

# Zeta Rev

40÷233 kW



## General

Chillers and reversible units with hermetic scroll compressors and plate heat exchanger. Extended range, versatile applications.

## Configurations

HE: high efficiency

SLN: super low noise

/HP: reversible heat pump

LE: with remote user-side heat exchanger

/LN: low noise

/DS: with desuperheater

/DC: with total recovery

## Strengths

- ▶ Chiller with low refrigerant charge
- ▶ Intelligent management of defrost cycles: Anti-Ice Circuit
- ▶ Night Shift function for noise control (option)
- ▶ BlueThink advanced control with integrated web server. Multilogic function and Blueeye® supervision system. (options)
- ▶ Flowzer: inverter driven pumps (options)

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AIRCONDITIONING

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## Zeta Rev

Chillers and reversible units with hermetic scroll compressors and plate heat exchanger. Extended range, versatile applications.

### STRUCTURE

The structure of the unit is made of galvanized sheet-iron coated with polyester powder in RAL 5017/7035 at 180°C, which makes it highly resistant to weather conditions.

The structure is a load-bearing frame, with removable panelling lined with sound absorbing expanded polyurethane matting.

All screws and bolts are stainless steel.

### REFRIGERANT

The unit is charged with refrigerant R410A, with GWP=2088 (value at 100 years).

### COMPRESSORS

The compressors are hermetic orbiting spiral scroll compressors connected in tandem. They are provided with thermal overload protection by internal Klixon® or external Kriwan® module (depending on the model) and with oil equalization line. All the compressors are fitted as standard with crankcase heater.

The compressors are enclosed in a dedicated technical compartment, which can be accessed by removing the panelling to allow maintenance operations to be carried out even with units running.

### SOURCE-SIDE HEAT EXCHANGER

#### (excluding HP units)

For the cooling only units, the exchangers are made with microchannel aluminium coils.

The microchannel coils are made using specific aluminium alloys for the tubes and for the fins. This allows the effects of galvanic corrosion to be drastically reduced to always ensure protection of the tubes that confine the refrigerant. The entire coil is also subjected to SilFLUX coating processes (or equivalent) or has zinc added to further increase its corrosion resistance.

The use of microchannel coils compared to conventional copper/aluminium coils reduces the total weight of the unit by about 10% and gives a reduction in refrigerant charge of at least 30%.

E-coated microchannel coils are available as an option. This option is strongly recommended for applications in coastal or highly industrialized areas.

To protect the exchangers from corrosion and ensure optimal operation of the unit, we advise following the recommendations given in the user, installation and maintenance manual for cleaning the coils.

For installations within a kilometre of the coast, the use of Cu/Al coils with anti-corrosion treatment is strongly recommended.

The exchanger is protected by a metal mesh.

### SOURCE-SIDE HEAT EXCHANGER

#### (only for HP units)

The exchangers are made with finned pack coils with copper tubes and aluminium fins.

At the base of each coil, there is an Anti-Ice Circuit: this helps to prevent ice formation in the lower part of the coil and therefore allows the unit to operate even with extremely harsh temperatures and with high humidity levels.

To protect the exchangers from corrosion and ensure optimal operation of the unit, we advise following the recommendations given in the user, installation and maintenance manual for cleaning the coils. For installations within a kilometre of the coast, use of the accessory is strongly recommended Coil treated with anti-corrosion paints.

### FANS

The fans are axial fans, directly coupled to a 6-pole electric motor, with integrated thermal overload protection (Klixon®) and IP 54 protection rating.

The fan includes the shroud, designed to optimize its efficiency and reduce noise emission to a minimum, and the safety guard.

For standard efficiency models from 3.2 to 10.2 and for HE and SLN version models from 3.2 to 7.2, the unit is fitted as standard with condensing control with fan speed adjuster. For the other models, condensing control by steps or condensing control with fan speed adjuster are available as alternative options.

### USER-SIDE HEAT EXCHANGER

The exchanger is a braze-welded stainless steel plate heat exchanger, insulated with a shroud of closed-cell insulating material.

For dual circuit models, the unit uses two heat exchangers already manifolded inside the unit and therefore with a single hydraulic connection.

The exchanger is also equipped with thermostat-controlled anti-freeze heater to protect it from ice formation when the unit is not running.

