



#### ELECTRICAL PANEL

The panel casing is manufactured from galvanized steel with a polyester powder coated surface. It includes a main switch with a door lock; fuses; relays for compressor overload protection; thermal contacts for the fans; interface relays and electrical terminals for external connections.

There is an optional 0-10 V dimming signal for fan speed; panel heat resistance for harsh climates and ventilation (natural or forced by internal fans) for summer/ tropical climates.

#### MICROPROCESSOR FOR AUTOMATIC CONTROL OF THE UNIT

The entire range is equipped with a single type of electronic controller (thus reducing spare parts requirements). It is one of the best controllers on the market. There are different options, which are software customisable. It displays the unit operation at any time to control the water temperature and the actual temperature, in case of partial or total blockages of the unit flow and indicates which safety switch was triggered. It also manages the "free-cooling" system if fitted.

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.

#### CONTROL SYSTEM

This type of microprocessor can control up to four compressors. It is equipped with a visual alarm, keys for the various functions, continuous control system and data rescue system in the event of a power failure. The display allows the setting and display of set-point values

#### MAIN FUNCTIONS

Outside air temperature display, water inlet and outlet; identification and display of blocks using alphanumeric code and full description; management of one or two pumps and the regulation of the free cooling valve (if installed);

differential pressure alarm delay at the start-up; operating counter for compressors; rotary compressors and pumps; insertion NOT simultaneous compressors; protection antifreeze; on-off control; alarm reset.

#### ALARMS

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



#### REFRIGERANT

The entire range is developed utilising R410A refrigerant, which provides security for the high-heat transfer coefficients, which mean 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 CWB water chiller has undergone testing at full load. The following checks were also performed:

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

#### EASY MAINTENANCE

The CWB series has been designed and built to facilitate inspection and maintenance. The hoods are easily removable, offering immediate access to system components. The clear arrangement of the components, the simplicity of the refrigerant and hydraulic circuit plus the electrical system's cable numbering, assist the users normal operating schedule.



#### ACCESSORIES AND OPTIONS AVAILABLE:

OPTIONS	INITIALS	OPTIONS	INITIALS
Pump P2	P2	Wind proof protection	WB
Pump P3	P3	Variable speed continuous fan (phase-cut)	CA
Pump P5	P5	[Room temperature = -10 °C]	
Double pump P2	D2	Combined condensation control (EC+WB fans)	CC
Double pump P3	D3	[Room temperature = -20 °C]	
Double pump P5	D5	Air filters for capacitors	FP
Tank (max 6 bar)	TP *	Water filter kit	WS
Non-metallic materials water circuit (steel)	NF	Water flange connections (EN 1092-1)	WC1
Anti-freeze resistors evaporator	RA1	Water threaded connections (GAS)	WC2
Anti-freeze resistors evaporator-pump	RA2	Rubber-type vibration dampers (units without tank)	FA1
Anti-freeze resistors evaporator-pump-tank	RA3	Rubber-type vibration dampers (with tank and pump)	FA2
Electrical panel anti-condensation resistor	RS	Remote panel	ER
Double water set point	W	Automatic loading kit (sold separately)	WF
E-coating condensers treatment	OEC	Packaging wooden base	BS
		Wooden crate packaging	CR

\* to create an option between P2, P3, P5, D2, D3, D5

Remote control panel to be inserted in the room for the unit remote control, with the same functions as installed in the machine.  
LAN port Interface for control connection and centralised supervision systems.

# FRIULAIR®

## Chillers



# CWB

AIR-COOLED WATER CHILLERS  
WITH AXIAL FANS AND SCROLL COMPRESSORS  
FROM 140 KW TO 570 KW

# FRIULAIR®

## Chillers

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MADE IN ITALY

The CWB range consists of Air cooled water chillers with axial fans for outdoor installation. The CWB family comprises of 12 basic models with cooling capacities ranging from 140 to 570 kW. This allows flexibility of the unit selection, its accessories and the final installation operating conditions. CWB units are particularly suitable for installations where continuous chilled water production is required even for applications in low external ambient temperatures. In this case, it is necessary to use the option of EC condenser fans. The optional free-cooling feature, available in the 160-280 kW models, allows the free cooling of the water using a coil cooled by the ambient air.

