

Installation, operating,
and maintenance
manual



Water chillers

Air/water
self-contained

Axial fans and
scroll compressors

ZETA 2002 - water chiller

Air-cooled liquid chillers with hermetic scroll compressors and plate type evaporator, suitable for outdoor installations. The unit has a refrigerant circuit for each pair of compressors.

UNIT FRAME

Self supporting frame with removable panels, internally coated with expanded polyurethane sound-absorbing material; constructed from galvanized sheet steel with RAL 5014 powder paint baked at 180°C to provide a durable weatherproof finish. Threaded fasteners in stainless steel.

COMPRESSORS

Hermetic scroll type with orbital motion, connected in tandem and equipped with oil level sight glass, Klixon internal thermal protection and oil equalisation line.

The compressors are housed in a sound insulated compartment and separated from the air flow; access is provided by removable panels which allow maintenance work to be performed in safety even when the unit is in operation.

CONDENSER

Composed of a high efficiency coil manufactured from copper tubes and aluminium fins. The finned coil is protected by a metal grille which is installed as standard.

CONDENSER FANS

Axial fans directly coupled to 6 pole motors with internal Klixon overload protection.

Motor protection category is IP 54. The fan is equipped with a safety grille to UNI EN 294.

EVAPORATOR

Brazed plate type in 316 AISI stainless steel. Thermal insulation of evaporator is provided by closed cell expanded material. Each evaporator is equipped with a low water temperature probe for freeze protection and each unit is equipped as standard with a mechanical flow switch.

REFRIGERANT CIRCUIT

Comprising: liquid valve, charge connection, liquid sight-glass, filter/dryer, thermostatic expansion valve with external pressure equalisation, high and low pressure switches for 2-compressor models.

For 4-compressor models high and low pressure values and relative condensation and evaporation temperatures are measured by pressure transducers that relay the signals to the controller so that they can be read directly on the display. The high pressure side of the circuit is equipped with high pressure switches and relief valves.

ELECTRICAL PANEL

The electrical panel includes:

- main switch
- thermal magnetic circuit-breakers for fans and (if present) pumps; compressor fuses for the power circuit
- compressor contactors
- fan contactors
- pump contactors (ST version)

The microprocessor controls the following functions on all units:

- water temperature regulation
- freeze protection
- compressor time intervals
- compressor start sequence and automatic lead/lag selection
- alarm reset
- common alarm contact for remote signalling
- operating and alarm indicator LEDs

LCD display of the following information:

- water inlet and outlet temperature
- programmed temperature set-point and differential
- alarms description
- compressor hours run meter

for 4 compressor units:

- number of starts of the unit and the compressors
- high and low pressure values and relative condensation and evaporation temperature values.

Electrical power supply [V/f/Hz]: 400/3~/50 ±5%

CONTROLS AND SAFETY DEVICES

- chilled water temperature probe (at evaporator inlet)
- freeze protection probe at the outlet of each evaporator
- safety high pressure switch with manual reset
- low pressure switch (with manual reset controlled by the control)
- high pressure relief valve
- compressor over-temperature protection
- fan over-temperature protection
- mechanical flow switch, supplied as standard on all units, as kit for units 3.2 to 13.2 and factory installed for units 14.4 to 26.4.

TESTING

The units are subjected to a dry run in the factory and supplied complete with oil and refrigerant.

ZETA UNIT VERSIONS

ZETA 2002 /HP: reverse cycle heat pump

The heat pump version operates as a air cooled chiller in summer and a air to water heat pump in winter by reversing the refrigerant flow to suit the required operating mode.

- Refrigerant circuit:
 - 4-way reversing valve, liquid receiver, second thermostatic valve.
- Electrical panel:
 - Microprocessor enabled for summer/winter changeover and automatic defrosting.

ZETA 2002 LE: condensing unit.

The basic ZETA 2002 model is not equipped with an evaporator or thermostatic valve.

Also the four compressor models are not supplied with a microprocessor controller. Liquid receivers can be supplied as an accessory. The solenoid valve on the liquid line is supplied as standard.

