

Data Book

TECS2 HFO 0351 - 1053_201511_EN HFO-1234ze



TECS2 HFO 0351 - 1053

339-1017 kW

High efficiency chiller, air source for outdoor installation



R HF01234ze

CENTRIFUGAL

FLOODED



(The photo of the unit is indicative and may vary depending on the model)

- ✓ HFO REFRIGERANT
- ✓ VERY HIGH EFFICIENCY

- ✓ EXTREMELY SILENT OPERATION
- ✓ LOW INRUSH CURRENTS

CERTIFICATIONS

Product certifications



Voluntary product certifications



Check ongoing validity of certificate:

www.eurovent-certification.com

or

www.certiflash.com



System certifications



Climaveneta S.p.A.:

Quality System complying with the requirements of UNI EN ISO9001:2008 regulation

Environmental Management System complying with the requirements of UNI EN ISO14001:2004 regulation

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LEGEND

Functions



Cooling



Refrigerant



HFO-1234ze

Compressors



Centrifugal compressor

Exchangers



Flooded evaporator

Other features



Energy Class A



Eurovent



VPF



VSPEED

1.1 PRODUCT FEATURES

1.2 GREEN CERTIFICATION RELEVANT

Climaveneta as a major player in the world HVAC market and a leading manufacturer of energy efficient, sustainable HVAC solutions, recognizes and supports the diffusion of green certification systems, as an effective way to deliver high performance buildings and improve the quality and the sustainability of the built environment.

Since the first certification system was introduced at the beginning of the 1990s, the demand for certified buildings has grown considerably, as well as the number of standards, rating and certification programs. Operating worldwide Climaveneta has extensive experience with many of them and is active member of Green Building Council Italy.

Climaveneta commitment to develop responsible and sustainable HVAC solutions, is reflected by a full range of premium efficiency products and systems, designed with special care to improve building energy performance ratings, according to major certification protocols, including LEED, BREAM, GREENSTAR, BCA, NABERS, DNGB, HQE and BEAM.

To find out more about how our products contribute to enhanced green certification rating and energy performance of a building, please refer to:
<http://www.climaveneta.com/EN/Company/Certifications/LEED/>
QR code



2.1 PRODUCT PRESENTATION

Outdoor unit for the production of chilled water featuring oil-free centrifugal compressor, with refrigerant HFO (1234-ze), axial-flow fans, condensing coil with copper tubes and aluminium fins, shell and tube flooded evaporator and electronic regulation valve. Base and supporting structure and panels are of galvanized epoxy powder coated steel with increased thickness. Flexible and reliable unit; it easily adapts itself to different thermal load conditions thanks to the precise thermoregulation together with the use of inverter technology. The compressor is radically innovative: magnetic bearings and digital rotor speed control allow partial load efficiency levels to be reached that were hitherto impossible.

2.3 HFO REFRIGERANT

4th generation refrigerant HFO 1234ze, with zero impact on the ozone layer and negligible greenhouse effect in comparison with traditional HFC refrigerants (Global Warming Potential GWP of HFO 1234ze =7, GWP of R134a =1430).

2.4 VERY HIGH EFFICIENCY

Very high efficiency at full and partial load, to top market levels, thanks to adopted technological solutions: large capacity modulation and expanded exchanger, offering minimum running costs of the unit in real working conditions.

2.5 EXTREMELY SILENT OPERATION

The best compromise between silence and efficiency, as result of a systematic design oriented to minimize the noise level.

2.6 LOW INRUSH CURRENTS

Reduced breakaway starting currents thanks to the revolutionary centrifugal compressor.

3.1 UNIT STANDARD COMPOSITION

3.2 High efficiency chiller, air source for outdoor installation

Outdoor unit for the production of chilled water featuring oil-free centrifugal compressor, with refrigerant HFO (1234-ze), axial-flow fans, condensing coil with copper tubes and aluminium fins, shell and tube flooded evaporator and electronic regulation valve. Base and supporting structure and panels are of galvanized epoxy powder coated steel with increased thickness. Flexible and reliable unit; it easily adapts itself to different thermal load conditions thanks to the precise thermoregulation together with the use of inverter technology. The compressor is radically innovative: magnetic bearings and digital rotor speed control allow partial load efficiency levels to be reached that were hitherto impossible.

3.3 Installation note

The unit is supplied fully refrigerant charged and factory tested. On site installation only requires power and hydraulic connection.

3.4 Structure

Base and frame in galvanized steel. The supporting frame are polyester-painted for the highest resistance to external factors: surfaces' hue and brightness are preserved. In silenced versions, pipes and compressors' box are covered with an acoustic layer to reduce global noise emissions.

3.5 Refrigerant circuit

Unit designed with up to 2 compressors in a single refrigerant circuit optimizing the heat exchange's process, especially in part load mode, without any risk in the proper management of oil which is, in this series, completely absent.

