

# Gear motors



# Shaded-pole motor EM 30

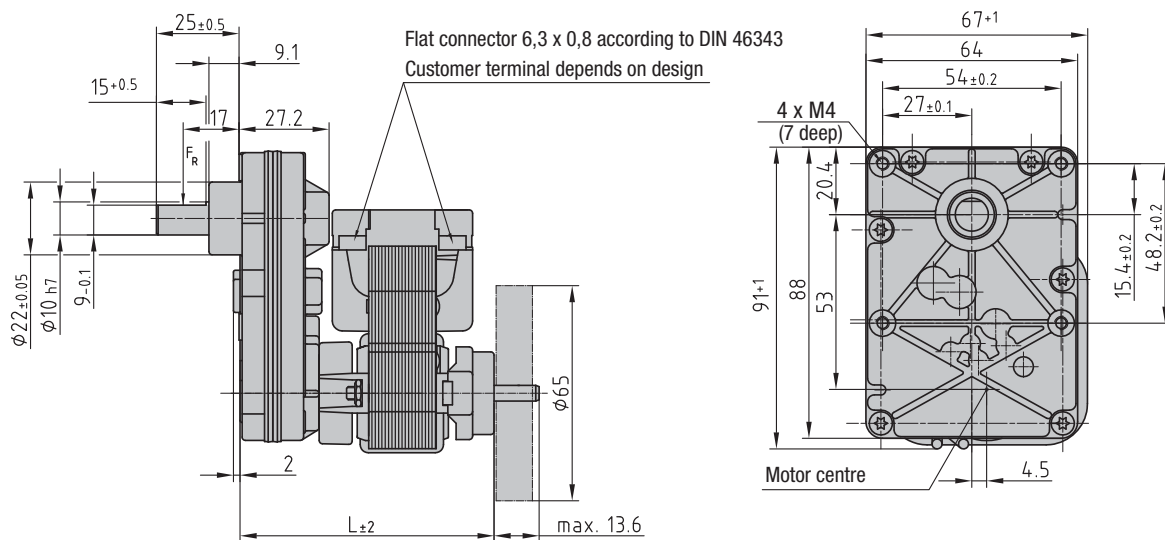
with Flatline 78



- **Spur gear unit:** Die-cast zinc housing
- **Max. permitted radial load:** 300 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Needle bearings
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature

Nominal data		Nominal voltage	Frequency	Reduction	Drive torque	Output speed	Output power	Nominal current	Mass	Length
Type	Motor	V	Hz	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	m (kg)	L (mm)
78.5.3030.F40	EM3030	230	50	408,4/5	7,4	6,37	4,9	0,46	1,1	87
78.5.3030.F41	EM3030	230	50	737,4/5	12,5	3,53	4,6	0,46	1,1	87
78.5.3020.F42	EM3020	230	50	976,0/5	11,9	2,66	3,3	0,15	0,9	77
78.5.3020.F43	EM3020	230	50	1266,1/5	13,0	2,05	2,8	0,15	0,9	77
78.5.3020.F44	EM3020	230	50	1648,6/5	14,0	1,58	2,3	0,15	0,9	77
78.5.3020.F45	EM3020	230	50	2135,9/5	15,0	1,22	1,9	0,15	0,9	77

Subject to alterations



# Capacitor motor KM 40

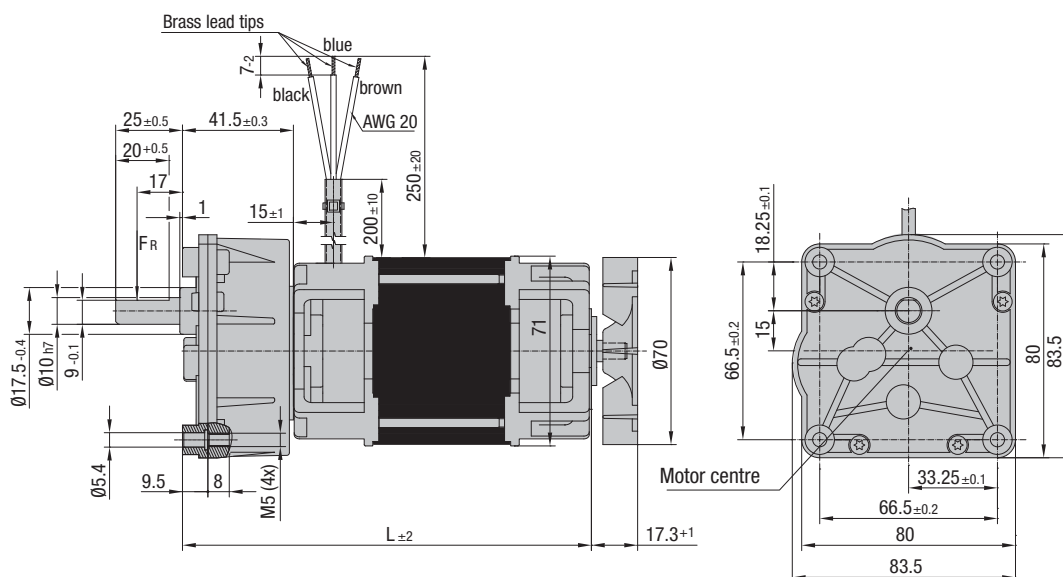
with Compactline 92



- **Spur gear unit:** Die-cast zinc housing
- **Max. permitted radial load:** 150 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Slide/needle bearings
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature

Nominal data		Nominal voltage	Frequency	Reduction	Drive torque	Output speed	Output power	Nominal current	Capacitor	Mass	Length
Type	Motor	V	Hz	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	μF/V	m (kg)	L (mm)
92.3.4050.2.C06	KM4050-2	230	50	55,0/3	10,0	50,0	52	0,68	5,0/400	2,1	153
92.3.4050.2.C07	KM4050-2	230	50	70,4/3	12,8	39,1	52	0,68	5,0/400	2,1	153
92.3.4050.2.C08	KM4050-2	230	50	92,3/3	15,0	29,8	47	0,68	5,0/400	2,1	153
92.3.4030.2.C09	KM4030-2	230	50	142,0/3	14,4	19,4	29	0,38	3,5/400	1,6	133
92.3.4030.2.C10	KM4030-2	230	50	184,4/3	15,0	14,9	23	0,38	3,5/400	1,6	133
92.3.4030.2.C11	KM4030-2	230	50	274,6/3	15,0	10,0	16	0,38	3,5/400	1,6	133
92.3.4030.4.C12	KM4030-4	230	50	142,0/3	12,9	9,15	12	0,20	1,5/400	1,6	133
92.3.4030.4.C13	KM4030-4	230	50	184,4/3	15,0	7,05	11	0,20	1,5/400	1,6	133
92.3.4030.4.C14	KM4030-4	230	50	274,6/3	15,0	4,73	7,4	0,20	1,5/400	1,6	133

Subject to alterations



# Capacitor motor KM 40

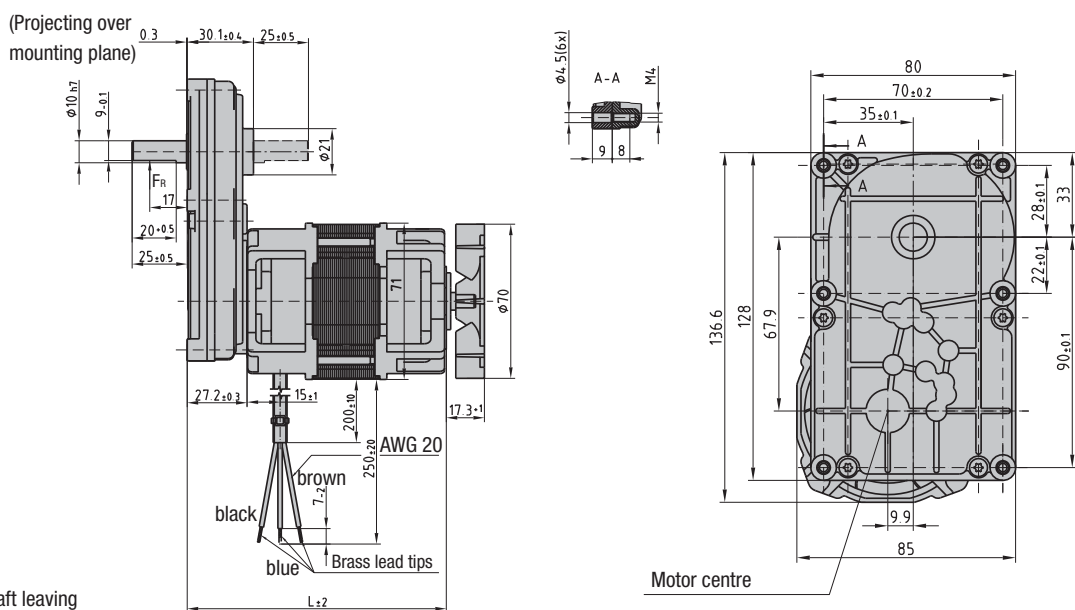
with Flatline 85



- **Spur gear unit:** Die-cast zinc housing
- **Max. permitted radial load:** 150 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Needle bearings on both sides
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature

Nominal data		Nominal voltage	Frequency	Reduction	Drive torque	Output speed	Output power	Nominal current	Capacitor	Mass	Length
Type	Motor	V	Hz	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	μF/V	m (kg)	L (mm)
85.3.4050.2.F08	EM4050-2	230	50	136,5/3	24,9	20,1	52	0,68	5,0/400	2,1	139
85.3.4050.2.F09	EM4050-2	230	50	189,0/3	25,0	14,6	38	0,68	5,0/400	2,1	139
85.4.4030.F10	KM4030-2	230	50	303,6/4	27,7	9,06	26	0,38	3,5/400	1,7	119
85.4.4030.F11	KM4030-2	230	50	454,0/4	30,0	6,06	19	0,38	3,5/400	1,7	119
85.4.4030.F12	KM4030-2	230	50	687,0/4	30,0	4,00	13	0,38	3,5/400	1,7	119
85.5.4030.F13	KM4030-2	230	50	1028,7/4	30,0	2,67	8,4	0,38	3,5/400	1,7	119

Subject to alterations



Alternative shaft leaving on motor-side on request order adding: W03

# EC motor VDC 3-49-15

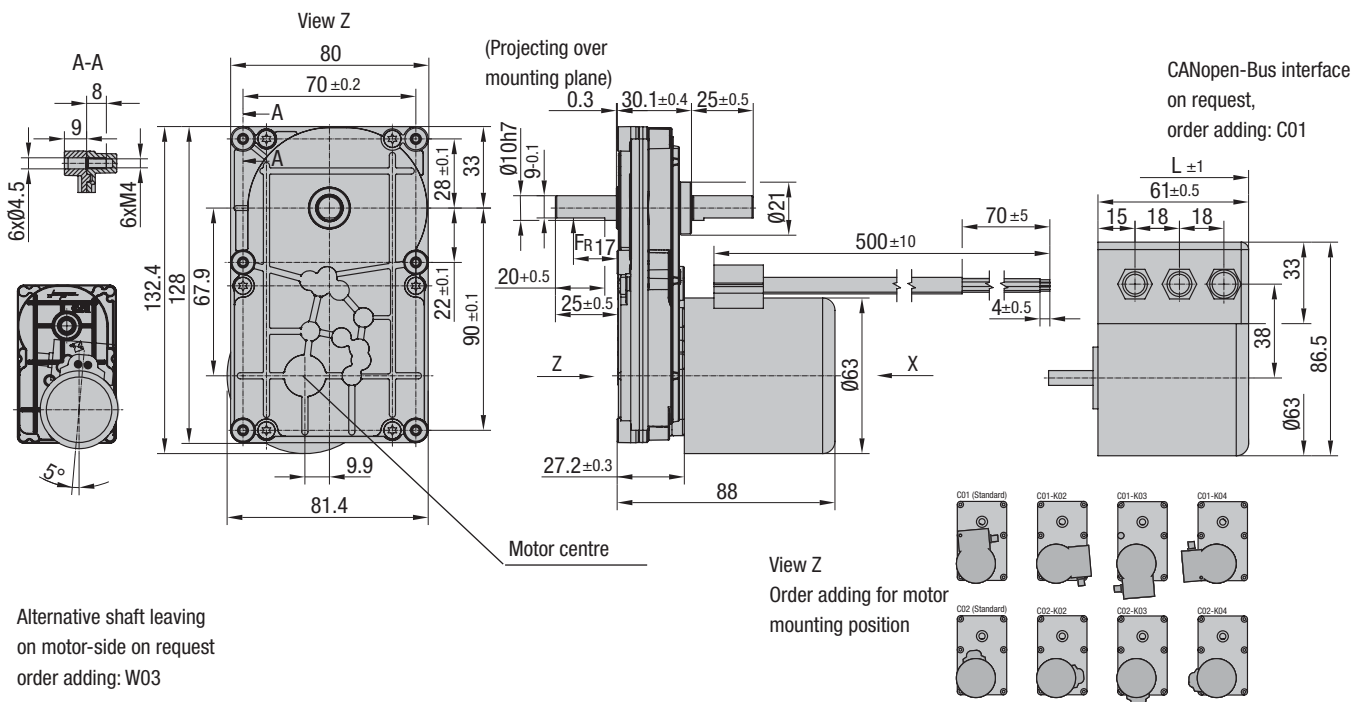
with Flatline 85



- **Spur gear unit:** Die-cast zinc housing
- **Max. permitted radial load:** 150 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Needle bearings on both sides
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature

Nominal data		Nominal voltage	Reduction	Drive torque	Output speed	Output power	Nominal current	Mass	Length
Type	Motor	V	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	m (kg)	L (mm)
85.3.C4915.F01	VDC-3-49-15	24	8,2/3	0,9	488	46	3,5	1,4	88
85.3.C4915.F02	VDC-3-49-15	24	12,3/3	1,3	325	46	3,5	1,4	88
85.3.C4915.F03	VDC-3-49-15	24	27,6/3	3,0	145	46	3,5	1,4	88
85.3.C4915.F04	VDC-3-49-15	24	40,3/3	4,4	99,3	46	3,5	1,4	88
85.3.C4915.F05	VDC-3-49-15	24	64,0/3	7,0	62,5	46	3,5	1,4	88
85.3.C4915.F06	VDC-3-49-15	24	101,8/3	11,0	39,3	46	3,5	1,4	88
85.3.C4915.F07	VDC-3-49-15	24	136,5/3	15,0	29,3	46	3,5	1,4	88
85.3.C4915.F08	VDC-3-49-15	24	189,0/3	21,0	21,2	46	3,5	1,4	88

Subject to alterations





# EC motor VDC 3-54-14

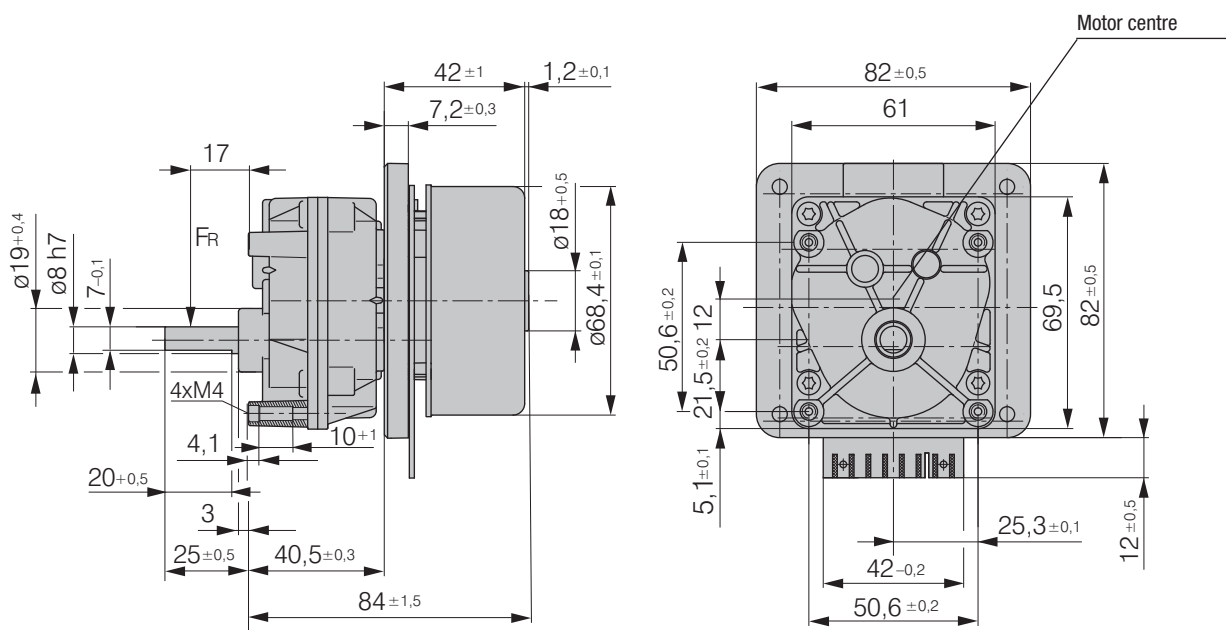
with Compactline 90



- **Spur gear unit:** Die-cast zinc housing
- **Max. permitted radial load:** 120 N
- **Max. permitted axial load:** 40 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Slide/needle bearings
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature

Nominal data		Nominal voltage	Reduction	Drive torque	Output speed	Output power	Nominal current	Mass	Length
Type	Motor	V	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	m (kg)	L (mm)
90.2.C5414.C01	VDC-3-54-14	24	16,0/2	1,7	219	39	2,8	0,8	84
90.2.C5414.C05	VDC-3-54-14	24	32,0/2	3,4	109	39	2,8	0,8	84
90.3.C5414.C07	VDC-3-54-14	24	57,8/3	5,5	60,6	35	2,8	0,8	84
90.3.C5414.C08	VDC-3-54-14	24	79,1/3	7,0	44,2	32	2,8	0,8	84
90.3.C5414.C09	VDC-3-54-14	24	121,6/3	7,0	28,8	21	2,8	0,8	84
90.4.C5414.C10	VDC-3-54-14	24	189,0/4	9,0	18,5	17	2,8	0,9	84
90.4.C5414.C12	VDC-3-54-14	24	368,0/4	9,0	9,51	9	2,8	0,9	84

Subject to alterations



# EC motor BG 4310

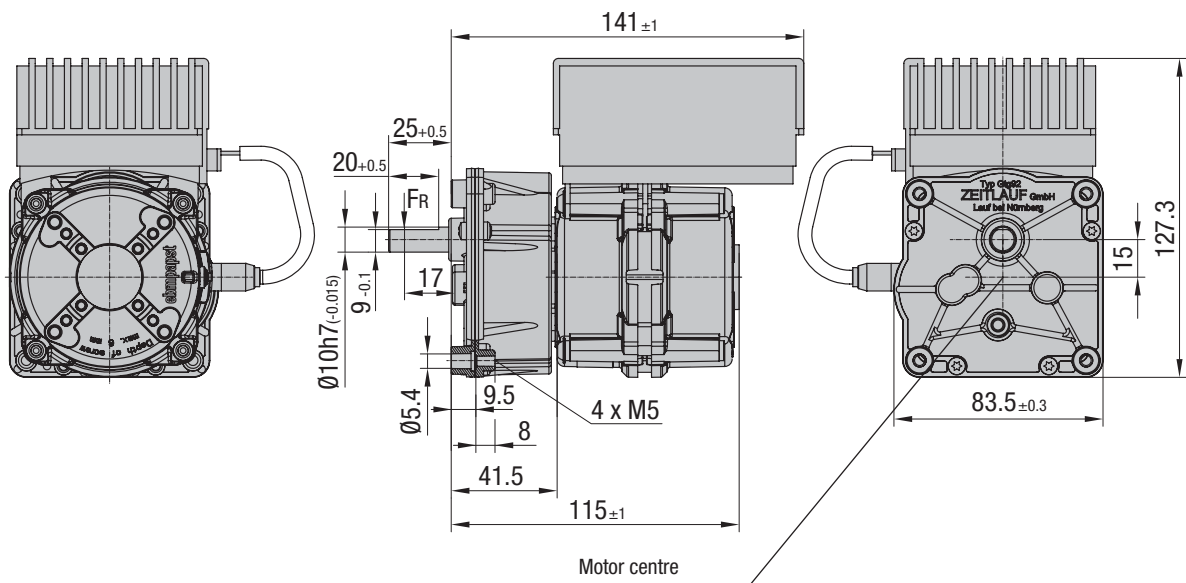
with Compactline 92



- **Spur gear unit:** Die-cast zinc housing
- **Type of protection:** IP 20
- **Max. permitted radial load:** 150 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Needle bearings on both sides
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature
- **Technical features:**
  - Control input 0-10 V (optional PWM)
  - cw (optional reverse on start)
  - Tach output optional

Nominal data		Nominal voltage	Frequency	Reduction	Drive torque	Output speed	Output power	Nominal current	Mass	Length
Type	Motor	V	Hz	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	m (kg)	L (mm)
92.3.B4310.C01	BG 4310	230	50	184,4/3	15	2,71...16,27	25	---	1,4	100
92.3.B4310.C02	BG 4310	230	50	274,6/3	20	1,82...10,92	23	---	1,4	100

