ECO FRIENDLY

PASSION FOR COOLING

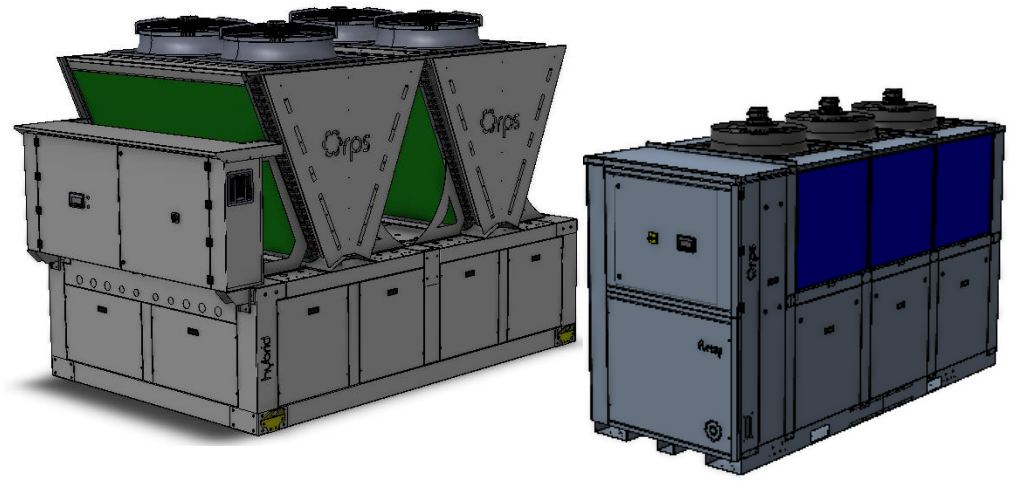
REVERSIBLE AIR TO WATER HEAT PUMP WITH NATURAL GAS R290

NOMINAL HEATING CAPACITY 10,14 ÷ 1.012,51

NOMINAL COOLING CAPACITY 9,28 ÷ 934,48

ErP Tier2

flexy hybrid+



PROPANE R290

[ST] REVERSIBLE HEAT PUMP WITH PROPANE R290



Release 2024

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HYDRAULIC CONFIGURATION

Q – BASE
T – WITH PUMP
G – WITH PUMP AND TANK

VERSION

ST – BASE
LN – SILENCED

MODELS

FLEXY	FHR 014	→ FHR 230
HYBRID+	HHR 150+	→ HHR 990+

DESCRIPTION

Package air-cooled reversible Heat Pump (cooling / heating) of "Propane Heat Pump" series are suitable for outdoor installation only with a specific kit and can be used "to cool" pure fluid solutions, mixture water plus Ethylene or Propylene Glycol for air conditioning or industrial application. Designed for installation in a confined space. Piston technology allows great efficiency improvements at part load, if compared to the other traditional systems for cooling capacity control. Natural Refrigerant gas R290 (Propane) with GWP=3.
These units have been designed considering the maintenance-friendly and keep a high cooling performance.
All units are completely assembled and tested 100% in the factory with specific quality procedures and are already equipped with all necessary hydraulic, refrigerant, and electrical connections for smart installation.

STRUCTURE

The structure casing is made of a strong base of structural panels in galvanized steel and painted in a furnace at 180°C, with polyester power, for outdoor installation. All carbon steel surfaces are powder-coated with color RAL7035 orange peel finished. The compressor compartment is separated from the condenser section to assure maximum accessibility for service and maintenance operations, even if the unit is in operation.

SEMI HERMETIC COMPRESSOR/S

The compressors are designed in accordance with the safety requirements necessary for the installation in ambient classified, for presence of flammable gas (Zone 2, Gas group IIB) according to Directive ATEX 94/9/CE, these compressors are equipped with electrical components conform to this Directive. Variable capacity as option, complete of inverter, frequency range speed from 30…70Hz (OPTION). Crankcase heater. Discharge sensor control with alarm reported to the controller. Complete thermal monitoring with PTC sensor, differential oil pressure and oil service valve. Electronic diagnostic safety device (Kriwan).