Standard components of the refrigerant circuits are:

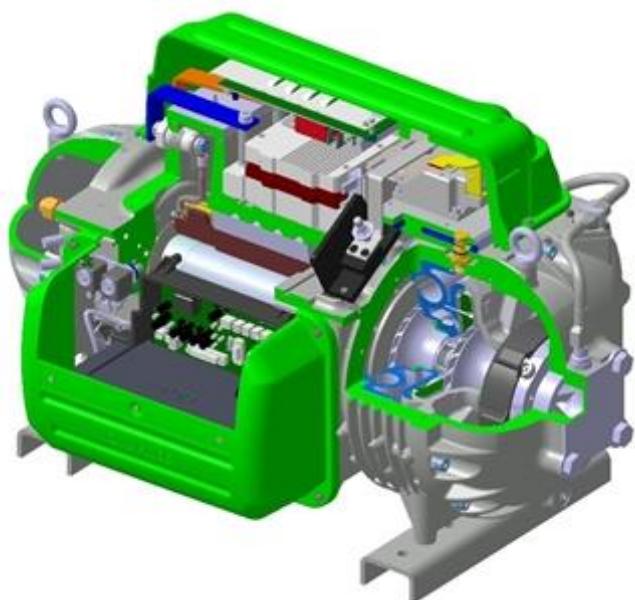
- electronic expansion valve
- high and low pressure safety valve with visualization of the pressure's level and the rotational speed directly from the controller's interface
- on-off cock on the compressor's suction and delivery line and on the refrigerant line
- filter on compressor's inlet
- drier filter with replaceable cartridge
- refrigerant line sight glass with humidity indicator
- safety switching device for limiting the pressure
- economizers

3.6 Compressor

Two stage, variable speed, centrifugal compressor with aluminium impellers, designed requiring no oil for lubrication. Compressor constructed with cast aluminium casing and high-strength thermoplastic electronics enclosures. Compressor provided with radial and axial magnetic bearings to levitate the shaft thereby eliminating metal to metal contact, and thus eliminating friction and the need for oil. Each bearing position is sensed by position sensors to provide real-time repositioning of the rotor shaft, controlled by the on-board digital electronics. Compressor speed is reduced as condensing temperature and/or heat load reduces, optimizing energy performance through the entire range.

Continuous modulation is possible thanks to the integrated inverter. Signals from the compressor controller determine the inverter output frequency, voltage and phase, thereby regulating the motor speed. In case of power failure, the compressor is capable of allowing for a normal de-levitation and shutdown. Inlet Guide Vanes is built-in to further trim the compressor capacity in conjunction with the variable-speed control, to optimize compressor performance at low loads.

The compressor is provided with a direct drive, high efficiency, permanent-magnet synchronous motor powered by pulse-width-modulating (PWM) voltage supply. Motor cooling is by liquid refrigerant injection. A non-return valve on the discharge port of the compressor is installed to protect against backflow of refrigerant during coastdown; a thermal protection protects against over-currents while a soft-charge device reduces in-rush starting current under 2 amps.



3.7 Plant side heat exchanger

Shell and tube heat exchanger, fully designed and manufactured by Climaveneta, working as flooded type evaporator, with water flowing inside the pipes and refrigerant flowing in the shell side. The steel shell is insulated with a foamed polyethylene closed-cell mat of 9 mm thickness and a thermal conductivity of 0,033 W/mK at 0°C. The copper pipes are internally and externally grooved in order to improve the heat exchange. A drop separator is integrated in the exchanger in order to protect the compressor against the risk of liquid suction. A differential pressure switch is fitted in order to control the water flow while the unit is working, avoiding the risk of ice generation. An electric heater, operating when antifreezing mode is active, is present on the shell. The pipes' flooding is controlled by an electronic expansion valve, managed by proprietary logics to guarantee the proper refrigerant flow and the complete flooding of pipes in all conditions of compressors' load. The heat exchanger complies with PED standards, concerning the operating pressures. Water side connections with flexible joints.

3.8 Source side heat exchanger

Condensing coil made with copper tubes and aluminium fins. The aluminium fins are spaced to guarantee the best heat exchange efficiency. The lower part of the exchanger works as a subcooling circuit increasing the cooling capacity.

3.9 Fan section source side - Fans EC

Axial electronically commutated fans (EC fans), with external rotor, profiled die-cast aluminium blades, housed in aerodynamic hoods complete with guard grille. 6-poles electric motor with built-in thermal protection. The brushless motor, governed by a special controller, continuously adjust fans' speed to minimize energy consumption, electromagnetic noises and current's absorption even during start-up phase.

3.10 Electrical and control panel

Electrical and control panel built to EN60204-1 and EC204-1 standards, complete with:

- electronic controller
- control circuit transformer
- general door lock isolator
- power circuit with bar distribution system
- EMC filter and reactor on the compressor's power circuit
- fuses for compressors and fans
- terminals for cumulative alarm block
- remote ON/OFF terminals
- spring-type control circuit terminal board
- auxiliary 4-20mA analogue input
- relays for remote pump(s) activation for both circuits (only for units without hydronic pumps)

3.11 Certification and applicable directives

The unit complies with the following directives and relative amendments:

- EUROVENT Certification program
- CE Declaration of conformity certificate for the European Union
- Electromagnetic compatibility EN 61000-3-4
- Machine directive 2006/42/EC
- PED directive 97/23/EC

UNIT STANDARD COMPOSITION

- Low Voltage directive 2006/95/EC
- ElectroMagnetic compatibility directive 2004/108/EC
- ISO 9001 Company's Quality Management System certification
- ISO 14001 Company's Environmental Management System certification

3.12 Tests

Tests performed throughout the production process, as indicated in ISO9001.