Subject to alterations





# EC motor BG 4310

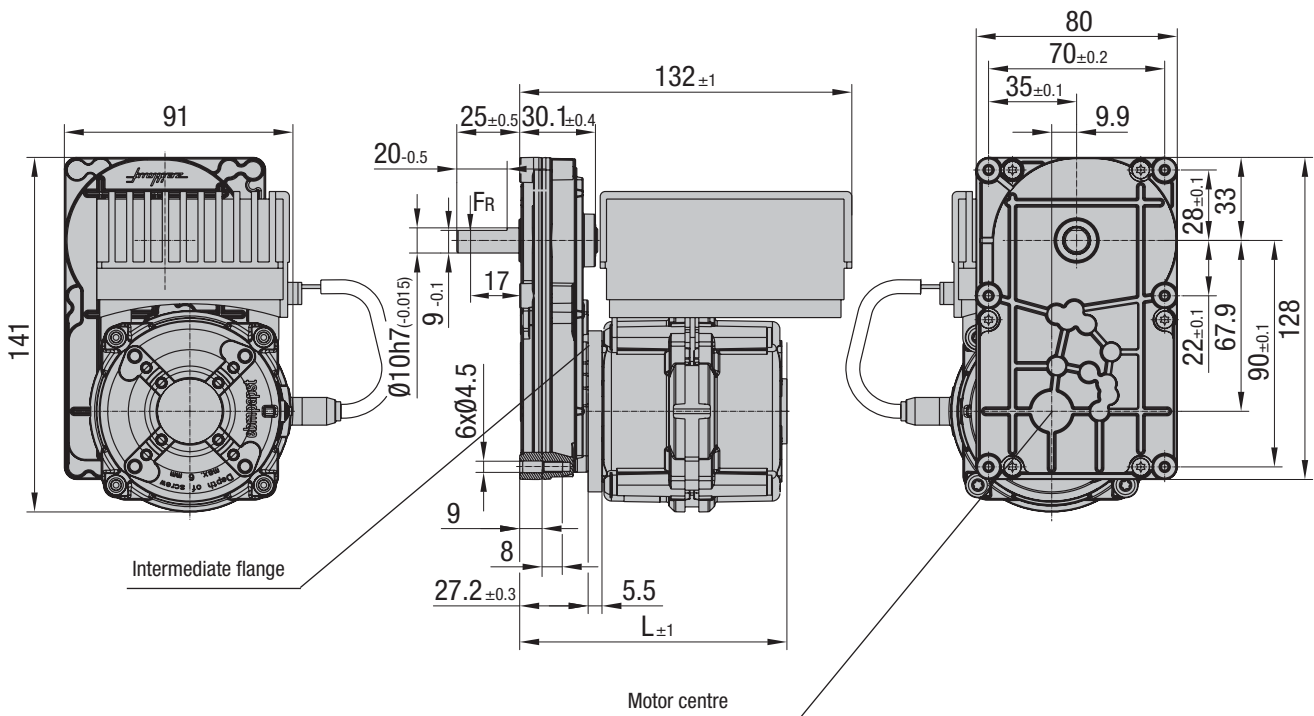
with Flatline 85



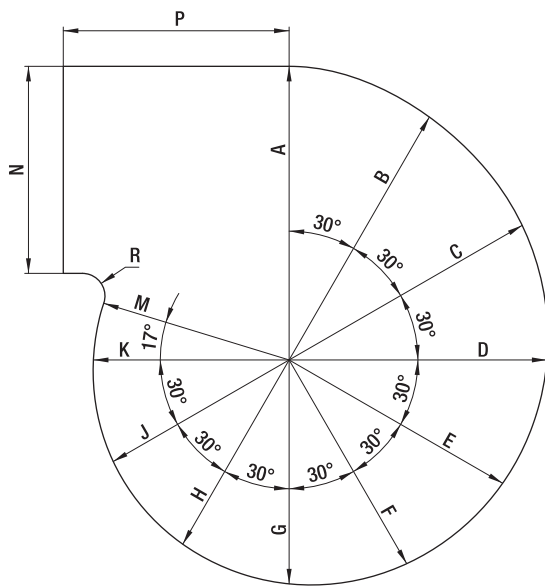
- **Spur gear unit:** Die-cast zinc housing
- **Type of protection:** IP 20
- **Max. permitted radial load:** 150 N
- **Max. permitted axial load:** 50 N
- **Expected service life:** 5000 h (Lifetime lubrication)
- **Input stage:** Noise optimized
- **Gearbox output shaft:** Needle bearings on both sides
- **Mode of operation:** Continuous operation S1 till to 50 °C ambient air temperature
- **Technical features:**  
 Control input 0-10 V (optional PWM)  
 cw (optional reverse on start)  
 Tach output optional

Nominal data		Nominal voltage	Frequency	Reduction	Drive torque	Output speed	Output power	Nominal current	Mass	Length
Type	Motor	V	Hz	i/No. of stages	M <sub>ab</sub> (Nm)	n <sub>ab</sub> (rpm)	P <sub>ab</sub> (W)	I (A)	m (kg)	L (mm)
85.4.B4310.F01	BG 4310	230	50	303,6/4	25	1,65...9,88	26	---	1,5	106
85.4.B4310.F02	BG 4310	230	50	454,0/4	30	1,10...6,61	21	---	1,5	106

Subject to alterations



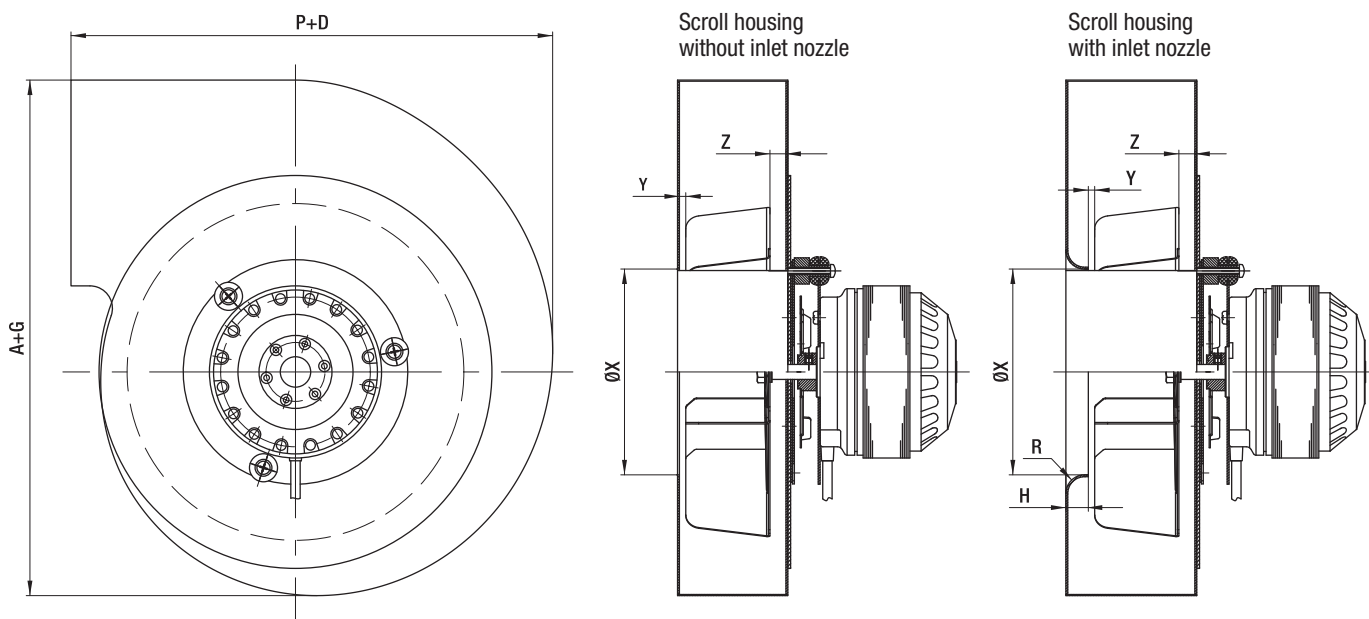
# Scroll dimensions



Scroll dimensions for AC / EC centrifugal fans (recommended by ebm-papst)

Size	A	B	C	D	E	F	G	H	J	K	M	N	P	R
Ø 140	121	116	111	106	102	97	92	88	84	82	80	86	93	9
Ø 150/152	130	124	119	114	109	104	99	94	90	87	86	92	100	10
Ø 160	139	132	127	122	116	111	106	100	96	93	92	98	107	11
Ø 180	156	149	143	137	131	125	119	113	108	104	103	110	120	12
Ø 210	182	174	167	160	152	146	139	132	127	121	120	128	140	14
Ø 250	218	209	200	192	182	175	167	158	152	145	144	154	168	19

subject to alterations



Distance between impeller and scroll housing/inlet nozzle (recommended by ebm-papst)

Size	X	Y	Z	R	H
Ø 140	80-100	3-5	8-11	10	10
Ø 150/152	90-110	3-5	8-11	10	10
Ø 160	100-120	3-5	8-11	10	10
Ø 180	110-130	3-5	8-11	12	12
Ø 210	120-135	3-5	8-11	12	12
Ø 250	140-160	3-5	8-11	12	12

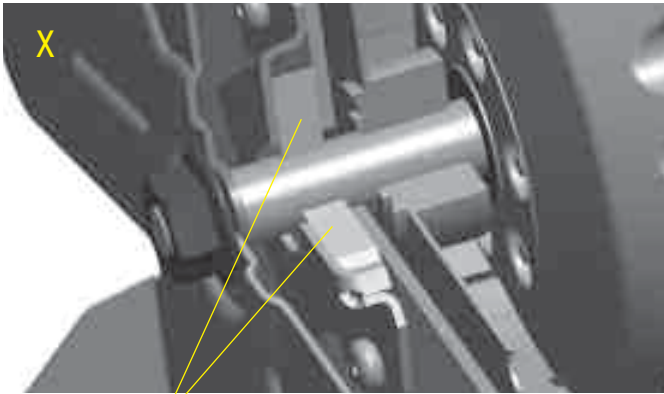
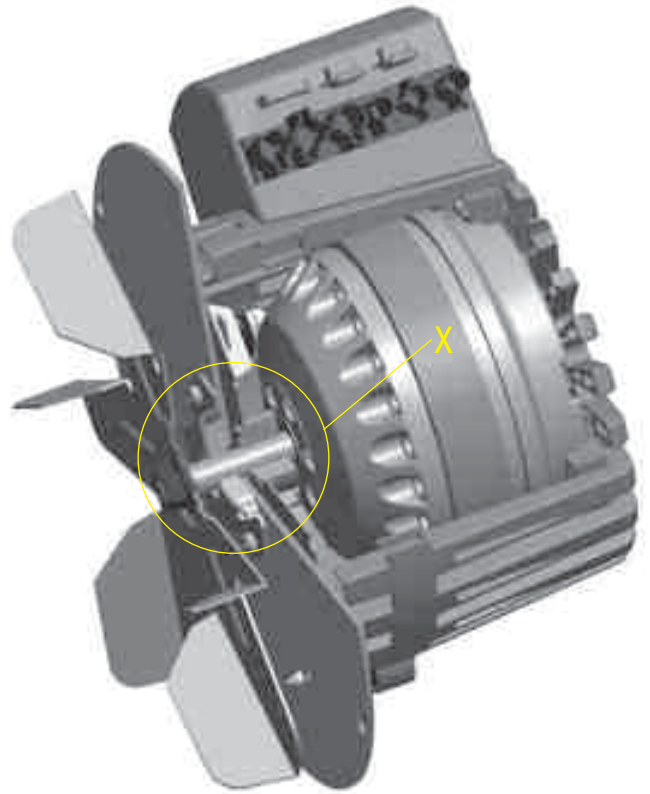
subject to alterations

## Additional shaft seal

ebm-papst also offers an additional shaft seal for its exhaust gas blowers. This was developed specifically for this application, intended for installation in passive and low-energy houses with regulated ventilation in apartments, for example.

