



**The modular free cooler.** Cooling capacity 18 kW - 407 kW



Cooling your industry, optimising your process.





## FC4TAE | FC4ALL

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#### 1. General

The FC4TAE and FC4ALL liquid coolers are packaged air-cooled units equipped with finned water coils, axial fans, water valve for free cooling control, and a microprocessor controller. The FC4TAE and FC4ALL free-cooling technology can be integrated whit any processcooling system. The free-cooling modules can be integrated during the design phase of a new process cooling system or can be added to an existing system. There are seven (7) models in the range comprising of five (5) FC4TAE modules and two (2) FC4ALL modules and they can run as a stand-alone module or can be hydraulically in series with a TAE evo Tech, Aries Tech or any equivalent water chiller.

The FC4TAE and FC4ALL liquid coolers are designed, built and tested in compliance with ISO 9001 and are fitted with components made by premium manufacturers. The FC4TAE standard unit has dualfrequency power supply 400V/3Ph/50Hz – 460V/3Ph/60Hz. Also available is the option for 460V/3Ph/60Hz UL power supply. The FC4ALL standard power supply is 400V/3Ph/50Hz. The FC4ALL also has the option for dual-frequency 400V/3Ph/50Hz-460V/3Ph/60Hz. The FC4TAE and FC4ALL electrical protection rating is IP54. The electrical cabinet is constructed in compliance with: CEI EN 60204-1 for units with power supply 400V/3Ph/50Hz or dual frequency 400V/3Ph/50Hz-460V/3Ph/60Hz; UL508A for units with power supply 460V/3Ph/60Hz UL.

The product destined for EU and EFTA countries is subject to the following directives:

- Electromagnetic Compatibility Directive 2014/30/UE;
- Machinery Directive 2006/42/EC;

FC4TAE and FC4ALL modules each hold EAC certification, required for distribution in Customs Union areas of Russia, Belarus and Kazakistan.

All data in this catalogue refer to standard units and nominal operating conditions (unless otherwise specified).

#### 2. Nameplate

Each FC4TAE/FC4ALL modules are identified by the codes:

#### FC4TAE XXX

Identification size number of the biggest TAEevoTECH model with the same overall dimensions. Range's name.

#### FC4ALL XXX

- The nominal cooling power for the combinable ARIES TECH chiller with the FC4ALL module. Range's name.
  - Nominal condition: IN/OUT water temperature: 20/15 °C; 30% ethylene glycol; ambient temperature 25 °C.

#### 3. Versions

The standard version is equipped with an electrical heater inside the electrical cabinet and is suitable for operation with minimum ambient temperature down to -15 °C. A low ambient temperature version is available which also includes high efficiency EC brushless fans. The low ambient temperature version is suitable for operating down to -20 °C. Antifreeze additives MUST BE USED to protect the hydraulic circuit.

#### 4. Testing

Each unit is tested in order to ensure that it operates correctly. Specifically, the performed test are:

- electrical safety tests performed as prescribed by EN60204-1;
- tightness test with air pressurized to 3 barg;
- check of fan wiring and operation;
- check of regulation water valve wiring and operation;
- check operation and positioning of the temperature probes;
- check operation of the microprocessor controller and the values of all operating parameters;

• check Modbus communications (if available).

At the time of installation, the units only require electrical and water connections, thus maximizing reliability levels.

### 5. Advantages derived from the use of FC4TAE/FC4ALL module

The free-cooling technology, during the cold seasons, is able to exploit the ambient air to cool down completely or partially the water for process cooling. It is possible to install only the FC4TAE or FC4ALL water cooler or combine the module with a TAEevo TECH, ARIES TECH or any equivalent water chiller. Using only the FC4TAE or FC4ALL cooler, working as a dry-cooler, is possible, dependent on ambient temperature, to achieve the complete dissipation of the thermal load with a minimum energy consumption. Combining the free-cooling unit with a water chiller, the solution also allows reducing the operating hours and wear of the chiller, thereby extending its operating life. The integration of the FC4TAE or FC4ALL cooler allows considerable energy costs reduction, mainly for the process cooling systems that require chilled water during the entire year.

