



Liquid Chiller for use with remote condenser

CCUH

48 kW to 147 kW – R 407C

35 kW to 101 kW – R134a





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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.
- Pressure transducer to optimise control of the fans on the remote condenser; and display the evaporation and condensation pressure.
- 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 CCUH 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

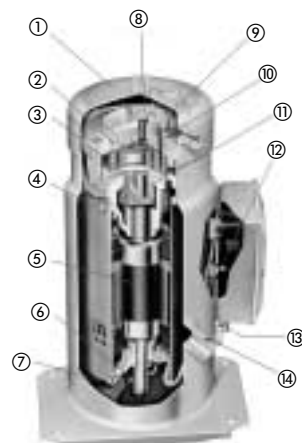
One of the main objectives of the project to redesign the compressors was to reduce energy consumption. 3-D® Scroll. COP has been improved by 10% in the new product range. This has been achieved by introducing an optimised spiral profile, more precise adjustment of components, and less discharge pressure 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 particulate 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

		CCUH 115 R407C	CCUH 120 R407C	CCUH 125 R407C	CCUH 225 R407C	CCUH 230 R407C	CCUH 235 R407C	CCUH 240 R407C	CCUH 250 R407C
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	50.99	63.93	76.78	90.39	102.36	114.53	127.18	153.16
Total Power input in cooling	(kW)	14.95	18.84	22.73	26.13	30.12	33.99	37.59	45.47
Evaporator water pressure drop	(kPa)	38	38	38	44	49	49	59	60
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		Brazed 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
Discharge and liquid connections									
Type		Brazed - Female							
Discharge connection		1 1/8 ODF	1 3/8 ODF	1 3/8 ODF	1 1/8 ODF	1 1/8 ODF	1 3/8 ODF	1 1/8 ODF	1 3/8 ODF
					1 1/8 ODF	1 3/8 ODF	1 3/8 ODF	1 3/8 ODF	1 3/8 ODF
Liquid connection		7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF
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)	389	416	443	626	655	689	757	815
Weight crated	(kg)	405	432	459	657	686	710	788	846

(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

R134a		CCUH 115	CCUH 120	CCUH 125	CCUH 225	CCUH 230	CCUH 235	CCUH 240	CCUH 250
		R134a	R134a	R134a	R134a	R134a	R134a	R134a	R134a
Eurovent Performances (1)									
Net Cooling Capacity	(kW)	36.69	45.34	53.79	64.22	72.02	79.86	89.76	106.26
Total Power input in cooling	(kW)	10.66	13.21	15.86	18.35	21	23.53	26.12	31.31
Evaporator water pressure drop	(kPa)	19	19	19	22	24	25	31	30
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)	133	188	195	200	207	214	220	234
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		Brazed 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
Discharge and liquid connections									
Type		Brazed - Female							
Discharge connection		1 1/8 ODF	1 3/8 ODF	1 3/8 ODF	1 1/8 ODF 1 1/8 ODF	1 1/8 ODF 1 3/8 ODF	1 3/8 ODF 1 3/8 ODF	1 1/8 ODF 1 3/8 ODF	1 3/8 ODF 1 3/8 ODF
Liquid connection		7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF	7/8 ODF
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)	389	416	443	626	655	689	757	815
Weight crated	(kg)	405	432	459	657	686	710	788	846

(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.

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 an 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.

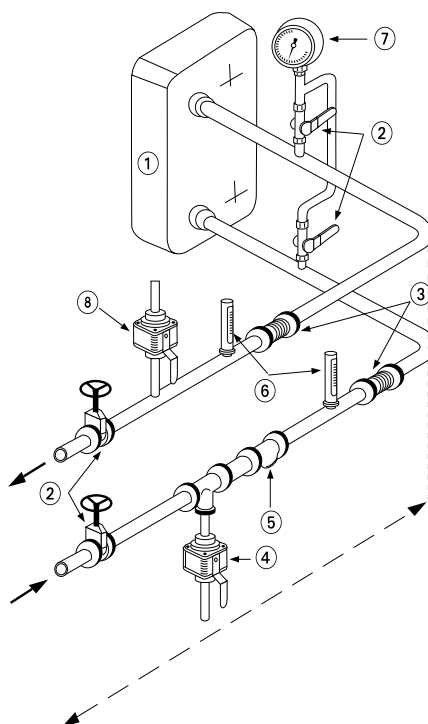
Flow rate limits

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.

Evaporator water connection



- ① Evaporator or condenser
- ② Stop valves
- ③ Flexible connection
- ④ Draining
- ⑤ Strainer
- ⑥ Thermometers
- ⑦ Pressure gauge

Selection Procedure

The capacity ratings indicated in the "Performance" section cover the most frequently used temperatures to select the machines. The conditions for the power ratings given in these tables are as follows:

- Fouling factor = 0.044 m².K/kW.
- Exchanger delta T between: 4°C and 8°C.

To select a condenserless chiller, the following data must be available:

- Type of refrigerant used.
- Capacity required.
- Chilled water return and leaving temperature.
- Condenser saturation temperature.

The water flow rate in the exchange is calculated using the following formula:

$$\text{Flow rate (l/s)} = \frac{[\text{Power (kW)} \times 0.239]}{\Delta T (^{\circ}\text{C})}$$

Example of selection

Data:

- R407C fluid.
- Capacity required: 100 kW.
- Chilled water leaving temperature = +7°C.
- Chilled water return temperature = +12°C.
- Condenser saturation temperature = 50°C.
- Liquid temperature: 50°C.

The values given in the capacity tables do not take account of sub-cooling.

1. Selection of the machine size

The tables in the "Performance" section indicate that a CCUH 230 provides 97.9 kW and consumes 32.4 kW in the above conditions.

2. Calculation of the flow rate

$$\text{Flow rate (l/s)} = \frac{[97.9 \times 0.239]}{5}$$

$$\text{Flow rate (l/s)} = 4.67$$

3. Calculation of water pressure losses in the exchanger.

The graph in the "Pressure Losses" section shows that for a flow rate of 4.67 l/s, a CCUH 230 has a pressure loss of 38.16 Kpa

Selection with ethylene glycol

When ethylene glycol is added to the chilled water circuit, the following correction factors must be applied to the water flow rate, pressure losses, power input and cooling capacity.

Chilled water leaving temperature	EG content (%)	Correction Factors			
		Water flow rate	Pressure loss	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.

$$\text{Water flow rate} = 4.67 \times 1.11 = 5.18 \text{ l/s}$$

$$\text{Pressure losses} = 38.16 \times 1.24 = 47.31 \text{ kPa}$$

$$\text{Power input} = 32.4 \times 1.005 = 32.56 \text{ kW}$$

$$\text{Cooling capacity} = 97.9 \times 0.97 = 94.96 \text{ kW}$$

Performance R407C

CCUH 115 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	27.7	10.3	26.6	11.3	25.3	12.6	23.9	14.2	22.4	16.0	§§	§§
33%	-8°C	33.1	10.4	31.7	11.4	30.3	12.7	28.7	14.2	26.9	16.1	25.0	18.2
27%	-4°C	39.0	10.4	37.5	11.4	35.8	12.7	34.0	14.2	32.0	16.1	29.8	18.2
20%	0°C	45.5	10.4	43.8	11.4	41.9	12.7	39.8	14.2	37.6	16.1	35.2	18.2
10%	4°C	52.5	10.4	50.6	11.4	48.5	12.6	46.2	14.2	43.7	16.0	41.1	18.2
	5°C	54.5	10.4	52.5	11.4	50.4	12.6	48.1	14.2	45.5	16.0	42.8	18.2
	6°C	56.2	10.4	54.2	11.4	52.1	12.6	49.7	14.2	47.1	16.0	44.3	18.1
	7°C	58.0	10.4	56.0	11.4	53.7	12.6	51.3	14.2	48.6	16.0	45.8	18.1
	8°C	59.8	10.4	57.7	11.4	55.4	12.6	52.9	14.1	50.2	16.0	47.3	18.1
	9°C	61.6	10.4	59.4	11.4	57.1	12.6	54.6	14.1	51.8	16.0	48.9	18.1
	10°C	63.4	10.4	61.2	11.4	58.8	12.6	56.3	14.1	53.4	16.0	50.4	18.1
	11°C	65.2	10.4	63.0	11.3	60.6	12.6	57.9	14.1	55.1	15.9	52.0	18.1
	12°C	67.0	10.4	64.8	11.3	62.3	12.6	59.6	14.1	56.7	15.9	53.5	18.1

