



Water Cooled Liquid Chiller

CGWH

50.8 kW to 152.5 kW - R 407C

38.1 kW to 111 kW - R134a



CG-PRC008-GB



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Characteristics and advantages

Simple installation Positioning

Scroll chillers are very compact, and easy to position.

To prevent the base touching the ground, the chillers are supplied with vibration isolators as standard.

Hydraulic connections

Since the water connections are now placed outside the unit, there is no need to drill through the panels to connect the hydraulic module.

Cooling line connections

The gas and liquid line connections pass through the holes drilled in the casing.

Warning: it is **MANDATORY** to install a filter drier (not supplied) when making these connections.

Electrical connections

Stuffing boxes behind the electrical cabinet make it very easy to feed through the power supply cable. The water flow detection system is fitted in the factory. It is not necessary to install a flow switch.

A hard contact output is available as standard on SMM (Scroll Manager Module) to connect the chilled water pump contactor directly. Space is reserved in the power cabinet to install the water pump contactor, which can be supplied as an option.

Quiet and reliable operation reliability

Use of Trane 3-D® Scroll compressors makes the units very reliable.

The Scroll compressor has the following advantages compared to a rotary compressor:

- 64 % less parts.
- The Scroll compressor generates much less vibration. Accordingly, the refrigerant lines undergo less stress.

Performance

Better performance is obtained because the Scroll compressor has no dead volume at the end of compression.

This enhanced performance is durable because there are no fragile parts such as springs and valves that wear out quickly.

Performance at part load

Each Scroll compressor always operates at full load.

The power supplied by the chiller depends on the number of compressors in operation.

In this way, the power factor remains very high even with a small load.

Low sound level

The Scroll compressor is much less noisy and generates less vibration than a rotary compressor. In addition, on sites where the sound level must be as low as possible, the compressors can be fitted with hoods.

Reduced maintenance

The Scroll compressor requires no maintenance, because it has no fragile parts such as springs or valves that have to be changed regularly.

Other standard characteristics

- Thermal insulation of all water piping, evaporator piping and low pressure refrigerant lines.
- Loss of water flow is prevented by a differential cut-out.
- Unit Supplied with rubber vibration isolators.
- Modem connection.
- IP 54 electrical cabinet.

Scroll Manager Module (SMM)

Sets the chilled water leaving temperature.

The control module manages the number of compressors in operation, so as to meet the system load.

Control

The SMM performs the following control functions:

- Automatic restart in the event of a power failure.
- Equalisation of the number of start-ups and the number of operating hours of each compressor.
- Management of the chilled water pump.
- Control of all the safety and protection devices.

Communication

The SMM is fitted with various communication systems. These systems simplify maintenance considerably and provide information about the chiller's operating status.

Operator interface

The SMM is fitted with a LCD communication interface. This interface enables precise monitoring of the chiller's operation and rapid diagnosis when a safety function is activated.

Remote management of the chiller

The hard contacts and the analogue inputs supplied as standard enable remote monitoring and control of the chiller. When a safety device is activated, a hard contact output is engaged. On/off inputs are available to disable total or partial operation of the chiller.

An analogue input (4-20 mA or 0-10 V) is used to modify the water set point.

Remote control by serial link

It is possible to integrate the CGWH into a BMS via a serial link with an optional TCI-S communication board. The TCI-S makes it possible to obtain an RS232 or RS485 serial link with Modbus protocol.



Trane 3-D® Scroll compressor

Evolution

As compressor technology continues to evolve, TRANE remains committed to improving existing products and developing new technologies. TRANE has constantly worked to perfect the 3-D® Scroll compressor, ever since it was first introduced. The most recent improvements made to this type of compressor are the result of on-site experience, backed up by laboratory tests. This experience has made it possible to develop a new 3-D® Scroll compressor that is quieter, more efficient, more flexible in its applications, lighter, more compact, and with even less parts.

Improved performance

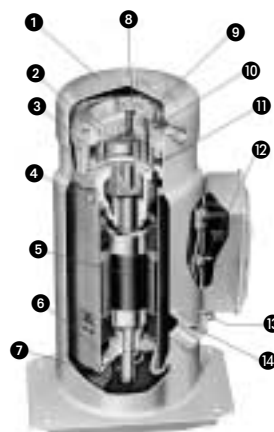
One of the main objectives of the project to redesign the compressors was to reduce energy consumption. 3-D® Scroll. COP has been improved by 10% in the new product range. This has been achieved by introducing an optimised spiral profile, more precise adjustment of components, and less discharge pressure losses thanks to a new check valve. In addition, leakage has been reduced during the compression cycle by increasing machining precision, and by reducing thermal constraints using cast iron spirals. A new high power motor has also been developed.

1. Over-sized discharge chamber to dampen hot gas pulses.

2. Cast iron spirals to reduce thermal constraints and increase COP.
3. Simplified mobile spiral drive system.
4. Tube to align the motor. Is also used to reduce the velocity of the suction gases. This helps to trap particle impurities in the bottom of the compressor.
5. High power motor to reduce energy consumption.
6. Large capacity oil tank to maintain optimum lubrication in all operating conditions.
7. Impurity trap to increase the compressor's operating life.
8. Redesigned check valve to reduce pressure losses and improve leak-tightness.
9. Valve to prevent damage in the event of phase reversal.
10. Optimised spiral profile to obtain a better COP.
11. Smooth bearings to reduce the sound level.
12. Motor temperature sensor to ensure effective protection.
13. Orifice for oil drainage and filling.
14. Oil level sight glass.

Quiet operation

This is achieved by replacing the ball bearings with plain bearings that transmit less noise between the fixed and rotating parts. In addition, the simplified mobile spiral drive system eliminates any possibility of impacts and the resulting noise. The improved check valve profile also makes operation quieter.



General characteristics

R407C Refrigerant

		CGWH 115	CGWH 120	CGWH 125	CGWH 225	CGWH 230	CGWH 235	CGWH 240	CGWH 250
		R407C	R407C	R407C	R407C	R407C	R407C	R407C	R407C
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	50.8	63.7	76.5	90.1	102	114.6	126	152.5
Total Power input in cooling	(kW)	15.3	19.3	23.3	26.8	30.9	34.6	39.2	47
Evaporator water pressure drop	(kPa)	39	39	39	45	50	50	60	62
Condenser water pressure drop	(kPa)	62	63	64	71	79	78	94	95
Main Power supply	(V/Ph/Hz)	400/3/50							
Sound Power Level	(dB(A))	75	81	83	82	84	85	84	86
Units Amps									
Nominal (4)	(A)	35.4	44.3	53.2	62.0	70.9	79.8	88.6	106.4
Start-up Amps	(A)	137	192	201	209	218	227	236	254
Recommended Fuse Size (Am)	(A)	Depend on installation.							
Max supply cable size	(mm²)	16	35	35	35	50	50	95	95
Max. Wire Length	(m)	Depend on installation.							
System Data									
Refrigerant circuit		1	1	1	2	2	2	2	2
Compressor									
Number		2	2	2	3	3	3	4	4
Type		Scroll							
Model		10T+10T	10T+15T	2x15T	2x10T+15T	10T+2x15T	3x15T	2x(10T+15T)	4x15T
Speeds number		1	1	1	1	1	1	1	1
Motors Number		1	1	1	1	1	1	1	1
Rated Amps (2)(4)	(A)	30	42	50	55	65	75	84	101
Locked rotor Amps (2)	(A)	120	175	175	175	175	175	175	175
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900
Sump Heater (2)	(W)	50W - 400V							
Evaporator									
Number		1	1	1	1	1	1	1	1
Type		Braze plate							
Model		V45-40	V45-50	V45-60	DV47-74	DV47-86	DV47-102	DV47-102	DV47-134
Water volume (total)	(l)	4.7	5.9	7.0	8.9	10.3	12.3	12.3	16.1
Antifreeze Heater	(W)	-	-	-	-	-	-	-	-
Evaporator Water Connections									
Type		ISO R7 - Male							
Diameter		1 1/2	1 1/2	1 1/2	2"	2"	2 1/2	2 1/2	2 1/2
Condenser									
Number		1	1	1	1	1	1	1	1
Type		Braze plate							
Model		B45-40	B45-50	B45-60	DB47-74	DB47-86	DB47-102	DB47-102	DB47-134
Water volume (total)	(l)	4.7	5.9	7.0	8.9	10.3	12.3	12.3	16.1
Antifreeze Heater	(W)	-	-	-	-	-	-	-	-
Condenser Water Connections									
Type : ISO R7		Male	Male	Male	Male	Male	Male	Male	Male
Diameter		1 1/2	1 1/2	1 1/2	2"	2"	2"	2 1/2	2 1/2
Dimensions									
Height	(mm)	1545	1545	1545	1545	1545	1545	1545	1545
Length	(mm)	1001	1001	1001	2002	2002	2002	2002	2002
Width	(mm)	800	800	800	800	800	800	800	800
Weight uncrated	(kg)	412	444	476	668	702	739	803	873
Weight crated	(kg)	428	460	492	699	733	770	834	904
Refrigerant Charge (3)									
Circuit A	(kg)	5	7	9	5	7	9	7	9
Circuit B	(kg)	-	-	-	5	5	5	7	9

(1) at Eurovent Conditions (Evap 12°C/7°C - Cond. 45°C - SC 5K)

(2) per motor

(3) per circuit

(4) 5°C sat suction temp. - 60°C sat discharge temp.