#### 6. 6. Free-cooling operating modes

#### 6.1 Total free-cooling

When the ambient temperature is the same or lower than the total free-cooling design temperature, the module cools down the process-cooling water to the set point. Then the water flow passes through the chiller, if installed, which is now switched-off because the system does not need further cooling capacity. When the ambient temperature is lower than the design total free-cooling temperature,

6.2 Partial free-cooling

When the ambient temperature is between the total design freecooling temperature and 2 °C below the inlet water temperature in the module, the FC4TAE or FC4ALL module will cool down partially the process-cooling water. Then the water passes through the

#### 6.3 Free-cooling off

When the ambient temperature is higher than the module's inlet water temperature by more than 2 °C, the microprocessor control excludes the module's finned coil exchanger.

#### 7. Structure and casing

The entire plinth, uprights and outer casing are manufactured of galvanized carbon steel sheet subjected to a phosphor degreasing treatment and painted with a polyester powder coating baked-on at 180 °C to provide a durable weatherproof finish. The plinth is finished in orange-peel blue (RAL 5013P), while the remaining parts of the frame and panels are finished in orange-peel light grey (RAL 7035P).

#### 8. Heat exchanger coils

The heat exchanger coils are of the finned core type composed of copper tubes and manifolds, aluminium swirl fins and galvanized steel or aluminium sheet shoulders. The hydraulic circuits are specially designed to facilitate air venting during charging of the the management of fans and the regulation valve, allows the partial load operation of the module to produce cold water down to the process temperature. Even in these conditions, if installed, the chiller is off. These functioning modes allow cooling down the process using only the FC4TAE or FC4ALL module, maximizing the energy saving.

chiller, if installed, that provides a further cooling capacity to reach the process outlet temperature. This functioning mode further reduces the energy consumption.

The chiller TAEevo TECH, ARIES TECH or equivalent will ensure the needed cooling power to cool down the water to the process temperature, while the FC4TAE or FC4ALL module is turned off.

The frame is designed to allow easy access to all components of the unit. The various parts of the frame are assembled by means of galvanized steel screws and rivets, while the removable panels are secured by metric screws. The water connections are a female threaded type and are always flush with the structure to facilitate hydraulic connection to the circuit.

system and drainage during discharging. The tops of the coil headers are fitted with bleed valves, while in the lower part are fitted the drain valves. A protective metallic mesh is always installed to protect the heat exchanger finned surface.

#### 9. Fans

Units are fitted with axial fans having die-cast aluminium body and sickle-shaped polypropylene-coated aluminium blades. The three-phase electric motor is of the external rotor type and features permanent lubrication. It is protected against overheating by an integrated thermal cutout and has IP54 protection with class F insulation to ensure outdoor operation in all weather conditions. The sickle-shaped blades optimize aerodynamic performance

and reduces noise. The protective grilles comply with the safety standards for the highest safety levels. The fans are controlled by the microprocessor controller, which gradually activates them in steps (standard) or regulates their rotation speed (optional) to guarantee the greatest possible precision in control of the process fluid discharge temperature.

#### 10. Hydraulic circuit

The water circuit of FC4TAE and FC4ALL modules is complete with:

- Water cooling coils with copper tubes and aluminium fins;
- On/Off water valve for free-cooling control;
- Drain plug in the lower part of manifolds;

- Manual air bleed valves in top of water inlet and outlet manifolds;
- EPDM hose connections;
- Brass and galvanized cast iron fittings;
- The water connections plate flush with the structure.

#### 11. Free-cooling regulation water valve

The modules FC4TAE 051 and 161 are fitted with an on/off three-way valve that includes a three-way valve body coupled to electrical servo-



control unit. The three-way valve is intended to control the water flow to the coil or in bypass mode always with fixed water flow.