USER SIDE EXCHANGER

Copper brazed plate heat exchangers provide efficient heat transfer with a small footprint. They are maintenance free, provide a long service lifetime and can withstand high temperatures and extremely high design pressures. Flow switch alarm device.

COIL EVAPORATOR

The evaporator coils are designed to provide great energy efficiency during everything environmental conditions. The wide fin pitch ensures the long working time of the heat pump and fewer defrosting cycles. Therefore, this feature allows to increase the COP (coefficient of performance) of the heat pump and energy efficiency of the entire system.
The fins of the evaporator coils are "**hydrophilic**" coated. Thanks to this treatment, the humidity of the air condenses on the fins avoiding droplets. The hydrophilic treatment creates a water film on the fins giving the following advantages:

- Avoids the reduction of the flow section of the air and an increase of air pressure drop;
- Allows reduced fins space which are not recommended in presence of water drops;
- Allows for higher air speeds without water drops carry-over.

Furthermore, the hydrophilic treatment can protect against corrosion and ensure long life of the coil.
The copper tubes of the evaporator coil are inner grooved, to increase the turbulence of the refrigerant and enhance the evaporation of it.
The max operating pressure refrigerant side is 42 relative bars.
The evaporator coil is installed vertically. So, thanks the gravity, the drop of water flows down the fin, from the top to the bottom of the coil, and becomes ice on the bottom part of the coil. The ice-forming grows, first, on the bottom part of the coil. Thanks to the RPS COOLING coil circuit design, during the defrost cycle, the hot gas melts for first the bottom zone of the coil and then the remaining part. Furthermore, this solution allows to increase the water flow and the coil cleaning.

WATER COLLECTION TRAY

Under the evaporator coil is installed a warmed water collection tray. The warming system is made by the refrigerant circuit. The liquid refrigerant come from the plate condenser, warm the water collection tray and avoid ice. Therefore, no electric system is used to warm the water collection tray.

AXIAL FANS

Axial fans directly coupled type, with wing-profile aluminum blades. Are designed not to create air turbulence. This ensures max efficiency with the lowest sound level. Speed control by a digital control from the pressure transducer signal. Each fan is provided with a galvanized steel protection grid (dark), which is painted after construction. The IP54 fans motors are completely closed and provided with in-built overload protection thermostat, incorporated to the motor windings. Fans speed control by cutting phases device.

REFRIGERANT CIRCUIT

Each circuit made with following components:

- shut-off valve for refrigerant gas
- antifreeze sensor probe
- discharge compressors sensor
- sight glass

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- dehydrating filter
- liquid receiver
- high- and low-pressure switches
- high and low refrigerant gauge
- EEV electronic expansion valve
- inversion cycle valve (cooling/heating)

SAFETY SYSTEM

The safety system is composed of an ATEX double forward curved blade centrifugal fan to keep the compressors compartment even airy to ensure a low concentration in case of leakage propane gas.
Some ATEX propane sensor detection (R290) gives an alarm in case presence of propane.

HYDRAULIC CIRCUIT

BASE hydraulic circuit available without tank, with or without pump. Available also a double pump (one runs and one in stand-by).

ELECTRIC CIRCUIT

Built in compliance with norm 60204-1/IEC 204-1 standards, inside of which are placed the control system and the components for motors starting, wired, and tested in the factory. It is made by a cabinet suitable for outdoor installation, containing power and control devices, microprocessor electronic board complete with keypad and display, for visualizing the several functions available. Yellow/red main switch of lock-door type, isolation transformer for auxiliary circuits, automatic switches for compressors, fans, and pump. Free general alarm and remote ON/OFF contact with signal alarm on display. Terminal board, relays for sequencing and missing phase.
RS485 connection with Modbus communication.
Power Supply 400V (+/-10%) 3ph 50Hz, auxiliary circuit 24Vac voltage.
Intrinsic safety device for gas leakage alarm (gas detection sensor intervention, or ATEX fan malfunction compressor compartment air extraction). CP plastic cover for protection LCD display. DIXELL controller.

