



Air cooled chillers

POWERCIAT LX R407C

Screw compressors
 CIAT *direct expansion*
 shell and tubes evaporator
 Hydraulic pack versions
 "Plug and Cool"
 H.P.S. equipment (High Power System)



Cooling capacity : 230 to 1100 kW



Cooling



Hydraulic module



Heat recovery



USE

The new generation of **POWERCIAT LX water chillers** offers an optimal solution to all the refrigeration applications encountered in the air conditioning or industrial process.

This range is designed with the latest generation of components : accessible hermetic twin screw compressors, modulating capacity control, communicating control and management by Xtra Connect microprocessor, components optimized for the ecological refrigerant HFC 407C.

This range is also proposed with an integrated hydraulic module : **POWERCIAT LXH**. This one includes all the elements required for a right operation of the unit : buffer tank, expansion vessel, single or twin pump, air vent , pressure relief valves , shut off valves , manometers...

A range with compact hydraulic equipment (without buffer tank) is also available : **POWERCIAT LXC**.

Units in accordance with EN 60-204 - EN 378-2 regulations and directives :

- Machines (98/37 CEE) modified
- CEM (89/336 CEE) modified 92/31 CEE - 93/68 CEE
- Low voltage (73/23 CEE) modified 92/31 CEE - 93/68 CEE
- DESP 97/23 CEE

→ **LX - LXH - LXC**

group 2 sizes 1200Z (HPS) to 1850Z (HPS)

group 3 sizes 2150Z (HPS) to 2800Z (HPS)

group 4 sizes 3050Z HPS to 4200Z HPS

RANGE

POWERCIAT LX - LXH - LXC

2 compressors, 2 refrigerant circuits :

12 models : 1200Z, 1200Z HPS, 1500Z, 1500Z HPS, 1850Z, 1850Z HPS, 2150Z, 2150Z HPS, 2500Z, 2500Z HPS, 2800Z, 2800Z HPS

3 compressors, 3 refrigerant circuits

4 models : 3050Z HPS, 3400Z HPS, 3750Z HPS, 4200Z HPS

■ CONFIGURATION

- a - **HIGH PERFORMANCE** version
Ventilation 905 rpm
- b - **LOW NOISE** version (LN)
Ventilation 715 rpm + compressors sound insulation
- c - **XTRA LOW NOISE** version (XLN)
Specific mounting for 715 rpm fans + compressors sound insulation



DESCRIPTION

POWERCIAT LX serie

■ Compressors

- Accessible hermetic twin screw type
- Optimized profile of rotors ensuring a high efficiency
- Electrical motor incorporated with **part-winding starting**
- Motor integral electronic protection
- Control of the phases balance and rotation direction
- Integrated overpressure valve
- Discharge temperature control
- Lubrication under controlled pressure
- 3-stage integrated oil separator
- Crankcase heater
- Suction filter
- Discharge valve
- Slide for modulating capacity control
- Compressors fitted on anti-vibration mounts

■ Evaporator

- Direct expansion shell and tube type
- High performance copper tubes bundle
- Steel shell
- Corrosion resistant baffles
- Thermal insulation by cellular foam with UV resistant polyurethane film

■ Air cooled condenser

- Copper tubes coils, aluminium fins
- Direct drive propeller fans
- Rotation speed : **905 or 715 rpm**
- 3 phase electrical motors, IP 54
- Standardized protection grilles

■ HPS (High Power system) on models LX/LXH/LXC...HPS



■ The HPS system allows to increase cooling capacity, improves the performance coefficients (EER) of your installation, particularly in part load, and ensures therefore an optimal operation of POWERCIAT during all the year.

■ Refrigerant accessories

- Filter dryers with rechargeable cartridges
- Liquid sight glasses
- Solenoid valves on liquid refrigerant lines
- Thermostatic expansion valves

■ Safety and regulation devices

- HP/LP pressure sensors
- Low and high pressure safety valves
- Chilled water control sensor (inlet and outlet)
- External temperature sensor

- Evaporator antifreeze sensor
- Compressors discharge sensor
- Evaporator water flow switch

