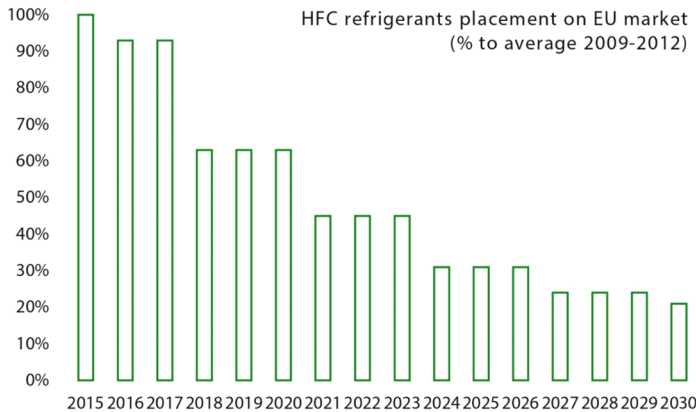




R290 Propane

Why R290 (Propane)?

F-Gas regulation



HFC refrigerants traditionally used in chillers and heat-pumps are subject to phase down in EU, US, China and other countries due to high GWP (Global warming potential) value. The goal is to decrease CO2 equivalent. The total HFC placement on the EU market will be gradually reduced to 31% of the baseline (average placement in 2009-2012) in 2024. The owners of HFC charged chillers will face:

- \\ Higher taxes for refrigerant charge
- \\ Higher fees for leakages
- \\ Higher refrigerant prices
- \\ Higher components cost

HFC refrigerants with high GWP will be prohibited following R22.

Advantages of R290 (Propane) and other hydrocarbons

$GWP = 3$ *Global warming potential*

$ODP = 0$ *Ozone depletion potential*



R290 (Propane) - is the best alternative to HFC refrigerants for air conditioning and heat pump application. The units have traditional design. Thermodynamic properties are very close to HFC refrigerants.

Felzer also manufactures units on other hydrocarbons - R1270 (propylene) and R600a (Isobutane). They are better suit for industrial low and high liquid temperature applications.

R290 (Propane) has lower operating pressure and lower oil temperature compare to commonly used HFCs. That means that your piping and compressors will work longer.

R290 - is a high purity (99,97%) grade of propane.
Do not use low purity Propane grades as a refrigerant.

// Air-cooled chillers AirGREEN



- \\ Reciprocating compressors
- \\ Microchannel condensers
- \\ Brazed plate evaporators and superheaters

// Water-cooled chillers WaterGREEN



- \\ Reciprocating compressors
- \\ Brazed plate evaporators, condensers and superheaters

// Water-to-water heat-pumps WaterGREEN HP



- \\ Reciprocating compressors
- \\ Brazed plate evaporators, condensers and superheaters

// Custom units

- // High and low chilled liquid temperatures.
- // Air-to-water and high temperature heat-pumps.
- // R1270 (Propylene) and R600a (Isobutane).
- // Screw compressor units up to 2000 kW.

Design features



High efficiency reciprocating compressors. 2-6 capacity steps in basic version. Possible to repair in case of failure. Automatic oil level control.

Brazed plate heat exchangers (BPHE). Stainless steel and copper from the water side. Possible to use with stainless steel piping.

Electronic expansion valve. Specially adjusted for R290 application.

RS485 Modbus in basic version.

All units are supplied with compressor area enclosures. All the necessary safety features are included in the basic version.



Factory packed water-to-water units can be easily moved with hydraulic pallet jack. Size with wooden pack is only 880x1900 mm, so the units fit standard doorways. For fast movement and location inside the buildings.



Safety features

Propane - is it safe? Yes.



Propane under pressure is widely used in a variety of residential and commercial applications. Now hydrocarbons are used in residential freezers as refrigerant. So it's safe to use propane chiller or heat pump. But some additional safety measures shall be considered based on local requirements.