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## REFRIGERANT CIRCUIT

Each refrigerant circuit of the basic unit (cooling only) comprises:

- valve on the liquid line
- charging valves
- liquid sight glass
- replaceable solid cartridge dehydrator filter (except for sizes 3.2, 4.2 and 5.2 where the filter is a weld-on filter)
- thermostatic expansion valve with pressure equalization
- high and low pressure switches

The pipes of the circuit and the exchanger are insulated with extruded closed-cell expanded elastomer.

As an accessory, all the units can be fitted with an electronic expansion valve that allows machine stability to be reached more quickly and better superheating control than the mechanical expansion valve, to maximize the use of the evaporator in all load conditions.

## ELECTRICAL CONTROL PANEL

The electrical control panel is made in a painted galvanized sheet-iron box with forced ventilation and IP54 protection rating.

The electrical control panel of the basic unit comprises:

- main disconnect switch
- automatic circuit breakers for compressors with fixed calibration
- fuses for protecting the fans and auxiliary circuits
- fan contactors
- phase-cutting fan speed adjuster
- thermal magnetic circuit breakers for pumps (if present)
- phase monitor
- potential-free general alarm contacts
- single potential free operating contacts for compressors, fans and pumps (when present)
- digital input for general ON/OFF
- summer/winter selection by digital input (only for HP units)
- external air temperature probe
- microprocessor controller with display accessible from the outside

All the electrical cables inside the panel are numbered and the terminal board dedicated to the customer's connections is coloured blue so that it can be quickly identified in the panel.

The power supply of the unit is 400V/3~+N/50Hz for the following models:

- Zeta Rev from size 3.2 up to size 10.2
- Zeta Rev HE from size 3.2 up to size 7.2
- Zeta Rev SLN from size 3.2 up to size 7.2

The power supply of the unit is 400V/3~/50Hz for the following models:

- Zeta Rev from size 12.2 up to size 24.4
- Zeta Rev HE from size 8.2 up to size 16.4
- Zeta Rev SLN from size 8.2 to 16.4 from size 8.2 up to size 16.4

## CONTROL BLUETHINK

The unit is supplied as standard with parametric control. The advanced control can be requested as accessory.

### Main controller functions parametric

The control allows the following functions:

- water temperature adjustment, with control of the water entering the user-side heat exchanger
- freeze protection
- compressor timings
- automatic rotation of compressor starting sequence
- recording of the alarm log
- RS485 serial port with Modbus protocol
- digital input for general ON/OFF
- digital input for Summer/Winter selection (only for HP units)

For further details on available functions and on displayed information, refer to the specific documentation of the controller.

By default, the serial connections present as standard are enabled only for reading from BMS. Enabling of writing from BMS is to be requested when ordering.

### Main controller functions advanced

The control allows the following functions:

- water temperature adjustment, with control of the water entering the user-side heat exchanger
- freeze protection
- compressor timings
- automatic rotation of compressor starting sequence
- recording of the log of all machine inputs, outputs and states
- automatic rotation of compressor starting sequence
- recording of the alarm log
- RS485 serial port with Modbus protocol
- Ethernet serial port with Modbus protocol and integrated web server preloaded web page
- digital input for general ON/OFF
- digital input for Summer/Winter selection (only for HP units)

For further details on available functions and on displayed information, refer to the specific documentation of the controller.

By default, the serial connections present as standard are enabled only for reading from BMS. Enabling of writing from BMS is to be requested when ordering.

### /DS: unit with desuperheater

In addition to the set-up of a chiller only unit, /DS units include a heat exchanger for condensation heat recovery.

The brazed plate heat recovery heat exchanger is placed in series with the condensing coil. One of these is required for each refrigerant circuit of the unit; for dual circuit units, the heat exchangers are to be manifolded outside the unit (by the customer).

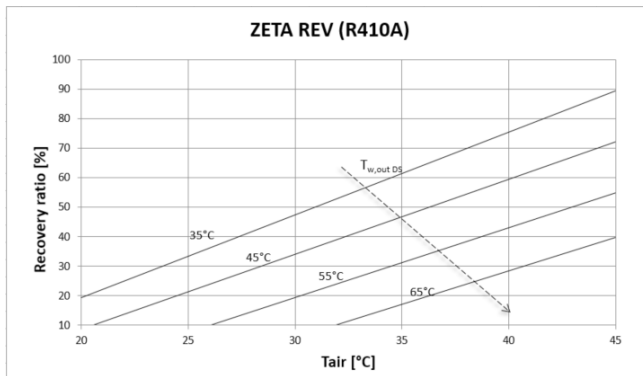
Condensation heat recovery is a function of size, version and operating conditions.