■ Electrical panel

- IP 44
- Electrical supply 400 V - 3 ph. - 50 Hz + earth (-5% / +4%)
- Wires numbering and electrical components referencing
- Main fuse disconnect safety switch with external handle
- Transformer for control circuit
- Compressors motors contactors
- Fans motors contactors
- Fuse-protected compressor motors
- Fans motors protection
- Main electrical ground
- Phase monitor (reversal, loss, over and under voltage)

■ Electronic control with microprocessor Xtra connect

ensuring the following main functions :

- 2 remote switchable set points
- Chilled water temperature control
- Possibility of water temperature variation as a function of the outside temperature (water law)
- Low temperature energy storage control
- Condensing pressure control
- Compressors discharge temperature control
- Compressors anti-short cycle control
- Control and optimisation of operating parameters
- Counting and balancing of compressors, pumps operating times
- Automaticity control
- LCD display panel, 2 lines of 20 characters allowing :
 - parametering of the unit
 - direct reading of all information : settings, water inlet/outlet temperatures, outside temperature, HP/LP pressures, unit operating status...
 - Faults control with memorization of the last 9 faults and operating logbook when those faults occur
 - Weekly management of the unit
 - Unit general fault display on terminals
 - Automaticity control on terminals
 - RS 485 output for bus connection with centralized Building Management System.

■ Capacity control

- Modulating capacity control :
 - from 25 to 100 % (sizes 1200Z (HPS) to 2800Z (HPS))
 - from 17 to 100 % (sizes 3050Z HPS to 4200Z HPS)

■ Frame and casing

- Frame in RAL 7035 and 7024 painted metal sheet
- Casing in RAL 7035 and 7024 lacquered metal sheet



Air cooled chillers

POWERCAT LXH serie

The design of **POWERCAT LXH units** is identical to the one of POWERCAT LX

These units integrate the **complete hydraulic** equipment for standard installation :

- 1 insulated buffer tank , capacity : 950 litres
- 1 monocellular centrifugal hydraulic pump (**single** or **twin** pump)
- 1 expansion vessel (80 litres)
- 1 automatic air vent
- 1 manual air vent
- 1 safety valve calibrated at 4 bars
- A drain hole
- 2 shut off valves for the pump
- 1 set of manometers
- Contactors, protection devices and control for pumps inside the unit electrical panel.

POWERCAT LXC serie

The design of **POWERCAT LXC units** is identical to the one of POWERCAT LX

These units integrate the **a compact hydraulic equipment**

- 1 monocellular centrifugal hydraulic pump (single or twin pump)
- 1 expansion vessel (80 litres)
- 1 automatic air vent
- 1 manual air vent
- 1 safety valve calibrated at 4 bars
- A drain hole
- 2 shut off valves for the pump
- 1 set of manometers
- Contactors, protection devices and control for pumps inside the unit electrical panel.

OPTIONS

- **LOW NOISE (LN)** version : ABS phonic insulation casing with sound proof material + 715 rpm fans
- **XTRA LOW NOISE (XLN)** version : ABS sound insulation casing with soundproof material + specific mounting for 715 rpm fans
- Compressors suction valves
- Evaporator antifreeze protection (LX serie)
- Evaporator antifreeze protection + piping + hydraulic equipment (LXH - LXC series)
- Condenser coil treatment :
 - polyurethane coated fins
 - polual blygold coating
- Anti-vibration mounts
- Evaporator flexible connections
- Remote control box
- Voltage free relay card
- Heat recovery with brazed plates desuperheaters (1 per refrigerant circuit)
- Low temperature glycol water
- Electronic expansion valve
- Soft start
- Management of several units MULTICONNECT
- Optimised high pressure
- Fans speed variator
- LonWorks gateway
- Container handling equipment
- Shackles



