

Intelligent EC fans *for greater efficiency in cooling towers.*

Aerodynamically optimized, infinitely variable control, low-maintenance: EC fans ensure energy-saving, reliable and economical cooling tower operation.

ebm**papst**

the engineer's choice



About ebm-papst.

ebm-papst is a leader in ventilation and drive engineering technology and a much sought-after engineering partner in many industries. With around 20,000 different products, we have the perfect solution for practically every requirement. We believe the consistent further development of our highly-efficient GreenTech EC technology provides our customers with the best opportunities for the future in industrial digitization. With GreenIntelligence, ebm-papst already offers intelligent networked complete solutions that are unique anywhere in the world today.

ebmpapst

the engineer's choice

Six reasons that make us the ideal partner:

Our systems expertise: as experts in advanced motor technology, electronics and aerodynamics, we provide system solutions from a single source.

Our spirit of invention: our 600 engineers and technicians will develop a solution that precisely fits your needs.

Our lead in technology: with our EC technology and GreenIntelligence, we combine the highest energy efficiency with the advantages of IoT and digital networking.

Closeness to our customers: at 49 sales offices worldwide.

Our standard of quality: our quality management is uncompromising, at every step in every process.

Our sustainable approach: we assume responsibility with our energy-saving products, environmentally-friendly processes, and social commitment.

GreenIntelligence. *Making Engineers Happy.*



Why do our customers look so happy? Because when it comes to the Internet of Things and the digital transformation, we provide them with a clear competitive edge with GreenIntelligence for intelligent control and interconnection of fans, drives and systems to make applications more powerful, processes more efficient, businesses more successful and their customers more satisfied.

Modern, functional and reliable solutions are in high demand for **refrigeration and air conditioning**. GreenIntelligence supplies easy-to-install fan solutions with intelligent networking capabilities and a wide variety of ideas and functions that make it possible to exploit the great potential of digitalization right away.

Here is how much GreenIntelligence there is in cooling tower fans:

- Monitoring of fan performance through sensor systems
- Encrypted data transfer including interfaces, protocols, servers, and cloud connectivity
- Data evaluation and data-based control
- Full control over all settings and activities
- All required hardware and software components from a single supplier



Björn already has a lot of ideas for making his refrigeration systems smarter.

The perfect solution for every type of cooling tower.

The effective answer to exacting demands.

Fans are among the most vital key components of cooling towers. They play a crucial role in effectively dissipating heat to the surrounding atmosphere in process and plant cooling applications, and also help keep conditions in manufacturing facilities and data centers at comfortable levels, as well as in large complexes such as hotels and supermarkets.

Built to last in a harsh environment.

Cooling towers require optimal and efficient cooling, even in the toughest environmental conditions. ebm-papst fans can withstand severe environmental factors and ward off corrosion. Their robust design is not affected by high humidity levels and/or rapid changes in temperature.

High air flow rates, quiet operation.

Due to the large refrigerating capacities, fans have to deliver high air flow while operating as quietly as possible, as cooling towers are often used in industrial, mixed and urban areas.

Effortless compliance with stringent efficiency directives.

However, the greatest challenge currently facing cooling towers is to satisfy the minimum requirements set down for energy efficiency. In the EU, the ErP Directive (Energy-related Products) is decisive here. Starting in 2022, it is expected to define even more stringent minimum efficiency levels for fans installed in products and devices. ebm-papst fan solutions considerably support cooling tower manufacturers and operators considerably, with sophisticated system technology and demanding certifications that go far beyond the legal requirements.

Meeting all requirements.

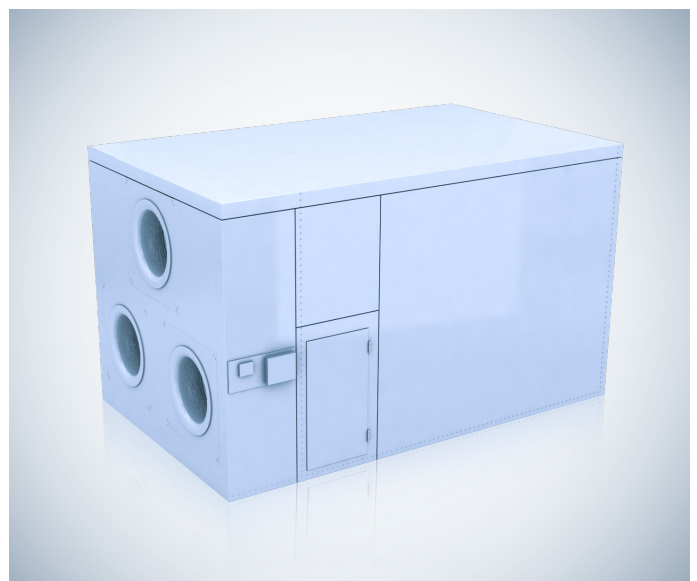
There are various options for the air supply in mechanical draft cooling towers, depending on their design. Axial fans offer excellent performance with high air flow rates and moderate pressures. Centrifugal fans are designed to overcome high pressures with a limited air flow rate. The good news: Regardless of whether you opt for induced or forced draft, ebm-papst can always provide you with an efficient and reliable solution for your purposes.

Inducted draft.



With this type, the fans are located in the air outlet of the cooling tower. The air is drawn through or sucked through the cooling tower by an axial fan.

Forced draft.



With this type, the fans are located in the air inlet of the cooling tower. Ambient air is forced through the cooling tower by centrifugal fans.

