
DOMINO 1100 Z C LN SB - R410A

DOMINO

The patented series of modular packaged chiller and heat pump with scroll compressors and R-410A refrigerant oriented towards higher energy efficiency and low noise emissions.

MODULAR

Due to the multiple configuration available, Domino is suitable for air conditioning any environment. More than 120 compositions are possible and the power range can be increased over time in a simple and economical way, thus following the development of the projects.

The basic unit can be installed in every position as Domino card game where its name come from, in this way no more problem for space and load of the unit.

ECOLOGICAL

The ecological refrigerant gas R-410A is not dangerous for the ozone; it allows high efficiency systems (ODP = 0) and convenient electrical consumption, and therefore, lower emissions of CO₂ in the atmosphere.

The scroll compressor, optimized for R410A are more efficiently, compact and silent.

EFFICIENT

Domino is equipped with an innovative axial fan with low electrical consumption and double size scroll compressor tandem with three different steps of capacity. The unit assure coefficients ESEER and IPLV extremely high and a perfect continuous response to the installation load variation.

Domino single circuit units operating with R410A are characterized by an ESEER clearly superior to the traditional dual-circuit units operating with R407C.

SILENT

Due to the special axial fans with owlet or Hy Blade profile of the shovels, Domino is more silent: it reaches a noise reduction of 6 dB(A) compared to standard axial fans version.

RELIABLY EVEN IN EXTREME CONDITIONS

Domino units can be equipped with low outdoor ambient kit: up to -15°C

PATENTED

Domino is covered by international patents:

Easy Change® On the site it allows to change each version from the other one, for example from the chiller to the heat pump.

External Air Recover® In heat pump mode it allows free heating of external air, avoiding the use of an external heat recovery with an increase of 40% for the COP.

Energy Multiplier Water Storer® Regenerative recovery system to increase the power and efficiency by using chilled water storage at medium heat.

Hybrid Smart Cooling® With the hybrid smart cooling system the unit can match the load request at any outdoor temperature.

Domino is the only chiller able to increase capacity with the increase of the outdoor temperature.

BASIC VERSIONS

C Chiller

H Heat pump

CM Cooling only condensing unit

HM Heat pump condensing unit

MC Modular chiller

MH Modular heat pump

OUTDOOR TEMPERATURE VERSION

(To be combined with basic versions)

HT High temperature, characterized by oversize heat exchange coils and high energetic performance fans.

ENERGETIC VERSIONS

(To be combined with basic versions)

D Partial recovery stainless steel brazed plate type desuperheater, externally insulated.

R Total recovery stainless steel brazed type exchanger, externally insulated.

ACOUSTIC VERSIONS

(To be combined with basic versions)

SL Super Low Noise, including continuous control of fans speed of rotation and by compressors aphonizing covering by means of coats, oversize heat exchange coils and high efficiency performance fans.

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HYDRAULIC VERSIONS**(To be combined with basic versions)**

B/M/A Hydraulic kit including: N.1 or N.2 pumps, available head pressure (B) Low (150 kPa), (M) Medium (250 kPa), (A) High (450 kPa), expansion vessel.

SB/SM/SA Hydraulic kit including N.1 pump, available head pressure (B) Low (150 kPa), (M) Medium (250 kPa), (A) High (450 kPa), expansion vessel, buffer tank.

XB/XM/XA Hydraulic kit including N.2 pumps, available head pressure (B) Low (150 kPa), (M) Medium (250 kPa), (A) High (450 kPa), expansion vessel, buffer tank.

MAIN FEATURES**PERSONALIZATION ON INDUSTRIAL SCALE**

Medium and high powered cooling units have always been built on order, each time personalized according to the client requirements. Thanks to Domino, Thermocold introduces the big mass production into this sector, without renouncing the flexibility obtained thanks to a more personalized production, on the contrary enforcing it thanks to the concept of modularity.

HIGH ENERGETIC EFFICIENCY

All basic modules are fitted out with twinned scroll compressors in order to assure constantly very high classes of energetic efficiency and seasonal energetic indexes (ESEER and IPLV). This allows to perfectly and quickly follow system load variations.

Together with the basic model, Thermocold suggests HT version (High Temperature) characterized by oversize exchangers and by an innovative fan which has an owl-wing or Hy Blade profile characterized by a low consumption of energy. Moreover, the Hybrid Smart Cooling enables to increase to 40% the energetic efficiency.

HYBRID SMART COOLING, A NEW LOGIC TO CHOOSE A COOLING UNIT

The choice isn't anymore at 35°C, but at a lower temperature, as for instance at 30°C. It's from this temperature on that Hybrid Smart Cooling works and the cooling unit is able to exactly satisfy the system power demand.

Hybrid Smart Cooling is the only system in the world which allows to reduce consumption of energy and meanwhile to reduce the initial investment costs.