FREE COOLING 100%



The modules FC4TAE351-602-802 and FC4ALL are fitted with two (2) on/off butterfly valves. The valves work in combined mode as

indicated in the following diagrams:



#### 12. Electrical board

The electrical equipment of FC4TAE and FC4ALL is made in compliance with CEI EN 60204-1 standards for powered versions in 400/3/50 and dual frequency 400/3/50 - 460/3/60. Powered versions 460/3/60 UL complies with UL 508A standards. In particular, it ensures protection against the elements necessary for the outdoor installation (protection class IP 54). The electrical panel is equipped with a main switch with door lock device, and contains the magneto thermal circuit breakers for the protection of power devices such as fans. The control section includes the transformer for the supply of auxiliary and the microprocessor control.

#### 13. Microprocessor control

The control and management of FC4TAE and FC4ALL modules are made by the on-board microprocessor control IC208CX; the parameters are displayed on dual display with identification of functions and alarms through icons.

- The electronic control system manages the following functions:
- On/Off and regulation of the fan and the on/off free-cooling water valve; • Remote on/off by digital input module;
- Display of inlet/outlet water temperatures;

- Display of the ambient temperature;
- Cooling regulation based on the inlet water temperature;
- Modular operation if the free-cooling module is combined with an Aries Tech chiller;
- Displaying the alarm history;
- Management of alarm messages:
- High or low temperature water inlet / outlet;
- Alarm fans;

- Warnings about faulty or disconnected temperature probe. It has a serial interface TTL (a KIT to convert TTL / RS485 is needed) for connection to a Modbus network and a free-potential contact for remote general alarm signal.

#### 14. Functioning

#### 14.1 Stand-alone functioning mode (dry-cooler)

The FC4TAE / FC4ALL modules are able to work in a stand-alone mode, as a dry cooler without any water chiller in the system. In this case the microprocessor control IC208CX manages the following functions:

- Cooling regulation based on the inlet water temperature;
- Display of inlet/outlet water temperatures;
- Adjusting the fan speed (optional) based on the water inlet temperature in the module;
- Adjustment of the regulation water valve according to the water inlet temperature;
- ON / OFF by remote signal.

Management and display of alarm messages such as:

- High or low temperature water inlet / outlet;
- Fans alarm;
- Probe fault or disconnection alarm.

Figure 1 shows an example of hydraulic installation for a module FC4TAE/FC4ALL in a system without any water chiller. The water flows in the FC4TAE/FC4ALL module, if the outside air temperature is lower than the water temperature, the free-cooling functioning is possible. If this condition is not met, the microprocessor takes the water regulation valve in by-pass position and turns off the fans.



#### 14.2 Functioning combined with a water chiller

Figure 2 shows an example of hydraulic installation for a FC4TAE/ FC4ALL module combined with a TAEevoTECH or ARIES TECH water chiller. The water flows in the FC4TAE/FC4ALL module then passes through the chiller; thanks to the installed water regulation valve, the water can flow through the module's coil and then through the evaporator of the chiller. When the ambient conditions are not favorable for the free-cooling working mode, the regulation valve bypass the module exchanger and the water will be completely cooled by the chiller.



This type of installation provides two different modes of interface between the chiller and free-cooling module.

#### 14.2.1 Stand-alone functioning mode with a chiller

The stand-alone operation of FC4TAE and FC4ALL modules, when the installation is carried out hydraulically in series with a chiller, provides that the module's microprocessor to control and manage all functions while the chiller is controlled by its own independent electronic control. This is only for in series operation mode permitted for the modules combined with a chiller not equipped with xDRIVE microprocessor.

#### 14.2.2 Modular functioning mode with a chiller

The FC4TAE and FC4ALL modules can operate in modularity (master and slave) with a MTA chiller equipped with a xDRIVE controller. Communication between chiller and free-cooling module is via Modbus protocol. The xDRIVE control of the chiller acts as a "master" while the IC208CX control FC4TAE or FC4ALL module becomes the "slave" device. The master controller communicates to the slave control the value of the set-point, the temperature measured by the control probe, the status of the compressors and pump and adjusts the set-point to coordinate the

#### 15. Available options, kit and special executions

#### 15.1 Options

The options listed below must be specified at the time of order because they can only be installed in the factory during the manufacturing process.