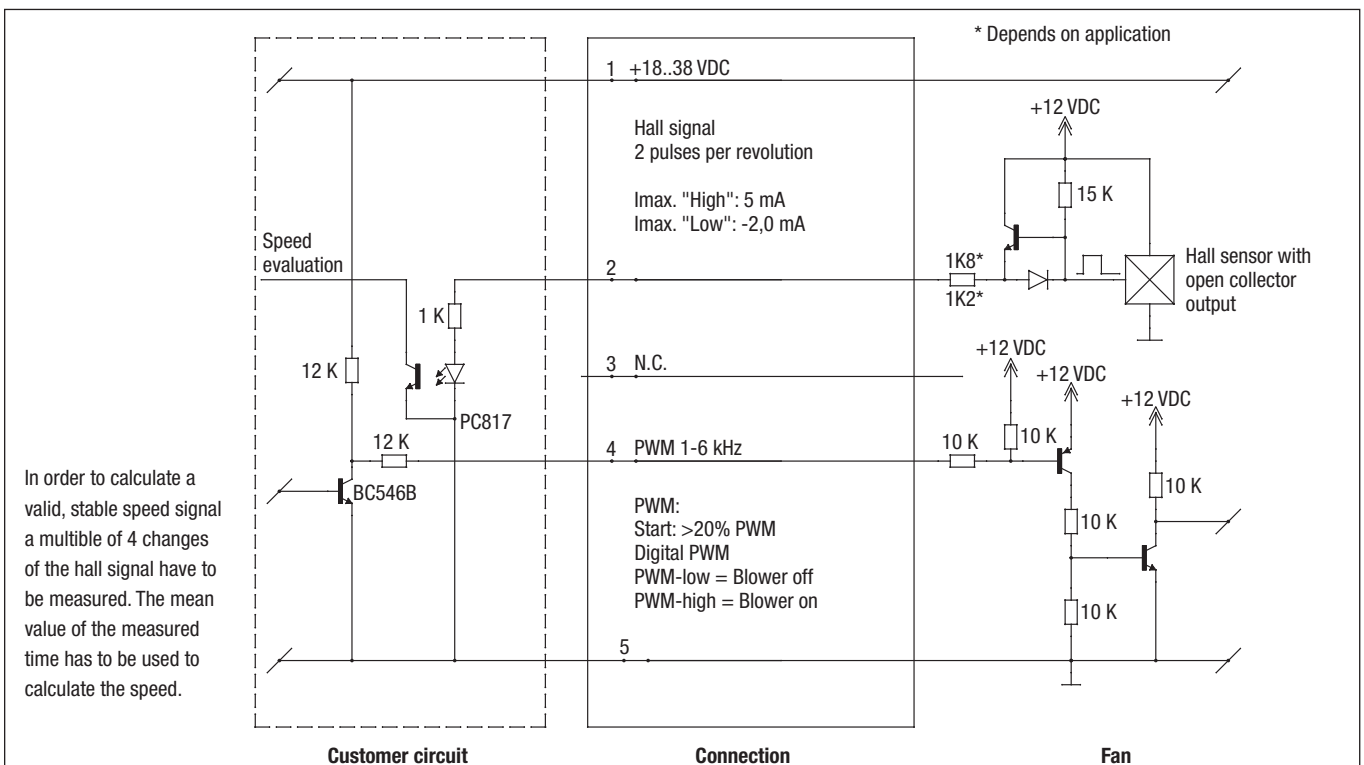
The sealing system is made from high temperature-resistance ceramic and ensures low leakage over the long term.

The final suitability of the system must be qualified and approved in the end device.



Shaft seal made from ceramic

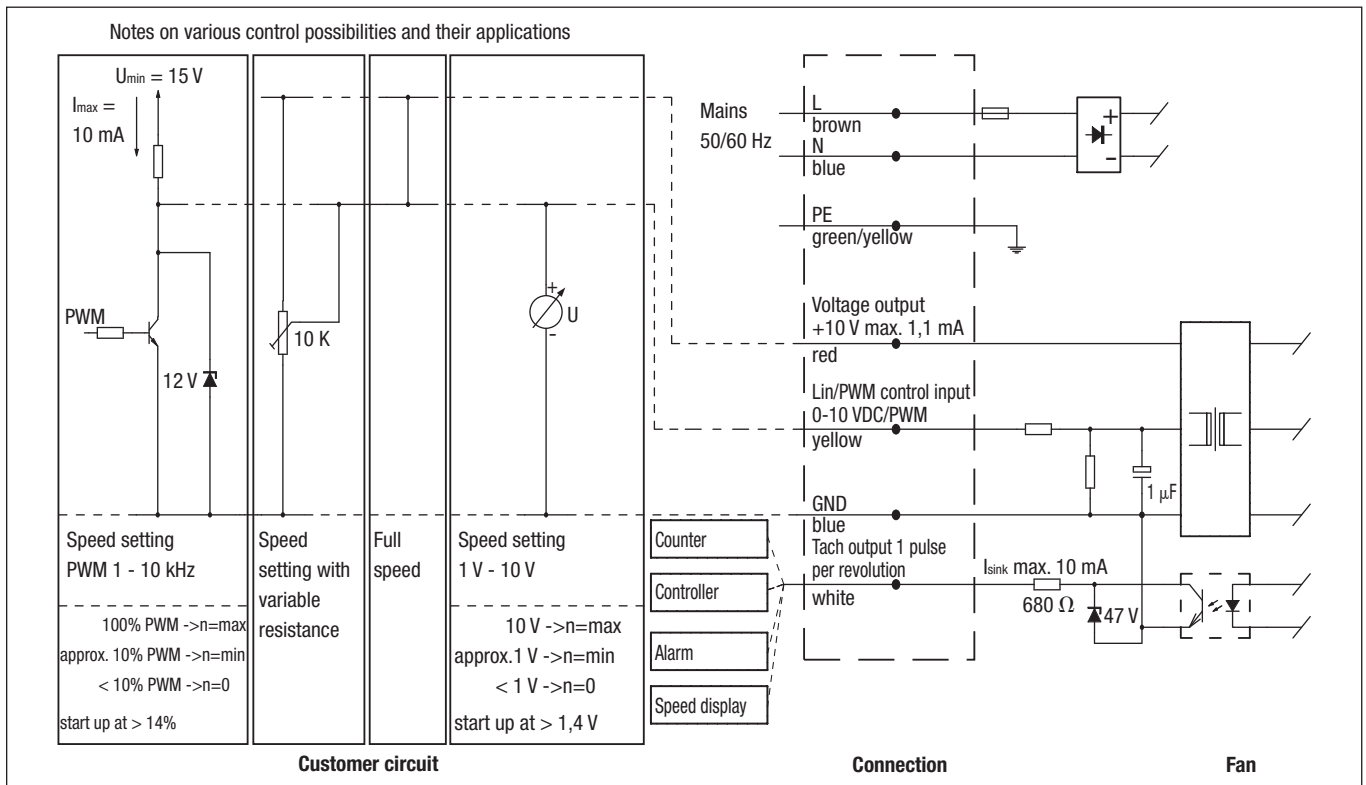
## Electrical connection EC (11) Tangential blowers



# Electrical connections EC H1)

## Technical features:

- PFC (passive)
- Output 10 VDC max. 1,1 mA
- Tach output
- Control input 0-10 VDC / PWM
- Over-temperature protected electronics / motor