POWERCAT LX serie



VERSION WITH HYDRAULIC EQUIPMENT

LXH - LXC series

Hydraulic equipment LXH serie

The "ALL INTEGRATED" solution

The PLUG and COOL solution offered by POWERCAT LXH - LXC

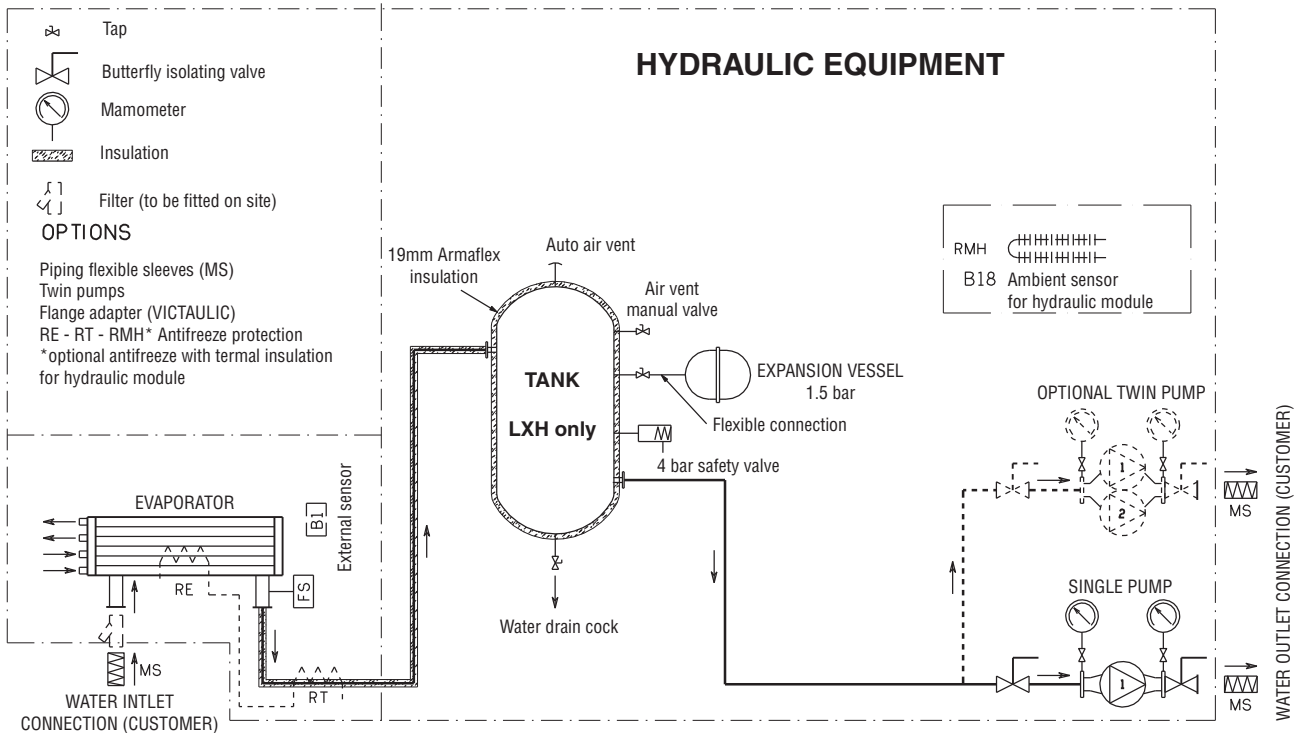
The hydraulic equipment integrates all the components necessary for the correct operation of the installation :

- 950 litres insulated buffer tank (LXH only)
- 80 litres expansion vessel
- Large choice of single or twin pumps for high head pressure (1)
- Manometers with shut off valves
- Pressure relief valves (calibrated at 4 bars)
- Drain circuit
- Manual and automatic air vent
- Control of the assembly
- Antifreeze protection (optional)

The hydraulic equipment, whose components have been selected in an optimal way, mounted and tested in factory, makes the installation of units easy and economical.

The preparation/commissioning times and the space required on site are therefore perfectly optimised.

(1) Our pumps are designed for operation on a closed water loop (low NPSH). For other applications, consult us (open water circuit, important intake height, etc).