ZETA 2002 LE /HP: heat pump condensing unit.

The basic ZETA 2002/HP model is not equipped with an evaporator, a thermostatic valve and four compressor models are not supplied with a microprocessor controller. Liquid receivers can be supplied as an accessory. The solenoid valve on the liquid line is supplied as standard.

HYDRAULIC MODULE OPTIONS

ZETA 2002 /ST 2PS : unit with storage tank and pumps.

In addition to the components of version ZETA 2002, this unit includes:
insulated storage tank; run and standby circulating pumps, with automatic changeover for four compressor models and manual changeover for two compressor models;
Also provided are an expansion tank, check valves and gate valves.

Version ST is available in the following additional four configurations:

- ST 1PS : with 1 pump and tank;
- ST 2P : with 2 pumps and no tank;
- ST S : with tank and no pumps;
- ST 1P : with 1 pump and no tank.

ACCESSORY VERSIONS

ZETA 2002 /DC: unit with heat recovery condenser.

Not available for HP versions.

This accessory is available for the following models: 3.2-13.2 " 1p-2p" 18.4-26.4" s" .

In addition to the components of version ZETA 2002, this unit includes a 100% heat recovery condenser for the production of hot water, a recovery water temperature control thermostat, and a recovery circuit safety pressure switch.

ZETA 2002 /DS: unit with desuperheaters

The brazed plate type desuperheater is arranged in series with the condensing coil. It is available for the following models: from 3.2 to 13.2 with " 1p-2p" and from 14.4 to 26.4 " 1p-2p-1ps-2ps-s" .

It is also available in the HP configuration. In this case the installation must be fitted with a shut-off valve on the water recovery circuit, to be closed during heat pump mode operation as described in the manual.

ZETA 2002 /LN: low noise unit

In addition to the components of version ZETA 2002, this unit includes:
galvanised sheet steel compressor compartment with full sound insulation using expanded polyurethane sound absorption material and expanded polyurethane with an intermediate layer of high acoustic impedance material applied to the sides of the compartment.

ZETA 2002 /SLN: extra low noise unit

In addition to the components of version LN, this unit is designed to operate with a slower fan speed to further reduce noise levels.

REFRIGERANT CIRCUIT ACCESSORIES:

- **Step type condensing pressure control**
(ambient air minimum temperature 0 °C).
The control is managed in On/Off mode by the microprocessor by means of the pressure transducers.
Available for models 18.4 to 26.4 only.
- **Condensing pressure control by fan speed regulator**
(ambient air minimum temperature -20 °C).
Fan speed is regulated in accordance with the condensation pressure read by the pressure transducers.
Available for all models.
- **Dual set-point.**
With double thermostatic valves + solenoid valves. In units with two compressors the set-point must be modified manually on the controller. For four compressor units two set-points can be programmed and switched between them from the keypad or using a digital input. The type of selection must be specified at the time of the order. In all cases the thermostatic valves switch automatically on the basis of the water temperature.
- **Pressure gauges.**
Available for all models. Note however that on 4-compressor units the suction and discharge pressure values are read by transducers that relay the results to the controller display.
- **Liquid receivers**
(standard on versions /HP and /HP/LE)
- **Compressor suction and discharge valves**
- **Liquid line solenoid valve**

HYDRAULIC CIRCUIT ACCESSORIES

- **Leaving water temperature control.**
Available only on 4-compressor models (not HP versions).
- **Anti-freeze heater**
- **Water side relief valve** (version ST only).
The value is set at 6 bar, corresponding to the maximum permissible working pressure.

