,7**	**822,3**
	V_e	98,1	102,2	106,3	119,2	128,0	141,7
	Δp_e	31,7	34,4	37,2	46,7	53,9	66,0
50	**Qc**	**746,0**	**770,3**	**794,9**	**870,3**	**921,9**	**1001,5**
	Vc	129,9	134,1	138,4	151,5	160,5	174,4
	Δp_c	36,1	38,5	41,0	49,1	55,1	65,1
	P	186,2	186,7	187,3	188,7	189,6	190,7

Tco	Teo	5	6	7	10	12	15
GLWC 2320 CA2.HE							
	Q_e	**889,2**	**923,5**	**958,2**	**1064,5**	**1137,2**	**1248,9**
	V_e	152,8	158,7	164,6	183,1	195,7	215,2
	Δp_e	59,0	63,7	68,6	84,8	96,9	117,2
26	**Qc**	**1008,7**	**1043,5**	**1078,6**	**1185,9**	**1259,0**	**1371,2**
	Vc	174,2	180,2	186,2	204,8	217,4	236,8
	Δp_c	48,8	52,3	55,8	67,5	76,1	90,2
	P	127,1	127,6	128,1	129,2	129,7	130,1
	Q_e	**859,1**	**892,6**	**926,6**	**1030,7**	**1101,9**	**1211,6**
	V_e	147,6	153,4	159,2	177,3	189,7	208,8
	Δp_e	55,1	59,5	64,1	79,5	91,0	110,3
30	**Qc**	**990,2**	**1024,4**	**1058,8**	**1164,1**	**1236,0**	**1346,2**
	Vc	171,2	177,1	183,1	201,3	213,7	232,8
	Δp_c	47,2	50,5	54,0	65,2	73,5	87,2
	P	139,6	140,1	140,6	141,9	142,6	143,3
	Q_e	**818,6**	**851,2**	**884,2**	**985,3**	**1054,5**	**1161,2**
	V_e	140,6	146,2	151,9	169,4	181,5	200,1
	Δp_e	50,0	54,1	58,4	72,6	83,3	101,3
35	**Qc**	**966,1**	**999,3**	**1032,8**	**1135,4**	**1205,5**	**1313,1**
	Vc	167,3	173,1	178,9	196,6	208,8	227,4
	Δp_c	45,1	48,2	51,5	62,3	70,2	83,3
	P	156,9	157,5	158,1	159,7	160,6	161,6
	Q_e	**775,2**	**806,7**	**838,5**	**936,3**	**1003,4**	**1106,9**
	V_e	133,2	138,6	144,0	161,0	172,7	190,7
	Δp_e	44,9	48,6	52,5	65,6	75,5	92,0
40	**Qc**	**940,7**	**972,9**	**1005,4**	**1105,0**	**1173,1**	**1278,0**
	Vc	163,2	168,8	174,4	191,7	203,5	221,7
	Δp_c	42,9	45,9	49,0	59,2	66,7	79,1
	P	176,1	176,8	177,6	179,5	180,6	182,0
	Q_e	**728,7**	**759,0**	**789,6**	**883,8**	**948,5**	**1048,6**
	V_e	125,2	130,4	135,6	152,0	163,3	180,7
	Δp_e	39,7	43,0	46,6	58,4	67,4	82,6
45	**Qc**	**914,1**	**945,2**	**976,6**	**1073,0**	**1139,0**	**1240,7**
	Vc	158,9	164,3	169,7	186,5	197,9	215,6
	Δp_c	40,6	43,4	46,4	56,0	63,1	74,9
	P	197,3	198,1	199,0	201,2	202,6	204,4
	Q_e	**679,2**	**708,1**	**737,4**	**827,8**	**890,0**	**986,2**
	V_e	116,7	121,7	126,7	142,4	153,2	169,9
	Δp_e	34,4	37,4	40,6	51,3	59,4	73,1
50	**Qc**	**886,4**	**916,2**	**946,4**	**1039,2**	**1103,0**	**1201,4**
	Vc	154,3	159,5	164,8	180,9	192,0	209,2
	Δp_c	38,3	41,0	43,7	52,7	59,4	70,4
	P	220,4	221,4	222,3	225,0	226,6	228,9

Q_e [kW] Chilled water capacity
V_e [m³/h] Chilled water volume flow
Δp_e [kPa] Chilled water pressure drop
P [kW] Unit power consumption (total)
T_{eo} [°C] Chilled water outlet temperature
Q_c [kW] Warm water capacity
V_c [m³/h] Warm water volume flow
Δp_c [kPa] Warm water pressure drop
– Operation outside operating limits
T_{co} [°C] Warm water outlet temperature

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

Capacity Data – HE Unit
GLWC 2360-2480 CA2.HE

GLWC 2360 CA2.HE							
Tco	**Teo**	**5**	**6**	**7**	**10**	**12**	**15**
	Qe	**1018,0**	**1057,3**	**1097,1**	**1218,8**	**1302,0**	**1430,0**
	Ve	174,9	181,6	188,5	209,6	224,1	246,4
	Δp_e	41,6	44,9	48,3	59,7	68,3	82,6
26	**Qc**	**1154,4**	**1194,2**	**1234,4**	**1357,3**	**1441,0**	**1569,4**
	Vc	199,3	206,2	213,1	234,4	248,8	271,0
	Δp_c	50,1	53,6	57,2	69,2	78,0	92,5
	P	145,1	145,6	146,1	147,4	147,9	148,3
	Q_e	**983,5**	**1022,0**	**1060,9**	**1180,1**	**1261,7**	**1387,2**
	V_e	169,0	175,6	182,3	202,9	217,1	239,0
	Δp_e	38,8	41,9	45,2	56,0	64,1	77,7
30	**Qc**	**1133,1**	**1172,2**	**1211,7**	**1332,3**	**1414,7**	**1541,0**
	Vc	195,9	202,7	209,5	230,4	244,6	266,4
	Δp_c	48,4	51,8	55,3	66,9	75,4	89,5
	P	159,2	159,8	160,4	162,0	162,8	163,6
	Q_e	**937,3**	**974,6**	**1012,3**	**1128,1**	**1207,4**	**1329,7**
	V_e	161,0	167,4	173,9	194,0	207,8	229,1
	Δp_e	35,3	38,1	41,1	51,2	58,7	71,4
35	**Qc**	**1105,4**	**1143,4**	**1181,9**	**1299,4**	**1379,8**	**1503,2**
	Vc	191,5	198,0	204,7	225,1	239,0	260,4
	Δp_c	46,2	49,4	52,8	63,8	72,0	85,4
	P	178,9	179,7	180,4	182,3	183,4	184,7
	Q_e	**887,6**	**923,6**	**960,1**	**1072,1**	**1148,9**	**1267,5**
	V_e	152,5	158,7	164,9	184,4	197,7	218,4
	Δp_e	31,6	34,2	37,0	46,2	53,2	64,9
40	**Qc**	**1076,4**	**1113,2**	**1150,5**	**1264,6**	**1342,8**	**1462,9**
	Vc	186,7	193,1	199,6	219,4	233,0	253,8
	Δp_c	43,9	47,0	50,2	60,7	68,4	81,2
	P	200,9	201,7	202,6	204,9	206,2	207,9
	Q_e	**834,4**	**869,1**	**904,1**	**1012,0**	**1086,2**	**1200,8**
	V_e	143,4	149,3	155,3	174,0	186,9	206,9
	Δp_e	28,0	30,3	32,8	41,2	47,5	58,2
45	**Qc**	**1046,0**	**1081,6**	**1117,6**	**1228,0**	**1303,6**	**1420,1**
	Vc	181,8	188,0	194,2	213,4	226,6	246,8
	Δp_c	41,6	44,5	47,5	57,4	64,7	76,8
	P	225,1	226,1	227,1	229,7	231,3	233,4
	Q_e	**777,8**	**810,9**	**844,5**	**947,9**	**1019,2**	**1129,4**
	V_e	133,6	139,3	145,1	163,0	175,4	194,6
	Δp_e	24,3	26,4	28,6	36,1	41,8	51,5
50	**Qc**	**1014,4**	**1048,5**	**1083,1**	**1189,4**	**1262,3**	**1374,8**
	Vc	176,6	182,6	188,6	207,1	219,8	239,4
	Δp_c	39,3	42,0	44,8	54,0	60,9	72,2
	P	251,7	252,8	253,9	256,8	258,6	261,1

GLWC 2420 CA2.HE							
Tco	**Teo**	**5**	**6**	**7**	**10**	**12**	**15**
	Q_e	**1153,7**	**1198,4**	**1243,6**	**1382,0**	**1476,7**	**1622,4**
	V_e	198,2	205,9	213,6	237,7	254,2	279,5
	Δp_e	55,4	59,8	64,4	79,6	91,1	110,2
26	**Qc**	**1308,3**	**1353,7**	**1399,6**	**1539,6**	**1635,1**	**1781,4**
	Vc	225,9	233,7	241,7	265,8	282,3	307,6
	Δp_c	51,5	55,2	59,0	71,4	80,5	95,6
	P	164,4	165,2	165,9	167,6	168,5	169,2
	Q_e	**1113,8**	**1157,4**	**1201,4**	**1336,5**	**1429,0**	**1571,3**
	V_e	191,3	198,8	206,4	229,8	245,9	270,7
	Δp_e	51,6	55,7	60,1	74,5	85,3	103,3
30	**Qc**	**1283,6**	**1328,0**	**1372,8**	**1509,9**	**1603,5**	**1746,9**
	Vc	221,9	229,6	237,4	261,1	277,2	302,0
	Δp_c	49,7	53,3	56,9	68,8	77,6	92,1
	P	180,6	181,5	182,4	184,5	185,6	186,8
	Q_e	**1062,2**	**1104,3**	**1146,9**	**1277,6**	**1367,2**	**1505,1**
	V_e	182,5	189,7	197,0	219,7	235,3	259,3
	Δp_e	47,0	50,8	54,7	68,1	78,1	94,8
35	**Qc**	**1253,1**	**1296,2**	**1339,8**	**1472,9**	**1563,9**	**1703,5**
	Vc	217,0	224,5	232,0	255,1	270,9	295,0
	Δp_c	47,6	50,9	54,4	65,7	74,1	87,9
	P	203,1	204,2	205,1	207,8	209,2	211,0
	Q_e	**1008,8**	**1049,4**	**1090,4**	**1216,6**	**1303,1**	**1436,5**
	V_e	173,3	180,3	187,3	209,2	224,3	247,5
	Δp_e	42,3	45,8	49,5	61,7	70,9	86,4
40	**Qc**	**1223,1**	**1264,9**	**1307,0**	**1436,0**	**1524,2**	**1659,7**
	Vc	212,2	219,4	226,7	249,1	264,4	287,9
	Δp_c	45,5	48,6	51,9	62,7	70,6	83,7
	P	228,1	229,3	230,4	233,5	235,3	237,5
	Q_e	**953,5**	**992,5**	**1032,0**	**1153,3**	**1236,7**	**1365,4**
	V_e	163,8	170,5	177,3	198,3	212,8	235,3
	Δp_e	37,8	41,0	44,3	55,5	63,9	78,0
45	**Qc**	**1193,6**	**1233,9**	**1274,6**	**1399,2**	**1484,5**	**1615,7**
	Vc	207,4	214,4	221,5	243,2	258,0	280,8
	Δp_c	43,5	46,4	49,6	59,7	67,2	79,6
	P	255,5	256,8	258,1	261,6	263,6	266,3
	Q_e	**896,3**	**933,6**	**971,5**	**1087,9**	**1168,0**	**1291,7**
	V_e	154,0	160,4	166,9	187,1	201,0	222,6
	Δp_e	33,4	36,3	39,3	49,4	57,0	69,8
50	**Qc**	**1164,6**	**1203,3**	**1242,5**	**1362,5**	**1444,7**	**1571,4**
	Vc	202,8	209,5	216,3	237,2	251,5	273,6
	Δp_c	41,5	44,3	47,3	56,8	63,9	75,6
	P	285,4	286,9	288,3	292,1	294,4	297,5

GLWC 2480 CA2.HE							
Tco	**Teo**	**5**	**6**	**7**	**10**	**12**	**15**
	Qe	**1306,2**	**1356,7**	**1407,7**	**1564,0**	**1670,9**	**1835,3**
	Ve	224,4	233,1	241,8	269,0	287,6	316,2
	Δp_e	65,5	70,6	76,0	94,0	107,5	130,0
26	**Qc**	**1481,1**	**1532,5**	**1584,3**	**1742,5**	**1850,4**	**2015,6**
	Vc	255,7	264,6	273,6	300,9	319,5	348,0
	Δp_c	53,6	57,4	61,4	74,2	83,7	99,3
	P	186,1	187,0	187,8	189,9	190,9	191,9
	Q_e	**1261,1**	**1310,3**	**1360,1**	**1512,6**	**1617,0**	**1777,6**
	V_e	216,7	225,1	233,7	260,1	278,3	306,3
	Δp_e	61,0	65,9	71,0	88,0	100,7	121,9
30	**Qc**	**1453,3**	**1503,5**	**1554,2**	**1709,0**	**1814,6**	**1976,5**
	Vc	251,3	260,0	268,7	295,5	313,7	341,7
	Dpc	51,8	55,4	59,2	71,6	80,7	95,8
	P	204,5	205,5	206,5	209,0	210,2	211,6
	Q_e	**1202,8**	**1250,4**	**1298,5**	**1446,1**	**1547,2**	**1702,9**
	V_e	206,6	214,8	223,1	248,7	266,3	293,4
	Δp_e	55,5	60,0	64,7	80,4	92,2	111,9
35	**Qc**	**1419,0**	**1467,7**	**1516,9**	**1667,2**	**1769,9**	**1927,4**
	Vc	245,8	254,2	262,7	288,8	306,5	333,8
	Δp_c	49,5	53,0	56,6	68,4	77,1	91,4
	P	230,0	231,2	232,3	235,2	236,9	238,8
	Q_e	**1142,4**	**1188,3**	**1234,7**	**1377,1**	**1474,8**	**1625,4**
	V_e	196,3	204,1	212,1	236,8	253,8	280,1
	Δp_e	50,1	54,2	58,5	72,9	83,8	102,0
40	**Qc**	**1385,2**	**1432,3**	**1479,9**	**1625,6**	**1725,1**	**1878,0**
	Vc	240,3	248,5	256,7	282,0	299,3	325,8
	Δp_c	47,4	50,6	54,1	65,2	73,5	87,1
	P	258,2	259,6	260,8	264,3	266,3	268,8
	Q_e	**1079,9**	**1124,0**	**1168,6**	**1305,7**	**1399,8**	**1545,1**
	V_e	185,5	193,1	200,8	224,5	240,9	266,2
	Δp_e	44,7	48,5	52,4	65,5	75,5	92,1
45	**Qc**	**1351,8**	**1397,2**	**1443,2**	**1584,0**	**1680,3**	**1828,4**
	Vc	234,9	242,8	250,8	275,3	292,0	317,8
	Δp_c	45,3	48,4	51,6	62,1	69,9	82,8
	P	289,2	290,7	292,1	296,1	298,4	301,4
	Q_e	**1015,3**	**1057,5**	**1100,3**	**1231,8**	**1322,2**	**1462,0**
	V_e	174,4	181,7	189,0	211,8	227,6	251,9
	Δp_e	39,6	42,9	46,5	58,3	67,3	82,5
50	**Qc**	**1318,9**	**1362,6**	**1406,8**	**1542,5**	**1635,5**	**1778,6**
	Vc	229,6	237,2	244,9	268,6	284,8	309,7
	Δp_c	43,2	46,2	49,2	59,2	66,5	78,6
	P	322,9	324,6	326,2	330,6	333,2	336,8

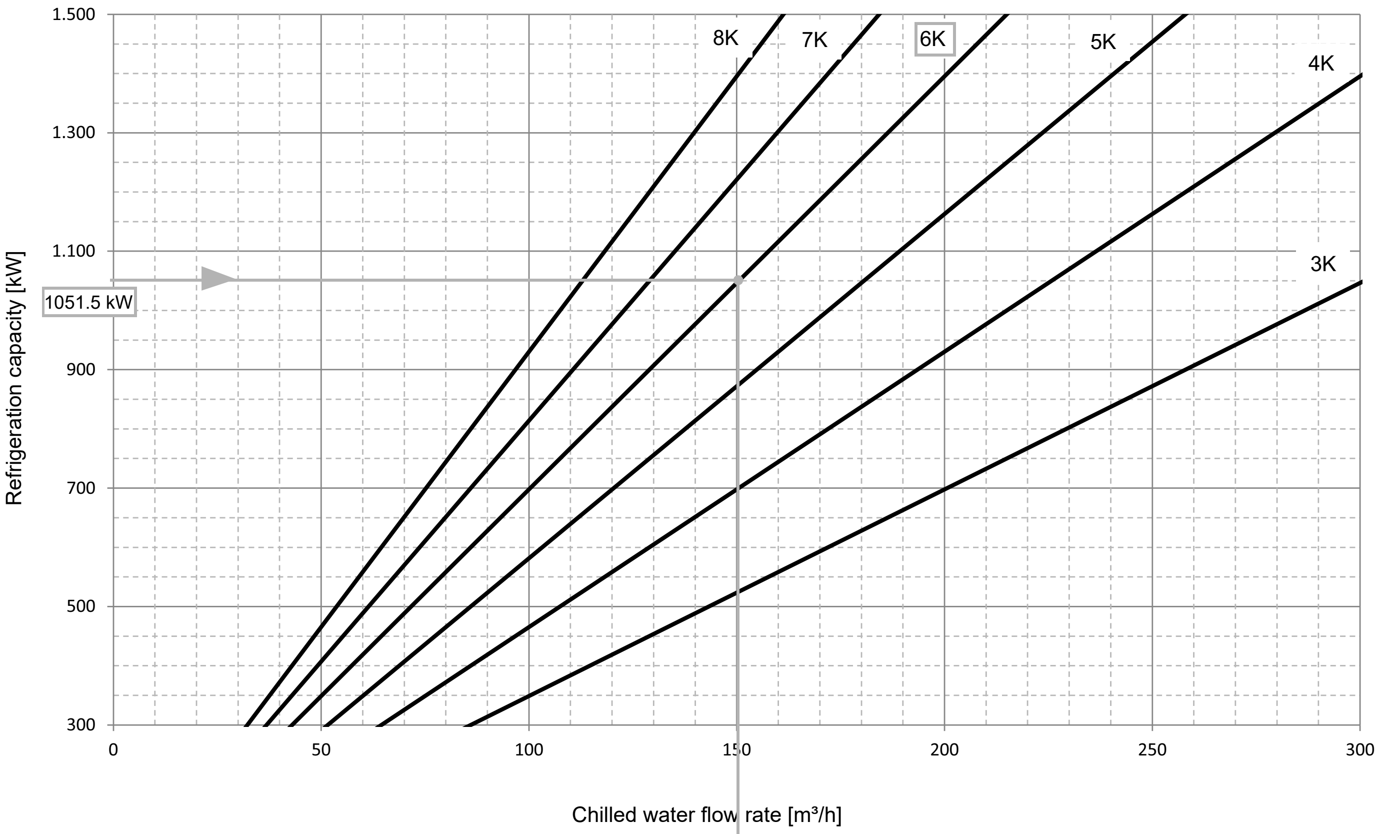
Q_e	*[kW]*	*Chilled water capacity*
V_e	*[m³/h]*	*Chilled water volume flow*
Δp_e	*[kPa]*	*Chilled water pressure drop*
P	*[kW]*	*Unit power consumption (total)*
T_{eo}	*[°C]*	*Chilled water outlet temperature*
Q_c	*[kW]*	*Warm water capacity*
V_c	*[m³/h]*	*Warm water volume flow*
Δp_c	*[kPa]*	*Warm water pressure drop*
–		*Operation outside operating limits*
T_{co}	*[°C]*	*Warm water outlet temperature*

Performance data are valid for the following input parameters: chilled water temperature difference (inlet temperature – outlet temperature) = 5 K warm water temperature difference (outlet temperature – inlet temperature) = 5 K, cooling medium = 100% water

For other temperature differences and/or media see the note on page 18 et seq.

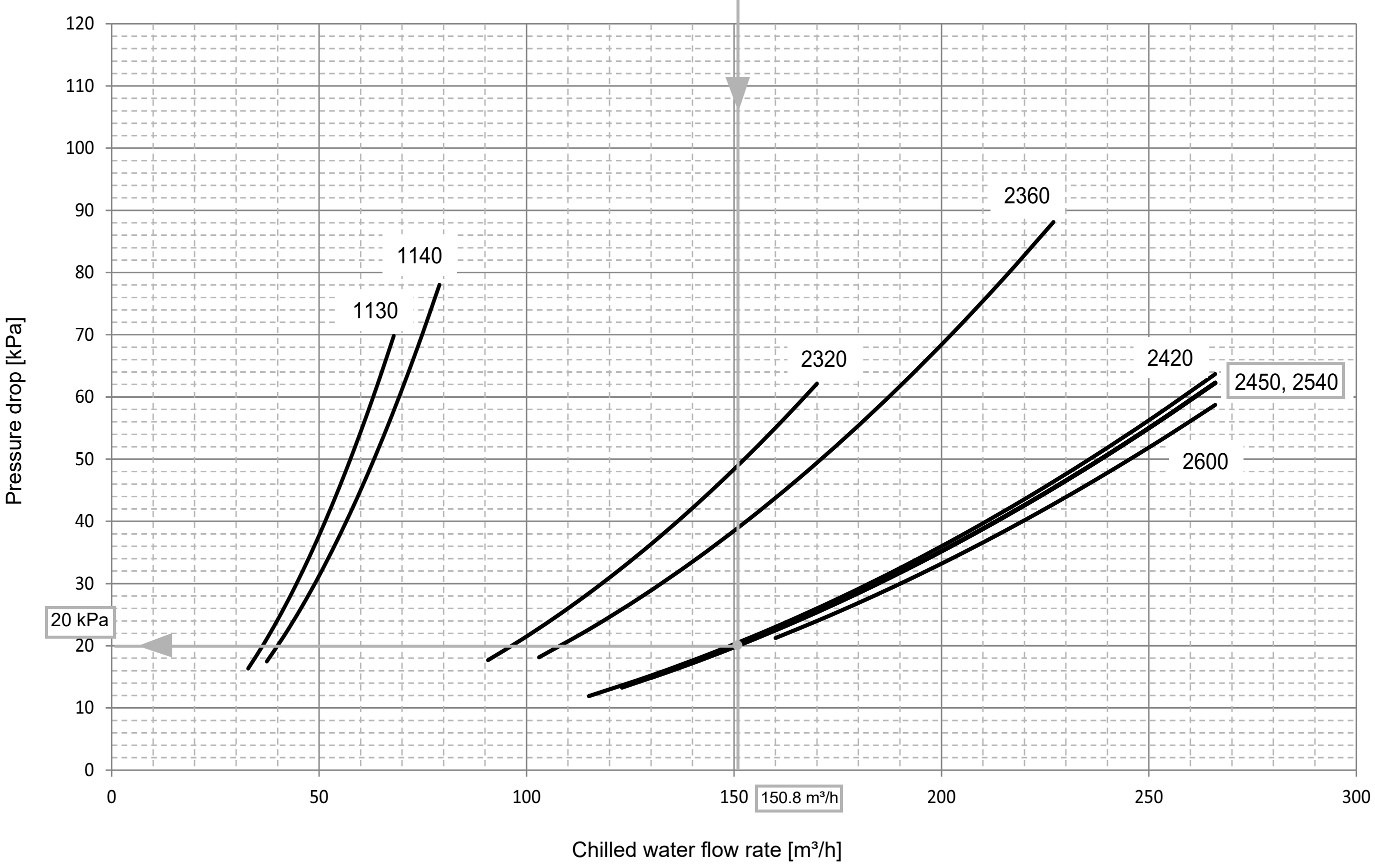
Chilled water flow rate
Unit series: GLWC(H) 1130-2600 CA2

D. 1



Water side pressure drop
Unit series: GLWC(H) 1130-2600 CA2

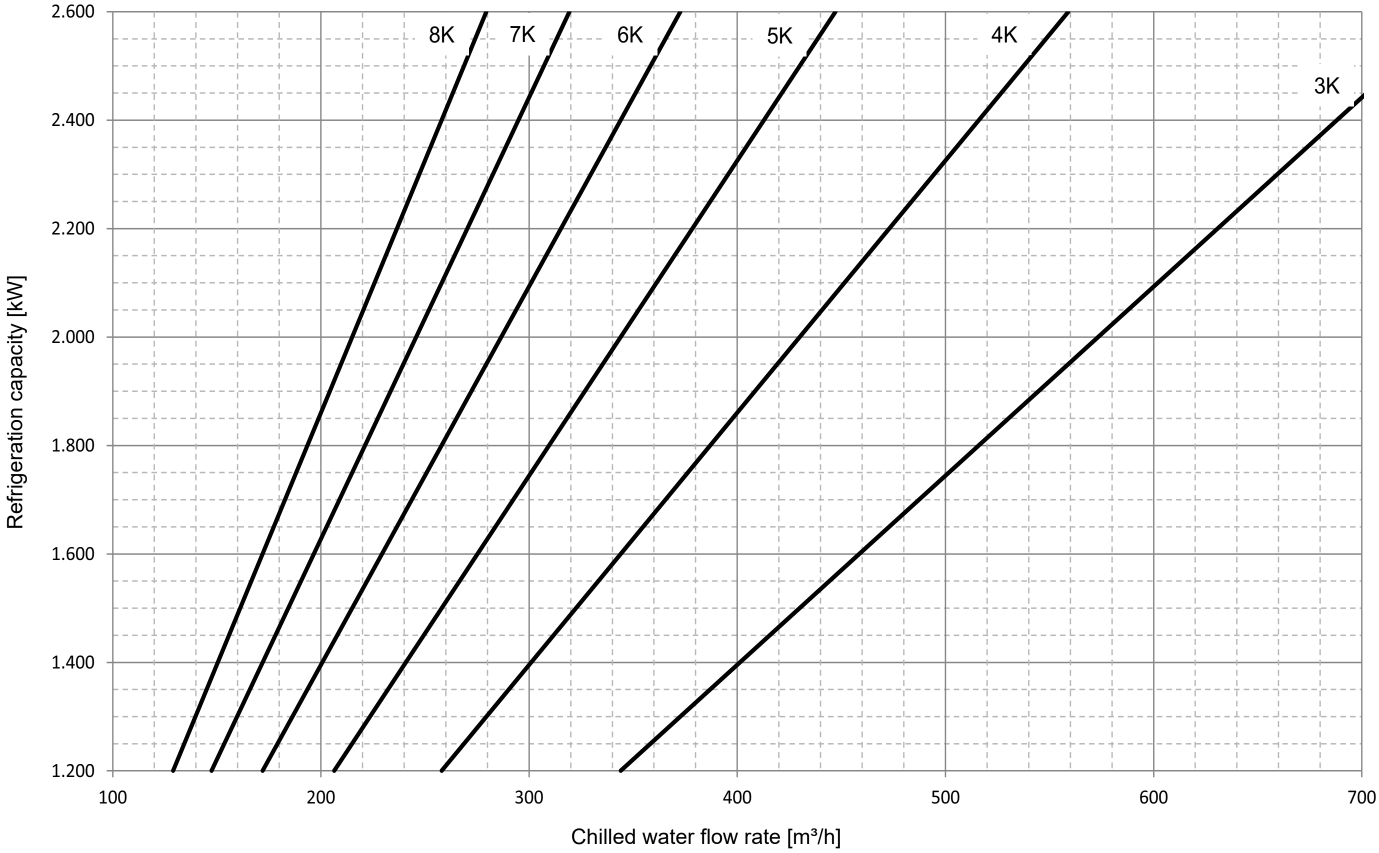
D. 2



Consider the maximum allowed water volume flow rate on page 20 and following pages.