An illustrative graph is shown below in which, as the ambient temperature changes, ( $T_{air}$ ) and as the temperature of the water leaving the heat recovery heat exchanger changes, ( $T_{w,out DS}$ ), the percentage of recovered heat is shown as an indication (Recovery ratio).

Condensation heat recovery is a function of size, version and operating conditions.

The percentage of recovered heat is calculated as the ratio between recovered heat flow to the desuperheater and the heat flow to the condenser under nominal conditions, therefore evaporator inlet-outlet water temperature 12-7°C.

In the following graph, a constant temperature delta of 5°C between water inlet and outlet at the heat recovery heat exchanger has been considered.



To maximize the use of the accessory and optimize machine operation, combination with the speed adjuster of the fans or with the EC fans is recommended.

This option is also available for /HP units, but in this case, in the installation, provision must be made for shutting off the heat recovery water circuit during operation in heat pump mode to avoid taking power from the user-side heat exchanger.

### /LN: low noise unit

In the unit with /LN option, all the compressors are enclosed in a compartment that is fully soundproofed with sound absorbing material and soundproofing material.

## HYDRAULIC MODULES

All units can be fitted with hydraulic module in various configurations:

- /1P: hydraulic module with one pump
- /2P: hydraulic module with two pumps
- /1PS: hydraulic module with one pump and buffer tank
- /2PS: hydraulic module with two pumps and buffer tank

All the above-mentioned modules have pumps with standard discharge head.

The following are also available:

- modules /1PM, /2PM, /1PMS and /2PMS that have pumps with increased available discharge head
- modules /1PG, /2PG, /1PGS and /2PGS that have pumps suitable for operating with glycol up to 50%

Hydraulic modules with one pump have:

- one pump
- an expansion vessel

Hydraulic modules with two pumps have:

- two pumps
- a check valve on the delivery side of each pump
- an expansion vessel

In the version with 2 pumps, these are always with one on standby while the other is working. Switching over between the pumps is automatic and is done by time (to balance the hours of operation of each one) or in the event of failure.

Hydraulic modules with tank also have:

- a gate valve at the inlet of the pump or the suction manifold
- a tank with drain valve and air valve

Refer to the table of configurations that are not possible to check for availability of specific set-ups.

All the hydraulic circuit components are fully insulated, except for:

- drain valves
- venting valves
- tank plugs
- safety valves
- expansion vessel
- probe pockets

