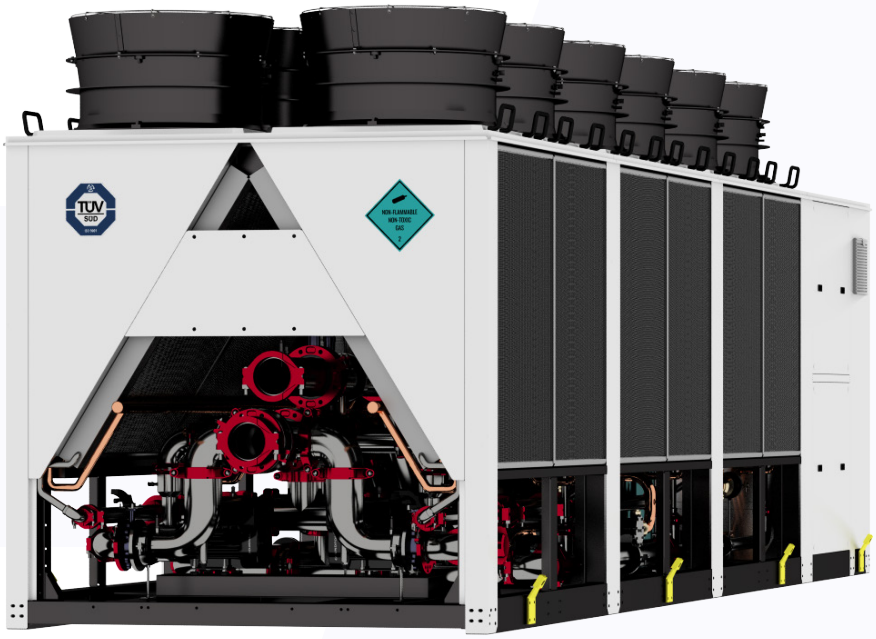
# Lightstream Freecool

## FREECOOLING CHILLERS WITH INVERTER COMPRESSORS



- SUPERIOR EFFICIENCY
- MICROCHANNEL TECHNOLOGY
- CAPACITY ON DEMAND

# 600-1200kW

SCREW | INVERTER | R134A/R1234ze | EC-FANS | MICROCHANNEL | FREECOOLING

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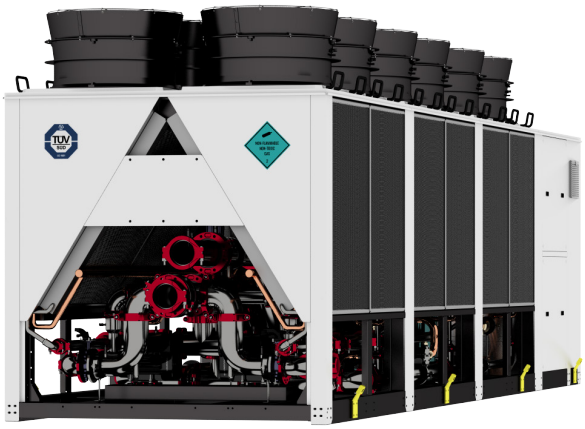
# Superior energy efficiency

**THE LIGHTSTREAM FREECOOL IS A FAMILY OF FREECOOLING CHILLERS EQUIPPED WITH FREQUENCY-CONTROLLED SCREW COMPRESSORS AND ADOPTED MICROCHANNEL TECHNOLOGY FOR FREECOOLING AND CONDENSING COILS, WHICH OFFER OUTSTANDING ENERGY EFFICIENCY WITH EER VALUES OF UP TO 3.96**

Chillers are usually selected based on their efficiency when providing 100 percent of their cooling capability, but most rarely operate at this condition. In most facilities, efficient operation under average conditions (across the spectrum of the load from 20 to 80 percent) is more important than chiller operation under extreme but rare weather conditions.

Lighstream Freecool chillers with inverter-driven compressors provide the opportunity to dramatically improve part load efficiency and give the facility operator substantial energy savings.