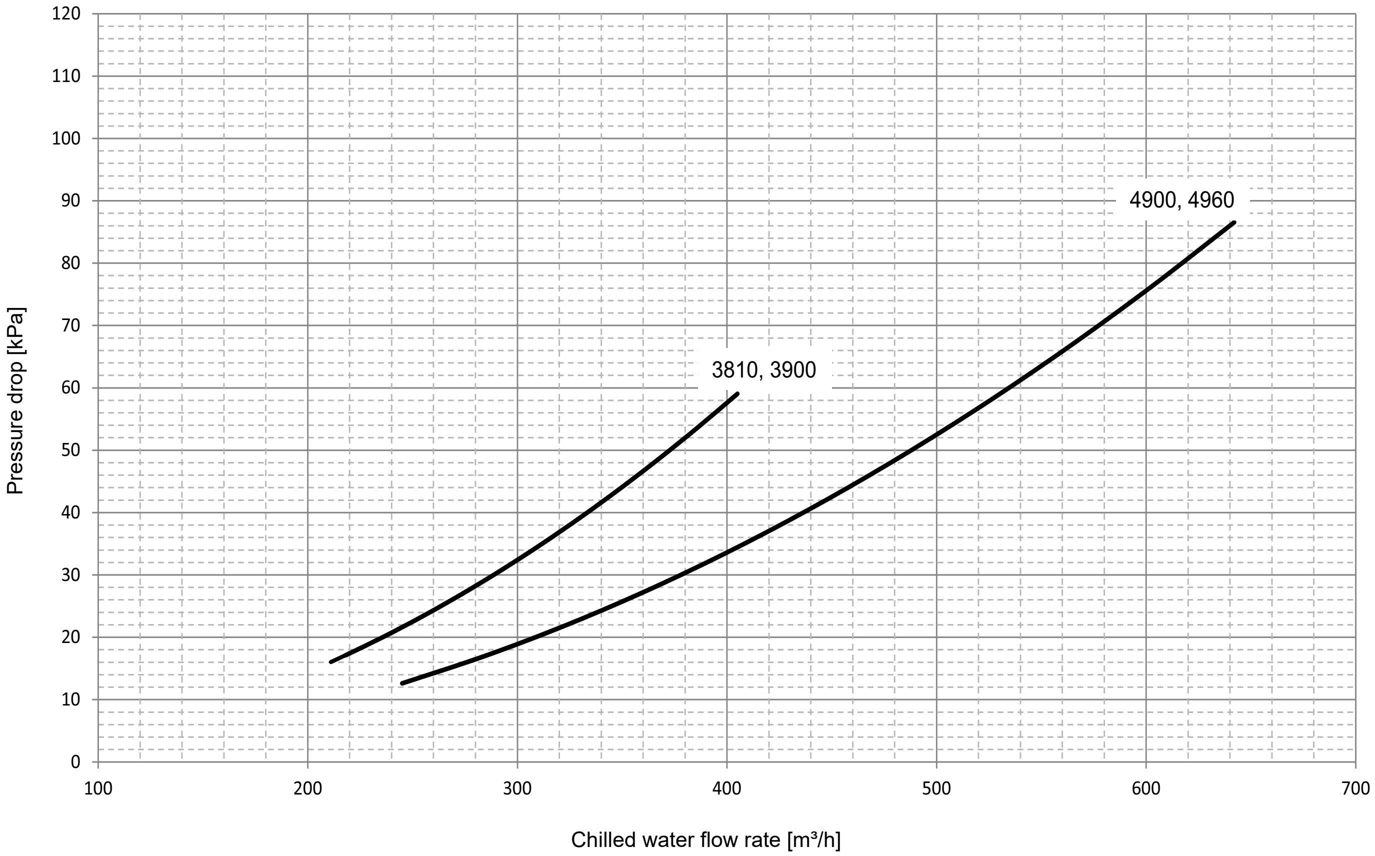
Chilled water volume flow
Unit series: GLWC(H) 3630-4960 CA2

D. 3



Water side pressure drop
Unit series: GLWC(H) 3630-4960 CA2

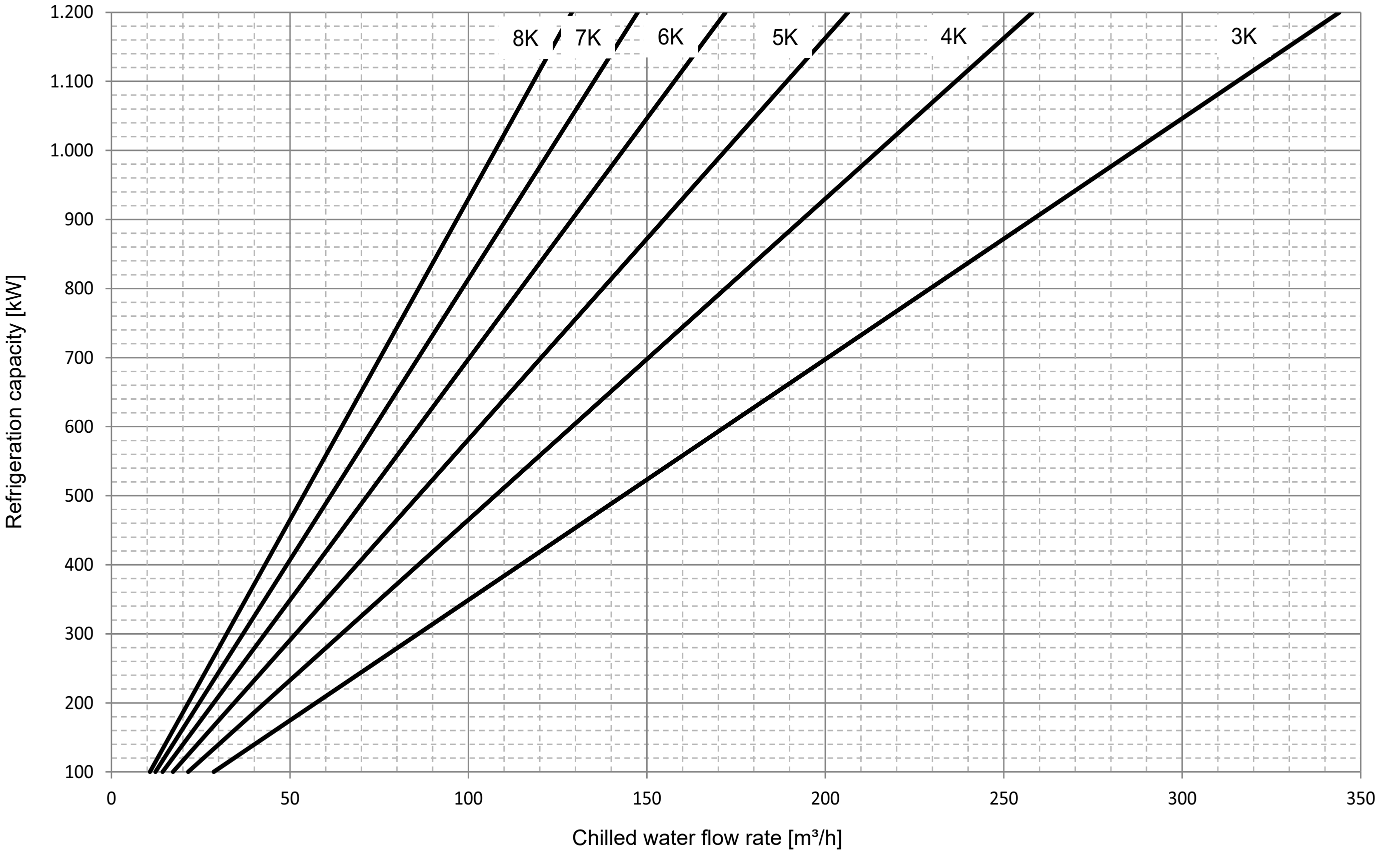
D. 4



Consider the maximum allowed water volume flow rate on page 20 and following pages.

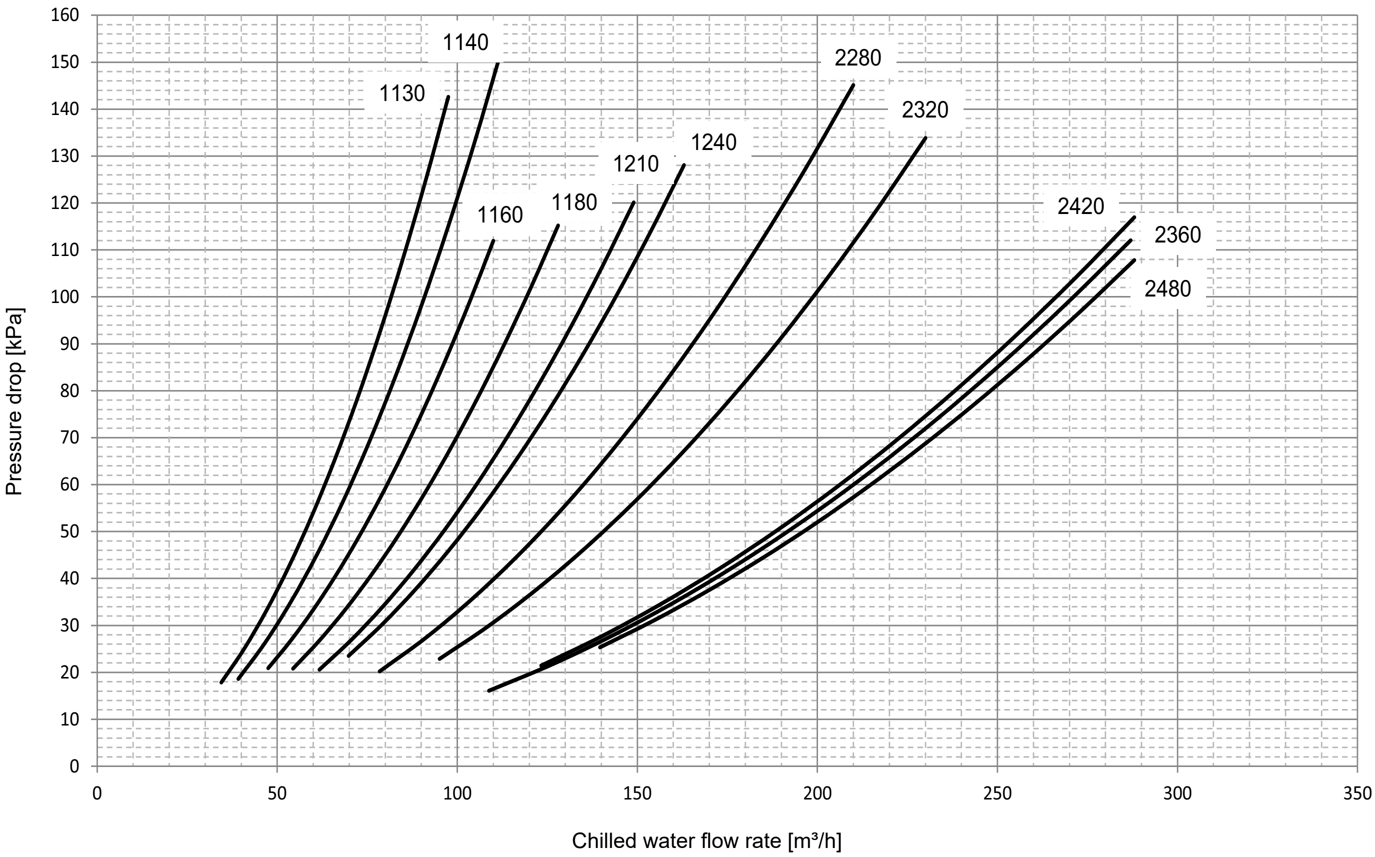
Chilled water flow rate
Unit series: GLWC 1130-2480 CA2.HE

D. 5



Water side pressure drop
Unit series: GLWC 1130-2480 CA2.HE

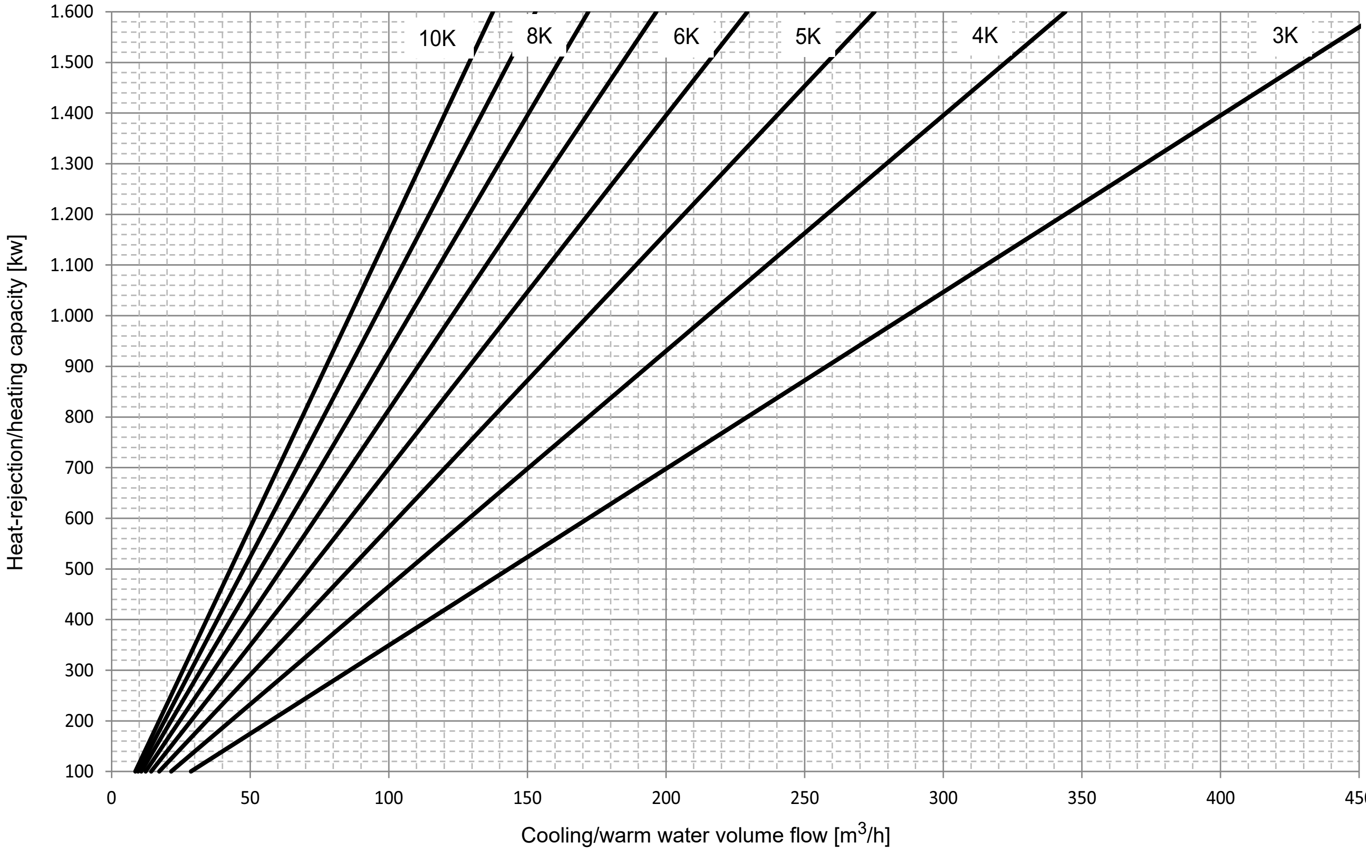
D. 6



Consider the maximum allowed water volume flow rate on page 20 and following pages.

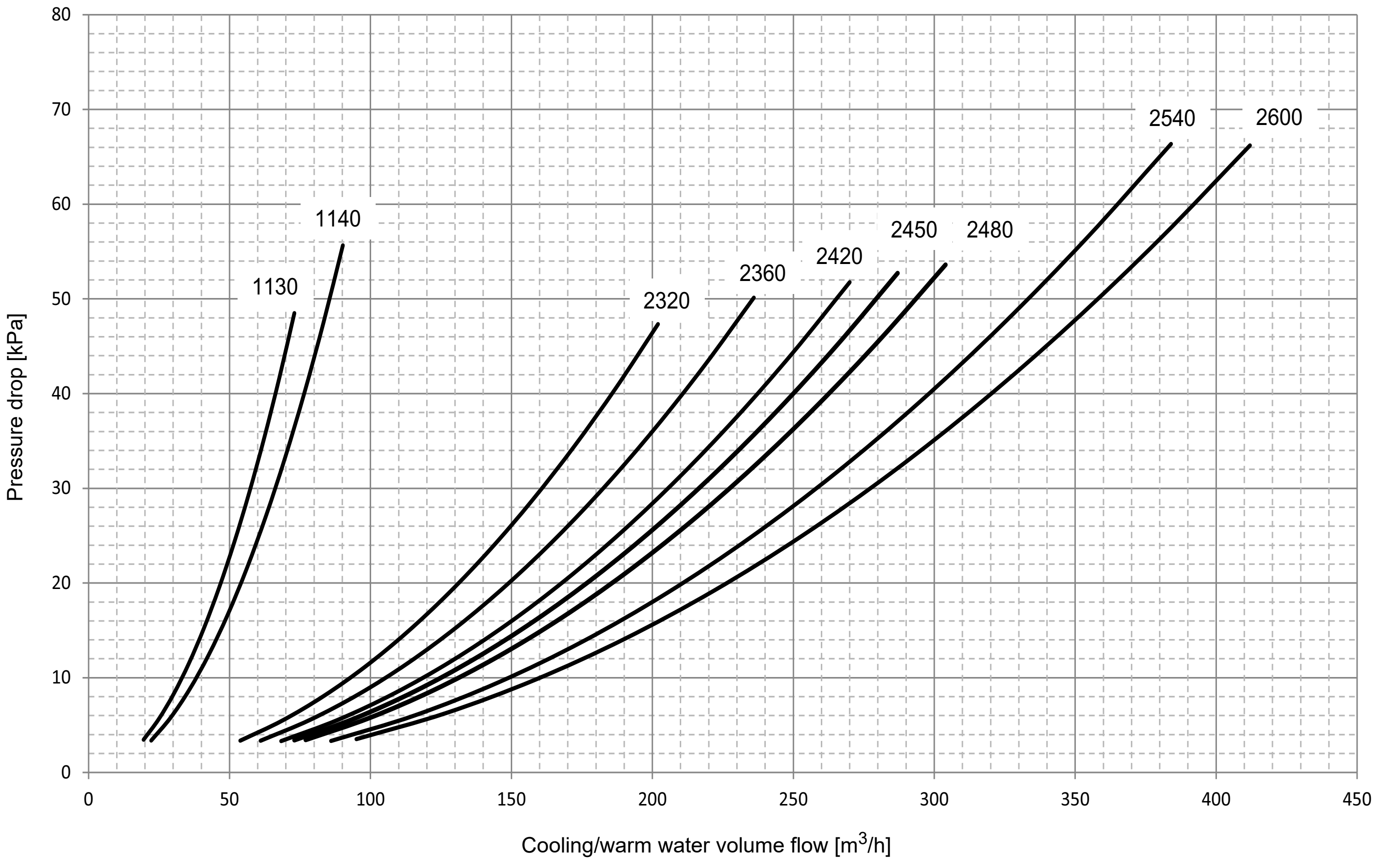
Cooling/warm water volume flow
Unit series: GLWC(H) 1130-2600 CA2

D. 7



Water side pressure drop
Unit series: GLWC(H) 1130-2600 CA2

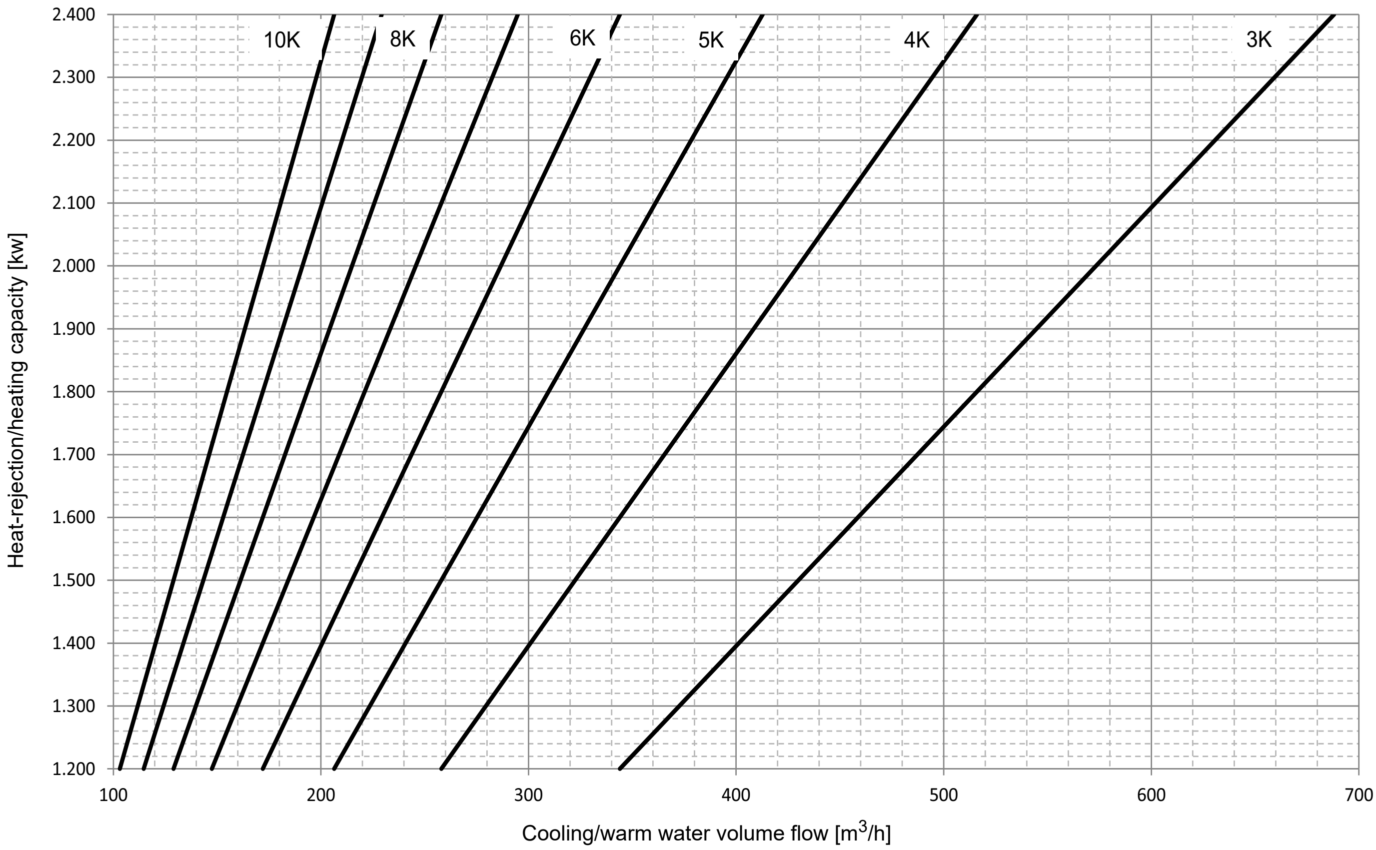
D. 8



Consider the maximum allowed water volume flow rate on page 20 and following pages.

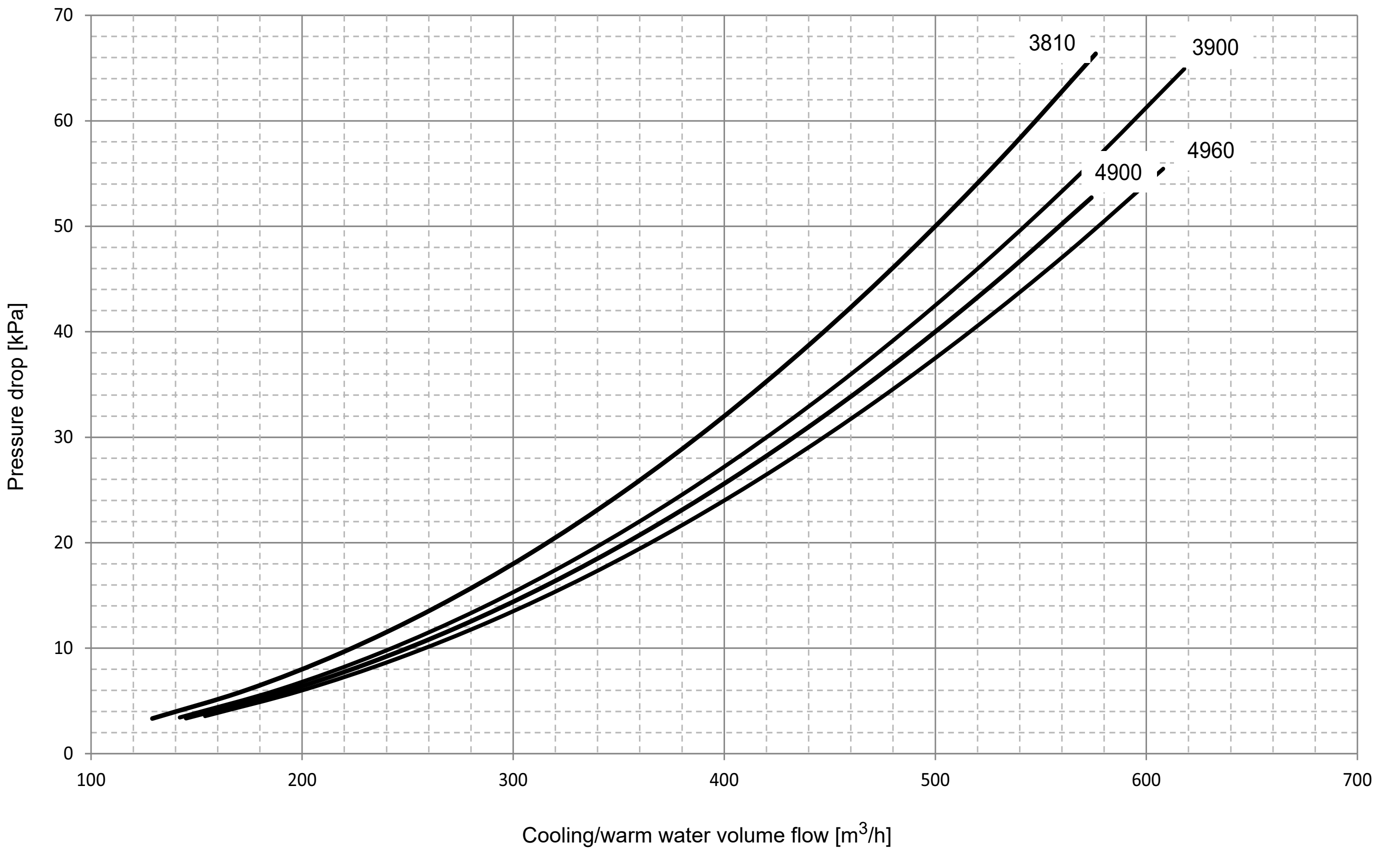
Cooling/warm water volume flow
Unit series: GLWC(H) 3630-4960 CA2

D. 9



Water side pressure drop
Unit series: GLWC(H) 3630-4960 CA2

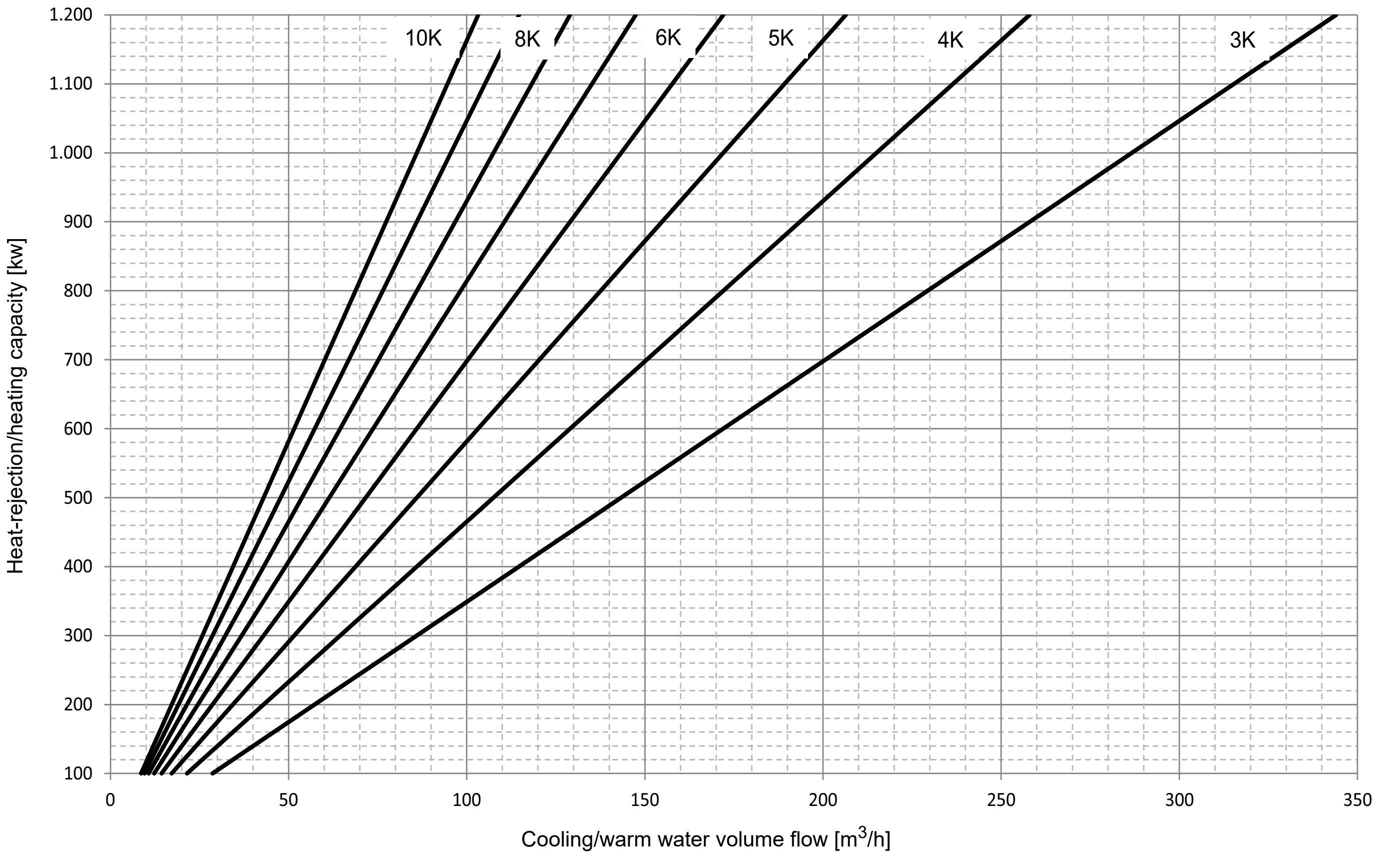
D. 10



Consider the maximum allowed water volume flow rate on page 20 and following pages.