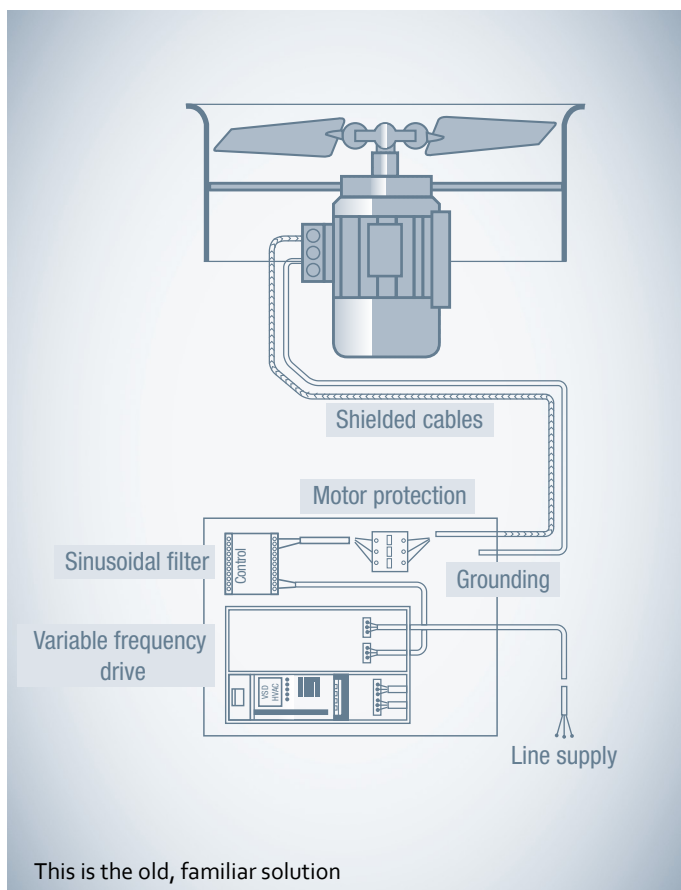
EC fans for top cooling tower performance.

Systematic efficiency.

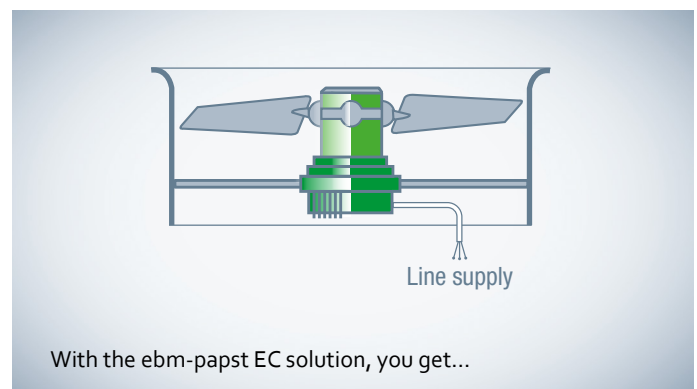
It is not just the efficiency of the individual components that matters, but rather the result of their interaction. And this is where EC fans from ebm-papst outshine conventional AC technology with their excellent performance, resulting from a perfect combination of impeller, motor and electronics. A major contribution to this comes from the GreenTech EC motor with external rotor. Its efficiency levels far surpass the

requirements of efficiency class IE4, without even using problematic rare-earth magnets. The integrated control electronics guarantee compact dimensions, as well as ease of installation and commissioning. So there are plenty of arguments in favor of using GreenTech EC technology.

Conventional fans with variable frequency drive



Highly efficient EC fan



... a complete system consisting of motor, impeller and integrated variable frequency drive. All from one supplier and fully configured. This means: no additional components and simple commissioning. Compliance with all legal regulations in accordance with the ecodesign directive for fans (ErP) is also fully ensured. We provide you with standard-compliant measurements and verifiable documentation.

... maximum efficiency. The EC motor provides this in combination with the perfectly matched components impeller, guard grill and nozzle respectively wall ring.

... an integrated derating function. Optimal protection against overtemperature and mechanical overload.

Sustainable and conserving resources.

The ebm-papst corporate and product philosophy takes environmental protection, the sustainability this implies, and economical operation as one holistic approach. Throughout the lifecycle of our EC fans, we rely on recycling, waste avoidance and environmentally friendly materials.

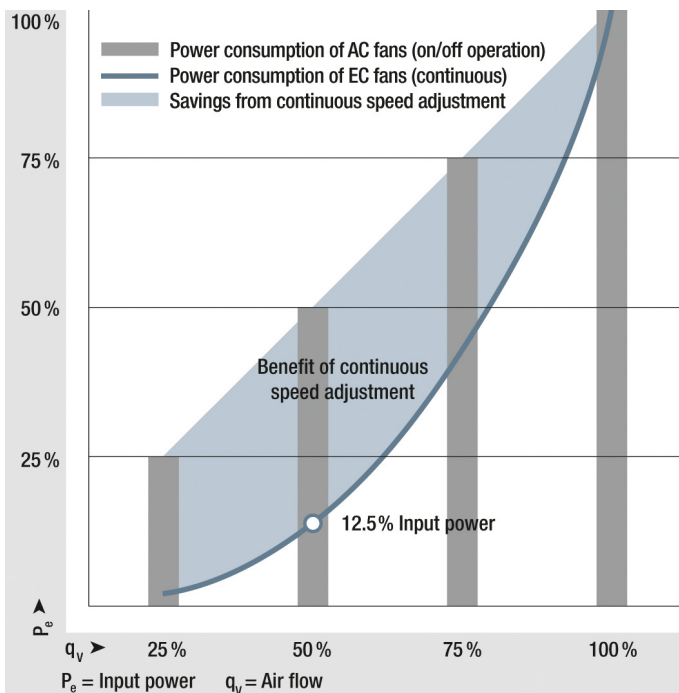
We consistently strive to increase efficiency and thus reduce emissions and energy consumption. Not without success! Our EC fans are not only extremely durable, they also feature highly efficient EC motors with infinitely variable speed range and linear interface control.

Continuously adjustable, economical and quiet.

It is still standard practice to either operate single cooling tower fans at full capacity or switch them off altogether, depending on the output required. From the point of view of the installation as a whole, this is not efficient. Far better regulation is possible when using ebm-papst EC fans. They allow infinitely variable speed adjustment at a constant high level of efficiency. This means that all fans may remain in operation, but the system still requires less energy. In addition, demand-oriented partial-load operation has a positive effect on the service life of the fans, which also makes cooling tower operation more economical than before.