Hybrid Smart Cooling uses water. Anyway consumptions are extremely low. If outdoor temperature is up to a 30°C there is no consumption, at 35°C the water consumption is equal to 7 litres/hour for each cooling kWh produced, increasing to 10 litres/hour for each kWh when the outdoor temperature raises to 45°C.

The water requirements can be compared to an evaporative tower (about 7/litres/h kWh) but it is just necessary when the air temperature is higher than 30°C.

PARTIAL LOAD HIGH EFFICIENCY THANKS TO THE HUGE NUMBER OF CHOKING STEPS

Thanks to the combination of multiple machines it is possible to increase efficiencies at partial loads. Each machine is also equipped with two compressors of different power, so it is possible to obtain 3 capacity steps. This increases partial load efficiency and the seasonal average efficiencies of the individual machine and the system of n machines.

- two speed operation by automatic speed change over (chiller units in ST,HP setting up);
- variable speed control by means of additional electronic card (chiller units in SLN version).

INNOVATIVE COOLING CIRCUIT

C setting: cooling circuit entirely made of copper, it includes refrigerant charging, thermostatic expansion valve, dehydrating filter, liquid indicator, solenoid valve, high and low pressure transducers, high and low pressure switches. The cooling circuits are made up of controlled atmosphere welds and they are evacuated, desiccated, pressure tested, loaded with precision by means of a specially provided electronic instrumentation.

H setting: reversible cooling circuit entirely made of copper, it includes: refrigerant charging, thermostatic expansion valve, dehydrating filter, liquid indicator, solenoid valve, high and low pressure transducers, high and low pressure switches, 4-ways valve for inversion cycle, liquid receiver and suction coil. The cooling circuits are made up of controlled atmosphere welds and they are evacuated, desiccated, pressure tested, loaded with precision by means of specially provided electronic instrumentation.

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ELECTRONICS FOR SINGLE UNITS

IP 65 electrical and control panel; made up according to CEI 44-5/IEC 204-2 laws. It includes the isolator door block handle; protection fuses for compressors, contactors for compressors, protection fuses for fans, contactors for fans; 220 V auxiliary circuit protection fuses; 24 V circuit voltage transformer; 24V auxiliary circuit protection; user junction-box with low voltage clamps.

Microprocessor

A multi-function 6 button controller with graphic display to set up the adjustment set point of the device power; to monitor the system analog state variables (in/out water temperature, pressure); to monitor the implement state (on-off compressors, valves, antifreeze strengths, etc.); to read the text and code of the activated alarm; to switch on/off the unit and change the function cycle; to change the device function parameters and through password input: proportional calling band of power steps, on-off compressor timing, antifreeze timing (for heat pumps), intervention threshold for antifreeze protection, eventual ventilator speed regulation curve in function of the condensation pressure, etc.

ALARM MANAGEMENT: the user interface provides complete information about the unit state and the possibility to decode in a direct and easy way eventual alarm situations, such as: lack of water flow; high/low pressure; thermal compressor; thermal ventilator; broken/ unrelated temperature/pressure drill, etc.

CONNECTIONS: Through the contacts (with standard equipment) over the electric panel, it is possible to manage the unit fundamental functions in remote mode: to switch on/off the unit; to select the function cycle (heating and cooling) in remote mode for heat pump versions; to detect the activation of the external water pump; to detect the general state alarm over the device; to detect the compressor on/off state. The controller can be interfaced to a supervisor software via a local or remote PC (via modem), or through complex BMS systems using Modbus protocol.

ELECTRONICS FOR MODULAR APPLICATIONS

Domino, for the modular installations, is equipped with the most innovative control system: Thermocold applies the most recent hardware technology available on the market and has developed its own control software, properly implemented for this product line, with the purpose to maximize efficiency and performances.

16 bit microprocessors with a 2MB storage capacity, real time clock in order to have an alarm archive, multilingual control software. Conceived to be inserted into a local network of electronic cards for the coordinated management of many cooling circuits on the basis of a single power regulation probe, with diversified control and alarm signals of condensation which just stop their circuit instead of the whole network.

The card addressed as master calls the power steps allotted on the whole system and manages the general alarms. The slave cards manage their own compressors according to the timing suggested by the master one, to condensation and to their circuit alarms. It is possible to manage each single network card by means of a unique 6 buttons terminal with LCD graphical display; to set the device power regulation setpoint; to monitor the analogical variables of the system status (in/out water temperatures, pressure on each circuit); to monitor the actuators status on each circuit (on/off compressors, antifreeze resistances, etc.); to read text and code of the intervened alarm; to switch on/off the unit and to change the functioning cycle; to modify the functioning parameters of the device by means of the input of a password: proportional calling band of power steps, on/off compressors timing, defrosting timing (for heat pumps), intervention threshold of antifreeze protection, possible regulation curve of fans speed depending on the condensation pressure, pre-starting timing and post switching off of the water circulation pump.