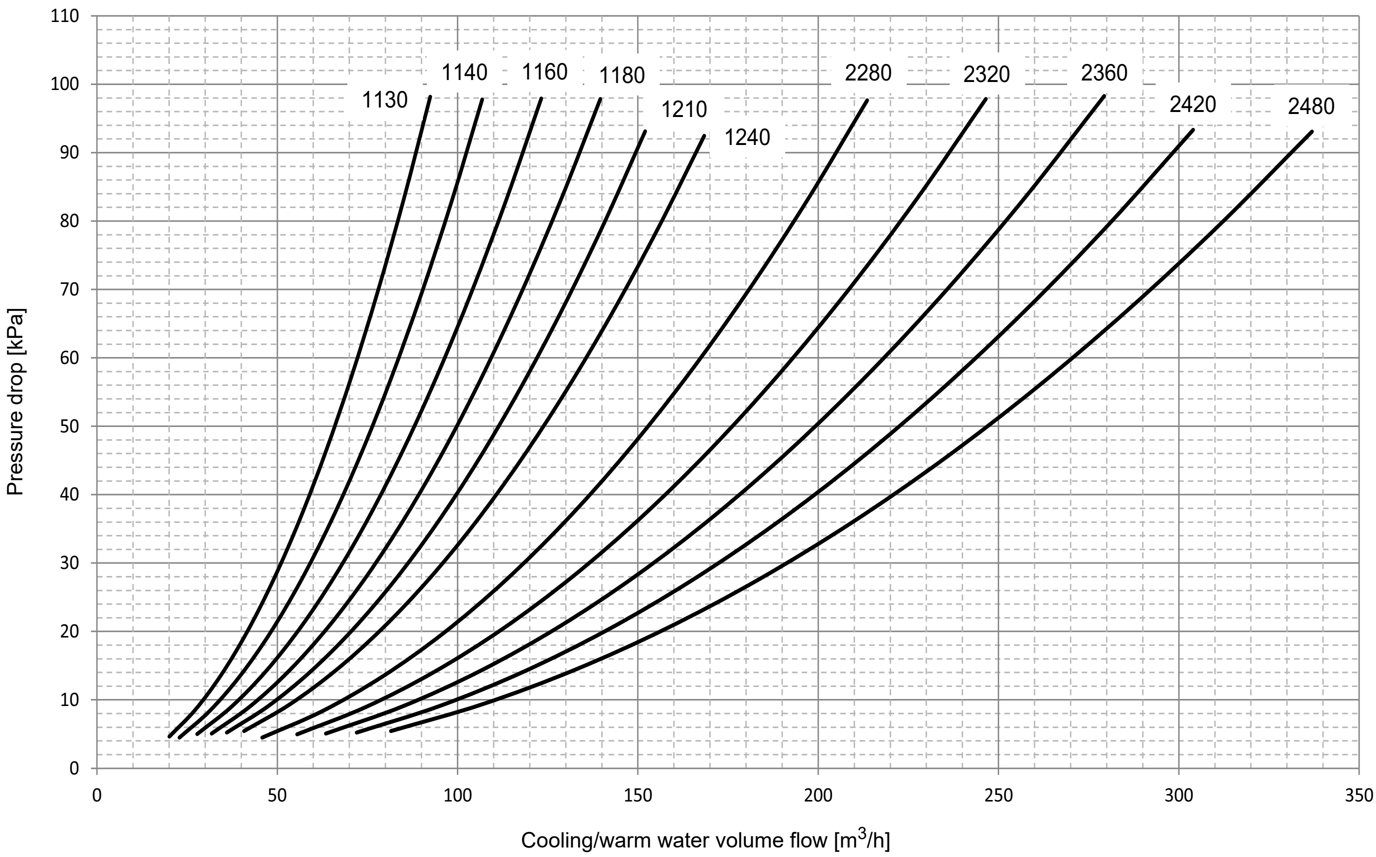
Cooling/warm water volume flow
Unit series: GLWC 1130-2480 CA2.HE

D. 11



Water side pressure drop
Unit series: GLWC 1130-2480 CA2.HE

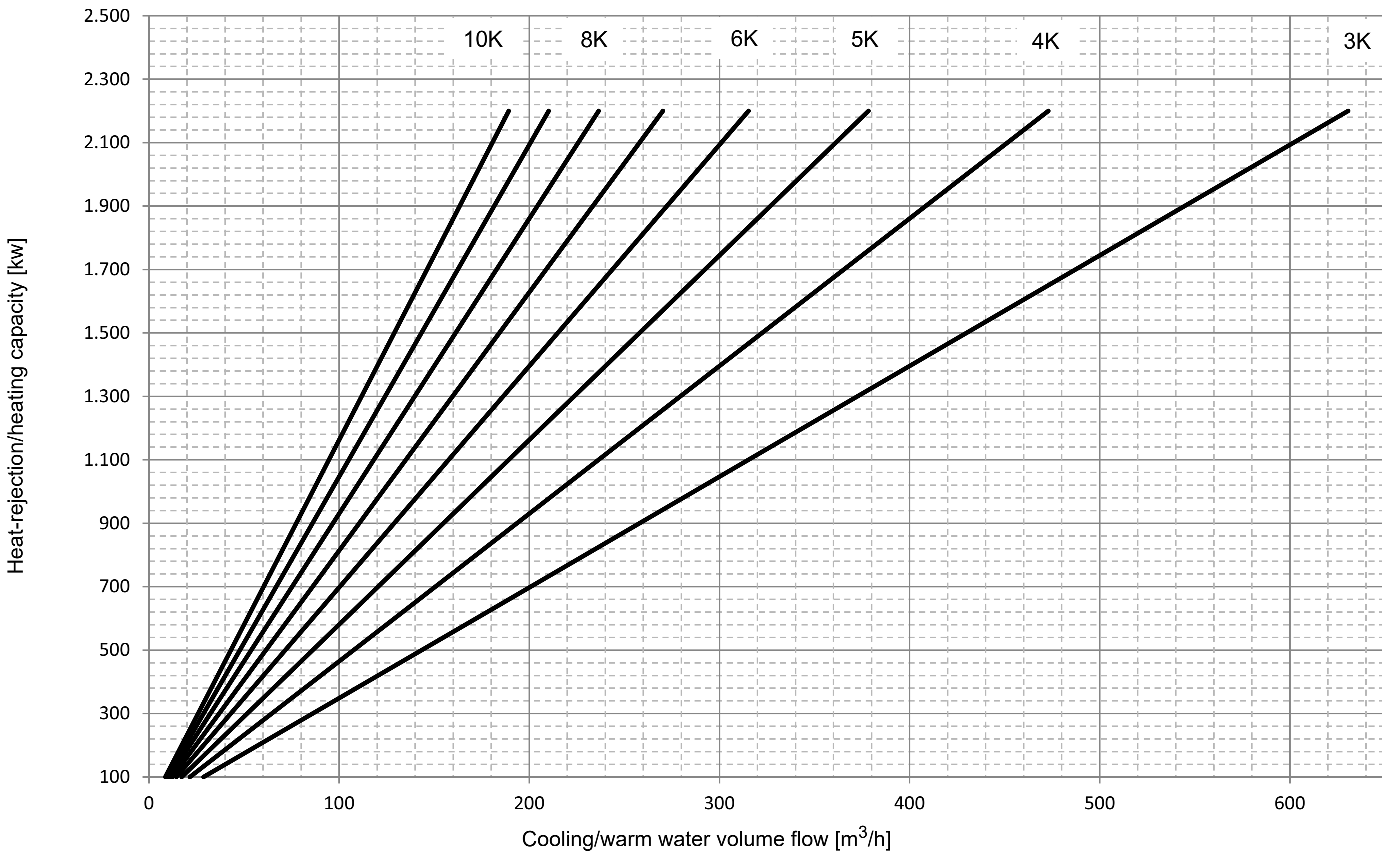
D. 12



Consider the maximum allowed water volume flow rate on page 20 and following pages.

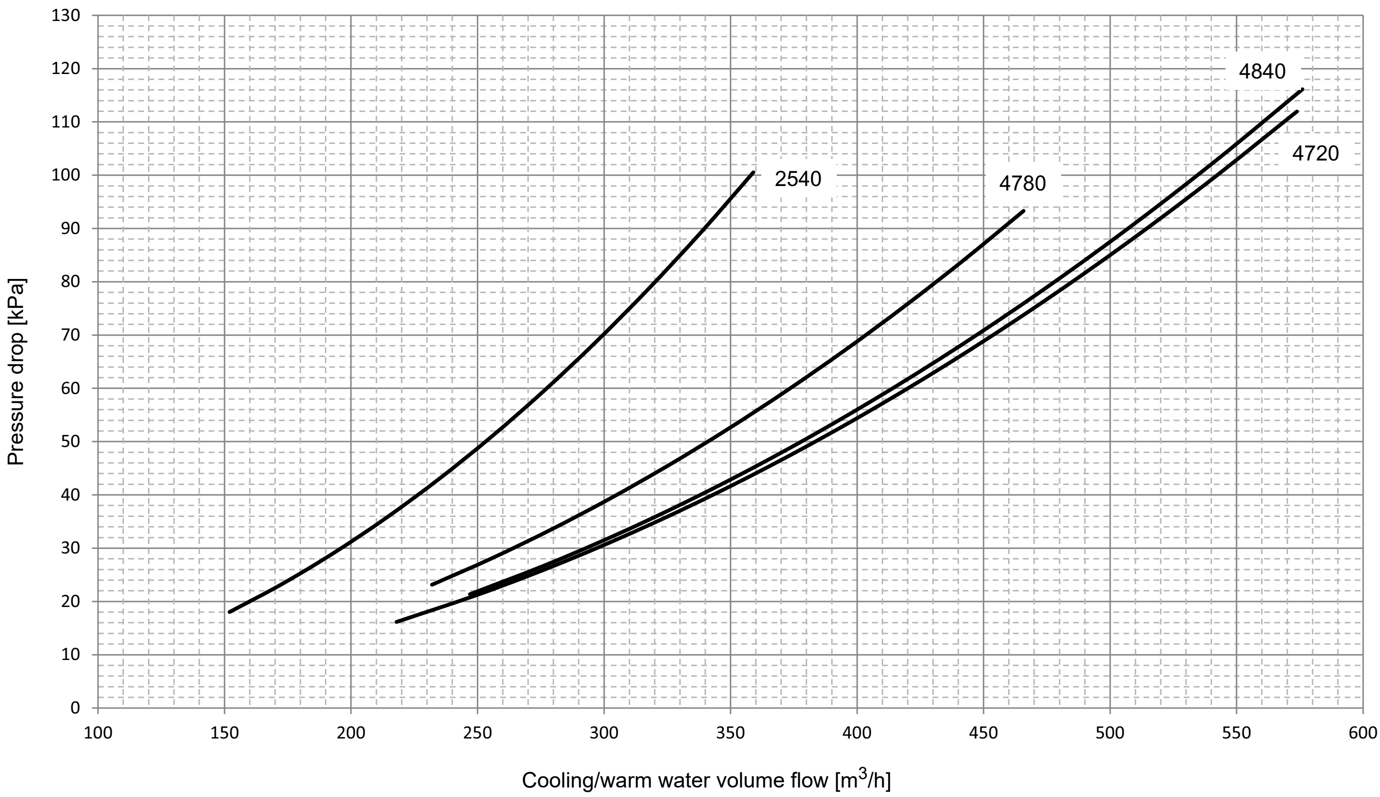
Cooling/warm water volume flow
Unit series: GLWC 2540-4840 CA2.HE

D. 13



Water side pressure drop
Unit series: GLWC 2540-4840 CA2.HE

D. 14



Consider the maximum allowed water volume flow rate on page 20 and following pages.

Water volume flow and water side pressure drop (for $\Delta T_e \neq 5$ K)

Use the diagrams to determine the chilled water flow and the pressure drop (page 41 et seq.).

For procedure on taking readings refer to the example on page page 18 et seq.

NOTE!
The minimum and maximum permissible water flow rates through coil are calculated and presented in the plot.
Extrapolation is not permitted.

Water glycol mixtures

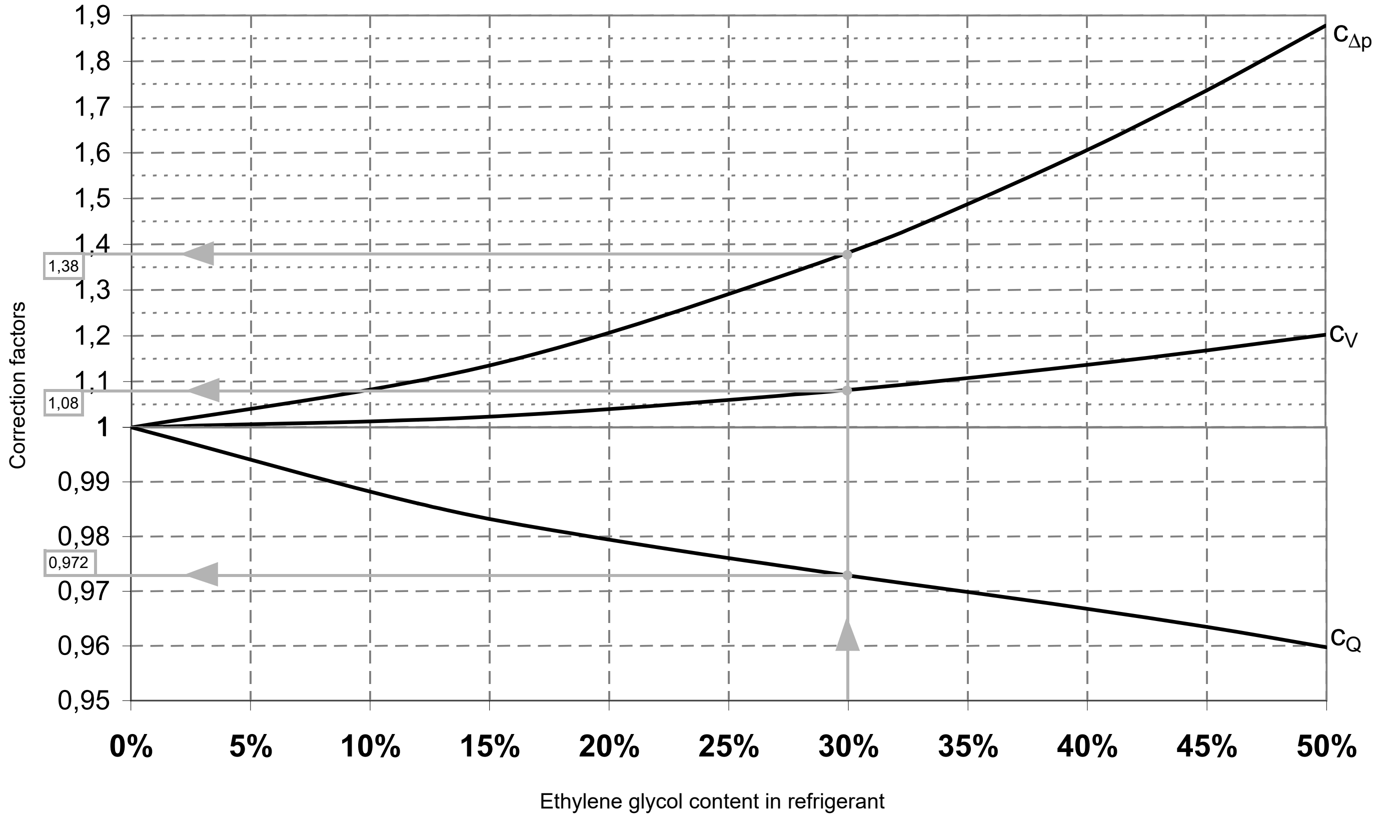
Using water-glycol mixtures instead of clean and pure water as heating medium changes the unit performance features. The performance and operating data for cooling/heating capacity, water flow rate and pressure drop on the water side are calculated with the help of correction factors specified in the diagram and conditional equations (next page).

Freezing point	[°C]	0	-5	-10	-15	-20	-25	-30	-35
Ethylene glycol content	[V-%]	0	12	20	30	35	40	45	50

Tab. 15: Freeze resistance of heating medium and the required glycol concentration

Correction Factors for Glycol Concentration

D. 15



c_Q- Correction factor for cooling/heating capacity
c_V - Correction factor for chilled/warm water volume flow
$c_{\Delta p}$ - Correction factor for water side pressure drop
Used diagram values are specified in "Using this Document"

NOTE!
Extrapolation is not permitted.

Use the value readings from the diagram in the following equations in order to arrive at correct values for the water glycol mixtures. Refer to the example in "Using this Document" for calculation logic.

Cooling/heating capacity
in relation to ethylene glycol concentration

Additing ethylene glycol to heating medium (water) reduces the cooling/heating capacity. Check that the necessary cooling/heating capacity is achieved. Otherwise select the next larger size (unit type) and repeat the calculation.

➔

$$\dot{Q}_G = c_Q \cdot \dot{Q}$$ *Gl. 2*

Q_G	[kW]	- Cooling/heating capacity depending on ethylene glycol concentration
c_Q		- Correction factor for cooling/heating capacity
Q	[kW]	- Cooling/heating capacity (refer to table „Capacity data")

Water flow rate depending on ethylene glycol concentration

➔

$$\dot{V}_G = c_V \cdot \dot{V}$$ *Gl. 3*

V_G	[m³/h]	- Volume flow depending on ethylene glycol concentration
c_V		- Correction factor for chilled water volume flow
V	[m³/h]	- Water volume flow (from table „Performance data" or calculated value with chilled water temperature difference ≠ 5 K)

Pressure drop (water side)
in relation to ethylene glycol concentration

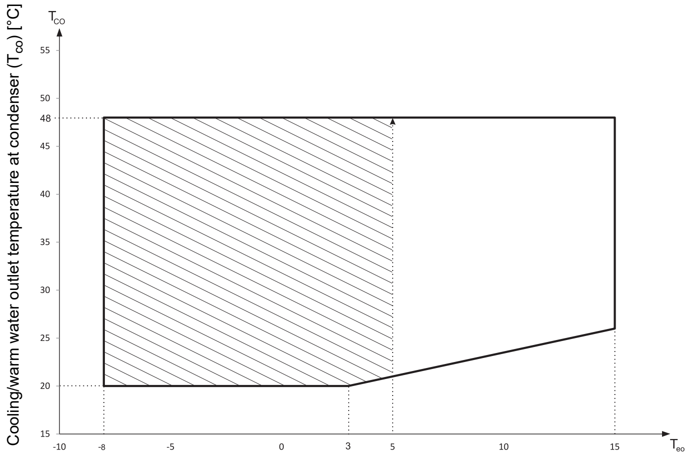
➔

$$\Delta p_G = c_{\Delta p} \cdot \Delta p$$ *Gl. 4*

Δp_g	[kPa]	- Pressure drop depending on ethylene glycol concentration
$c_{\Delta p}$		- Correction factor for chilled water side pressure drop
Δp	[kPa]	- Pressure drop (on water side) (from "Performance data" table or calculated value with chilled water temperature difference ≠ 5 K)

NOTE ON UNIT PLANNING AND CONFIGURATION
For your individual unit design please use our web-based Aid@ unit-layout software or contact your FläktGroup sales office.

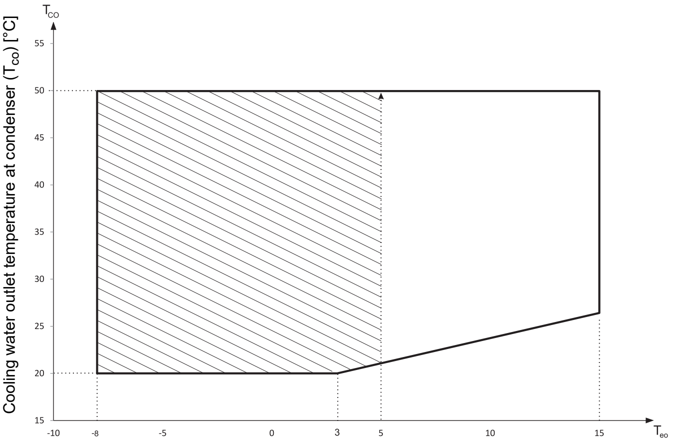
Basic unit



Chilled water outlet temperature at evaporator (T_{eo}) in °C

HE unit

D. 16



Chilled water outlet temperature at evaporator (T_{eo}) in °C

The operating limits apply for continuous operation of unit and water pump given that the correct commissioning, cleaning, maintenance and setup/installation of the unit and corresponding accessories is carried out.

For operational reasons water must be protected from freezing by adding glycol. FläktGroup recommends to use at least 30% ethylene gly-col.

GLWC(H) 1130-4960 CA2					
		Evaporator		**Condenser**	
		Min.	**Max.**	**Min.**	**Max.**
Water inlet	[°C]	-5	23	10	44
Water outlet	[°C]	-8	15	20	48
Δ T with water outlet temp. > 5 °C	[K]	4	8	-	-
Δ T at water outlet temp. ≤ 5 °C	[K]	3	5	-	-
Δ T	[K]	-	-	4	10

Tab. 16

GLWC 1130-4840 CA2.HE					
		Evaporator		**Condenser**	
		Min.	**Max.**	**Min.**	**Max.**
Water inlet	[°C]	-5	23	10	46
Water outlet	[°C]	-8	15	20	50
Δ T with water outlet temp. > 5 °C	[K]	4	8	-	-
Δ T at water outlet temp. ≤ 5 °C	[K]	3	5	-	-
Δ T	[K]	-	-	4	10

Tab. 17

For detailed design please contact your FläktGroup sales office.

NOTE!

- Depending on water and/or ambient temperatures, it may be necessary to protect the hot and cold water circuits from frost.
  FläktGroup recommends the use of at least 30% ethylene glycol.
- After the compressor start maintain the minimum warm water outlet temperature at 20 °C to ensure safe operation of the unit.
- After the compressor start maintain the maximum chilled water outlet temperature at 15 °C to ensure safe operation of the unit.
- Relative humidity during operation must not exceed 90 %.

Single-circuit buffer tank with one pump for the entire system

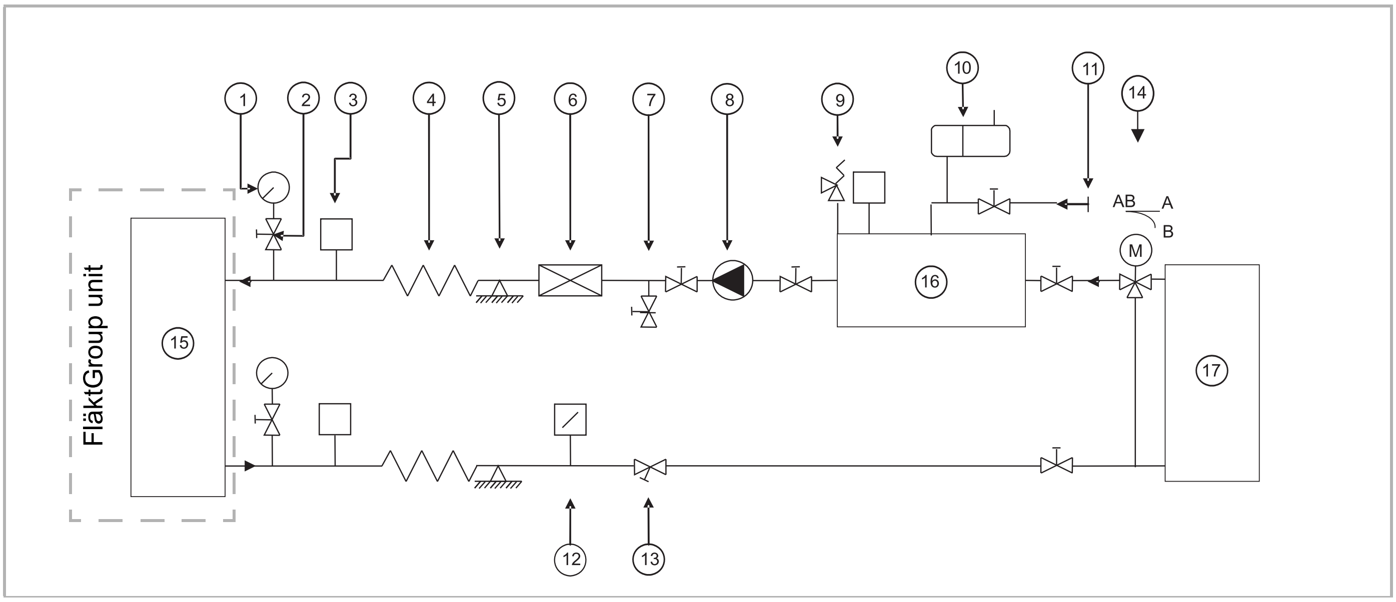


Fig. 13: Hydraulic circuit of single circuit buffer tank

1	Pressure gauge	10	Expansion tank
2	Shut off cock	11	Filling valve
3	Automatic venting	12	Flow switch
4	Vibration damping connection	13	Balancing valve/double regulating valve
5	Unit-independent pipeline fixing point	14	3-way valve
6	Water filter (maximum mesh size 1 mm^2)	15	FläktGroup unit
7	Drain valve	16	Single circuit buffer tank
8	Pump – primary circuit	17	Consumer
9	Safety valve		

Items 4, 5, 6 and 12 are also specified by FläktGroup in addition to the internal parts required by legal regulations.
The hydraulic integration of the single circuit buffer tank as illustrated above can be used for both a chilled and a warm water circuit.

Intended use: with a single-circuit buffer tank, the buffer tank primarily serves to increase the volume in the hydraulic system, to ensure the compressor's minimum runtime and to prevent unneeded frequent unit activations and deactivations.

Application: with small to medium-sized air-conditioning systems, a single-circuit buffer tank system is used, wherever possible, with identical consumers requiring the same volume flow and identical water temperatures.

Hydraulics: water is pumped from the buffer tank into the unit at required capacity reduction. The water is cooled/heated. The chilled/warm water now flows via the consumer(s) and is heated/cooled again. The 3-way valve is fully open in position A - AB. The bypass line B is closed. If the load reduction of the consumers drops, the bypass line B is opened. This ensures a constant water/volume flow across the unit, regardless of the load reduction. The unit requires a constant water/volume flow for trouble-free operation. Therefore, pumps that are speed-regulated during operation must not be used. If the bypass line B is fully open due because there is no load reduction, water stops flowing across the consumer(s). The water temperature approaches the setpoint of the unit and the compressor switches off gradually. The water pump continuously remains in operation in order to record the current water temperatures in the system. If the load reduction increases again, the unit switches on the individual compressors again depending on how far the temperature deviates from the setpoint.

Regulation: external enabling of the unit should be done by e.g. a timer and/or outside air temperature. Switching the external enabling via the water temperature or the position of the 3-way valve is not permitted, as this would prevent the unit from automatically regulating the capacity to optimise energy consumption. This would cause an undesirable cycle operation. The compressor's capacity is controlled depending on the temperature difference (setpoint and actual value) from the unit. Depending on the unit configuration, the water pump control function can be withdrawn from the unit. The consumers and the 3-way valve are controlled by others.