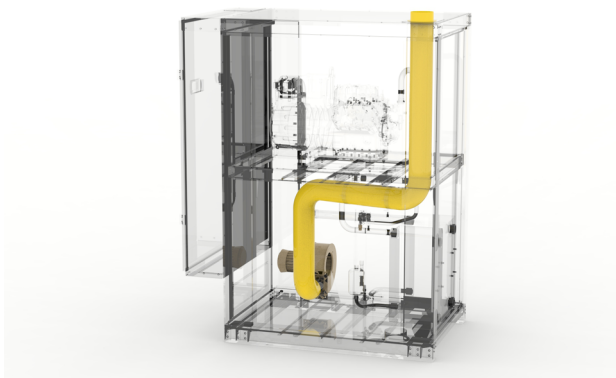
We have made risk assessment of all of our products and as a result a group of safety features were realized in our units. Propane is not explosive if concentration is too low or too high. The goal is to prevent explosive concentration in case of leakage, to prevent sparks and open fire near leakage and to ventilate the leaked gas to the safe, well ventilated space.



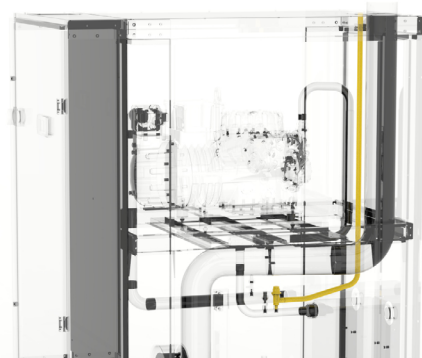
Refrigerant leak detector in the unit to detect the leakage



ATEX sensors, switches and other critical equipment to prevent sparks



Fan (ATEX on indoor) for ventilation of the leaked gas from the unit to the duct

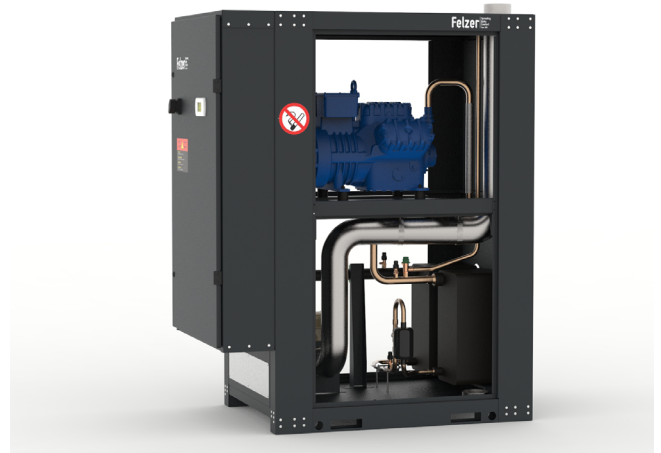


Safety valve piping to evacuate refrigerant in case of overpressure

Superheaters // PB & PF lines



PB unit with integrated superheater heat exchanger



PF unit with superheat only in evaporator

R290 systems require higher superheat compare to HFC systems. We have two product lines. In PF units all superheat is achieved in evaporator. In PB units the superheat in evaporator is lower. And the final superheat on compressor suction line is produced in special heat exchanger. That allows to rise the evaporation pressure and efficiency of the unit. So if you would like to receive more efficient unit choose PB product line. If you look for cost effective solution choose PF.

// Inverter option



All Felzer R290 units are available with inverter option. In basic version the capacity of the units is controlled in steps using cylinder cutoff. System may be improved by frequency control of compressors from 30 to 70Hz (25 to 87Hz on some models). Remote frequency drive will be integrated in electrical cabinet outside the compressor compartment. The following advantages may be received by final customer:

\\ Infinite capacity control

\\ Higher part load energy efficiency

// Operation without additional pressure fluctuation

// Steady suction pressure and superheat

// Smaller temperature difference at heat exchanger (higher suction and lower discharge pressure)

\\ Higher capacity -> smaller unit sizes

// Operation with frequency higher than 50Hz in extreme temperature or extreme capacity request periods