#### Electrical supply:

- Dual Frequency electrical supply 400V/3Ph/50Hz 460V/3Ph/60HZ (standard for FC4TAE, option for FC4ALL);
- Electrical supply 400V/3Ph/50Hz (standard for FC4ALL);
- Electrical supply 460V/3Ph/60Hz UL508A (option only for FC4TAE).

#### Fans control:

- ON/OFF (standard);
- EC BRUSHLESS VERSION (option).

#### 15.2 Kit

Kits are accessories which are supplied separately, generally at the same time as the unit, and installed by the user. They can be supplied later as spare parts, modification kits, completion kits, etc.

Filter kit for coil: metallic mesh filters for coils protection.

**Hydraulic connection kit:** kit complete with all the hydraulic fittings, epdm pipes, and insulating materials to connect the FC4TAE/FC4ALL module with the water chiller.

#### 15.3 Special designs

Special designs are not described in detail in our catalogue, since feasibility has to be assessed on a case by case basis and financial quotations must be provided by our sales department. operation of the chiller with the FC4TAE/FC4ALL module. The adjustment logic is neutral zone type. If the Modbus communication between the chiller and the module is interrupted, both machines continue to operate in stand-alone mode while maintaining the active operating settings before interruption of modularity.

#### Painted condensing coils:

- NO (standard);
- YES (option).

Low ambient temperature -20 °C: included with the EC Brushless fans selection.

#### Packaging:

- FC4TAE051-161: wooden pallet and cardboard box;
- FC4TAE351: wooden pallet and protection plastic film;
- FC4TAE602-802 and FC4ALL300-450: wooden beams and protection plastic film.

Remote control kit.

Antivibration mounting kit: available only for FC4ALL units.

Wooden crate kit: on request protection packaging for container shipment.

Wooden pallet kit: for container shipment, only for FC4ALL450.

#### **SELECTION GUIDE**

A thermodynamic selection software package for the selection and combination of FC4TAE/FC4ALL modules also allows calculation of the potential energy savings for installation in the main worldwide cities.

The number of operating hours of the chiller + module combination in total and partial free-cooling mode can be calculated on the basis of the main cities' temperature profiles. The software calculates the total annual energy saving (kWh) compared to a solution without free-cooling unit (Chiller only), providing the following as output:

- Annual percentage energy saving;
- Annual cost saving in Euro;
- $\bullet$  Calculation of the quantity of atmospheric  $\text{CO}_2$  emissions avoided.

#### PERFORMANCE AND TECHNICAL DATA DUAL FREQUENCY VERSIONS 50/60 Hz

#### **GENERAL DATA - 50 Hz**

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#### FC4TAE 051 FC4TAE 161 FC4TAE 351 FC4TAE 602 FC4TAE 802 FC4ALL 300 FC4ALL 450

Electrical power supply (1)								
Power	V/Ph/Hz			40	0 ± 10% / 3 - PE	/ 50		
Auxiliary	V/Ph/Hz			24	- 230 ± 10% / 1	/ 50		
Condenser coils								
Condenser number	N°	1	1	1	1	2	2	2
Ranks number	N°	4	4	4	4	4	4	4
Total frontal surface	m <sup>2</sup>	0,63	1,19	2,16	3,83	7,66	10,10	10,10
Exchanger type	-				Finned coil	•	-	
Axial fans								
Fans number	N°	1	2	3	2	2	3	6
Total airflow	m³/h	5950	13100	21500	37400	43400	63000	108000
Nominal power (each)	kW	0,48	0,69	0,69	1,60	1,60	1,60	1,60
Hydraulic data		~					-	
Min/max water flow tare	m <sup>3</sup> /h	1,3 / 7,0	2,8 / 18,0	4,7 / 27,0	7,2 / 48,0	14,2 / 56,0	14,2 / 65,0	14,2 / 95,0
Tank volume	l	8,3	20,1	36,7	71,7	143,4	178,8	178,8
Max pressure hydraulic circuit	barg	6	6	6	6	6	6	6
Water connections	-	Rp 1"	Rp 1 1/2"	Rp 2"	Rp 2 1/2"	Rp 3"	DN 100 (4")	DN 125 (5")
Dimensions and installed weight (2	2)							
Width	mm	760	760	866	1410	1410	1410	2190
Length	mm	983	1517	2225	2926	2926	3660	3660
Height	mm	1360	1360	1460	2190	2190	2190	2190
Weight	ka	160	220	355	695	890	1020	1325