Hydraulic or pump module: depending on unit configuration and selected accessories, the unit can also be fitted with one or two water pumps, a buffer tank and other hydraulic components (see the available accessories).

Dual-circuit buffer tank with multiple pumps for the entire system

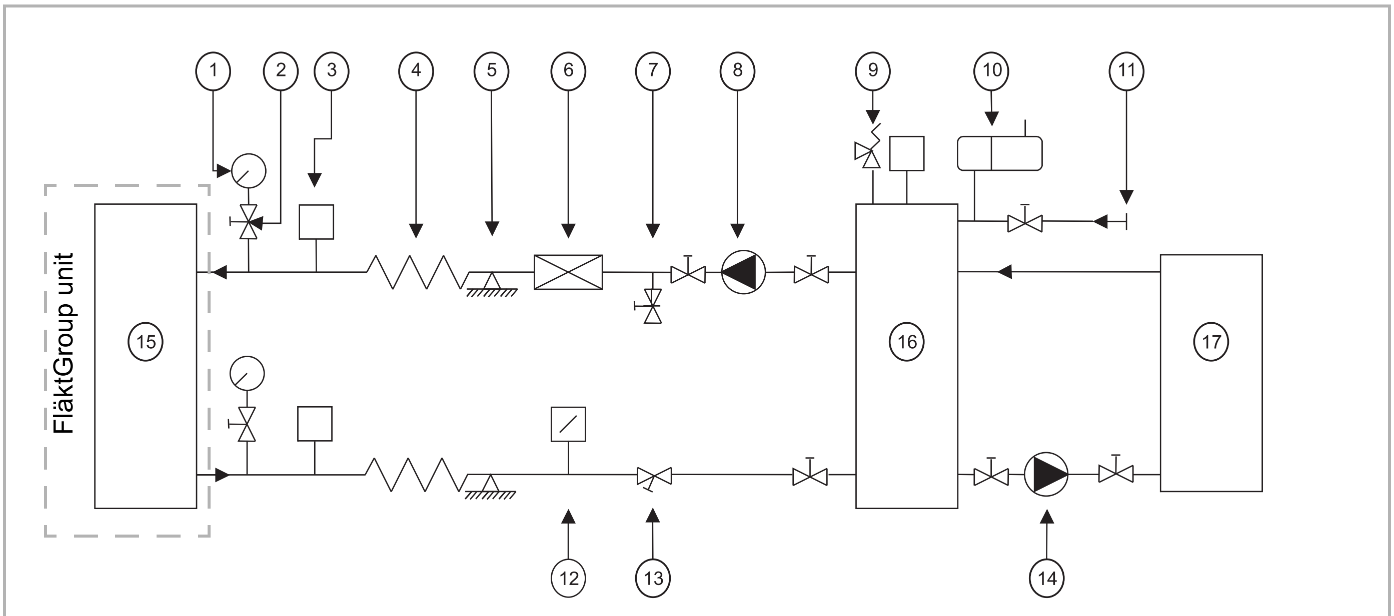


Fig. 14: Hydraulic circuit of twin-circuit buffer tank

1	Pressure gauge	10	Expansion tank
2	Stop cock	11	Filling valve
3	Automatic venting	12	Flow switch
4	Vibration damping connection	13	Balancing valve/double regulating valve
5	Unit-independent duct fixing point	14	Pump – secondary circuit
6	Water filter (maximum mesh size 1 mm^2)	15	FläktGroup unit
7	Drain valve	16	Hydraulic switch/buffer tank suitable for chilled and warm water systems
8	Pump – primary circuit		
9	Safety valve	17	Consumer

Items 4, 5, 6 and 12 are also specified by FläktGroup in addition to the internal parts required by legal regulations.

The hydraulic integration of the dual circuit buffer tank as illustrated above can be used for both chilled and warm water circuits. With the warm water circuit, however, it must be noted that the pump for the primary circuit takes the supply from the buffer tank from below, where the chilled water collects. The water is conveyed to the unit by the primary pump. The supply to the pump for the secondary circuit must be taken from the buffer tank from above, as the warmest water can be taken from here. The secondary pump conveys the water to the consumers.

Intended use: with dual-circuit buffer tank, the buffer tank fulfils two main tasks. First, the buffer tank is used to increase volume. A generously dimensioned buffer tank not only guarantees the compressor's minimum running time, it also achieves proper thermal layering within the buffer tank. The second task is to separate the water volume flows on the primary and secondary sides. This enables the most diverse of consumers to be individually supplied and regulated in the secondary side.

Application: A dual-circuit buffer tank is mainly used in medium to large air-conditioning systems containing a number of different consumers. The water volume flow to the individual consumers can vary. The consumer can be supplied by various, speed-regulated secondary pumps.

Hydraulics

Chilled water operation: water is pumped downwards from the buffer tank into the primary circuit of the unit at required capacity reduction. The water is **cooled** and returned to the buffer tank from **below**. The **chilled water** in the secondary circuit is taken from the buffer tank from **below** and fed to the consumers via auxiliary secondary pumps. The **heated** water flows back to the buffer tank **from above**.

Warm water operation: water is pumped upwards from the buffer tank into the unit in the primary circuit at the required capacity reduction. The water is **heated** and returned to the buffer tank from **above**. The **warm water** in the secondary circuit is taken from the buffer tank from **above** and fed to the consumers via auxiliary secondary pumps. The **cooled** water flows back to the buffer tank from **below**.

A constant water volume flow across the unit must be ensured in the primary circuit. The water volume flow on the secondary side, i.e. at the consumers, can vary due to hydraulic separation, thus enabling the use of speed-regulated pumps. With a dual-circuit buffer tank, individual consumer circuits can also be switched off and on depending on demand. The transported volume of the primary pumps must be greater than the total transported volume on the secondary side. This ensures that the return flow temperatures of the secondary circuit do not influence the inlet temperatures of the secondary circuit.If the water temperature in the buffer tank approximates the setpoint, the compressors are switched off gradually via the unit control system. The water pump on the primary side continuously remains in operation in order to record the current water temperatures in the system. If the load reduction increases again, the unit switches on the individual compressors again depending on how far the temperature deviates from the setpoint.

Regulation: external enabling of the unit should be done by e.g. a timer and/or outside air temperature. Switching the external enabling via the water temperature in the buffer tank is not permitted, as this would prevent the unit from automatically regulating the capacity to optimise energy consumption. This would cause an undesirable cycle operation. The compressor's capacity is controlled depending on the temperature difference (setpoint and actual value) from the unit. Depending on the unit configuration, the water pump control function can be withdrawn from the unit. The consumers and the secondary pumps are controlled by others.

Hydraulic or pump module: depending on unit configuration and selected accessories, the unit can also be fitted with one or two water pumps, a buffer tank and other hydraulic components (see the available accessories).

EQUIPMENT DAMAGE!
Under all circumstances please remember to install a water filter before the direct inlet into the water side heat exchanger. The water filter prevents formation of dirt and scale of all kinds on the heat exchangers. Water filters are optional and can be ordered separately but are needed for safe and trouble-free operation of the unit and thus constitute a requirement for upholding the validity of the warranty.

EQUIPMENT DAMAGE!
Remember that a constant water volume flow across the evaporator/condenser must be ensured during unit operation. Refer to the "Planning Manual on Chillers" for further instructions on hydraulic integration of chillers and heat pumps.

Schematic Representation of Various Hydraulic Heat Rejection Circuits (Example)

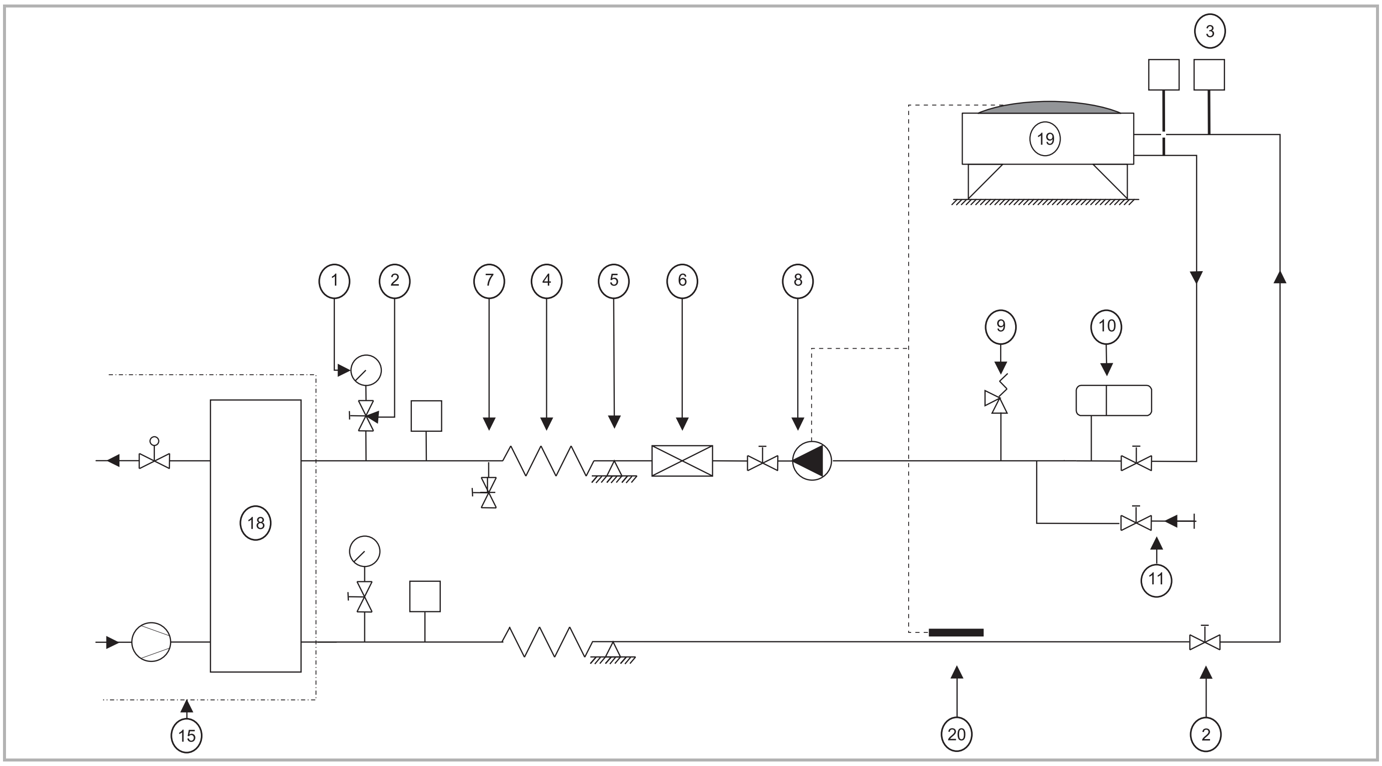


Fig. 15: Heat rejection circuit with cooling water pump with speed control and/or speed control of the heat rejection unit

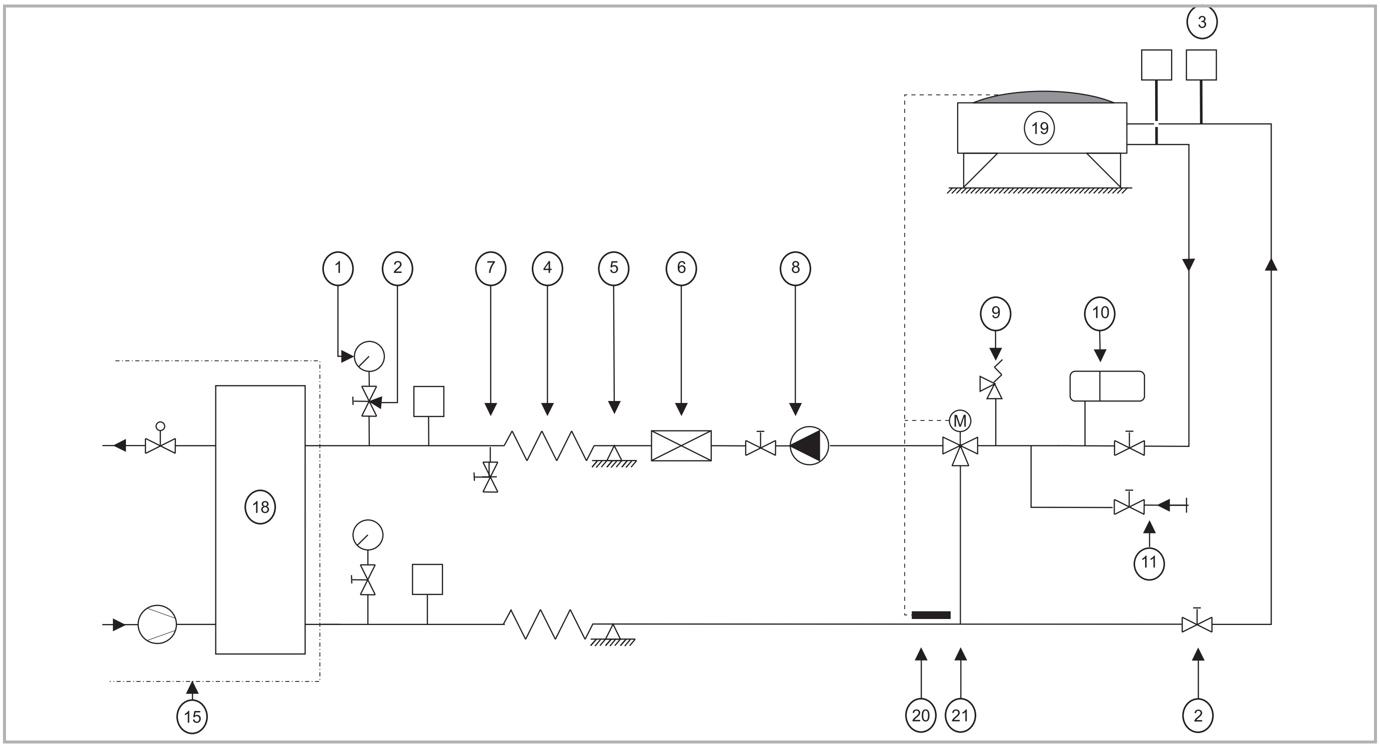


Fig. 16: Heat rejection circuit with a 3-way valve and/or fan speed control of the heat rejection unit

EQUIPMENT DAMAGE!

Consider to install a water filter directly before the water inlet of the evaporator and condenser. A water filter (mesh width from 0.5 to 1 mm) prevents formation of dirt and scale on the coils. Water filters are optional and can be ordered separately but are needed for safe and trouble-free operation of the unit and thus constitute a requirement for the validity of the warranty.

Frost protection

The FläktGroup chiller and heat pumps of the GLWC and GLWH series are designed for indoor installation. Therefore protection of the chilled water circuit from frost at chilled water temperatures above 5 °C is usually not required. It is assumed that chilled water lines are run frost-safe inside a building. If this is not the case use the antifreeze agent.

In most common cases the cool water circuit of the heat rejection unit has to be frost protected, because the latter is usually installed outdoor and is exposed to weather effects. FläktGroup recommends to use ethylene glycol as an antifreeze agent (also refer to section „Water-glycol mixes“ on page 60 et seq. and chapter „Medium connections“ in the relevant operation manual).

Dimensioning

Dimension the FläktGroup heat rejection unit in such a way that the cooling water temperature within the operating limits remains as low as possible. The lower the cooling water temperature, the higher the achieved refrigeration capacity and the lower the energy consumption of the unit.

Design the cooling water circuit between supply and return lines at the condenser and the heat rejection unit for temperature difference of 5 K (also see „Capacity data“ starting with page 20 et seq.).

Minimum cooling water outlet temperature

To ensure safe operation of the unit maintaining minimum cooling water outlet temperature of 20° C is required. This situation is not always the case because of cold weather. Therefore there are several technical possibilities to ensure the minimum cooling water outlet temperature.

Possibility 1:

– Option 1 enables control the fan speed depending on the cooling water outlet temperature. Under all circumstances it is recommended to control the fan RPM speed in order to ensure continuous operation of the unit under constant conditions. As an option regulation of the field-provided fan speed control with a 0-10 volt signal is available (option .E37).

Possibility 2:

– Option 2 should be implemented if, despite the speed control of fan motors resulting from e.g. a year-round unit operation, the minimum cooling water temperature can not be ensured. In this case using a cooling water pump depending on the cooling water outlet temperature is possible if the limits for minimum and maximum water volume flow through condenser are adhered to (refer to Fig. 15 on page 54). As an option regulation of the field-provided pump speed control with a 0-10 volt signal is available (option .E37).

Possibility 3:

– Option 3 can also be used in order to provide for the minimum cool water outlet temperature of the unit. In this case a 3-way valve is installed in cooling water inlet additionally to the fan speed control to provide valve regulation depending on the cooling water outlet temperature (refer to Fig. 16 on page 54).

When switching between heating and cooling it is imperative to observe the unit operating limits.

Operation of a 3-way valve (by others)

Following compressor start ensure a minimum cooling water temperature of 20 °C. The cooling water temperature determines the condensing pressure with an effect on the evaporation pressure in the refrigeration circuit. In order to avoid low pressure disturbances at insufficiently high cooling water temperature, FläktGroup recommends to use a 3-way valve for units operated in transition periods and in winter. As an option units are fitted with controls for a 3-way valve using 0-10 Volt signal (option .E37). The function of a 3-way valve is to bring the cooling water temperature to the required level during the unit start up - even if the cooling water in the heat rejection system is too cold as a result of low ambient temperature. Consider the operating limits of the unit on page 50 et seq.

A 3-way valve is suitable for use in heat rejection units, cooling towers, evaporative condensers and earth loops.

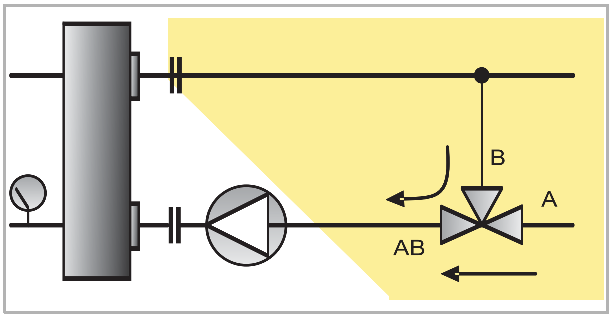


Fig. 17: *Scheme of a 3-way valve*

– Constant water volume flow across condenser

Functional description of a 3-way valve

Depending on the condensing pressure which is measured by the already installed pressure sensor, the following positions of a 3-way valve can be set: position A - AB, B - AB or mixed position A - B - AB.

Install the 3-way valve on the cooling water side. If option .E37 is also ordered, carry out electrical connection and wiring of the 3-way valve in accordance with the specifications on page 62 and the following instructions and/or enclosed wiring diagram.

The above-mentioned configurations are only relevant for the cooling operation, however they can accordingly be applied for the heating operation.

Using a 3-way valve in heating mode is reasonable as integrated microprocessor control of a 3-way valve enables to regulate unit operation at constant water temperature and ensure safe and trouble-free unit performance.

Regulation using 0-10 Volt signal (option .E37)

In accordance with specifications for electrical integration on page 62 carry out the following wiring of a 0-10 Volt signal and connection to field-provided controls.

For units with 1 or 2 compressors:
- N: output VG: 0 Volt, terminal 013
- O: output VG0: 24 Volt, terminal 014
- P: output Y1: 0-10 Volt, terminal 015

Depending on the condensing pressure, a 0-10 Volt signal is transmitted to field-provided controls using terminal 015.

For units with 3 or 4 compressors
- N: output VG: 0 Volt, terminal 025 for refrigeration circuit 1 and 2
- O: output VG0: 24 Volt, terminal 026 for refrigeration circuit 1 and 2
- P: output Y1: 0-10 Volt, terminal 027 for refrigeration circuit 1
- Q: output Y2: 0-10 Volt, terminal 028 for refrigeration circuit 2

- N: output VG: 0 Volt, terminal 029 for refrigeration circuit 3 and 4
- O: output VG0: 24 Volt, terminal 030 for refrigeration circuit 3 and 4
- P: output Y1: 0-10 Volt, terminal 031 for refrigeration circuit 3
- Q: output Y2: 0-10 Volt, terminal 032 for refrigeration circuit 4

Depending on the condensing pressure, a 0-10 Volt signal of the corresponding refrigeration circuit is transmitted to field-provided controls using terminals 027, 028, 031 and 032. Unlike units with 1 or 2 compressors where a 0-10 V signal is generated for the entire unit, on units fitted with 3 or 4 compressors a 0-10 V signal is generated per each refrigeration circuit. If only one 0-10 Volt signal is needed for the entire unit, e.g. when only one 3-way valve per unit but not for each cooling water circuit should be connected, specify the given condition in the order.

Sound level GLWC 1130-4960 CA2 & GLWH 1130-4960 CA2*

Total sound level			Octave band [Hz]							
Capacity stage	Sound power[1]	Sound pressure level[2]	63	125	250	500	1000	2000	4000	8000
	[dB(A)]	[dB(A)] 10 m	Sound power level via octave band [dB(A)]							
1130	97	65	81	78	89	93	96	84	73	67
1140	97	65	81	78	89	93	96	84	73	67
2320	99	67	83	80	90	95	98	86	75	69
2360	99	67	83	80	90	95	98	86	75	69
2420	99	67	83	80	90	95	98	86	75	69
2450	99	67	83	80	90	95	98	86	75	69
2480	99	67	83	80	90	95	98	86	75	69
2540	101	69	84	82	93	97	100	89	77	70
2600	101	69	84	82	93	97	100	89	77	70
3810	102	70	85	83	94	97	101	91	78	72
3900	102	70	85	83	94	97	101	91	78	72
4900	102	70	85	83	94	97	101	91	78	72
4960	102	70	85	83	94	97	101	91	78	72

Tab. 18: Noise levels

*** Data on operating conditions**
Data applies only to chilled water inlet and outlet temperature of 12 °C/ 7 C° and warm water inlet and outlet temperature of 30 °C/35 °C.

1 Specification of sound power (EUROVENT certified value)
Manufacturer determines the sound power value for Eurovent certified units in accorsdance with ISO 9614 and Eurovent 8/1 standard. For units, that are not participating in the Eurovent certification programme, sound power is determined in accordance with the ISO 3744 standard.

NOTE!
This certification expressly refers to sound power in dB(A), which thus constitutes obligatory data in this case.

2 Specification of sound pressure level
The sound pressure level is determined according to enveloping surface method with a reflecting surface (Q=2). 10 m clearance is related to the external dimensions of the unit.
For the sound pressure level the following correction values can be used:
Sound pressure level at 5 m: +5 dB to sound pressure level in 10 meters distance
Sound pressure level at 15 m: -3 dB to sound pressure level in 10 meters distance
Sound pressure level at 20 m: -6 dB to sound pressure level in 10 meters distance

NOTE!
Only an externally engaged acoustics engineer should carry out specific sound level calculations to be valid for your installation site.

Sound level GLWC 1130-2480 CA2(.HE)*

Total sound level			Octave band [Hz]							
Capacity stage	Sound power[1]	Sound pressure level[2]	63	125	250	500	1000	2000	4000	8000
	[dB(A)]	[dB(A)] 10 m	Sound power level via octave band [dB(A)]							
1130	97	65	81	78	89	93	96	84	73	67
1140	97	65	81	78	89	93	96	84	73	67
1160	97	65	81	78	89	93	96	84	73	67
1180	97	65	81	78	89	93	96	84	73	67
1210	97	65	81	78	89	93	96	84	73	67
1240	97	65	81	78	89	93	96	84	73	67
2280	99	67	83	80	90	95	98	86	75	69
2320	99	67	83	80	90	95	98	86	75	69
2360	99	67	83	80	90	95	98	86	75	69
2420	99	67	83	80	90	95	98	86	75	69
2480	99	67	83	80	90	95	98	86	75	69
2540	101	69	84	82	93	97	100	89	77	70
4750	102	70	85	83	94	97	101	91	78	72
4780	102	70	85	83	94	97	101	91	78	72
4840	102	70	85	83	94	97	101	91	78	72

Tab. 19: Noise levels

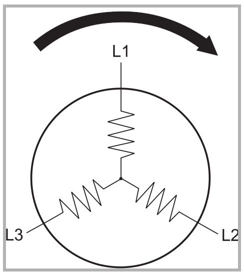
**** Data on operating conditions***
Data applies only to chilled water inlet and outlet temperature of 12 °C/ 7 C° and warm water inlet and outlet temperature of 30 °C/35 °C.

1 Specification of sound power (EUROVENT certified value)
Manufacturer determines the sound power value for Eurovent certified units in accorsdance with ISO 9614 and Eurovent 8/1 standard. For units, that are not participating in the Eurovent certification programme, sound power is determined in accordance with the ISO 3744 standard.

NOTE!
This certification expressly refers to sound power in dB(A), which thus constitutes obligatory data in this case.

2 Specification of sound pressure level
The sound pressure level is determined according to enveloping surface method with a reflecting surface (Q=2). 10 m clearance is related to the external dimensions of the unit.
For the sound pressure level the following correction values can be used:
Sound pressure level at 5 m: +5 dB to sound pressure level in 10 meters distance
Sound pressure level at 15 m: -3 dB to sound pressure level in 10 meters distance
Sound pressure level at 20 m: -6 dB to sound pressure level in 10 meters distance

NOTE!
Only an externally engaged acoustics engineer should carry out specific sound level calculations to be valid for your installation site.



Before you start setting up the unit's electrical connections, check the following:

- Before the electric connection is carried out, the unit has to charged with water or water/glycol mixture. Dry run of pumps should be by all means avoided!
- The properties of the mains power supply must comply with EN 60204-1 regulations and the power requirements of the unit.
- Voltage tolerance of mains power supply must not exceed tolerances ± 10% with a maximum phase difference of 3%. Do not operate the motors, if the voltage difference between the phases exceeds 3%, as this will invalidate the warranty. To check, use the following formula (see example).

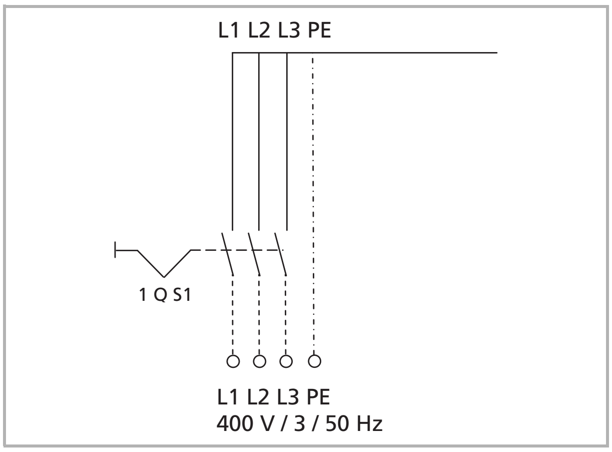
$$\text{Voltage imbalance } \Delta U_{max} = \frac{\text{max. voltage imbalance from average value}}{\text{average voltage } U_m} \times 100$$

EXAMPLE

	Input data		**⇨ Result**
Requirements Calculate and determine specific input data and measurements beforehand.	Rated voltage Voltage between phases	➔ 400 V/50 Hz/3 phases ➔ L1/L2 = 409 V; L2/L3 = 398 V; L1/L3 = 396 V	
1. Step Determine average voltage U_m	Average voltage	➔ $U_m = \frac{\Sigma U}{3}$ $\frac{(409 + 398 + 396)}{3} = 401\ V$	➔ **U_m = 401 V**
2. Step Determine maximum voltage imbalance ΔU_{max}	Voltage imbalance ΔU_{max} in %? U_{max} = 409 V U_m = 401 V	➔ $\Delta U_{max} = \frac{\text{max. voltage imbalnce}}{U_m} \times 100$ $\frac{(409 - 401)V}{401\ V} \times 100 = 2\ \%$	➔ **ΔU_{max} = 2 % ✓**

NOTE!
When connecting the supply voltage, make sure you observe the **clockwise rotation direction**!If the rotation direction is wrong, change the phases at the main power supply of the unit. Change the phase sequence of the power supply line by others – never change the wiring in the unit control cabinet.