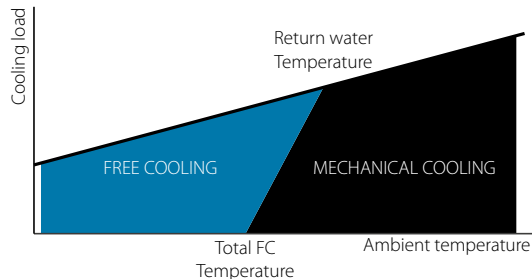
\\ Soft start function

// Reduced starting current with full motor torque

// Reduced mechanical load

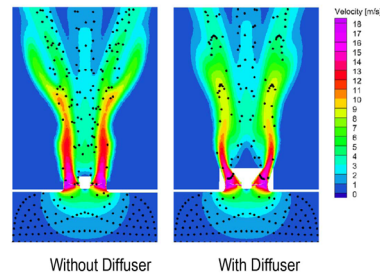
// Minimized danger of liquid slugging during start-up

// Free cooling on Air-cooled and Water-cooled chillers



Free cooling allows to chill water or brine by the air without using compressors. Significant power savings can be achieved if the unit is in operation in the midseason and wintertime. Available on Water-cooled chillers in separate modules (controlled from chiller controller) with inverter condenser pump. And on Air-cooled chillers integrated in the unit.

// EC fans and high-efficiency diffusers on Air-cooled chillers



// Touch screen, BACnet, LONworks - Smart features



Number of smart features can be optionally installed to connect the unit to BMS (building management system), control it from the WEB, or make human control more user friendly.

// Operation down to -35°C with condenser bypass



If your unit shall work in the wintertime but Free cooling is not applicable (cold brine, ice banks, etc.) condenser bypass and electrically heated receiver with a set of control valves may be integrated. With EC fans these units will work even in -35°C.

// Hydraulic modules and other useful options (see selection soft)

AirGREEN PB	0120.1	0150.1	0200.1	0250.1	0300.1	0240.2	0300.2	0350.1	0400.2	0400.1	0500.2
Air-cooled chillers capacities. User water 12/7°C, air 35°C											
Cooling capacity, kW	34,2	37,4	42,7	54,0	64,5	68,4	74,8	85,5	85,4	95,6	108,0
Power input, kW	10,4	11,7	13,5	18,0	19,8	20,7	23,4	27,2	27,0	31,1	36,0
EER	3,30	3,20	3,16	3,00	3,26	3,30	3,20	3,14	3,16	3,07	3,00
Product data											
Number of compressors	1	1	1	1	1	2	2	1	2	1	2
Number of circuits	1	1	1	1	1	2	2	1	2	1	2
Sound power, dBA	84	84	84	84	85	85	85	85	85	85	85
Sound pressure, dBA	52	52	52	52	53	53	53	53	53	53	53
Length, m	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52
Width, m	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21
Hight, m	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
Weight, kg	860	870	880	900	980	1050	1090	1000	1200	1250	1300

AirGREEN PB	0500.1	0600.2	0700.2	0800.2	1000.2
Air-cooled chillers capacities. User water 12/7°C, air 35°C					
Cooling capacity, kW	117,0	129,0	171,0	191,2	234,0
Power input, kW	37,6	39,5	54,4	62,2	75,2
EER	3,11	3,26	3,14	3,07	3,11
Product data					
Number of compressors	1	2	2	2	2
Number of circuits	1	2	2	2	2
Sound power, dBA	86	86	86	86	88
Sound pressure, dBA	54	54	54	54	56
Length, m	2,72	2,72	2,72	2,72	3,93
Width, m	2,22	2,22	2,22	2,22	2,22
Hight, m	2,30	2,30	2,30	2,30	2,30
Weight, kg	2050	2100	2350	2400	2650