Performance or noise tests can be performed by highly qualified staff in the presence of customers.

Performance tests comprise the measurement of:

- electrical data
- water flow rates
- working temperatures
- power input
- power output
- pressure drops on the water-side exchanger both at full load (at the conditions of selection and at the most critical conditions for the condenser) and at part load conditions.

During performance testing it is also possible to simulate the main alarm states.

Noise tests are performed to check noise emissions according to ISO9614.



3.13 Electronic control W3000 TE

The brand new W3000TE controller offers advanced functions and algorithms. The large format keyboard provides a complete view of the statuses of the unit. The controls and the complete LCD display favour an easy and safe access to the machine setup. These resources allow the assessment and intervention on the unit, by means of a multi-level menu, with selectable user's language. The led icons immediately show the operating status of the circuits, as well as of the fans and of the water pumps (if present). An optional extra is the touch screen interface: 7.0" WVGA colour display with adjustable LED backlight and front USB port. The touch screen technology allows intuitive navigation between the various screens, safe access to the data with a three-level password protection as well as the graphic display of the performance of some monitored measurements.

The diagnostics comprises a complete alarm management system, with "black box" (via PC) and alarm log functions (via display or also PC) for a better analysis of the unit performance.

For the systems made of several units, the adjustment of the resources is performed by optional proprietary devices.

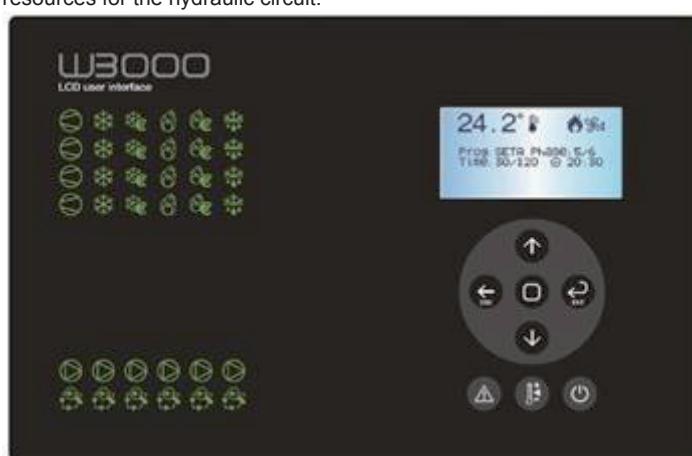
Consumption metering and performance measurement are possible as well. Supervision can be easily developed via proprietary devices or the integration in third party systems by means of the most common protocols as ModBus, Bacnet-over-IP, Echelon LonWorks, Bacnet MS/TP protocols.

Compatibility with the remote keyboard managing up to 8 units.

The presence of the programmable timer allows the creation of an operating profile containing up to 4 typical days and 10 time bands.

The control is characterized by the continuous modulation of the unit capacity, based on PID algorithms and referring to the water delivery temperature.

Optionally (VPF package), capacity modulation can be integrated with hydraulic flow modulation, thanks to inverter-driven pumps and to specific resources for the hydraulic circuit.



3.13 Touch screen

Touch screen interface

3.14 Versions

/SL-CA-E - Super low noise version, premium efficiency, Class A enhanced

Super Low-noise version, exceeds the Class A of efficiency.

Acoustic insulation on the compressors box, on pipes and a low fans' rotational speed gives the minimization of sound emission.

Generous sizing of heat exchange surfaces and use of economizers permit the efficiency at full load to be always higher than 3,4 at standard conditions.

4.1 ACCESSORIES

ACCESSORIES	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
380 NUMBERED WIRING			
381 NUMBERED WIRING ON EL. BOARD			ALL
3300 COMPRESSOR REPHASING			
3302 COMPR.POWER FACTOR CORR.0,95	Capacitors on the compressors' power inlet line.	The unit's average cos(phi) increases.	ALL
3410 AUTOMATIC CIRCUIT BREAKERS			
3411 AUTOM.CIRC.BREAKERS FOR COMPR.	Over-current switch on the compressors	In case of overcurrent allows resetting of the switch without the replacement of relative fuses.	ALL
3412 AUTOM. CIRCUIT BREAK. ON LOADS	Over-current switch on the major electrical loads.	In case of overcurrent allows resetting of the switch without the replacement of relative fuses.	ALL
3413 AUTOM.CIRC.BREAKERS FOR FANS	Over-current switch on the fans	In case of overcurrent allows resetting of the switch without the replacement of relative fuses.	ALL
3600 ON/OFF COMPRESSOR SIGNAL			
3601 COMPRESSOR OPERATION SIGNAL	Auxiliary contacts providing a voltage-free signal.	Allows remote signalling of compressor's activation or remote control of any auxiliary loads.	ALL
4180 REMOTE CONNECTION ARRANGEMENT			
4181 SERIAL CARD MODBUS	Interface module for ModBUS protocols.	Allows integration with BMS operating with ModBUS protocol.	ALL
4182 SERIAL CARD FOR LONWORKS	Interface module for Echelon systems.	Allows integration with BMS operating with LonWorks protocols	ALL
4184 SERIAL CARD BACNET MS/TP RS485	Interface module for BACnet protocols.	Allows integration with BMS operating with BACnet protocol.	ALL
4185 SERIAL CARD FOR BACNET OVER IP	Interface module for BACnet OVER-IP protocols.	Allows to interconnect BACnet devices over Internet Protocol within wide-area networks.	ALL
6160 AUXILIARY INPUT			
6161 AUXILIARY SIGNAL 4-20mA	4..20mA analogue input.	Allows to change the operating set-point according to the value of current applied to the analogue input.	ALL
6162 REMOTE SIGNAL DOUBLE SP	Allows to activate the Energy Saving set-point.	Allows to activate the Energy Saving set-point.	ALL
6170 DEMAND LIMIT			
6171 INPUT REMOTE DEMAND LIMIT	Digital input (voltage free)	It permits to limit the unit's power absorption for safety reasons or in temporary situation.	TECS2 HFO /SL-CA-E: 0702, 1053.
6190 TYPE OF VISUAL DISPLAY			
6195 W3000 TOUCH VISUAL DISPLAY	Colour WVGA 7" display keyboard with adjustable LED backlight (WARNING: with outdoor temperature below 0°C the display response time may visibly increase)	The touch-screen's technology is characterized by an easy-to-access data, and it allows an effective graphical representation of the main figures protecting the access through 3 privilege levels.	ALL