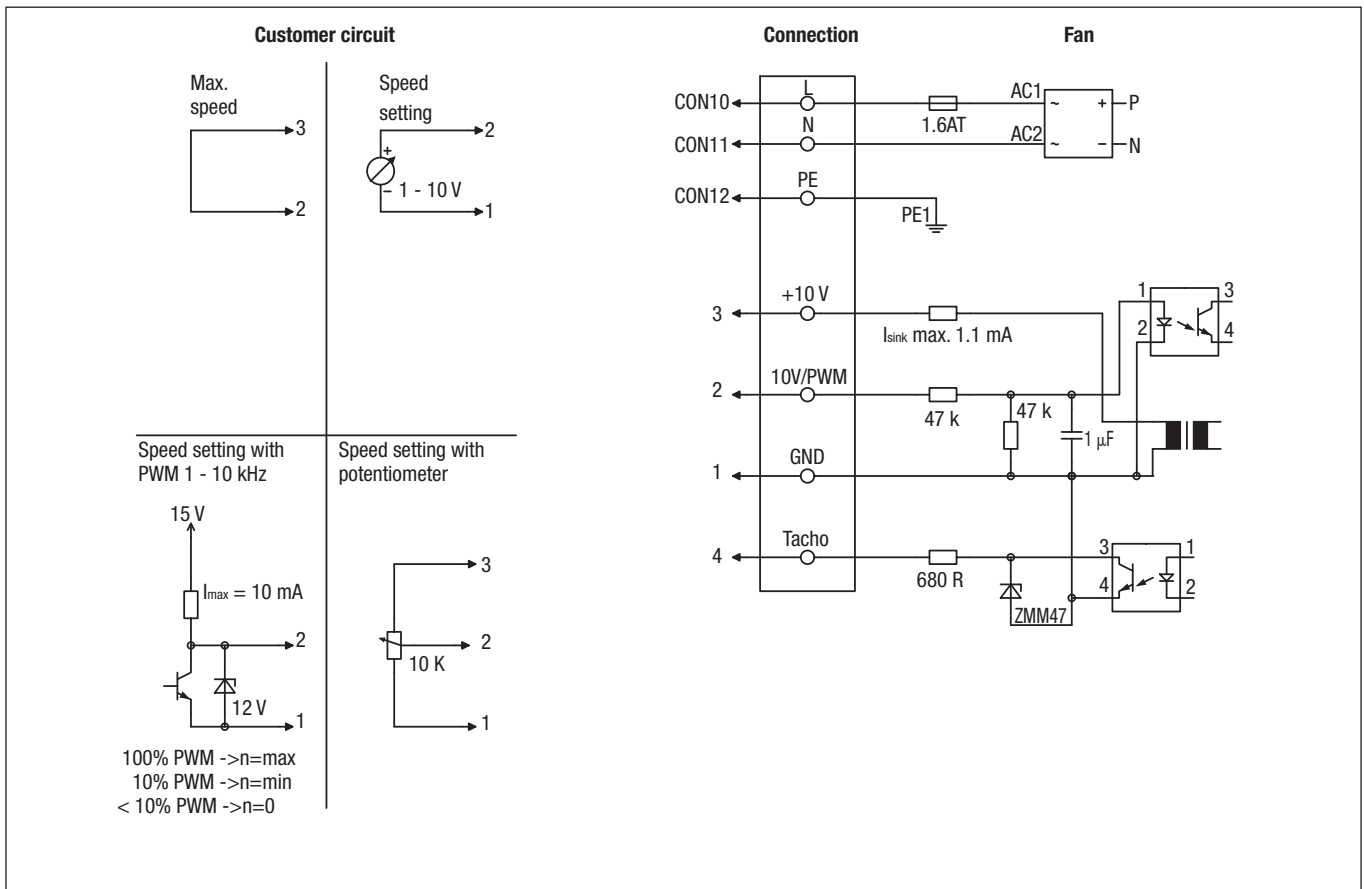
Line	Connection	Colour	Assignment / function
1	L	brown	Mains 50/60 Hz, phase
	N	blue	Mains 50/60 Hz, neutral
	PE	green/yel.	Protective earth

Line	Connection	Colour	Assignment / function
2	+ 10 V	red	Voltage output +10 V max. 1,1 mA
	0-10 V / PWM	yellow	Control input (Impedance 100 k $\Omega$ )
	GND	blue	GND
	Tacho	white	Tach output: 1 pulse per revolution

# Electrical connections EC H4)

## Technical features:

- Control input 0-10 VDC / PWM
- Output 10 VDC max. 1,1 mA
- Tach output
- Line undervoltage detection
- Locked-rotor protection
- Soft start
- Over-temperature protected electronics / motor

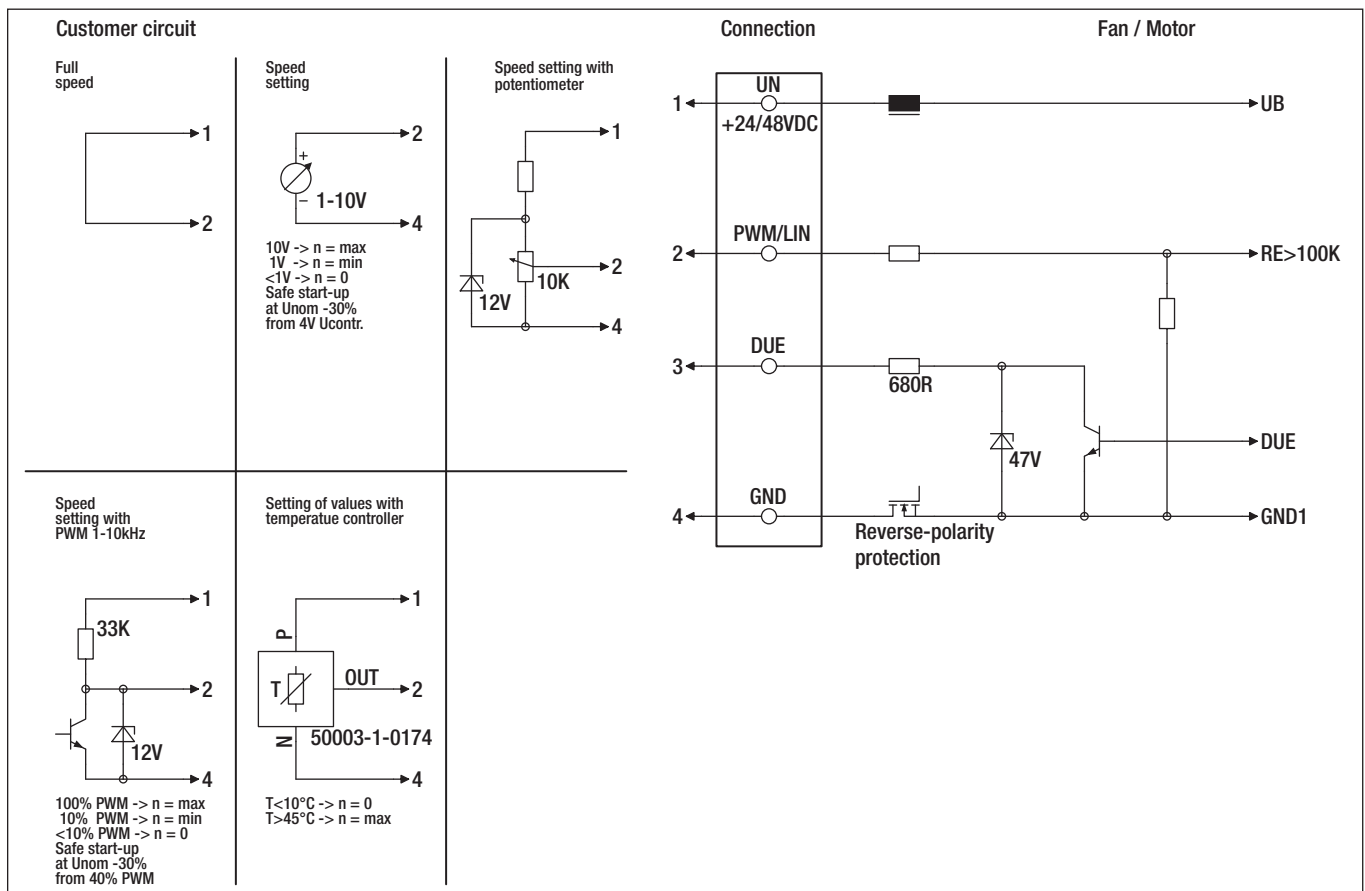


Line	Connection	Colour	Assignment / function
CON10	L	black	Power supply 230 VAC, 50 - 60 Hz, see type plate for voltage range
CON11	N	blue	Neutral conductor
CON12	PE	green/yellow	Protective earth
1	GND	blue	GND-Connection for control interface
2	0-10V / PWM	yellow	Control input 0-10V or PWM, electrically isolated
3	10V max. 1.1 mA	red	Voltage output 10V / 1.1 mA, electrically isolated, not short-circuit-proof
4	Tacho	white	Tach output: Open Collector, 1 pulse per revolution, electrically isolated