TECHNICAL CHARACTERISTICS

POWERCAT LX - LXH - LXC			1200Z	1200Z HPS	1500Z	1500Z HPS	1850Z	1850Z HPS	2150Z	2150Z HPS
High performance version	Cooling capacity (1)	kW	236	261	305	338	362	409	429	486
	Absorbed power (2)	kW	101	110	129	140	156	172	184	202
	EER/ESEER		2.31/2.92	2.37/2.92	2.35/2.94	2.41/2.96	2.32/2.91	2.38/2.98	2.32/2.89	2.41/2.94
Low noise and xtra low noise versions	Cooling capacity (1)	kW	230	258	300	335	354	402	420	478
	Absorbed power (2)	kW	101	109	128	138	155	173	182	209
	EER/ESEER		2.28/2.97	2.37/2.95	2.34/3.05	2.43/3.06	2.27/2.96	2.32/2.96	2.3/2.98	2.29/3.02
Compressor	Type		Accessible hermetic twin screw							
	Number		2							
	Rotation speed	rpm	2900							
	R407C refrigerant charge (kg)	circ.1	23	24	40	45	55	56	55	56
		circ.2	23	24	25	26	25	26	45	46
	Capacity control		Modulating from 25 to 100% (50 to 100% on each compressor)							
	Type of oil for R407C		BITZER BSE 170							
Oil charge for compressor	litres	2 x 9		15 + 9		22 + 9		22 + 15		
Evaporator	Type		Direct expansion shell and tubes							
	Number		1							
	Water capacity	litres	56,5		68		85			
	Hydraulic connections		VICTAULIC type							
	Maximum pressure on water side	bar	10							
Mini / maxi water flow	m³/h	30 / 82		40 / 100		60 / 135				
Air cooled condenser	Fans		Direct drive propeller type - 800 mm diameter							
	Number of fans		4		6		8			
	Rotation speed	rpm	HIGH PERFORMANCE version				905 rpm			
	Air flow	m³/h	88 000		136 000		132 000		180 000	
	Motor unit power	kW	2,6							
	Rotation speed	rpm	LOW NOISE - XTRA LOW NOISE versions				715 rpm			
	Air flow	m³/h	72 400		112 200		108 600		148 400	
High performance version	Lw / Lp (3)	dB(A)	96/64		98/66		100/67			
	Low noise version (LN)	Lw / Lp (3)	90/58		92/60		95/62			
	Xtra low noise version (XLN)	Lw / Lp (3)	85/53		87/55		88/55			

POWERCAT LX - LXH - LXC			2500Z	2500Z HPS	2800Z	2800Z HPS	3050Z HPS	3400Z HPS	3750Z HPS	4200Z HPS
High performance version	Cooling capacity (1)	kW	522	594	605	690	740	820	903	1076
	Absorbed power (2)	kW	216	238	244	268	287	320	362	413
	EER/ESEER		2.42/3	2.5/2.95	2.47/3.05	2.57/3.06	2.57/3.26	2.55/3.05	2.49/3.07	2.4/3.07
Low noise and xtra low noise version	Cooling capacity (1)	kW	509	582	595	685	725	803	881	1045
	Absorbed power (2)	kW	216	235	240	262	303	331	364	437
	EER/ESEER		2.36/3.01	2.48/2.95	2.48/3.16	2.61/3.15	2.39/3.21	2.42/3.1	2.42/3.21	2.35/3.13
Compressor	Type		Accessible hermetic twin screw							
	Number		2				3			
	Rotation speed	rpm	2900							
	R407C refrigerant charge (kg)	circ.1	55	60	62	63	62	60	60	86
		circ.1	55	60	62	63	50	60	60	92
		circ.1	-	-	-	-	50	45	60	92
	Capacity control		Modulating from 25 to 100% (50 to 100% on each compressor)				Modulating from 17 to 100% (50 to 100% on each compressor)			
Type of oil for R407C		BITZER BSE 170								
Oil charge for compressor	litres	2 x 22			22 + 2 x 15		2 x 22 + 15		3 x 22	
Evaporator	Type		Direct expansion shell and tubes							
	Number		1							
	Water capacity	litres	122		219		440			
	Hydraulic connections		VICTAULIC type							
	Maximum pressure on water side	bar	10							
Mini / maxi water flow	m³/h	60 / 135		80 / 180		80 / 216				
Air cooled condenser	Fans		Direct drive propeller type - 800 mm diameter							
	Number of fans		8		12		15			
	Rotation speed	rpm	HIGH PERFORMANCE version				905 rpm			
	Air flow	m³/h	176 000		276 000		268 000		264 000	
	Motor unit power	kW	2,6							
	Rotation speed	rpm	LOW NOISE - XTRA LOW NOISE versions				715 rpm			
	Air flow	m³/h	144 800		228 000		224 400		217 200	
High performance version	Lw / Lp (3)	dB(A)	101/68		101/68		102/69			
	Low noise version (LN)	Lw / Lp (3)	96/63		98/65		97/64		98/65	
	Xtra low noise version (XLN)	Lw / Lp (3)	89/56		91/58		90/57		91/58	

(1) Cooling capacity for 12°C / 7°C evaporator chilled water and 35°C condenser air inlet.