ACCESSORIES

ACCESSORIES	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
3390 ELECTRIC HEATER ON BOARD			
3391 ELECTRIC HEATER ON BOARD	Electrical heater fed directly from the unit, is automatically activated at temperatures internal QE below 30 ° C (off state at T higher than 40 ° C).	It avoids the risk of humidity condensation on the electrical panel.	ALL
3450 ELECTR. COMP. AS IEC 61000-6			
3451 EMC COMP. FOR RESIDENTIAL APP.	EMC compatibility for residential applications as per EN61000-6-3	Assure units' EMC compatibility as per EN61000-6-3, for residential, commercial and light industrial applications.	ALL
5920 MANAGEMENT & CONTROL SYSTEMS			
5921 NETWORK ANALYZER FOR DEMETRA	This option includes all following devices on-board the unit panel: - network analyzer operating on ModBUS protocol over EIA RS-485 (without certification MID) - Current transformers.	They meter the electricity absorbed and are connected with RS485 bus to an external device for energy metering (DEMETRA - see dedicated manual).	ALL
5922 ClimaPRO ModBUS RS485 - MID	This option includes all following devices on-board the unit panel: - MID certified network analyzer operating on ModBUS over EIA RS-485 - Current transformers - W3000TE controller - Software release LA09 or later version.	This accessory allows to acquire the electrical data and the power absorbed by the unit and communicate with ClimaPRO via high level communication interface based on ModBUS over EIA RS-485. More specifically, the data collected are: power supply, current, frequency, power factor ($\cos\phi$), electrical power consumption, energy consumption. This specific energy meter model is MID certified and can therefore be used for billing applications. This option also ensures the compatibility between the units and ClimaPRO, thus allowing ClimaPRO to acquire all the main unit's operating variables and status by means of a high level communication interface to the controller installed onboard the unit panel.	ALL
5923 ClimaPRO BacNET over IP	This option includes all following devices on-board the unit panel: - network analyzer operating on BACnet over IP - Current transformers - W3000TE controller - Software release LA09 or later version.	This accessory allows to acquire the electrical data and the power absorbed by the unit and communicate with ClimaPRO via high level communication interface based on BACnet over IP. More specifically, the data collected are: power supply, current, frequency, power factor ($\cos\phi$), electrical power consumption, energy consumption. This network analyzer is not MID certified and cannot therefore be used for billing applications. This option also ensures the compatibility between the units and ClimaPRO, thus allowing ClimaPRO to acquire all the main unit's operating variables and status by means of a high level communication interface to the controller installed onboard the unit panel.	ALL

ACCESSORIES

ACCESSORIES	DESCRIPTIONS	BENEFITS	AVAILABLE FOR MODELS
890 CONDENSING COIL			
881 Cu/Cu EXTERNAL COIL	Air-refrigerant heat exchanger with copper fins and tubes.	Recommended for applications in corrosive atmospheres	ALL
894 Cu PIPES/PREPAINED ALL. FINS	Fins made from pre-painted material.	Recommended for applications in medium level pollution atmospheres.	ALL
895 FIN GUARD SILVER TREATM	Air-refrigerant heat exchanger with epoxidic treatment on coils and fins.	Recommended for marine exposure conditions, with an high level of pollution or other aggressive atmospheres.	ALL
2000 COIL PROTECTION			
2001 COIL PROT.GRILLS IN PERALUMAN	Coil protecting grilles	Protects against the intrusion of solid bodies with mediumlarge dimensions.	ALL
1800 EVAPORATOR WATER FLOW SWITCH			
1801 EVAPORATOR WATER FLOW SWITCH			ALL
2900 WATER CONNECTIONS			
2903 EVAP.FLANGES + COUNTERFLANGES			ALL
2020 ANTI-INTRUSION GRILLS			
2021 ANTI-INTRUSION GRILLS	Anti-intrusions grills	Avoid the intrusion of solid bodies into the unit's structure.	ALL
2100 ANTIVIBRATION MOUNTING			
2101 RUBBER TYPE ANTIVIBR.MOUNTING			ALL
2102 SPRING TYPE ANTIVIBR.MOUNTING			ALL
9970 PACKING			
9965 NYLON + COIL PROT. PACKING			ALL
9979 CONTAINER PACKING			ALL