R134a Refrigerant

		CGWH 115	CGWH 120	CGWH 125	CGWH 225	CGWH 230	CGWH 235	CGWH 240	CGWH 250
		R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	38.1	47	56	66.8	75.1	83.6	93.1	111
Total Power input in cooling	(kW)	10	12.5	14.8	17.2	19.6	22	24.7	29.4
Evaporator water pressure drop	(kPa)	21	21	20	24	27	27	33	33
Condenser water pressure drop	(kPa)	33	32	32	37	41	41	50	50
Main Power supply	(V/Ph/Hz)	400/3/50							
Sound Power Level	(dB(A))	75	81	83	82	84	85	84	86
Units Amps									
Nominal (4)	(A)	25.4	32.4	39.4	45.1	52.1	59.1	64.8	78.8
Start-up Amps	(A)	137	192	201	209	218	227	236	254
Recommended Fuse Size (Am)	(A)	Depend on installation.							
Max supply cable size	(mm²)	16	35	35	35	50	50	95	95
Max. Wire Length	(m)	Depend on installation.							
System Data									
Refrigerant circuit		1	1	1	2	2	2	2	2
Compressor									
Number		2	2	2	3	3	3	4	4
Type		Scroll							
Model		10T+10T	10T+15T	2x15T	2x10T+15T	10T+2x15T	3x15T	2x(10T+15T)	4x15T
Speeds number		1	1	1	1	1	1	1	1
Motors Number		1	1	1	1	1	1	1	1
Rated Amps (2)(4)	(A)	30	42	50	55	65	75	84	101
Locked rotor Amps (2)	(A)	120	175	175	175	175	175	175	175
Motor RPM	(rpm)	2900	2900	2900	2900	2900	2900	2900	2900
Sump Heater (2)	(W)	50W - 400V							
Evaporator									
Number		1	1	1	1	1	1	1	1
Type		Braze plate							
Model		V45-40	V45-50	V45-60	DV47-74	DV47-86	DV47-102	DV47-102	DV47-134
Water volume (total)	(l)	4.7	5.9	7.0	8.9	10.3	12.3	12.3	16.1
Antifreeze Heater	(W)	-	-	-	-	-	-	-	-
Evaporator Water Connections									
Type		ISO R7 - Male							
Diameter		1 1/2	1 1/2	1 1/2	2"	2"	2 1/2	2 1/2	2 1/2
Condenser									
Number		1	1	1	1	1	1	1	1
Type		Braze plate							
Model		B45-40	B45-50	B45-60	DB47-74	DB47-86	DB47-102	DB47-102	DB47-134
Water volume (total)	(l)	4.7	5.9	7.0	8.9	10.3	12.3	12.3	16.1
Antifreeze Heater	(W)	-	-	-	-	-	-	-	-
Condenser Water Connections									
Type : ISO R7		Male	Male	Male	Male	Male	Male	Male	Male
Diameter		1 1/2	1 1/2	1 1/2	2"	2"	2"	2 1/2	2 1/2
Dimensions									
Height	(mm)	1545	1545	1545	1545	1545	1545	1545	1545
Length	(mm)	1001	1001	1001	2002	2002	2002	2002	2002
Width	(mm)	800	800	800	800	800	800	800	800
Weight uncrated	(kg)	412	444	476	668	702	739	803	873
Weight crated	(kg)	428	460	492	699	733	770	834	904
Refrigerant Charge (3)									
Circuit A	(kg)	5	7	9	5	7	9	7	9
Circuit B	(kg)	-	-	-	5	5	5	7	9

(1) at Eurovent Conditions (Evap 12°C/7°C - Cond. 45°C - SC 5K)

(2) per motor

(3) per circuit

(4) 5°C sat suction temp. - 60°C sat discharge temp.

Installation recommendations

Certain factors must be taken into account when selecting the chiller, to obtain reliable and satisfactory operation.

Chiller size

The capacity ratings are indicated in the "Performance" section. The machine size should not be over-estimated because it could make operation of the installation unstable and cause the compressor to short-cycle.

If you want to have extra capacity on standby, you should install two machines.

Positioning

Foundations

A special foundation is not required, provided the floor is flat, level and strong enough to support the unit's weight (see "Weight" section).

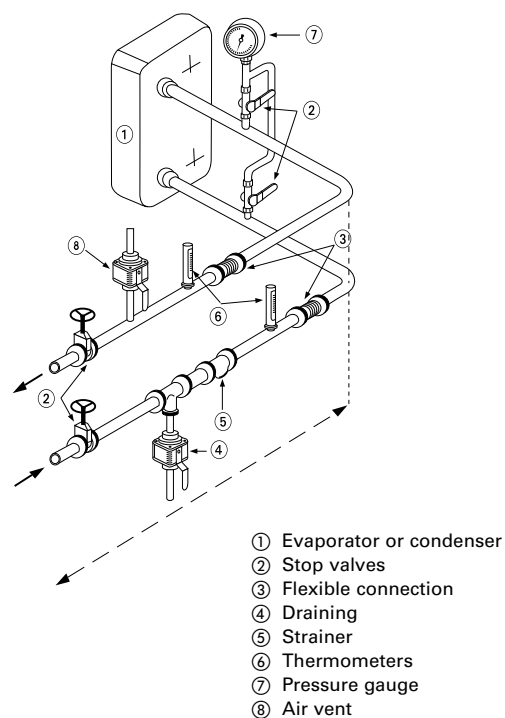
Sound insulation

4 or 6 vibration isolators are supplied as standard. They will be inserted between the floor and the unit to attenuate vibration. An acoustics engineer should always be consulted when noise is a critical factor.

Water drain

Ensure that near the unit is a large enough drain to evacuate the water when from the system emptying the unit for shutdown or repair.

Evaporator and condenser water connection



Water connection

Install the chilled water feed pump upstream of the evaporator so that the circuit is pressurised. The diameters of the water pipe connections are given in the submittals. The 1/4 stub connectors on the outlet connections can be used as a drainage hole for the plate heat exchanger.

1. **Pressure gauge:** indicates the chilled water entering and leaving pressure. Provide for gate valves at the chilled water entering and leaving connections.
2. **Thermometers:** indicate the chilled water entering and leaving temperatures.
3. **Damper valve:** adjusts the water flow rate.
4. **Gate valves:** isolate the chiller and water feed pump during maintenance operations.
5. **Filter:** designed to prevent the plate heat exchangers from clogging, and must not let through particles with a diameter greater than 1 mm. Make sure all the water pipes are insulated to prevent frost damage. Install heaters on all the water piping likely to be exposed to negative temperatures, or add anti-freeze to the water circuit.

Minimum water volume

The minimum recommended water volume depends on the type of application. Contact our Trane Office. If necessary, provide a buffer tank. The control and safety devices are only certain to operate correctly if the system's water volume is sufficient. A complete hydraulic module comprising pump(s), storage tank, expansion vessel, anti-freeze protection, filters and gate valves can be supplied on demand.

Water treatment

Use of untreated or partially treated water in this unit may lead to deposits of scale, algae and sludge forming or may lead to corrosion and erosion. It is recommended to use the services of a qualified water treatment specialist to determine whether any treatment should be applied.

Flow rate limits

The minimum and maximum flow rates are indicated in the "General characteristics" section.

Too low a flow rate may cause freezing of the evaporator.

Too high a flow rate may cause erosion of the evaporator and very substantial pressure losses.

Selection Procedure

The unit capacity tables presented in the "Performance Data" section, covers the most frequently encountered temperatures. Capacities presented in these tables are given in following conditions :

- Fouling factor = 0.044 m²K/kW
- DT through the exchanger included between 4°C and 8°C.

To select a CGWH, the following information is required

- Design system load.
- Design leaving and entering chilled water temperature.
- Design entering and leaving hot water temperature.
- Refrigerant type

To calculate the required chilled water flow, we use the formula:

$$\text{Water flow (l/s)} = \text{Capacity (kW)} \times 0.239 / \Delta T (^{\circ}\text{C})$$

Water flow in the condenser is calculated using the following formula:

$$\text{Water flow (l/s)} = [\text{Capacity} + \text{Power input}] (\text{kW}) \times 0.239 / \Delta T (^{\circ}\text{C})$$

Selection example

Data:

- Required system load : 100 kW
- Leaving chilled water temperature = +7°C.
- Return chilled water temperature = + 12°C
- Hot water leaving temperature = 35°C.
- Entering hot water temperature
- R407C refrigerant

1. Selection of the unit size:

The tables in the "Performance Data" section indicate that a CGWH 230 provides 104.5 kW and the power input is 27.9 kW in the here above conditions, with R407C.

2. Water flow:

$$\text{Water flow (l/s)} = 104.5 \times 0.239 / 5$$

$$\text{Water flow (l/s)} = 4.99$$

3. Hot water flow:

$$\text{Water flow (l/s)} = (104.5 + 27.9) \times 0.239 / 5$$

$$\text{Water flow (l/s)} = 6.32$$

4. Water pressure drop through the evaporator:

The curves in the "Water Pressure Drop" section indicate that at 4.99 l/s, the water pressure drop for a CGWH 230 is 60 kPa

5. Hot water pressure drop through the condenser:

The curves in the "Water Pressure Drop" section indicate that at 6.32 l/s, the water pressure drop for a CGWH 230 is 70 kPa.