There are three types of alarms:

SERIOUS ALARMS: managed by a master card, they have as consequence the deactivation of the whole system, warning on the display, alarm buzzer, relay exit activation of the general alarm (mail on the master card).

They are: lack of water flow; possible warning of serious alarm on digital input (lack/inversion of the triad of power supply voltages of the machine, current leakage to ground).

CIRCUIT ALARMS: they deactivate only the circuit where they have occurred, give a text alarm on the display, activate the buzzer and the general alarm output relay fitted on the master card. They are: high/low pressure; compressor thermal protection; fans thermal protection; temperature or pressure probe failure;

SIGNAL-ONLY ALARMS: they only give a signal text on the display and activate the general alarm output relay fitted on the master card, but they don't deactivate any circuit of the machine. They are: unit maintenance time; compressor maintenance time; water pump maintenance time; net self-control failure: for the multi-card cooling units, this means that one or more slave-addressed cards are off-line.

UNIT DESCRIPTION**SCROLL COMPRESSORS**

Hermetic scroll compressors, complete with a heating protection of the electric engine with automatic reinsertion and a crankcase resistance in order to prevent the refrigerant thinning in the oil during device downtimes.

The junction-box is contained into a covering with an IP 54 protection degree. In the HP and SLN versions compressors are covered with a specially provided aphonizing coat made to measure in order to reduce sound emissions.

In order to maximize energetic efficiencies at partial loads compressors are differently sized for each cooling circuit in order to realize 3 power steps with two compressors. A sophisticated technology studied by Thermocold allows an intelligent activation of compressors which lengthens their duration and reliability.

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FRAME

Lattice framework piece of furniture with elements made of varnished zinc-coated steel able to withstand the mechanical stress both during transport and functioning. The high corrosion strength, assured by an epoxy powder based treatment, and the weather events strength allows the outdoor installation. The building shape assures a perfect air transition through finned parcel exchangers and allows accessibility to internal components so as to simplify repairs and maintenance.

CONDENSING COILS

The DOMINO system allows the introduction of innovative coils with microchannel entirely made of aluminum (C version only).

Thermocold historically focused on innovation, goes beyond the technology of classic heat exchangers made of copper aluminum, introducing a significant innovation on the market and mastering specific technical aspects.

Main features:

Reduced power consumption and noise

Con minori perdite di carico lato aria e dimensioni della batteria a microcanali estremamente contenute grazie alla particolare conformazione della stessa, la turbolenza sulla batteria e le perdite di carico risultano ridotte con conseguente riduzione delle emissioni sonore, della potenza e/o numero di ventilatori necessari.

With less air pressure drops and extremely small coils with microchannel size thanks to its structure, the turbulence on the coils and load losses are reduced resulting in reduced noise, power and/or number of fans required.

Compact

The heat transfer surface in contact with the refrigerant is greatly increased, so these heat exchangers are more compact and provide higher performance compared to the tube & fin.

Reduced refrigerant charge

Thanks to new MCHX technology (Microchannel heat exchanger) the refrigerant charge is reduced by up to 37% compared to equivalent machines with Al-Cu fin & tube condensers.

Lower emissions of refrigerant into the atmosphere with considerable benefits in terms of environmental protection.

Significant reductions in weight, which is a double advantage, a significant reduction of costs and maintenance time, and at the same time lower CO2 emissions in transport.

Corrosion

MCHX condensers do not suffer from galvanic corrosion that usually arises in conventional copper/aluminum exchangers. Severe salt spray test confirmed this theory. Even if corrosion should occur, it attacks the fins and not the tubes, avoiding costly service interruptions. Protective coatings produced by electrolysis will be available in order to further increase the corrosion resistance and use of the same in chemically aggressive environments.

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FOR HP, SLN VERSIONS: air side high efficiency and low by-pass impact finned parcel exchangers occupying a wide area, with aluminium gills and copper pipes mechanically expanded. The ranks number has increased in order to assure a full load functioning up to an outdoor temperature equal to 45°C even with a reduced air delivery.

EVAPORATORS

Directly expanded braze welded plated, externally isolated with closed cells anti-condensate mat, fitted with antifreeze electrical resistance driven by thermostat and water differential gear pressure switch.

RECOVERY OF HEAT EXCHANGERS

D VERSION: brazed plate heat exchanger with partial recovery (desuperheater), externally insulated.

R VERSION: brazed plate heat exchanger with total recovery, externally insulated.

FANS

The technology of ECOPROFILE propeller fans, has blades statically and dynamically balanced, driven directly by the electric motors, closed type, external rotor and thermal protection for outdoor installation. Class F windings, internal protection according to VDE 0730. Ecoprofile are characterized by low speed and "owl" profile to reduce the effect of vortices, thereby reducing the energy consumed for operation and noise, reducing it by an average of 6dB (A) compared with standard fans.