## ZETA REV

			13.2	14.4	15.2	16.2	16.4	18.4	20.4	24.4
<b>ZETA REV</b>										
<b>Cooling</b>										
Refrigeration capacity	(1)	kW	125,1	136,8	146,2	159,1	153,4	189,3	207,7	233,3
Total absorbed power	(1)	kW	47,9	53,0	61,8	47,4	58,1	62,2	72,0	82,9
EER	(1)		2,61	2,89	2,76	2,58	2,64	3,04	2,88	2,81
Eurovent efficiency class	(1)		D	C	C	D	D	B	C	C
ESEER			3,86	4,21	4,03	3,92	4,11	4,28	4,22	4,18
<b>ZETA REV /HP</b>										
<b>Cooling</b>										
Refrigeration capacity	(1)	kW	122,7	132,3	141,5	153,1	148,1	182,5	198,8	224,1
Total absorbed power	(1)	kW	49,0	55,1	64,5	49,3	60,3	65,1	76,0	86,7
EER	(1)		2,51	2,69	2,57	2,37	2,45	2,81	2,62	2,58
Eurovent efficiency class	(1)		D	D	D	E	E	C	D	D
ESEER			3,79	4,15	3,92	3,80	4,05	3,95	3,83	3,84
<b>Heating</b>										
Heating capacity	(2)	kW	132,8	143,3	153,2	168,4	162,3	194,3	211,9	237,8
Total absorbed power	(2)	kW	43,4	49,0	54,7	45,0	52,1	61,0	68,2	78,1
COP	(2)		3,06	3,18	3,13	3,08	3,12	3,18	3,11	3,04
Eurovent efficiency class	(2)		B	B	B	B	B	B	B	B
<b>Compressors</b>										
Compressors/Circuits		n°/n°	2/1	2/1	2/1	4/2	4/2	4/2	4/2	4/2
Minimum capacity reduction step	(7)	%	50%	45%	50%	25%	25%	21%	25%	22%
Refrigerant charge CH (MCHX)	(3)	kg	9,6	15,7	15,7	15,9	15,9	24,6	24,6	25,4
Refrigerant charge HP	(3)	kg	26,5	39,5	39,5	42,5	44,3	55,5	55,5	55,9
<b>Fans</b>										
Quantity		n°	2	2	2	2	2	3	3	4
Total air flow rate CH (MCHX)		m³/h	39.000	42.000	42.000	42.000	42.000	63.000	63.000	76.000
Total air flow rate HP		m³/h	36.000	40.000	40.000	40.000	40.000	58.000	58.000	70.000
<b>User-side heat exchanger</b>										
Quantity		n°	1	1	1	2	2	2	2	2
Water flow rate CH	(1)	m³/h	21,6	25,3	27,5	23,6	26,5	32,7	35,9	40,3
Pressure drop CH	(1)	kPa	39,2	34,9	40,9	22,8	28,2	29,3	34,9	34,3
Water flow rate HP	(1)	m³/h	21,2	24,4	26,4	22,8	25,6	31,5	34,3	38,7
Pressure drop HP	(1)	kPa	36,5	31,7	36,7	20,7	25,5	26,5	31,1	30,9
<b>Noise levels</b>										
Sound power level cooling	(4)	dB(A)	87	87	87	84	85	87	89	90
Sound power level heating	(5)	dB(A)	87	87	87	84	85	87	89	90
Sound pressure level cooling	(6)	dB(A)	55	55	55	52	53	55	57	58
Sound power level of vers. LN cooling	(4)	dB(A)	85	85	85	82	83	85	87	88
Sound power level of vers. LN heating	(5)	dB(A)	85	85	85	82	83	85	87	88
Sound pressure level of vers. LN cooling	(6)	dB(A)	53	53	53	50	51	53	55	56
<b>Dimensions and weights**</b>										
Length		mm	3.200	3.200	3.200	3.200	3.200	4.200	4.200	4.200
Depth		mm	1.100	1.100	1.100	1.100	1.100	1.100	1.100	1.100
Height		mm	1.880	2.380	2.380	2.380	2.380	2.380	2.380	2.380
Operating weight		kg	1.012	1.168	1.168	1.208	1.312	1.596	1.626	1.750

CH: chiller unit; HP: heat pump unit; MCHX: unit with microchannel coils

(1) External air temperature 35°C, user-side heat exchanger water inlet/outlet temperature 12/7°C. Values in accordance with EN 14511.

(2) Outside air temperature 7°C DB, 6°C WB; condenser inlet/outlet water temperature 40/45°C. Values in accordance with EN 14511.

(3) Theoretical values referred to the basic unit. The amount of gas actually charged in the unit may differ.

(4) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 35°C and user-side heat exchanger water inlet-outlet temperature of 12-7°C. Binding values. Values obtained from measures taken according to standard ISO 3744 and to the Eurovent certification programme where applicable.

(5) Unit operating at nominal operating capacity, without any accessories, with external air temperature of 7°C (6°C wb) and user-side heat exchanger water inlet-outlet temperature of 40-45°C. Values obtained from measures taken according to standard ISO 3744.

(6) Values obtained from the sound power level (conditions: note 4), related to a distance of 10m from the unit in free field with directivity factor Q=2. Non-binding values.

(7) Approximate value. The minimum capacity reached by the unit depends on the operating conditions. The value shown may not be suitable for calculating the minimum volume of water: to do this, consult the "Minimum water content in the system" section.