Selection with ethylene glycol

When ethylene glycol is added in the chilled water circuit the following adjustment factors have to be taken into account.

Chilled water leaving temperature	EG content (%)	Correction Factors			
		Water flow l/s	Pressure drop kPa	Power Input	Cool. capacity
12	30	1.11	1.2	1.005	0.98
5	30	1.11	1.24	1.005	0.97
4	10	1.02	1.08	1	1
0	20	1.05	1.19	1	1
-4	27	1.08	1.29	1	1
-8	33	1.1	1.46	1	1
-12	37	1.12	1.62	1	1

Example :

Selection from the "Selection Procedure" paragraph with 30% ethylene glycol.

Water flow rate = $4.99 \times 1.11 = 5.53$ l/s

Evaporator pressure losses = $60 \times 1.24 = 74.4$ kPa

Power input = $27.9 \times 1.005 = 28$ kW

Cooling capacity = $104.5 \times 0.97 = 101.3$ kW

Performance R407C

CGWH 115 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	27.7	10.3	26.6	11.4	25.3	12.7	23.9	14.2	22.4	16.0
33%	-8°C	32.9	10.5	31.5	11.6	30.0	12.9	28.4	14.5	26.6	16.4
27%	-4°C	38.5	10.7	36.9	11.8	35.2	13.2	33.3	14.8	31.3	16.7
20%	0°C	44.6	10.9	42.8	12.0	40.8	13.4	38.7	15.1	36.4	17.1
10%	4°C	51.2	11.0	49.1	12.2	46.9	13.7	44.5	15.4	42.0	17.4
	5°C	53.1	11.1	51.0	12.3	48.7	13.7	46.2	15.5	43.6	17.5
	6°C	54.7	11.1	52.6	12.3	50.2	13.8	47.7	15.6	45.0	17.6
	7°C	56.4	11.2	54.2	12.4	51.8	13.8	49.2	15.6	46.4	17.7
	8°C	58.0	11.2	55.8	12.4	53.3	13.9	50.7	15.7	47.8	17.8
	9°C	59.7	11.2	57.4	12.4	54.9	13.9	52.2	15.7	49.2	17.8
	10°C	61.4	11.3	59.0	12.5	56.5	14.0	53.7	15.8	50.7	17.9
	11°C	63.1	11.3	60.7	12.5	58.0	14.0	55.2	15.9	52.1	18.0
	12°C	64.8	11.3	62.3	12.5	59.6	14.1	56.7	15.9	53.5	18.0

CGWH 120 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	35.1	12.9	33.5	14.3	31.9	15.9	30.2	17.8	28.4	20.0
33%	-8°C	41.5	13.2	39.7	14.6	37.8	16.3	35.8	18.2	33.6	20.5
27%	-4°C	48.5	13.5	46.4	14.9	44.3	16.6	42.0	18.6	39.5	21.0
20%	0°C	56.0	13.7	53.8	15.2	51.3	17.0	48.7	19.1	45.9	21.5
10%	4°C	64.2	14.0	61.7	15.5	58.9	17.3	55.9	19.5	52.8	21.9
	5°C	66.6	14.0	63.9	15.6	61.1	17.4	58.0	19.6	54.8	22.1
	6°C	68.6	14.1	65.9	15.6	63.0	17.5	59.9	19.7	56.5	22.2
	7°C	70.6	14.2	67.9	15.7	64.9	17.6	61.7	19.8	58.2	22.3
	8°C	72.7	14.2	69.9	15.8	66.8	17.6	63.5	19.8	60.0	22.4
	9°C	74.8	14.3	71.9	15.8	68.8	17.7	65.4	19.9	61.8	22.5
	10°C	76.9	14.3	73.9	15.9	70.7	17.8	67.3	20.0	63.5	22.6
	11°C	79.0	14.4	76.0	15.9	72.7	17.9	69.1	20.1	65.3	22.7
	12°C	81.1	14.4	78.0	16.0	74.6	17.9	71.0	20.2	67.1	22.8

CGWH 125 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	42.5	15.6	40.5	17.2	38.5	19.1	36.4	21.4	34.3	24.1
33%	-8°C	50.0	15.9	47.8	17.6	45.5	19.6	43.1	22.0	40.6	24.6
27%	-4°C	58.4	16.3	55.9	18.0	53.3	20.1	50.6	22.5	47.7	25.2
20%	0°C	67.4	16.6	64.7	18.4	61.8	20.5	58.6	23.0	55.3	25.8
10%	4°C	77.2	16.9	74.1	18.8	70.8	21.0	67.3	23.5	63.5	26.4
	5°C	80.0	17.0	76.8	18.9	73.4	21.1	69.8	23.7	65.9	26.6
	6°C	82.4	17.1	79.2	19.0	75.7	21.2	71.9	23.8	68.0	26.7
	7°C	84.8	17.1	81.5	19.0	78.0	21.3	74.1	23.9	70.0	26.9
	8°C	87.3	17.2	83.9	19.1	80.2	21.4	76.3	24.0	72.1	27.0
	9°C	89.8	17.3	86.3	19.2	82.6	21.5	78.5	24.1	74.2	27.1
	10°C	92.2	17.3	88.7	19.3	84.9	21.6	80.7	24.2	76.3	27.2
	11°C	94.7	17.4	91.1	19.4	87.2	21.7	82.9	24.3	78.4	27.4
	12°C	97.2	17.5	93.5	19.4	89.5	21.8	85.1	24.4	80.5	27.5

CGWH 225 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	47.0	19.9	47.0	19.9	44.7	22.1	42.3	24.8	39.7	27.9
33%	-8°C	58.2	18.4	55.7	20.3	53.0	22.6	50.2	25.3	47.2	28.5
27%	-4°C	68.3	18.7	65.4	20.7	62.4	23.1	59.1	25.9	55.6	29.2
20%	0°C	79.3	19.1	76.0	21.1	72.5	23.5	68.8	26.5	64.8	29.8
10%	4°C	91.0	19.4	87.4	21.5	83.5	24.0	79.3	27.0	74.7	30.5
	5°C	94.4	19.5	90.7	21.6	86.6	24.1	82.3	27.1	77.6	30.6
	6°C	97.3	19.6	93.5	21.7	89.3	24.2	84.9	27.3	80.1	30.8
	7°C	100.3	19.6	96.3	21.7	92.1	24.3	87.5	27.4	82.6	30.9
	8°C	103.2	19.7	99.2	21.8	94.8	24.4	90.1	27.5	85.1	31.0
	9°C	106.2	19.8	102.1	21.9	97.6	24.5	92.8	27.6	87.6	31.2
	10°C	109.1	19.8	104.9	22.0	100.4	24.6	95.4	27.7	90.1	31.3
	11°C	112.1	19.9	107.8	22.1	103.1	24.7	98.1	27.8	92.7	31.4
	12°C	115.1	19.9	110.7	22.1	105.9	24.8	100.8	27.9	95.2	31.6

CGWH 230 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	53.6	22.7	53.6	22.7	51.0	25.3	48.3	28.3	45.4	31.8
33%	-8°C	66.4	21.0	63.5	23.2	60.5	25.8	57.3	28.9	53.9	32.5
27%	-4°C	77.8	21.5	74.6	23.7	71.1	26.4	67.4	29.6	63.5	33.3
20%	0°C	90.2	21.9	86.5	24.2	82.6	27.0	78.4	30.3	73.9	34.0
10%	4°C	103.5	22.3	99.3	24.6	94.9	27.5	90.2	30.9	85.1	34.8
	5°C	107.3	22.4	103.0	24.8	98.5	27.7	93.6	31.1	88.3	35.0
	6°C	110.5	22.4	106.2	24.9	101.5	27.8	96.5	31.2	91.1	35.2
	7°C	113.8	22.5	109.4	25.0	104.5	27.9	99.4	31.4	93.8	35.3
	8°C	117.1	22.6	112.5	25.1	107.6	28.0	102.3	31.5	96.6	35.5
	9°C	120.4	22.7	115.7	25.2	110.7	28.2	105.2	31.6	99.4	35.6
	10°C	123.7	22.8	118.9	25.3	113.7	28.3	108.2	31.8	102.2	35.8
	11°C	127.0	22.8	122.1	25.4	116.8	28.4	111.1	31.9	105.0	35.9
	12°C	130.3	22.9	125.3	25.5	119.9	28.5	114.0	32.0	107.8	36.1

CGWH 235 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	60.5	25.5	60.5	25.5	57.5	28.3	54.4	31.7	51.2	35.6
33%	-8°C	74.9	23.6	71.6	26.0	68.2	29.0	64.6	32.4	60.9	36.4
27%	-4°C	87.7	24.1	84.0	26.6	80.1	29.6	76.0	33.1	71.6	37.2
20%	0°C	101.5	24.5	97.4	27.1	93.0	30.2	88.3	33.9	83.3	38.1
10%	4°C	116.3	25.0	111.7	27.7	106.7	30.9	101.5	34.6	95.8	38.9
	5°C	120.5	25.1	115.8	27.8	110.7	31.0	105.2	34.8	99.4	39.1
	6°C	124.1	25.2	119.3	27.9	114.0	31.2	108.4	35.0	102.4	39.3
	7°C	127.7	25.3	122.8	28.0	117.4	31.3	111.6	35.1	105.5	39.5
	8°C	131.4	25.4	126.2	28.2	120.7	31.5	114.9	35.3	108.6	39.7
	9°C	135.0	25.5	129.7	28.3	124.1	31.6	118.1	35.5	111.6	39.8
	10°C	138.6	25.6	133.2	28.4	127.5	31.7	121.3	35.6	114.7	40.0
	11°C	142.2	25.7	136.7	28.5	130.8	31.9	124.5	35.7	117.7	40.2
	12°C	145.7	25.7	140.1	28.6	134.1	32.0	127.6	35.9	120.7	40.3

