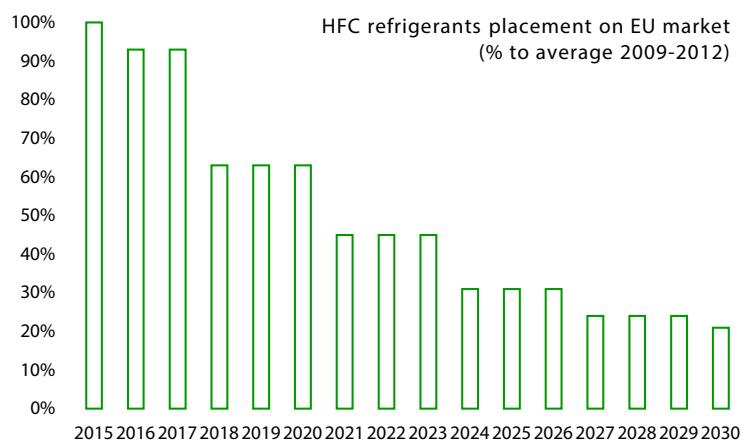




R290 Propane

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. Thermodynamical 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.

Our products

// Aircooled chillers AirGREEN



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

// Watercooled chillers WaterGREEN



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

// Water-to-water heatpumps WaterGREEN HP



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

// Custom units

- // High and low chilled liquid temperatures.
- // Air-to-water and high temperature heatpumps.
- // R1270 (Propylene) and R600a (Isobutane).
- // Screw compressor units upto 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 heatpump. 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 realised 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 openfire near leakage and to ventilate the leaked gas to the safe, well ventilated space.



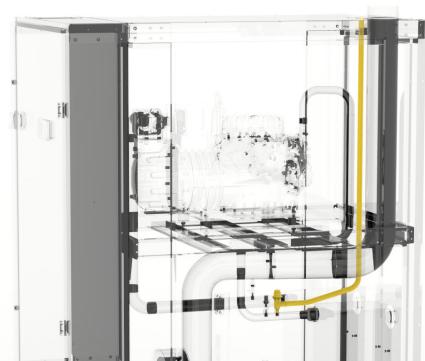
Refrigerant leak detector in the unit to detect the leakage



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.

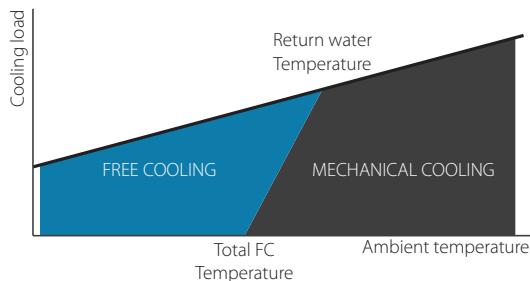
// Inverter option



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:

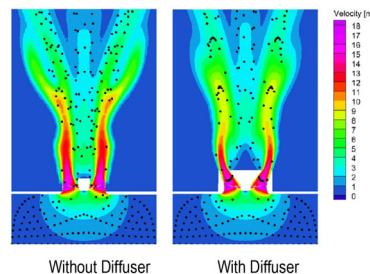
- \\\ Infinite capacity control
- \\\ Higher part load energy efficiency
 - // Operation without additional pressure fluctuation
 - // Steady suction pressure and superheat
 - // Smaller temperature difference at heat exchanger (higher suction and lower discharge pressure)
- \\\ Higher capacity -> smaller 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
 - // Minimised danger of liquid slugging during start-up

// Freecooling on aircooled and watercooled chillers



Freecooling 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 watercooled chillers in separate modules (controlled from chiller controller) with inverter condenser pump. And on aircooled chillers integrated in the unit.

// EC fans and high-efficiency diffusers on aircooled chillers



// Touchscreen, 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 freecooling is not applicable (cold brine, icebanks, 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)

Air-to-water units PB

// Reciprocating product line

| AirGREEN PB | 0120.1 | 0150.1 | 0200.1 | 0250.1 | 0300.1 | 0240.2 | 0300.2 | 0350.1 | 0400.2 | 0400.1 | 0500.2 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Aircooled 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 |
|---|--------|--------|--------|--------|--------|
| Aircooled 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 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Aircooled 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 |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Aircooled 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 |

Water-to-water units PB

// Reciprocating product line

| WaterGREEN PB | 0120.1 | 0150.1 | 0200.1 | 0250.1 | 0300.1 | 0240.2 | 0300.2 | 0350.1 | 0400.2 | 0400.1 | 0500.2 |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Watercooled 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 heatpump. 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 |
|--|--------|--------|--------|--------|--------|
| Watercooled 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 heatpump. 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 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Watercooled 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 heatpump. 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 |
|--|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Watercooled 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 heatpump. 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 |



Felzer SIA
Brivibas gatve, 201
Riga, Latvia, LV-1039
tel: +371 230 05 545
sales@felzer.lv
www.felzer.lv

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