#### **GENERAL DATA - 60 Hz**

		FC4TAE 051	FC4TAE 161	FC4TAE 351	FC4TAE 602	FC4TAE 802	FC4ALL 300	FC4ALL 450
Electrical power supply (1)								
Power	V/Ph/Hz			460	) ± 10% / 3 - PE	/ 60		
Auxiliary	V/Ph/Hz			24	- 230 ± 10% / 1 /	/ 60		
Condenser coils								
Condenser number	N°	1	1	1	1	2	2	2
Ranks number	N°	4	4	4	4	4	4	4
Total frontal surface	m <sup>2</sup>	0,63	1,19	2,16	3,83	7,66	10,10	10,10
Exchanger type	-				Finned coil			
Axial fans								
Fans number	N°	1	2	3	2	2	3	6
Total airflow	m³/h	6950	15800	25500	42600	50000	73400	122000
Nominal power (each)	kW	0,76	1,03	1,03	2,50	2,50	2,50	2,50
Hydraulic data								
Min/max water flow tare	m³/h	1,3 / 7,0	2,8 / 18,0	4,7 / 27,0	7,2 / 48,0	14,2 / 56,0	14,2 / 65,0	14,2 / 95,0
Tank volume	l	8,3	20,1	36,7	71,7	143,4	178,8	178,8
Max pressure hydraulic circuit	barg	6	6	6	6	6	6	6
Water connections	-	Rp 1"	Rp 1 1/2"	Rp 2"	Rp 2 1/2"	Rp 3"	DN 100 (4")	DN 125 (5")
Dimensions and installed weight (2	)							
Width	mm	760	760	866	1410	1410	1410	2190
Length	mm	983	1517	2225	2926	2926	3660	3660
Height	mm	1360	1360	1460	2190	2190	2190	2190
Weight	kg	160	220	355	695	890	1020	1325

#### **ELECTRICAL DATA - 50/60 Hz**

			Standard fans			EC fans	
Model	Hz	FLI (kW)	FLA (A)	ICF1 (A)	FLI (kW)	FLA (A)	ICF1 (A)
FC4TAE 051	50	0,48	0,98	3,90	1,00	1,70	-
FC4TAE 161	50	1,38	2,68	7,84	2,00	3,40	-
FC4TAE 351	50	2,07	4,02	9,18	3,00	5,10	-
FC4TAE 602	50	3,20	7,20	14,60	3,90	6,60	-
FC4TAE 802	50	3,20	7,20	14,60	3,90	6,60	-
FC4TAE 051	60	0,76	1,17	3,90	1,00	1,35	-
FC4TAE 161	60	2,06	3,12	8,96	2,00	2,70	-
FC4TAE 351	60	3,09	4,68	10,52	3,00	4,05	-
FC4TAE 602	60	5,00	8,40	13,70	3,90	5,20	-
FC4TAE 802	60	5,00	8,40	13,70	3,90	5,20	-

			Standard fans			EC fans	
Model	Hz	FLI (kW)	FLA (A)	ICF1 (A)	FLI (kW)	FLA (A)	ICF1 (A)
FC4ALL 300	50	4,80	10,80	18,20	5,85	9,90	-
FC4ALL 450	50	9,60	21,60	36,40	11,70	19,80	-
FC4ALL 300	60	7,50	12,60	17,90	5,85	7,80	-
FC4ALL 450	60	15,00	25,20	35,80	11,70	15,60	-

**FLI** = max power absorbed in the working limits condition;

**FLA** = max power absorbed in the working limits condition;

ICF1 = Start-up current at the start of the last compressor in the working limits condition.

