

EVAPORATOR

It is made from AISI 316 stainless steel brazed plate, is compact and highly efficient. The exchanger completely separate and independent from the collection tank. All installed evaporators ensure high heat exchange efficiency between the refrigerant and fluid to be cooled and reduced pressure losses. They allow very low temperature approaches to optimise energy efficiency. The electronic controller antifreeze function monitors the water temperature from the evaporator outlet to prevent freezing. A differential pressure switch protects the heat exchanger from any lack of water flow, while a mechanical filter at the inlet (standard) protects the entire hydraulic circuit from dirt coming in from the process. In the models ranging from CWTO75 to CWTI130, the evaporators have double refrigerant circuit and single water circuits. This configuration is particularly efficient at partial loads, compared to solutions using independent evaporators (see also section **"The multi-compressor choice"**).



ELECTRICAL PANEL

The panel is manufactured from galvanized steel with a polyester powder coated surface compliant to EN 60204 EC. It includes a main switch with door interlock (which prevents access to the panel when it is under voltage) and watertight door to access the electronic controls. It is equipped with an active ventilation system when the unit is running. It includes: thermo-magnetic motor protectors for compressors and pumps, remote control switches, autotransformer, compressor rotation control device. The cables inside the cabinet are

numbered. For easy use, an ON / OFF switch on the electrical panel door is provided.

MICROPROCESSOR FOR AUTOMATIC CONTROL OF THE UNIT

The entire range is equipped with a single type of electronic controller (to help the customer manage their spare parts stock). It is one of the best brands on the market. It allows the user to view the unit's status at any time, to control the water temperature settings and the effective water temperature and to indicate the safeties that were activated, if the unit is partially or totally blocked.

It is possible to read and set data from a customer's remote PC using the chiller's IP address. A standard RS485 port is installed and a connection via LAN/ Ethernet is optional.



MAIN FUNCTIONS

- regulates the water temperature from the evaporator outlet;
- pump on and off ;
- fan speed adjustment
- controls the on and off cycles of compressors according to the water temperature required (with allocation of operating times for the multi-compressor machines);
- implements the emergency capacity control of the compressors (for multi-compressor machines) if air or water temperatures go beyond the expected limits;
- regulates the distribution of pump operating time (in double pump models);
- measures and displays the evaporator water inlet and outlet temperatures;
- measures and displays the condensation pressure.

ALARMS CONTROL

- high refrigerant pressure switch;
- low refrigerant pressure switch;
- water differential pressure switch;
- incorrect phase sequence;
- thermal compressors;
- thermal pump
- temperature failure probe;
- pressure failure probe;
- high water temperature;
- anti-freeze



REFRIGERANT

The entire range utilises R410A coolant which provides security for the high heat transfer coefficients leading to increased efficiency and energy savings. The use of such a coolant allows more compact exchangers and a reduction in the machine's size for the same installed power.

CHECKS AND TESTING

Each CWT unit has undergone testing at full load and the following checks were also performed

- correct component assembly
- check of correct protection and safety operation
- pressurisation of the cooling circuit and leaks detection using a helium leak detector
- check of correct electronic controller operation
- pressurisation of the hydraulic circuit
- performance and electrical data measurement
- electrical tests according to the EN60204 standard



EASY MAINTENANCE

The CWT range has been designed and built to facilitate easy inspection and maintenance.

The panels are easily removable, offering immediate access to all parts of the system. The clear arrangement of the components, the simple composition of the refrigerant and hydraulic circuit and the electrical system's cable numbering, aid the users normal control operations.

ACCESSORIES AND OPTIONS AVAILABLE - OPTIONAL COMPONENTS

MODEL CWT	007÷030	038÷130
High head pump (P5)	○	○
Double pump P3	X	○
High head pump (P5)	X	○
Version without a tank	X	○
Version without pump	○	○
Open hydraulic circuit with additional tank *	○	○
Non-ferrous materials version	○	○
Automatic filling kit	○	○
Remote Control Panel	○	○
Wheels	○	○
Feet	○	○

Key: X not available; ● standard; ○ optional;

*Note: from CWTO07 to CWTO65 models with additional tank, the length increases by 300 mm.

Remote control panel can be located away from the chiller for remote control of the unit, with the same functions as integral panel in the machine. LAN port Interface for control connection and centralised supervision systems.