ELECTRONIC CONTROL SYSTEM

The electronic control system is designed to heat pump mode and it can understand then the evaporator coil needs to be defrosted. Thanks to its specific software, the electronic control system minimizes the defrost cycle and increases the energy efficiency of the heat pump.
The heat pump is designed to work from inlet air temperature 45°C to -10°C. This wide range doesn't allow to standardize the heating mode working time. In particular, the amount of humidity in the air is responsible for the not predictable behavior of the heat pump working period. However, the electronic control system can adapt the heat pump to the real environmental condition and to minimize the defrost cycle.
The electronic control system cleans the evaporator coil every time the heat pump is on stand-by for a long time (by a defrost). Therefore, the heat pump always starts to work with the fins of the evaporator coil without ice. This ensures to warm the water of the hydronic system with the maximum efficiency of the heat pump and without issue due to the ice-forming.

TECHNICAL DATA - [ST] Reversible HEAT PUMP with Propane R290

UNIT MODEL - FHR flexy		014	015	018	020	025	028	032	036	042	051	057	064
Nominal Cooling Capacity (1)	**kW**	**9,28**	**11,07**	**11,24**	**14,43**	**16,95**	**19,92**	**23,82**	**26,19**	**29,52**	**34,79**	**39,00**	**43,08**
Power absorbed (1)	kW	3,41	3,92	4,77	5,19	6,29	7,22	8,63	9,12	10,51	11,92	14,70	16,12
EER (2)		2,72	2,82	2,36	2,78	2,69	2,76	2,76	2,87	2,81	2,92	2,65	2,67
Nominal flow rate (1)	m3/h	1,59	1,90	2,08	2,47	2,91	3,42	4,08	4,49	5,06	5,96	6,69	7,38
Pressure drops	bar	0,32	0,30	0,31	0,32	0,28	0,28	0,30	0,32	0,32	0,30	0,29	0,32
Nominal Heating Capacity (3)	**kW**	**10,14**	**12,02**	**12,24**	**15,74**	**18,45**	**21,67**	**26,05**	**28,38**	**32,26**	**37,68**	**42,26**	**46,75**
Power absorbed (3)	kW	3,26	3,76	4,55	4,93	5,99	6,88	8,23	8,74	10,10	11,40	14,12	15,48
COP (4)		3,11	3,20	2,69	3,19	3,08	3,15	3,16	3,25	3,19	3,30	2,99	3,02
Nominal flow rate (3)	m3/h	1,74	2,06	2,27	2,70	3,16	3,72	4,46	4,87	5,53	6,46	7,25	8,01
Pressure drops	bar	0,42	0,39	0,41	0,42	0,36	0,37	0,39	0,42	0,42	0,39	0,38	0,42
Performance index in according to Regulation EU no.813/2013 (5)													
SCOP(5)	W/W	3,22	3,08	3,24	3,25	3,08	3,10	3,10	2.89	3,20	3,05	3,13	3,19
Seasonal Energy Efficiency η_s	%	120,2	118,5	124,9	125	118,5	119,9	119,9	111,5	123,9	117,6	118,9	123
Operation limits													
Ambient working limits (CHILLER)	°C	-10°C...+45°C											
Water set-point limits (leaving fluid temperature) (CHILLER)	°C	5°C…25°C											
Ambient working limits (HEAT PUMP)	°C	-10°C...+40°C											
Water set-point limits (leaving fluid temperature) (HEAT PUMP)	°C	30°C…60°C											
Refrigerant													
Type / GWP / Class		R290 (propane) / 3 / A3											
Compressors													
Type		Semihermetic											
Quantity / Refrigerant circuits	n°/n°	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1	1 / 1
Fans													
Quantity		1				2						2	
Air flow	m^3/h	6.500				13.000						31.000	
User side exchanger													
Type		Plate exchanger											
Noise level													
ST standard — Noise pressure level (1) (6)	dB(A)	54,5	54,5	54,5	55,4	55,4	55,4	55,4	55,4	55,4	55,4	58,3	58,3
LN Low noise (OPTION) — Noise pressure level (1) (6)	dB(A)	46,7	46,7	46,5	46,5	47,6	47,6	47,6	47,5	47,5	47,5	50,5	50,5
Dimensions													
Length / Depth / Height	mm	755 x 1.410 x 1.580				780 x 1.860 x 1.635						1.045 x 2.455 x 2.125	
Weight	kg	335	335	335	335	440	440	440	440	440	440	790	790
Size		FLEXY 1				FLEXY 2						FLEXY 3	
Hydraulic connections IN/OUT	BSP	1”1/2				1”1/2						2”	

