Centriflow Plus

Plug Fan – Technical data

Freilaufender Radialventilator – Technische Daten

Kammarfläkt – Tekniska data

FläktWoods

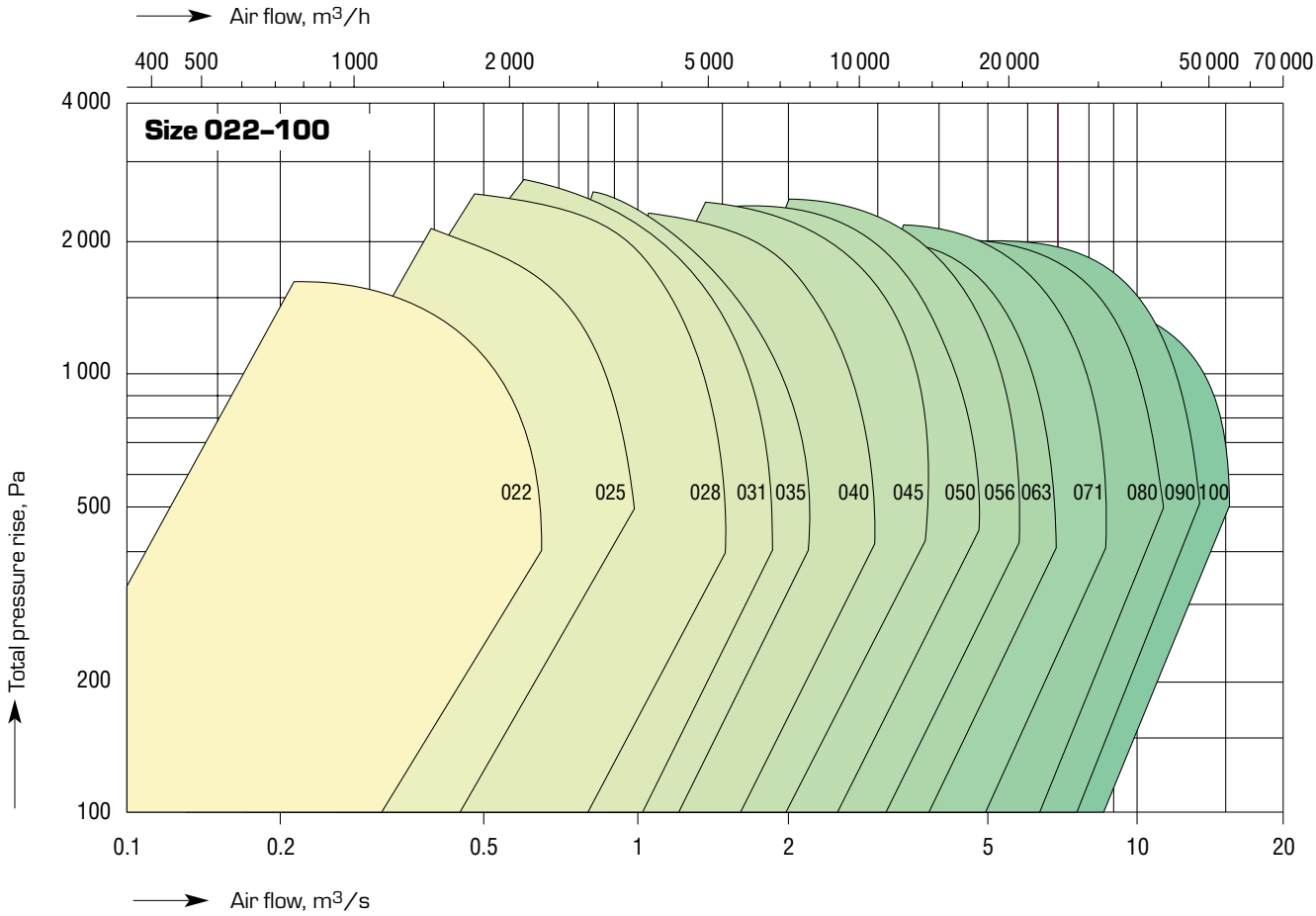
Contents

General description

The direct driven CENTRIFLOW plug fans are available in 14 sizes and cover airflows up to 16 m^3/s and pressure rises up to 2300 Pa. CENTRIFLOW Plus is characterized by high efficiency. The impeller has backward curved blades. The CENTRIFLOW is available in two versions, standard and spark-proof for Group II, Category 3G according to Directive 94/9/EC (ATEX-100). The fans are supplied with an integrated air flow sensor with two measuring points as standard.
Fans are supplied in a right-hand version (viewed from the fan inlet).