5.1 GENERAL TECHNICAL DATA

[SI System]

TECS2 HFO / SL-CA-E

TECS2 HFO / SL-CA-E		0351	0702	1053
Power supply	V/ph/Hz	400/3/50	400/3/50	400/3/50
PERFORMANCE				
COOLING ONLY (GROSS VALUE)				
Cooling capacity	(1)	kW	339	679
Total power input	(1)	kW	96,3	192
EER	(1)	kW/kW	3,52	3,53
ESEER	(1)	kW/kW	5,56	5,96
COOLING ONLY (EN14511 VALUE)				
Cooling capacity	(1)(2)	kW	338	677
EER	(1)(2)		3,48	3,50
ESEER	(1)(2)	kW/kW	5,36	5,75
Cooling energy class		A	A	A
EXCHANGERS				
HEAT EXCHANGER USER SIDE IN REFRIGERATION				
Water flow	(1)	l/s	16,2	32,4
Pressure drop	(1)	kPa	27,4	23,0
COMPRESSORS				
Compressors nr.	N°	1	2	3
Number of capacity	N°	0	0	0
No. Circuits	N°	1	1	2
Regulation		STEPLESS	STEPLESS	STEPLESS
Min. capacity step	%	-	-	-
Refrigerant		HFO-1234ze	HFO-1234ze	HFO-1234ze
Refrigerant charge	kg	150	475	550
Oil charge	kg	0	0	0
FANS				
Quantity	N°	8	16	14
Air flow	m³/s	30,22	62,78	77,30
Fans power input	kW	0,85	0,85	0,85
NOISE LEVEL				
Noise Pressure	(3)	dB(A)	58	59
Noise Power	(4)	dB(A)	90	92
SIZE AND WEIGHT				
A	(5)	mm	4000	7900
B	(5)	mm	2260	2260
H	(5)	mm	2430	2430
Operating weight	(5)	kg	3130	6450
				7610

Notes:

1 Plant (side) cooling exchanger water (in/out) 12,0°C/7,0°C; Source (side) heat exchanger air (in) 35,0°C.

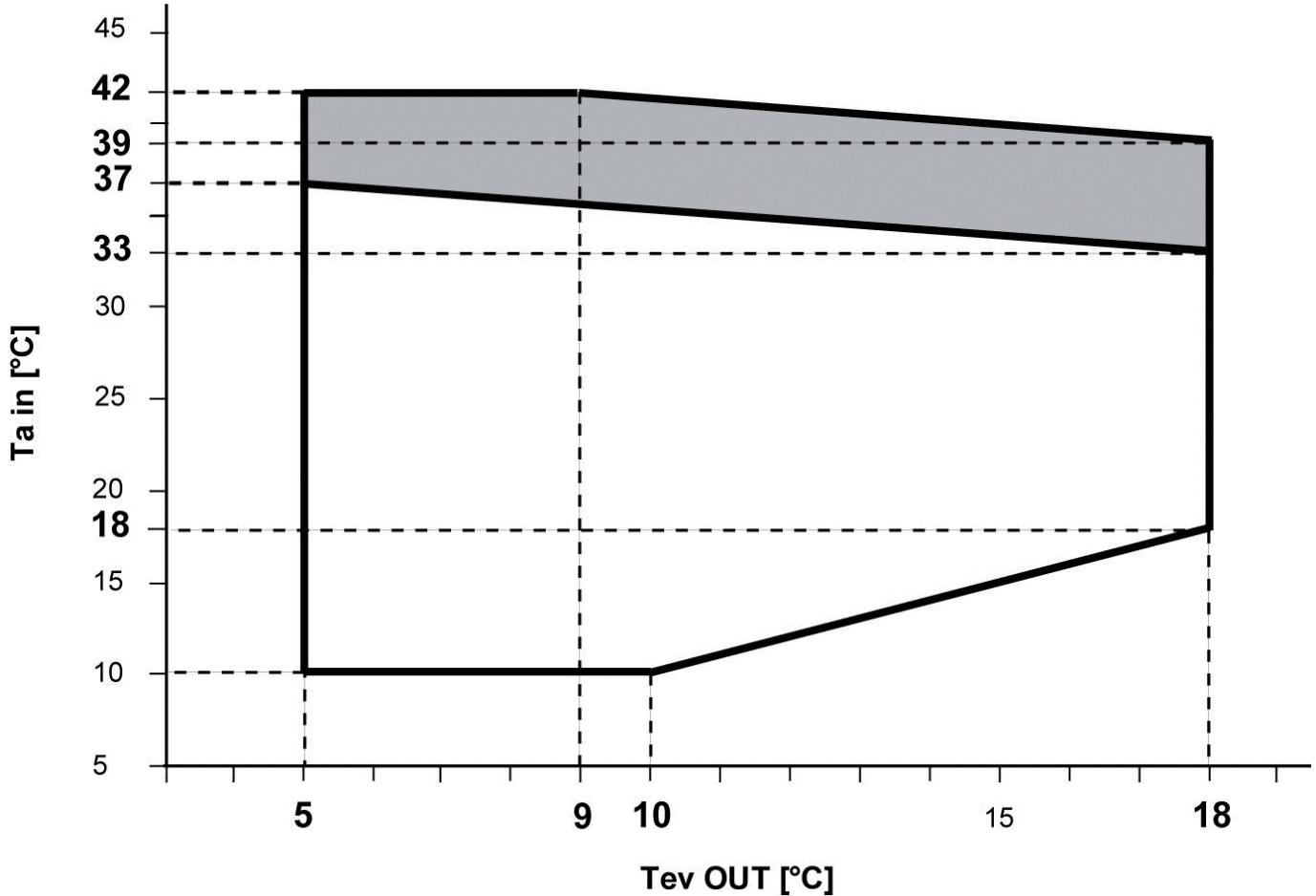
2 Values in compliance with EN14511-3:2011.