ELECTRICAL ACCESSORIES

- **Serial interface:**
 - 2-compressor units are equipped with RS485 type serial interface with Carel protocol.
 - 4-compressor units are equipped with RS485 type serial interface with Modbus protocol; the following optional protocols are available on request: Carel; Echelon in version RS485 or in version FTT10
- **Power factor correction $\cos \phi \geq 0.9$** at nominal operating conditions
- **Single voltage-free contacts for machine status signals**
- **Set-point variable in a range of 3 °C with remote signal** (0-1V, 0-10V, 0-4mA, 0-20mA).
Available only for models from 16.4 to 26.4
- **Remote user terminal panel** (in addition to the standard terminal)

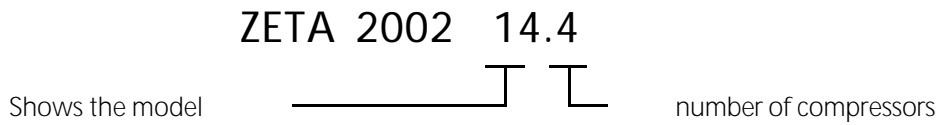
VARIOUS ACCESSORIES

- Rubber anti-vibration mountings.
Available for all models in the series
- Spring type anti-vibration mounts.
Available for models 18.4 to 26.4
- Timber crate packing
- Pallet/skid for container shipment
- Mesh coil guard with metallic filter.
Standard equipment on models from 14.4 to 26.4.
- Anti-corrosion treatment of coils for use in aggressive environments
- Non-standard RAL paint colours

SERIES

The ZETA 2002 series of water cooled chillers and heat pumps, are available in various sizes with capacities from 38 to 266 kW.

Model designations consist of two numbers:



The model, serial number, characteristics, power supply, etc. are shown by means of decals on the unit.

| | | | |
|--|---|--|-------------------------|
| | | Via Enrico Mattei, 20 35028 Piove di Sacco (PD) ITALY Tel. +039.049.9716300 | |
| c o n d i z i o n a m e n t o | | 0062 | |
| Modello/Model Modell/Modèle | Matricola/Serial number (BBOX) Matrikel/Matricule | | |
| <input type="text"/> | <input type="text"/> | | |
| Tensione-Fasi-Frequenza Voltage-Phases-Frequency Spannung-Phases-Frequenz Tension-Phases-Fréquence | Tensione circuiti ausiliari Auxiliary circuit voltage Steuerspannung Tension circuits auxiliaires | | |
| <input type="text"/> | <input type="text"/> | | |
| Corrente massima assorbita Max absorbed current Maximalstromverbrauch Courant maxi absorbée | Corrente massima di spunto Max starting current Max. Anlaufstrom Courant maxi démarrage | | |
| <input type="text"/> A | <input type="text"/> A | | |
| Tipo refrigerante Refrigerant type Kältemittel Typ Type de refrigerant | IP quadro elettrico IP electrical board IP E-Schrank IP tableau électrique | | |
| <input type="text"/> | <input type="text"/> | | |
| Numero circuiti refrigerante Refrigerant circuit number Anzahl des Kältemittelkreislaufes Numero circuits refrigerant | Press. massima circuito refriger. Max. Refrigerant circuit pressure Max. Druck Kältekreislauf Pression maxi circuit refrigerant | | |
| <input type="text"/> | <input type="text"/> kPa bar | | |
| Press. massima circuito idraulico Max. Hydraulic circuit pressure Max. Druck im Hydraul. Kreislauf Pression maxi circuit hydraulique | Data di produzione Manufacturing date Erstellungsdatum Date de fabrication | | |
| <input type="text"/> kPa bar | <input type="text"/> | | |
| Carica refrigerante per circuito(kg)/Refrigerant charge per circuit(kg) /Kältemittelfüllung Kreislauf(kg)/Charge de refrigerant chaque circuit(kg) | | | |
| <input type="text"/> C1 | <input type="text"/> C2 | <input type="text"/> C3 | <input type="text"/> C4 |

| | | | |
|--|--|--|--|
| | | Via Enrico Mattei, 20 35028 Piove di Sacco (PD) ITALY Tel. +039.049.9716300 | |
| c o n d i z i o n a m e n t o | | 0062 | |
| MODELLO - MODELE - MODEL - TYP | | | |
| MATRICOLA - MATRICULE - SERIAL NO. - SERIENUMMER | | | |
| REFRIGERANTE - REFRIGERANT - KÄLTEMITTEL - REFRIGERANT | | | |