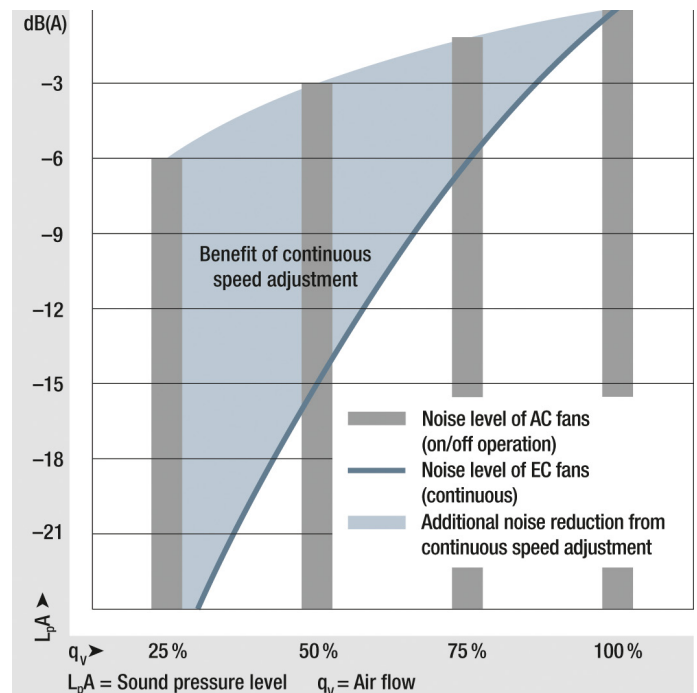
Another pleasant side effect: Due to demand-oriented partial-load operation, the system requires not only less energy, it also operates much more quietly.

The diagrams below illustrate the potential energy savings and noise reduction in a direct comparison of on/off operation and infinitely variable speed adjustment.



Low energy consumption:

With on/off operation, air performance is reduced by 50% when half of the fans are switched off. With infinitely variable speed adjustment for all the fans, power consumption is only 12.5% with 50% air flow.



Less noise:

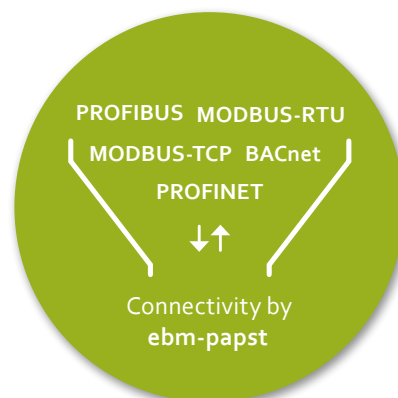
Whereas switching off half the fans (half the air flow) only reduces noise generation by approx. 3 dB, reducing speed to half the air flow brings about an improvement of 15 dB.

Cleverly controlled, all-round networking: That's GreenIntelligence.

Efficiency made smarter.

GreenIntelligence stands for intelligent networking solutions from ebm-papst. For this, all the fans, regardless of their size, come with state-of-the-art sensors and various BUS interfaces. On the one hand, this makes it possible to read all operating data easily and comprehensively. On the other hand, the fans can be integrated into any control system or into higher-level open-and-closed-loop control systems – quickly and easily via plug & play.

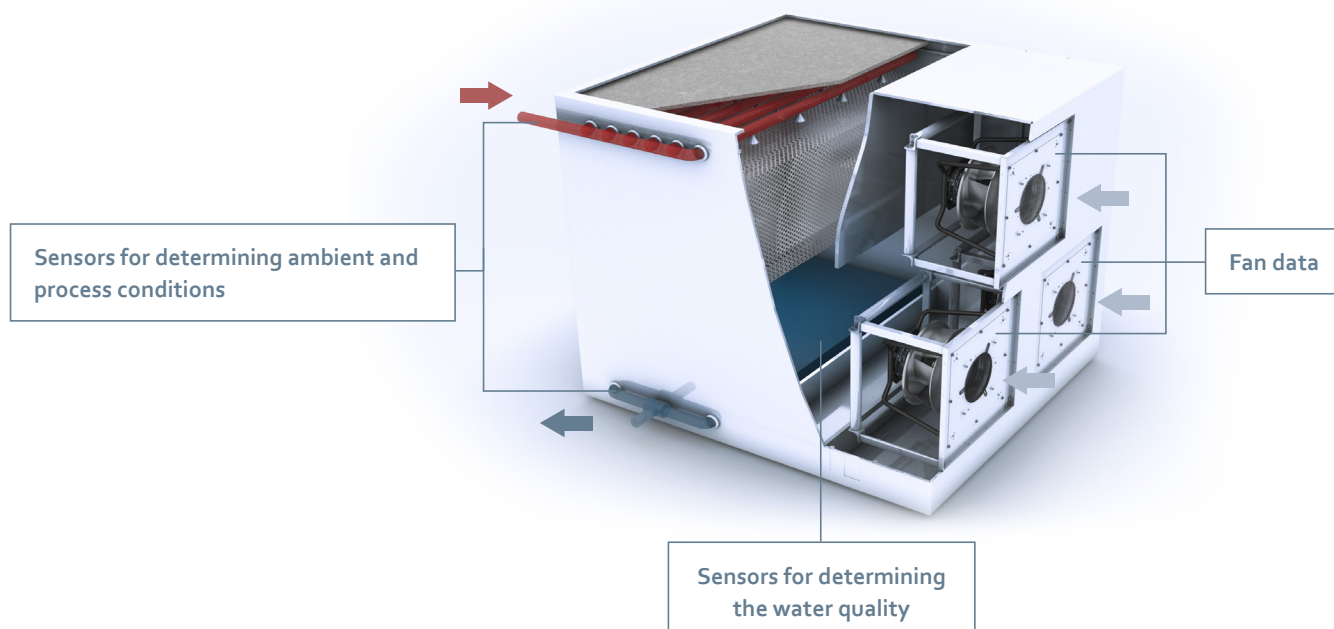
This creates new added value for cooling tower manufacturers and operators. For this way, all components interact optimally and remote monitoring, predictive maintenance and self-optimizing processes become possible.