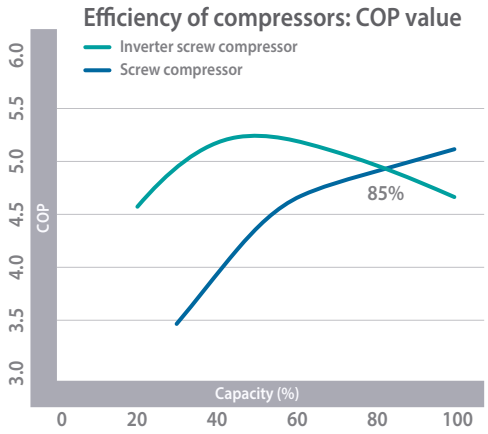


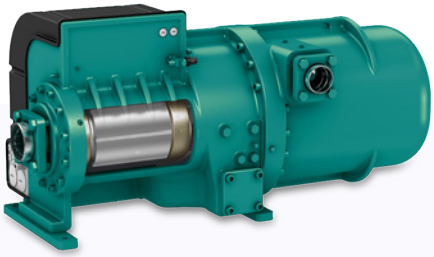

## R1234ze

### Low-GWP refrigerant option

Refrigerants with low global warming potential (GWP) are becoming more and more important in the refrigeration and air conditioning industry in Europe and beyond.

R1234ze features low GWP of one and zero ozone depletion potential, thus providing the environmental leadership while achieving the best energy performance levels for applications.



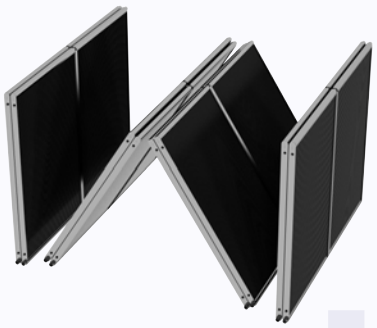
# Exact capacity match

### Frequency-controlled screw compressors

The compact frequency-controlled screw compressors of Lightstream Freecool series chillers are especially suitable for systems that frequently operated under part-load.

These compressors achieve also impressively high full-load efficiency and significantly improved ESEER and SCOP values. With an average EER value of 3.72, Lightstream Freecool chillers are setting new benchmarks in the industry.

The compressors monitors its own application limits and communicate via Modbus with the master system controls. The integrated data log can be used at any time to analyse operation over the running time and optimise the system settings.



# Microchannel technology

- HIGHER FREECOOLING PERFORMANCE
- REDUCED CONDENSING TEMPERATURES
- MODULAR W-BANK DESIGN

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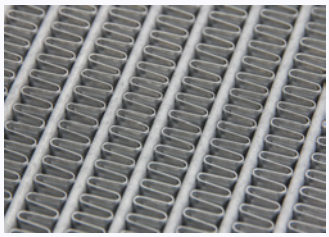
Microchannel technology adopted in Lighstream Freecool design for both condenser and freecooling coils gives a number of advantages, including higher heat transfer rate, low airside pressure drops, and closer approach temperatures. The end result is up to 40% higher energy efficiency in comparison to fin/tube coil design.

Smaller coil face, thin design, up to 50% less weight, and less refrigerant charge translate to lower system cost. Microchannel condensers used in Lightstream Freecool chillers are true HVAC coils developed and optimized especially for refrigeration applications and enable remarkable low condensing temperatures of up to 43.5°C.



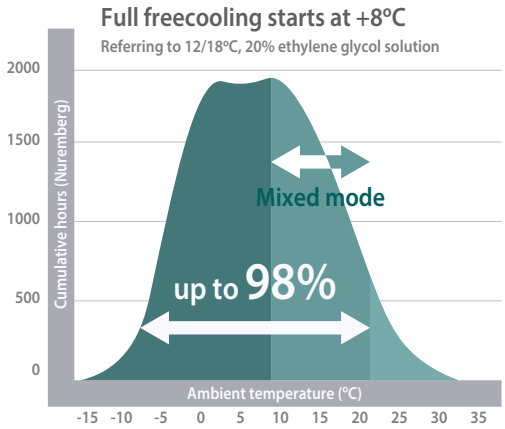
High-performance louvered fins

## Solution not found in any other designs

# 20% higher EER

Higher microchannel condenser performance results in a reduced condensing temperature, which in turn reduces compressor power consumption and increases the overall chiller efficiency, while allowable operating envelope of the compressors gets widened to a higher ambient temperature.