(2) Compressors + fans absorbed power

(3) Lw : Global sound power level - Lp : Global sound pressure level at 10 metres, in free field, following ISO 3744 regulation



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POWERCIAT LX R407C

ELECTRICAL CHARACTERISTICS

POWERCIAT LX - LXH - LXC		1200Z	1200Z HPS	1500Z	1500Z HPS	1850Z	1850Z HPS	2150Z	2150Z HPS							
COMPRESSORS (1)																
Maximum nominal current	A	216 (2 x 108)		270 (162+108)		324 (216+108)		378 (216+162)								
Part winding starting current (3)	A	377		531		720		774								
Starting current with SOFT START option (3)	A	283		377		506		560								
FAN MOTORS (1)																
HIGH PERFORMANCE version 905 rpm																
Maximum nominal current	A	24		36				48								
LOW NOISE - XTRA LOW NOISE versions 715 rpm																
Maximum nominal current	A	12,8		19,2				25,6								
LX ANTIFREEZE PROTECTION (OPTION) (2)																
Evaporator heating element power	W	180				240										
Maximum nominal current	A	0,80				1,05										
LXC ANTIFREEZE PROTECTION (OPTION) (2)																
Evaporator + hydraulic pipe + expansion vessel heating element power	W	420		480				540								
Maximum nominal current	A	1.83		2.1				2.35								
LXH ANTIFREEZE PROTECTION (OPTION)																
Evaporator heating element power + piping	W	300		420				480								
Maximum nominal current	A	1,3 (2)		1.83 (2)				2.1								
Hydraulic module heating element power	W			1500												
Maximum nominal current	A			2,3 (1)												
CONTROL AUXILIARY CIRCUIT (2)																
Maximum nominal current	A			4												
Transformer power	VA			1600												
POWERCIAT LX - LXH - LXC		2500Z	2500Z HPS	2800Z	2800Z HPS	3050Z HPS	3400Z HPS	3570Z HPS	4200Z HPS							
COMPRESSORS (1)																
Maximum nominal current	A	432 (2 x 216)		492 (2 x 246)		540 (216 + 2 x 162)	594 (2 x 216 + 162)	648 (3 x 216)	738 (3 x 246)							
Part winding starting current (3)	A	828		911		936	990	1044	1157							
Starting current with SOFT START option (3)	A	614		647		722	776	830	924							
FAN MOTORS (1)																
HIGH PERFORMANCE version 905 rpm																
Maximum nominal current	A	48		72				90								
LOW NOISE - XTRA LOW NOISE versions 715 rpm																
Maximum nominal current	A	25,6		38,4				48								
LX ANTIFREEZE PROTECTION (OPTION) (2)																
Evaporator heating element power	W			320												
Maximum nominal current	A			1,40												
LXC ANTIFREEZE PROTECTION (OPTION) (2)																
Evaporator + hydraulic pipe + expansion vessel heating element power	W			560												
Maximum nominal current	A			2.5												
LXH ANTIFREEZE PROTECTION (OPTION)																
Evaporator heating element power + piping	W		560			500										
Maximum nominal current	A		2,5 (2)			2,20 (2)										
Hydraulic module heating element power	W			1500												
Maximum nominal current	A			2.3 (1)												
CONTROL AUXILIARY CIRCUIT (2)																
Maximum nominal current	A			4												
Transformer power	VA		1600			2000										
SINGLE PUMPS (LXH - LXC ONLY) (1)																
Number		102	103	104	105	106	107	108	109	110	111	112	113	114	115	116
Power	kW	3	4	4	5,5	5,5	7,5	7,5	11	11	11	15	15	18,5	22	30
Maximum nominal current	A	6,3	8,0	8,0	10,3	10,3	13,8	13,8	20,0	20,0	20,0	26,5	26,5	32,5	39	53
TWIN PUMPS (LXH - LXC ONLY) (1)																
Number		202	203	204	205	206	207	208	209	210	211	212	213	214	215	216
Power	kW	3	4	4	5,5	5,5	7,5	7,5	11	11	11	15	15	18,5	22	30
Maximum nominal current	A	6,3	8,0	8,0	10,3	10,3	13,8	13,8	20,0	20,0	20,0	26,5	26,5	32,5	39	53