General survey chart

GPEB



Design description

Fan Impeller

The impeller is made of sheet steel, welded and painted with 60 µm thick epoxy powder paint, (colour: RAL 7005, dark grey). The impellers are dynamically balanced to ISO Standard 1940 – 1973 G 2.5 (sizes 035 – 100) and G 6.3 (sizes 022 – 031) at the maximum speed. The vibration level of the fan is below 7.1 mm/s RMS.

Fan Inlet

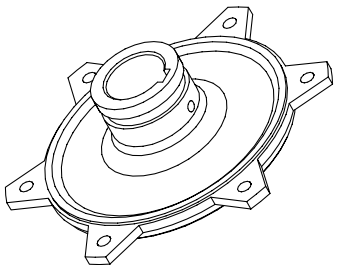
The design of the fan inlet is vitally important to the fan efficiency and the low level of sound generated by the fan. The inlet cones are deep-drawn in one piece and are fitted to the end panel. The inlet cone and end panel are made of galvanized sheet steel.

Motor base with base frame

The motor base is made of galvanized sheet steel or of welded sheet steel and painted with 60 µm thick epoxy powder paint (colour: RAL 7005, dark grey). The base frame is made of galvanized steel or of steel, welded and hot-dip galvanized.

Hub

The fan impeller is either equipped with a standard hub (separate for each motor size) or with a taper lock type hub. The standard hub is made of aluminium or welded steel. The taper lock hub is made of cast iron and phosphatised.



Standard hub

Air flow sensor

The air flow sensor is used for measuring the airflow of the plug fans. The method is based on differential pressure. The pressure is measured at a specific point in the inlet cone and the reference pressure is measured upstream of the inlet cone. The air flow sensor is supplied factory mounted in the inlet cone. The airflow is calculated as a function of the coefficient k and the differential manometer reading Δpm from the expression:

$$Q_V = \frac{1}{k} \times \sqrt{\Delta p_m}$$

Q_V = airflow (m^3/s)
k = coefficient of the fan (k-factor)
Δp_m = measured pressure difference (Pa)

Fan size Centrimaster Plus	k-factor
GPEB-1-022	68,87
GPEB-1-025	54,81
GPEB-1-028	41,27
GPEB-1-031	36,22
GPEB-1-035	29,05
GPEB-1-040	22,05
GPEB-1-045	18,21
GPEB-1-050	14,88
GPEB-1-056	11,81
GPEB-1-063	9,21
GPEB-1-071	7,28
GPEB-1-080	5,84
GPEB-1-090	4,46
GPEB-1-100	3,54

Directive for Machinery

Centriflow Plus is not a product which is ready for use but it is designed for mounting in an air handling unit. The air handling unit manufacturer must follow all instructions according to Directive for Machinery, EMC Directive and Low Voltage Directive as well as use all necessary protective measures.

Design description

CENTRIMETER airflow transmitter

CENTRIMETER provides a simple and accurate means of measuring a fan's airflow. The measuring device is self-calibrating and automatically sets a reference zero point and adjusts itself for changes in ambient temperature. The device allows the user to select the displayed units of measured airflow, either in m^3/s or m^3/h, or differential pressure in Pa.

Airflow is displayed on the device by means of measuring fan differential pressure and converting it to airflow from a constant "k-factor" which varies for each individual type and size. The airflow transmitter is programmed from factory with the k-factors of CENTRIFLOW Plus and CENTRIFLOW plug fans as well as CENTRIMASTER double inlet fans. The type and size of fan connected to the Centrimeter can be easily selected by using the buttons which are located beneath the removable display fascia.

CENTRIMETER also includes two 0…10V output functions, which are proportional to the actual measured airflow or pressure. CENTRIMETER is compact (86,5 x 64,5 x 37 mm) and it is suitable for ambient temperatures of 0 … +50 °C. Degree of protection is IP54.