*Different components are connected via different protocols.
Using one to communicate with all is simply intelligent!*

Your benefits:

- Real-time visualization and monitoring of fan and sensor data
- Analysis and identification of potential energy savings
- Time saving since manual counter reading is no longer required
- Shortening of the maintenance period thanks to faults and their exact position in the system being reported directly
- Improvement of maintenance plans with sensor-aided estimation for predictive maintenance
- High system availability without unforeseeable downtimes
- Global connectivity and remote monitoring of the entire system



4

Level 4: SMART DATA

The data is analyzed and provided via a dashboard or an API.

3

Level 3: Transfer to the ebm-papst cloud

The LTE Edge gateway aggregates and encrypts all pre-processed data and transfers it to the ebm-papst cloud via GSM or Ethernet.

2

Level 2: Connectivity

The data recorded by all fans or connected external sensors is sent to an LTE Edge gateway via Ethernet or WiFi. This allows local data pre-processing (Edge Computing) and the execution of data-based control and analysis applications.

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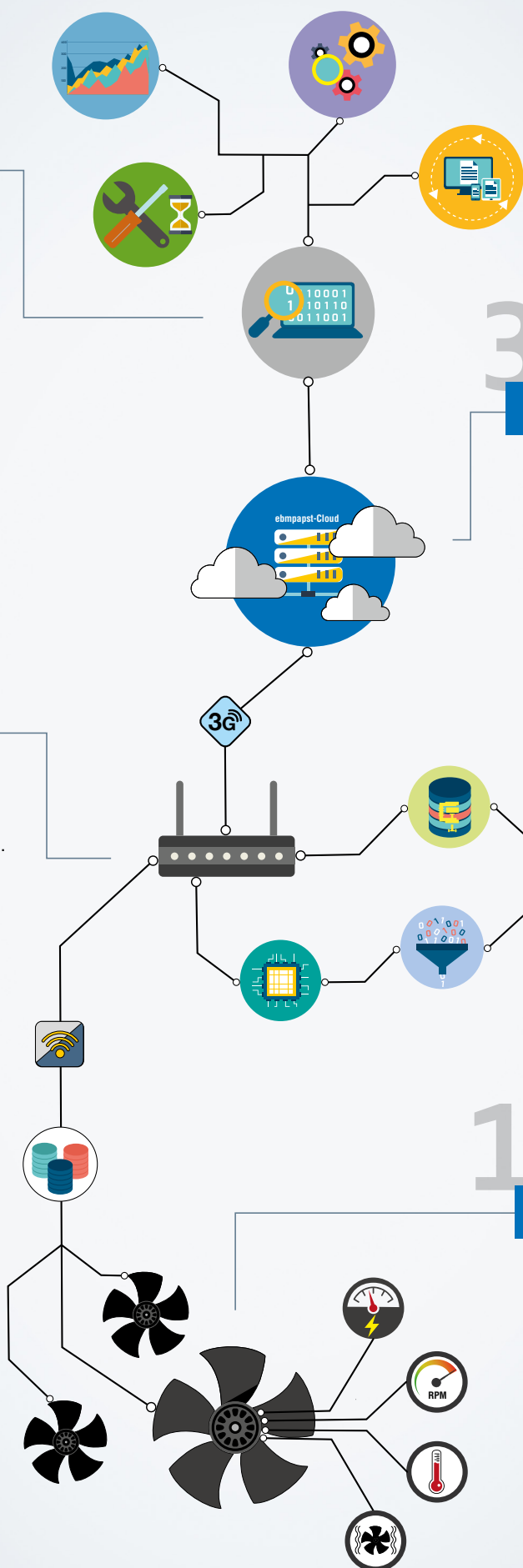
Level 1: IoT on fan level

The latest generation of ebm-papst fans comes with state-of-the-art sensors for monitoring fan data. Here is what is recorded and logged:

- Speed
- Power consumption/performance
- Vibration detection/bearing condition monitoring
- Temperature monitoring
- Operating hours

IoT solutions from ebm-papst on four levels.

The connectivity of our solutions begins on fan level and can be expanded with supplementary solutions – from the ebm-papst cloud to automatic analysis of the data.



Lots of fans, lots of advantages: *FanGrid technology from ebm-papst.*

Constant performance following simple plug & play installation.