3 Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

4 Sound power on the basis of measurements made in compliance with ISO 9614.

5 Unit in standard configuration/execution, without optional accessories.

- Unavailable



Ta in Source (side) heat exchanger air [°C]

Tev out Plant (side) cooling exchanger water [°C]



Non-silenced operating range

For the limits of single size and version refer to software ELCA.

6.2 ETHYLENE GLYCOL MIXTURE

Ethylene glycol and water mixture, used as a heat-conveying fluid, cause a variation in unit performance. For correct data, use the factors indicated in the following tabel.

	Freezing point (°C)							
	0	-5	-10	-15	-20	-25	-30	-35
	Ethylene glycol percentage by weight							
	0%	12%	20%	30%	35%	40%	45%	50%
cPf	1	0,985	0,98	0,974	0,97	0,965	0,964	0,96
cQ	1	1,02	1,04	1,075	1,11	1,14	1,17	1,2
cdp	1	1,07	1,11	1,18	1,22	1,24	1,27	1,3

cPf: cooling power correction factor

cQ: flow correction factor

cdp: pressure drop correction factor

For data concerning other kind of anti-freeze solutions (e.g. propylene glycol) please contact our Sale Department.

6.3 FOULING FACTORS

Performances are based on clean condition of tubes (fouling factor = 1). For different fouling values, performance should be adjusted using the correction factors shown in the following table.

FOULING FACTORS	EVAPORATOR			CONDENSER/RECOVERY			DESUPERHEATER
ff (m ² °CW)	F1	FK1	KE [°C]	F2	FK2	KC [°C]	R3
0	1,000	1,000	0,0	1,000	1,000	0,0	1,000
1,80 x 10 ⁻⁵	1,000	1,000	0,0	1,000	1,000	0,0	1,000
4,40 x 10 ⁻⁵	1,000	1,000	0,0	0,990	1,030	1,0	0,990
8,80 x 10 ⁻⁵	0,960	0,990	0,7	0,980	1,040	1,5	0,980
13,20 x 10 ⁻⁵	0,944	0,985	1,0	0,964	1,050	2,3	0,964
17,20 x 10 ⁻⁵	0,930	0,980	1,5	0,950	1,060	3,0	0,950

ff: fouling factors

F1 - F2: potential correction factors

FK1 - FK2: compressor power input correction factors

R3: capacity correction factors

KE: minimum condenser outlet temperature increase

KC: maximum condenser outlet temperature decrease

7.1 HYDRAULIC DATA

[SI System]

Water flow and pressure drop

Water flow in the plant (side) exchanger is given by:

$$Q = P / (4,186 \times \Delta t)$$

Q: water flow (l/s)

Dt: difference between inlet and outlet water temp. (°C)

P: heat exchanger capacity (kW)

Pressure drop is given by:

$$\Delta p = K \times (3,6 \times Q)^2 / 1000$$

Q: water flow (l/s)

Dp: pressure drop (kPa)

K: unit size ratio

SIZE	Power supply V/ph/Hz	HEAT EXCHANGER USER SIDE				
		K	Q min l/s	Q max l/s	C.A.S. I	C.a. min I
TECS2 HFO /SL-CA-E /0351	400/3/50	8,04	10,0	27,8	-	5000
TECS2 HFO /SL-CA-E /0702	400/3/50	1,69	21,1	58,1	-	5000
TECS2 HFO /SL-CA-E /1053	400/3/50	1,49	24,4	67,2	-	5000

Q min: minimum water flow admitted to the heat exchanger

Q max: maximum water flow admitted to the heat exchanger

C.a. min: minimum water content admitted in the plant

C.A.S.: Exchanger water content

8.1 ELECTRICAL DATA

[SI System]

TECS2 HFO / SL-CA-E

SIZE	Power supply V/ph/Hz	Maximum values								
		Compressor				Fans (1)		Total (1)(2)		
		n	F.L.I. [kW]	F.L.A. [A]	L.R.A. [A]	F.L.I. [kW]	F.L.A. [A]	F.L.I. [kW]	F.L.A. [A]	
0351	400/3/50	1	92	150	165	2,00	3	107	173	0
0702	400/3/50	2	92	150	165	2,00	3	214	346	0
1053	400/3/50	3	92	150	165	2,00	3	313	507	0

F.L.I.: Full load power

F.L.A.: Full load current

L.R.A.: Locked rotor amperes for single compressor

S.A.: Inrush current

(1) Values calculated referring to the version with the maximum number of fans working at the max absorbed current

(1)(2) Safety values to be considered when cabling the unit for power supply and line-protections

Electrical data valid for standard units without any additional option

Plant (side) cooling exchanger water (in/out) 12,0°C/7,0°C; Source (side) heat exchanger air (in) 35,0°C.