#### **ELECTRICAL DATA - 50 Hz**

			Standard fans			EC fans	
Model	Hz	FLI (kW)	FLA (A)	ICF1 (A)	FLI (kW)	FLA (A)	ICF1 (A)
FC4ALL 300	50	5,70	11,70	18,80	5,85	9,90	-
FC4ALL 450	50	11,40	23,40	37,60	11,70	19,80	-

**FLI** = max power absorbed in the working limits condition;

**FLA** = max power absorbed in the working limits condition;

ICF1 = Start-up current at the start of the last compressor in the working limits condition.

#### SOUND LEVELS - 50 Hz

				Daviaa	Dresser	Distance						
Madal	63	125	250	500	1000	2000	4000	8000	Power	Pressure	Distance	NUB
Model	Sound power level Lw dB (A) dB (A) dB								dB (A)10m	(1) L (m)		
FC4TAE 051	30,9	46,7	61,6	67,4	70,5	72,4	65,6	52,9	76,0	48,0	1	15
FC4TAE 161	34,8	51,1	66,4	72,4	75,6	77,6	70,5	57,5	81,0	53,0	3	10
FC4TAE 351	36,6	52,9	68,2	74,2	77,3	79,3	72,3	59,2	83,0	55,0	5	6
FC4TAE 602	51,1	68,6	69,8	74,8	80,5	75,5	71,0	63,5	83,2	55,2	10	0
FC4TAE 802	51,1	68,6	69,8	74,8	80,5	75,5	71,0	63,5	83,2	55,2		
FC4ALL 300	52,9	70,4	71,5	76,5	82,2	77,3	72,8	65,3	85,0	57,0		
FC4ALL 450	55,9	73,4	74,5	79,5	85,2	80,3	75,8	68,3	88,0	60,0		

Sound power: determined on the basis of measurements taken in accordance with the standard ISO 3744. Sound pressure at 10 m: average value obtained in free field on a reflective surface at a distance of 10 m from the side of the condenser coils and at a height of 1,6 m from the unit support base. Values with tolerance +/- 2 dB. The sound levels refer to operation of the unit under full load in nominal conditions. (1) To calculate a different distance of the sound pressure level, use the formula: dB(A)L=dB(A)10m+Kdb.

#### **SOUND LEVELS - 60 Hz**

				Octave b	ands (Hz)				Daviaa	Dressure	Distance	
Madalla	63	125	250	500	1000	2000	4000	8000	Power	Pressure	Distance	KUB
Modello			Sound power level Lw dB (A) dB (A) dB (A) 10m (1)							(1) L (m)		
FC4TAE 051	33,4	49,3	64,1	70,0	73,0	75,0	68,1	55,4	78,5	50,5	1	15
FC4TAE 161	36,7	53,1	68,4	74,4	77,5	79,5	72,5	59,4	82,9	54,9	3	10
FC4TAE 351	39,0	55,4	70,7	76,7	79,8	81,8	74,8	61,7	85,3	57,3	5	6
FC4TAE 602	53,6	71,1	72,3	77,3	83,0	78,0	73,5	66,0	85,7	57,7	10	0
FC4TAE 802	53,6	71,1	72,3	77,3	83,0	78,0	73,5	66,0	85,7	57,7		
FC4ALL 300	55,4	72,9	74,1	79,1	84,8	79,8	75,3	67,8	87,5	59,5		
FC4ALL 450	57,9	75,4	76,6	81,6	87,3	82,3	77,8	70,3	90,0	62,0		

Sound power: determined on the basis of measurements taken in accordance with the standard ISO 3744. Sound pressure at 10 m: average value obtained in free field on a reflective surface at a distance of 10 m from the side of the condenser coils and at a height of 1,6 m from the unit support base. Values with tolerance +/- 2 dB. The sound levels refer to operation of the unit under full load in nominal conditions. (1) To calculate a different distance of the sound pressure level, use the formula: dB(A)L=dB(A)10m+Kdb.