# Electrical connections EC J5)

## Technical features:

- Control input 0-10 VDC / PWM
- Tach output
- Motor current limitation
- Reverse polarity and locked-rotor protection
- Soft start

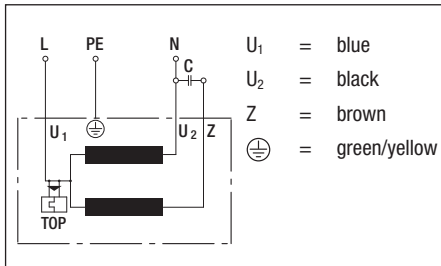


Line	Connection	Colour	Assignment / function
1	UN +24/48 VDC	red	Power supply 24/48 VDC, maximum ripple $\pm 3,5 \%$
2	PWM/LIN	yellow	Control input $R_e > 100 \text{ K}$
3	Tach	white	Tach output, 3 pulses per revolution, $I_{\text{sink max.}} = 10 \text{ mA}$
4	GND	blue	Reference ground

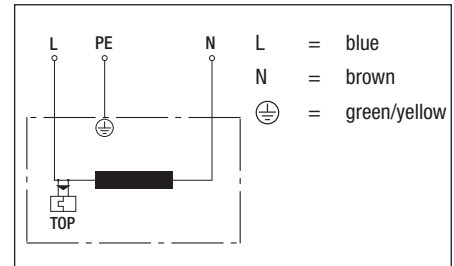
# Electrical connections AC

## A1) / B)

**A1) Single-phase capacitor motor**  
with TOP wired internally



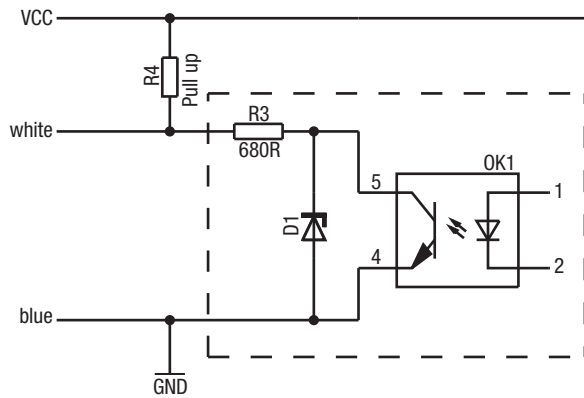
**B) Shaded pole motor**  
with TOP wired internally





# Electrical connections Hall IC C) / D)

## C) Speed monitoring with EC fans



Fan connections: white (OUT): Speed signal  
blue (IN): Ground connection

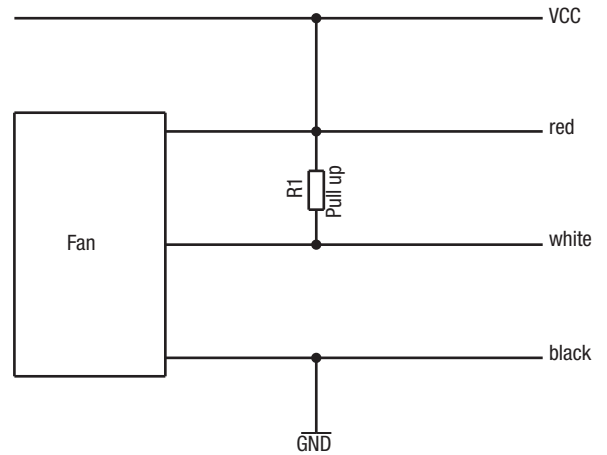
Specification from ebm-papst:

$I_{sink_{max}} = 10 \text{ mA}$  (by transistor in OK1)

$VCC_{max} = 40 \text{ V}$  (external supply to be provided by customer)

Pull up resistor = Pay attention to power loss of the resistors in dimensioning!

## D) Speed monitoring with AC fans



Fan connections: red (IN): DC-Voltage  
white (OUT): Speed signal  
black (IN): Ground connection

Specification from ebm-papst:

$VCC = 5 \text{ VDC}$  (external supply to be provided by customer)

Pull up resistor = 4,5 k $\Omega$

# Technical parameters & scope

## High standards for all ebm-papst products

Here at ebm-papst, we constantly strive to further improve our products in order to be able to offer you the best possible product for your application. Careful monitoring of the market ensures that technical innovations are reflected in the improvements of our products. Based on the technical parameters listed below and the ambience you want our product to operate in, we here at ebm-papst can always work out the best solution for your specific application.

### General performance parameters

Any deviations from the technical data and parameters described here are listed on the product-specific data sheet.

### Type of protection

The type of protection is specified in the product-specific data sheets.

### Insulation class

The insulation class is specified in the product-specific data sheets.

### Mounting position

The mounting position is specified in the product-specific data sheets.

### Condensate discharge holes

Information on the condensate discharge holes is provided in the product-specific data sheets.

### Mode of operation

The mode of operation is specified in the product-specific data sheets.

### Protection class

The protection class is specified in the product-specific data sheets.



### Information on ErP directive for hot air blowers

With implementation of the ErP directive, more stringent efficiency requirements apply in two stages as of 2013 and 2015 for fans in the power range between 125 W and 500 kW. The corresponding minimum efficiency values for the different types of fan are stipulated by the EU.

ebm-papst GreenTech EC fans already surpass the minimum values required by law. Users can recognise fans complying with the directive from the CE marking for example. Exceptions not subject to the directive include fans for conveying hot media at temperatures in excess of 100°C

### Service life

The service life of ebm-papst products depends on two major factors:

- The service life of the insulation system
- The service life of the bearing system

The service life of the insulation system mainly depends on voltage level, temperature and ambient conditions, such as humidity and condensation. The service life of the bearing system depends mainly on the thermal load on the bearing.

The majority of our products use maintenance-free ball bearings for any mounting position possible.

The service life L10 of the ball bearings can be taken as approx. 40,000 operating hours at an ambient temperature of 40 °C, yet this estimate can vary according to the actual ambient conditions.

We will gladly provide you with a lifetime calculation taking into account your specific operating conditions.

### Motor protection / thermal protection

Information on motor protection and thermal protection is provided in the product-specific data sheets.

Depending on motor type and field of application, the following protective features are realised:

- Thermal overload protection (TOP), either in-circuit or external
- PTC with electronic diagnostics
- Impedance protection
- Thermal overload protection (TOP) with electronic diagnostics
- Current limitation via electronics

If an external TOP is connected, the customer has to make sure to connect a conventional trigger device for switching it off.

Products without fitted TOP and without protection against improper use, a motor protection complying with the valid standards has to be installed.

### Mechanical strain / performance parameters

All ebm-papst products are subjected to comprehensive tests complying with the normative specifications. In addition to this, the tests also reflect the vast experience and expertise of ebm-papst.



### **Vibration test**

Vibration tests are carried out in compliance with

- Vibration test in operation according to DIN IEC 68, parts 2-6
- Vibration test at standstill according to DIN IEC 68, parts 2-6

### **Shock load**

Shock load tests are carried out in compliance with

- Shock load according to DIN IEC 68, parts 2-27

### **Balancing quality**

Testing the balancing quality is carried out in compliance with

- Residual imbalance according to DIN ISO 1940
- Standard balancing quality level G 6.3

Should you require a higher balancing quality level for your specific application, please let us know and specify this when ordering your product.

### **Chemo-physical strain / performance parameters**

Should you have questions about chemo-physical strain, please direct them to your ebm-papst contact.

### **Fields of application, industries and applications**

Our products are used in various industries and applications:

Ventilation, air-conditioning and refrigeration technology, clean room technology, automotive and rail technology, medical and laboratory technology, electronics, computer and office technology, telecommunications, household appliances, heating, machines and plants, drive engineering. Our products are not designed for use in the aviation and aerospace industry!