Motor

The CENTRIFLOW Plus fans are normally supplied with the motor mounted. The motors used are IEC-standard, three-phase, foot mounted motors. Standard motors are of efficient class Eff2, high-efficiency motors class Eff1 are available to request. The motors are available with bimetal thermocontact or with thermistor. The motors are specified in a separate motor table for each fan size.

Integral motors

The integral motors are 3-phase motors with integrated frequency converter. No separate motor cable between the frequency converer and the motor is needed because the frequency converter is mounted on the motor. An EMC filter is built into the frequency converter. The integral motors are supplied with three-phase, 400V AC power. The appropriate integral motors are specified in the motor tables. A separate PAN-01-0 panel is available as an accessory. Integral motors are well suited for fan operation due to the low level of sound that they generate. The integral motors are fully programmed with the appropriate fan and motor parameters, have Degree of Protection IP55 and are designed for operation where the ambient temperature ranges from 0 to +40 °C. Installation instructions together with a list of relevant parameters are included in the supply. The EMC level of the integral motors complies with EN Standard EN 61800-3 (Environmental Class 1, restricted distribution). The integral motors do not have any thermal overload sensors in their motor windings. The frequency converter instead manages this protective motor function.

Design description

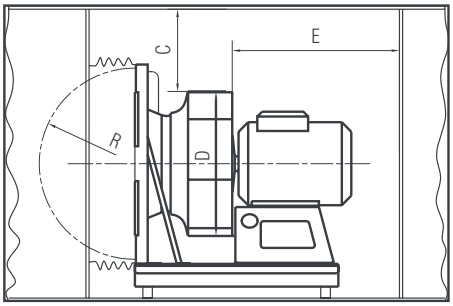
Plug fan in spark-proof version

CENTRIFLOW Plus is available in spark-proof version for Group II, Category 3G according to Directive 94/9/EC (ATEX-100). Inlet cone is made of brass or copper and the gap between impeller and inlet cone is according to the Directive. Spark-proof version comes with a flame-proof motor type EExde IIB T4 and is suitable for potentially explosive atmospheres surrounding it also together with a frequency converter. These motors are equipped with thermistor.

If necessary an IP20 inlet protective screen should be used.

Centriflow Plus in spark-proof version is not a product which is ready for use but it is designed for mounting in an air handling unit. The air handling unit manufacturer must follow all instructions according to Directive 94/9/EC, Directive for Machinery, EMC Directive and Low Voltage Directive as well as use all necessary protective measures.

Recommended distances to other components



R 0.5 x D
E 1 x D
C 0.4 D

Tolerances and quality

Tolerances

The particulars of the fans are given with the tolerance specified in DIN 24 166, Class 2. The fan curves have been plotted for the max. permissible speed of rotation (with frequency inverter) for each motor size.

	Toleransklass		
DIN 24166	1	2	3
Air flow qv:	±2,5%	±5,0%	±10,0%
Pressure rise, Δp_t:	±2,5%	±5,0%	±10,0%
Shaft power demand*, P:	+3,0%	+8,0%	+16,0%
Efficiency**, h:	–2,0%	–5,0%	–
A-weighted sound power level*, L_{WA}:	+3 dB	+4 dB	+6 dB

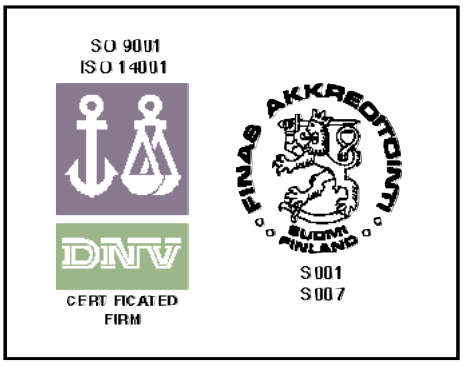
* Negative tolerance permissible

** Positive tolerance permissible

Fan performance has been measured in accordance with ISO 5801 and 13347-2.

Quality to ISO 9001 and ISO 14001

The production process at Fläkt Woods Oy is certificated to ISO 9001 and the responsibility for quality control is documented in every phase from product development to production, procurement and sales. Our environmental protection system is certificated to ISO 14001. Our ambition is to minimize the impact of our business perations and our products on the environment.