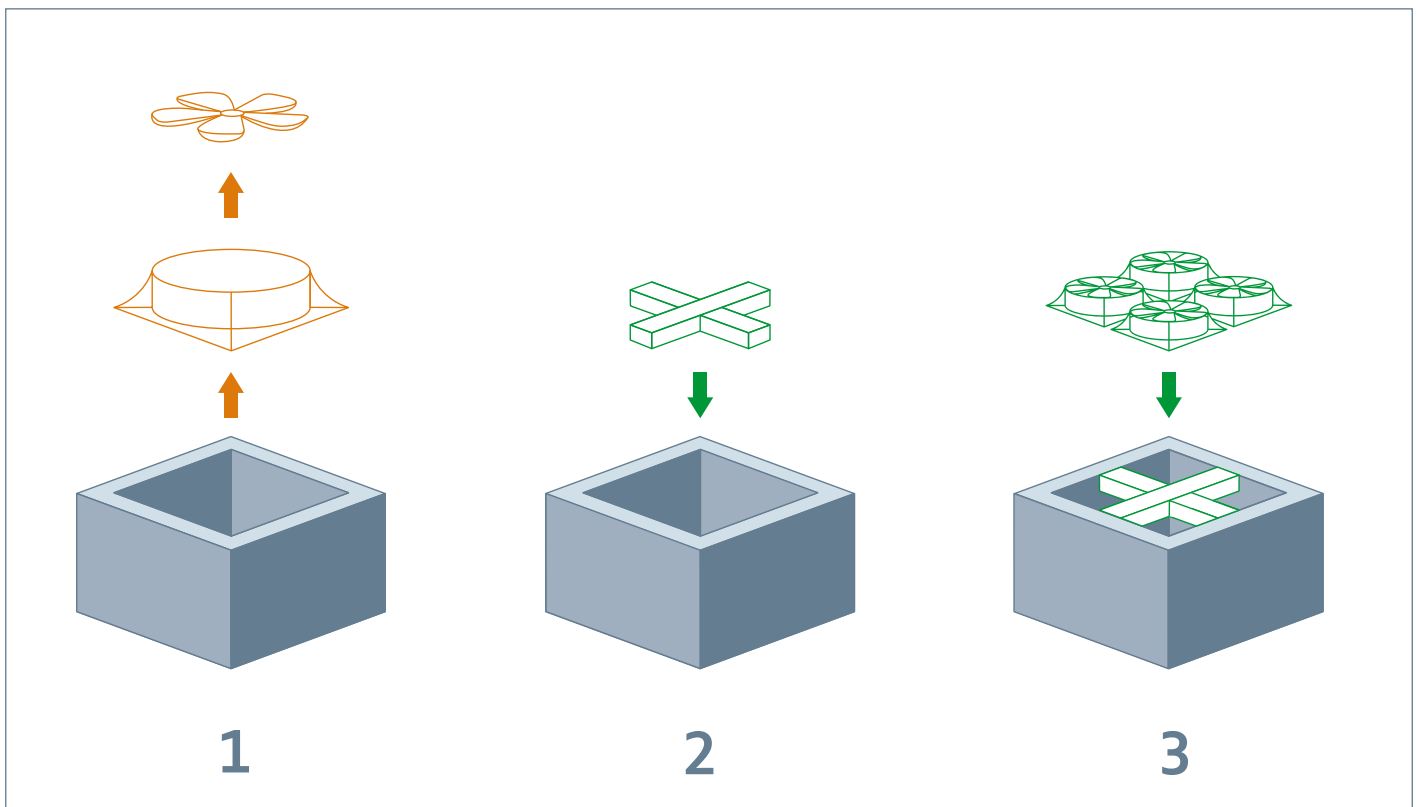
To enhance reliability and ensure constant air flow through the cooling tower, multiple fans can be operated in parallel in a FanGrid. This offers a number of advantages: High-volume air flows are no problem.

If one of the devices has to be serviced, the others make up for the missing air quantity immediately and without interruption, so that

the cooling tower continues to operate at exactly the same cooling capacity. What's more, installation of FanGrid solutions is extremely easy thanks to the plug & play solution. Straightforward monitoring and control of FanGrid solutions is possible with MODBUS RTU. Maintenance does then not have to be performed at regular intervals, but rather only when servicing is required. This makes it easier to plan service deployments.

Quick and easy plug & play installation.

FanGrid solutions are surprisingly easy to install - as you would expect from ebm-papst. They come in the form of an easy-to-fit plug & play solution rather than having to connect and wire up separate motors, fan blades and variable frequency drives.



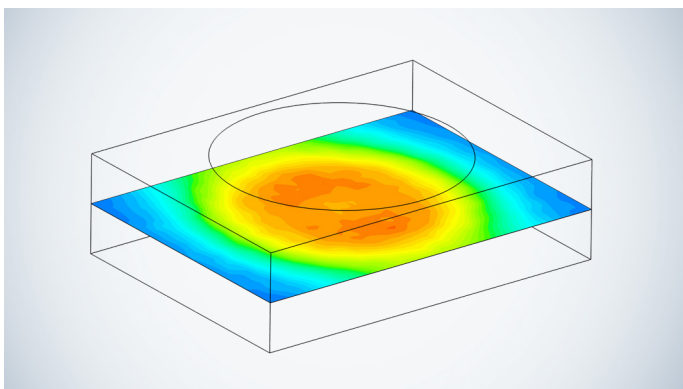
Step 1: Dismantling the existing AC fan system

Step 2: Installation of a frame design for FanGrid solution

Step 3: Installation of 4 smaller fans and installation of diffusers

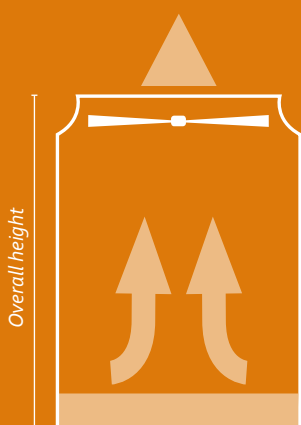
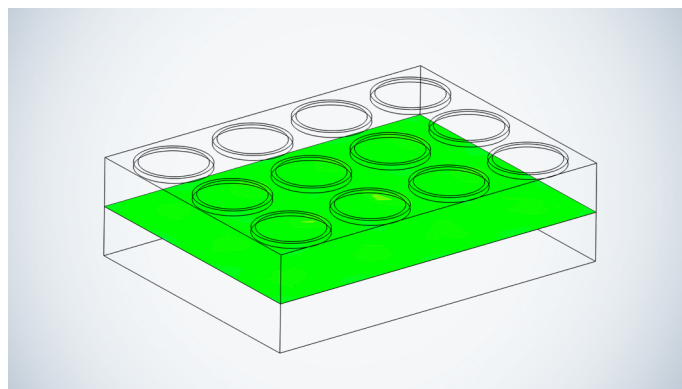
Disadvantages of one large fan.

- Bulky design on account of heavy motor and transmission.
- Poor flow of air in corners.
- More vibration due to the large motor and mechanical system.
- Fan failure leads to a complete shutdown.
- Replacing a fan takes significantly longer.

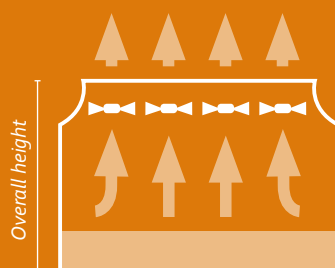


Advantages of multiple small fans.