#### **PERFORMANCE DATA - 50/60 Hz**

Madal		Free-cooling capacity	Absorbed power	Water flow	DP
Model	HZ	[kW]	[kW]	[m³/h]	[kPa]
FC4TAE 051	50	18,3	0,5	3,4	48,0
FC4TAE 161	50	44,4	1,4	8,3	47,0
FC4TAE 351	50	75,2	2,1	14,1	41,0
FC4TAE 602	50	133,0	3,2	25,0	43,0
FC4TAE 802	50	184,2	3,2	34,6	24,0
FC4TAE 051	60	20,6	0,8	3,9	60,0
FC4TAE 161	60	51,0	2,1	9,6	61,0
FC4TAE 351	60	85,5	3,1	16,1	53,0
FC4TAE 602	60	146,8	5,0	27,6	52,0
FC4TAE 802	60	206,6	5,0	38,8	30,0

Model		Free-cooling capacity	Absorbed power	Water flow	DP
	HZ	[kW]	[kW]	[m³/h]	[kPa]
FC4ALL 300	50	265,8	4,8	49,9	55,0
FC4ALL 450	50	406,7	9,6	76,3	75,0
FC4ALL 300	60	330,7	7,5	56,4	69,0
FC4ALL 450	60	446,0	15,0	83,7	89,0

Free-cooling module cooling capacity based on: water inlet +15 °C, water outlet +10 °C, 30% ethylene glycol 30% and ambient temperature 0 °C.

#### **PERFORMANCE DATA - 50 Hz**

Model		Free-cooling capacity	Absorbed power	Water flow	DP
	HZ	[kW]	[kW]	[m³/h]	[kPa]
FC4ALL 300	50	265,8	5,7	49,9	55,0
FC4ALL 450	50	406,7	11,4	76,3	75,0

Free-cooling module cooling capacity based on: water inlet +15 °C, water outlet +10 °C, 30% ethylene glycol 30% and ambient temperature 0 °C.

#### **WORKING LIMITS**

#### FC4TAE 051 - FC4TAE 161

#### FC4TAE 351 - FC4TAE 602 - FC4TAE 802 - FC4ALL 300 - FC4ALL 450

		Min	Max				Min	Max
External air temperature	°C	-20 [1]	+46 <sup>(5)</sup>		External air temperature	°C	-20 <sup>(6)</sup>	+46
Module inlet water temperature	°C	-6	+60		Module inlet water temperature	°C	-16	+60
Module outlet water temperature	°C	-10 [2]	+56		Module outlet water temperature	°C	-20 <sup>[7]</sup>	+56
Delta T of the water <sup>(3)</sup>	°C	4	10	]	Delta T of the water <sup>(8)</sup>	°C	4	10
Hydraulic circuit pressure <sup>(4)</sup>	barg	1,5	6,0	]	Hydraulic circuit pressure <sup>(9)</sup>	barg	1,5	6,0

(1) For uses below ambient temperature -15 °C must be used the "ambient temperature -20 °C" option, which includes electronic fans regulation. A suitable amount of glycol must be added to the water circuit.

(2) A suitable amount of glycol must be added to the water circuit.

(3) As the module minimum and maximum flow rates allow.

(4) Recommended for use in closed circuits. Contact MTA for any information.

(5) The model FC4TAE 051 dual frequency version, when fed 460/3/60, it has a maximum ambient temperature equal to 41 °C.

(6) For uses below ambient temperature -15 °C must be the "ambient temperature -20 °C" option, which includes electronic fans speed regulation. A suitable amount of glycol must be added to the water circuit.

