Data Center Cooling

ebmpapst

The engineer's choice

Table of Contents

Available in AC, DC or GreenTech EC design

*Fans from ebm-papst, which have long been the standard in electronics cooling, are available in these 3 designs: **axial, centrifugal or diagonal**. For each type, ebm-papst offers a large selection of fans, available in AC, DC or GreenTech EC design, for all voltages and in all standard sizes. With electronics built-in at the factory, they also offer numerous additional options and can be networked intelligently with MODBUS or other device logic.*

Radial impellers

Medium flow rate at medium pressure

If the required cooling air has to be turned 90° or if the system resistance is too high for an axial fan, radial fans are the most effective. ebm-papst offers not only motor/blower assemblies but also radial fan packages that include the inlet ring, power connector and housing for simpler installation.

Plenum fans/RadiPac

Medium flow rate at medium pressure

The plenum fan is the easiest to integrate a radial impeller into a system. Plenum fans are driven by energy-saving EC external rotor motors with drive capacities between 400 W and 6 kW. The position of the impellers on the EC external-rotor motors have optimized aerodynamics and installation requirements.

Axial fans

High flow rate at lower pressure

Axial fans supply air flow at relatively low system pressures, without changing the air direction. Mounting the impeller to the rotor eliminates the need for an external driveshaft, forming a very compact assembly. The motor and impeller assembly can be mounted to a wall plate with integrated venturi and a grill guard. This complete package provides easy mounting, low noise levels and high efficiency.

Compact tubeaxial fans

High flow at medium to high pressure

Tubeaxial fans for the cooling of electronic equipment are equipped with external housing and an electric motor integrated into the fan hub. This compact construction allows space-saving accommodation of all devices and easy installation; the flange is equipped with mounting holes.

ebm-papst compact fans are available in various IP (Ingress Protection) ratings, select models up to IP68.

Diagonal fans

High flow rate at relatively high pressure

At first glance diagonal fans only differ slightly from axial fans. Intake is axial whereas exhaust is diagonal. Due to the conical shape of the wheel and housing the air is pressurized higher, in direct comparison with axial fans of the same size and comparable performance. These fans are also distinguished by the lower operating noise and higher efficiency.

IT Market Overview

IT product cooling for data centers

As new products and technologies emerge, the demands for more efficient data center systems increase. With each generation, IT equipment becomes smaller and more powerful, increasing the consumption of energy and consequently emitting more heat. Component overheating and heat build-up within enclosures are the primary causes for failure. If heat is not continuously removed it can result in reduced service life, severely impacting ROI and operating performance.

ebm-papst understands the complexity of your company needs for continuous and reliable performance of electronic components in the data center environment. To meet the needs of company demands, ebm-papst offers thousands of off-the-shelf and custom solutions all incorporating innovative technology that enables the optimal performance needed to match the ever increasing demands of modern IT components.

EC, the first choice for data centers

Although fans and blowers can be used interchangeably with various applications, some are used more frequently than others. For data centers, radial impellers tend to be the first choice because of their natural high aerodynamic efficiency. Our radial impellers with EC technology are appropriate for evaporator fans for direct cooling, in-room-cooling systems, power exhaust, economizers, evaporative cooling, air to air heat exchangers, fan coil units, supplementary cooling systems, CRAC (Computer room air conditioning), CRAH (Computer Room Air Handling), unit cooling and air handling units.

Axial fans can be chosen when applications limit the use of radial impellers. EC axial fans from ebm-papst are appropriate for condensers, chillers, evaporators, power exhaust systems and rooftop units. For the highest efficiency at variable load performance, multiple fans can be modulated together. The choice is simple - ebm-papst fans and blowers are the best solutions to deliver the results you need for your data center applications.