(1) Current for 400V / 3PH / 50HZ voltage

(2) Current for 230V / 1PH / 50HZ voltage

(3) Starting current of the biggest compressor + maximum current of others

compressors in full load

Nominal current for cables selection = add the maximum nominal currents indicated in the above tables

DESUPERHEATER EXCHANGER LX - LXH - LXC

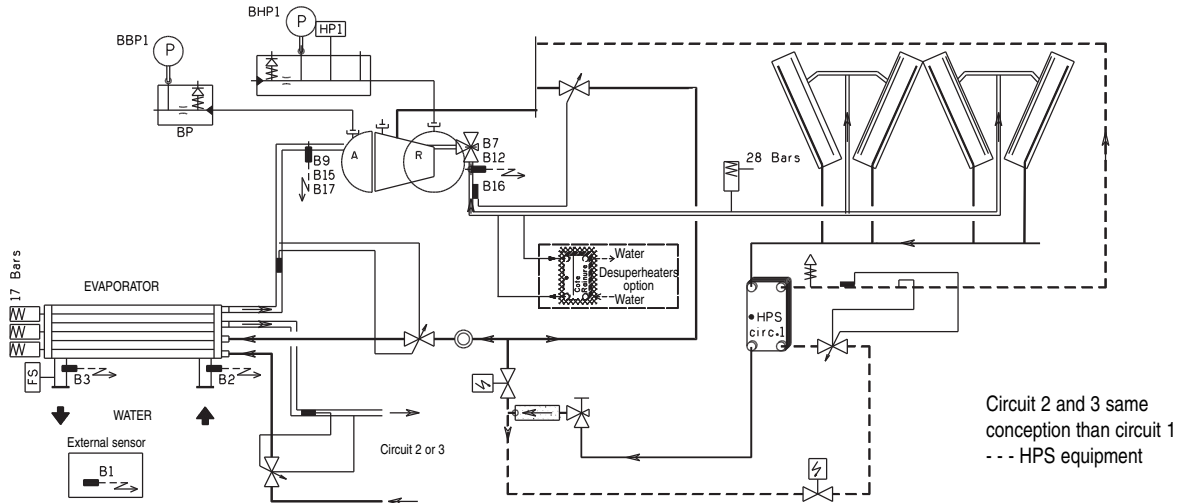
The system consists in free hot water supplying thanks to heat recovery on the compressors discharge gas, through an auxiliary desuperheater exchanger.

This optional equipment is only available on request, and factory mounted.

■ Diagram of the refrigerant circuit

The following refrigeration diagram describes an example of a CIAT unit, with desuperheater (on each refrigerant circuit). The heat recovery is possible only if the machine is running.

For the same cooling or heating capacity, the desuperheater system allows a free heating of hot water with a reduction of the total input power of the machine.



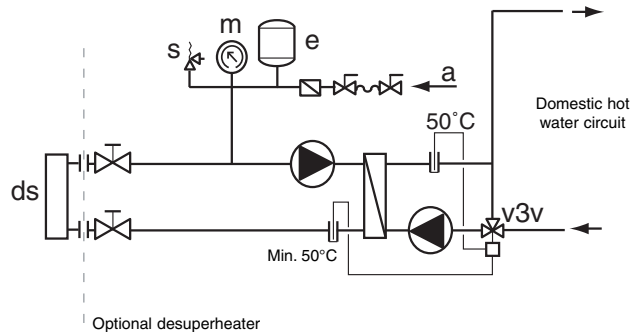
■ Principle and precautions of hydraulic connection

To start and run the machine under good conditions, the circuit must be as short as possible, and the water flow of the desuperheater must start slowly to normal operating condition, with a water flow equal to 10% of its standard value, and must be calculated for a hot water inlet temperature of **+50°C**.

Thus, it is recommended to have a hydraulic diagram making it possible to obtain very quickly a hot water at the inlet of the desuperheater (3-way valve + controller + temperature sensor on the exchanger water inlet)

The controller set point must be adjusted to **+50°C** minimum.

Note: pay attention to the selection of the expansion tank, because the recovery water circuit can reach the temperature of 115°C in the event of circulator stop or non hot water consumption.