(7) For uses below water outlet temperature -10 °C must be the "ambient temperature -20 °C" option, which includes the electronic fans sped regulation. A suitable amount of glycol must be added to the water circuit.

(8) As the module minimum and maximum flow rates allow.

(9) Recommended for use in closed circuits. Contact MTA for any information.

#### **PRESSURE DROPS**

#### FC4TAE MODULES



flow rate of 30% water and glycol mixture [m<sup>3</sup>/h]



#### **FC4ALL MODULES**

available head pressure **ΔP** [kPa]

# FC4TAE - FC

flow rate of 30% water and glycol mixture [m³/h]

#### **OVERALL DIMENSIONS**



**FC4TAE 161** 







1361

760

∕∕

360

**FC4TAE 351** 







		051	161	351
$\overline{\bullet}$	Water inlet	Rp 1"	Rp 1 1/2"	Rp 2"
Ð	Water outlet	Rp 1"	Rp 1 1/2"	Rp 2"

**\*\*** Holes





#### **FC4TAE 602**







**FC4TAE 802** 







FC4ALL 300









🧍 Power supply

▲ Air vent = Rp 3/8"
▲ Water discharge = Rp 3/8"

FC4ALL 450



#### **CLEARANCES**



Minimum distance to respect (mm).

	Α	В	C	D
FC4TAE 051	1200	1000	1200	1000
FC4TAE 161	1200	1200	1200	1200
FC4TAE 351	1200	1200	1200	1200
FC4TAE 602	1200	1200	1500	1200
FC4TAE 802	1500	1200	1500	1200
FC4ALL 300	2000	1200	2000	1200
FC4ALL 450	2000	1200	2000	1200

#### **INSTALLATION GUIDE**

MTM

The FC4TAE and FC4ALL coolers must be installed in compliance with the following guidelines:

- a) The units must be installed horizontally to ensure complete drainage of the water and glycol mixture when needed;
- b) Ensure the clearances prescribed in the catalogue are observed.
- c) As far as possible, position the unit in a way which minimizes noise, vibrations, etc. Specifically, install units as far as possible from areas in which cooler noise emissions could result in disturbance; do not install the cooler under windows or in passageways between two residential units. Vibration transmitted to the ground must be reduced by the use of antivibration devices mounted beneath the unit, flexible couplings on the water piping connections and on the trunking containing the electrical power feeding cables.
- d) Always make the electrical connection of the unit with reference to the wiring diagrams supplied with it.
- e) Make the water connections to the unit, installing the following components:
  - flexible couplings;
  - shut-off valves;
  - bleed valves in the highest sections of the plant;
  - drain points in the lowest points of the plant;
  - pump and expansion tank (if not already part of system);
  - flow switch;
  - water filter (40 mesh) at the cooler inlet.
- f) Install a water storage tank at the cooler inlet (for stand-alone operation) if the water capacity of the circuit is not sufficient. Ensure that the system has sufficient thermal inertia to prevent hunting of the chilled water temperature within the set values and improve the unit's energy efficiency.

- g) When using coolers with parallel-connected water circuits, take care not to create imbalances in the water flows entering the values modules.
- h) Comply with the recommended minimum distances between units shown in the "Dimensions and weights" table.
- i) If it is necessary to treat water flow rates higher than the maximum permissible flow rate associated with the cooler, it is advisable to set up a bypass between the cooler inlet and outlet.
- I) If it is necessary to treat water flow rates that lower than the minimum permissible flow rate associated with the cooler, install a bypass line between the cooler outlet and inlet.
- m)Carefully bleed all air from the water circuit because even a small amount of air in the circuit can reduce the efficiency of the unit.
- n) Installation of coolers in closed-circuit systems is preferable. In the event of use in open circuits, ensure that the installation allows the air to be bled from the circuit correctly, and that any pumps operate with the appropriate head.
- o) It is important always to use antifreeze mixture in the water circuit.
- p) Any pumps must not be allowed to operate dry, even during pump start-up.
- q) For installations in aggressive environments, the "heat exchange coils with protective paint" option must be selected.



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