Rack and Cabinet Level Cooling

Rack cooling for Data Centers

Data center heat loads have increased dramatically as more components are squeezed into densely packed rack space. Excess heat in a server room adversely effects equipment performance, shortens equipment life-spans, and is the primary reason for downtime. Rack cooling ventilation designs should reduce hot spots and provide adequate cooling to every part at the rack level. Hot spots caused by improper airflow and poor circulation that are not properly cooled result in temperatures that exceed the recommended conditions for equipment reliability and performance. Effective cooling techniques must be employed so heat can be dissipated as efficiently and as close to the source as possible. This calls for the most innovative and efficient solutions to meet the challenging needs of data center applications.

Maximum performance, custom solutions

Our fans and blowers for rack cooling in data centers can direct cooled air to where it can be used most productively and efficiently and are available in a wide range of AC, traditional 12, 24, 48 VDC and full EC systems. Our compact fans are high performing, able to handle high backpressures, and can be intelligently controlled and adapted to specific requirements, all while delivering long service life and maintenance-free operation. Our wealth of contract manufacturing capabilities and expertise allows us to customize solutions to meet your unique data center needs.

The preferred solutions for rack and cabinet level cooling:

- Radial impellers
- Diagonal fans
- Compact fans

Modular Data Center Cooling

Modular / containerized data center cooling

A new generation of data center is becoming an increasingly popular choice as the needs for more efficient systems grow. Some companies are migrating from large facility data centers to portable or modular data centers that are set up within sea containers or other pre-packaged systems. Portable or modular data centers are fitted to house many racks of IT equipment with ultra-efficient cooling systems inside. These data centers can be manufactured and deployed more rapidly than traditional data centers because this style offers the easiest 'scalable' solution while maintaining high operation efficiencies.

Because the majority of portable and modular data centers don't have the same heat / cooling duct losses experienced in traditional data centers, the new configurations can super-charge their energy efficiency by incorporating ebm-papst's range of EC blowers and fans, from our small 80 mm fans up to 1250 mm models.

The preferred solutions for modular / containerized cooling:

- Plenum fans/RadiPac
- Radial impellers
- HyBlade® axial fans
- Compact fans

Data Center Facility Cooling

Facility cooling

Today's data center facilities require more power as demands for technology increase. Removing excess heat from a data center room or building requires a well-planned air moving design that directs cooling at various locations while maintaining overall area cooling. This dilemma can easily be solved by using sensors that constantly capture air and processor temperatures, used to automatically regulate fan speeds and cool system power, preventing systems from running continuously at full power. Our EC products can work as a fan with integrated controller (master) or with an existing facility controller (slave).

The preferred solutions for facility cooling:

- Plenum fans/RadiPac
- Radial impellers
- HyBlade® axial fans

**For larger applications, axial and plenum fans are available in 1,250 mm.*

EC Plenum Fans / RadiPac

Features

Sizes (mm): ø250 to ø1,250
Air Flow (CFM): 1,758 to 27,158
Frequency (Hz): 50/60
Voltage (VAC): 230, 277, 380, 480
Integrated electronics, extremely low noise and minimal heat generation with an aerodynamically optimized mounting package

Plenum fans	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
EG1R-XXX-250	ø250	1,758	5.15	820	3,580	72	60	14.7
EG1R-XXX-280	ø280	2,322	4.52	1,000	3,100	72	60	15.6
EG1R-XXX-310	ø310	3,410	9.11	2,915	4,100	82	40	33.0
EG1R-XXX-355	ø355	3,702	4.92	1,700	2,600	73	50	28.6
EG1R-XXX-400	ø400	5,239	5.89	3,000	2,550	78	60	48.4
EG1R-XXX-450	ø450	7,216	8.33	5,370	2,750	82	40	68.2
EG1R-XXX-500	ø500	8,980	7.08	5,500	2,200	82	45	72.6
EG1R-XXX-560	ø560	10,130	5.65	4,700	1,750	78	40	88.0