Specification text – GPEB

CENTRIFLOW, GPEB

Direct driven plug fan supplied as a complete fan unit with IEC standard, foot-mounted motor mounted on a stable base frame. Fan impeller with backward curved blades, made of sheet steel, welded and painted with a 60 µm thick coat of epoxy powder. The impellers are dynamically balanced to an accuracy in accordance with ISO 1940 – 1973 G 2.5 (sizes 035 – 100) or G 6.3 (sizes 022 – 031) at the maximum speed.

The fan is supplied with built in air flow sensor for air flow measurement. The fan is available in two versions, standard and spark-proof for Group II, Category 3G according to Directive 94/9/EC (ATEX-100). Fan performance has been measured in accordance with ISO 5801 and 13347-2.

Fan particulars for the GPEB to DIN 24166, Class 2

Manufacturer's quality system is certificated to ISO 9001 and our environmental protection system is certificated to ISO 14001.

Airflow,qv .....m^3/s

Total pressure rise, pt .....Pa

Power demand, P .....kW

Min. efficiency, η .....%

Max. A-weighted sound power level, LWA.....dB

All presented acoustic data is specified **without** removing the blade frequency.

Fan chart – explanation

Symbols used in the fan chart

The fan chart is applicable to air with a density of 1,2 kg/m^3 and with a frequency converter or an integral motor. The motors are sized in most cases for a 50 Hz mains power supply so that they can be wired directly to the mains.

① = Airflow, m^3/s (longitudinal axis)

② = Airflow, m^3/h (longitudinal axis)

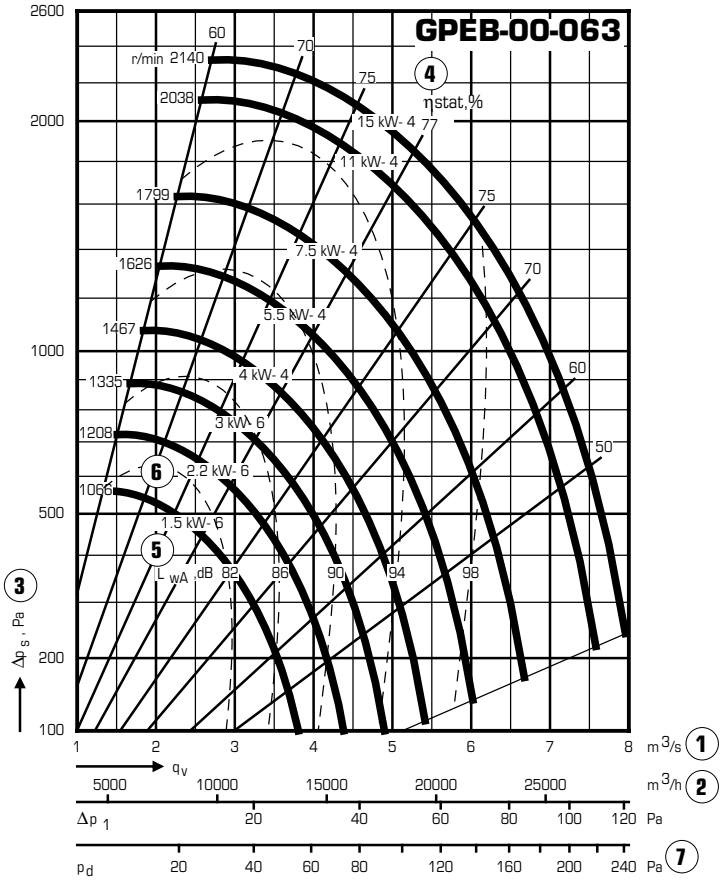
③ = Static pressure rise, Pa (vertical axis)

④ = Static fan efficiency η_{stat}, %

⑤ = Total sound power level LWA (dB), broken line

⑥ = Motor size and number of motor poles, kW – poles

⑦ = Calculated dynamic pressure according to the outlet area of the impeller, Pa



Acoustic Details - explanation

Acoustic Details

The total A-weighted sound power level L_{WA} generated at the outlet of an open discharge fan is specified in the fan chart. Correction factors are tabulated in the table below. The following expression can be used for breaking down the sound into each octave band and sound path:

$$L_{Wokt(s)} = L_{WA} + K_{okt(s)}$$

where $K_{okt(s)}$ can be obtained from the table. The following expression can be used for calculating the A-weighted sound power level at the fan inlet:

$$L_{WA(2)} = L_{WA} + \Delta L$$

where the correction factor ΔL can be obtained from the table.