Voltage tolerance: 10%

Maximum voltage unbalance: 3%

Give the typical operating conditions of units designed for outdoor installation, which can be associated (according to reference document IEC 60721) to the following classes:

- climatic conditions class 4K4H: air temperature range from -20 up to 55°C (*), relative humidity range from 4 up to 100%, with possible precipitations, at air pressure from 70 and 106 kPa and a maximum solar radiation of 1120 W/m²
- special climatic conditions negligible
- biological conditions class 4B1 and 4C2: locations in a generic urban area
- mechanically active substances class 4S2: locations in areas with sand or dust representative of urban areas
- mechanical conditions class 4M1: locations protected from significant vibrations or shocks

The required protection level for safe operation, according to reference document IEC 60529, is IP43XW (protection against access, to the most critical unit's parts, of external devices with diameter larger than 1 mm and rain).

The unit can be considered IP44XW protected, i.e. protected against access of external devices (with diameter larger than 1 mm) and water in general.

(*) for the unit's operating limits, see "selection limits" section

9.1 FULL LOAD SOUND LEVEL

TECS2 HFO / SL-CA-E

SIZE	SOUND POWER								Total sound level dB(A)	
	Octave band [Hz]									
	63	125	250	500	1000	2000	4000	8000		
Sound power level dB										
0351	88	89	89	86	86	82	77	71	90	
0702	90	91	91	88	88	84	79	73	92	
1053	91	92	92	89	89	85	80	74	93	

Working conditions

Plant (side) cooling exchanger water (in/out) 12,0°C/7,0°C; Source (side) heat exchanger air (in) 35,0°C.

Sound power on the basis of measurements made in compliance with ISO 9614.

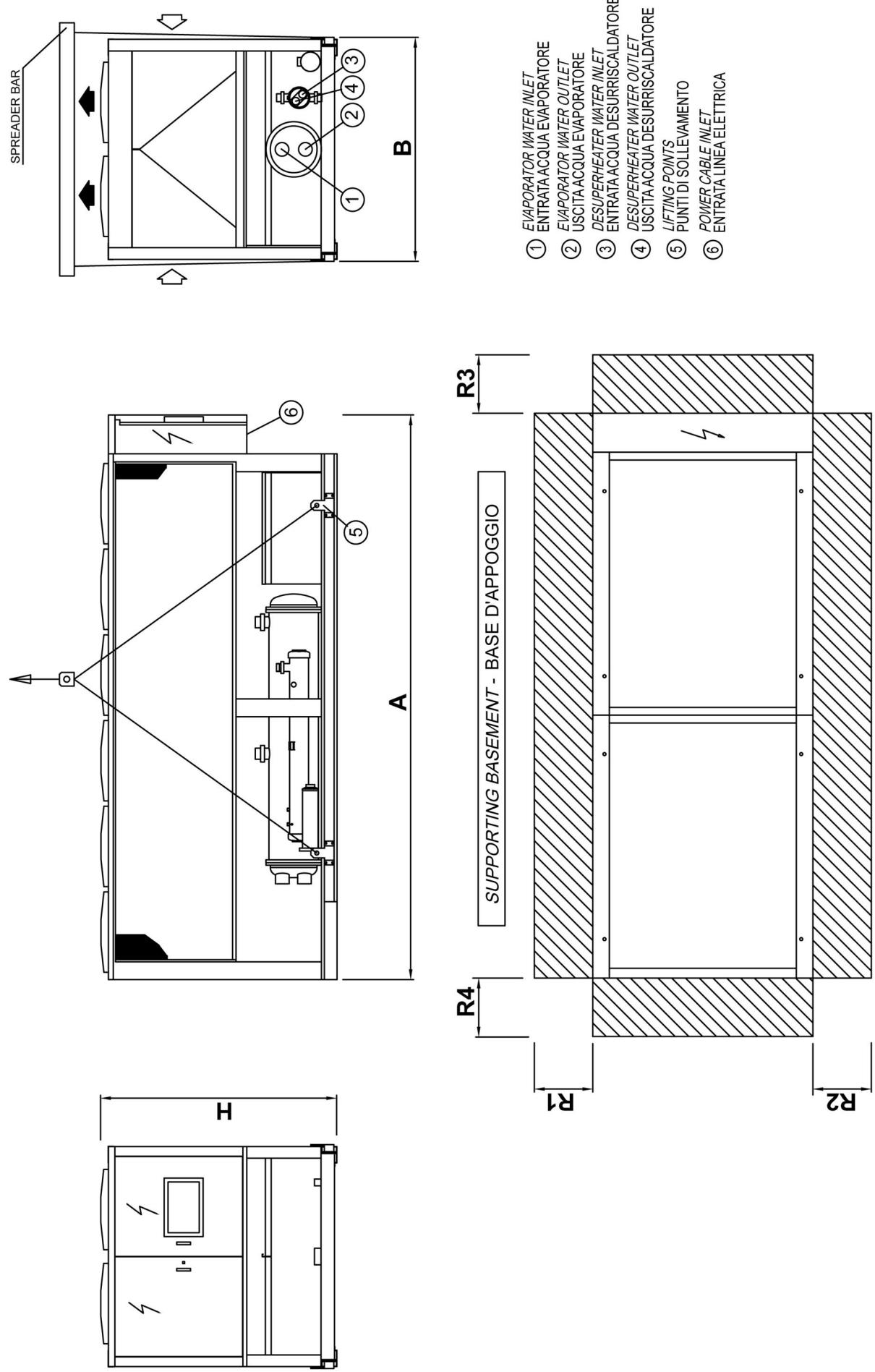
Such certification refers specifically to the sound Power Level in dB(A). This is therefore the only acoustic data to be considered as binding.