CCUH 120 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	35.1	12.9	33.6	14.2	31.9	15.9	30.2	17.8	28.4	20.0	§§	§§
33%	-8°C	41.8	13.0	40.0	14.3	38.1	15.9	36.1	17.9	34.0	20.1	31.8	22.7
27%	-4°C	49.1	13.1	47.2	14.4	45.1	16.0	42.8	17.9	40.4	20.2	37.8	22.7
20%	0°C	57.2	13.1	55.0	14.4	52.6	16.0	50.1	17.9	47.4	20.2	44.4	22.8
10%	4°C	65.8	13.1	63.4	14.4	60.8	16.0	58.0	17.9	55.0	20.2	51.7	22.8
	5°C	68.3	13.2	65.9	14.4	63.2	16.0	60.3	17.9	57.2	20.2	53.8	22.8
	6°C	70.5	13.2	68.0	14.4	65.3	16.0	62.3	17.9	59.1	20.2	55.7	22.8
	7°C	72.7	13.2	70.1	14.4	67.4	16.0	64.3	17.9	61.1	20.2	57.6	22.8
	8°C	74.9	13.2	72.3	14.4	69.5	16.0	66.4	17.9	63.0	20.2	59.4	22.8
	9°C	77.1	13.2	74.5	14.4	71.6	16.0	68.4	17.9	65.0	20.2	61.3	22.8
	10°C	79.4	13.2	76.7	14.4	73.7	16.0	70.5	17.9	67.0	20.2	63.3	22.8
	11°C	81.6	13.2	78.9	14.4	75.8	16.0	72.6	17.9	69.0	20.2	65.2	22.8
	12°C	83.9	13.2	81.0	14.4	78.0	16.0	74.6	17.9	71.0	20.2	67.1	22.8

CCUH 125 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	42.6	15.5	40.6	17.1	38.5	19.1	36.4	21.4	34.3	24.0	§§	§§
33%	-8°C	50.4	15.7	48.3	17.3	46.0	19.2	43.6	21.5	41.1	24.1	38.5	27.1
27%	-4°C	59.2	15.7	56.8	17.3	54.3	19.3	51.6	21.6	48.7	24.2	45.7	27.2
20%	0°C	68.8	15.8	66.1	17.4	63.3	19.3	60.3	21.7	57.1	24.3	53.6	27.3
10%	4°C	79.1	15.9	76.2	17.5	73.1	19.4	69.8	21.7	66.2	24.4	62.3	27.4
	5°C	82.1	15.9	79.2	17.5	76.0	19.4	72.5	21.7	68.8	24.4	64.8	27.4
	6°C	84.7	15.9	81.7	17.5	78.4	19.4	74.9	21.7	71.1	24.4	67.0	27.4
	7°C	87.3	15.9	84.2	17.5	80.9	19.4	77.3	21.7	73.4	24.4	69.2	27.5
	8°C	89.9	15.9	86.8	17.5	83.4	19.4	79.7	21.7	75.7	24.4	71.5	27.5
	9°C	92.6	15.9	89.4	17.5	85.9	19.4	82.1	21.8	78.1	24.4	73.7	27.5
	10°C	95.2	15.9	92.0	17.5	88.4	19.4	84.6	21.8	80.4	24.4	76.0	27.5
	11°C	97.9	15.9	94.6	17.5	90.9	19.5	87.0	21.8	82.8	24.4	78.2	27.5
	12°C	100.6	15.9	97.2	17.5	93.5	19.5	89.5	21.8	85.1	24.5	80.5	27.5

CCUH 225 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	49.0	18.1	46.9	19.9	44.6	22.2	42.2	24.9	39.6	28.1	§§	§§
33%	-8°C	58.5	18.2	56.0	20.0	53.4	22.3	50.6	25.0	47.5	28.1	44.3	31.8
27%	-4°C	69.1	18.3	66.3	20.1	63.3	22.3	60.1	25.0	56.6	28.2	52.9	31.8
20%	0°C	80.7	18.3	77.6	20.1	74.2	22.3	70.6	25.0	66.6	28.2	62.4	31.9
10%	4°C	93.1	18.4	89.7	20.1	86.0	22.3	82.0	25.0	77.6	28.2	72.9	31.9
	5°C	96.8	18.4	93.3	20.1	89.4	22.3	85.3	25.0	80.8	28.2	76.0	31.9
	6°C	99.9	18.4	96.3	20.1	92.4	22.3	88.1	25.0	83.5	28.2	78.6	31.9
	7°C	103.0	18.4	99.3	20.1	95.3	22.3	91.0	25.0	86.3	28.2	81.3	31.9
	8°C	106.1	18.4	102.4	20.1	98.3	22.3	93.9	25.0	89.1	28.2	83.9	31.9
	9°C	109.3	18.4	105.5	20.1	101.3	22.3	96.8	25.0	91.9	28.2	86.6	31.9
	10°C	112.5	18.4	108.6	20.1	104.3	22.3	99.7	25.0	94.7	28.2	89.4	31.8
	11°C	115.7	18.4	111.7	20.1	107.4	22.3	102.7	25.0	97.6	28.2	92.1	31.8
	12°C	118.8	18.4	114.8	20.1	110.4	22.3	105.6	25.0	100.4	28.2	94.8	31.8

CCUH 230 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	56.1	20.7	53.5	22.8	50.9	25.4	48.1	28.5	45.2	32.0	§§	§§
33%	-8°C	66.7	20.8	63.8	22.9	60.8	25.5	57.6	28.6	54.2	32.2	50.7	36.2
27%	-4°C	78.7	20.9	75.5	23.0	72.0	25.6	68.4	28.7	64.5	32.3	60.4	36.3
20%	0°C	91.7	21.0	88.2	23.1	84.3	25.7	80.2	28.8	75.9	32.3	71.2	36.4
10%	4°C	105.8	21.1	101.9	23.1	97.6	25.7	93.1	28.8	88.2	32.4	82.9	36.5
	5°C	109.8	21.1	105.8	23.2	101.5	25.7	96.8	28.8	91.7	32.4	86.3	36.5
	6°C	113.3	21.1	109.2	23.2	104.8	25.7	100.0	28.8	94.8	32.4	89.3	36.5
	7°C	116.8	21.1	112.6	23.2	108.1	25.7	103.2	28.8	97.9	32.4	92.2	36.5
	8°C	120.3	21.1	116.0	23.2	111.4	25.7	106.4	28.8	101.0	32.4	95.2	36.5
	9°C	123.8	21.1	119.4	23.2	114.7	25.7	109.6	28.8	104.1	32.4	98.2	36.5
	10°C	127.3	21.1	122.9	23.2	118.1	25.7	112.9	28.8	107.2	32.4	101.2	36.5
	11°C	130.8	21.1	126.3	23.2	121.4	25.7	116.1	28.8	110.3	32.4	104.2	36.5
	12°C	134.4	21.1	129.8	23.2	124.7	25.7	119.3	28.8	113.4	32.4	107.1	36.5

CCUH 235 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	63.2	23.3	60.2	25.7	57.2	28.6	54.1	32.1	50.9	36.0	§§	§§
33%	-8°C	75.1	23.5	71.8	25.9	68.4	28.8	64.8	32.2	61.0	36.2	57.1	40.7
27%	-4°C	88.5	23.6	84.8	26.0	80.9	28.9	76.9	32.4	72.5	36.3	68.0	40.8
20%	0°C	103.0	23.7	99.0	26.1	94.7	29.0	90.1	32.5	85.2	36.5	80.0	41.0
10%	4°C	118.6	23.8	114.2	26.2	109.4	29.1	104.3	32.6	98.9	36.6	93.0	41.1
	5°C	123.1	23.8	118.6	26.2	113.7	29.1	108.4	32.6	102.8	36.6	96.8	41.1
	6°C	126.9	23.8	122.3	26.2	117.3	29.1	111.9	32.6	106.2	36.6	100.0	41.1
	7°C	130.7	23.8	126.0	26.2	120.9	29.1	115.4	32.6	109.5	36.6	103.2	41.2
	8°C	134.6	23.8	129.8	26.2	124.6	29.1	119.0	32.6	112.9	36.6	106.5	41.2
	9°C	138.4	23.9	133.5	26.2	128.2	29.2	122.5	32.6	116.3	36.6	109.7	41.2
	10°C	142.3	23.9	137.3	26.2	131.8	29.2	126.0	32.6	119.7	36.6	112.9	41.2
	11°C	146.1	23.9	141.0	26.2	135.5	29.2	129.5	32.6	123.1	36.7	116.2	41.2
	12°C	149.9	23.9	144.7	26.2	139.0	29.2	132.9	32.6	126.4	36.7	119.4	41.2