■ Recovery example on desuperheater

POWERCAT LX - LXH - LXC	Cooling capacity Pf (kW)	Absorbed power Pa (kW)	Recovery Pr (kW)	Water flow qv (m³/h)	Pressure drop dP (mCE)
1200Z	236	101	59	10.1	0.31
1200Z HPS	261	110	65	11.2	0.39
1500Z	305	129	76	13.1	0.53
1500Z HPS	338	140	85	14.6	0.66
1850Z	362	156	90	15.5	0.74
1850Z HPS	409	172	102	17.5	0.95
2150Z	429	184	107	18.4	0.68
2150Z HPS	486	202	122	21.0	0.88
2500Z	522	216	131	22.5	1.01
2500Z HPS	594	238	148	25.5	1.30
2800Z	605	244	151	26.0	1.35
2800Z HPS	590	268	173	29.8	1.78
3050Z HPS	740	287	185	31.8	0.90
3400Z HPS	820	320	205	35.3	1.11
3750Z HPS	903	362	226	38.9	1.35
4200Z HPS	1076	413	269	46.3	1.91

Note : heat recovery performances for :

- machine running in full load, chilled water = +12/+7°C and outside air = +35°C°C
- hot water temperature on recovery = +55/+60°C

DIMENSIONS LX - LXH

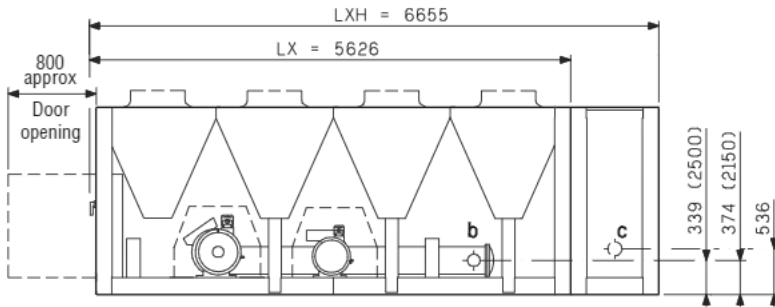
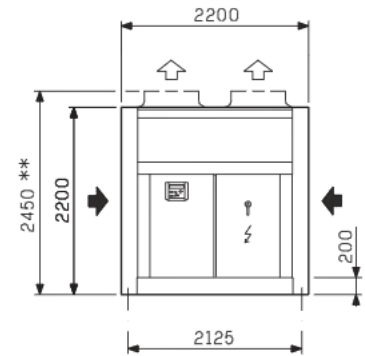
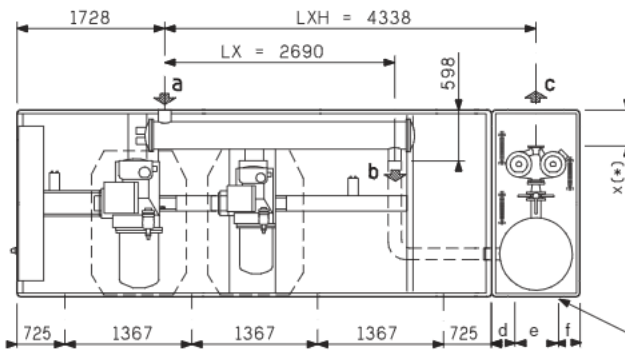