**STRUCTURE**

Self-supporting, manufactured from galvanized steel frame with a polyester powder coated surface. The panels are easily removed, allowing access for maintenance and repair.



**COOLING CIRCUIT**

The cooling circuit is manufactured by skilled technicians using quality materials and brazing procedures that comply with Directive 97/22/EC. This applies to all models and includes the following components (except those listed above): dehydrating filter, sight glass and humidity indicators, high and low pressure manostats (fixed setting), the high and low pressure gauges, pressure taps for checks and maintenance, evaporation and condensation pressure transducers, refrigerant temperature probes and air / water probes.

For the models from CWB270 to CWB570, the evaporator has a double refrigerant circuit and a single water circuit. Compared to solutions with independent evaporators, this configuration is particularly effective for partial load applications.

**HYDRAULIC CIRCUIT**

The hydraulic circuit consists of an internal evaporator and pipework. It features a differential pressure monostat that protects the evaporator in the event of a loss of water flow.

**DETTAGLI TECNICI**

**COMPRESSORS**

A scroll compressor with a hermetically sealed oil sight glass. The compressors are equipped with 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. The compressors 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 from electrical overcurrent or excessive temperatures and/ or from the flow of the hot gas. Depending on the required cooling capacity, different solutions are available, such as mono-circuit, bi-compressor or dual circuit, bi-compressor. Control of partial loads is optimised to distribute power over more phases. This improves EER making it possible to reduce the fluctuations of the water temperature flow and significantly reduce the initial current.



**FANS**

Axial fans are directly coupled to three-phase motors with an external rotor. A safety fan guard is fitted on the air outlet.

EC type fans are available as an option with a controlled variable speed which uses a 0-10 V signal sent from the electronic controller.

The compact, high efficiency fans

have a very low noise level, especially at partial loads. These are continuously adjusted using a 0-10 V signal.



**CONDENSER**

The condenser consists of a finned coil of aluminium micro-channels. This robust construction gives a lighter condensing unit (at least 60% lighter than traditional copper-aluminium batteries). They are fully recyclable and reduce the amount volume of refrigerant charge. This leads to a drastic reduction of load losses on the air side and enhances

the fans' energy efficiency, allowing optimisation of the fan size, which further reduces the machine noise level and improves the EER.

An "e-coating" treatment is an available option.



**EVAPORATOR**

The Evaporator is a mono-circuit made from AISI 316 stainless steel brazed plate, on the refrigerant side for models up to 220 KW. Larger models have two independent circuits on the refrigerant side. We can develop customised configurations by building machines with shell and tube evaporators, which consist of a group of copper tubes immersed in a steel tank.

In both products, the heat exchangers are manufactured in accordance to the PED 97/23/EC directives that legislate the pressure vessel construction. All installed heat exchangers ensure high efficiency of heat exchange between the refrigerant and fluid to be cooled and reduced pressure losses. They can be customised according to customer requests to allow very low temperature approaches to optimise energy efficiency.



**ELECTRONIC EXPANSION VALVE**

The entire range is equipped with electronic expansion valves that considerably increases the energy efficiency of the machine compared with thermostatic-mechanical models, especially for partial loads applications. These valves, correctly managed by the controller, allow a precise flow of refrigerant to the evaporator, maximizing the super heating control. This

improves the energy efficiency of the machine and avoids the risk of liquid returning to the evaporator, even under the most unfavourable operating conditions.

In the case of fluctuating thermal loads, the electronic valve reacts much more rapidly than a mechanical thermostatic valve and allows a quick adjustment of the power to meet the needs of the moment.