Air-to-water units PF

AirGREEN PF	0120.1	0150.1	0200.1	0250.1	0300.1	0240.2	0350.1	0300.2	0400.1	0400.2	0500.1
Air-cooled chillers capacities. User water 12/7°C, air 35°C											
Cooling capacity, kW	29,7	35,6	40,2	49,4	59,8	59,3	71,1	71,2	83,7	80,4	95,7
Power input, kW	10,1	12,1	13,6	16,6	18,1	20,6	23,8	24,6	28,4	27,5	34,0
EER	2,94	2,95	2,97	2,98	3,31	2,88	2,99	2,90	2,94	2,92	2,81
Product data											
Number of compressors	1	1	1	1	1	2	1	2	1	2	1
Number of circuits	1	1	1	1	1	2	1	2	1	2	1
Sound power, dBA	84	84	84	84	84	85	85	85	85	85	85
Sound pressure, dBA	52	52	52	52	52	53	53	53	53	53	53
Length, m	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52	2,52
Width, m	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21	1,21
Hight, m	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
Weight, kg	840	850	860	880	960	1030	1140	950	1160	1180	1200

AirGREEN PF	0500.2	0600.1	0600.2	0700.1	0700.2	0800.1	0800.2	1000.2	1200.2	1400.2	1600.2
Air-cooled chillers capacities. User water 12/7°C, air 35°C											
Cooling capacity, kW	98,9	118,7	119,6	137,7	144,2	142,2	167,3	191,4	237,4	275,4	288,5
Power input, kW	33,6	44,3	36,6	52,1	54,7	48,3	57,6	68,9	89,7	105,5	110,5
EER	2,94	2,68	3,27	2,64	2,64	2,94	2,90	2,78	2,65	2,61	2,61
Product data											
Number of compressors	2	1	2	1	2	1	2	2	2	2	2
Number of circuits	2	1	2	1	2	1	2	2	2	2	2
Sound power, dBA	85	86	85	86	86	86	86	86	88	88	88
Sound pressure, dBA	53	54	53	54	54	54	54	54	56	56	56
Length, m	2,52	2,72	2,72	2,72	2,72	2,72	2,72	2,72	3,93	3,93	3,93
Width, m	1,21	2,22	2,22	2,22	2,22	2,22	2,22	2,22	2,22	2,22	2,22
Hight, m	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30	2,30
Weight, kg	1250	1950	1980	2050	2100	2350	2400	2450	2650	2700	2800

WaterGREEN PB	0120.1	0150.1	0200.1	0250.1	0300.1	0240.2	0300.2	0350.1	0400.2	0400.1	0500.2
Water-cooled chillers capacities. User water 12/7°C, condenser water 30/35°C											
Cooling capacity, kW	36,2	40,2	47,0	61,8	71,3	72,4	80,4	92,4	94,0	104,1	123,6
Power input, kW	7,6	8,7	10,2	13,5	15,5	15,1	17,4	20,2	20,4	23,6	26,9
EER	4,79	4,62	4,60	4,59	4,61	4,79	4,62	4,57	4,60	4,41	4,59
Water-to-water heat pump. User water 40/45°C, source brine 5/0°C											
Cooling capacity, kW	33,8	37,9	44,4	58,4	67,3	67,7	75,9	87,4	88,8	99,4	116,8
Power input, kW	8,3	9,5	11,2	14,7	16,9	16,5	19,1	22,1	22,4	25,8	29,5
EER	4,09	3,98	3,97	3,96	3,98	4,09	3,98	3,95	3,97	3,85	3,96
Product data											
Number of compressors	1	1	1	1	1	2	2	1	2	1	2
Number of circuits	1	1	1	1	1	2	2	1	2	1	2
Sound power, dBA	82	82	82	82	83	83	83	83	83	83	83
Sound pressure, dBA	50	50	50	50	51	51	51	51	51	51	51
Length, m	1,50	1,50	1,50	1,50	1,50	2,00	2,00	1,50	2,00	1,50	2,00
Width, m	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88
Hight, m	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88
Weight, kg	850	860	870	890	970	1040	1080	990	1190	1240	1290