\*\* Basic CH unit without included accessories

## ZETA REV

			3.2	4.2	5.2	6.2	7.2	8.2	9.2	10.2	12.2
<b>REGULATION 2016/2281</b>											
Pdesign	(1)	kW	40,4	45,3	52,9	59,6	66,7	80,9	92,8	101,9	116,2
<b>Compliance 12/7</b>											
Compliance	(1)		N	N	N	Y	Y	Y	Y	Y	Y
$\eta_{sc}$	(1)	%	N	N	N	152,2	151,0	149,3	150,1	149,9	149,0
SEER	(1)		N	N	N	3,88	3,85	3,81	3,83	3,82	3,80
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	N	N	N	N
<b>Compliance 12/7 unit with EC fans</b>											
Compliance	(1)		Y	Y	Y	Y	Y	Y	Y	Y	Y
$\eta_{sc}$	(1)	%	149,1	149,1	149,0	155,1	152,9	155,5	157,7	154,9	151,2
SEER	(1)		3,80	3,80	3,80	3,95	3,90	3,96	4,02	3,95	3,85
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	N	N	N	N
<b>Compliance 23/18</b>											
Compliance	(2)		Y	Y	Y	Y	Y	Y	Y	Y	Y
$\eta_{sc}$	(2)	%	170,3	163,3	165,9	-	-	-	-	-	-
SEER	(2)		4,33	4,16	4,22	-	-	-	-	-	-
<b>Compliance SEPR</b>											
Compliance	(3)		Y	Y	Y	Y	Y	Y	Y	Y	Y
SEPR	(3)		5,66	5,38	5,3	5,53	5,24	5,53	5,54	5,33	5,09

			13.2	14.4	15.2	16.2	16.4	18.4	20.4	24.4	
<b>REGULATION 2016/2281</b>											
Pdesign	(1)	kW	125,1	136,8	146,2	159,1	153,4	189,3	207,7	233,3	
<b>Compliance 12/7</b>											
Compliance	(1)		N	Y	Y	N	Y	Y	Y	Y	
$\eta_{sc}$	(1)	%	N	149,4	151,6	N	149,1	154,1	150,8	149,1	
SEER	(1)		N	3,81	3,87	N	3,80	3,93	3,84	3,80	
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	N	N	N	
<b>Compliance 12/7 unit with EC fans</b>											
Compliance	(1)		Y	Y	Y	Y	Y	Y	Y	Y	
$\eta_{sc}$	(1)	%	149,1	158,8	155,0	149,1	151,1	163,6	158,0	160,0	
SEER	(1)		3,80	4,05	3,95	3,80	3,85	4,17	4,03	4,07	
Compliance Tier 2 (2021)	(1)		N	N	N	N	N	Y	N	N	
<b>Compliance 23/18</b>											
Compliance	(2)		Y	Y	Y	Y	Y	Y	Y	Y	
$\eta_{sc}$	(2)	%	163,0	-	-	167,0	-	-	-	-	
SEER	(2)		4,15	-	-	4,25	-	-	-	-	
<b>Compliance SEPR</b>											
Compliance	(3)		Y	Y	Y	Y	Y	Y	Y	Y	
SEPR	(3)		5,17	5,23	5,2	5,1	5,03	5,42	5,22	5,05	

Y = unit in compliance with Ecodesign at the indicated condition.

N = unit not in compliance with Ecodesign at the indicated condition: it can be installed only in non-EU countries.

- = value not necessary: conformity is already provided at the most restrictive condition (1).

(1) User-side heat exchanger water inlet/outlet temperature 12/7°C (low temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(2) User-side heat exchanger water inlet/outlet temperature 23/18°C (medium temperature application), with reference to regulation 2016/2281 and standard EN 14825.

(3) User-side heat exchanger water inlet/outlet temperature 12/7°C, with reference to regulation 2016/2281 and norm EN 14825.

## USER-SIDE EXCHANGER FLOW RATE FIELDS

The units are sized and optimized for the following nominal conditions: external air 35°C, inlet/outlet of the user-side heat exchanger 12/7°C.

The units can work at design conditions different from nominal conditions, provided that:

- the design condition falls within the operating limits specified below
- the unit is equipped with all the accessories necessary for operation (e.g. brine kit, fan speed adjuster)
- the flow rate at design conditions (that is, of the specific application) must always come within the allowed flow rate ranges specified below. If the design conditions require a water flow rate that does not come within the allowed operating range, you must contact our sales department that will identify the most suitable solution for the specific application.

### ZETA REV

	Qmin	Qmax
	m <sup>3</sup> /h	m <sup>3</sup> /h
<b>3.2</b>	3,5	10,5
<b>4.2</b>	3,9	11,7
<b>5.2</b>	4,6	13,7
<b>6.2</b>	5,2	15,5
<b>7.2</b>	5,8	17,3
<b>8.2</b>	7,0	21,0
<b>9.2</b>	8,0	24,0
<b>10.2</b>	8,8	26,4
<b>12.2</b>	10,0	30,1
<b>13.2</b>	10,8	32,4
<b>15.2</b>	12,6	37,9
<b>16.2</b>	13,7	41,2
<b>14.4</b>	11,8	35,4
<b>16.4</b>	13,2	39,7
<b>18.4</b>	16,3	49,0
<b>20.4</b>	17,9	53,8
<b>24.4</b>	20,1	60,4