CGWH 240 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	70.3	25.9	67.1	28.5	63.8	31.7	60.4	35.6	56.8	40.0
33%	-8°C	83.0	26.4	79.4	29.1	75.6	32.4	71.6	36.4	67.3	40.9
27%	-4°C	97.2	26.9	93.1	29.7	88.8	33.2	84.1	37.2	79.2	41.9
20%	0°C	112.5	27.4	107.9	30.3	103.0	33.9	97.7	38.0	92.0	42.8
10%	4°C	128.8	27.9	123.6	30.9	118.1	34.5	112.1	38.8	105.7	43.7
	5°C	133.4	28.0	128.1	31.1	122.4	34.7	116.2	39.0	109.6	44.0
	6°C	137.4	28.1	131.9	31.2	126.0	34.9	119.7	39.2	112.9	44.2
	7°C	141.3	28.2	135.7	31.3	129.7	35.0	123.2	39.4	116.3	44.4
	8°C	145.3	28.3	139.6	31.4	133.4	35.2	126.8	39.6	119.6	44.6
	9°C	149.2	28.4	143.4	31.5	137.1	35.3	130.3	39.7	123.0	44.8
	10°C	153.2	28.5	147.2	31.7	140.7	35.4	133.8	39.9	126.3	44.9
	11°C	157.1	28.6	150.9	31.8	144.3	35.6	137.2	40.0	129.6	45.1
	12°C	160.9	28.7	154.7	31.9	147.9	35.7	140.6	40.2	132.9	45.3

CGWH 250 - STD/R407C

		Sat discharge temp.									
		25°C		30°C		35°C		40°C		45°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	82.3	34.1	82.3	34.1	78.2	37.9	73.9	42.4	69.6	47.6
33%	-8°C	101.7	31.6	97.2	34.8	92.6	38.8	87.7	43.4	82.6	48.7
27%	-4°C	118.9	32.2	113.8	35.6	108.5	39.6	102.9	44.4	97.0	49.8
20%	0°C	137.2	32.8	131.6	36.3	125.6	40.5	119.2	45.4	112.5	50.9
10%	4°C	156.5	33.4	150.2	37.0	143.5	41.3	136.4	46.3	128.8	52.0
	5°C	161.9	33.6	155.5	37.2	148.6	41.5	141.2	46.6	133.3	52.3
	6°C	166.5	33.7	159.9	37.4	152.8	41.7	145.3	46.8	137.2	52.6
	7°C	171.1	33.8	164.3	37.5	157.1	41.9	149.4	47.0	141.1	52.8
	8°C	175.6	33.9	168.7	37.6	161.3	42.1	153.4	47.2	144.9	53.0
	9°C	180.1	34.1	173.1	37.8	165.5	42.2	157.4	47.4	148.7	53.3
	10°C	184.6	34.2	177.4	37.9	169.6	42.4	161.3	47.6	152.5	53.5
	11°C	188.9	34.3	181.6	38.0	173.6	42.6	165.2	47.8	156.1	53.7
	12°C	193.2	34.4	185.7	38.2	177.6	42.7	168.9	47.9	159.7	53.9

Performance R134a

CGWH 115 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	20.2	6.8	19.4	7.5	18.5	8.3	17.6	9.3	16.6	10.3	15.6	11.5
33%	-8°C	24.2	6.9	23.1	7.7	22.1	8.5	20.9	9.5	19.8	10.5	18.5	11.7
27%	-4°C	28.5	7.1	27.3	7.8	26.0	8.7	24.7	9.7	23.3	10.8	21.9	12.0
20%	0°C	33.1	7.2	31.7	8.0	30.3	8.8	28.8	9.9	27.2	11.0	25.6	12.3
10%	4°C	38.0	7.3	36.5	8.1	34.9	9.0	33.2	10.0	31.4	11.2	29.5	12.5
	5°C	39.4	7.3	37.8	8.1	36.1	9.0	34.4	10.1	32.6	11.3	30.7	12.6
	6°C	40.6	7.3	39.0	8.1	37.3	9.1	35.5	10.1	33.6	11.3	31.7	12.6
	7°C	41.9	7.3	40.2	8.2	38.5	9.1	36.6	10.2	34.7	11.4	32.7	12.7
	8°C	43.1	7.4	41.4	8.2	39.6	9.1	37.7	10.2	35.8	11.4	33.7	12.7
	9°C	44.4	7.4	42.6	8.2	40.8	9.2	38.9	10.2	36.8	11.5	34.7	12.8
	10°C	45.7	7.4	43.9	8.2	42.0	9.2	40.0	10.3	37.9	11.5	35.8	12.8
	11°C	46.9	7.4	45.1	8.2	43.2	9.2	41.1	10.3	39.0	11.5	36.8	12.9
	12°C	48.2	7.4	46.3	8.3	44.4	9.2	42.3	10.3	40.1	11.6	37.8	12.9

CGWH 120 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	25.0	8.6	23.9	9.4	22.8	10.4	21.7	11.5	20.5	12.7	19.3	14.1
33%	-8°C	29.8	8.8	28.5	9.6	27.2	10.6	25.8	11.8	24.4	13.0	23.0	14.4
27%	-4°C	35.1	9.0	33.6	9.8	32.1	10.9	30.5	12.0	28.8	13.3	27.1	14.8
20%	0°C	40.9	9.1	39.2	10.0	37.4	11.1	35.5	12.3	33.6	13.6	31.6	15.1
10%	4°C	47.0	9.3	45.1	10.2	43.1	11.3	41.0	12.5	38.8	13.9	36.6	15.5
	5°C	48.7	9.3	46.7	10.3	44.7	11.4	42.5	12.6	40.3	14.0	37.9	15.5
	6°C	50.2	9.4	48.2	10.3	46.1	11.4	43.9	12.7	41.6	14.1	39.2	15.6
	7°C	51.8	9.4	49.7	10.4	47.5	11.5	45.3	12.7	42.9	14.1	40.4	15.7
	8°C	53.3	9.4	51.2	10.4	49.0	11.5	46.7	12.8	44.2	14.2	41.7	15.8
	9°C	54.9	9.5	52.7	10.4	50.4	11.5	48.1	12.8	45.6	14.2	43.0	15.8
	10°C	56.5	9.5	54.2	10.5	51.9	11.6	49.5	12.9	46.9	14.3	44.2	15.9
	11°C	58.0	9.5	55.8	10.5	53.4	11.6	50.9	12.9	48.3	14.3	45.5	16.0
	12°C	59.6	9.5	57.3	10.5	54.8	11.7	52.3	12.9	49.6	14.4	46.8	16.0

CGWH 125 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	29.7	10.4	28.4	11.3	27.2	12.4	25.8	13.7	24.5	15.1	23.1	16.7
33%	-8°C	35.5	10.7	33.9	11.6	32.4	12.7	30.7	14.0	29.1	15.5	27.4	17.1
27%	-4°C	41.8	10.9	40.0	11.9	38.2	13.1	36.2	14.4	34.3	15.9	32.3	17.6
20%	0°C	48.6	11.1	46.6	12.1	44.5	13.4	42.3	14.7	40.0	16.3	37.7	18.0
10%	4°C	55.9	11.3	53.6	12.4	51.2	13.6	48.7	15.0	46.2	16.6	43.5	18.4
	5°C	58.0	11.4	55.6	12.4	53.1	13.7	50.5	15.1	47.9	16.7	45.1	18.5
	6°C	59.8	11.4	57.3	12.5	54.8	13.8	52.2	15.2	49.4	16.8	46.6	18.6
	7°C	61.6	11.5	59.1	12.5	56.5	13.8	53.8	15.3	51.0	16.9	48.1	18.7
	8°C	63.4	11.5	60.9	12.6	58.2	13.9	55.5	15.3	52.6	17.0	49.6	18.8
	9°C	65.3	11.5	62.7	12.6	59.9	13.9	57.1	15.4	54.2	17.0	51.1	18.9
	10°C	67.1	11.6	64.5	12.7	61.7	14.0	58.8	15.4	55.7	17.1	52.6	18.9
	11°C	69.0	11.6	66.2	12.7	63.4	14.0	60.4	15.5	57.3	17.2	54.1	19.0
	12°C	70.8	11.6	68.0	12.8	65.1	14.1	62.1	15.6	58.9	17.2	55.6	19.1