Connecting power supply using main isolator of unit



GLWC(H) 1130-4960 CA2
GLWC 1130-4840 CA2
GLWH 1130-4960 CA2

Fig. 18: GLWC/H mains isolator

Integrating common fault signal

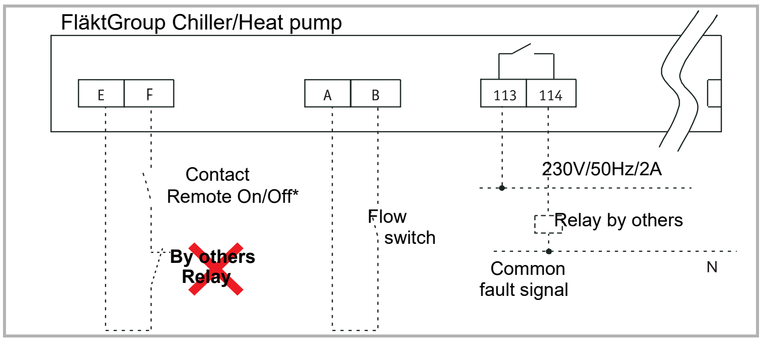


Fig. 19: *Electric integration of fault signal*

Terminals: *A - B:* *Connecting flow switch by others*
E - F: *Remote contact for switching the unit off and on via NO contact by others*
113 - 114: *Common fault signal (voltage by others max. 230 V AC/50 Hz/2 A)*

EQUIPMENT DAMAGE!

Do **not** open the remote on/off contact, e.g. via the changeover contact of the relay by others, if the system is faulty.

- In such a way the fault can be reset.
- The cause of the malfunction cannot be determined.
- The entire unit stops operating although it is possible that only one refrigeration circuit is affected.

Integrating flow switch

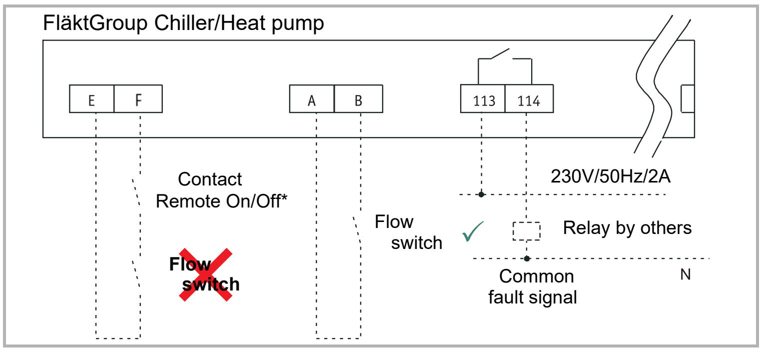


Fig. 20: *Electrical integration of flow switch*

Terminals: *A - B:* *Connecting the flow switch by others*
E - F: *Remote contact for switching the unit off and on via NO contact by others*
113 - 114: *Common fault signal (voltage by others max. 230 V AC/50 Hz/2 A)*

EQUIPMENT DAMAGE!

Do **not** use the flow switch to switch the remote On/Off contact.

Connect the flow switch to terminals A-B in the chiller's control cabinet. The flow switch acts as a safety device and not as a regular switching device for the unit.

NOTE!

Under all circumstances remember to install an additional flow switch at chilled water outlet of the unit and connect it to terminals A-B in the control cabinet of the unit. The additional flow switch can be optionally ordered and is a requirement for safe and trouble-free operation of the unit and in such a way this requirement constitutes an integral part for the validity of the guarantee.

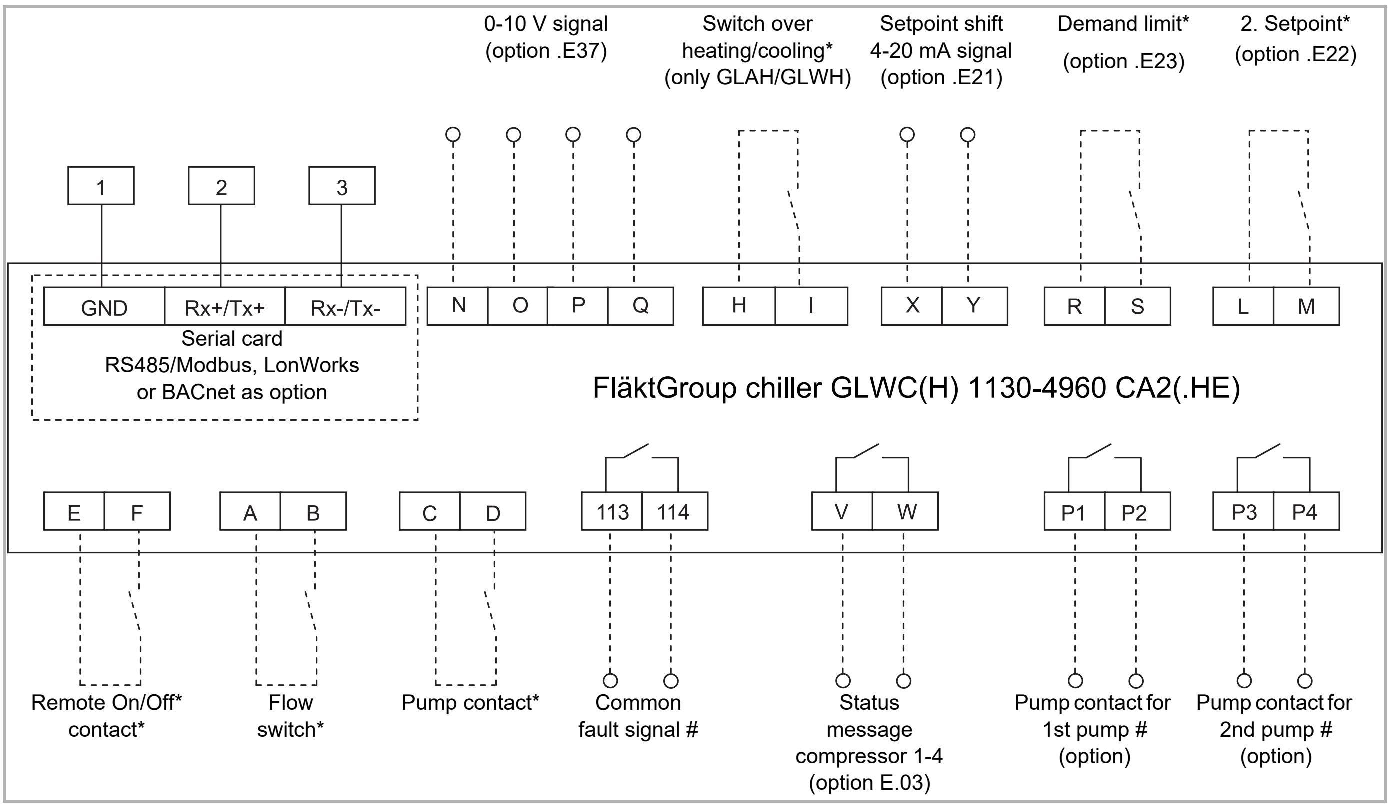


Fig. 21: Electrical integration GLWC(H) 1130-4960 CA2(.HE)

Drawings legend:

Terminals:	*A - B:*	*Connecting flow switch by others (requirement for validity of guarantee)*
	E - F:	*Remote contact for switching the machine off and on via the NO contact by others*
	C - D:	*Pump contact (normally open contact of load contactor of the chilled water pump by others)*
	P1 - P2:	*Relay for controlling water pump by others (option)*
	P3 - P4:	*Relay for controlling an additional water pump by others (consider selected option)*
	X - Y:	*Setpoint shift via 4-20 mA signal (option .E21) (Terminal designation of X-Y is 010-011 or 019-020; refer to order-related wiring diagram)*
	L - M:	*Activation of 2nd setpoint (option .E22)*
	R - S:	*Demand limit command, capacity limitation via NC contact by others (option .E23)[1)]*
	H - I:	*Switch-over contact heating / cooling (contact open: heating, contact close: cooling) -> (only GLAC/GLWH)*
	N-O-P-Q	*0-10 Volt signal control, also see page 56 (option .E37)*
	113 - 114:	*Common fault signal*
	V - W	*consider exact terminal designation of the operation messages depending on number of compressors:*
	109 - 110:	*Operation message compressor 1 (from capacity stage 1130 up to max. 2600) (option .E03)*
	111 - 112:	*Operation message compressor 2 (from capacity stage 2280 up to max. 2600) (option .E03)*
	115 - 116:	*Operation message compressor 1 (from capacity stage 3630 up to max. 3900) (option .E03)*
	117 - 118:	*Operation message compressor 2 (from capacity stage 3630 up to max. 3900) (option .E03)*
	119 - 120:	*Operation message compressor 3 (from capacity stage 3630 up to max. 3900) (option .E03)*
	121 - 122:	*Operation message compressor 4 (from capacity stage 4900 up to max. 4960) (option .E03)*
	1 - 2 - 3:	*Connection to serial card (option)[2)]*
	- - - - - - -	*Cabling by others*
	#	*potential by others necessary max. 230 V / 50 Hz / 2 A)*
	***	*potential may not be supplied by others (supplied by controller)*

1) Reduction of refrigeration capacity (demand limit switch) and electrical power consumption by opening a volt free dry contact by others
2) The serial card is required to link the chiller to a building management system or for communication with a master/slave control sequencer.

NOTE!

In order to switch from heating into cooling mode or the other round, the romote contact for switch on and off of the unit has be opened. After that, the unit operating mode has to be changed by opening or closing the contact. Then, the remote contact for switch on and off of the unit can be closed again and the unit will start its operation. Please consider the operating limits of the unit. Switching over e.g. from heating to cooling mode at increased water temperatures can lead to faults and disruptions.

GLWC/H #### CA2

Capacity stage	1130	1140	2320	2360	2420	2450	2480
	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Capacity stage	**2540**	**2600**	**3810**	**3900**	**4900**	**4960**	**-**
	N/A	N/A	N/A	N/A	N/A	N/A	-

Tab. 20: Anti-vibration isolators basic unit

GLWC #### CA2.HE

Capacity stage	1130	1140	1160	1180	1210	1240
	N/A	N/A	N/A	N/A	N/A	N/A
Capacity stage	**2280**	**2320**	**2360**	**2420**	**2480**	**2540**
	N/A	N/A	N/A	N/A	N/A	N/A
Capacity stage	**4720**	**4780**	**4840**	**-**	**-**	**-**
	N/A	N/A	N/A	-	-	-

Tab. 21: Anti-vibration isolators HE unit

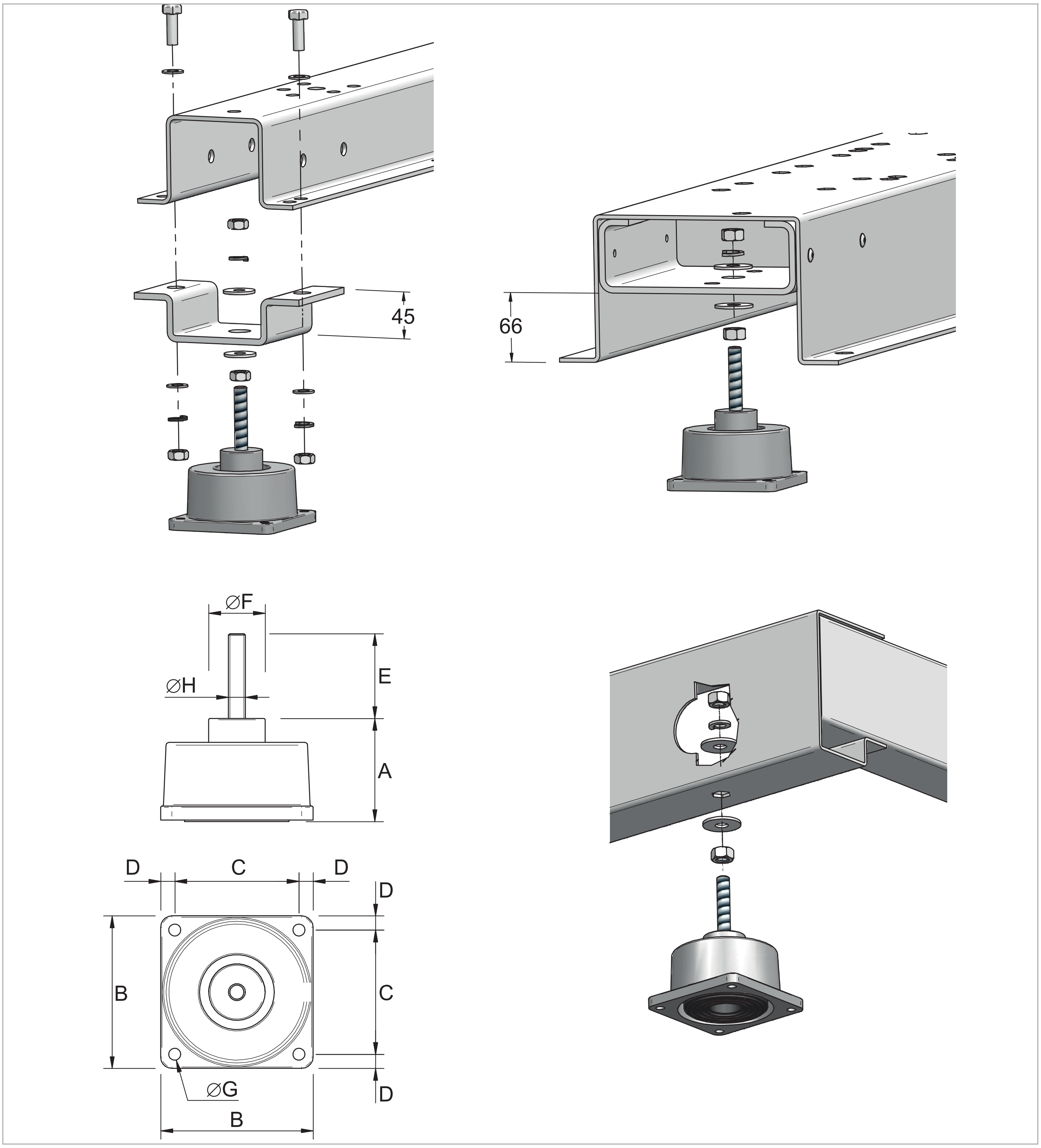


Fig. 22: Installation of anti-vibration isolators

Type	A	B	C	D	E	ØF	ØG	ØH
FZ 100-51	56	80	67	6,5	60	25	6,5	M12
FZ 200-51	72	108	90	9	60	40	8,5	M12
FZ 200-57	72	108	90	9	60	60	8,5	M12
FZ 400-51	95	155	125	15	60	65	12,5	M14
FZ 400-57	95	155	125	15	60	70	12,5	M16
FZ 600-51	95	175	140	17.5	60	75	14	M18
FZ 1600-57	95	175	140	17.5	60	100	14	M20
FZ 1500-57	95	205	162	21.5	60	80	16	M20