Superior performance of the microchannel freecooling coil translates to higher freecooling capacity and increased freecooling hours, thus increasing the overall system efficiency. In the same time, the microchannel freecooling coils do not impact the fan power consumption due to the low airside pressure drop.




FULL FREECOOLING AT

# AS HIGH AS

# +8°C*

* referring to 12/18°C 20% ethylene glycol water solution

# RoboClean™

## Automatic coil cleaning system

Lightstream Freecool chillers are equipped with RoboClean™ - an automatic coil cleaning system which determines the need for cleaning by reading from air differential pressure transmitters and initiates coil cleaning procedure when the pressure difference rises above a set point. Cleaning is performed by spraying water onto the coils by rotating nozzles.

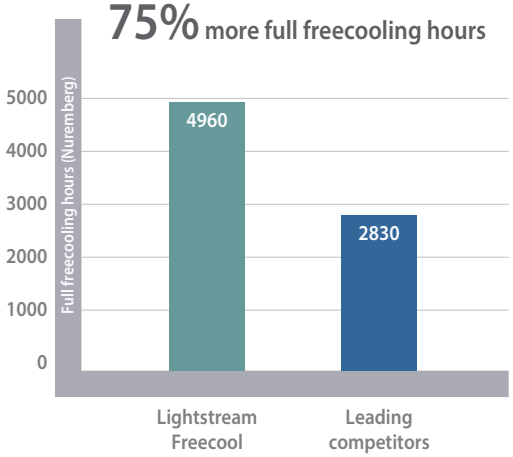
Automatic heat exchanger cleaning technique allow for maintenance to be performed without shutting down the chiller and disassembly, thus reducing the system downtime incurred by manual cleaning method.

# Applications

Lightstream Freecool has been designed with attention to every detail to maximize its efficiency and reliability and fits ideally to the requirements of mission-critical applications, industry process, commercial applications, and in every area where efficiency and reliability are the key factors.

Due to its excellent efficiency at part-load conditions, Lightstream Freecool is a brilliant economy solution for applications where the heat load is not constant or expected to grow.

Lightstream Freecool chillers are intended for all-year operation in any environmental condition, be it cold or hot climate zone, high populated urban area, or seashore installation, or installation in a high-polluted industrial area.

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# Intelligent fan system

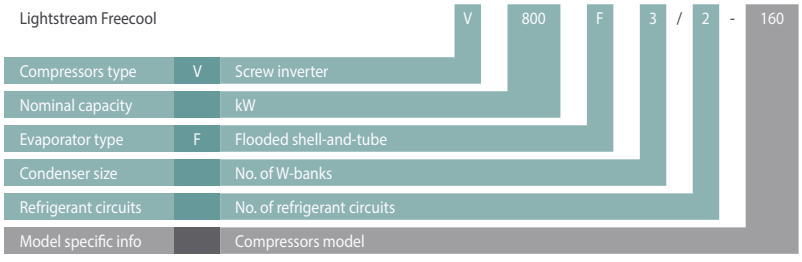
## EC-type fans with reduced power consumption

Lightstream Freecool's new generation fan system not only reduces power consumption by up to 30% while easily managing the extraordinary high volume flows – it also works at much reduced operating noise.

The smart fan system includes the unique fans with bionic wing concept, the most advanced EC motor technology, and multifunctional air diffusers, resulting in an extra economic efficiency for the customers.

EC motor technology does not provide savings only during full-load operation - it is exactly when operating under partial load that EC motors lose much less of their efficiency.