### **Legal and normative directives**

The products described in this catalogue are designed, developed and produced in keeping with the standards in place for the relevant product and, if known, the conditions governing the relevant fields of application.

### **Standards**

Information on standards is provided in the product-specific data sheets.

### **EMC**

Information on EMC standards is provided in the product-specific data sheets.

Complying with the EMC standards has to be established on the final appliance, as different mounting situations can result in changed EMC properties.

### **Leakage current**

Information on the leakage current is provided in the product-specific data sheets.

Measuring is according to IEC 60990.

### **Approvals**

In case you require a specific approval for your ebm-papst product (VDE, UL, GOST, CCC, CSA, etc.) please let us know.

Most of our products can be supplied with the relevant approval.

Information on existing approvals is provided in the product-specific data sheets.

### **Air performance measurements**

All air performance measurements are carried out on suction side and on chamber test beds conforming to the specifications as per ISO 5801 and DIN 24163. The fans under test are installed in the measuring chamber at free air intake and exhaust (installation category A) and are operated at nominal voltage, with AC also at nominal frequency, and without any additional components such as guard grilles.

As required by the standard, the air performance curves correspond to an air density of 1.2 kg/m<sup>3</sup>.

# Technical parameters & scope



## Measurement conditions for air and noise measurement

ebm-papst products are measured under the following conditions:

- Axial and diagonal fans in direction of rotation “V” in full nozzle and without guard grille
- Backward curved centrifugal fans, free-running and with inlet nozzle
- Forward curved single and dual inlet centrifugal fans with housing

## Noise measurements

All noise measurements are carried out in low-reflective test rooms with reverberant floor. Thus the ebm-papst acoustic test chambers meet the requirements of precision class 1 according to DIN EN ISO 3745. For noise measurement, the fans being tested are placed in a reverberant wall and operated at nominal voltage (for AC, also at nominal frequency) without additional attachments such as the guard grille.

## Sound pressure level and sound level

All acoustic values are established according to ISO 13347, DIN 45635 and ISO 3744/3745 to accuracy class 2 and given in A-rated form.

When the sound pressure level ( $L_p$ ) is measured, the microphone is on the intake side of the fan being tested, usually at a distance of 1 m on the fan axis.

To measure the sound power level ( $L_w$ ), 10 microphones are distributed over an enveloping surface on the intake side of the fan being tested (see graphic). The sound power level measured can be roughly calculated from the sound pressure level by adding 7 dB.

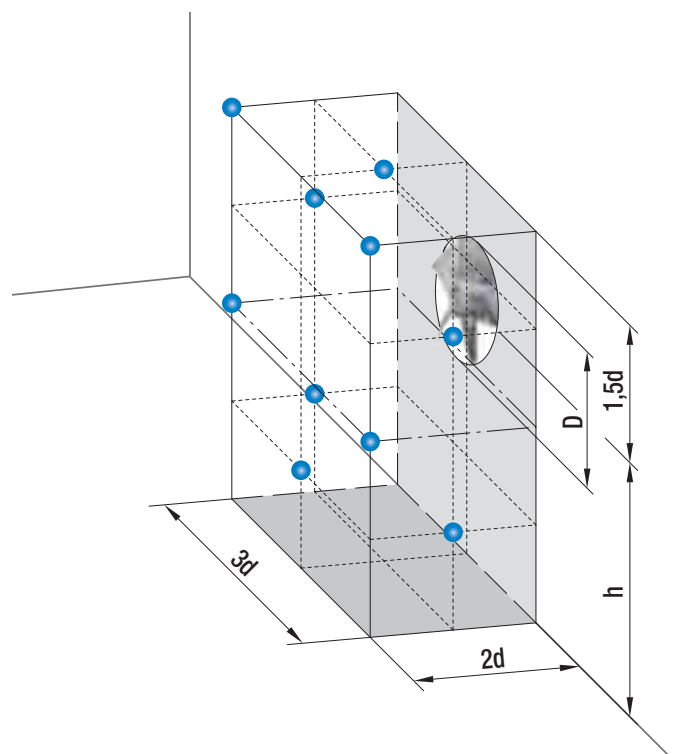
Measuring configuration as per ISO 13347-3 respectively DIN 45635-38:

- 10 measuring points

$$d \geq D$$

$$h = 1,5d \dots 4,5d$$

$$\text{Measurement area } S = 6d^2 + 7d(h + 1,5d)$$



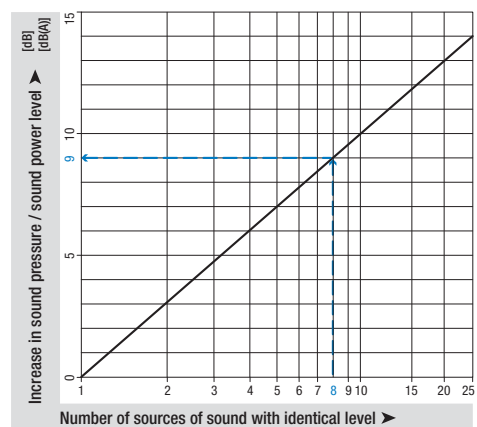


### Combined level of multiple same-level sound sources

Adding 2 noise sources with the same level results in a level increase of approx. 3 dB.

The noise characteristics of multiple identical fans can be determined in advance based on the noise values specified in the data sheet. This is shown in the diagram opposite.

**Example:** 8 A3G800 axial fans are on a condenser. According to the data sheet, the sound pressure level of a fan is approximately 75 dB(A). The level increase measured from the diagram is 9 dB. Thus the overall sound level of the installation can be expected to be 84 dB(A).

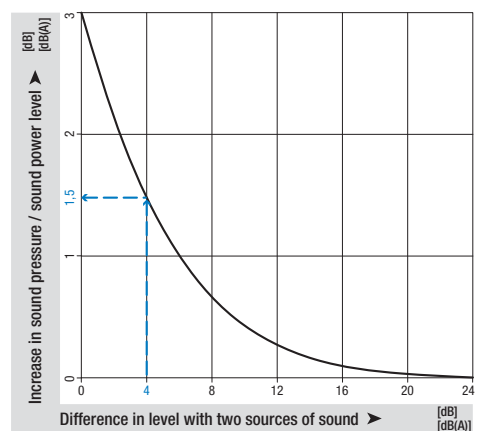


### Combined level of two different-level sound sources

The acoustic performance of two different fans can be predetermined based on the sound levels given in the data sheet. This is shown in the diagram opposite.

**Example:** There is an axial fan A3G800 with a sound pressure level of 75 dB(A) at the operating point and an axial fan A3G710 with 71 dB(A) in a ventilation unit. The level difference is 4 dB.

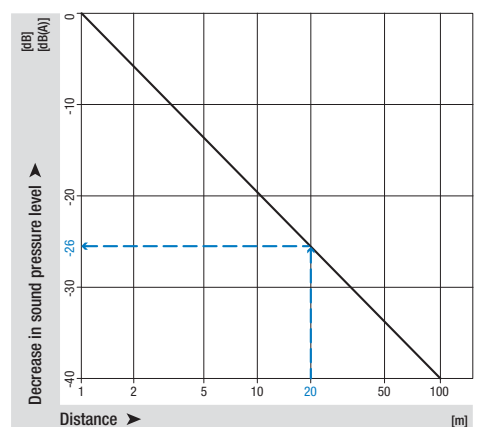
The level increase can now be read in the diagram as approx. 1.5 dB. This means that the overall sound level of the unit can be expected to be 76.5 dB(A).



### Distance laws

Sound power level is independent of distance to the sound source. In contrast to this, sound pressure level decreases the further away the noise source is. The adjacent diagram shows the decrease in level under far sound field conditions. Far sound field conditions apply whenever the distance between microphone and fan is big when compared to fan diameter and wavelength to be considered. For more information on far sound field, please consult the relevant literature on this complex topic. Per doubling of distance, the level in the far sound field decreases by 6 dB. In the near field of the fan, other correlations apply and the decrease in levels can be considerably smaller. The following example only applies to far sound field conditions and can vary strongly depending on the installation effects:

With an axial fan A3G300, a sound pressure level of 65 dB(A) was measured at a distance of 1 m. According to the adjacent diagram, at a distance of 20 m we would get a reduction by 26 dB, i.e. a sound pressure level of 39 dB(A).



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