Tab. 22 Size in mm

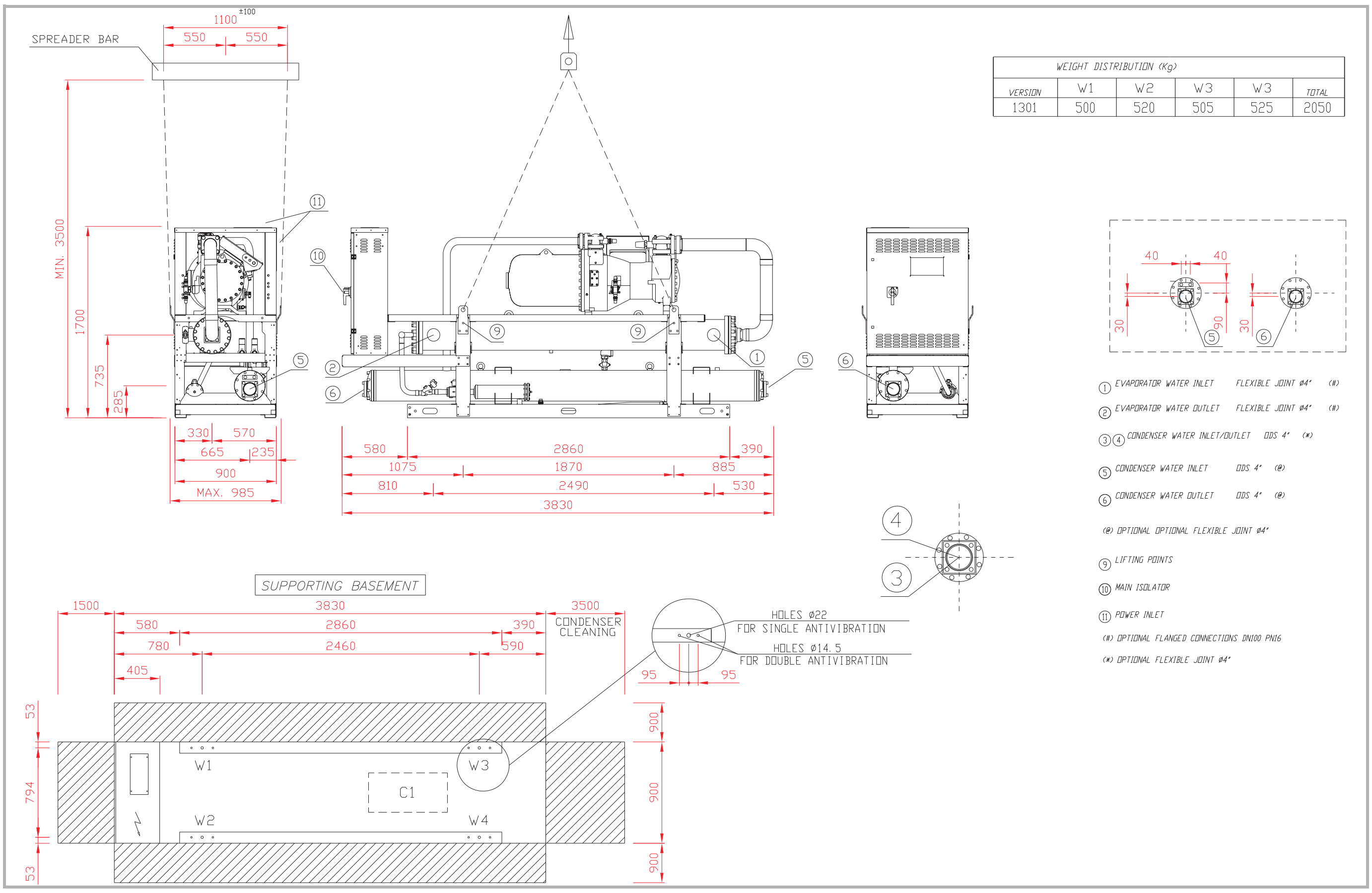


Fig. 23: D9C37401-1 – GLWC(H) 1130 CA2

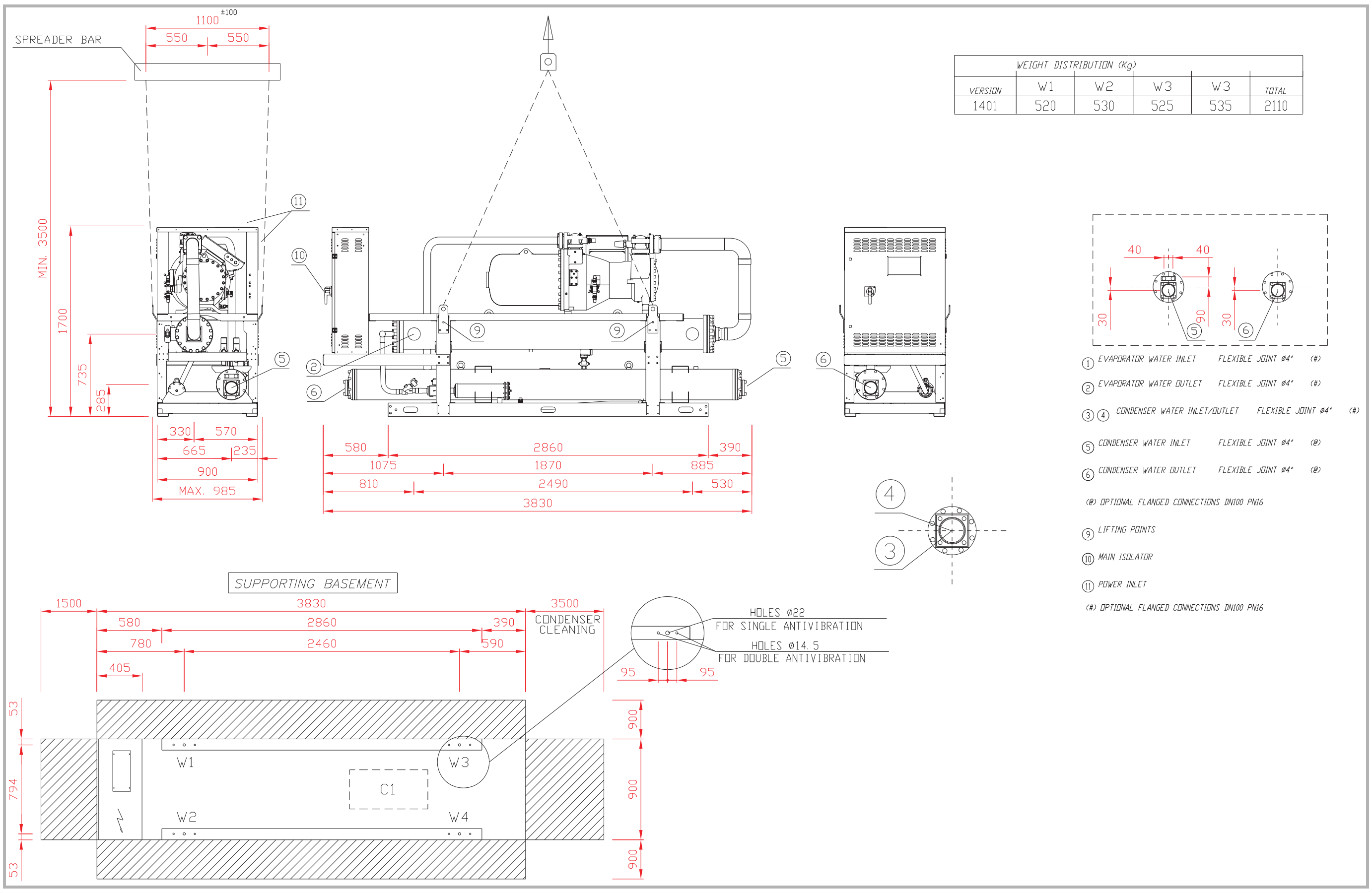


Fig. 24: D9C40401-1 – GLWC(H) 1140 CA2

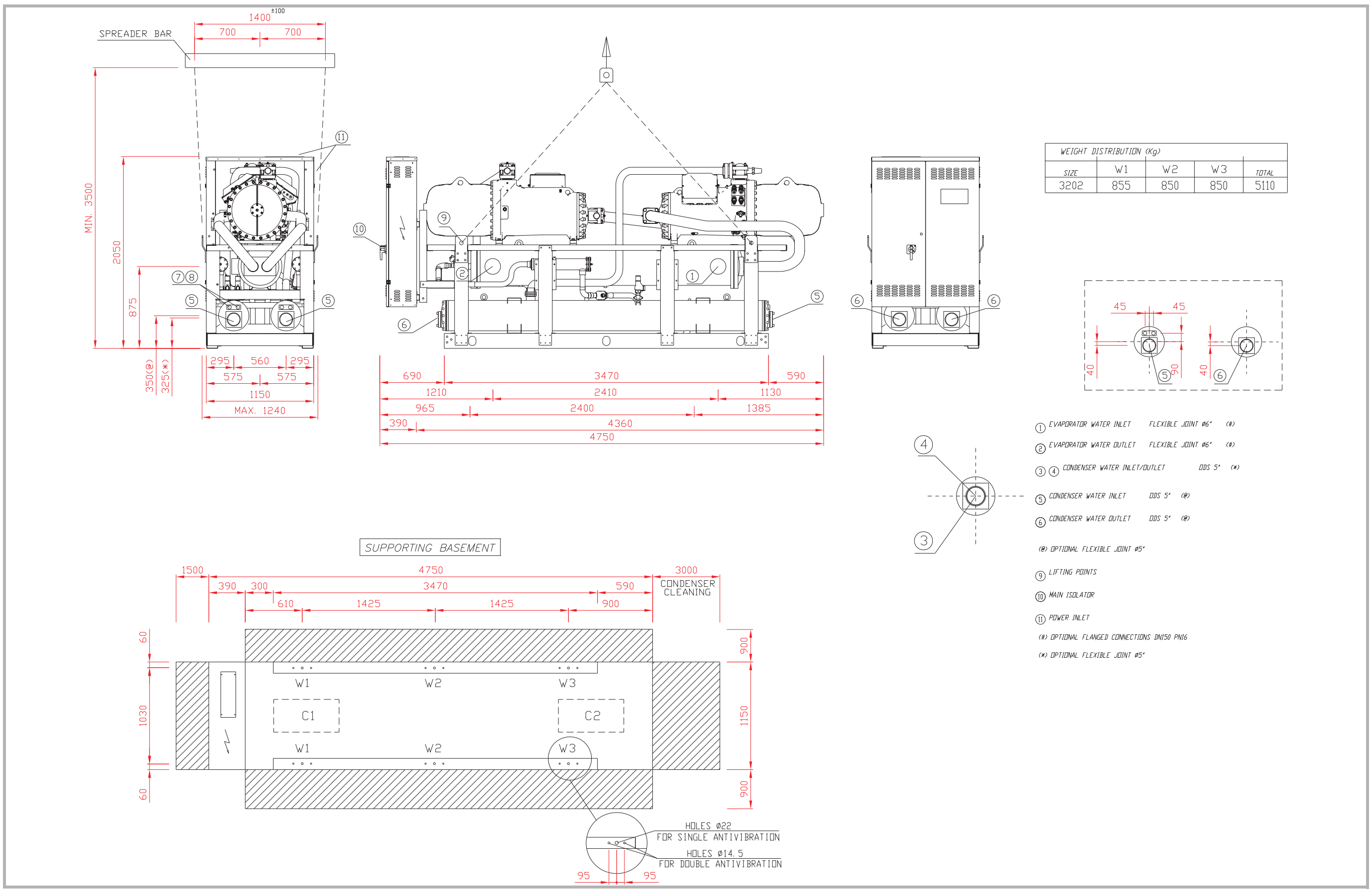


Fig. 25: D9C69401-1 – GLWC(H) 2320 CA2

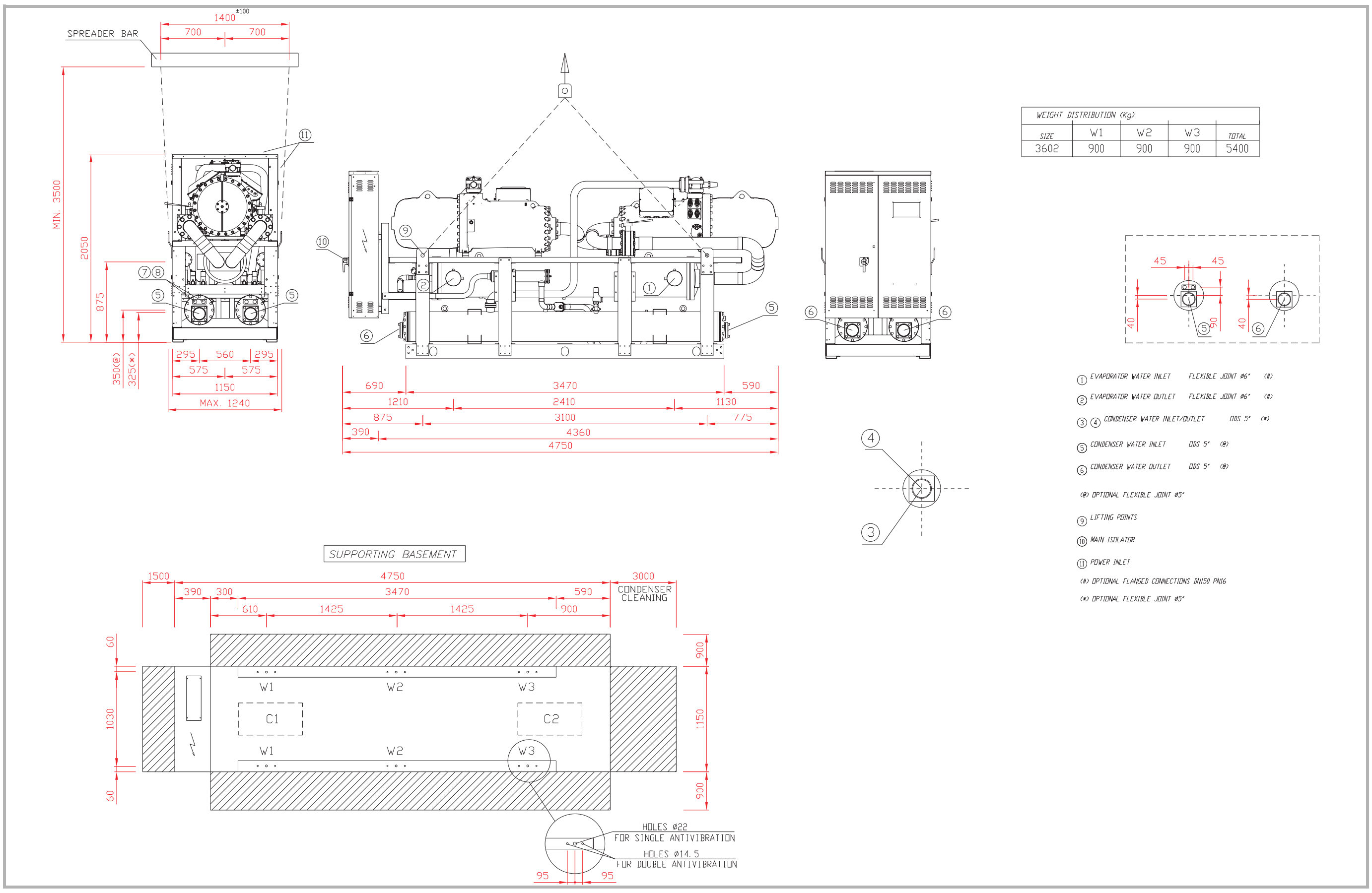


Fig. 26: D9C73401-1 – GLWC(H) 2360 CA2

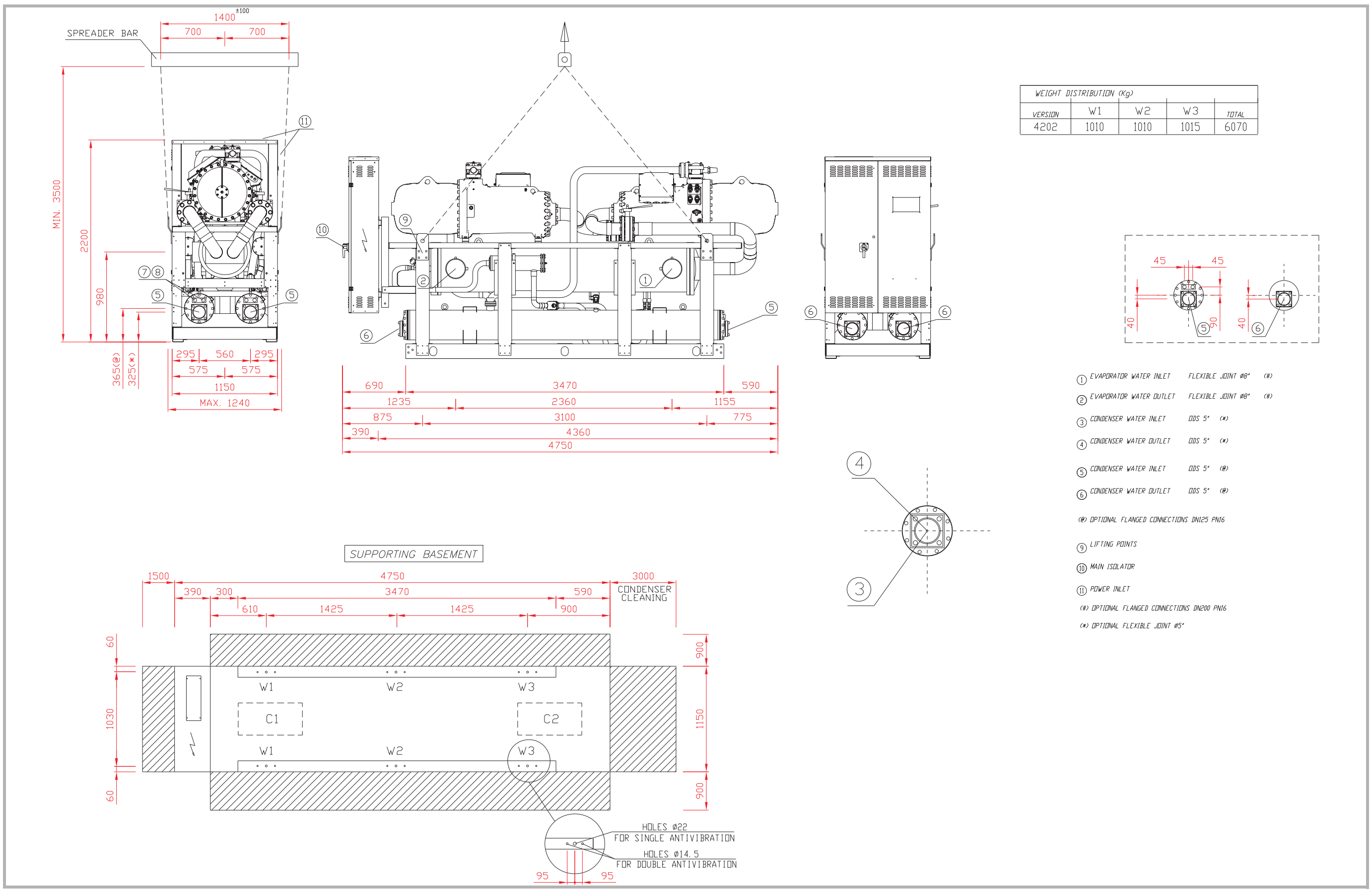


Fig. 27: D9C78401-0 – GLWC(H) 2420 CA2

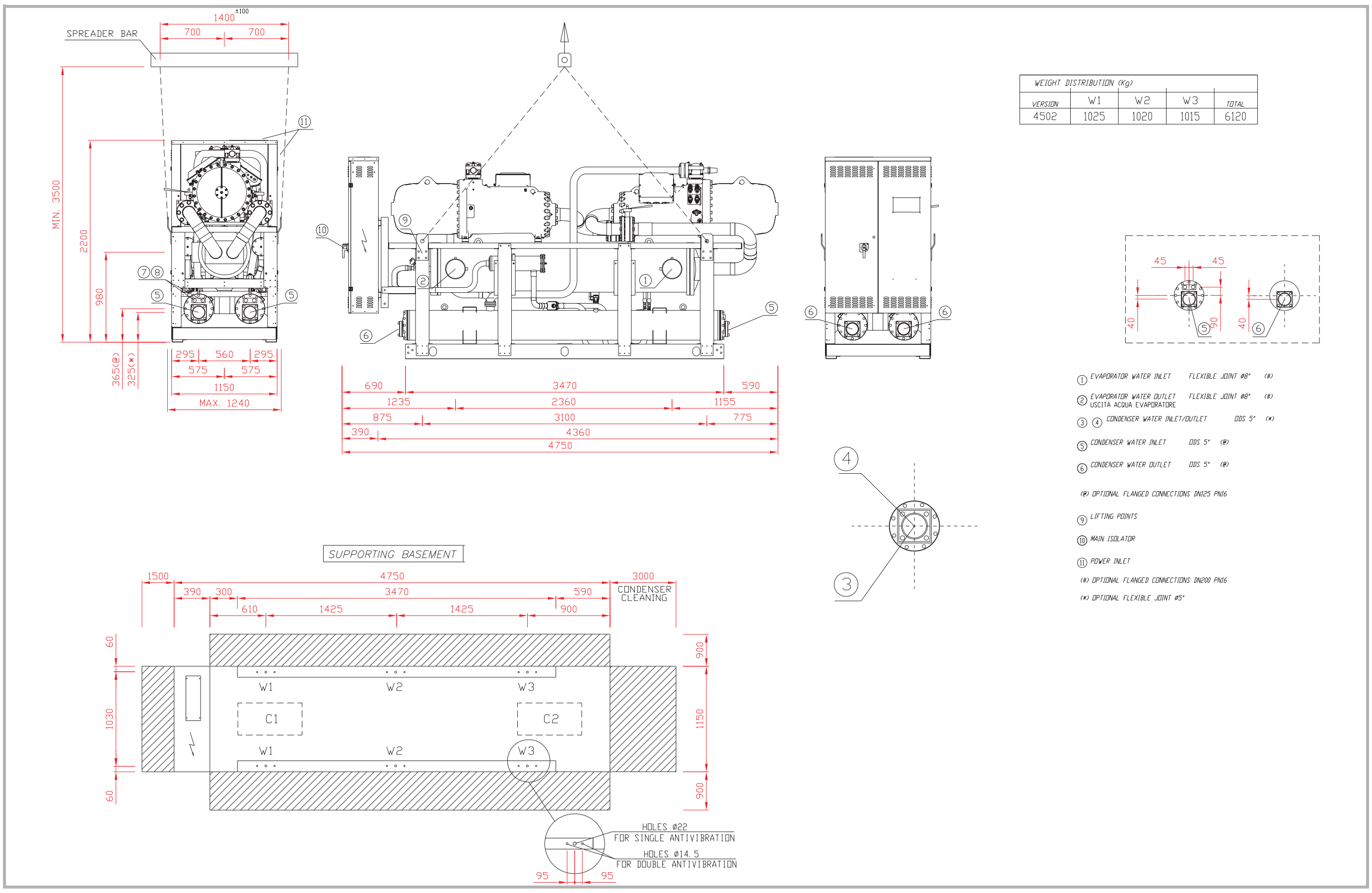


Fig. 28: D9C79401-0 – GLWC(H) 2450 CA2

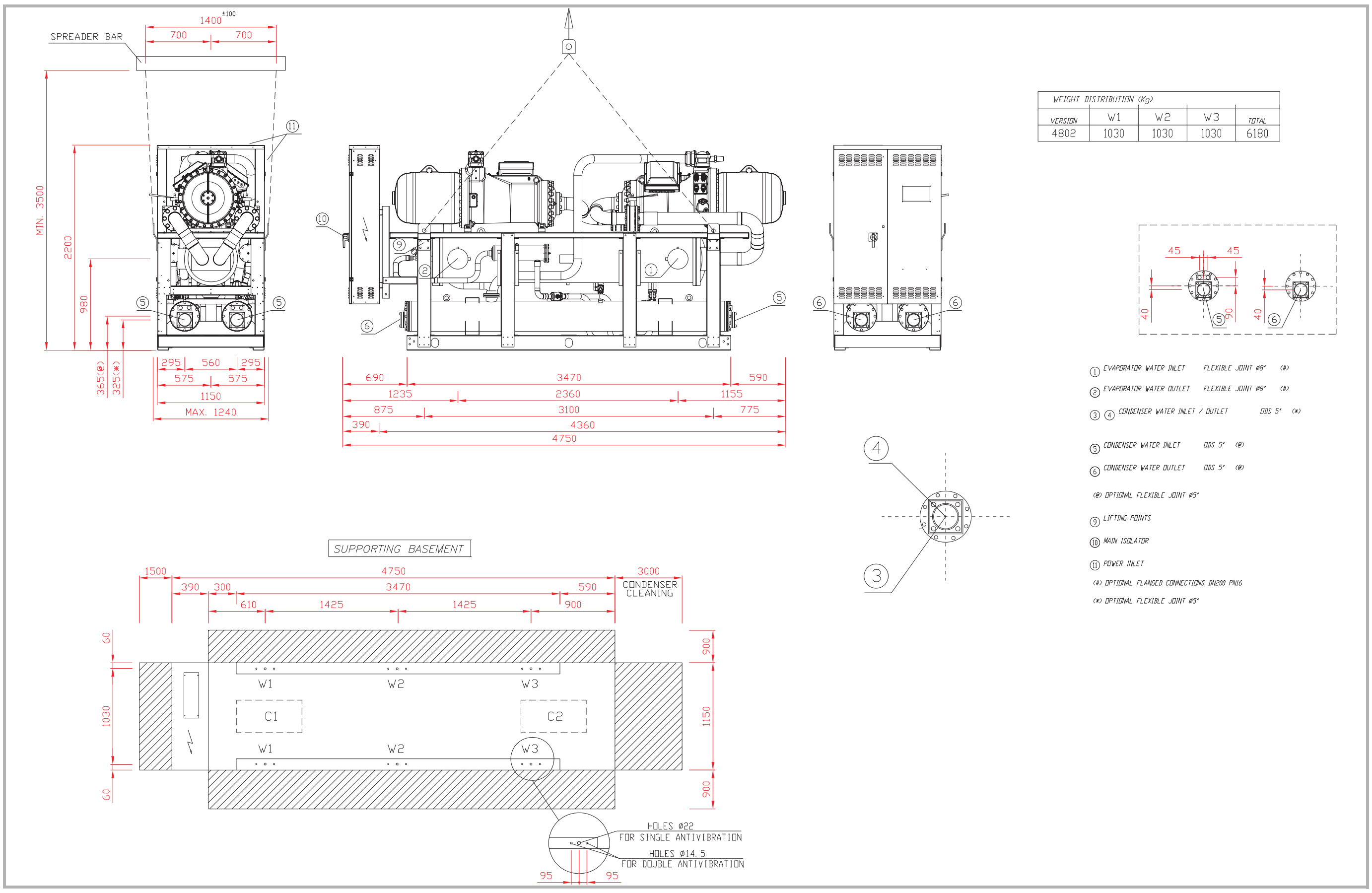


Fig. 29: D9C81401-0 – GLWC(H) 2480 CA2

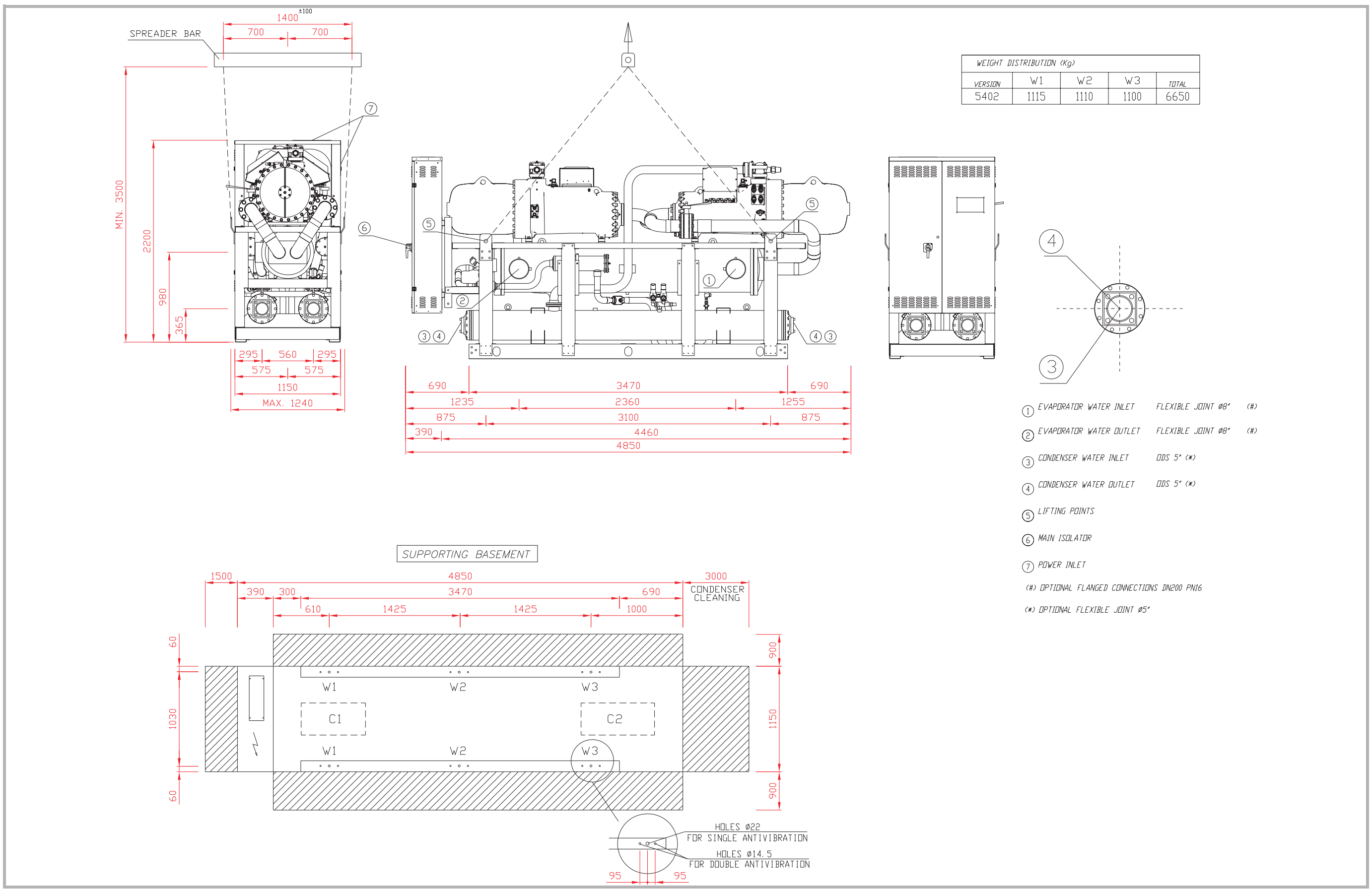


Fig. 30: D9C84401-0 – GLWC(H) 2540 CA2

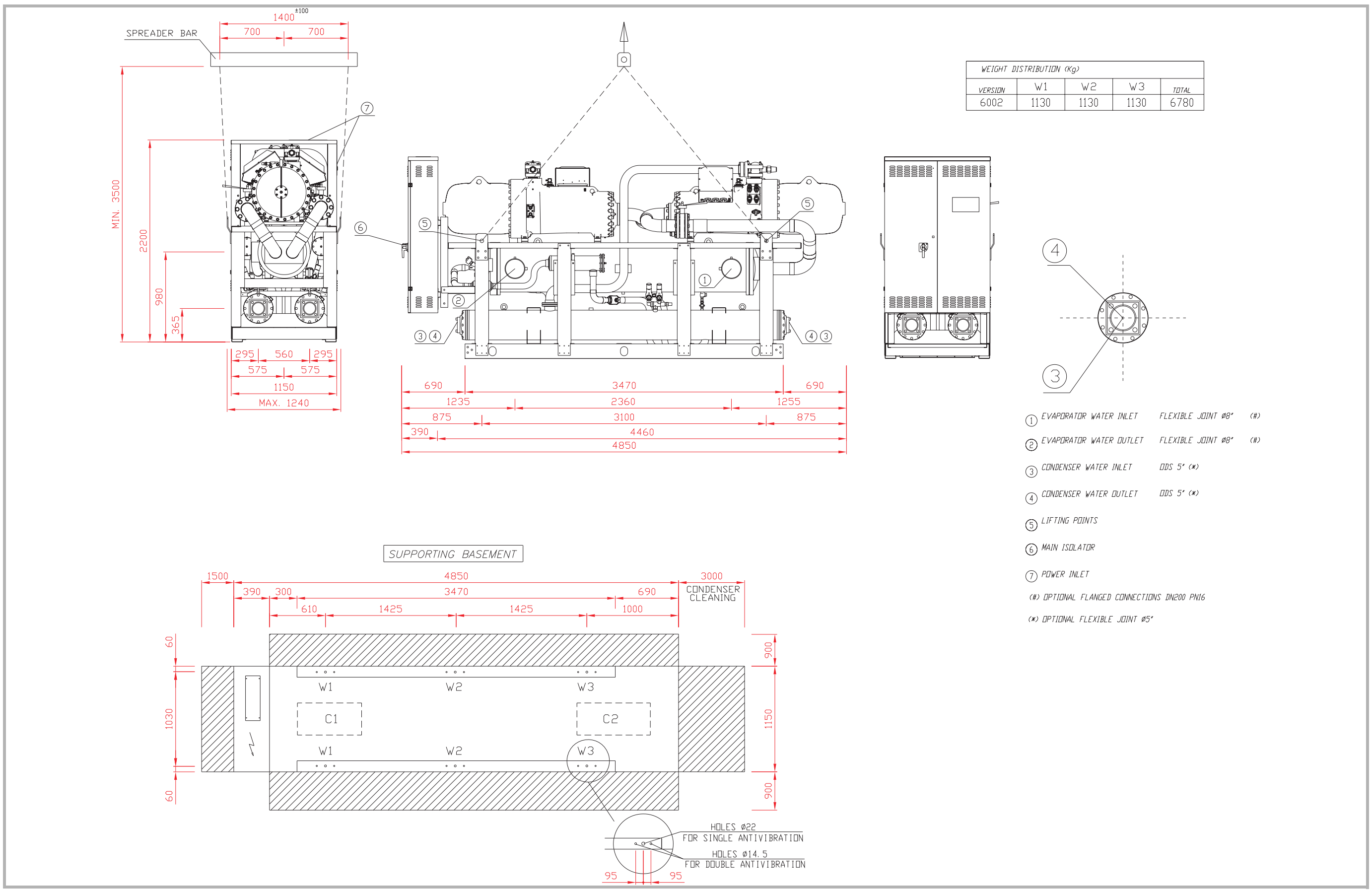


Fig. 31: D9C85401-0 – GLWC(H) 2600 CA2

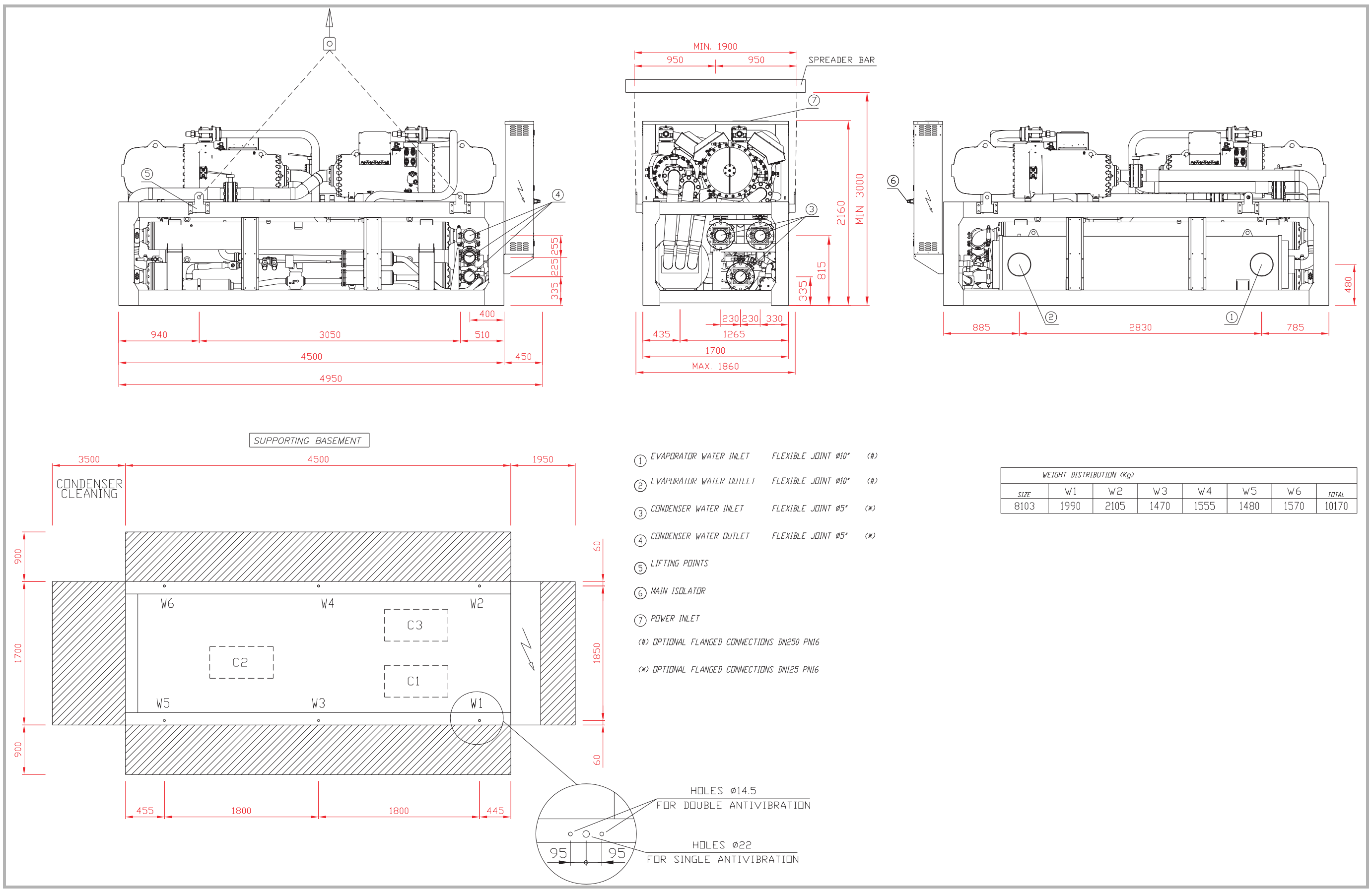
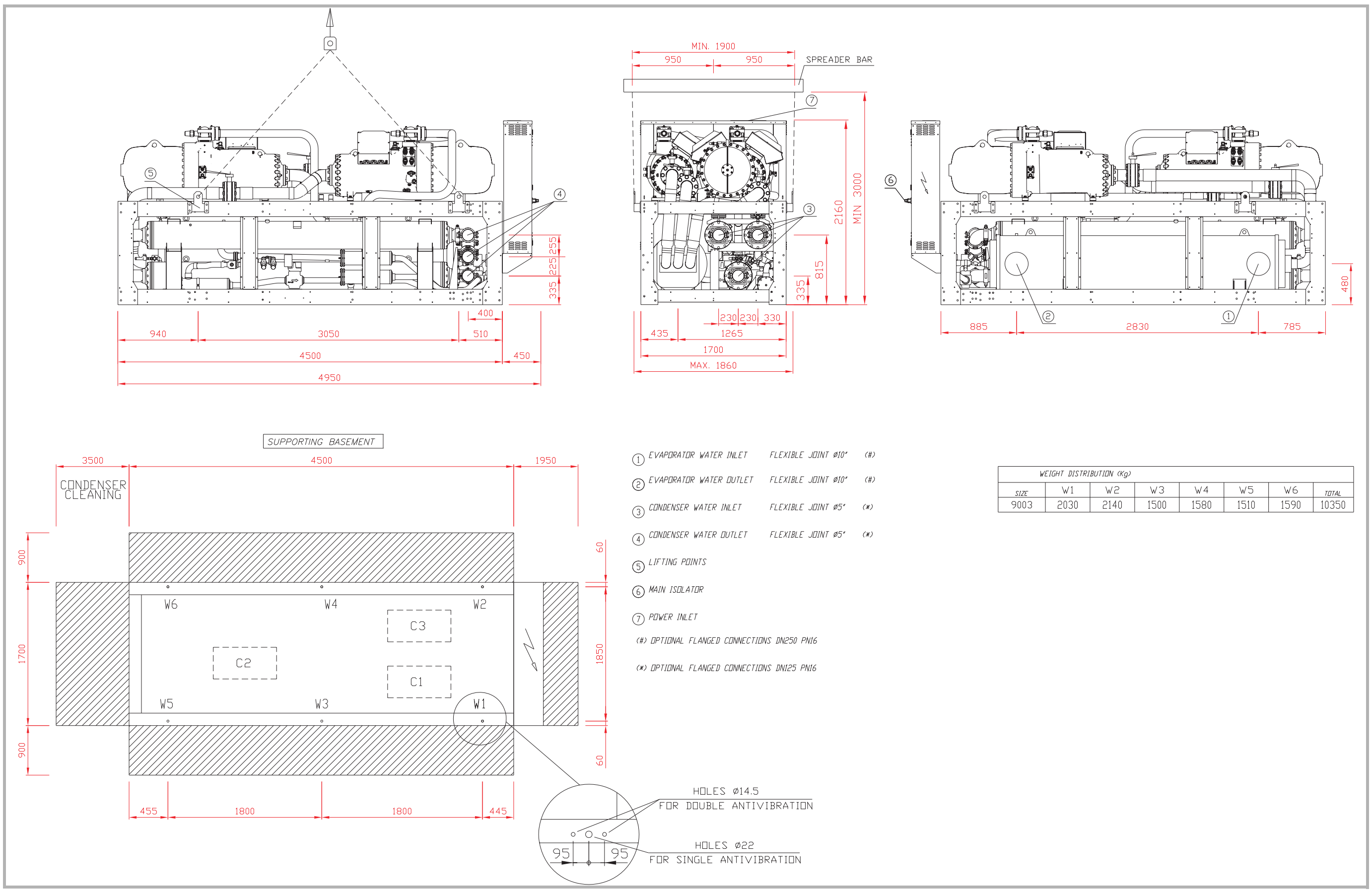