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UNIT MODEL - FHR flexy		014	015	018	020	025	028	032	036	042	051	057	064
Electrical data													
Power Supply	V/ph/Hz	400V 3ph 50Hz											
Protection class	IP	54											
Auxiliary voltage	V	24Vac											
Controller		RS30											
FLI - Power absorbed	kW	5,10	6,45	6,40	7,46	9,20	11,80	12,63	13,89	15,32	17,94	23,84	26,66
FLA - Current absorbed	A	8,77	11,13	10,97	12,77	15,83	20,37	21,65	23,79	26,21	30,66	41,21	46,01
ICF – Start-up current	A	36,00	45,00	46,00	54,00	65,00	82,00	91,00	101,00	112,00	132,00	164,00	185,00
P3 Pump													
Type		Centrifugal											
Available pressure	bar	4,71	4,63	4,40	4,10	3,19	3,17	3,07	3,04	2,94	2,84	3,14	3,08
FLI - Power absorbed	kW	0,75	0,75	0,75	0,75	1,30	1,30	1,30	1,30	1,30	1,30	2,20	2,20
FLA - Current absorbed	A	1,7	1,7	1,7	1,7	3,30	3,30	3,30	3,30	3,30	3,30	4,70	4,70

(1) External air temperature +35°C, input water evaporator and output temperature 12°C/7°C, fluid water.
(2) EER energy efficiency ratio
(3) External air temperature 7°C and 87% r.h., input condenser water temperature and output temperature 40/45°C, fluid water.
(4) COP coefficient operating performance
(5) Technical information in according of Commission Regulation (EU) 2015/1095 on 5 May 2015, that implementing Directive 813/2013/EC on "EcoDesign" requirements.
(6) Sound pressure level derived from measurements made according to ISO 3744, refers to a distance of 10 meters from the unit in free field conditions with direction factor 2

TECHNICAL DATA - [ST] Reversible HEAT PUMP with Propane R290

UNIT MODEL - FHR flexy		072	081	096	115	128	145	150	162	180	210	230
Nominal Cooling Capacity (1)	**kW**	**54,09**	**58,69**	**64,78**	**69,58**	**78,01**	**86,16**	**108,17**	**117,39**	**129,54**	**161,37**	**175,13**
Power absorbed (1)	kW	19,23	20,58	22,50	25,64	30,24	31,28	37,49	41,16	45,00	56,23	61,09
EER (2)		2,81	2,85	2,88	2,71	2,58	2,75	2,89	2,85	2,88	2,87	2,87
Nominal flow rate (1)	m3/h	9,27	10,06	11,10	11,93	13,37	14,77	18,54	20,12	22,21	27,66	30,02
Pressure drops	bar	0,28	0,30	0,32	0,32	0,31	0,29	0,31	0,32	0,31	0,29	0,30
Nominal Heating Capacity (3)	**kW**	**58,33**	**63,25**	**69,80**	**75,35**	**84,53**	**93,50**	**116,66**	**126,51**	**139,59**	**174,79**	**189,85**
Power absorbed (3)	kW	18,47	19,83	21,67	24,60	26,09	30,00	35,98	39,66	43,34	53,92	58,35
COP (4)		3,16	3,19	3,22	3,06	2,91	3,12	3,24	3,19	3,22	3,24	3,25
Nominal flow rate (3)	m3/h	10,00	10,84	11,97	12,92	14,49	16,03	20,00	21,69	23,93	29,96	32,55
Pressure drops	bar	0,36	0,39	0,41	0,42	0,40	0,38	0,40	0,41	0,40	0,38	0,39
Performance index in according to Regulation EU no.813/2013 (5)												
SCOP(5)	W/W	3,22	3,32	3,24	3,25	3,08	3,10	3,25	3,20	3,21	3,22	3,14
Seasonal Energy Efficiency η_s	%	120,2	128,5	124,9	125	118,5	119,9	125	123,9	122	123	120,7
Operation limits												
Ambient working limits (CHILLER)	°C	-10°C...45°C										
Water set-point limits (leaving fluid temperature) (CHILLER)	°C	5°C…25°C										
Ambient working limits (HEAT PUMP)	°C	-10°C...40°C										
Water set-point limits (leaving fluid temperature) (HEAT PUMP)	°C	30°C…60°C										
Refrigerant												
Type / GWP / Class		R290 (propane) / 3 / A3										
Compressors												
Type		Semihermetic										
Quantity / Refrigerant circuits	n°/n°	1 / 1	1 / 1	1 / 1	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2	2 / 2
Fans												
Quantity		2			3				4			
Air flow	m³/h	31.000			46.500				62.000			
User side exchanger												
Type		Plate exchanger										
Noise level												
ST standard — Noise pressure level (1) (6)	dB(A)	58,3	58,3	58,3	63,7	63,7	63,7	63,8	65,0	65,0	65,0	65,0
LN Low noise (OPTION) — Noise pressure level (1) (6)	dB(A)	50,5	50,5	50,5	55,9	55,9	55,9	56,0	57,2	57,2	57,2	57,2
Dimensions												
Length / Depth / Height	mm	1.045 x 2.455 x 2.125			1.305 x 3.220 x 2.200				1.305 x 4.060 x 2.200			
Weight	kg	790	790	790	1.180	1.180	1.180	1.180	1.305	1.305	1.305	1.305
Size		FLEXY 3			FLEXY 4				FLEXY 5			