CCUH 240 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	70.3	25.8	67.1	28.5	63.8	31.7	60.4	35.6	56.8	40.1	55	55
33%	-8°C	83.6	26.0	80.1	28.6	76.3	31.9	72.3	35.7	68.0	40.2	63.5	45.3
27%	-4°C	98.6	26.1	94.6	28.7	90.3	31.9	85.7	35.8	80.8	40.3	75.6	45.4
20%	0°C	114.7	26.2	110.3	28.8	105.5	32.0	100.4	35.9	94.9	40.4	88.9	45.5
10%	4°C	132.0	26.3	127.1	28.8	121.8	32.0	116.1	35.9	110.0	40.4	103.4	45.6
	5°C	136.9	26.3	131.9	28.8	126.5	32.0	120.7	35.9	114.3	40.4	107.6	45.6
	6°C	141.1	26.3	136.0	28.8	130.5	32.0	124.5	35.9	118.1	40.4	111.1	45.6
	7°C	145.4	26.3	140.2	28.8	134.5	32.0	128.4	35.9	121.8	40.4	114.7	45.6
	8°C	149.6	26.3	144.3	28.8	138.5	32.0	132.3	35.9	125.5	40.4	118.3	45.6
	9°C	153.8	26.3	148.4	28.8	142.5	32.0	136.1	35.9	129.3	40.4	121.9	45.6
	10°C	158.0	26.3	152.5	28.8	146.5	32.0	140.0	35.9	133.0	40.4	125.4	45.6
	11°C	162.2	26.3	156.6	28.8	150.4	32.0	143.8	35.9	136.7	40.4	129.0	45.6
	12°C	166.4	26.3	160.6	28.8	154.4	32.0	147.6	35.9	140.3	40.4	132.5	45.6

CCUH 250 - STD/R407C

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	86.1	31.1	82.0	34.3	77.9	38.2	73.6	42.8	69.3	48.0	55	55
33%	-8°C	102.2	31.3	97.7	34.5	93.0	38.4	88.1	43.0	83.0	48.3	77.7	54.2
27%	-4°C	120.1	31.5	115.1	34.7	109.9	38.6	104.3	43.2	98.4	48.5	92.2	54.5
20%	0°C	139.4	31.6	133.9	34.8	128.1	38.7	121.9	43.3	115.3	48.6	108.2	54.7
10%	4°C	159.8	31.7	153.8	34.9	147.4	38.8	140.5	43.4	133.1	48.8	125.2	54.8
	5°C	165.5	31.8	159.4	34.9	152.8	38.8	145.7	43.4	138.1	48.8	130.0	54.8
	6°C	170.4	31.8	164.2	34.9	157.4	38.8	150.2	43.5	142.4	48.8	134.1	54.9
	7°C	175.3	31.8	168.9	35.0	162.1	38.9	154.7	43.5	146.7	48.8	138.3	54.9
	8°C	180.2	31.8	173.7	35.0	166.6	38.9	159.1	43.5	151.0	48.8	142.3	54.9
	9°C	185.0	31.8	178.3	35.0	171.2	38.9	163.5	43.5	155.2	48.9	146.4	54.9
	10°C	189.7	31.8	183.0	35.0	175.6	38.9	167.8	43.5	159.3	48.9	150.3	55.0
	11°C	194.4	31.8	187.5	35.0	180.0	38.9	172.0	43.5	163.4	48.9	154.3	55.0
	12°C	199.0	31.8	191.9	35.0	184.3	38.9	176.2	43.5	167.4	48.9	158.1	55.0

Performance R134a

CCUH 115 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	19.6	7.3	18.8	8.1	17.8	9.0	16.9	10.0	15.8	11.2	14.8	12.4
33%	-8°C	23.6	7.3	22.6	8.1	21.5	9.0	20.3	10.1	19.1	11.2	17.8	12.5
27%	-4°C	28.0	7.3	26.8	8.1	25.5	9.0	24.2	10.1	22.8	11.2	21.3	12.5
20%	0°C	32.8	7.3	31.4	8.1	30.0	9.0	28.5	10.1	26.9	11.3	25.2	12.6
10%	4°C	38.0	7.3	36.4	8.1	34.8	9.0	33.1	10.1	31.3	11.3	29.5	12.6
	5°C	39.4	7.3	37.8	8.1	36.2	9.0	34.4	10.1	32.6	11.3	30.7	12.6
	6°C	40.7	7.3	39.1	8.1	37.4	9.0	35.6	10.1	33.7	11.3	31.7	12.6
	7°C	42.0	7.3	40.4	8.1	38.6	9.0	36.8	10.1	34.9	11.3	32.8	12.6
	8°C	43.4	7.3	41.7	8.1	39.9	9.0	38.0	10.1	36.0	11.3	34.0	12.6
	9°C	44.7	7.3	42.9	8.1	41.1	9.0	39.2	10.1	37.2	11.2	35.1	12.6
	10°C	46.0	7.2	44.2	8.0	42.4	9.0	40.4	10.0	38.4	11.2	36.2	12.6
	11°C	47.3	7.2	45.5	8.0	43.6	9.0	41.6	10.0	39.5	11.2	37.3	12.6
	12°C	48.7	7.2	46.8	8.0	44.9	9.0	42.9	10.0	40.7	11.2	38.4	12.6

CCUH 120 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	24.2	9.2	23.1	10.1	22.0	11.2	20.8	12.4	19.6	13.7	18.4	15.2
33%	-8°C	29.1	9.3	27.8	10.2	26.4	11.3	25.0	12.5	23.6	13.8	22.1	15.3
27%	-4°C	34.6	9.3	33.0	10.2	31.5	11.3	29.8	12.5	28.1	13.9	26.4	15.4
20%	0°C	40.5	9.3	38.8	10.3	37.0	11.3	35.1	12.6	33.2	14.0	31.2	15.5
10%	4°C	46.9	9.3	45.0	10.3	43.0	11.4	40.9	12.6	38.7	14.0	36.4	15.6
	5°C	48.7	9.3	46.7	10.3	44.7	11.4	42.5	12.6	40.3	14.0	37.9	15.6
	6°C	50.3	9.3	48.3	10.3	46.2	11.4	44.0	12.6	41.7	14.0	39.3	15.6
	7°C	51.9	9.3	49.9	10.3	47.7	11.4	45.4	12.6	43.1	14.0	40.6	15.6
	8°C	53.6	9.3	51.5	10.3	49.2	11.4	46.9	12.6	44.5	14.0	42.0	15.6
	9°C	55.2	9.3	53.1	10.3	50.8	11.4	48.4	12.6	45.9	14.0	43.4	15.6
	10°C	56.9	9.3	54.7	10.3	52.3	11.4	49.9	12.6	47.4	14.0	44.7	15.6
	11°C	58.5	9.3	56.3	10.3	53.9	11.4	51.4	12.6	48.8	14.0	46.1	15.6
	12°C	60.2	9.3	57.9	10.3	55.5	11.4	52.9	12.6	50.3	14.0	47.5	15.6