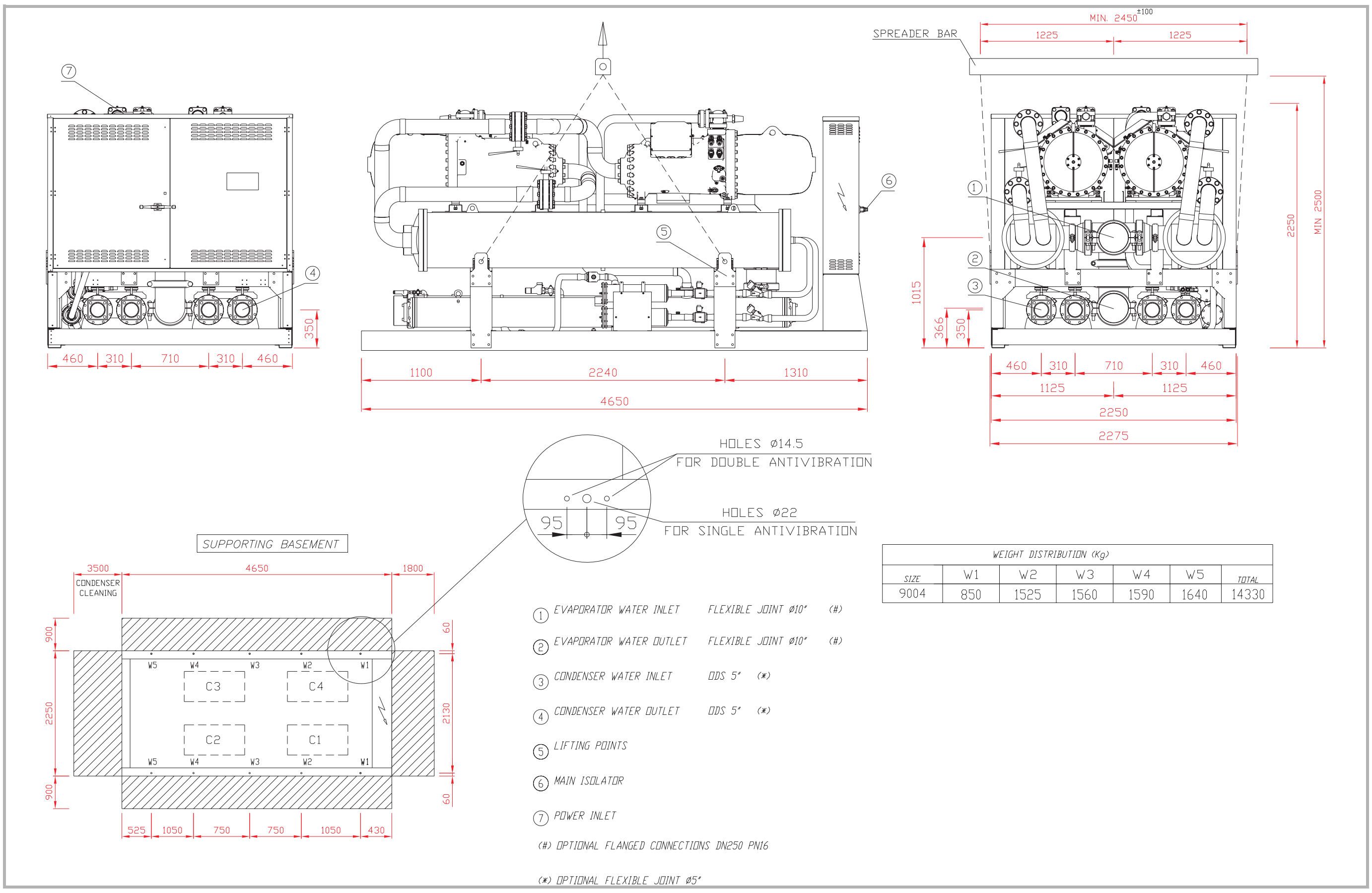
Fig. 32: D9C95401-1 – GLWC(H) 3810 CA2



WEIGHT DISTRIBUTION (Kg)

SIZE	W1	W2	W3	W4	W5	W6	TOTAL
9003	2030	2140	1500	1580	1510	1590	10350

Fig. 33: D9C97401-0 – GLWC(H) 3900 CA2



WEIGHT DISTRIBUTION (Kg)

SIZE	W1	W2	W3	W4	W5	TOTAL
9004	850	1525	1560	1590	1640	14330

Fig. 34: D9C98401-1 – GLWC(H) 4900 CA2

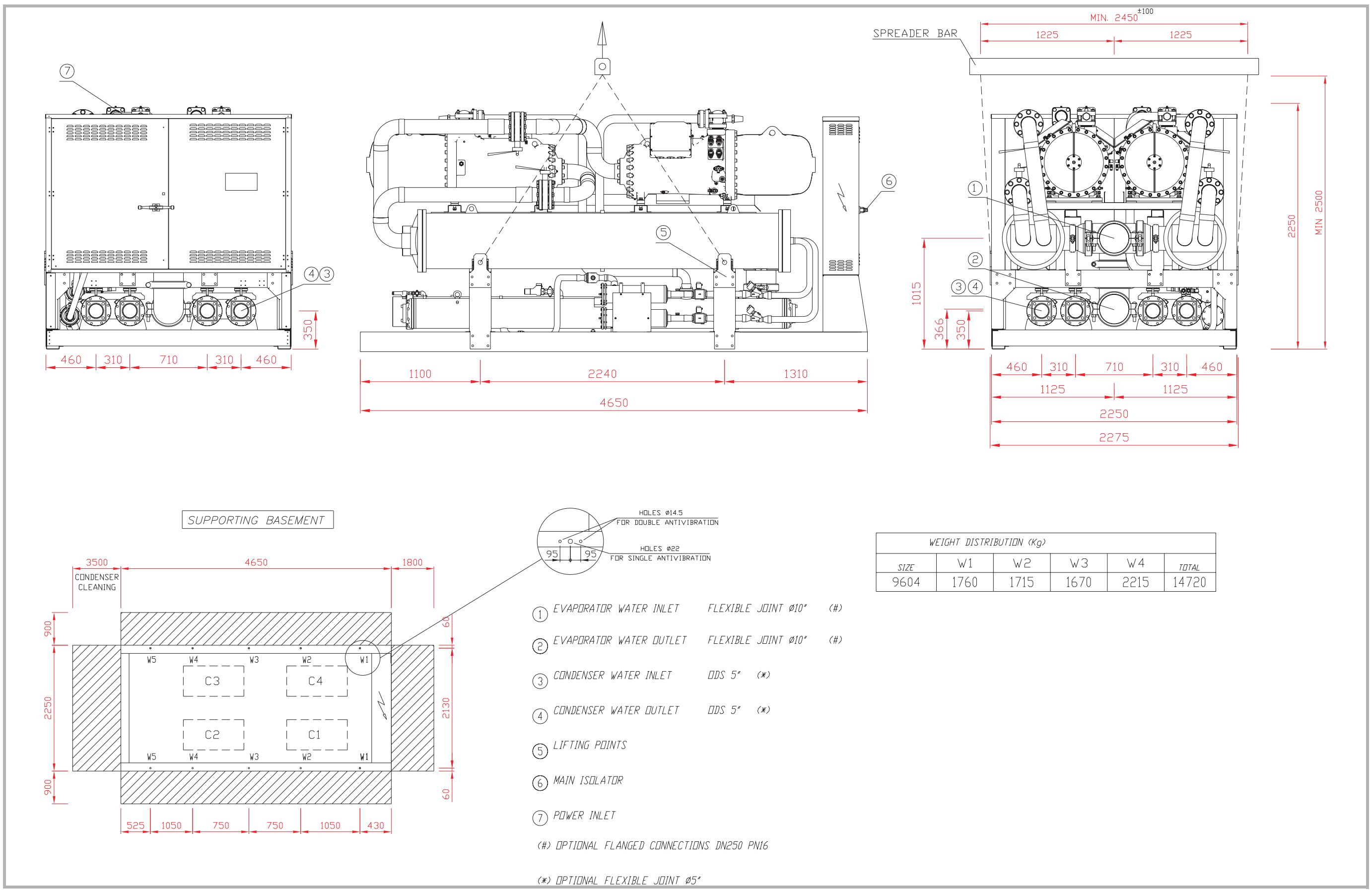


Fig. 35: D9C99401-1 – GLWC(H) 4960 CA2

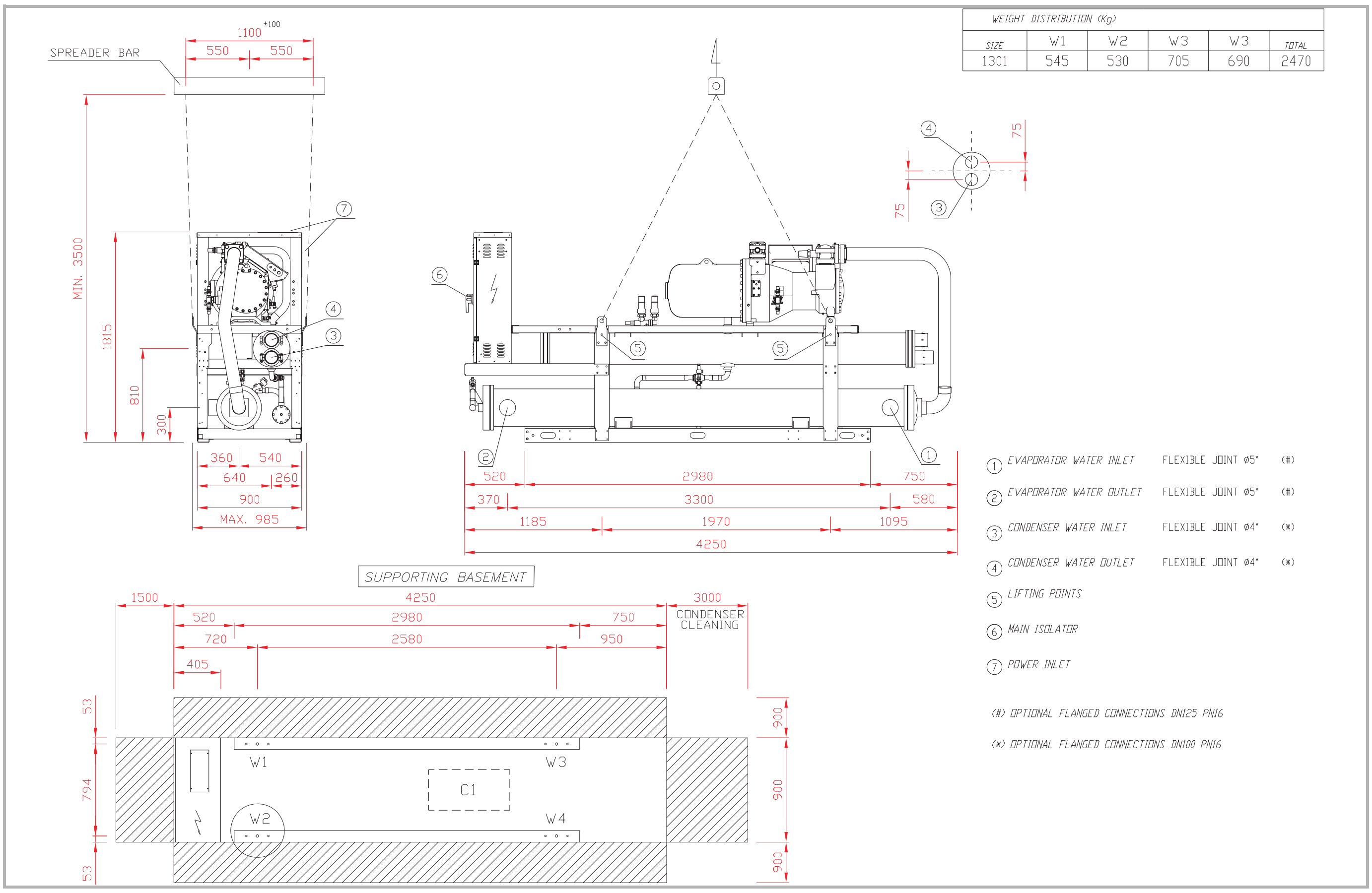


Fig. 36: D9C37501-0 – GLWC 1130 CA2.HE

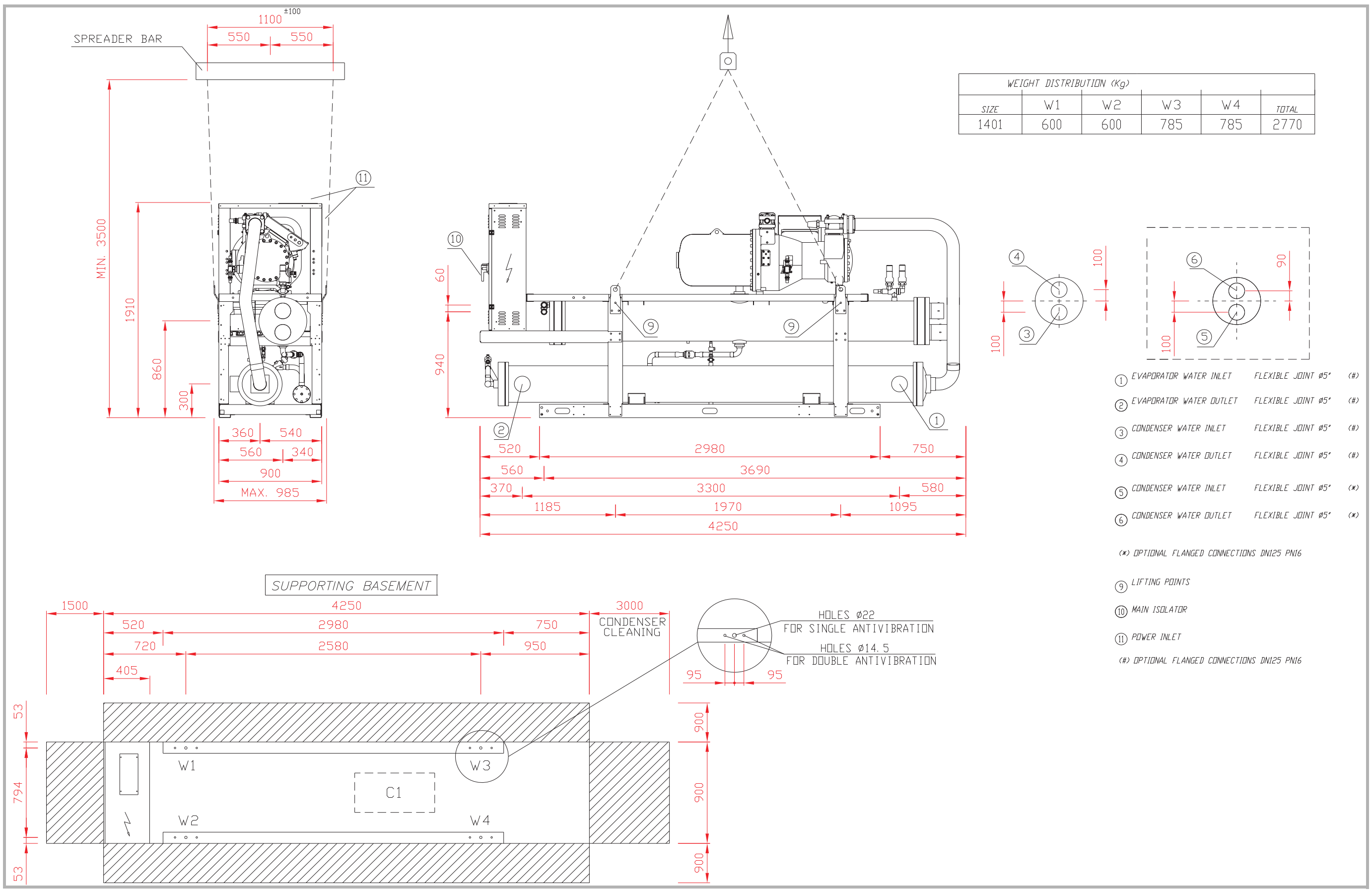


Fig. 37: D9C40501-1 – GLWC 1140 CA2.HE

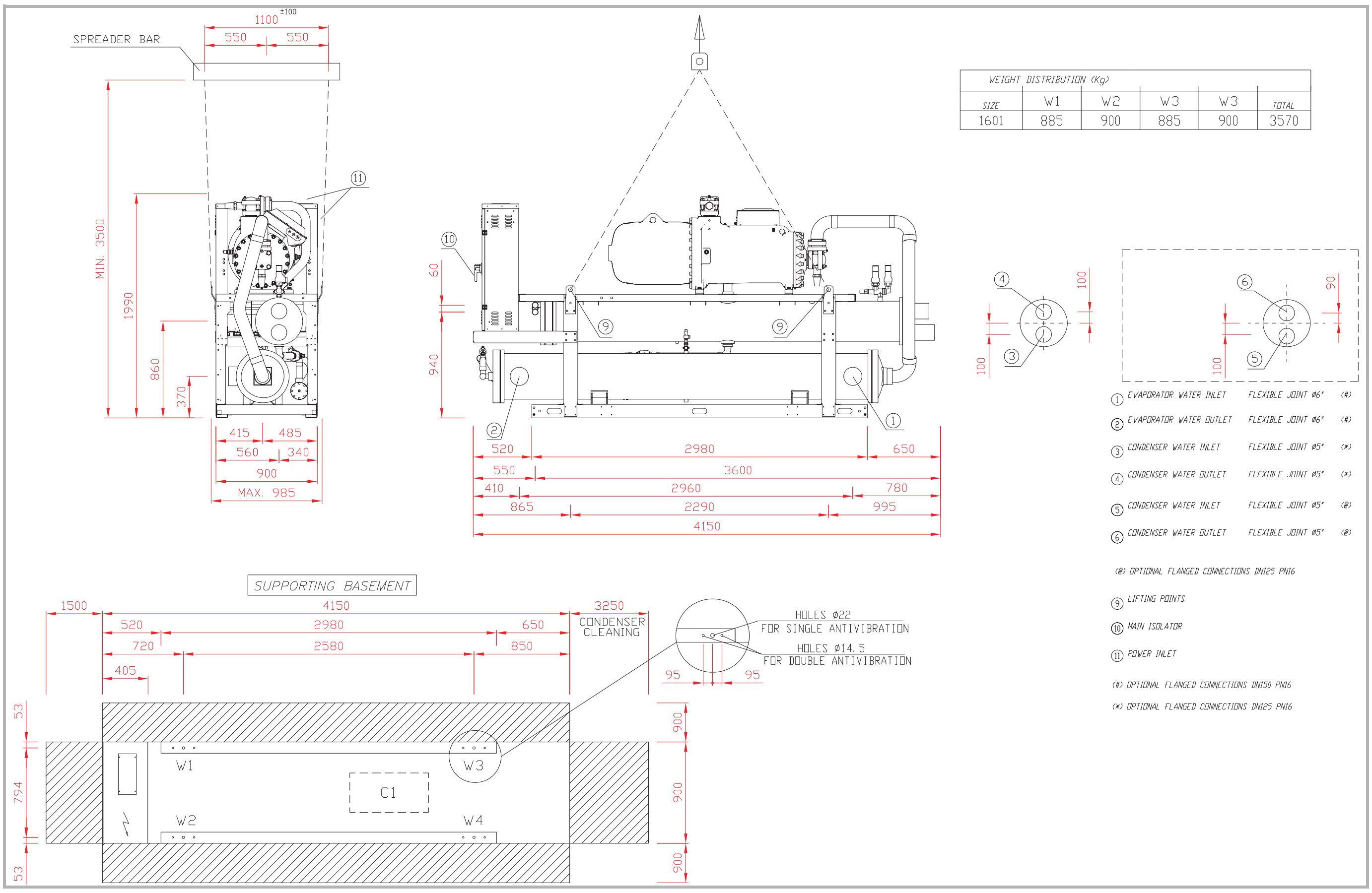


Fig. 38: D9C48501-1 – GLWC 1160 CA2.HE

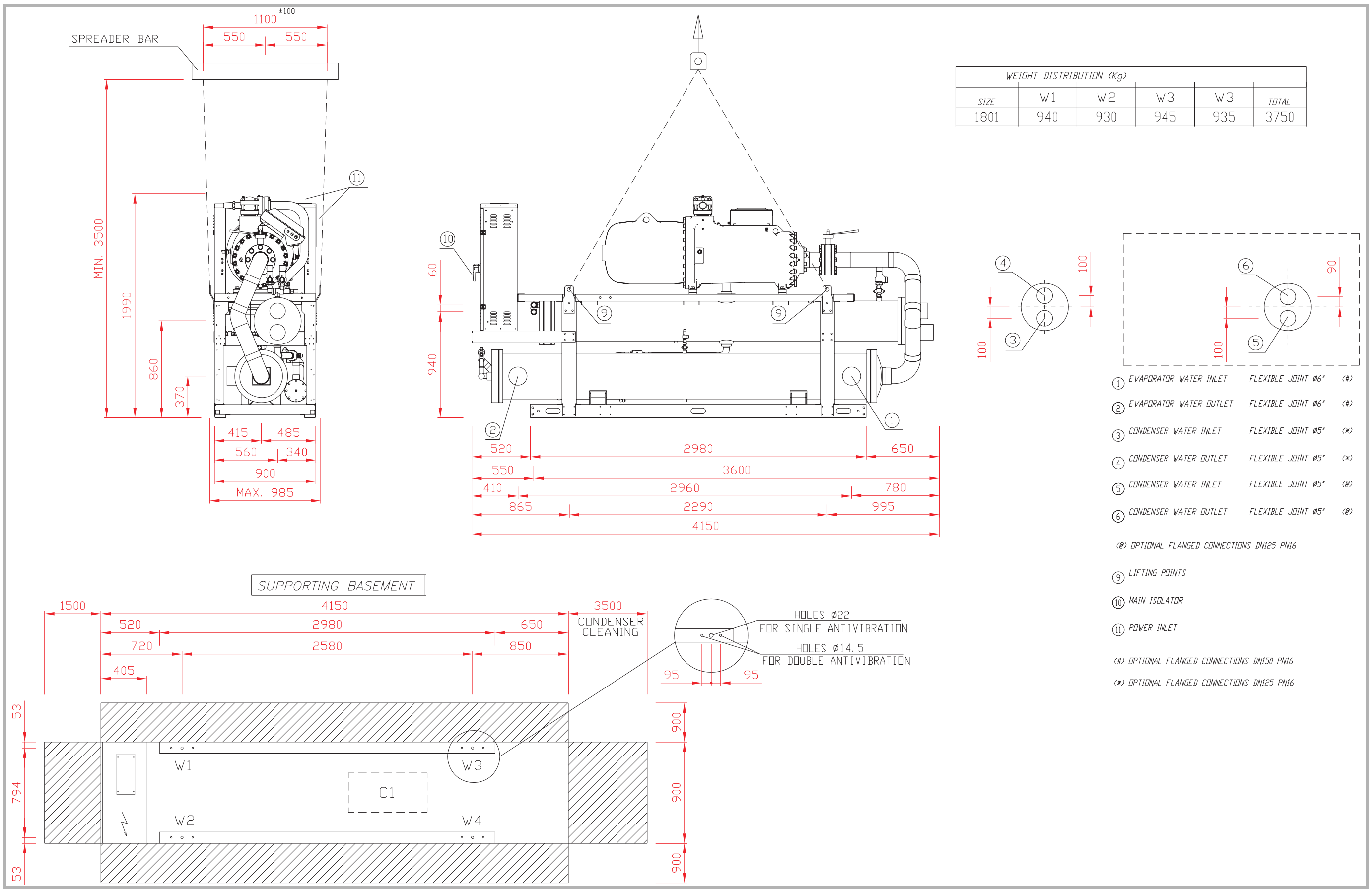


Fig. 39: D9C54501-1 – GLWC 1180 CA2.HE

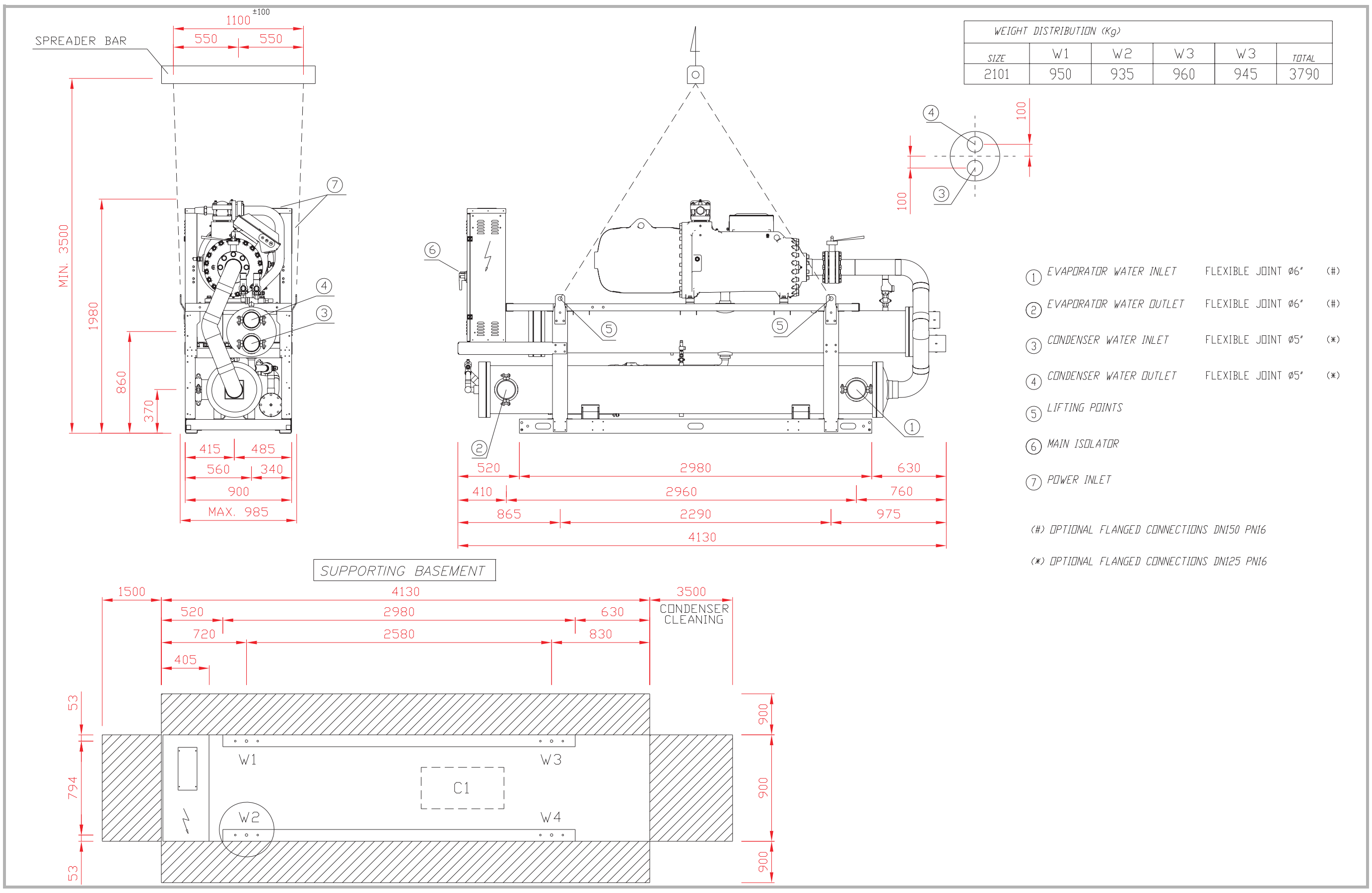
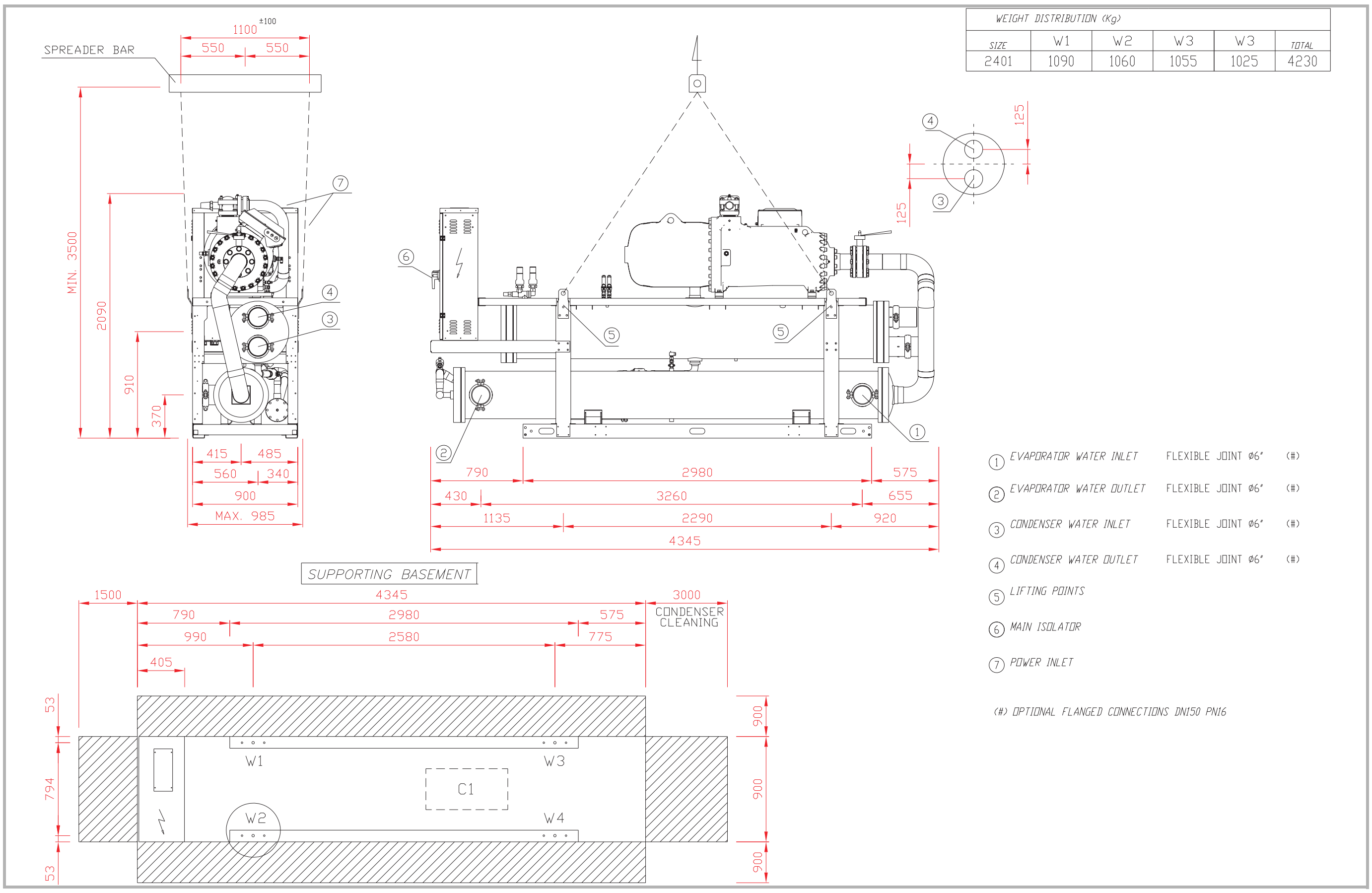