# Model identification

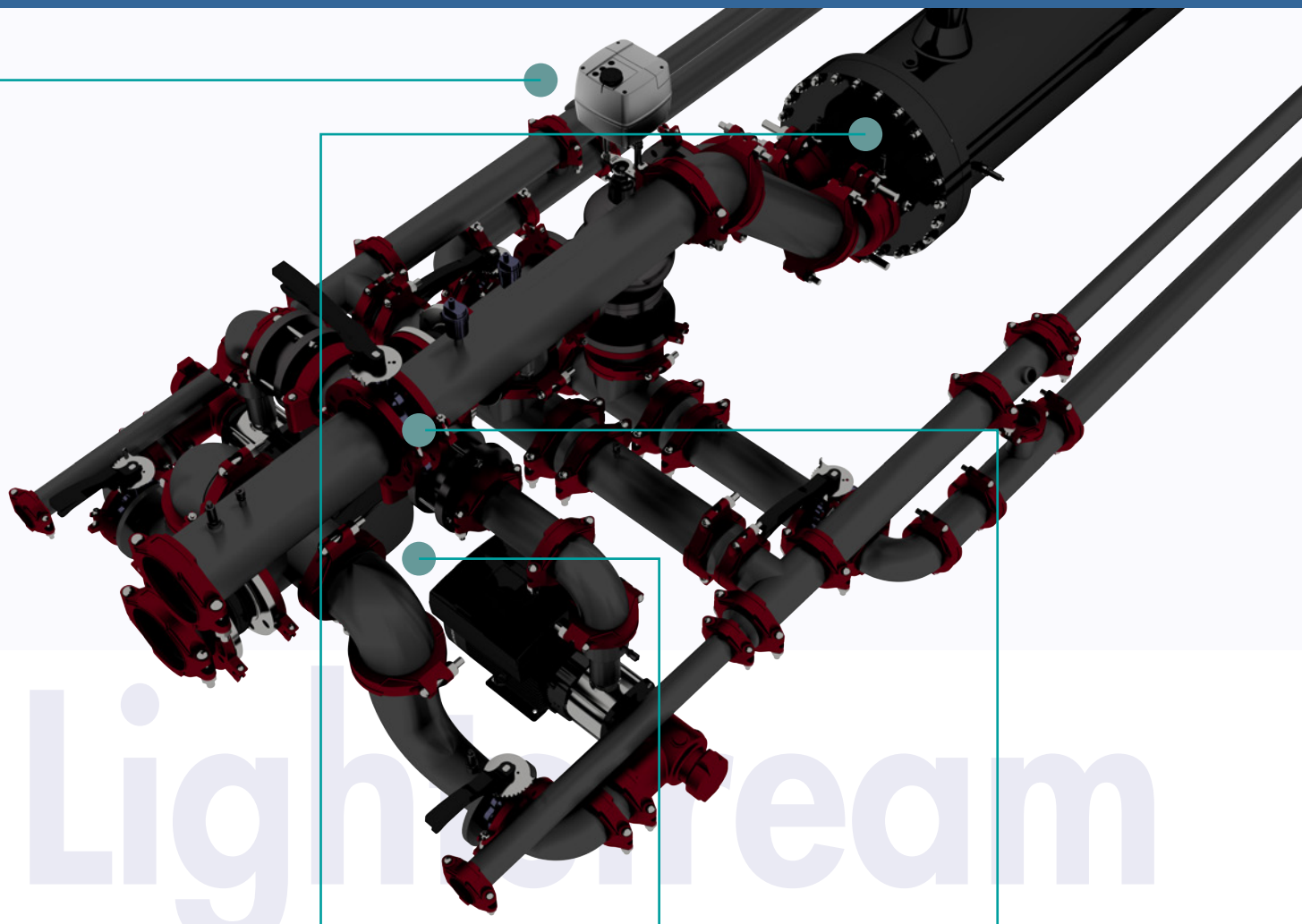



# Frame sizes

| Frame size | Length | Width | Height |
|---|---|---|---|
| | mm | mm | mm |
| F1 | 6115 | 2170 | 2500 |
| F2 | 8265 | 2170 | 2500 |
| F3 | 10415 | 2170 | 2500 |
| F4 | 12565 | 2170 | 2500 |

# Waterside system

Lightstream Freecool chiller equipped with premium quality, high-performance waterside components, enabling it to cover every application scenario



## MOTORIZED 3-WAY MIXING VALVE

Actuated 3-way mixing valve controls the supply water temperature at the reduced fan speed conditions.
2-way regulating valves are available as an option.