SIZE	SOUND PRESSURE LEVEL								Total sound level dB(A)	
	Octave band [Hz]									
	63	125	250	500	1000	2000	4000	8000		
Sound pressure level dB										
0351	56	57	57	54	54	50	45	39	58	
0702	57	58	58	55	55	51	46	40	59	
1053	58	59	59	56	56	52	47	41	60	

Working conditions

Plant (side) cooling exchanger water (in/out) 12,0°C/7,0°C; Source (side) heat exchanger air (in) 35,0°C.

Average sound pressure level at 10m distance, unit in a free field on a reflective surface; non-binding value calculated from the sound power level.

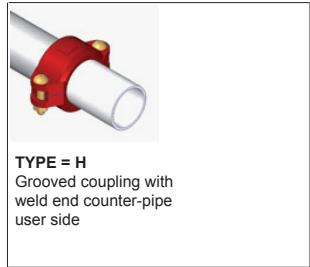


DIMENSIONAL DRAWINGS

[SI System]

TECS2 HFO 0351 - 1053

SIZE	DIMENSIONS AND WEIGHTS				CLEARANCE				HEAT EXCHANGER USER SIDE	
	A [mm]	B [mm]	H [mm]	WEIGH [kg]	R1 [mm]	R2 [mm]	R3 [mm]	R4 [mm]	IN/OUT	
	Type	Ø								
TECS2 HFO /SL-CA-E /0351	4000	2260	2430	3130	2000	2000	1800	1500	H	4"
TECS2 HFO /SL-CA-E /0702	7900	2260	2430	6450	2000	2000	1800	1500	H	6"
TECS2 HFO /SL-CA-E /1053	9700	2260	2430	7610	2000	2000	1800	1500	H	8"

LEGEND OF PIPE CONNECTIONS

UNI ISO 228/1

Pipe threads where pressure-tight joints are not made on the threads - Designation, dimensions and tolerances

Used terminology:

G: Pipe threads where pressure-tight joints are not made on the threads

A: Close tolerance class for external pipe threads where pressure-tight joints are not made on the threads

B: Wider tolerance class for external pipe threads where pressure-tight joints are not made on the threads

Internal threads: G letter followed by thread mark (only tolerance class)

External threads: G letter followed by thread mark and by A letter for A class external threads or by B letter for B class external threads.

UNI EN 10226-1

Pipe threads where pressure-tight joints are made on the threads - Designation, dimensions and tolerances

Used terminology:

Rp: Internal cylindrical threads where pressure-tight joints are made on the threads

Rc: Internal conical threads where pressure-tight joints are made on the threads

R: External conical threads where pressure-tight joints are made on the threads

Internal cylindrical threads: R letter followed by p letter

Internal conical threads: R letter followed by c letter

External conical threads: R letter

Designation	Description
UNI EN 10226-1 - Rp 1 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 1 1/2"
UNI EN 10226-1 - Rp 2 1/2	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 2 1/2"
UNI EN 10226-1 - Rp 3	Internal cylindrical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 3"
UNI EN 10226-1 - R 3	External conical threads where pressure-tight joints are made on the threads, defined by standard UNI ISO 7/1 Conventional ø 3"
UNI ISO 228/1 - G 4 B	Internal cylindrical threads where pressure-tight joints are not made on the threads, defined by standard UNI ISO 228/1 Tolerance class B for external thread Conventional ø 4"
DN 80 PN 16	Flange Nominal Diameter: 80 mm Nominal Pressure: 16 bar

Notes:

Conventional diameter value [in inches] identifies short thread designation, based upon the relative standard.

All relative values are defined by standards.

As example, here below some values:

	UNI EN 10226-1	UNI ISO 228/1
Conventional ø	1"	1"
Pitch	2.309 mm	2.309 mm
External ø	33.249 mm	33.249 mm
Core ø	30.291 mm	30.291 mm
Thread height	1.479 mm	1.479 mm



for a greener tomorrow



Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses, we are helping contribute to the realization of a sustainable society.

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