CCUH 125 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	28.7	11.1	27.5	12.2	26.2	13.4	24.8	14.7	23.4	16.3	22.0	18.0
33%	-8°C	34.6	11.2	33.0	12.3	31.4	13.5	29.8	14.9	28.1	16.4	26.3	18.2
27%	-4°C	41.1	11.3	39.3	12.3	37.4	13.6	35.4	15.0	33.5	16.6	31.4	18.3
20%	0°C	48.2	11.3	46.1	12.4	44.0	13.7	41.7	15.1	39.5	16.7	37.1	18.4
10%	4°C	55.8	11.4	53.5	12.5	51.1	13.7	48.6	15.1	46.0	16.7	43.3	18.5
	5°C	57.9	11.4	55.5	12.5	53.1	13.7	50.5	15.1	47.8	16.8	45.1	18.6
	6°C	59.8	11.4	57.4	12.5	54.9	13.7	52.2	15.2	49.5	16.8	46.7	18.6
	7°C	61.8	11.4	59.3	12.5	56.7	13.7	54.0	15.2	51.2	16.8	48.3	18.6
	8°C	63.7	11.4	61.1	12.5	58.5	13.7	55.7	15.2	52.9	16.8	49.9	18.6
	9°C	65.6	11.4	63.0	12.5	60.3	13.7	57.5	15.2	54.6	16.8	51.5	18.6
	10°C	67.6	11.4	64.9	12.5	62.2	13.7	59.3	15.2	56.3	16.8	53.1	18.6
	11°C	69.5	11.4	66.8	12.5	64.0	13.7	61.0	15.2	58.0	16.8	54.8	18.6
	12°C	71.4	11.4	68.7	12.5	65.8	13.7	62.8	15.2	59.7	16.8	56.4	18.6

CCUH 225 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	34.0	12.9	32.5	14.2	30.9	15.7	29.3	17.4	27.6	19.3	25.8	21.4
33%	-8°C	41.0	12.9	39.2	14.3	37.2	15.8	35.2	17.5	33.2	19.4	31.0	21.6
27%	-4°C	48.8	13.0	46.7	14.3	44.4	15.8	42.1	17.6	39.6	19.5	37.1	21.7
20%	0°C	57.4	13.0	54.9	14.3	52.3	15.9	49.7	17.6	46.9	19.6	44.0	21.8
10%	4°C	66.6	13.0	63.8	14.3	60.9	15.9	57.9	17.7	54.8	19.6	51.6	21.8
	5°C	69.2	13.0	66.3	14.3	63.4	15.9	60.3	17.7	57.0	19.6	53.7	21.9
	6°C	71.4	13.0	68.5	14.3	65.5	15.9	62.3	17.7	59.0	19.7	55.6	21.9
	7°C	73.7	13.0	70.8	14.3	67.7	15.9	64.4	17.7	61.0	19.7	57.5	21.9
	8°C	76.0	13.0	73.0	14.3	69.8	15.9	66.5	17.7	63.0	19.7	59.4	21.9
	9°C	78.3	13.0	75.2	14.3	72.0	15.9	68.6	17.7	65.1	19.7	61.4	21.9
	10°C	80.6	13.0	77.5	14.3	74.2	15.9	70.7	17.6	67.1	19.7	63.3	21.9
	11°C	82.9	12.9	79.7	14.3	76.3	15.9	72.8	17.6	69.1	19.7	65.2	21.9
	12°C	85.2	12.9	81.9	14.3	78.5	15.8	74.9	17.6	71.1	19.7	67.1	21.9

CCUH 230 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	38.3	14.8	36.6	16.2	34.9	17.9	33.0	19.8	31.1	21.8	29.2	24.2
33%	-8°C	46.1	14.9	44.1	16.3	41.9	18.0	39.7	19.9	37.4	22.0	35.0	24.4
27%	-4°C	55.0	15.0	52.5	16.4	50.0	18.1	47.4	20.0	44.7	22.2	41.9	24.6
20%	0°C	64.6	15.0	61.8	16.5	58.9	18.2	55.9	20.1	52.8	22.3	49.6	24.7
10%	4°C	74.9	15.0	71.8	16.5	68.5	18.2	65.1	20.2	61.6	22.4	58.0	24.8
	5°C	77.8	15.0	74.6	16.5	71.2	18.2	67.7	20.2	64.1	22.4	60.3	24.8
	6°C	80.3	15.0	77.0	16.5	73.6	18.2	70.0	20.2	66.3	22.4	62.5	24.9
	7°C	82.8	15.0	79.5	16.5	76.0	18.2	72.3	20.2	68.5	22.4	64.6	24.9
	8°C	85.4	15.0	81.9	16.5	78.4	18.2	74.6	20.2	70.7	22.4	66.7	24.9
	9°C	87.9	15.0	84.4	16.5	80.7	18.2	76.9	20.2	73.0	22.4	68.8	24.9
	10°C	90.4	15.0	86.9	16.5	83.1	18.2	79.2	20.2	75.1	22.4	70.9	24.9
	11°C	92.9	15.0	89.3	16.5	85.5	18.2	81.5	20.2	77.3	22.4	73.0	24.9
	12°C	95.4	15.0	91.7	16.5	87.8	18.2	83.7	20.2	79.5	22.4	75.0	24.9

CCUH 235 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	42.6	16.6	40.8	18.2	38.8	20.0	36.8	22.1	34.7	24.4	32.6	26.9
33%	-8°C	51.3	16.8	49.0	18.4	46.6	20.2	44.2	22.3	41.6	24.6	39.0	27.2
27%	-4°C	61.2	16.9	58.4	18.5	55.6	20.4	52.7	22.5	49.7	24.8	46.6	27.4
20%	0°C	71.9	17.0	68.7	18.6	65.5	20.5	62.2	22.6	58.7	25.0	55.1	27.6
10%	4°C	83.2	17.1	79.7	18.7	76.1	20.5	72.3	22.7	68.4	25.1	64.4	27.8
	5°C	86.4	17.1	82.8	18.7	79.0	20.6	75.2	22.7	71.1	25.1	67.0	27.8
	6°C	89.2	17.1	85.5	18.7	81.6	20.6	77.7	22.7	73.5	25.1	69.3	27.8
	7°C	91.9	17.1	88.2	18.7	84.2	20.6	80.2	22.7	75.9	25.2	71.5	27.9
	8°C	94.7	17.1	90.8	18.7	86.8	20.6	82.7	22.7	78.3	25.2	73.8	27.9
	9°C	97.4	17.1	93.5	18.7	89.4	20.6	85.1	22.8	80.7	25.2	76.1	27.9
	10°C	100.1	17.1	96.1	18.7	91.9	20.6	87.6	22.8	83.0	25.2	78.3	27.9
	11°C	102.8	17.1	98.7	18.7	94.4	20.6	90.0	22.8	85.3	25.2	80.5	27.9
	12°C	105.4	17.1	101.2	18.7	96.8	20.6	92.3	22.8	87.6	25.2	82.7	27.9

CCUH 240 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	48.5	18.4	46.3	20.3	44.1	22.4	41.8	24.8	39.3	27.4	36.8	30.4
33%	-8°C	58.3	18.5	55.7	20.4	53.0	22.5	50.1	24.9	47.2	27.6	44.2	30.6
27%	-4°C	69.3	18.6	66.2	20.5	63.1	22.6	59.7	25.1	56.3	27.8	52.8	30.8
20%	0°C	81.2	18.7	77.7	20.5	74.1	22.7	70.3	25.2	66.4	27.9	62.3	31.0
10%	4°C	93.8	18.7	89.9	20.5	85.8	22.7	81.6	25.2	77.2	28.0	72.6	31.1
	5°C	97.3	18.7	93.2	20.5	89.1	22.7	84.7	25.2	80.2	28.0	75.4	31.1
	6°C	100.3	18.7	96.2	20.5	91.9	22.7	87.4	25.2	82.8	28.0	78.0	31.1
	7°C	103.3	18.7	99.1	20.5	94.7	22.7	90.2	25.2	85.4	28.0	80.5	31.1
	8°C	106.3	18.7	102.0	20.5	97.5	22.7	92.9	25.2	88.0	28.0	82.9	31.2
	9°C	109.3	18.7	104.9	20.5	100.3	22.7	95.5	25.2	90.6	28.0	85.4	31.2
	10°C	112.2	18.7	107.7	20.5	103.0	22.7	98.2	25.2	93.1	28.0	87.8	31.2
	11°C	115.0	18.6	110.5	20.5	105.7	22.7	100.8	25.2	95.6	28.0	90.2	31.2
	12°C	117.8	18.6	113.2	20.5	108.3	22.7	103.3	25.2	98.0	28.0	92.5	31.2