CGWH 225 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	35.2	12.0	33.7	13.1	32.2	14.5	30.6	16.0	29.0	17.8	27.2	19.7
33%	-8°C	42.1	12.2	40.3	13.4	38.4	14.8	36.5	16.4	34.5	18.2	32.4	20.2
27%	-4°C	49.8	12.5	47.6	13.7	45.4	15.1	43.1	16.8	40.8	18.6	38.3	20.7
20%	0°C	58.0	12.7	55.6	14.0	53.0	15.4	50.4	17.1	47.7	19.0	44.9	21.1
10%	4°C	66.8	12.9	64.1	14.2	61.2	15.7	58.2	17.5	55.1	19.4	51.9	21.6
	5°C	69.3	12.9	66.5	14.3	63.5	15.8	60.4	17.5	57.2	19.5	53.9	21.7
	6°C	71.5	13.0	68.6	14.3	65.6	15.9	62.4	17.6	59.1	19.6	55.7	21.8
	7°C	73.7	13.0	70.7	14.4	67.6	15.9	64.4	17.7	61.0	19.7	57.5	21.9
	8°C	75.9	13.0	72.8	14.4	69.6	16.0	66.3	17.8	62.8	19.8	59.2	22.0
	9°C	78.0	13.1	74.9	14.4	71.7	16.0	68.3	17.8	64.7	19.8	61.0	22.1
	10°C	80.2	13.1	77.0	14.5	73.7	16.1	70.2	17.9	66.6	19.9	62.8	22.2
	11°C	82.4	13.1	79.2	14.5	75.8	16.1	72.2	17.9	68.5	20.0	64.6	22.3
	12°C	84.6	13.2	81.3	14.6	77.8	16.2	74.1	18.0	70.3	20.1	66.3	22.3

CGWH 230 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	39.7	13.7	38.0	15.0	36.3	16.5	34.6	18.2	32.7	20.1	30.8	22.2
33%	-8°C	47.5	14.0	45.4	15.3	43.3	16.9	41.2	18.6	38.9	20.6	36.6	22.8
27%	-4°C	56.1	14.3	53.7	15.7	51.2	17.3	48.7	19.1	46.0	21.1	43.3	23.3
20%	0°C	65.4	14.6	62.7	16.0	59.8	17.6	56.8	19.5	53.8	21.6	50.6	23.9
10%	4°C	75.3	14.8	72.2	16.3	69.0	18.0	65.6	19.9	62.2	22.0	58.5	24.4
	5°C	78.1	14.9	74.9	16.4	71.5	18.0	68.1	20.0	64.5	22.2	60.8	24.6
	6°C	80.5	15.0	77.2	16.4	73.8	18.1	70.2	20.1	66.6	22.3	62.7	24.7
	7°C	82.9	15.0	79.6	16.5	76.0	18.2	72.4	20.2	68.6	22.3	64.7	24.8
	8°C	85.3	15.1	81.9	16.5	78.3	18.3	74.6	20.2	70.7	22.4	66.7	24.9
	9°C	87.8	15.1	84.2	16.6	80.6	18.3	76.7	20.3	72.8	22.5	68.6	25.0
	10°C	90.2	15.1	86.6	16.6	82.8	18.4	78.9	20.4	74.8	22.6	70.6	25.1
	11°C	92.5	15.2	88.9	16.7	85.0	18.4	81.0	20.5	76.8	22.7	72.5	25.2
	12°C	94.9	15.2	91.1	16.7	87.2	18.5	83.1	20.5	78.8	22.8	74.4	25.3

CGWH 235 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	44.2	15.4	42.4	16.8	40.5	18.4	38.6	20.3	36.6	22.3	34.5	24.7
33%	-8°C	53.0	15.8	50.7	17.2	48.4	18.9	46.0	20.8	43.5	22.9	41.0	25.3
27%	-4°C	62.6	16.1	60.0	17.6	57.2	19.3	54.3	21.3	51.4	23.5	48.4	25.9
20%	0°C	73.0	16.5	69.9	18.0	66.8	19.7	63.5	21.7	60.1	24.0	56.6	26.5
10%	4°C	84.0	16.7	80.5	18.3	76.9	20.1	73.2	22.2	69.3	24.5	65.3	27.1
	5°C	87.0	16.8	83.4	18.4	79.7	20.2	75.9	22.3	71.9	24.6	67.8	27.3
	6°C	89.7	16.9	86.0	18.4	82.2	20.3	78.2	22.4	74.2	24.8	69.9	27.4
	7°C	92.3	16.9	88.6	18.5	84.7	20.4	80.6	22.5	76.4	24.9	72.1	27.5
	8°C	94.9	17.0	91.1	18.6	87.1	20.4	83.0	22.6	78.7	25.0	74.2	27.6
	9°C	97.6	17.0	93.6	18.6	89.5	20.5	85.3	22.7	80.9	25.1	76.3	27.8
	10°C	100.1	17.1	96.1	18.7	91.9	20.6	87.6	22.7	83.1	25.2	78.4	27.9
	11°C	102.7	17.1	98.6	18.8	94.3	20.7	89.9	22.8	85.2	25.3	80.4	28.0
	12°C	105.1	17.2	101.0	18.8	96.6	20.7	92.1	22.9	87.3	25.3	82.5	28.1

CGWH 240 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	50.1	17.2	48.0	18.8	45.8	20.7	43.6	22.9	41.2	25.4	38.8	28.1
33%	-8°C	59.8	17.6	57.2	19.2	54.6	21.2	51.8	23.5	49.0	26.0	46.0	28.8
27%	-4°C	70.6	17.9	67.5	19.7	64.4	21.7	61.1	24.0	57.8	26.6	54.3	29.5
20%	0°C	82.0	18.3	78.6	20.0	75.0	22.1	71.2	24.5	67.4	27.2	63.4	30.2
10%	4°C	94.0	18.5	90.1	20.4	86.1	22.6	81.9	25.0	77.5	27.8	73.0	30.8
	5°C	97.4	18.6	93.3	20.5	89.2	22.7	84.8	25.1	80.3	27.9	75.6	31.0
	6°C	100.3	18.7	96.1	20.6	91.9	22.7	87.4	25.2	82.8	28.0	78.0	31.1
	7°C	103.1	18.7	98.9	20.6	94.5	22.8	90.0	25.3	85.2	28.1	80.3	31.3
	8°C	106.0	18.8	101.7	20.7	97.2	22.9	92.5	25.4	87.6	28.2	82.6	31.4
	9°C	108.8	18.8	104.4	20.8	99.8	23.0	95.0	25.5	90.0	28.4	84.9	31.5
	10°C	111.6	18.9	107.1	20.8	102.4	23.1	97.5	25.6	92.4	28.5	87.1	31.6
	11°C	114.3	18.9	109.7	20.9	104.9	23.1	99.9	25.7	94.7	28.6	89.3	31.7
	12°C	116.9	19.0	112.2	20.9	107.3	23.2	102.2	25.8	96.9	28.6	91.4	31.8

CGWH 250 - STD/R134a

		Sat discharge temp.											
		25°C		30°C		35°C		40°C		45°C		50°C	
% Ethylene	Leaving water temp.	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input	cooling cap	power input
Glycol	Evaporator (°C)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)	(kW)
37%	-12°C	60.2	20.6	57.7	22.5	55.1	24.7	52.4	27.1	49.7	29.9	46.8	33.0
33%	-8°C	72.0	21.1	68.9	23.0	65.7	25.3	62.4	27.8	59.0	30.7	55.5	33.9
27%	-4°C	84.9	21.6	81.2	23.5	77.5	25.8	73.6	28.5	69.6	31.4	65.5	34.7
20%	0°C	98.6	22.0	94.4	24.0	90.1	26.4	85.6	29.1	81.0	32.1	76.3	35.5
10%	4°C	112.7	22.4	108.0	24.5	103.1	26.9	98.1	29.7	92.9	32.8	87.5	36.3
	5°C	116.5	22.5	111.6	24.6	106.6	27.0	101.4	29.8	96.1	33.0	90.6	36.5
	6°C	119.8	22.5	114.8	24.6	109.7	27.1	104.4	29.9	98.9	33.1	93.2	36.6
	7°C	123.0	22.6	117.9	24.7	112.7	27.2	107.3	30.0	101.6	33.2	95.8	36.8
	8°C	126.2	22.7	121.0	24.8	115.6	27.3	110.1	30.2	104.3	33.4	98.4	36.9
	9°C	129.3	22.7	124.0	24.9	118.5	27.4	112.8	30.3	106.9	33.5	100.9	37.1
	10°C	132.3	22.8	126.9	25.0	121.3	27.5	115.5	30.3	109.5	33.6	103.3	37.2
	11°C	135.2	22.9	129.6	25.0	123.9	27.5	118.0	30.4	111.9	33.7	105.6	37.3
	12°C	137.9	22.9	132.3	25.1	126.5	27.6	120.5	30.5	114.2	33.8	107.8	37.4

Control

The CGWH units can be controlled separately by the SMM module, or integrated into BMS systems via a serial link.

Remote control

Installation Stop/Start:

- This is performed using a switch connected to the SMM (not supplied by Trane). On dual-circuit units, each circuit can be started separately.

Note:

For the chiller to start, the water leaving temperature must be higher than the set point.

Control of the chilled water pump

The SMM starts the chilled water pump as soon as the Start/Stop switch is set to the Start position.

The water pump contactor can be supplied as an optional extra.

On installations with 2 water pumps (one in operation, the other on standby), the 2 contactors can be supplied as optional extras.

If the pump in operation breaks down, the standby pump starts immediately. A switch in the chiller's control panel (when the double pump control option has been selected), makes it possible to change the pumps' start sequence.