Acoustic Details - Table

Fan size		Correction K_{okt}, dB								
Sound path (s)	Fan speed range r/min	Octave band, centre frequency, Hz								ΔL
		63	125	250	500	1000	2000	4000	8000	
To the outlet s = 1	0 – 766	-4	-4	-2	0	-6	-12	-17	-18	0
	767 – 1533	-16	2	-1	-1	-5	-12	-15	-17	0
	1534 – 2140	-20	-11	0	-1	-4	-13	-18	-20	0
To the inlet s = 2	0 – 766	-3	-6	-3	-9	-14	-20	-22	-28	-6,9
	767 – 1533	-12	-2	-5	-9	-10	-18	-20	-23	-5,9
	1534 – 2140	-25	-14	1	-10	-11	-19	-23	-25	-5,1

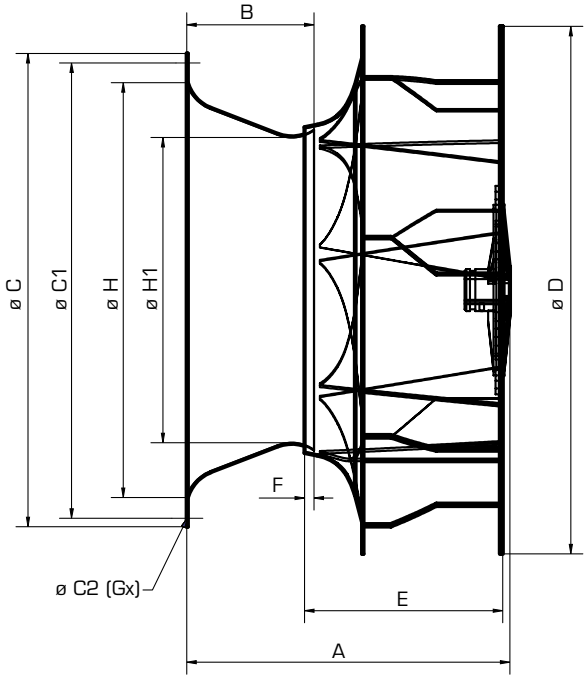
Symbols used

L_{WA}	A-weighted total sound power	dB(A)
s	Sound path	-
$L_{WA(2)}$	A-weighted total sound power level to inlet	dB(A)
$L_{Wokt(s)}$	Sound power level at each octave band and sound path (without A-weighting)	dB
$K_{okt(s)}$	Correction factor for breaking down the sound level into each octave band and sound path	dB

GPEC

CENTRIFLOW PLUS GPEC

Individual fan impellers and inlet cones are available for customers who want to construct their own plug fan unit. The supply of one GPEC includes one fan impeller with hub and one inlet cone.



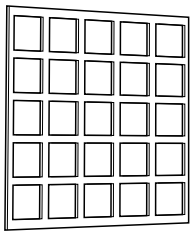
Size	A	B	C	C1	C2	D	E	F	G	H	H1
022	164	62	245	229	3,3	261	99	5	6	212	149
025	185	69	269	254	3,3	290	110	5	6	238	167
028	206	78	302	287	3,3	325	123	5	6	269	189
031	228	87	335	321	3,3	365	137	5	6	300	211
035	256	98	367	352	3,3	412	155	6	6	338	237
040	286	111	410	394	3,3	464	174	8	6	379	266
045	319	123	470	454	3,3	522	196	7	6	425	298
050	356	140	520	504	3,3	580	218	9	9	478	335
056	406	165	585	568	3,3	650	243	10	9	535	375
063	450	180	640	624	3,3	731	273	10	12	601	422
071	503	202	770	754	3,3	824	306	12	12	674	472
080	567	223	870	855	5,5	928	348	13	24	756	530
090	633	249	970	955	5,5	1044	388	16	24	850	597
100	709	282	970	955	5,5	1160	433	17	24	910	670