OPERATING LIMITS

- Maximum temperature 45 °C
- Maximum inlet temperature 30 °C
- Minimum water outlet temperature - 10 °C (with 30% ethylene glycol)

FRIULAIR®

Chillers



CWT

AIR-COOLED WATER CHILLERS
WHIT ROTARY AND SCROLL COMPRESSORS,
FROM 7 KW TO 128 KW

FRIULAIR®

Chillers

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MADE IN ITALY

The CWT water chiller range was the first series introduced by Friulair for the air conditioning and industrial processes cooling sector. It gave us an opportunity to confirm the quality and design of our products, which are the result of decades of experience in the refrigeration industry – albeit in different fields of application.

The range was designed for outdoor installation and specifically designed to meet the industry application requirements, to provide accurate control of the chilled water temperature with continuous operation and absolute reliability. The range is air cooled with axial fans. It is composed of 16 basic models, covering cooling capacities from 7 to 128 kW.

All units are equipped with:

- hermetic rotary or scroll compressors;
- R410A ecological refrigerant gas;
- plate evaporator;
- aluminium micro channel finned coils;
- fans with continuous speed control;
- microprocessor controller;
- ventilated electrical panel;
- integrated storage tank;
- hydraulic pump;
- stainless steel condensers filters;
- filter and shut-off valves for water;

STRUCTURE

The unit frame is made of galvanized steel with an additional polyester powder coat protection. This makes the range particularly resistant to external conditions and suitable for outdoor installation. All fasteners are stainless steel or electro-galvanized. The panels are easily removed, allowing access for maintenance and repair. The compressor compartment is accessible on three sides. This is independent from the condensing coil, so the user can access them safely even while the machine is in operation. The hydraulic system is also easily accessible, through the removal of steel filters that protect the condenser coils.



REFRIGERANT CIRCUIT AND THE EXPANSION VALVE

This is manufactured from top quality materials by skilled personnel according to strict procedures of brazing, compliant with Directive 97/23. It is composed of:

- rotary (CWT007 and CWT010 models) and scroll compressors designed for use with R410A;
- evaporator assembled from AISI 316 stainless steel brazed plate;
- condenser assembled from micro channel aluminium ;
- filter dryer;
- flow sight glass with moisture indicator
- external equalisation thermostatic expansion valve. The thermostatic expansion valve regulates the injection of liquid refrigerant into the evaporator. The injection is a response to the refrigerant overheating. The range of thermostatic valves that we use are designed for specific applications and are connected to the circuit via bi-metal brazing;
- unidirectional valves (only for multi-compressor units);
- high pressure switch with manual reset and low pressure switch with automatic reset;
- high and low pressure manometers;
- pressure connections for checks and maintenance.

HYDRAULIC CIRCUIT AND CIRCULATION PUMPS

This consists of an evaporator and interior piping to the machine, it also includes:

- an storage tank made of carbon steel and thermally insulated;
- an electric stainless steel, thermally insulated pump;
- a water bypass to prevent incidents
- caused by the erroneous closure of the stop valves;
- expansion vessel;
- safety valve;
- automatic vent valve;
- water-level sensor
- water differential pressure switch;
- stop ball valves;
- inlet unit water filter;
- manometer;
- drain valve.

The high litre/kW ratio (volume of the tank / refrigerating capacity) for refrigeration compressor allows it to be reduced to the minimum setting when starting up. It also helps to keep the outlet water temperature constant. The multi-compressor configuration allows for a smaller collection tank compared to the mono compressor and this means that the design temperature of the machine is rapidly attained [see also section **"The multi-compressor" choice**].

A storage tank is placed on the discharge pipe to further mitigate temperature variations during the compressors' starting and shut-down. The collection tank is available on all models both pressurised and atmospheric (optional) version. All models are equipped with stainless steel centrifugal pumps with high efficiency (with steel impeller AISI304) and a mechanical seal made from carbon/ceramic/EPDM. The available pressure head of the installed pumps can be P3 and P5. From CWT038 model onwards a double pump and rotation system for equalization of run times is available. All pump-motors are asynchronous 2 poles ventilated motor with insulation class F and IP44 / IP55 protection. All units in the range can be used with mixtures of water and ethylene glycol up to 30%.