FIG. 3



** For XTRA LOW NOISE version only



8 or 12 holes for ground fitting diameter 20.2 mm

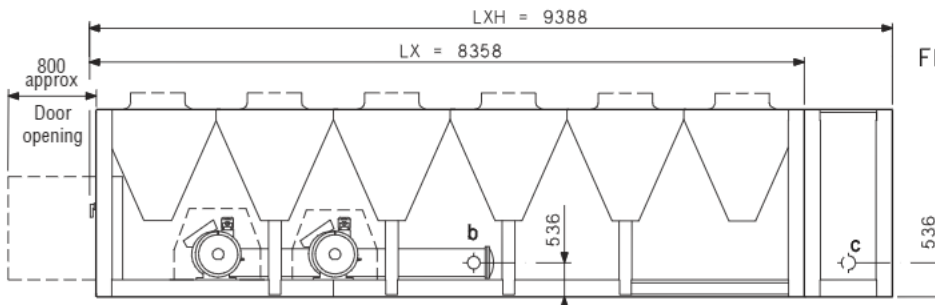
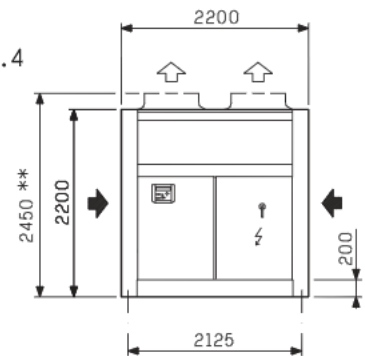
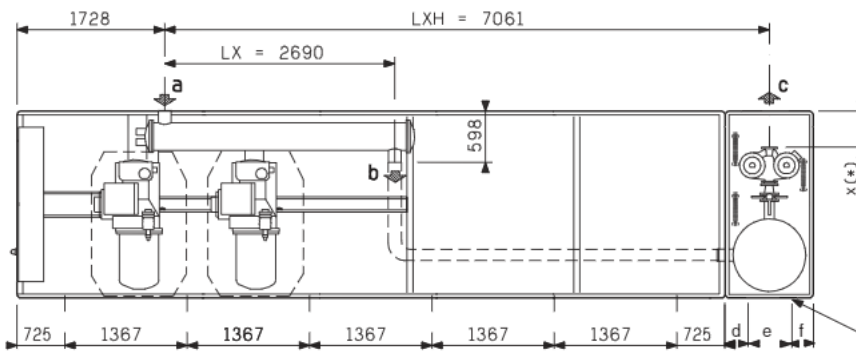


FIG. 4



** For XTRA LOW NOISE version only



12 or 16 holes for ground fitting diameter 20.2 mm

d	288
e	453
f	288

Models	Fig.	inlet LX / LXH a	Chilled water outlet LX b	outlet LXH c	Weight kg	
					empty	in operation
LX 2150Z (HPS)	3	VICTAULIC DN 125	DN 125	*	4652	4767
LXH 2150Z (HPS)					5402	6567
LX 2500Z (HPS)	3	VICTAULIC DN 150	DN 150	*	5177	5327
LXH 2500Z (HPS)					5927	7127
LX 2800Z (HPS)	4	VICTAULIC DN 150	DN 150	*	6071	6221
LXH 2800Z (HPS)					6821	8021

* c according to the selected pump (see page 26)



XTRACONNECT CONTROL

ERGONOMIC INTERFACE PANEL

- LDC multilingual screen (2 lines of 20 characters)
- Pressures and temperatures reading
- Pump control
- Communication

Available free contacts inputs / outputs

- Inputs :**
- External ON/OFF contact
 - Chilled water pump external ON/OFF contact
 - Setpoint 1/2 selection
 - General fault
 - Emergency stop
 - Compressors load shedding
 - 0 - 20 mA remote control
- Output :**
- General fault of the unit
 - General fault per circuit
 - Pump control

RS 485 OUTPUT IN STANDARD

- MODBUS-JBUS open Protocol (standard)**
- LONWORKS Protocol (option)**

FREE CONTACTS RELAY CARD (OPTION)

Available outputs :

- Water flow fault
- Antifreeze fault
- Pump fault
- Fans fault
- Emergency stop fault
- Low and high pressure fault
- Compressors safety fault
- Compressors superheating fault
- Compressors lubrication fault
- Discharge temperature fault
- Compressors running

REMOTE CONTROL BOX (OPTION)

- Operation and design same as display console**

MULTICONNECT MULTI-UNIT MANAGEMENT (OPTION)

Main functions available:

- Management of up to 8 units on a single water loop
- Management in cooling mode (water chiller) or heating mode (heat pump)
- Management of chilled-water or hot-water pumps
- Centralised management of a backup unit
- Unit load shedding
- System time programming
- Energy storage mode management
- Fault management on each unit
- Unit running time balancing
- Integrated Modbus BMS link for obtaining information on unit operation and faults



Non contractual document. With the thought of material improvement always in mind, CIAT reserves the right, without notice, to proceed with any technical modification.

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CIAT Service

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CERTIFIED ISO 9001
QUALITY SYSTEM



Compagnie Industrielle d'Applications Thermiques - S.A. with a registered capital of 26 000 000 € - R.C.S. Belley B 545 620 114