### ZETA REV HE

	Qmin	Qmax
	m <sup>3</sup> /h	m <sup>3</sup> /h
<b>3.2</b>	3,7	11,0
<b>4.2</b>	4,2	12,7
<b>5.2</b>	5,0	15,1
<b>6.2</b>	5,5	16,4
<b>7.2</b>	6,2	18,7
<b>8.2</b>	7,5	22,6
<b>9.2</b>	8,7	26,1
<b>10.2</b>	9,6	28,8
<b>12.2</b>	11,0	33,1
<b>13.2</b>	12,0	36,0
<b>15.2</b>	13,7	41,1
<b>16.2</b>	15,5	46,5
<b>14.4</b>	12,5	37,4
<b>16.4</b>	14,8	44,4

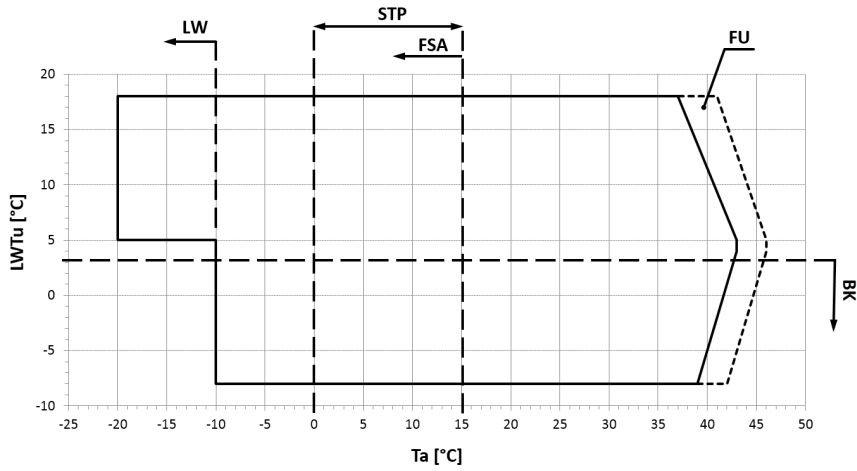
### ZETA REV SLN

	Qmin	Qmax
	m <sup>3</sup> /h	m <sup>3</sup> /h
<b>3.2</b>	3,5	10,6
<b>4.2</b>	4,0	11,9
<b>5.2</b>	4,5	13,6
<b>6.2</b>	5,4	16,1
<b>7.2</b>	6,1	18,3
<b>8.2</b>	7,3	21,8
<b>9.2</b>	8,2	24,7
<b>10.2</b>	9,2	27,6
<b>12.2</b>	10,1	30,4
<b>13.2</b>	11,8	35,4
<b>15.2</b>	13,3	39,8
<b>16.2</b>	14,7	44,0
<b>14.4</b>	12,2	36,7
<b>16.4</b>	14,0	42,0