ECOPROFILE ELECTRONIC fans are available as well in the brushless version, which uses brushless electric motors, further improving both power consumption and noise emissions. In addition, these fans provide a continuous adjustment of condensation.

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MOUNTED ACCESSORIES

Hybrid smart cooling® (2 way modulating valve, brazed heat exchanger).
Low outdoor water temperature kit from - 6 up to – 10°C.
Low outdoor water temperature kit below – 10°C.
Double set point. (1)
Numbered wires
Electronic expansion valve.
Power factor correction to $\cos. \phi = 0,91$. (2)
Automatic circuit breakers for compressors.
Automatic circuit breakers for fans.
Over/under voltage + phase failure protection relay.
Condensing control with variable fan speed modulation with inverter.
Condensing control by additional step
Ecoprofile electronic fans (full inverter).
Soft starter.
Electrical panel IP66.
Low outdoor temperature kit up to -15°C (in cooling mode only). (3)
Compressors sound jackets.
Pre painted condensing coils.
Epoxy coated condensing coils fins.
Copper/copper condensing coils.
BLYGOLD condensing coils.
Plastic packing + wooden cage
Plastic packing + wooden case
Plastic packing + wooden case for transport by sea
Extra packing (for hydraulic versions)

LOOSE ACCESSORIES

Kit GENIUS. (4)
Remote Display.
Signal amplification card (distances more than 50 mt).
Connecting cable by meter (maximum length of the network 500 mt)
Enabling multiple units for modular applications (Changing password related to the C.O.)
Anti intrusion grilles.
Liquid receivers (ver. CM – HM).
Connection valve kit (ver. CM – HM).
Flow switch.
Automatic water filling.
Water gauges.
Rubber antivibration mounts.
Spring antivibration mounts.
Water strainer.
Threaded diameter FF
Connection type
KV

LOOSE ACCESSORIES THAT CAN BE USED ONLY ON MASTER UNIT (in case of combination) OR ON SINGLE UNITS

Serial communication card RS485.
System management software through PC in Windows ambient.

NOTES

- (1) Available in the temperature std range. It includes electronic expansion valve.
- (2) The phase correction will applied on each unit. The device will be provided loose with clamps for the connection to the pannel.
- (3) It must be associated with "Condensing control with variable fan speed modulation with inverter" or "SL" setting.
- (4) For modular applications.

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CAPACITY	Cooling Capacity [kW] 97,0		Compressors power input [kW] 33,0						
ENERGETIC PERFORMANCES	EER	2,94	Total EER	2,68					
COMPRESSORS	COMPRESSORS		2						
	Refrigerant circuits		1						
	Unloading steps		3						
	Refrigerant charge [kg]		20,0						
	Oil charge [kg]		13,4						
SOURCE	Fans		2						
	Nominal air flow [m³/h]		31860						
	Air temperature [°C]		35,0						
	Power input (each) [kW]		1,58						
	Running current for each fan [A]		3,00						
USER	Fluid type		Ethilene Glycol 35%						
	Fluid temp. in/out [°C]		12,0/7,0						
	Evaporators number		1						
	Evaporators water flow [m³/h]		18,6						
	Evaporators pressure drop [kPa]		81						
SB	Pump pressure [kPa]	218,1	Absorbed current [A]	8,6					
	Power input [kW]	2,5	Tank capacity [l]	120,0					
ELECTRICAL DATA (not included pump)	FLI [kW]	33.7	FLI maximum [kW]	41.0					
	FLA [A]	62.6	FLA maximum [A]	76.1					
	SA [A]	240.1	SA maximum [A]	251.6					
	LRA [A]	215.0							
ACOUSTIC DATA	Sound level pressure at 20 m (ISO 3744)		[db]	46					
	Sound level pressure at 10 m (ISO 3744)		[db]	51					
	Sound level pressure 5 m (ISO 3744)		[db]	56					
	Sound level pressure 1 m (ISO 3744)		[db]	65					
	Sound power level (ISO 3744)		[db]	83					
	Hz	63	125	250	500	1000	2000	4000	8000
	[db]	61	57	52	48	45	43	37	32
DIMENSIONS	Length [mm]	2420	Height [mm]	2090					
	Width [mm]	1100	Weight [kg]	1050					

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SELECTED ACCESSORIES

- Packaged pump station 150 kpa + water tank
- Electronic expansion valve
- Automatic circuit breakers for compressors
- Condensing control (d/y)
- Condensing control with variable fan speed modulationnew
- Anti intrusion grilles - electrical panel side
- Flow switch
- Rubber antivibration mounts for hydraulic version

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DOMINO 180Z-1140Z C-H SB/SM/SA - XB/XM/XA