**TECHNICAL DATA CWB**

Model		140	160	190	220	270	300	320	380	420	450	510	570
Cooling capacity (1)	[kW]	142,37	166,11	193,06	224,25	270,55	293,84	318,38	386,82	423,69	458,07	526,44	574,08
Compressors power input (1)	[kW]	31,93	43,53	38,45	50,98	52,67	38,45	74,26	73,30	87,75	103,02	105,15	122,70
Total power input (1)(2)	[kW]	36,05	47,65	44,63	57,16	60,91	70,78	82,50	85,66	100,11	115,38	121,63	139,18
Total absorbed current (1)(2)	[A]	59,90	76,72	74,60	94,16	103,14	134,65	140,93	164,73	164,73	189,89	212,16	232,79
EER (pump excluded) (1)	-	3,95	3,49	4,33	3,92	4,44	4,15	3,86	4,52	4,23	3,97	4,33	4,12
Water flow (1)	[l/ h]	24.488	28.570	33.207	38.571	46.535	50.541	54.761	66.532	72.874	78.789	90.547	98.742
Pressure drop (1)	[kPa]	55	73	51	67	53	62	71	51	60	70	67	79
Maximum power input (total) (2)(3)	[kW]	54,4	65,2	69,4	82,2	85,8	97,0	113,6	134,5	149,6	1164,5	188,0	202,0
Maximum absorbed current (total) (2)(3)	[A]	88,1	103,8	112,6	133,3	139,5	156,5	181,6	215,2	241,0	266,6	311,5	332,6
Starting current (2)(3)	[A]	257,8	265,7	349,0	359,3	318,4	333,2	492,6	377,1	473,5	492,6	508,2	555,0
Fan power	[kW]	2,06	2,06	2,06	2,06	2,06	2,06	2,06	2,06	2,06	2,06	2,06	2,06
Fan current	[A]	3,80	3,80	3,80	3,80	3,80	3,80	3,80	3,80	3,80	3,80	3,80	3,80
Number of fans	[#]	2	2	3	3	4	4	4	6	6	6	8	8
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
IP protection degree	-	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54	IP54
Refrigerant	-	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A	R410A
Compressor type	-	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
Condenser type	-	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel	Microchannel
N° of compressors	[#]	2	2	2	2	4	4	4	4	4	4	4	4
N° of refrigerant circuits	[#]	1	1	1	1	2	2	2	2	2	2	2	2
Air flow	[m³/h]	44000	44000	66000	66000	88000	88000	88000	132000	88000	132000	176000	176000
Sound pressure level (4)	[dB(A)]	58,0	56,5	58,0	58,0	60,5	60,5	59,5	58,5	60,5	60,5	59,5	61,5
Water connections diameter	[inch]	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"	3"	3"	3"	3"	3"	3"	3"
Width	[mm]	1104	1104	1104	1104	2204	2204	2204	2204	2204	2204	2204	2204
Depth	[mm]	3004	3004	4002	4002	3004	3004	3004	4004	4004	4004	5004	5004
Height	[mm]	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977	1977
Weight	[kg]	1170	1180	1290	1300	1810	1830	1850	2250	2270	2290	2650	2650
Tank capacity - Option	[dm3]	470	470	470	470	600	600	600	600	600	600	600	600
Expansion vessel capacity - Option	[dm3]	18	18	18	18	18	18	18	18	18	18	18	18
P2 Pump power input - Option	[kW]	3,75	3,75	3,75	3,75	5,10	5,10	5,10	6,70	6,70	6,70	9,10	9,10
P2 Pump absorbed current - Option	[A]	6,50	6,50	6,50	6,50	9,20	9,20	9,20	11,80	11,80	11,80	15,70	15,70
P3 Pump power input - Option	[kW]	6,70	6,70	6,70	6,70	9,10	9,10	9,10	9,10	9,10	9,10	13,10	13,10
P3 Pump absorbed current - Option	[A]	11,80	11,80	11,80	11,80	15,70	15,70	15,70	15,70	15,70	15,70	22,00	22,00
P5 Pump power input - Option	[kW]	11,00	11,00	11,00	11,00	16,58	16,58	16,58	17,50	17,50	17,50	13,10	13,10
P5 Pump absorbed current - Option	[A]	18,80	18,80	18,80	18,80	27,20	27,20	27,20	30,00	30,00	30,00	22,00	30,00

(1) Data referred to following conditions: water temperature in/out: 20/15°C - ambient air temperature: 25°C - (2) Data referred to unit without 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) Maximum temperature 45 °C. - (6) Maximum inlet temperature 30 °C. - (7) minimum water outlet temperature - 10 °C (with 30% ethylene glycol). Friulair S.r.l. reserves the right to make technical changes without prior notice, errors and omissions excepted.