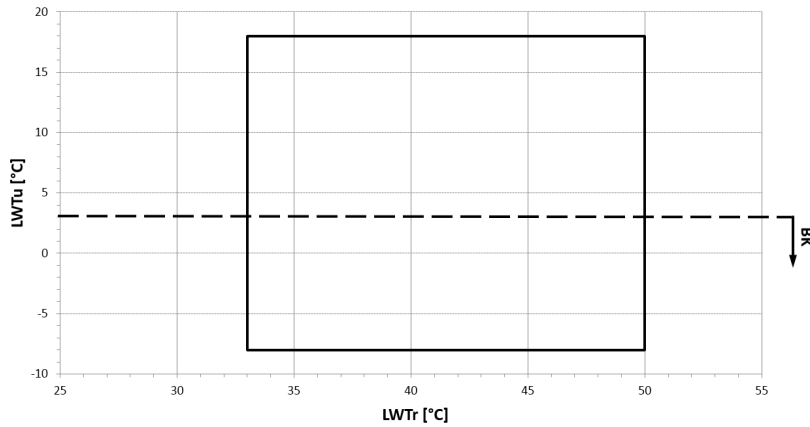
# OPERATING LIMITS

## ZETA REV

### COOLING



### TOTAL RECOVERY



- Ta:** external air temperature
- LWTu:** water outlet temperature from the user-side heat exchanger
- LWTr:** water outlet temperature from the recovery exchanger
- FSA:** to work in the area indicated by the arrow, it is mandatory to include the "Fan speed adjuster" accessory or the "EC fans" accessory
- LW:** in the indicated area, the unit can work only where there is no wind
- FU:** in the indicated area, the control could actuate a forced capacity reduction of the compressors so as to prevent tripping of the safety devices
- STP:** for external air temperatures of between +15°C and 0°C, the unit can work only if equipped with the "Condensing control by steps" accessory. For temperatures below 0°C, the unit can work only if fitted with the accessories indicated in the FSA note.
- BK:** For LWTu lower or equal to +3°C, it is mandatory to fit the "Brine Kit" accessory

For LWTu below +5°C, it is compulsory to use suitable percentages of antifreeze additives (glycols) to prevent ice formation in the exchanger.

The inlet and outlet temperatures of the user-side exchanger must be given on ordering to allow correct setting of the alarm parameters and verification of the sizing of the expansion valve.

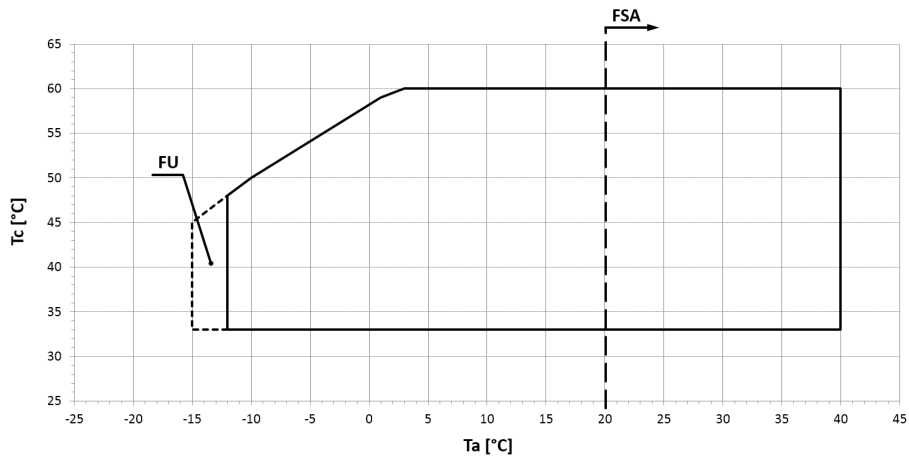
The cooling set point can then be changed by the customer in an interval that, compared to the set point given on ordering, ranges from -1K up to the maximum temperature allowed by the above-stated operating limits.

The unit will be optimized to work at the set point temperatures given on ordering. For different set points, the cooling capacity provided and the level of efficiency of the machine could decrease and move away from these conditions.

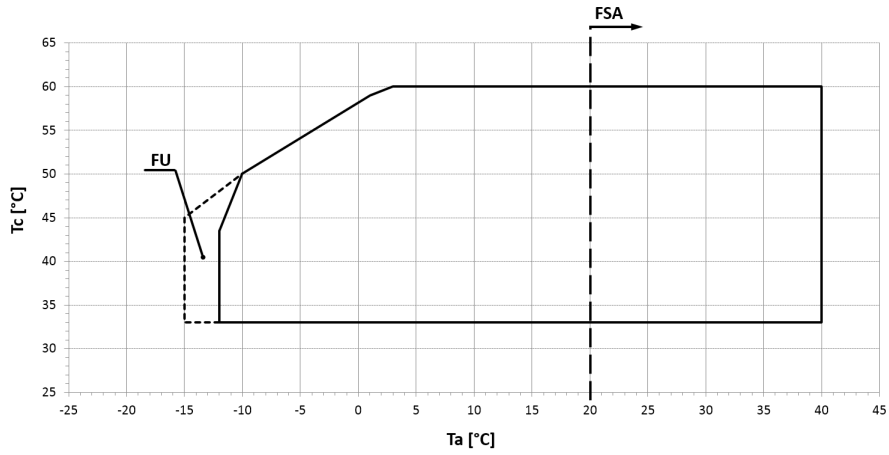


# HEATING

For models Zeta Rev 3.2, 4.2, 5.2, 6.2, 7.2, 8.2, 14.4, 16.4



For models Zeta Rev 9.2, 10.2, 16.2, 18.4, 20.4



For models Zeta Rev 12.2, 13.2, 15.2, 24.4