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Hydraulic connections IN/OUT	BSP	2”			2”1/2				2”1/2			
UNIT MODEL - FHR flexy		**072**	**081**	**096**	**115**	**128**	**145**	**150**	**162**	**180**	**210**	**230**
Electrical data												
Power Supply	V/ph/Hz	400V 3ph 50Hz										
Protection class	IP	54										
Auxiliary voltage	V	24Vac										
Controller		RS30										
FLI - Power absorbed	kW	29,18	32,04	37,28	46,08	51,72	56,76	59,61	64,08	74,56	78,56	94,25
FLA - Current absorbed	A	50,29	55,13	64,03	79,33	88,93	97,49	102,33	110,25	128,05	134,87	161,51
ICF – Start-up current	A	205,00	226,0	267,00	202,00	228,00	252,00	265,00	282,00	331,00	349,00	423,00
P3 Pump												
Type		Centrifugal										
Available pressure	bar	3,01	2,93	2,83	3,51	3,49	3,47	3,34	3,28	3,22	3,03	2,92
FLI - Power absorbed	kW	2,80	2,80	2,80	3,00	3,00	3,00	3,00	4,00	4,00	4,00	4,00
FLA - Current absorbed	A	4,70	4,70	4,70	6,40	6,40	6,40	6,40	8,70	8,70	8,70	8,70

(1) External air temperature +35°C, input water evaporator and output temperature 12°C/7°C, fluid water.
(2) EER energy efficiency ratio
(3) External air temperature 7°C and 87% r.h., input condenser water temperature and output temperature 40/45°C, fluid water.
(4) COP coefficient operating performance
(5) Technical information in according of Commission Regulation (EU) 2015/1095 on 5 May 2015, that implementing Directive 813/2013/EC on “EcoDesign” requirements.
(6) Sound pressure level derived from measurements made according to ISO 3744, refers to a distance of 10 meters from the unit in free field conditions with direction factor 2.