RadiPac	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
K3G630	ø630	13,741	4.96	6,140	1,450	76	50	127.6
K3G710	ø710	15,865	4.35	6,000	1,200	75	40	154.0
K3G800	ø800	19,169	3.59	5,800	960	74	40	213.4
K3G900	ø900	21,848	3.15	5,500	800	71	40	235.4
*K3GZ50	ø1,250	27,158	1.12	2,750	350	62	40	792.0

**Various designs in blade geometry and motor options for each nominal size listed enables higher / lower performances.*
Contact Engineering for specific part numbers and values

EC Radial Impellers

Features

Sizes (mm): ø333 to ø630

Air Flow (CFM): 133 to 13,741

Frequency (Hz): 50/60

Voltage (VAC): 230, 277, 380, 480

Integrated electronics, extremely low noise and minimal heat generation

	Size	Max. Air Flow	Max Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
R3G133	133	333	1.21	17	3,200	48	60	1.1
R3G190	190	575	4.80	169	4,120	63	60	3.0
R3G220	220	749	3.73	168	3,230	62	45	3.2
R3G225	225	767	3.05	170	2,860	60	60	3.9
R3G250	250	1,758	5.15	820	3,580	72	60	14.7
R3G280	280	2,322	4.52	1,000	3,100	72	60	15.6
R3G310	310	3,410	9.11	2,915	4,100	82	40	33.0
R3G355	355	3,702	4.92	1,700	2,600	73	50	28.6
R3G400	400	5,239	5.89	3,000	2,550	78	60	48.4
R3G450	450	7,216	8.33	5,370	2,750	82	40	68.2
R3G500	500	8,980	7.08	5,500	2,200	82	45	72.6
R3G560	560	10,130	5.65	4,700	1,750	78	40	88.0
R3G630	630	13,741	4.96	6,140	1,450	76	50	127.6

Not all sizes available in all voltages.

**Various designs in blade geometry and motor options for each nominal size listed enables higher / lower performances.*

Contact Engineering for specific part numbers and values

EC HyBlade®
Axial Fans

Features

Sizes (mm): ø300 to ø1,250

Air Flow (CFM): 1,873 to 38,675

Frequency (Hz): 50/60

Voltage (VAC): 230, 277, 380, 480

Integrated electronics, extremely low noise and minimal heat generation

	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
W3G300	300	1,873	0.56	170	2,020	62	60	8.8
W3G350	350	2,198	0.40	165	1,480	59	60	11.2
W3G400	400	3,316	0.65	400	1,630	67	60	19.1
W3G450	450	3,856	0.50	345	1,300	61	60	20.9
W3G500	500	6,130	0.81	980	1,600	68	60	36.3
W3G560	560	6,756	0.73	950	1,350	77	60	46.2
W3G630	630	12,502	1.17	3,200	1,510	78	65	88.0
W3G710	710	14,614	0.97	2,830	1,250	75	60	94.2
W3G800	800	16,479	1.05	2,980	1,090	76	65	114.4
W3G910	910	20,609	0.77	2,880	1,000	74	65	125.4
W3G990	990	20,559	0.73	2,580	960	77	70	135.1
W3GZ50*	1,250	38,675	0.79	4,700	690	76	60	318.3

**1,250 mm size only available with aluminum blade design.*

Contact Engineering for specific part numbers and values

DC Impellers

Features

Sizes (mm): ø101 to ø400

Air Flow (CFM): 112 to 1,947

Voltage (VDC): 12, 24, 48

DC fans with electronically commutated external rotor motor and fully integrated commutation electronics