Accessories

Airflow sensor with four measuring points **GPEZ-09-00-ccc-1-0**

Protective screen, inlet **GPEZ-13-00-ccc-d-0**

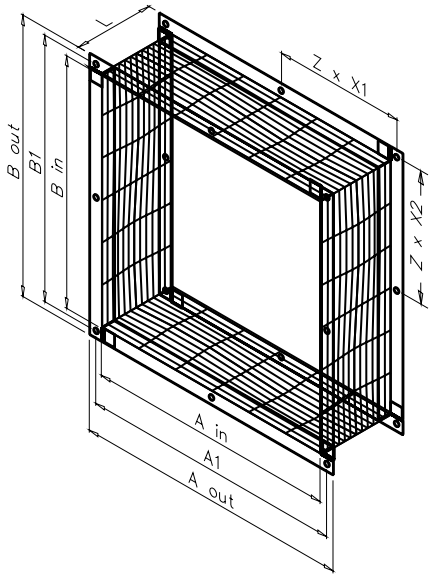
The pressure loss across the protective screen is 1.3 x p_d.



Protective screen IP20, inlet **GPEZ-14-00-ccc-d-0**

Protective screen IP 20
If necessary GPEZ-14 is used with GPEB-8 spark-proof plug fans.

Flexible connections, inlet **GPEZ-21-00-ccc-d-0**



Size	A out	A in	B out	B in	A1	B1	L	Z	X1	X2
022	315	261	300	241	285	270	115	1	285	270
025	330	276	330	276	300	300	115	1	300	300
028	400	346	400	346	370	370	115	1	370	370
031	400	346	400	346	370	370	115	1	370	370
035	500	446	480	426	470	450	115	1	470	450
040	500	446	500	446	470	470	115	1	470	470
045	630	570	580	520	600	550	115	2	300	275
050	630	570	630	570	600	600	115	2	300	300
056	750	690	750	690	720	720	115	2	360	360
063	750	690	750	690	720	720	115	2	360	360
071	950	890	850	790	920	820	115	3	307	273
080	950	890	950	890	920	920	115	3	307	307
090	1180	1120	1180	1120	1150	1150	115	4	287,5	287,5
100	1180	1120	1180	1120	1150	1150	115	4	287,5	287,5

Anti-vibration mountings Rubber **GPEZ-42-00-ccc-d-0**

For particulars of the part designations and dimensions see the motor table on the relevant page of the catalogue.

Anti-vibration mountings Steel spring **GPEZ-43-00-ccc-d-0**

For particulars of the part designations and dimensions see the motor table on the relevant page of the catalogue.

Anti-vibration mountings for GPEB-8 spark-proof version, rubber **GPEZ-45-00-ccc-d-0**

Particulars on request

Anti-vibration mountings for GPEB-8 spark-proof version, steel spring **GPEZ-46-00-ccc-d-0**

Particulars on request

Accessories

Painted finish GPLZ-60-00-ccc-d-0
exterior and interior
d = 1 Epoxy powder painted finish, 60 µm,, colour: RAL 7005, dark grey
d = 2 Epoxy powder painted finish, 100 µm, colour: RAL 7005, dark grey
d = 3 Wet painted finish, painted in 3 coats, 250 µm, colour: RAL 7005, dark grey

d =1 Powder painted, 60 µm
he fan (impeller, end panel, inlet cone, motor base and base frame) is painted with a 60 µm thick coat of epoxy powder. Colour: RAL 7005, dark grey. All the bolts are made of stainless steel version.

Painting process:
– alkaline degreasing
– iron phosphatising
–flushing with hot water, water temperature: 40 °C
– drying at 150 °C
– powder painting, 60 µm, in one coat
– drying at approx. 215 °C

An epoxy powder finish is well suited for items that are subjected to mechanical strain. This type of finish also provides good protection against rust, alkalis, fats and solvents.

d =2 Powder painted, 100 µm

The fan (impeller, end panel, inlet cone, motor base and base frame) are painted with a 100 µm thick coat of epoxy powder. Colour: RAL 7005, dark grey. All the bolts are made of stainless steel. Painting process and epoxy power just like version d = 1, but the paint thickness is 100 µm in one coat.

d = 3 Wet painted, 250 µm, in 3 coats.