- + Even flow of air through all components.
- + Optimum structural design thanks to uniform weight distribution.
- + No downtimes for servicing.



✗ Use of one large fan.



✓ Use of an ebm-papst FanGrid

Space-saving and economical.

Cooling towers that operate with a single, large fan are often very tall. This is due to the fact that the fan and spray nozzles have to be kept a good distance apart to stop water being drawn into the fan.

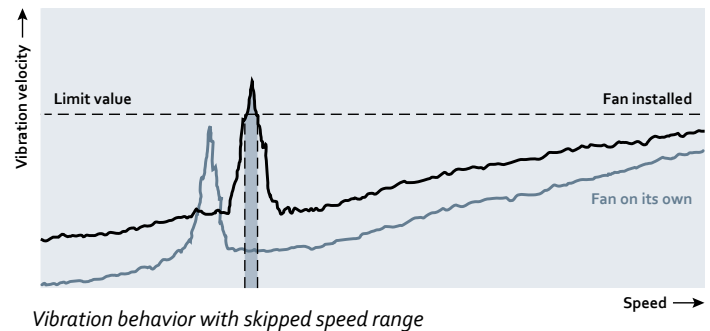
The use of an ebm-papst FanGrid with the same output thus makes it possible to significantly reduce the height of the cooling tower because there is less distance between the heat exchanger and the fan. This saves material for the cooling tower wall and housing, and also makes better use of the heat exchanger surface since the flow profile is more homogeneous.

Maximum operational reliability, *long service life.*

Active self-protection due to imbalance detection

Depending on the installation situation, previously unforeseeable speed ranges may result in increased vibration levels in the resonant range. Causes include too high residual imbalance (due to transport and handling), modified vibration behavior after installation in customer devices or even contamination sticking to the impeller. If a fan is operated frequently at excessive vibration levels, the ball bearings can be damaged and premature failures occur. Although these vibrations can be measured during commissioning of the cooling tower, they can simply not be eliminated.

That's why ebm-papst optionally equips its fans with vibration sensors that detect resonances – the software then avoids operation in the identified critical ranges. A test start-up is activated during commissioning. Here, the fan analyses the vibration strength across the entire speed control range and suggests ranges with too high a vibration velocity to be skipped. With simple confirmation, these critical speed ranges will be “passed over” in future operation. This means: Although the speed ranges are passed through, continuous operation in these ranges is avoided. The advantage is that this can be done automatically and that no prior knowledge is required.



Full control.

The ebm-papst EC-Control software includes everything that cooling tower operators need for commissioning, condition monitoring and vibration analysis. That being said, you can adjust all settings manually, determine your own speed range values and define subsequent actions.



Eurovent standards surpassed.

ebm-papst axial and centrifugal fans easily meet the minimum requirements of the Eurovent document 9/12 - 2016 "Performance Efficiency Standard for Evaporative Cooling Equipment."

Successfully tested under extreme conditions.

Fan solutions from ebm-papst offer maximum operational reliability. Though not required officially, each of them has to undergo our own extremely rigorous testing.

Shock and vibration tests

Testing with shock and vibration loads is performed on the basis of a number of different standards depending on customer requirements. Shock testing is conducted primarily in accordance with DIN EN 60068-2-27 and DIN EN 60068-2-29, whereas vibration testing is mainly based on DIN EN 60068-2-64 and DIN EN 61373.

Corrosion test

This test is designed to check the operation and electrical safety of all device components. It simulates exposure to an extremely corrosive environment over a long period of time.

Highly Accelerated Lifetime Test (HALT)

Under test conditions with thermal cycles between -100 °C and +200 °C with a rate of rise of 70 K/min and simultaneous shock loading of 50 g RMA, the HALT reveals any weaknesses during the development phase already.

Temperature-change rain test

The fans are directly exposed to water and temperatures of -10°C to +60°C over a period of six months. Each device has to undergo a total of 900 test cycles.

The benefits at a glance:



Efficiency

*Low power consumption
High air performance*



Plug & play

*Easy installation
and commissioning*



Controllability

*Demand-controlled
ventilation*



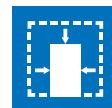
Sustainability

*Resource conservation
during development,
production, and operation*



Power density

*High ventilation efficiency
High power reserve*



Compactness

Small footprint



Noise reduction

Low noise emission



Monitoring

*Polling of operating
data and states*

Once a fan solution has successfully passed all the intensive checks, it is given H2+C environmental classification by ebm-papst. Together with great reliability, robustness and efficiency of the products, this is the best indication that the devices are excellently designed and ideally suited to long-term operation in cooling towers. These tests were successfully performed on all the following ebm-papst product families.

Find out on the following pages which fan solution is best suited for your application.



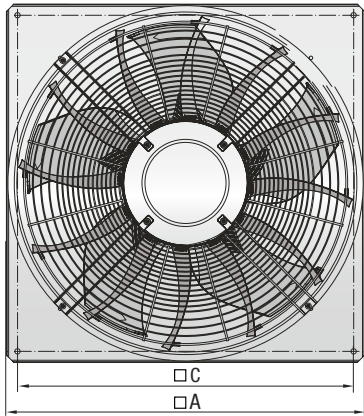
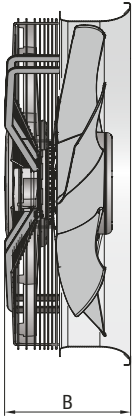
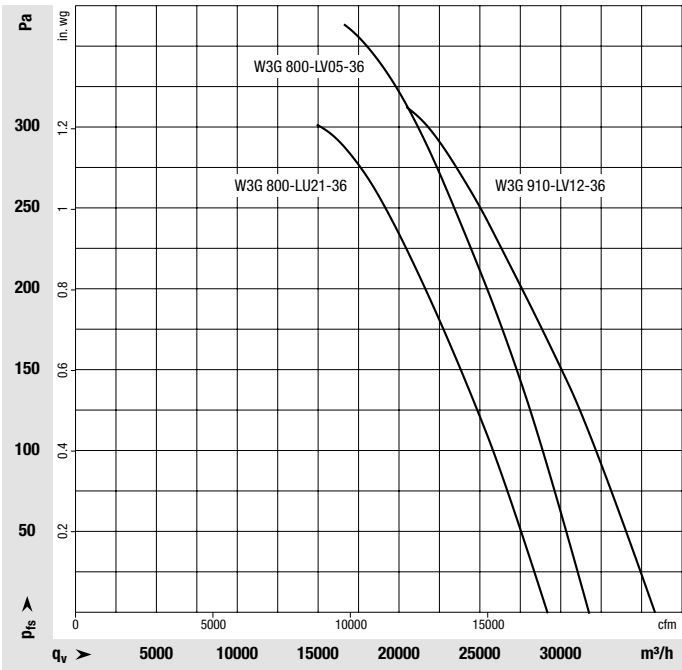
Would you like further information? We would be happy to provide it: info1@de.ebmpapst.com