| |
|---------------------------------|
| MODELLO |
| MATRICOLA |
| REFRIGERANTE |
| ESECUZIONE SECONDO NORMATIVE |
| SCHEMA ELETTRICO |
| SCHEMA FRIGORIFERO |
| SCHEMA IDRAULICO |
| DISEGNO MECCANICO |

| |
|---|
| MODELLO MODELE MODEL -TYP |
| MATRICOLA - MATRICULE SERIAL NO. - SERIENUMMER |

TECHNICAL DATA

R407C refrigerant

| MODEL ZETA 2002 | | 12.2 | 13.2 | 14.4 | 16.4 |
|-----------------------------------|-------------------|-------------|----------|----------------|----------------|
| Cooling (*) | | | | | |
| Nominal capacity | kW | 117,9 | 126,6 | 137 | 157,6 |
| Evaporator water flow | l/s | 5,63 | 6,05 | 6,55 | 7,53 |
| | l/h | 20.283 | 21.780 | 23.567 | 27.103 |
| Evaporator pressure drop | kPa | 50,7 | 43,2 | 51,8 | 55,8 |
| Heating (**) | | | | | |
| Nominal capacity | kW | 119,5 | 132,4 | 136,2 | 157,3 |
| Condenser water flow | l/s | 5,71 | 6,33 | 6,51 | 7,52 |
| | l/h | 20.561 | 22.779 | 23.425 | 27.061 |
| Condenser pressure drop | kPa | 52 | 47 | 51,2 | 55,6 |
| Compressors | | type scroll | | | |
| Quantity | n | 2 | 2 | 4 | 4 |
| Refrigerant circuits | n | 1 | 1 | 2 | 2 |
| Absorbed power cooling (*) | kW | 40 | 45,9 | 44,4 | 52 |
| Absorbed power heating (**) | kW | 40,5 | 44,4 | 46,8 | 55 |
| Capacity steps | % | 0-50-100 | 0-50-100 | 0-25-50-75-100 | 0-25-50-75-100 |
| Condenser cooling fans | | type axial | | | |
| Total air flow | m ³ /s | 6,60 | 6,58 | 11,27 | 11,27 |
| | m ³ /h | 23.760 | 23.700 | 40.560 | 40.560 |
| Fan motor power | n x kW | 3 x 0,6 | 3 x 0,6 | 2 x 2,0 | 2 x 2,0 |
| Nominal revolution speed | RPM | 860 | | | |
| Electric motor supply | V/Ph/Hz | 230/~ /50 | | 400/3 ~ /50 | |
| Refrigerant charge | | | | | |
| Chiller version | kg | 1 x 32 | 1 x 32 | 2 x 19,5 | 2 x 21 |
| Heat pump version | kg | 1 x 36 | 1 x 36 | 2 x 22 | 2 x 23 |
| Oil | | | | | |
| Oil charge | l | 2 x 8 | 2 x 8 | 4 x 4 | 4 x 6,6 |
| Oil producer | | Maneurop | | | |
| Oil type | | 160 SZ | | | |
| Evaporator | | type plate | | | |
| Heat exchanger water volume | l | 8,4 | 9,4 | 5,2 | 4,8 |
| Max operating pressure water side | bar | 30 | | | |
| Dimension and weight | | | | | |
| Length | mm | 3.234 | 3.234 | 3.234 | 3.234 |
| Width | mm | 1.144 | 1.144 | 1.119 | 1.119 |
| Height | mm | 1.740 | 1.740 | 2.380 | 2.380 |
| Shipping weight | kg | 1.124 | 1.158 | 1.400 | 1.464 |

(*) ambient air temperature 35°C; evaporator entering/leaving water temperature 12-7 °C.;

(**) ambient air temperature 8°C DB, 70%RH; condenser entering/leaving water temperature 40-45 °C.

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