The fan (end panel, inlet cone, motor base and base frame) are painted with 3 coats of epoxy; total thickness: 250 µm. Colour: RAL 7005, dark grey. The fan impeller is painted with a 100 µm thick coat of epoxy powder, Colour: RAL 7005, dark grey. All the bolts are made of stainless steel.

Ordering code

Plug fan **GPEB-a-00-ccc-dd-0**

GPEB = high-efficiency plug fan

Version **(a)**
a = 1 standard version with IEC foot mounted motor and standard hub
= 2 standard version with IEC foot mounted motor and taper lock hub
= 8 spark-proof version for Group II Category 3G with IEC foot mounted EExde IIB T4 motor, only with standard hub

Fan size **(ccc)**
022, 025, 028, 031, 035, 040, 045, 050, 056, 063, 071, 080, 090, 100

Motor size IEC **(dd)**
07 = 071 13 = 132
08 = 080 16 = 160
09 = 090 18 = 180
10 = 100 20 = 200
11 = 112

Fan impeller with hub and inlet cone **GPEC-a-bb-ccc-dd-0**

GPEC = Fan impeller with hub and inlet cone

Version **(a)**
1 = standard hub
2 = taper lock hub

Motor IEC-size **(bb)**
07 = 071 13 = 132
08 = 080 16 = 160
09 = 090 18 = 180
10 = 100 20 = 200
11 = 112

Fan size **(ccc)**
022, 025, 028, 031, 035, 040, 045, 050, 056, 063, 071, 080, 090, 100

Rotation and version **(dd)**
First d: 1 = right-hand version (viewed from the fan inlet)
Second d: 1 = standard without airflow sensor
2 = standard with airflow sensor with two measuring points
3 = standard with airflow sensor with four measuring points

Motor, single speed **APAL-a-bbbbb-c-d-2**
Motor, integral **APAT-a-bbbbb-2-0**

Number of motor poles (a)
(See motor tables)
2, 4, 6, 8 (single-speed motor)
2, 4 (integral motor)

Rated output **(bbbbb)**
(See motor tables)

Supply voltage **(c)**
Single-speed motor
1 = 220–240 V delta / 380–400 V star (not applicable to APAT)
2 = 380–420 V delta / 660–690 V star (APAT 380–480V)

Temperature sensors in the stator windings **(d)**
0 = without
1 = with bimetal temperature contacts (not applicable to APAT)
2 = with thermistor (not applicable to APAT)

Control panel for integral motor **PAN-01-0**

Ordering code

Accessories **GPEZ-aa-00-ccc-d-0**

(aa) Type of accessory

(ccc) fan size

(d) 1 = supplied with fan, mounted
0 = supplied loose

Airflow sensor with four measuring points **GPEZ-09-00-ccc-1-0**

Fan size **(ccc)**

Protective screen, inlet **GPEZ-13-00-ccc-d-0**

Fan size **(ccc)**

Protective screen IP 20 inlet for spark-proof version **GPEZ-14-00-ccc-d-0**

Fan size **(ccc)**

Flexible connection, inlet **GPEZ-21-00-ccc-d-0**

Fan size **(ccc)**

Anti-vibration mountings, rubber **GPEZ-42-00-ccc-d-0**

Fan size **(ccc)**

Version **(d)**
see motor table for relevant fan

Anti-vibration mountings, steel spring **GPEZ-43-00-ccc-d-0**

Fan size **(ccc)**

Version **(d)**
see motor table for relevant fan

Anti-vibration mountings, GPEB-8 spark-proof, rubber **GPEZ-45-00-ccc-d-0**

Fan size **(ccc)**

Version **(d)**
According to EExde-motor

Anti-vibration mountings , GPEB-8 spark-proof, steel spring **GPEZ-46-00-ccc-d-0**

Fan size **(ccc)**

Version **(d)**
According to EExde-motor

Painting **GPLZ-60-00-ccc-d-0**

Fan size **(ccc)**

Version **(d)**
d = 1 Epoxy –powder painting, 60 µm, colour RAL 7005, dark grey
d = 2 Epoxy –powder painting100 µm, colour RAL 7005, dark grey
d = 3 Epoxy wet painted in 3 coats, 250 µm, colour RAL 7005, dark grey

CENTRIMETER airflow transmitter **GTLZ-86-5-0**

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