WaterGREEN PB	0500.1	0600.2	0700.2	0800.2	1000.2
Water-cooled chillers capacities. User water 12/7°C, condenser water 30/35°C					
Cooling capacity, kW	125,3	142,6	184,8	208,2	250,6
Power input, kW	28,2	30,9	40,4	47,2	56,4
EER	4,44	4,61	4,57	4,41	4,44
Water-to-water heat pump. User water 40/45°C, source brine 5/0°C					
Cooling capacity, kW	119,4	134,6	174,8	198,8	238,8
Power input, kW	30,9	33,8	44,2	51,7	61,7
EER	3,87	3,98	3,95	3,85	3,87
Product data					
Number of compressors	1	2	2	2	2
Number of circuits	1	2	2	2	2
Sound power, dBA	84	84	84	84	86
Sound pressure, dBA	52	52	52	52	54
Length, m	1,50	2,00	2,00	2,00	2,00
Width, m	0,88	0,88	0,88	0,88	0,88
Hight, m	1,88	1,88	1,88	1,88	1,88
Weight, kg	2040	2090	2340	2390	2640



Water-to-water units PF

WaterGREEN PF	0120.1	0150.1	0200.1	0250.1	0300.1	0240.2	0350.1	0300.2	0400.1	0400.2	0500.1
Water-cooled chillers capacities. User water 12/7°C, condenser water 30/35°C											
Cooling capacity, kW	32,3	39,2	45,1	56,5	64,6	64,6	76,0	78,3	90,6	90,2	106,4
Power input, kW	7,5	9,1	10,5	12,7	14,5	15,0	18,0	18,3	21,4	20,9	25,8
EER	4,31	4,29	4,32	4,44	4,47	4,31	4,22	4,29	4,23	4,32	4,13
Water-to-water heat pump. User water 40/45°C, source brine 5/0°C											
Heating capacity, kW	30,4	36,9	42,4	52,7	60,2	60,8	71,9	73,8	85,7	84,8	101,2
Power input, kW	7,8	9,5	10,8	13,2	15,0	15,5	18,7	18,9	22,2	21,7	26,7
COP	3,91	3,90	3,92	4,00	4,02	3,91	3,85	3,90	3,86	3,92	3,79
Product data											
Number of compressors	1	1	1	1	1	2	1	2	1	2	1
Number of circuits	1	1	1	1	1	2	1	2	1	2	1
Sound power, dBA	82	82	82	82	82	83	83	83	83	83	83
Sound pressure, dBA	50	50	50	50	50	51	51	51	51	51	51
Length, m	1,50	1,50	1,50	1,50	1,50	2,00	1,50	2,00	1,50	2,00	1,50
Width, m	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88
Hight, m	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88
Weight, kg	830	840	850	870	950	1020	1130	940	1150	1170	1190

WaterGREEN PF	0500.2	0600.1	0600.2	0700.1	0700.2	0800.1	0800.2	1000.2	1200.2	1400.2	1600.2
Water-cooled chillers capacities. User water 12/7°C, condenser water 30/35°C											
Cooling capacity, kW	112,9	126,5	129,2	136,9	152,0	155,6	181,3	212,8	252,9	273,8	311,2
Power input, kW	25,4	34,4	28,9	37,9	36,0	44,4	42,9	51,5	68,7	75,8	88,8
EER	4,44	3,68	4,47	3,61	4,22	3,50	4,23	4,13	3,68	3,61	3,50
Water-to-water heat pump. User water 40/45°C, source brine 5/0°C											
Heating capacity, kW	105,4	124,2	120,4	135,2	143,8	155,0	171,4	202,4	248,4	270,3	310,0
Power input, kW	26,3	35,6	29,9	39,3	37,3	46,0	44,4	53,4	71,2	78,6	92,0
COP	4,00	3,49	4,02	3,44	3,85	3,37	3,86	3,79	3,49	3,44	3,37
Product data											
Number of compressors	2	1	2	1	2	1	2	2	2	2	2
Number of circuits	2	1	2	1	2	1	2	2	2	2	2
Sound power, dBA	83	84	83	84	84	84	84	84	86	86	86
Sound pressure, dBA	51	52	51	52	52	52	52	52	54	54	54
Length, m	2,00	1,50	2,00	1,50	2,00	1,50	2,00	2,00	2,15	2,15	2,15
Width, m	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88	0,88
Hight, m	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88	1,88
Weight, kg	1240	1940	1970	2040	2090	2340	2390	2440	2640	2690	2790



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