Modification of the chilled water set point

The SMM can be configured to automatically modify the chilled water set point according to the evaporator return water temperature. The chilled water set point is increased when the water return temperature drops. This system makes it possible to reduce power consumed by the chiller running on part load.

Automatic sequencing

On sites where 2 or 3 CGWH units are installed in parallel on the same water circuit, it is possible to program the SMM modules to optimise the number of chillers which will operate.

Equipment required

Simply link the SMM modules using a shielded pair cable. This cable is connected to each module's serial link connection.

Programming

When the installation is commissioned, the SMM modules on each unit are programmed so that the unit operates as required.

Modem connection

The SMM is equipped with an RS232 serial link. This link can be connected to a modem (not supplied by Trane) to perform remote monitoring of the unit, via the telephone network.

A maximum of three modules can be connected to a modem.

Integration into a BMS via a serial link

The CGWH units can be integrated into a BMS via a serial link, using an optional communication gateway called TCI-S. The TCI-S gives you an RS 485 or RS 232 serial link with Modbus protocol.

Available information

Status of binary inputs and outputs, such as:

- Number of compressors in operation.
- Chilled water pump in operation.

Analogue data such as:

- Evaporator leaving water temperature.
- Condensation pressure.
- Evaporation pressure.
- Number of hours of operation of each compressor.
- Number of start-ups of each compressor.

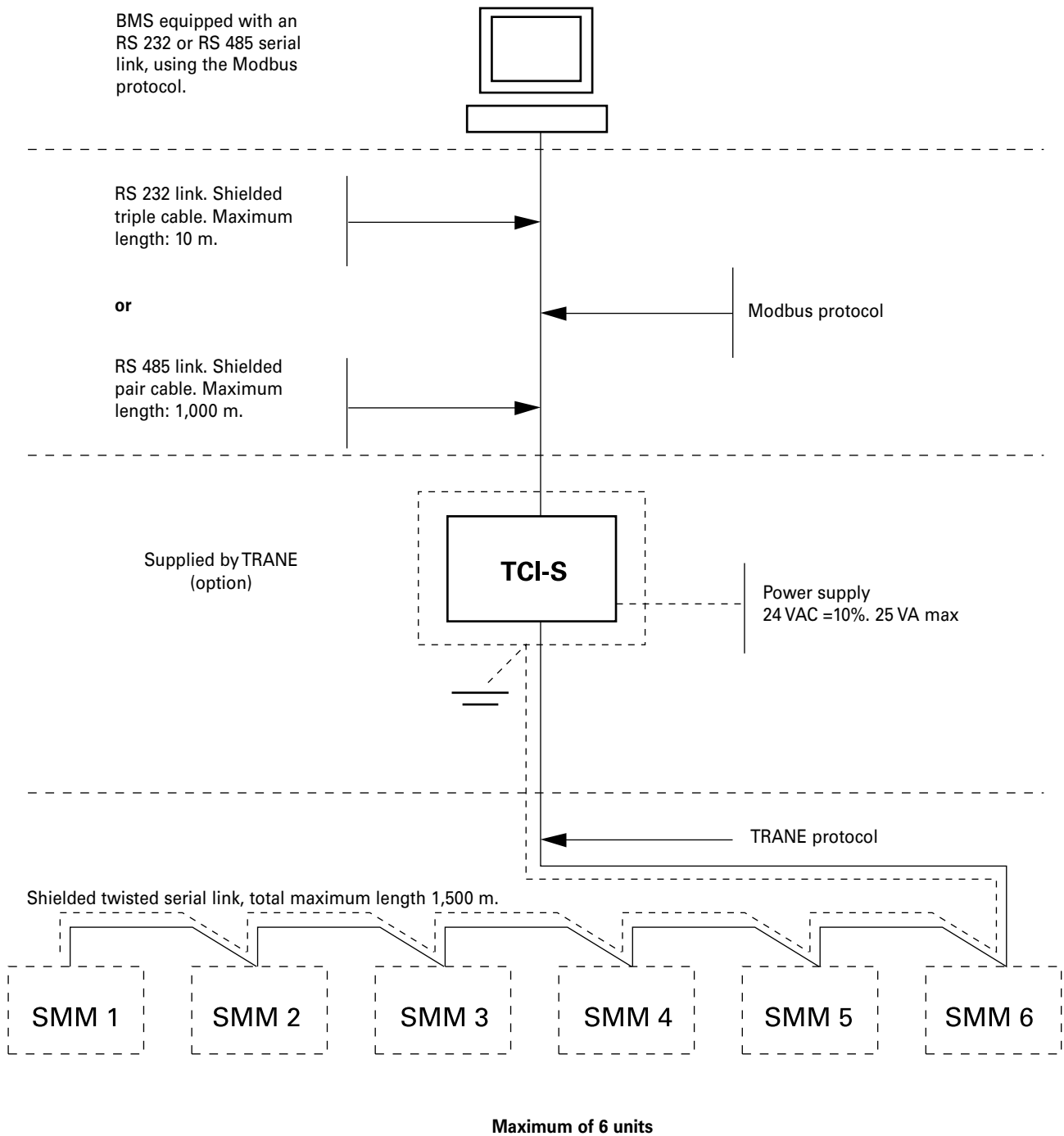
Chiller's operating status

- Chilled water set point.
- Type of fault occurring, if any.

Commands that can be transmitted:

- Remote enable/disable for the unit or a circuit.
- Modification of the chilled water set point.

Equipment required



Pressure Losses

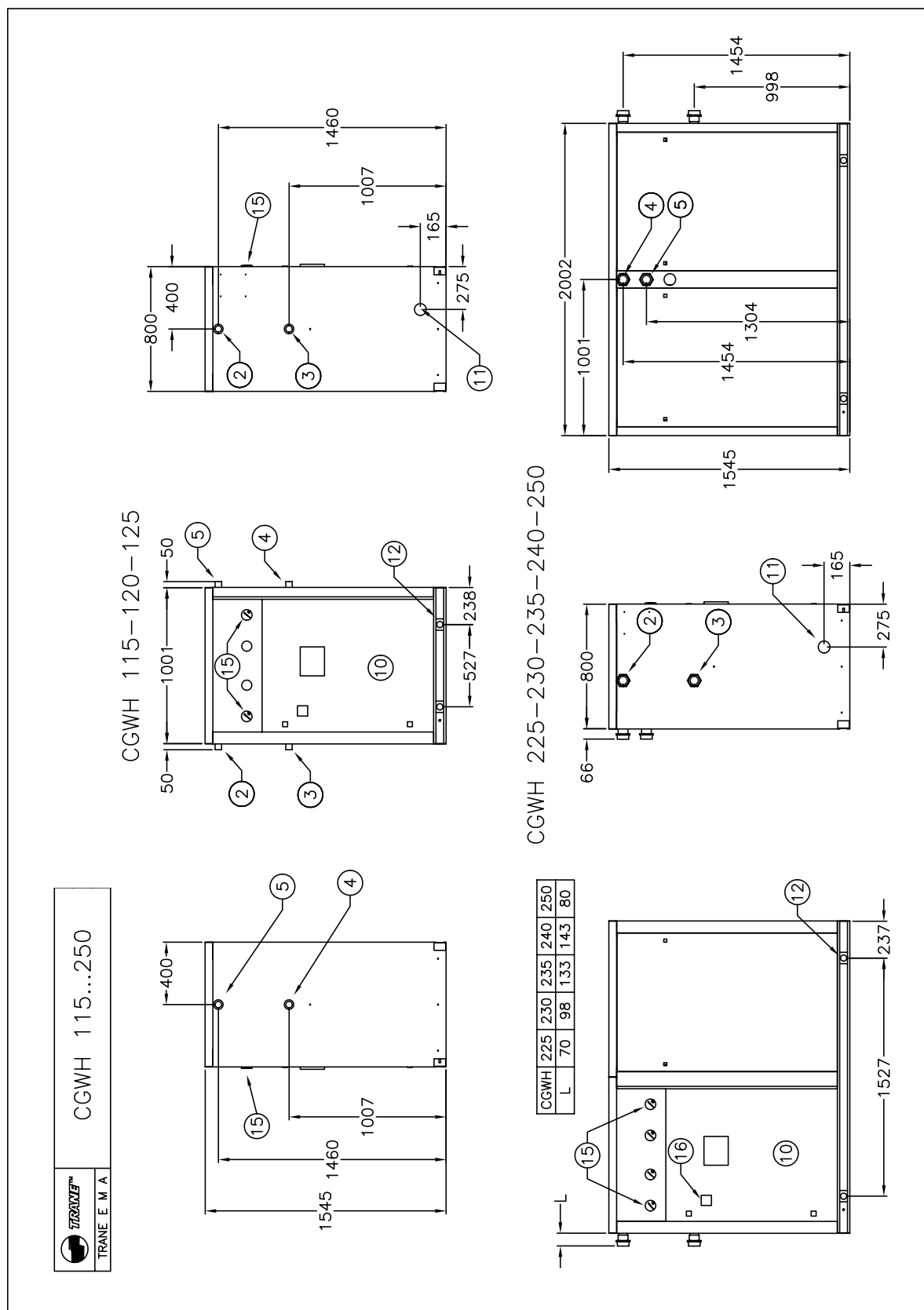
Evaporator pressure drop

ΔP kPa	Water flow - l/s							
	CGWH 115	CGWH 120	CGWH 125	CGWH 225	CGWH 230	CGWH 235	CGWH 240	CGWH 250
10	1.155	1.449	1.736	1.867	2.007	2.163	2.163	2.554
20	1.631	2.045	2.447	2.665	2.862	3.136	3.136	3.725
40	2.301	2.886	3.448	3.805	4.082	4.547	4.547	5.434
60	2.815	3.53	4.215	4.686	5.024	5.651	5.651	6.777
80	3.248	4.072	4.86	5.432	5.822	6.593	6.593	7.926
100	3.629	4.55	5.427	6.092	6.527	7.43	7.43	8.95