TECHNICAL DETAILS

COMPRESSORS

Hermetic and depending on the machine size can be rotary or scroll. These are equipped with oil sight glass, a crankcase heater, and are protected by a relay phase sequence control (to avoid reverse rotation). They are mounted on rubber shock absorbers. The compressors are widely used in the air conditioning and refrigeration industry.

They offer a high level of energy efficiency (EER), reliability, low noise and low vibrations.

They are internally equipped with non-return valves, which protect against over-pressure resulting from the refrigerating circuit if the compressor is stopped.

There is also an internal thermal protector, which protects them from electrical over-current or excessive running temperatures from the flow of the hot gas.

THE MULTI-COMPRESSOR CHOICE

The multi-compressor configuration for single refrigerant circuit is already used on model CWT25 and is the main feature of the CWT range. It gives the chiller important advantages when compared to similarly powered units that have a single compressor for each circuit.

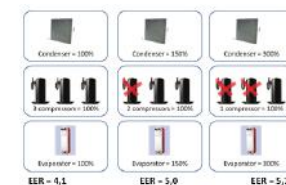
A. It has a **higher efficiency (EER)** at partial loads. It is a fact that all the majority units on the market, even those of our competitors, only work at the rated load for short

period of their life. With our solution, when the unit is operating at a partial load, i.e. with only few of the compressors functioning, the oversized exchangers are used. This increases their energy efficiency (EER) by taking advantage of electricity consumption absorbed by the machine – especially compared to mono-compressor solutions.

B. lower starting currents increases the average life span of the compressors;

C. better by activating the appropriate number of compressors;

For further details on the benefits of "multi-compressor choice" please refer to the diagrams provided in our technical manuals.



FANS

Axial, directly coupled to a three-phase motors 4/6/8 poles and external rotor motors. All the fans are equipped with internal thermal protection with automatic reset and class F insulation. The condensation control (standard) is run with a phase cutting controller, through a reading taken by a pressure transducer placed on the refrigerant circuit. This solution makes the machine even more silent when the outside temperature is low or when it operates at partial load – it optimises the power absorbed and increases its energy efficiency (EER).



CONDENSER

It consists of an aluminium micro-channels finned coil. This allows the construction of lighter air condensing units (at least 60% lighter than traditional copper-aluminium coils). They are fully recyclable, and reduce the amount of refrigerant in the circuit (from 30% to 35% less than a traditional condenser) with the larger heat exchange surfaces compared to the traditional copper pipe condenser. This leads to a drastic reduction of load losses on the air side and enhances the fans' energy efficiency. This means an optimisation of fan size, which further reduces the machine noise and improves the EER.

The aluminium structure makes these condensers free from galvanic corrosion risks.

In all models, the condenser is protected by stainless steel air filters, which are easily removable and washable.