CCUH 250 - STD/R134a

		Sat discharge temp											
		30°C		35°C		40°C		45°C		50°C		55°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	58.1	22.2	55.5	24.3	52.8	26.8	50.1	29.5	47.2	32.6	44.3	35.9
33%	-8°C	69.9	22.4	66.7	24.5	63.4	27.0	60.1	29.8	56.6	32.9	53.0	36.3
27%	-4°C	83.0	22.6	79.3	24.7	75.4	27.2	71.5	30.0	67.4	33.1	63.2	36.6
20%	0°C	97.1	22.7	92.9	24.8	88.5	27.3	84.0	30.1	79.3	33.3	74.5	36.9
10%	4°C	111.8	22.8	107.0	24.9	102.1	27.4	97.1	30.3	91.8	33.5	86.4	37.1
	5°C	115.7	22.8	110.9	24.9	105.8	27.4	100.6	30.3	95.2	33.5	89.6	37.1
	6°C	119.2	22.8	114.2	24.9	109.0	27.4	103.7	30.3	98.2	33.5	92.4	37.1
	7°C	122.6	22.8	117.5	24.9	112.2	27.4	106.8	30.3	101.1	33.6	95.2	37.2
	8°C	125.9	22.8	120.7	24.9	115.3	27.5	109.7	30.3	104.0	33.6	98.0	37.2
	9°C	129.1	22.8	123.8	25.0	118.4	27.5	112.7	30.3	106.8	33.6	100.6	37.2
	10°C	132.3	22.8	126.9	25.0	121.3	27.5	115.5	30.4	109.5	33.6	103.2	37.2
	11°C	135.3	22.8	129.8	25.0	124.1	27.5	118.2	30.4	112.1	33.6	105.7	37.2
	12°C	138.2	22.8	132.6	25.0	126.8	27.5	120.8	30.4	114.5	33.6	108.1	37.2

Control

The CCUH 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 condenserless 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 CCUH 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 CCUH 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.

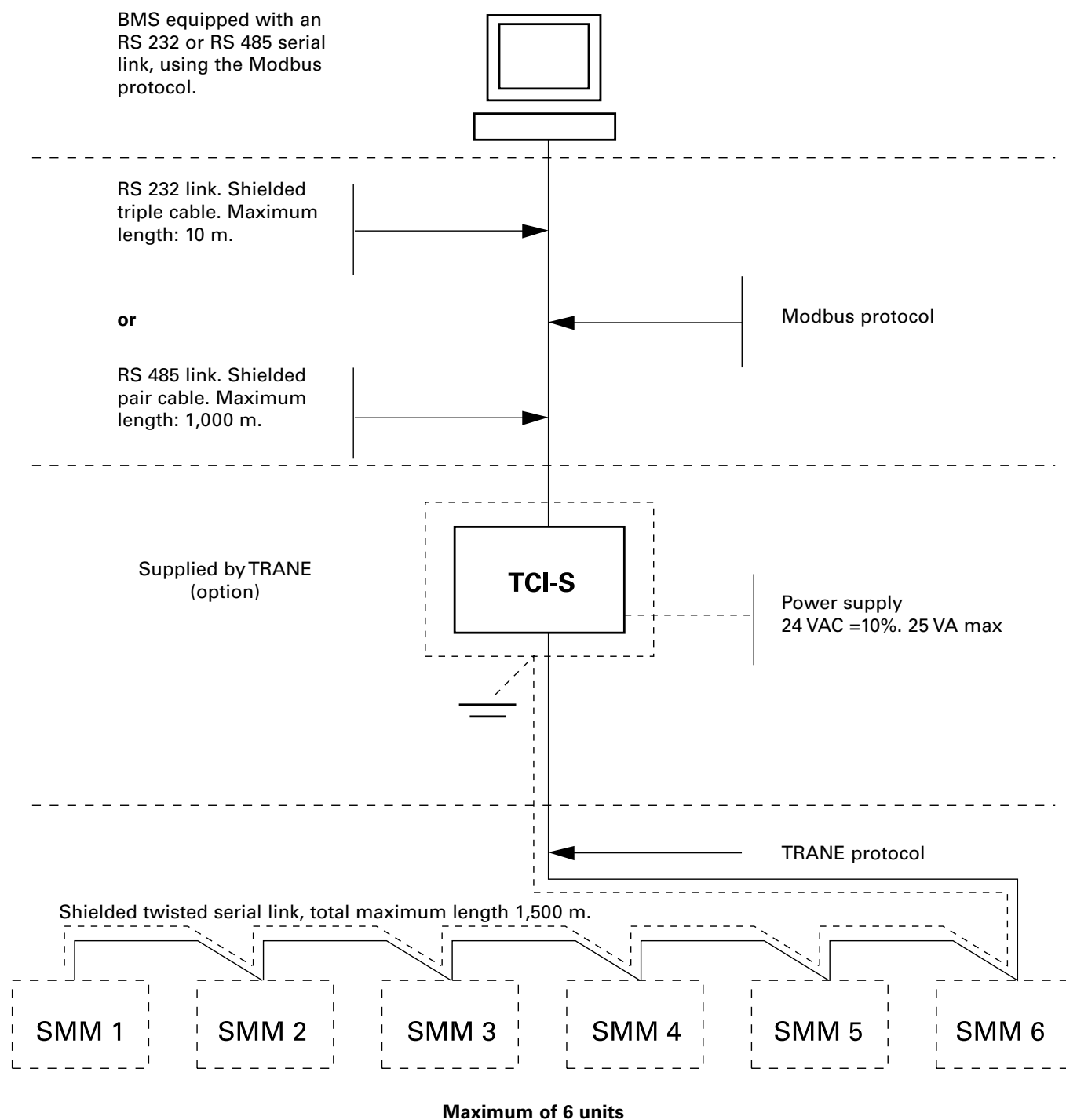
Chiller's operating status:

- 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

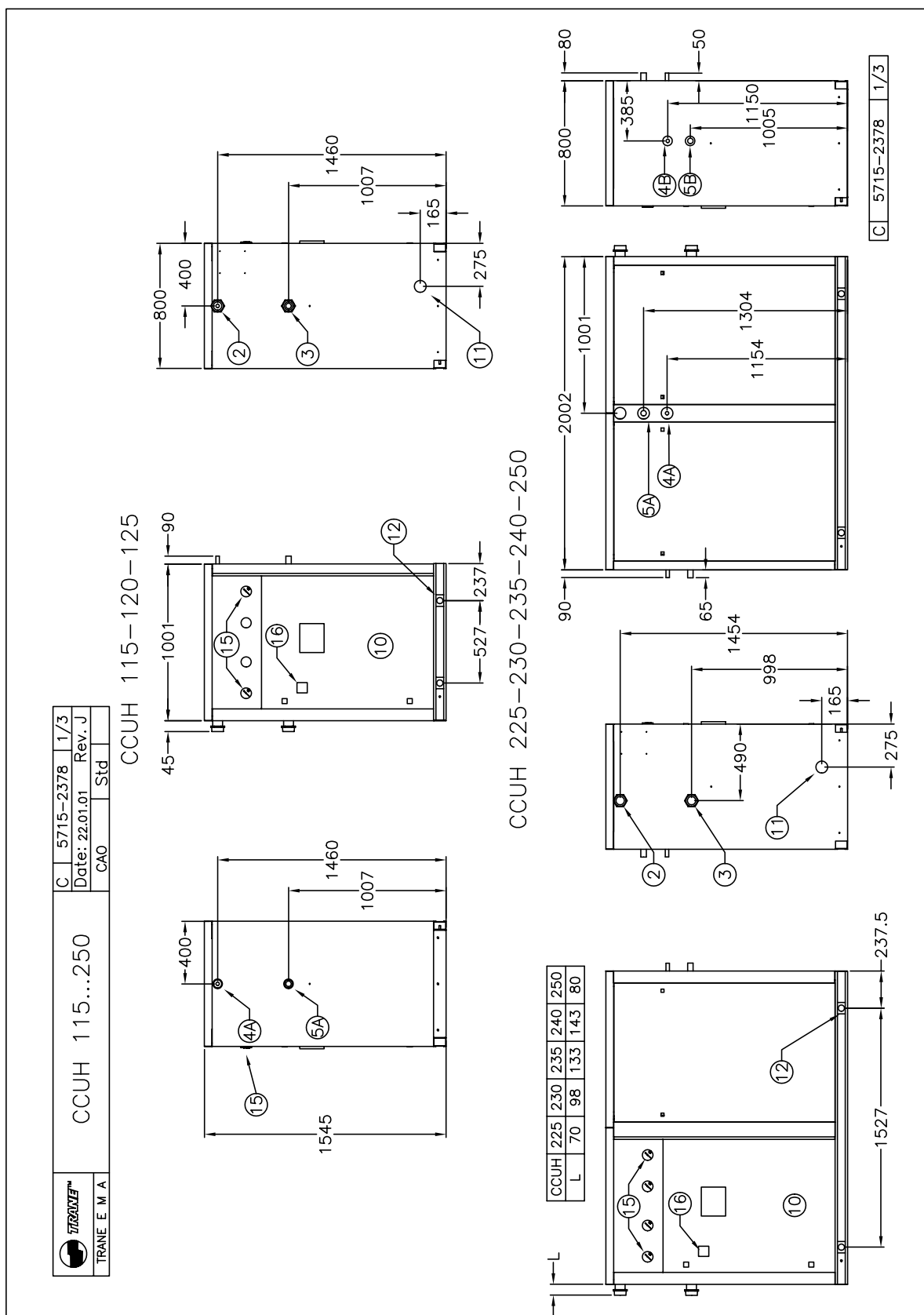


Pressure Losses (R407C and R134a)

Evaporator pressure drop

DP kPa	Water flow - l/s							
	CCUH 115	CCUH 120	CCUH 125	CCUH 225	CCUH 230	CCUH 235	CCUH 240	CCUH 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

Dimensions



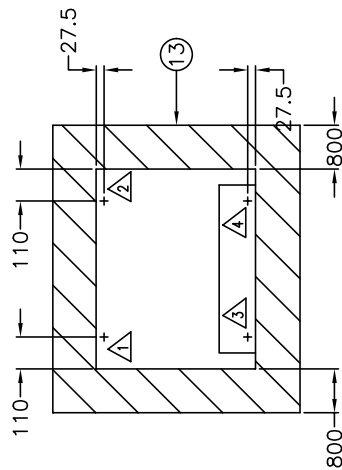
	CCUH 115...250		C	5715-2378	2/3
			CAO	Date: 22.01.01	Rev. J

REFRIGERISSEUR DE LIQUIDE / WASSERKUEHLMASCHINEN / LIQUID CHILLERS
 REFRIGERATORI DI LIQUIDO / WATERKOELMACHINE / ENFRÍADOR DE LIQUIDO

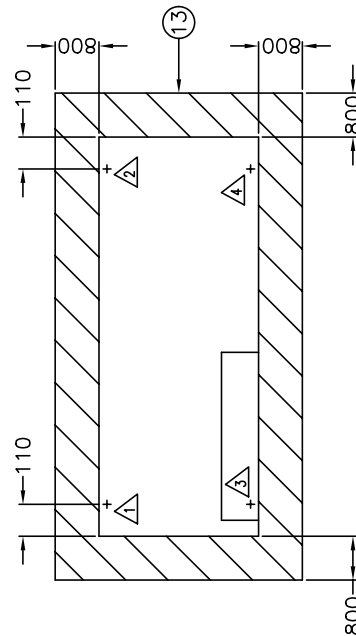
SIZE	1	2-3	4A-4B	5A	5B	6	7	8	9
115	10T+10T	1"1/2	7/8	1"1/8	-	40	2	7.6	389
120	10T+15T	(SO R7)	7/8	1"3/8	-	50	2	10.4	416
125	15T+15T	MALE	7/8	1"3/8	-	60	2	13.2	443
225	10T+10T	2"	7/8	1"1/8	1"1/8	74	2	7.6	626
230	10T+15T	(SO R7)	7/8	1"3/8	1"1/8	86	2	10.4	655
235	15T+15T	MALE	7/8	1"3/8	1"1/8	102	2	13.2	679
240	10T+15T	2"1/2	7/8	1"3/8	1"3/8	102	2	10.4	757
250	15T+15T	(SO R7)	7/8	1"3/8	1"3/8	134	2	13.2	815

14				
SIZE	1	2	3	4
115	107	101	105	99
120	113	120	103	108
125	135	123	114	104
225	122	175	191	138
230	122	186	206	141
235	122	195	217	145
240	157	191	222	187
250	165	204	242	204

CCUH 115-120-125



CCUH 225-230-235-240-250



 TRANE™ TRAN E M A	CCUH 115...250			C	5715-2378	3/3
				Date: 22.01.01		Rev. J
				CAO		Std