Condenser pressure drop

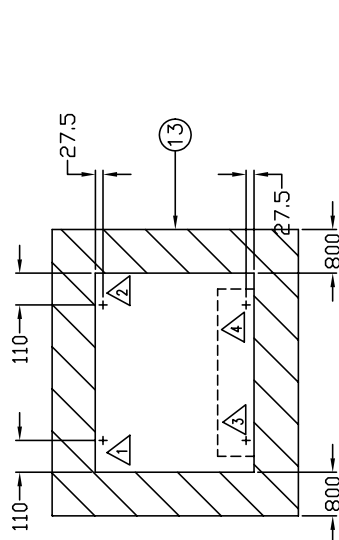
ΔP kPa	Water flow - l/s							
	CGWH 115	CGWH 120	CGWH 125	CGWH 225	CGWH 230	CGWH 235	CGWH 240	CGWH 250
10	1.34	1.681	2.014	2.166	2.328	2.509	2.509	2.963
20	1.892	2.373	2.839	3.092	3.32	3.638	3.638	4.322
40	2.67	3.348	4.001	4.414	4.736	5.275	5.275	6.304
60	3.266	4.095	4.89	5.436	5.829	6.556	6.556	7.862
80	3.768	4.724	5.638	6.302	6.755	7.649	7.649	9.196
100	4.211	5.278	6.297	7.068	7.573	8.621	8.621	10.384

Dimensions





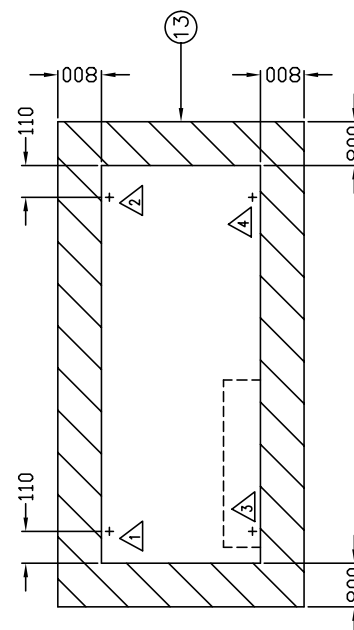
CGWH 115-120-125



REFROIDISSEUR DE LIQUIDE / WASSERKUEHLMASCHINEN / LIQUID CHILLERS
 REFRIGERATORI DI LIQUIDO / WATERKOELMACHINE / ENFRIADOR DE LIQUIDO

SIZE	1	2-3-4-5	6	7	8	9
115	10T+10T	1"1/2	40	5	7.6	412
120	10T+15T	(ISO R7)	50	7	10.4	444
125	15T+15T	MALE	60	9	13.2	476
225	10T+10T	2"	74	5	7.6	668
	15T			5	6.6	
230	10T+15T	(ISO R7)	86	7	10.4	702
	15T			5	6.6	
235	15T+15T	MALE	102	9	13.2	739
	15T			5	6.6	
240	10T+15T	2"1/2	102	7	10.4	803
	10T+15T	(ISO R7)		7	10.4	
250	15T+15T	MALE	134	9	13.2	873
	15T+15T			9	13.2	

CGWH 225-230-235-240-250



SIZE	1	2	3	4
115	107	101	105	99
120	113	120	103	108
125	135	123	114	104
225	136	177	198	157
230	138	187	213	164
235	142	198	227	172
240	175	189	226	213
250	185	205	252	231

CGWH 115...250

FRANCAIS	DEUTSCH	ENGLISH	ITALIANO	NERLANDS	ESPAÑOL
① COMPRESSEUR ② CONNEXION ENTREE EAU EVAPORATEUR ③ CONNEXION SORTIE EAU EVAPORATEUR ④ CONNEXION ENTREE EAU CONDENSEUR ⑤ CONNEXION SORTIE EAU CONDENSEUR ⑥ NOMBRE PLAQUES ECHANGEURS ⑦ CHARGE FLUIDE FRIGORIGENE (kg) ⑧ CHARGE HUILE (LITRES) ⑨ POIDS EN FONCTIONNEMENT (kg) ⑩ ARMOIRE ELECTRIQUE ⑪ ACCES RACCORDEMENT CLIENT ⑫ POINT DE LEVAGE #40 ⑬ AIRE CONSEILLEE POUR MAINTENANCE ⑭ CHARGE PAR POINT	VERDICHTER WASSER ENTRITT VERDAMPFER WASSER AUSTRITT VERDAMPFER WASSER ENTRITT VERFLÜSSIGER WASSER AUSTRITT VERFLÜSSIGER ANZAHL PLATTEN WÄRMETAUSCHER KÄLTEMITTEL FÜLLUNG (KG) ÖLFÜLLUNG (LITER) BETRIEBSGEWICHT (KG) SCHRANK KABELINFÜHRUNG TRANSPORT OEFEN #40 MINDEST WANDABSTAND ZUR WARTUNG PUNKTBELASTUNG	COMPRESSOR EVAPORATOR WATER INLET CONNECTION EVAPORATOR WATER OUTLET CONNECTION CONDENSEUR WATER INLET CONNECTION CONDENSEUR WATER OUTLET CONNECTION HEAT EXCHANGER PLATES NUMBER REFRIGERANT CHARGE (KG) OIL CHARGE (LITRES) OPERATING WEIGHT (KG) ELECTRICAL PANEL POWER SUPPLY INLET RIGGING EYES #40 MINIMUM CLEARANCE FOR MAINTENANCE WEIGHT PER POINT	① COMPRESSORE ② COLLEGAMENTO ACQUA ENTRATA EVAPORATORE ③ COLLEGAMENTO ACQUA USCITA EVAPORATORE ④ COLLEGAMENTO ACQUA ENTRATA CONDENSATORE ⑤ COLLEGAMENTO ACQUA USCITA CONDENSATORE ⑥ NUMERO DE PASTIRE SCAMBIATORE DI CALORE ⑦ REFRIGERANTE (KG) ⑧ OLIO (LITRI) ⑨ PESO UNITA IN FUNZIONE (KG) ⑩ PANNELLO ELETTRICO ⑪ PASSAGGIO ALIMENTAZIONE ELETTRICA ⑫ FORI DI SOLLEVAMENTO #40 ⑬ SPAZI MINIMI RICHIESTI PER LA MANUTENZIONE ⑭ CARICO DI PARTITO	COMPRESSOR VERDAMPER WATERINTEDE AANSLUITING VERDAMPER WATERUITREDE AANSLUITING CONDENSOR WATERINTEDE AANSLUITING CONDENSOR WATERUITREDE AANSLUITING AANTAL PLATEN WARMTEWISSELAAR KOELMIDDEL (KG) OIL (LITER) BEDRIJFSGEWICHT (KG) BESTURINGSPANEEL KABELDOORVOER HUISOGEN #40 MINIMUMAFSTAND VOOR ONDERHOUD GEWICHT PER PUNT	COMPRESOR CONEXION DE ENTRADA DE AGUA AL EVAPORADOR CONEXION DE SALIDA DE AGUA DEL EVAPORADOR CONEXION DE ENTRADA DE AGUA AL CONDENSADOR CONEXION DE SALIDA DE AGUA DEL CONDENSADOR NUMERO DE PLACAS INTERCAMBIADOR DE CALOR REFRIGERANTE (KG) ACEITE (LITROS) PESO EN OPERACION (KG) PANEL ELECTRICO ACCESO CONEXION CLIENTE PUNTOS DE ELEVACION #40 ESPACIO LIBRE PARA MANTENIMIENTO REPARTO DE PESOS
⑮ MANOMETRES ⑯ SECTIONNEUR PUISSANCE	MANOMETER SCHRANK HAUPTSCHALTER	PRESSURE GAUGES POWER DISCONNECT SWITCH	⑮ MANOMETRI ⑯ SEZIONATORE DI POTENZA	/ TOEBEHOREN / MANOMETERS HOOFDSCHAKELAAR	/ OPCIONES MANOMETROS SECCIONADOR DE FUERZA

Electrical characteristics

Electrical characteristics

Unit	Number of 10 T compressors	Size		IN (A)	ID (A)	Control (W)
		Number of 15 T compressors	Number of fans			
115	2	0	1	37	140	800
120	1	1	2	47	194	800
125	0	2	2	57	204	800
225	2	1	2	65.5	212	800
230	1	2	3	75.5	222	800
235	0	3	3	85.5	232	800
240	2	2	4	94	241	800
250	0	4	4	114	261	800