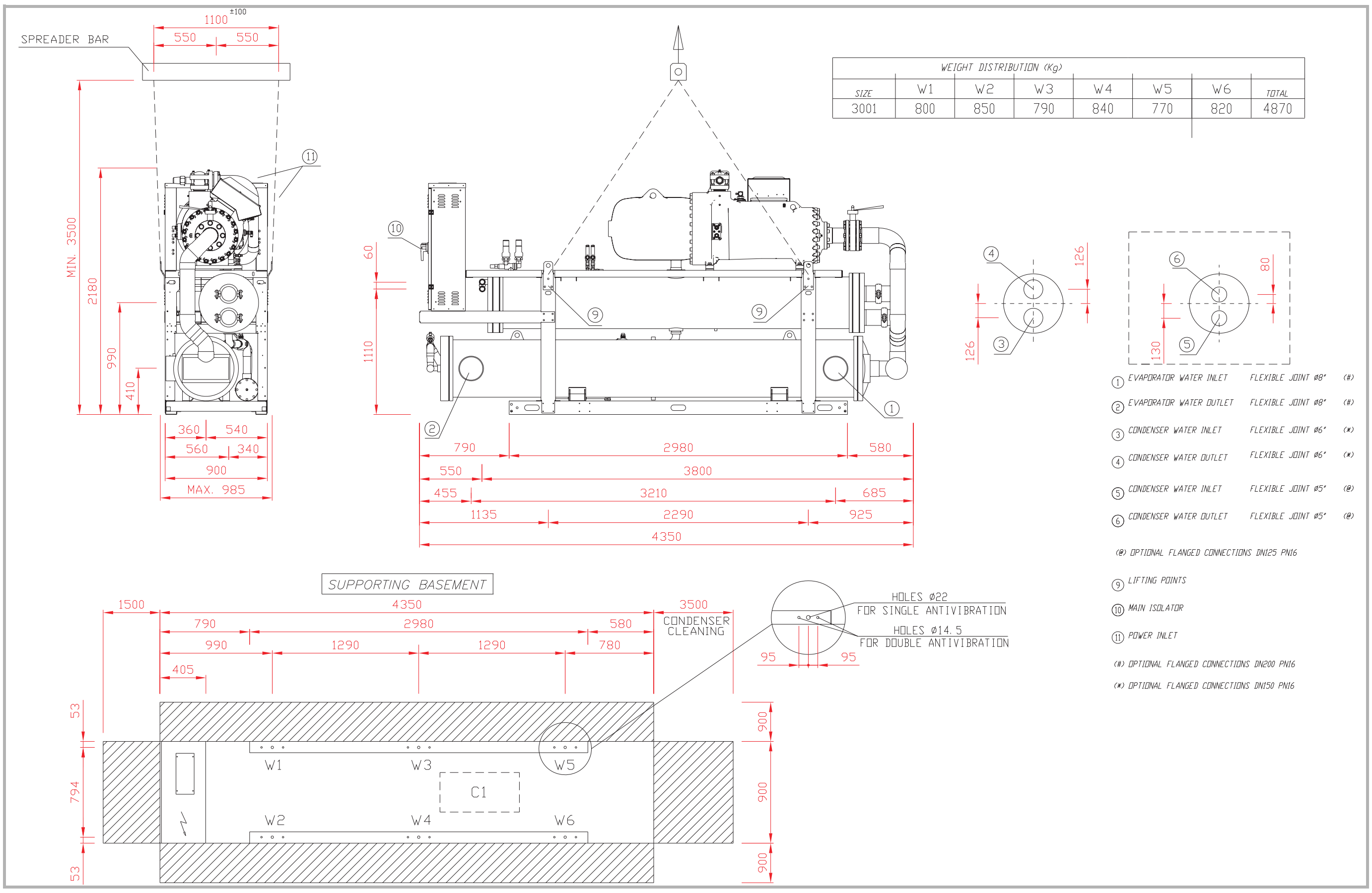
Fig. 40: D9C59501-0 – GLWC 1210 CA2.HE



WEIGHT DISTRIBUTION (Kg)

SIZE	W1	W2	W3	W3	TOTAL
2401	1090	1060	1055	1025	4230

Fig. 41: D9C61501-0 – GLWC 1240 CA2.HE



WEIGHT DISTRIBUTION (Kg)

SIZE	W1	W2	W3	W4	W5	W6	TOTAL
3001	800	850	790	840	770	820	4870

Fig. 42: D9C64501-0 – GLWC 1300 CA2.HE

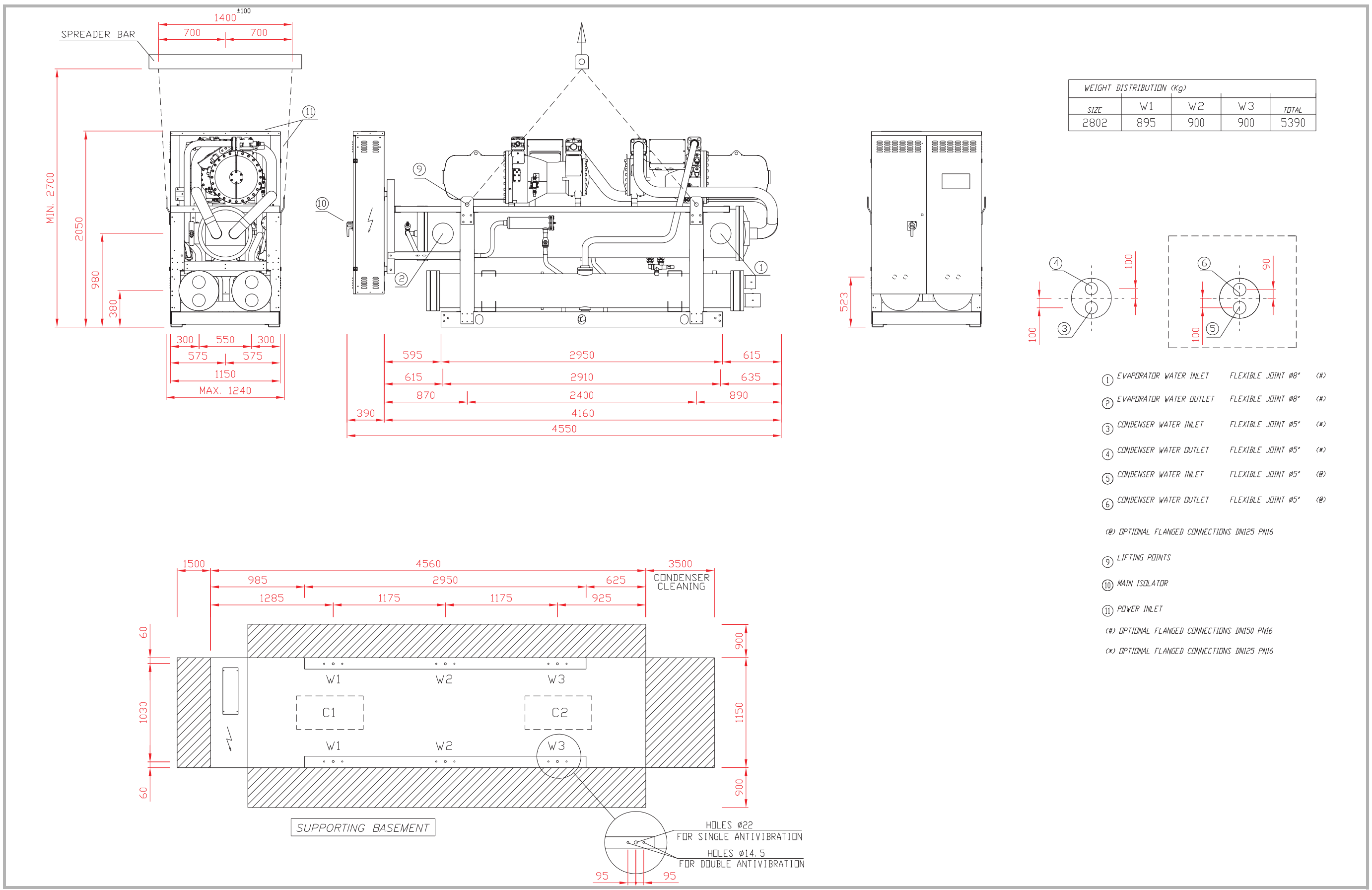


Fig. 43: D9C65501-2 – GLWC 2280 CA2.HE

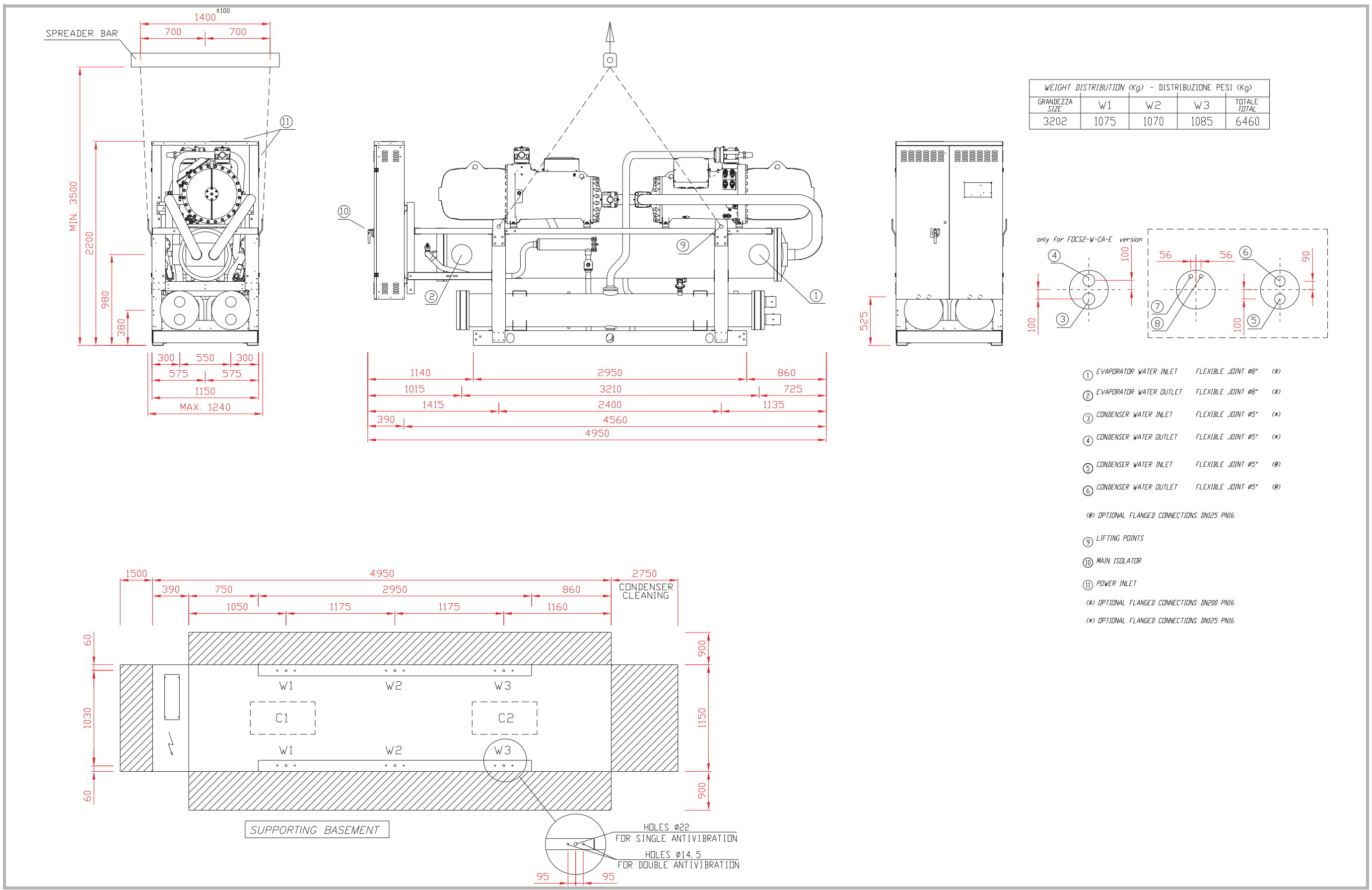


Fig. 44: D9C69501-2 – GLWC 2320 CA2.HE

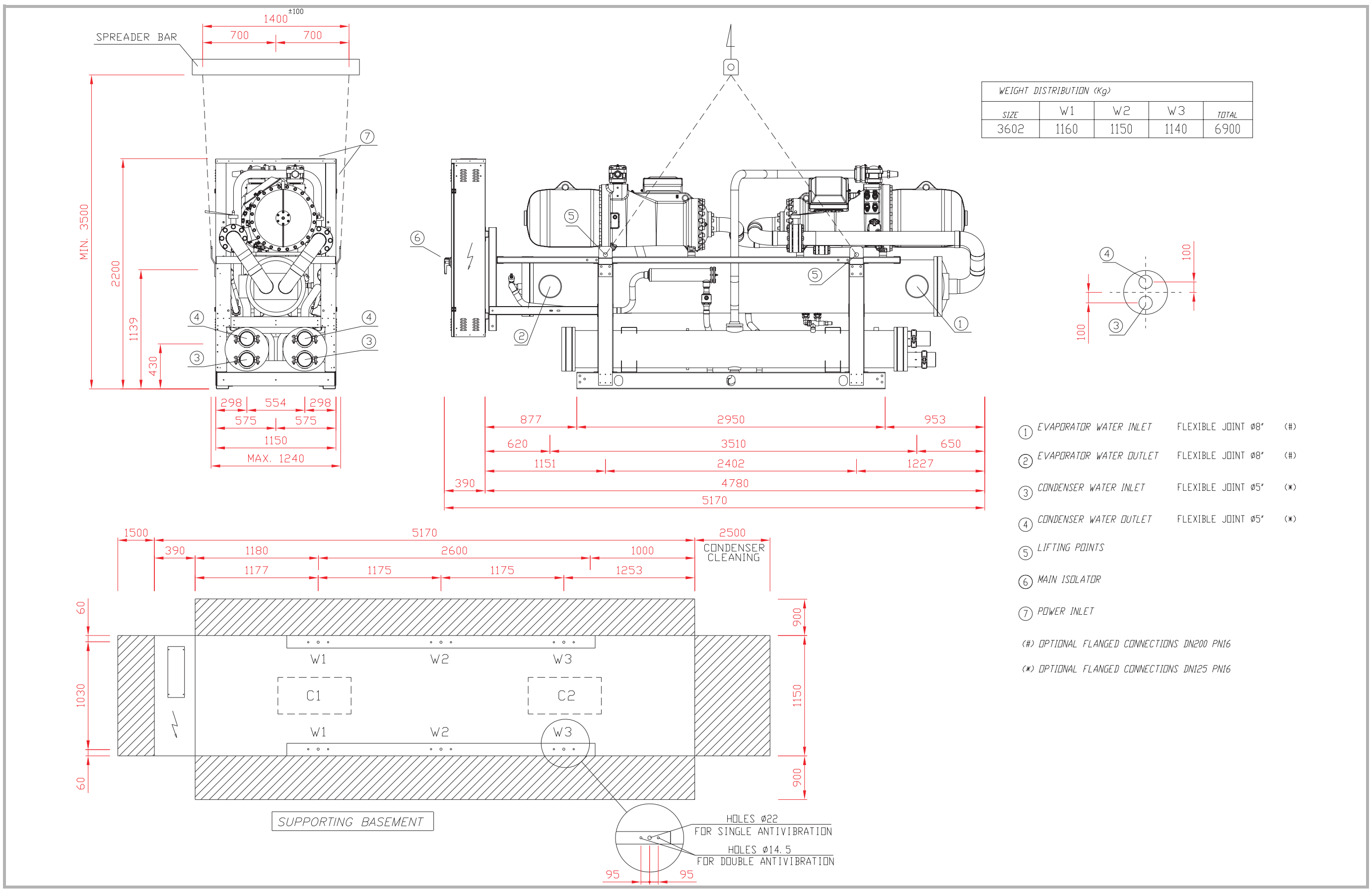


Fig. 45: D9C73501-0 – GLWC 2360 CA2.HE

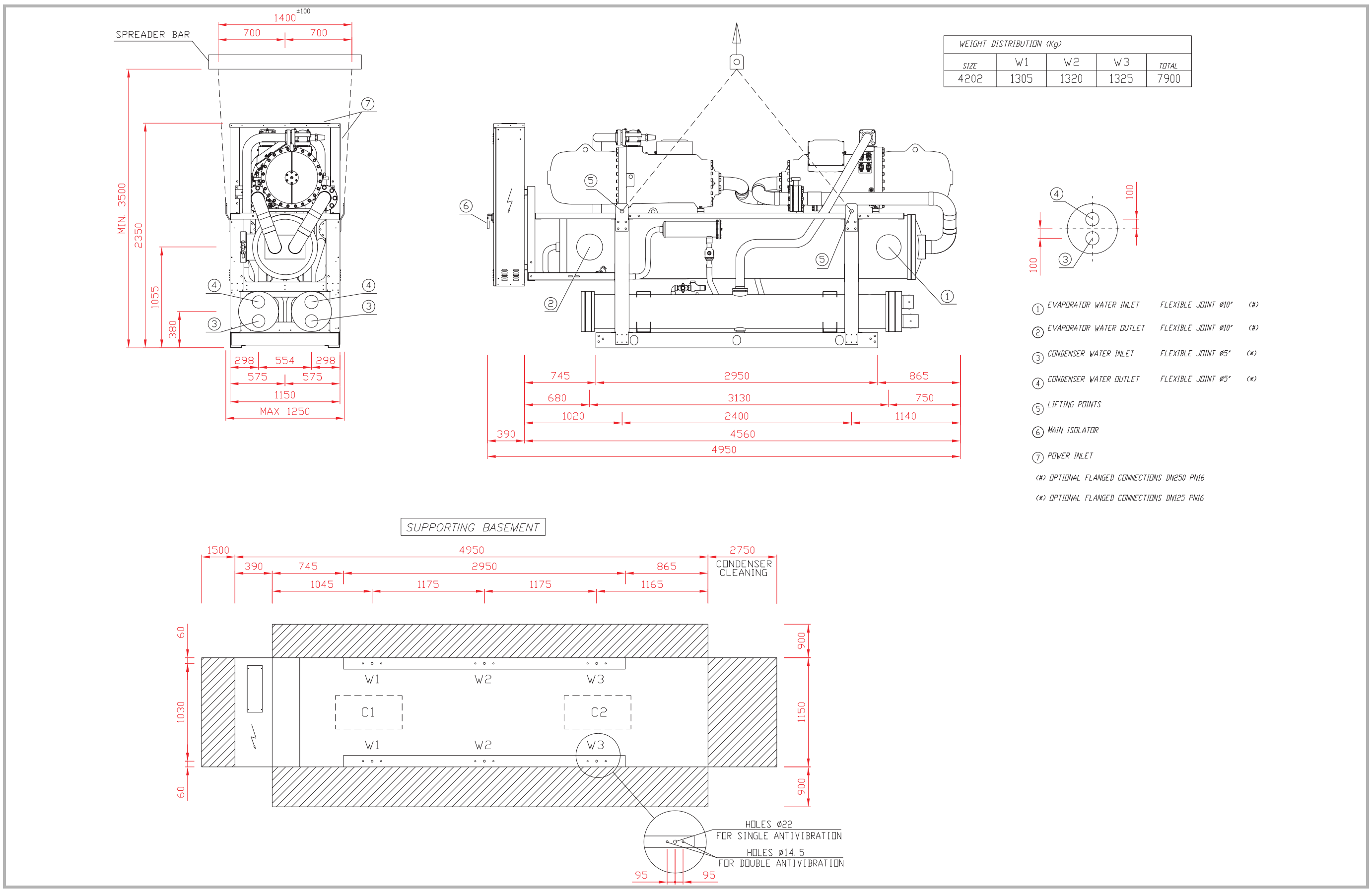


Fig. 46: D9C78501-0 – GLWC 2420 CA2.HE

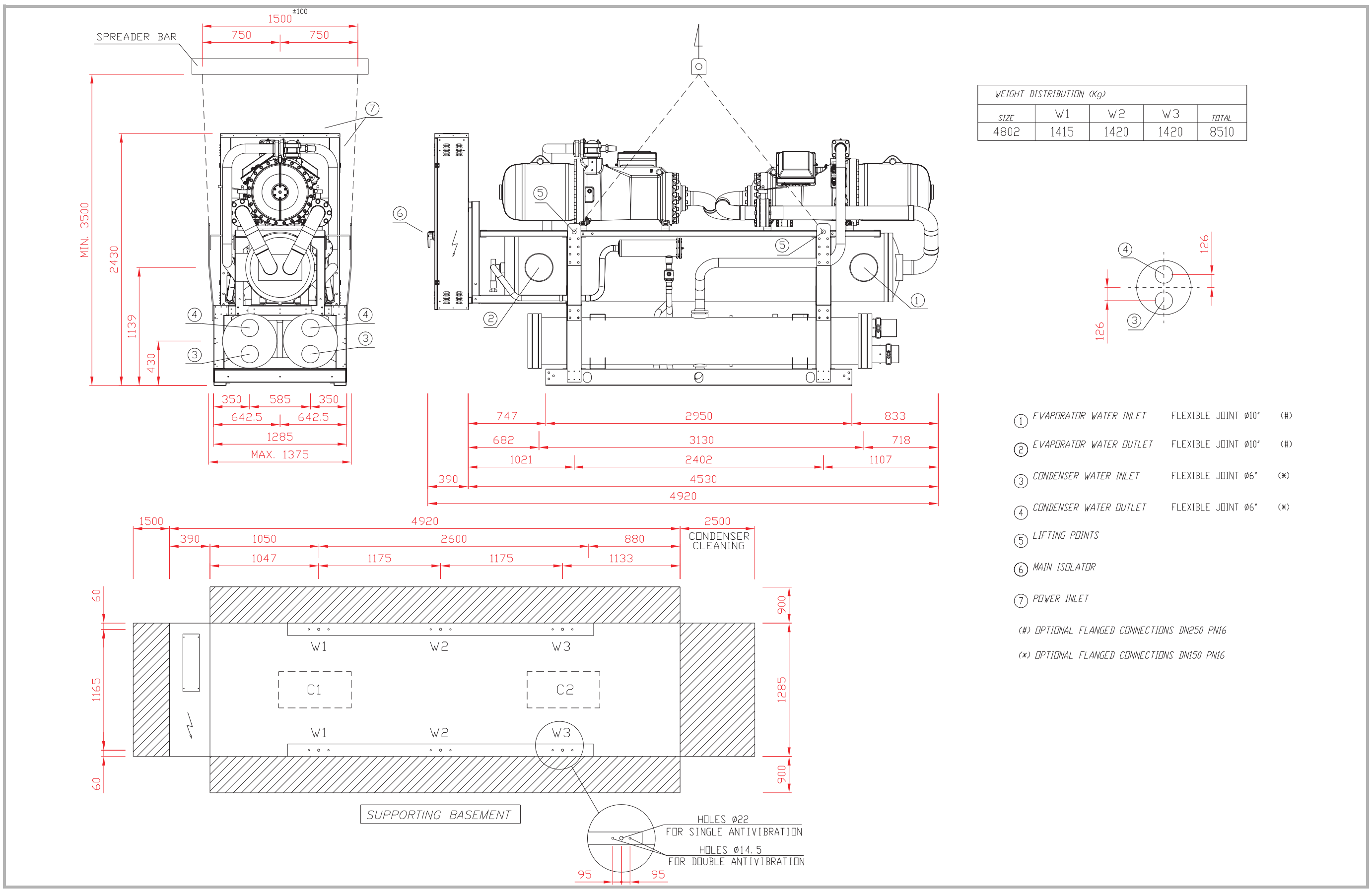


Fig. 47: D9C81501-0 – GLWC 2480 CA2.HE

Legend for dimensional drawings

GLWC - CA2 & GLWH - CA2 - Capacity stages 1130-1140, 2320-2480

Acronym	Specification
1	Chilled water inlet (refer to technical data on page 20 et seq. for the pipe diameter).
2	Chilled water outlet (refer to technical data on page 20 et seq. for the pipe diameter).
3	Warm water inlet/outlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
4	Warm water inlet/outlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
5	Warm water inlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
6	Warm water outlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
9	Lifting point for rigging and transport
10	Main isolator
11	Power supply

Tab. 23

GLWC - CA2 & GLWH - CA2 - Capacity stages 2540-4960
GLWC - CA2.HE - Capacity stages 1130-4840

Acronym	Specification
1	Chilled water inlet (refer to technical data on page 20 et seq. for the pipe diameter).
2	Chilled water outlet (refer to technical data on page 20 et seq. for the pipe diameter).
3	Warm water inlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
4	Warm water outlet (for connections and pipe diameter refer to technical data on page 20 et seq.)
5	Lifting point for rigging and transport
6	Main isolator
7	Power supply

Tab. 24

Description of pipe connections		
Threaded connections (defined as of UNI ISO 7/1)		
Rp XX	["]	Parallel internal thread with seal through thread
Rc XX	["]	Conical internal thread with seal through thread
R XX	["]	Conical external thread with seal through thread
Threaded connections (defined as of UNI ISO 288/1)		
XX	["]	ISO G: parallel external thread not sealing through thread
Flange connections		
DN XX / PN XX	-	Nominal diameter with pressure class (e. g.DN 80 PN16: nominal diameter 80 mm, nominal pressure 16 bar)
Groove-lock connections		
G / Victaulic groove lock coupling	["]	flexible joint: rated diameter (also known as „Victaulic®“ trade mark)

Tab. 25

NOTE!
For detailed planning please only use the order related documentation. Detailed dimensional drawings can be obtained on request from your relevant FläktGroup sales office. Specifications and technical data are subject to regular updates. The manufacturer reserves the right to make necessary changes to information without prior written notice.

Notes

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