AxiBlade.

For all applications, the modular system of the AxiBlade product range offers the best possible efficiency and noise characteristics to meet your requirements – with a system efficiency level of up to 54% and up to 8 dB(A) less noise as compared to the HyBlade product range. This means far greater efficiency and power density with the same installation space for every application.



- Simple monitoring via MODBUS
- Early detection of bearing damage (optional)
- Information on heat exchanger contamination
- Efficient operation across a wide range
- Information on the actual operating time



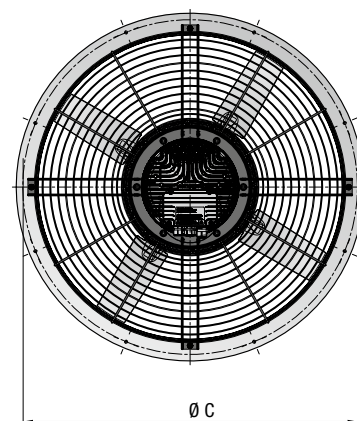
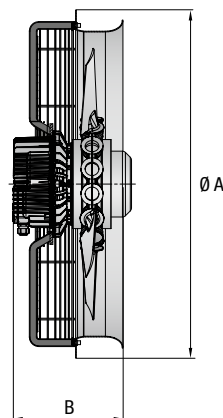
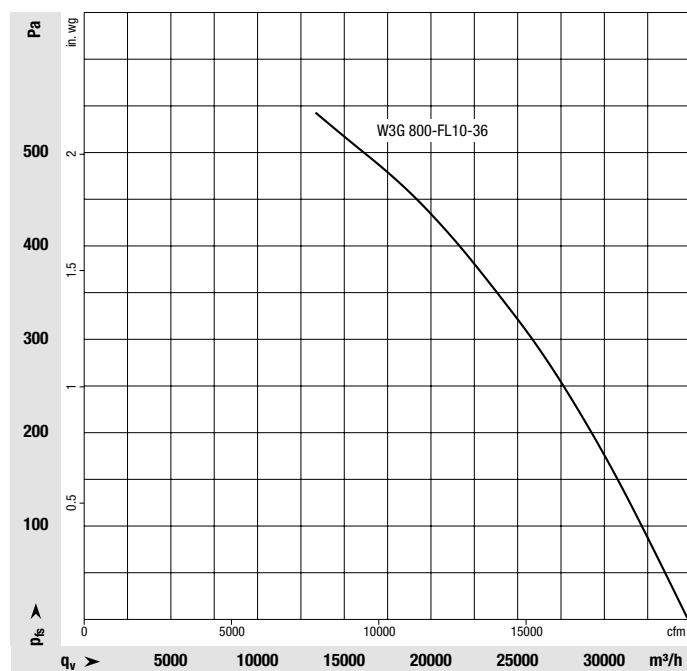
Nominal data												
Type	Size	Nominal voltage range	Frequency	Speed	Max. power consumption	Max. input current	Max. back pressure	Permissible ambient temperature	Weight	Dimensions A	Dimensions B	Dimensions C
W3G 800-LU21-36	800	3- 380-480	50/60	1,090	2,650	4.0	290	-25 to +60	47	970	350	910
W3G 800-LV05-36	800	3- 380-480	50/60	1,190	3,500	5.3	350	-25 to +60	52	970	350	910
W3G 910-LV12-36	910	3- 380-480	50/60	1,070	3,250	5.0	300	-25 to +60	56	1,070	352	1,010

Subject to technical changes. We will gladly supply you with more detailed product data sheets on request.

EC medium pressure axial fans.

With the new EC medium pressure axial fans, our highly efficient GreenTech EC technology is now also available for the medium pressure range. So a lot will be new to you as well – and will make life easier. You get a complete system consisting of motor, impeller and integrated variable frequency drive. All from one supplier and fully configured.

- Simple monitoring via MODBUS
- Early detection of bearing damage (optional)
- Information on heat exchanger contamination
- Efficient operation across a wide range
- Information on the actual operating time



Nominal data												
Type	Size	Nominal voltage range	Frequency	Speed	Max. power consumption	Max. input current	Max. back pressure	Permissible ambient temperature	Weight	Dimensions A	Dimensions B	Dimensions C
W3G 800-FL10-36	mm	V AC	Hz	rpm	W	A	Pa	°C	kg	mm	mm	mm
	800	3~ 380-480	50/60	2100	5,300	8.1	540	-25 to +50	55	992	272	955