## FLOODED EVAPORATOR

The flooded evaporator enables to operate at the higher saturated evaporating temperature when compared to many others evaporator types and allows to achieve higher cooling capacity with correspondingly higher efficiency.
The refrigerant pool behaves as a flywheel, allowing the controls of the flooded evaporator to track the varying load of a batch process, while optimized tube geometry ensures optimal refrigerant distribution.

## INVERTER-DRIVEN PUMPS

Compact, flexible and reliable inline pumps with integrated frequency converters help to maintain the exact volumetric water flow while keeping the energy consumption at an optimum level.
Electro-coated cast iron pump body provides high corrosion resistance and ensures long lifespan.

## BUTTERFLY SHUT-OFF VALVES

Lightstream Freecool chillers feature butterfly shut-off valves with spherically machined valve discs and the matching moulded liner ensure perfectly tight shutoff, even if the valve is actuated frequently.

# Technical Specifications

| Model | | V600 | | V700 | | V800 | | V900 | | V1000 | | V1200 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Frame size | | F2/2-125 F1 | | F3/2-125 F2 | | F3/2-160 F2 | | F4/2-160 F3 | | F4/2-200 F3 | | F5/2-200 F4 | |
| Compressors frequency | | 85% | 100% | 85% | 100% | 85% | 100% | 85% | 100% | 85% | 100% | 85% | 100% |
| Cooling capacity (DX mode)[1] | kW | 625 | 708 | 665 | 742 | 799 | 924 | 820 | 955 | 1000 | 1154 | 1020 | 1182 |
| Cooling capacity (FC mode)[2] | kW | 530 | 530 | 795 | 795 | 795 | 795 | 1060 | 1060 | 1060 | 1060 | 1325 | 1325 |
| Energy efficiency (EER) | kW/kW | 3.76 | 3.62 | 3.96 | 3.83 | 3.74 | 3.67 | 3.76 | 3.76 | 3.68 | 3.56 | 3.68 | 3.62 |
| Min DX cooling capacity | kW | 101.0 | 111.5 | 90.3 | 89.0 | 98.5 | 103.5 | 93.1 | 95.3 | 104.6 | 112.4 | 95.8 | 102.2 |
| Min full freecooling temp | °C | 4.6 | 3.4 | 7.3 | 6.6 | 5.9 | 4.7 | 7.7 | 6.8 | 6.5 | 5.2 | 7.7 | 6.9 |
| Net weight | kg | 4950 | 4950 | 7350 | 7350 | 7550 | 7550 | 10050 | 10050 | 10350 | 10350 | 12750 | 12750 |
| Compressors | | Frequency-controlled compact screw | | | | | | | | | | | |
| Quantity | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Power input | kW | 140.4 | 169.8 | 129.2 | 155.2 | 175.0 | 213.2 | 166.8 | 202.6 | 220.0 | 272.8 | 212.8 | 262.2 |
| Absorbed current | A | 236.6 | 281.2 | 219.6 | 259.0 | 289.4 | 347.4 | 276.8 | 331.2 | 357.6 | 438.0 | 346.6 | 422.0 |
| Fans | | EC-type axial | | | | | | | | | | | |
| Quantity | | 8 | 8 | 12 | 12 | 12 | 12 | 16 | 16 | 16 | 16 | 20 | 20 |
| Airflow | $m^3/h$ | 224000 | 224000 | 336000 | 336000 | 336000 | 336000 | 448000 | 448000 | 448000 | 448000 | 560000 | 560000 |
| Power input | kW | 25.8 | 25.8 | 38.6 | 38.6 | 38.6 | 38.6 | 51.5 | 51.5 | 51.5 | 51.5 | 64.4 | 64.4 |
| Absorbed current | A | 39.2 | 39.2 | 58.8 | 58.8 | 58.8 | 58.8 | 78.4 | 78.4 | 78.4 | 78.4 | 98.0 | 98.0 |
| Evaporator | | Flooded shell-and-tube | | | | | | | | | | | |
| Water flow rate | $m^3/h$ | 93.2 | 105.6 | 99.1 | 110.6 | 119.1 | 137.8 | 122.3 | 142.4 | 149.1 | 172.1 | 152.1 | 176.2 |
| Pressure drop | kPa | 46 | 47 | 28 | 34 | 29 | 38 | 30 | 40 | 36 | 47 | 37 | 49 |
| Refrigerant circuits | | R134a | | | | | | | | | | | |
| Quantity | | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Refrigerant mass flow | kg/min | 255.3 | 294.5 | 257.2 | 295.4 | 319.8 | 376.7 | 320.4 | 377.8 | 397.8 | 463.1 | 398.6 | 467.6 |