FRANCAIS		DEUTSCH		ENGLISH		ITALIANO		NEDERLANDS		ESPAÑOL	
① COMPRESSEUR	VERDICHTER	COMPRESSOR	① COMPRESSORE	COMPRESSOR	COMPRESOR	① COMPRESSORE	COMPRESSOR	COMPRESSOR	COMPRESOR	COMPRESOR	COMPRESOR
② CONNEXION ENTREE EAU EVAPORATEUR	WASSER ENTRITT VERDAMPFER	EVAPORATOR WATER INLET CONNECTION	② COLLEGAMENTO ACQUA ENTRATA EVAPORATORE	VERDAMPFER WATERINLEDE AANSluitING	CONEXION DE ENTRADA DE AGUA AL EVAPORADOR	② COLLEGAMENTO ACQUA ENTRATA EVAPORATORE	VERDAMPFER WATERINLEDE AANSluitING	VERDAMPFER WATERINLEDE AANSluitING	CONEXION DE ENTRADA DE AGUA AL EVAPORADOR	CONEXION DE ENTRADA DE AGUA AL EVAPORADOR	CONEXION DE ENTRADA DE AGUA AL EVAPORADOR
③ CONNEXION SORTIE EAU EVAPORATEUR	WASSER AUSTRITT VERDAMPFER	EVAPORATOR WATER OUTLET CONNECTION	③ COLLEGAMENTO ACQUA USCITA EVAPORATORE	VERDAMPFER WATERUITREDE AANSluitING	CONEXION DE SALIDA DE AGUA DEL EVAPORADOR	③ COLLEGAMENTO ACQUA USCITA EVAPORATORE	VERDAMPFER WATERUITREDE AANSluitING	VERDAMPFER WATERUITREDE AANSluitING	CONEXION DE SALIDA DE AGUA DEL EVAPORADOR	CONEXION DE SALIDA DE AGUA DEL EVAPORADOR	CONEXION DE SALIDA DE AGUA DEL EVAPORADOR
④A ④B LIGNE LIQUIDE CIRCUIT A/B	FLUESSIGKEITSLIETUNG A/B	LIQUID LINE A/B	④A ④B LIQUIDO A/B	LIQUID LINE A/B	LIQUIDO A/B	④A ④B LIQUIDO A/B	LIQUID LINE A/B	LIQUID LINE A/B	LIQUIDO A/B	LIQUIDO A/B	LIQUIDO A/B
⑤A ⑤B LIGNE GAZ CIRCUIT A/B	GASLEITUNG A/B	GAS LINE A/B	⑤A ⑤B LINEA DEL GAS A/B	GASLEIDING A/B	LINEA DE GAS A/B	⑤A ⑤B LINEA DEL GAS A/B	GASLEIDING A/B	GASLEIDING A/B	LINEA DE GAS A/B	LINEA DE GAS A/B	LINEA DE GAS A/B
⑥ NOMBRE PLAQUES ECHANGEURS	ANZAHL PLATTEN WÄRMETAUSCHER	HEAT EXCHANGER PLATES NUMBER	⑥ NUMERO DE PASTRE SCAMBIASTORE DI CALORE	ANZAAL PLATEN WARMTEWISSELAAR	NUMERO DE PLACAS INTERCAMBIADOR DE CALOR	⑥ NUMERO DE PASTRE SCAMBIASTORE DI CALORE	ANZAAL PLATEN WARMTEWISSELAAR	ANZAAL PLATEN WARMTEWISSELAAR	NUMERO DE PLACAS INTERCAMBIADOR DE CALOR	NUMERO DE PLACAS INTERCAMBIADOR DE CALOR	NUMERO DE PLACAS INTERCAMBIADOR DE CALOR
⑦ CHARGE FLUIDE FRIGORIGENE (Kg)	KÄLTEMITTEL FUELLUNG (Kg)	REFRIGERANT CHARGE (Kg)	⑦ REFRIGERANTE (Kg)	REFRIGERANT CHARGE (Kg)	REFRIGERANTE (Kg)	⑦ REFRIGERANTE (Kg)	REFRIGERANT CHARGE (Kg)	REFRIGERANT CHARGE (Kg)	REFRIGERANTE (Kg)	REFRIGERANTE (Kg)	REFRIGERANTE (Kg)
⑧ CHARGE HUILE (LITRES)	ÖLFUELLUNG (LITER)	OIL CHARGE (LITRES)	⑧ OLIO (LITRI)	OIL CHARGE (LITRES)	ACEITE (LITROS)	⑧ OLIO (LITRI)	OIL CHARGE (LITRES)	OIL CHARGE (LITRES)	ACEITE (LITROS)	ACEITE (LITROS)	ACEITE (LITROS)
⑨ POIDS EN FONCTIONNEMENT (Kg)	BETRIEBSGEWICHT (Kg)	OPERATING WEIGHT (Kg)	⑨ PESO UNITA IN FUNZIONE (Kg)	OPERATING WEIGHT (Kg)	PESO EN OPERACION (Kg)	⑨ PESO UNITA IN FUNZIONE (Kg)	BEDRIJFSGEWICHT (Kg)	BEDRIJFSGEWICHT (Kg)	PESO EN OPERACION (Kg)	PESO EN OPERACION (Kg)	PESO EN OPERACION (Kg)
⑩ ARMOIRE ELECTRIQUE	SCHALTSCHRANK	ELECTRICAL PANEL	⑩ PANNELLO ELETTRICO	PANNELLO ELETTRICO	PANEL ELECTRICO	⑩ PANNELLO ELETTRICO	BESTURINGSPANEEL	BESTURINGSPANEEL	PANEL ELECTRICO	PANEL ELECTRICO	PANEL ELECTRICO
⑪ ACCES RACCORDEMENT CLIENT	KABELINFUEHRUNG	POWER SUPPLY INLET	⑪ PASSAGGIO ALIMENTAZIONE ELETTRICA	PASSAGGIO ALIMENTAZIONE ELETTRICA	ACCESO CONEXION CLIENTE	⑪ PASSAGGIO ALIMENTAZIONE ELETTRICA	KABELDOORVOER	KABELDOORVOER	ACCESO CONEXION CLIENTE	ACCESO CONEXION CLIENTE	ACCESO CONEXION CLIENTE
⑫ POINT DE LEVAGE #40	TRANSPORT OESSEN #40	RIGGING EYES #40	⑫ FORI DI SOLLEVAMENTO #40	FORI DI SOLLEVAMENTO #40	PUNTOS DE ELEVACION #40	⑫ FORI DI SOLLEVAMENTO #40	HUSOGEN #40	HUSOGEN #40	PUNTOS DE ELEVACION #40	PUNTOS DE ELEVACION #40	PUNTOS DE ELEVACION #40
⑬ AIRE CONSEILLEE POUR MAINTENANCE	MINDEST WANDABSTAND ZUR WARTUNG	MINIMUM CLEARANCE FOR MAINTENANCE	⑬ SPAZI MINIMI RICHIESTI PER LA MANUTENZIONE	MINIMUMSTAND VOOR ONDERHOUD	ESPACIO LIBRE PARA MANTENIMIENTO	⑬ SPAZI MINIMI RICHIESTI PER LA MANUTENZIONE	MINIMUMSTAND VOOR ONDERHOUD	MINIMUMSTAND VOOR ONDERHOUD	ESPACIO LIBRE PARA MANTENIMIENTO	ESPACIO LIBRE PARA MANTENIMIENTO	ESPACIO LIBRE PARA MANTENIMIENTO
⑭ CHARGE PAR POINT	PUNKTBELASTUNG	WEIGHT PER POINT	⑭ CARICO DI PARTITO	CARICO DI PARTITO	REPARTO DE PESOS	⑭ CARICO DI PARTITO	GEMICHT PER PUNT	GEMICHT PER PUNT	REPARTO DE PESOS	REPARTO DE PESOS	REPARTO DE PESOS
OPTIONS / ZUBEHOER / OPTIONS		OPZIONI / TOEBEHOREN / OPCIONES		OPZIONI / TOEBEHOREN / OPCIONES		OPZIONI / TOEBEHOREN / OPCIONES		OPZIONI / TOEBEHOREN / OPCIONES		OPZIONI / TOEBEHOREN / OPCIONES	
⑮ MANOMETRES	MANOMETER	PRESSURE GAUGES	⑮ MANOMETRI	MANOMETERS	MANOMETROS	⑮ MANOMETRI	MANOMETERS	MANOMETERS	MANOMETROS	MANOMETROS	MANOMETROS
⑯ SECTIONNEUR PUISSANCE	SCHALTSCHRANK HAUPTSCHALTER	POWER DISCONNECT SWITCH	⑯ SEZIONATORE DI POTENZA	HOOFDSCHAKelaar	SECCIONADOR DE FUERZA	⑯ SEZIONATORE DI POTENZA	HOOFDSCHAKelaar	HOOFDSCHAKelaar	SECCIONADOR DE FUERZA	SECCIONADOR DE FUERZA	SECCIONADOR DE FUERZA

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Electrical characteristics

Unit	Number of 10 T compressors	Number of 15 T compressors	Size Number of fans	IN (A)	ID (A)	Control (W)
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

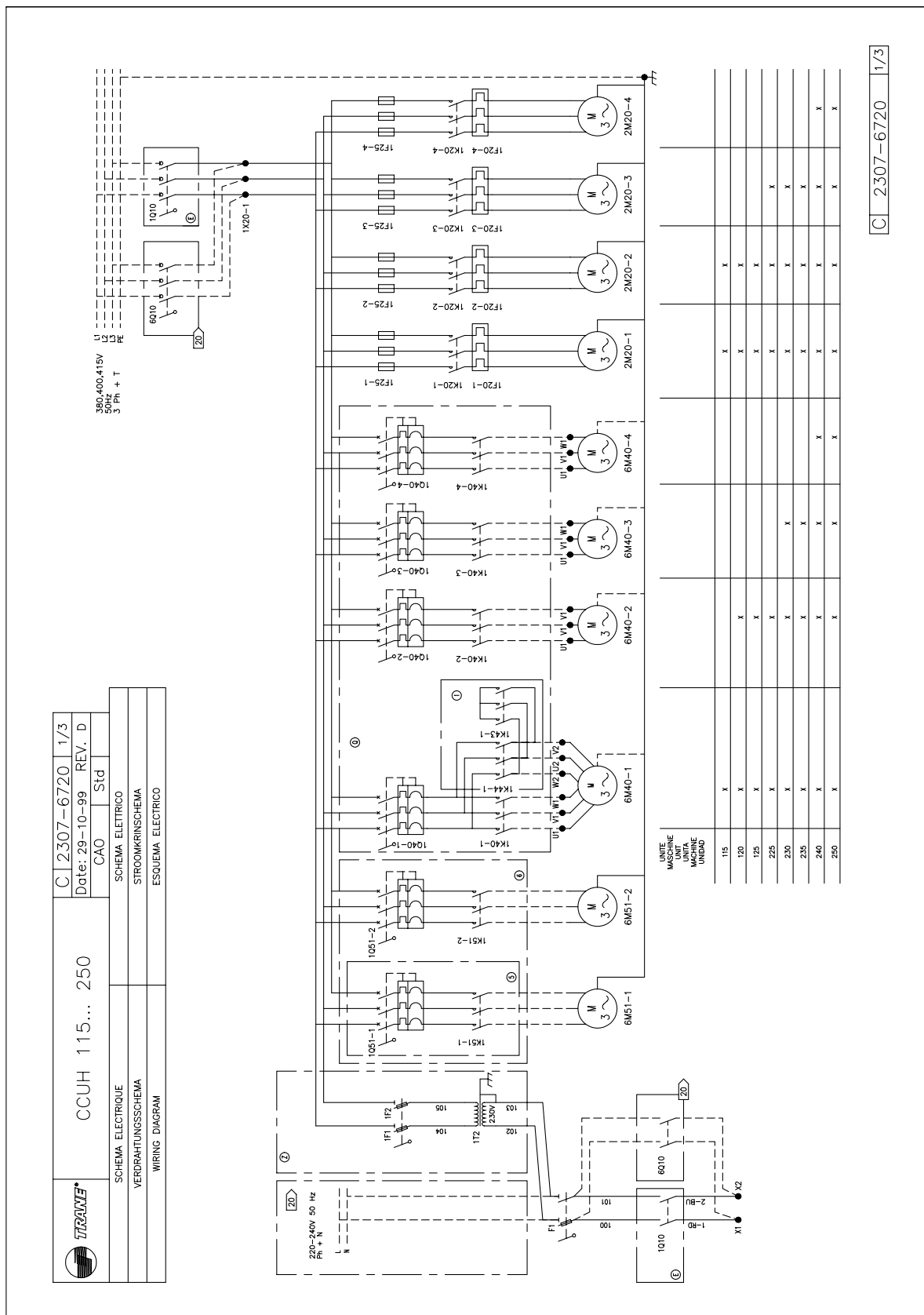
Size	115	120	125	225	230	235	240	250
Sound level (dB(A)) (±3 dB(A))	49	55	57	56	58	59	58	61