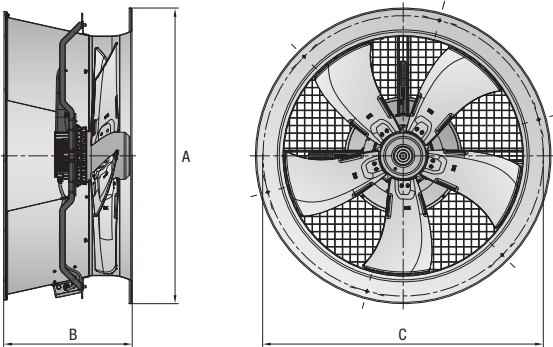
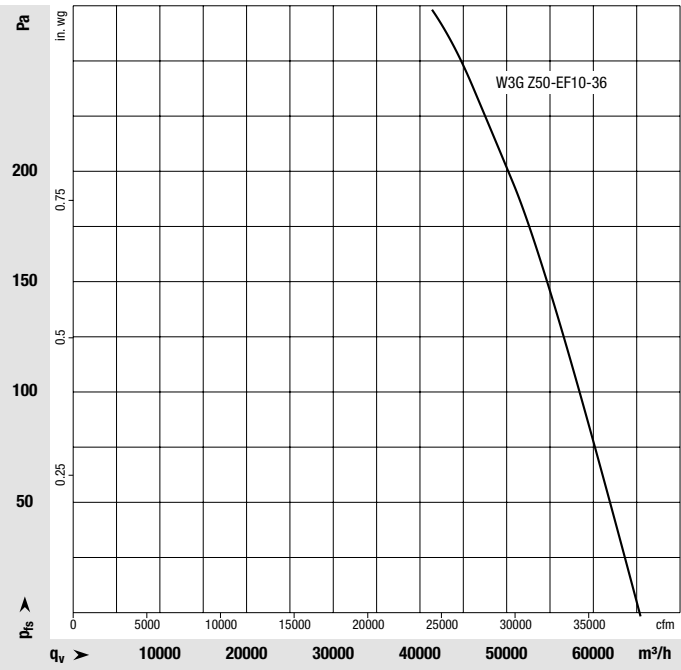
Subject to technical changes. We will gladly supply you with more detailed product data sheets on request.

W3G Z50.

The W3G Z50 is ideally suited for maximum efficiency thanks to its effective aerodynamics, integrated drive and integrated interface. Fitted with a double flange housing with integrated diffuser, this is an outstanding example of a particularly quiet-running axial fan.



- Simple monitoring via MODBUS
- Early detection of bearing damage (optional)
- Information on heat exchanger contamination
- Efficient operation across a wide range
- Information on the actual operating time



Nominal data												
Basis p/n	Size	Nominal voltage range	Frequency	Speed	Max. power consumption	Max. input current	Max. back pressure	Permissible ambient temperature	Weight	Dimensions A	Dimensions B	Dimensions C
W3G Z50-EF10-36	1,250	3- 380-480	50/60	840	6,000	9.3	260	-25...+60	193	1,560	676	1,480

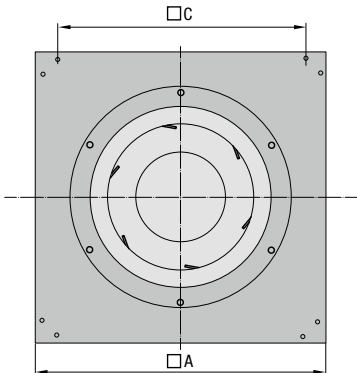
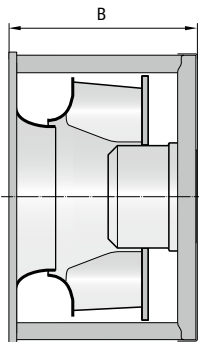
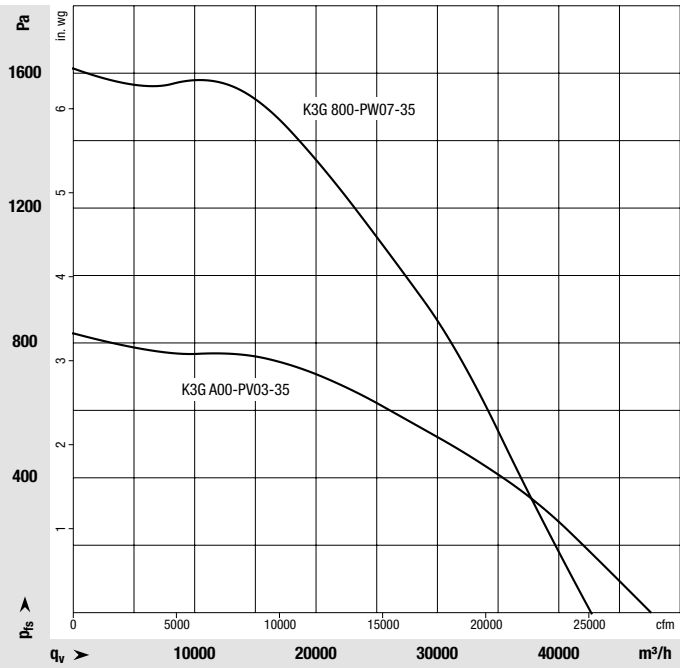
Subject to technical changes. We will gladly supply you with more detailed product data sheets on request.

RadiPac.

As the RadiPac impeller, motor and electronics are optimally coordinated, overall efficiency levels well in excess of 60% are obtained. A major contribution to this comes from the GreenTech EC motor with external rotor. RadiPac EC centrifugal fans offer a whole range of outstanding features, from high efficiency to simple handling and compact dimensions.



- Enhanced functionality for fault analysis
- Simple condition monitoring with intuitive operation
- Full control of all settings
- Skip function for resonant ranges, thus longer service life of fans and lower maintenance costs
- All required hardware and software components from a single supplier



Nominal data												
Type	Size	Nominal voltage range	Frequency	Speed	Max. power consumption	Max. input current	Max. back pressure	Permissible ambient temperature	Weight	Dimensions A	Dimensions B	Dimensions C
K3G 800-PW07-35	800	3- 380-480	50/60	1,370	11,300	17.5	–	-25 to +40	157	960	880	786
K3G A00-PV03-35	1,000	3- 380-480	50/60	750	6,340	9.8	–	-25 to +40	168	1,180	873	1,036

Subject to technical changes. We will gladly supply you with more detailed product data sheets on request.
 These types do not have resonance detection. RadiPac centrifugal fans with other features and resonance detection can be ordered.

www.ebmpapst.com

ebmpapst

the engineer's choice



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