TECHNICAL DATA - [ST] Reversible HEAT PUMP with Propane R290

UNIT MODEL - HHR			230	260	315	345	380	420
Nominal Cooling Capacity (1)		**kW**	**386,50**	**413,30**	**463,20**	**507,10**	**557,30**	**601,00**
Power electrical absorbed (1)		kW	137,64	147,35	171,44	185,68	202,76	217,90
EER (2)			2,81	2,80	2,70	2,73	2,75	2,76
Nominal flow rate (1)		m3/h	66,30	70,90	79,40	87,00	94,85	103,00
Pressure drops		bar	0,44	0,45	0,45	0,46	0,48	0,50
Nominal Heating Capacity (3)		**kW**	**433,60**	**463,00**	**518,75**	**568,00**	**624,20**	**673,50**
Power electrical absorbed (3)		kW	134,48	142,92	166,76	180,76	197,40	211,76
COP (4)			3,22	3,24	3,11	3,14	3,16	3,18
Nominal flow rate (3)		m3/h	74,35	79,40	88,90	97,40	107,00	115,45
Pressure drops		bar	0,43	0,44	0,43	0,45	0,47	0,51
Performance index in according to Regulation EU no.813/2013 (5)								
SCOP			3,08	3,08	3,08	3,09	3,09	3,09
Seasonal Energy Efficiency η_s			120,2	120,1	120,2	120,5	120,3	120,4
Operation limits								
Ambient working limits (CHILLER)		°C	-10°C...+45°C					
Water set-point limits (leaving fluid temperature) (CHILLER)		°C	2°C…25°C					
Ambient working limits (HEAT PUMP)		°C	-10°C...+40°C					
Water set-point limits (leaving fluid temperature) (HEAT PUMP)		°C	30°C…60°C					
Accuracy water temperature		K	±2					
Refrigerant								
Type			R290 (propane)					
Global Warming Potential GWP			3					
Class ASHRAE			A3					
Compressors								
Type			Semihermetic					
Quantity / Refrigerant circuits		n°/n°	4 / 2					
Part load		%	0-25-50-100%					
Starting			Part winding					
Fans								
Type			Axial					
Quantity / Diameter		n°/mm	8 / 710		12 / 710		16 / 710	
Air flow		m^3/h	137.000		210.000		275.000	
User side exchanger								
Type			Plate exchanger					
Quantity / Refrigerant circuits		n°/n°	1 / 2					
Noise level								
ST standard	Sound power level (1) (6)	dB(A)	97,2	97,2	100,1	100,2	102,4	102,4
	Noise pressure level (1) (6)	dB(A)	69,3	69,3	72,1	72,2	74,4	74,4
SL silenced	Sound power level (1) (6)	dB(A)	90,1	90,1	93,0	93,2	95,3	95,3
	Noise pressure level (1) (6)	dB(A)	62,1	62,1	65,0	65,2	67,3	67,3
Dimensions, weight, and connections								
Length		mm	6.350		9.150		12.000	
Depth		mm	2.220		2.220		2.220	
Height		mm	2.460		2.460		2.460	

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Weight	kg	4.500	4.560	6.210	6.250	7.140	7.200
Size		HYBRID 4		HYBRID 5		HYBRID 6	
Hydraulic connections IN/OUT	BSP	DN100		DN125		DN150	
Electrical data							
Power Supply	V/ph/Hz	400V 3ph 50Hz					
Protection class	IP	54					
Auxiliary voltage	V	24Vac					
Controller		RS30					
FLI - Max running power absorbed	kW	191,2	214,7	249,3	303.6	303.6	303.6
FLA - Max running current absorbed	A	399,0	446,8	520,2	632,2	632,2	632,2
ICF – Start-up current	A	475,0	540,0	640,0	700,0	700,0	700,0
P3 Pump							
Type		Centrifugal					
Available pressure	bar	2,7	2,5	2,5	2,7	2,6	2,5
FLI - Max running power absorbed	kW	11,0	11,0	15,0	15,0	15,0	15,0
FLA - Max running current absorbed	A	20,2	20,2	27,7	27,7	27,7	27,7

(1) External air temperature +35°C, input water evaporator and output temperature 12°C/7°C, fluid water.
(2) EER energy efficiency ratio
(3) External air temperature 7°C and 87% r.h., input condenser water temperature and output temperature 40/45°C, fluid water.
(4) COP coefficient operating performance
(5) Technical information in according of Commission Regulation (EU) 2015/1095 on 5 May 2015, that implementing Directive 813/2013/EC on "EcoDesign" requirements.
(6) Sound pressure level derived from measurements made according to ISO 3744, refers to 10 meters from the unit in free field conditions with direction factor 2.