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	405
120	430
125	460
225	460
230	690
235	710
240	790
250	850

Typical electrical diagrams



Mechanical characteristics

Trane liquid chillers designed for installation indoors and outdoors with an air-cooled condenser are composed of a rigid welded steel base, a steel bar frame, and painted galvanised steel panels. They are mass-produced, fully fitted, wired and tested in the factory, and comprise:

Trane compressors

3-D® Scroll hermetic with only three main moving parts. Equipped with a leak prevention system in 3 dimensions to obtain leak-free compression volumes. In addition, the endurance tests conducted have demonstrated that 3-D® Scroll compressors are not affected by slugging. Direct drive 3,000 rpm. Motor cooled by the suction gases. 3-D® Scroll compressors are also fitted with a centrifugal oil pump, an oil level sight glass and a manual valve to remove or add oil.

Start-up and control panel

Two separate sections (to prevent electro-magnetic interference): one for the SMM module and one for the electro mechanical components. The electro-mechanical components consist of:

- The contactors that start the compressors and fans.
- The overload relays.
- The terminal block for customer connections.

The SMM module performs the following functions:

- Control of the chilled water leaving temperature.
- Control of the different operating modes and safety parameters.

In addition, the SMM module provides:

- An LCD display for local communication.
- An on/off input on each circuit for remote start/stop commands.
- An analogue input to modify the chilled water set point (0-10 V or 4-20mA signal).
- An on/off output on each circuit to indicate a safety function has been activated.

- The SMM module can be programmed to automatically modify the chilled water set point according to the chilled water return temperature.
- A modem connection.
- A serial link.

Evaporator

One brazed plate exchanger per unit (True dual circuit on duplex unit), made from stainless steel with copper solder. Threaded water circuit connection. On chillers with two evaporators (sizes 225 to 250), the water headers are supplied, and factory-fitted. Maximum operating water pressure 1 MPa. Thermal insulation by vinyl-based closed cell foam.

Refrigerant circuit

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

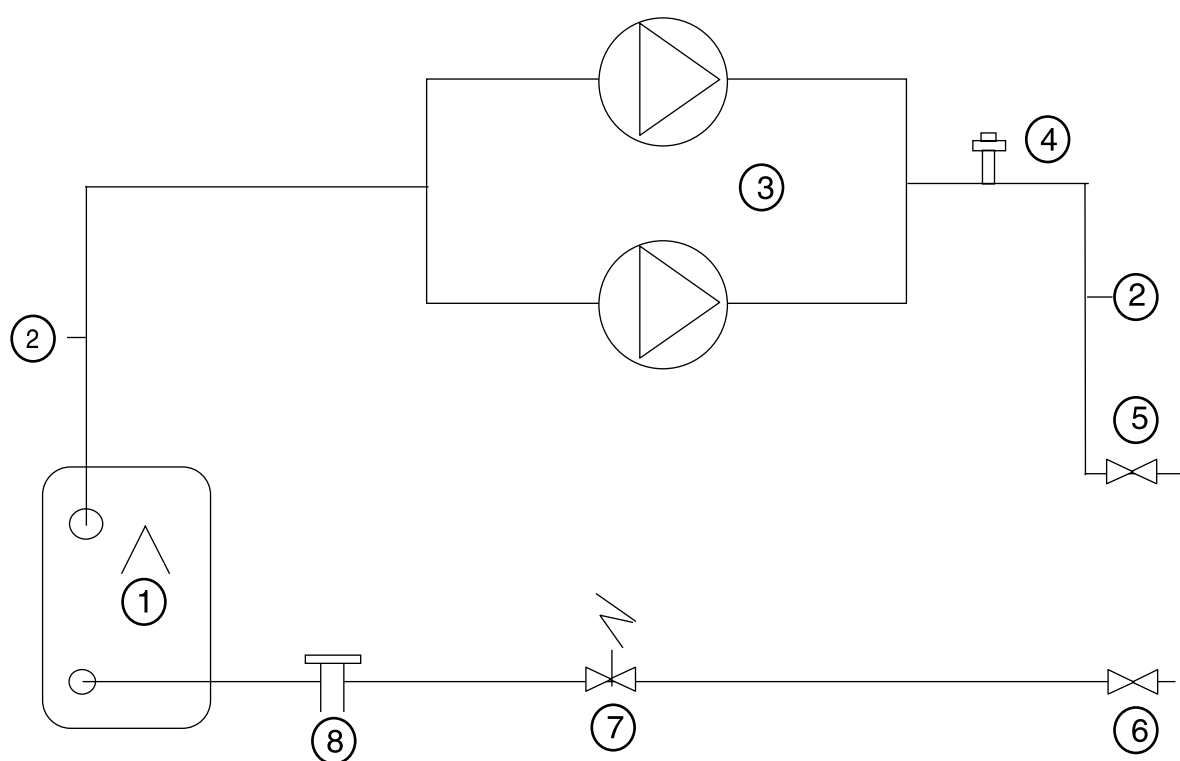
Options

- Disconnect switch.
- Modbus communication interface (TCI-S).
- Compressor sound-attenuating hood.
- Water pump(s) contactor(s).

Quality Assurance

The Trane factories have received ISO 9001 certification. This total quality standard guarantees conformity with technical specifications and compliance with manufacturing procedures.

Refrigerant circuit display diagram



- 1 Evaporator
- 2 Schraeder valve
- 3 Compressors
- 4 HP safety valve
- 5 - 6 Manual stop valves
- 7 Solenoid valves
- 8 Expansion valve **Evaporator**

Options

Disconnect switch

Equipped with an auxiliary contact to trip to disconnect the power supply even if the unit is in operation.

Sound-proofing hood

To reduce the unit's sound level.

Water pump(s) contactor(s)

Fitted in the electrical panel, so they can be put into service more quickly.

TCI-S

To integrate the units into BMS systems via a serial link.

Hydraulic module

Main components :

Single or double centrifugal pump, single-housing, dynamically balanced impeller fitted directly to the drive shaft, axial face seal. The rotor shaft guidance bearings have been selected to ensure quiet operation. The 2 pole F class IP 54 motor is protected by embedded thermistor sensors, with automatic reset.

Storage tank

Equipped with internal anti-corrosion protection to lengthen operating life.

Expansion vessel

Its housing treated against corrosion and its membrane made using a ethylene-propylene compound to prevent premature ageing.

Filter

Filter with removable screen to reduce the risk of evaporator clogging. Valves are placed upstream and downstream of the filter so that it can be removed without having to empty <deletion> the water contained in the installation.

Anti-frost protection

The hydraulic module is equipped with a heater to prevent any risk of freezing, to a temperature of -5°C. The hydraulic module can be equipped with an optional additional heater to protect the module down to -15°C.

Water capacity	300 litres
Expansion vessel volume	24 litres
Empty weight with double pump	340 kg
Dimensions	
Length	1200 mm
Width	737 mm
Height	1300 mm
Water connection	2 1/2

Notes



TRANE®

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Quality Management System Approval

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Date	0101
Supersedes	B10SD002
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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