(1) Coolant: Water/Ethylene glycol 80%/20%; Coolant temperatures: 12/18°C; Ambient temperature: 35°C

(2) Ambient temperature: 6°C

# Package, options and accessories

| Description | | Description | | Description | |
|---|---|---|---|---|---|
| **General** | | **General** | | **General** | |
| RoboClean™ automatic coil cleaning system | □ | Anti-vibration mounts | □ | Mesh guards for coils | □ |
| ClimateProfile™ | □ | Anti-vibration springs | □ | Weatherproof hood | □ |
| Soundproof compressor compartment | ■ | High ambient kit | □ | R134a refrigerant | ■ |
| Low noise design (grades 1 to 4) | □ | Low ambient kit | □ | R1234ze refrigerant | □ |
| MCHE e-coating | □ | -10°C brine kit | □ | Corrosion-resistant frame | □ |
| MCHE thermoguard | □ | High-sided paneling | □ | Thermal insulation | ■ |
| **Waterside** | | **Waterside** | | **Waterside** | |
| Freecooling | ■ | 1x 3-way mixing valve | ■ | Flanged water connections | □ |
| Strainer 20 mesh | ■ | 2x 2-way regulating valve | □ | Grooved water connections | ■ |
| Strainer 60 mesh | □ | Manual shut-off butterfly valves | ■ | Temperature transducers/gauges | □ |
| Manual balancing valve | □ | Motorized shut-off butterfly valves | □ | Pressure transducers | ■ |
| Bypass | □ | Automatic air vents | ■ | Differential pressure transducer | ■ |
| Redundant pumping group (2x in-line inv.-driven pumps) | □ | Flowmeter | □ | Pressure gauges | □ |
| **Refrigerant side** | | **Refrigerant side** | | **Refrigerant side** | |
| Oil cooling system | □ | High-efficient refrigerant filter | ■ | Economiser | □ |
| Oil pumping system | □ | Evaporator immersion heater | ■ | Gas leakage detection | ■ |
| Electronic expansion valves | ■ | Flooded shell-and-tube evaporator (2-pass) | ■ | Discharge non-return valves | ■ |
| Pressure indication on high/low sides | ■ | Gas and liquid shut-off valves | ■ | Motorized suction ball valves | ■ |
| Safety valves on high/low sides | ■ | Liquid level control valve | ■ | Enlarged liquid receivers | □ |
| Service valves (compr. suction/discharge) | ■ | Gas and liquid pressure transducers | ■ | Compressor backflow prevention valves | ■ |
| **Airside** | | **Airside** | | **Airside** | |
| EC fans | ■ | High-efficient fan diffusers | □ | Differential pressure transducers | ■ |
| **Electric and controls** | | **Electric and controls** | | **Electric and controls** | |
| Touch screen HMI | ■ | Dual power supply w/ ATS | □ | Sequence management | □ |
| Electric panel heater | □ | BMS connectivity | ■ | Compressor operation indication | ■ |
| Compressor compartment ventilation | ■ | SNMP connectivity | ■ | Remote monitoring software | ■ |
| Energy monitoring | □ | GSM connectivity | □ | Controller power backup | ■ |

■ Standard feature

□ Optional feature