TECHNICAL DATA CWT

Model		007	010	015	018	020	025	030	038	040	045	055	065	075	090	110	130
Cooling capacity ⁽¹⁾	[kW]	7,00	10,31	14,54	18,90	21,31	23,30	28,11	37,80	42,70	45,10	56,70	64,00	75,61	89,79	113,41	128,11
Compressors power input ⁽¹⁾	[kW]	1,45	2,26	3,54	4,11	4,69	5,22	6,92	7,92	9,16	10,00	12,79	14,49	15,47	17,71	24,19	27,81
Total power input ⁽¹⁾⁽²⁾	[kW]	2,51	3,32	4,60	5,71	6,29	6,82	8,52	10,82	12,06	12,90	15,55	17,25	21,27	23,51	30,69	35,31
Total absorbed current ⁽¹⁾⁽²⁾	[A]	5,08	6,48	8,70	11,30	12,75	13,06	16,07	20,30	23,29	23,96	28,19	32,55	37,26	42,72	54,22	64,88
EER (pump excluded) ⁽¹⁾	–	3,76	3,86	3,68	3,93	3,96	3,94	3,69	4,06	4,04	3,96	4,03	4,06	3,96	4,21	4,10	4,09
Water flow ⁽¹⁾	[l/ h]	1204	1773	2501	3251	3665	4008	4834	6502	7345	7758	9753	11009	13004	15444	19506	22035
Available pressure ⁽¹⁾	[kPa]	252	246	315	323	324	311	302	327	331	335	278	259	227	227	263	307
Maximum power input (total) ⁽²⁾⁽³⁾	[kW]	3,3	4,4	5,9	7,7	8,5	9,4	11,4	15,1	16,8	17,5	21,1	23,6	30,3	33,5	43,2	49,1
Maximum absorbed current (total) ⁽²⁾⁽³⁾	[A]	6,7	8,1	10,9	14,7	16,3	17,3	20,8	27,7	30,8	31,5	37,9	42,6	52,5	58,7	75,8	86,9
Starting current ⁽²⁾⁽³⁾	[A]	35,6	47,6	55,6	74,3	94,3	49,8	65,5	87,2	108,8	76,3	97,5	120,6	112,0	136,7	135,3	164,9
Fan power	[kW]	0,41	0,41	0,41	0,70	0,70	0,70	0,70	0,70	0,70	0,70	0,63	0,63	1,80	1,80	1,75	1,75
Fan current	[A]	1,80	1,80	1,80	2,90	2,90	2,90	2,90	2,90	2,90	2,90	2,70	2,70	3,00	3,00	3,30	3,30
Number of fans	[#]	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
P3 Pump power input ⁽²⁾	[kW]	0,65	0,65	0,65	0,90	0,90	0,90	0,90	1,50	1,50	1,50	1,50	1,50	2,20	2,20	3,00	4,00
P3 Pump absorbed current ⁽²⁾	[A]	1,60	1,60	1,60	2,60	2,60	2,60	2,60	3,40	3,40	3,40	3,40	3,40	4,60	4,60	6,30	8,10
Power supply	[V/Ph/Hz]	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50	400/3/50
IP protection degree	–	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44	IP44
Refrigerant	–	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Compressor type	–	Rotary	Rotary	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll	Scroll
Evaporator type	–	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates	Brazed plates
Condenser type	–	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel
N° of compressors	[#]	1	1	1	1	1	2	2	2	2	3	3	3	4	4	6	6
N° of refrigerant circuits	[#]	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Air flow	[m³/h]	4,346	4,346	4,531	8,179	8,179	8,049	8,049	15,399	15,399	15,399	18,791	18,791	32,931	32,931	44,185	44,185
Sound pressure level ⁽⁴⁾	[dB(A)]	43,0	43,0	43,0	50,0	50,0	50,0	50,0	53,0	53,0	53,0	49,5	49,5	58,5	58,5	52,0	52,0
Water connections diameter	[inch]	1"	1"	1"	1"	1"	1"	1"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2"
Width	[mm]	662	662	662	662	662	662	662	752	752	832	832	832	1110	1110	1210	1210
Depth ⁽⁵⁾	[mm]	991	991	991	1305	1305	1305	1305	1635	1635	1850	1850	1850	2025	2025	2230	2230
Height	[mm]	1335	1335	1335	1425	1425	1425	1425	1535	1535	1700	1700	1700	1900	1900	2255	2255
Weight	[kg]	210	215	260	265	275	315	325	400	410	500	500	515	720	770	980	1000
Tank capacity	[dm³]	95,0	95,0	95,0	95,0	95,0	95,0	95,0	135,0	135,0	135,0	135,0	135,0	205,0	205,0	205,0	205,0
Expansion vessel capacity	[dm³]	5,0	5,0	5,0	5,0	5,0	5,0	5,0	8,0	8,0	8,0	8,0	8,0	12,0	12,0	12,0	12,0
P5 Pump power input - Option	[kW]	0,75	0,75	0,75	1,30	1,30	1,30	1,30	2,20	2,20	2,20	2,20	2,20	4,00	4,00	4,00	4,00
P5 Pump absorbed current - Option	[A]	2,50	2,50	2,50	3,50	3,50	3,50	3,50	4,60	4,60	4,60	4,60	4,60	8,10	8,10	8,10	8,10
Available pressure ⁽¹⁾⁽⁵⁾	[kPa]	452	445	415	521	518	502	483	530	527	532	452	421	432	424	426	372

[1] Data referred to following conditions: water temperature in/out: 20/15°C - ambient air temperature: 25°C – [2] Data referred to unit with standard P3 pump – [3] Data related to most heavy condition allowed by safety devices fitted on the unit – [4] Referred at 10 m and at an height of 1,5 m in free field – [5] Data referred to unit with P5 pump (optional) – [6] For models from CWT007 to CWT065 with additional loading tank, length increases by 300mm. Friulair S.r.l. reserves the right to make technical changes without prior notice, errors and omissions excepted.