Sound pressure levels

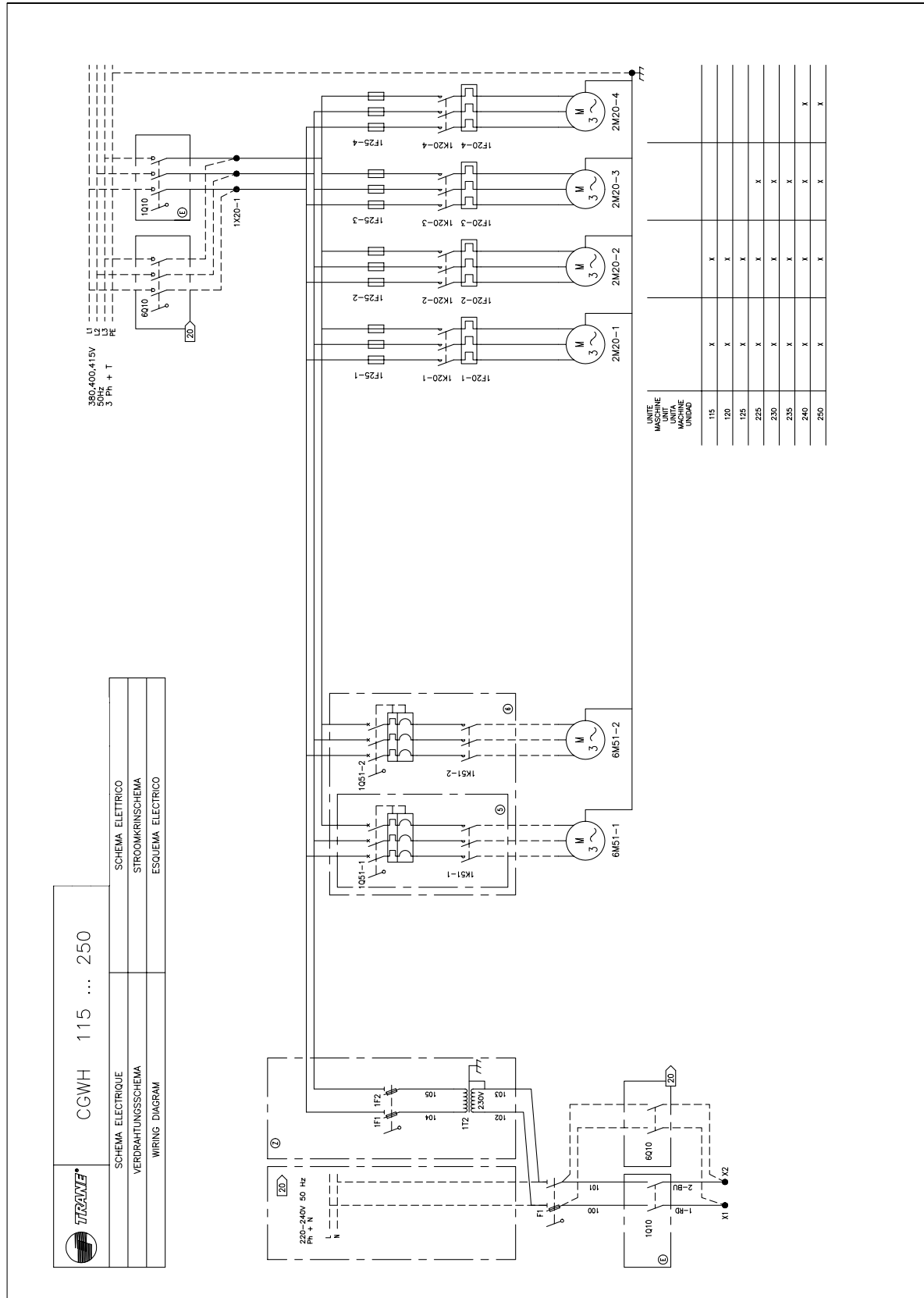
Size	115	120	125	225	230	235
Sound level (dB(A)) (±3 dB(A))	49	55	57	56	58	59

LP (db(A)) at 5 m from the unit under free field conditions and at 1,5 m height.

Weight

Size	Shipping weight (kg)
115	390
120	420
125	450
225	630
230	660
235	680
240	760
250	820

Typical electrical diagrams



Mechanical characteristics

TRANE liquid chillers, water cooled are designed for outdoor operation. The main components are Trane 3-D® Scroll compressors, brazed plate exchangers, painted galvani-sed steel panels. All units are subject to test during manufacture and are fully run tested before shipment.

Trane Compressors

TRANE 3-D® Scroll compressors have simple mechanical design with only three major moving parts. Scroll type compression provides inherently low vibration. 3-D® compliance provides a completely enclosed compression chamber which leads to increased efficiency. Exhaustive testing on the 3-D®

Scroll, including start up with the shell full of liquid, has proven that slug-ging does not fail involutes.

Direct-drive, 3000 rpm, suction gas-cooled hermetic motor. TRANE 3-D® Scroll compressor includes centrifugal oil pump, oil level sightglass and oil charging valve.

Refrigerant circuit

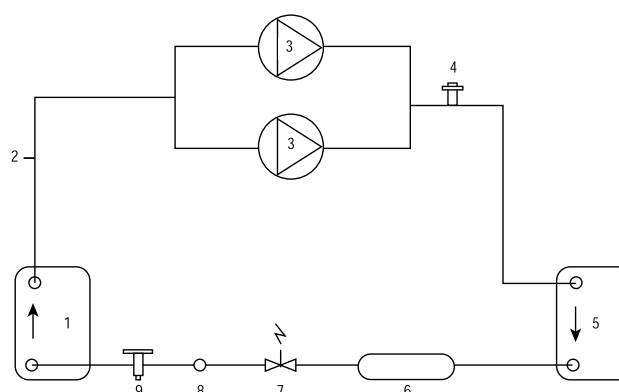
The circuits are assembled, pressure tested, and charged with refrigerant in the factory. Each circuit includes the following components (see next page).

Condenser

One brazed plate type per circuit in stainless steel with copper brazed joints. One refrigerant circuit for sizes 115 to 125, two refrigerant circuits for sizes 225 to 250, water cooled units.

Evaporator

Brazed plate type in stainless steel with copper brazed joints. Water connections pipe thread ISO R7. On units with 2 evapo-rators, (sizes 225 to 250, the connecting water manifold is facto-ry installed. Maximum operating pressure, water side = 1 MPa. Thermal insulation of flexible closed cell polyvinyl based. Provided with heater to avoid freeze-up down to - 18°C.



- 1 Evaporator
- 2 Schraeder
- 3 Compressor
- 4 Safety valve
- 5 Condenser
- 6 Filter dryer
- 7 Solenoid valve
- 8 Sight glass
- 9 Expansion valve

Control Panels

Two separate compartments to avoid magnetic interferences are provided for the SMM module and the electro-mechanical components.

The electro-mechanical compartment contains the compressor contactors, the fan contactors, the overload relays, and the customer connection terminals.

The SMM module provides the following functions :

- Control of the leaving water temperature, and the condensing pressure.
- Control of the various operating modes and the safety parameters. In addition, the module has the following features :
- A liquid crystal display for local communication.
- An input for remote stop/start per circuit.
- One output per circuit indicating that a safety function is activated.
- An analog input for adjustment of the water temperature set point (4/20 mA or 0/10 V).
- Programming function for automatic adjustment of the chilled water setpoint in relation to the outdoor temperature.
- A Modem connection
- A serial link connection.

Factory testing

All CGWH heat pumps are fully run tested before shipment. Unit operation and all controls are thoroughly checked.

Shipment

CGWH ship on a wooden skid with the refrigerant and oil operating charge.

Quality Assurance

The Quality Management System applied by Trane has been subject to independent third party assessment and approval to ISO 9001.

The products described in this catalogue are designed and manufactured in accordance with the approved system requirements as defined in the Trane Quality Manual.

Options

- Copper fins
- Disconnect switch
- Modbus communication interface (TCI-S)
- Sound attenuating enclosure
- Air coil protecting grill
- Water pump contactor(s)

Options

Disconnect switch

Equipped with a contactor which allows to switch off the unit even if it is in operation.

Sound attenuator on the compressors

Provides reduced sound level.

Water pump contactor(s)

Located in electrical panel.
Provides easier installation

TCI-S

Allows to connect to BMS system, via serial link.

Hydraulic module for CGWH 115 to 250

The hydraulic module includes the following components :

Pump

Direct drive, dynamically balanced motor and pump assembly selected by Trane for quiet operation.

Full enclosure, designed to match appearance of unit.

Two pole motor (3000 rpm), class F, IP54 is protected with temperature sensor, automatic reset.

Water tank

The water tank is provided with an internal anti-corrosion protection to ensure long life.

Expansion tank

The expansion tank accommodates volume changes due to temperature changes in the chilled water circuit. It has an internal anti-corrosion protection.

Strainer

Cleanable water strainer to reduce evaporator fouling.

Shut off valves placed before and after the strainer allows for easy maintenance.

Anti-freeze protection

This heater is activated when the outside temperature is lower or equal to 2°C.

Water storage capacity	300 l
Volume of the expansion tank	25 l
Shipping weight	340 kg
Dimensions	
Length	1200 mm
Width	737 mm
Height	1300 mm
Water connection	2 1/2



TRANE®

The Trane Company
An American Standard Company
www.trane.com

For more information contact
your local sales office or
e-mail us at comfort@trane.com



Quality Management System Approval

Literature Order Number	CG-PRC008-GB
Date	0301
	New
Stocking Location	Europe

Since The Trane Company has a policy of continuous product improvement, it reserves the right to change design and specifications without notice.

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