	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
RER101	101	112	1.76	19	5900	62.9	70	0.7
RER120TD	120	230	2.56	92	6300	72.6	60	0.9
RER133TD	133	333	3.06	87	6000	70.4	65	2.0
RER160NTD	160	298	4.72	142	6000	71.8	65	1.3
RER175TD	175	578	4.03	166	5400	75.4	65	1.7
RER190TD	190	572	3.81	148	4400	66.6	65	1.9
RER220TD	220	755	2.75	140	3500	68.7	55	2.1
RER225TD	225	944	3.10	165	3300	72.4	55	2.3
R3G250	250	932	2.42	135	2645	72	60	6.6
R3G280	280	1192	1.72	123	1965	70	60	7.3
R3G310	310	1546	2.30	208	1930	69	60	9.7
R3G400	400	1947	1.61	192	1160	63	60	11.7

Contact Engineering for specific part numbers and values

DC Compact Fans

Features

Sizes (mm): ø82 to ø200

Air Flow (CFM): 131 to 968

Voltage (VDC): 12, 24, 48

DC fans with electronically commutated external rotor motor and fully integrated commutation electronics.

Compact Fans	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
8200J	80x38	131	2.62	36	14,000	71	70	0.4
3200J	92x38	165	2.82	50	13,000	73	70	0.5
4100N	119x38	336	5.04	120	11,000	78	75	0.9
5300	140x51	395	5.44	149	9,200	79	65	2.0
6300	172x51	561	4.64	150	9,200	75	65	2.0

Diagonal Fans	Size	Max. Air Flow	Max. Static Pressure	Power Input	Nom. Speed	Sound Pressure	Max. Ambient Temp.	Weight
Series	**mm**	**CFM**	**(in. wg)**	**Watts**	**rpm**	**dB(A)**	**°C**	**lbs.**
2200F	200x51	720	4.03	103	6,500	72	65	2.2
DV6300	172x51	649	6.05	390	6,800	89	65	2.1
K3G200	225x89	968	3.23	418	5,480	87	60	4.8

Contact Engineering for specific part numbers and values

Temperature sensors

Nominal Data	Nom. Voltage	Current Draw	Output Voltage	Output Current	Output Impedance	Measuring Temp.
Part No.	VDC	mA	VDC	mA	kΩ	°C
50005-1-0174	15-30	10	0-10	1.0	1.1	-20 to 80
50002-1-0174	18-60	10	2-10	0.1	6.8	-30 to 55
50003-1-0174	18-60	10	0-10	0.1	6.8	10 to 45

USB-RS485 adapter

Part Number: 21490-1-0174
The ebm-papst USB RS485 adapter connects RS485 devices to a computer USB. This also requires the ebm-papst EC Control software version 2.0 or later. The USB drivers required for operating the adapter are also included.

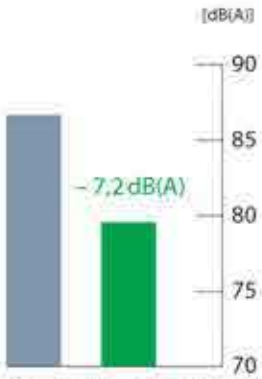
Knob potentiometer

Part Number: 420-05-0640
This unique design consists of a knob driving and incorporating a potentiometer. The mounting hardware and terminals are situated on the back side of the panel reducing to a minimum the required clearance.

AxiTop axial fan diffuser

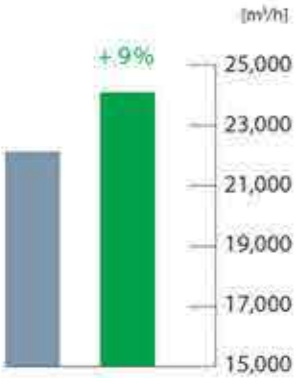
The AxiTop diffuser is designed to recover wasted energy by purposely and efficiently decelerating the flow and reducing swirl, boosting the pressure rise of the impeller. Aerodynamic efficiency is increased and acoustic noise is reduced.

Reduced noise at same air volume



Less energy consumption at same air volume

Increased air volume at comparable energy consumption



Comparison figures measured in application, each with 800 mm EC fan.

AxiTop is currently available for ebm-papst axial fan sizes 800mm and 910mm.