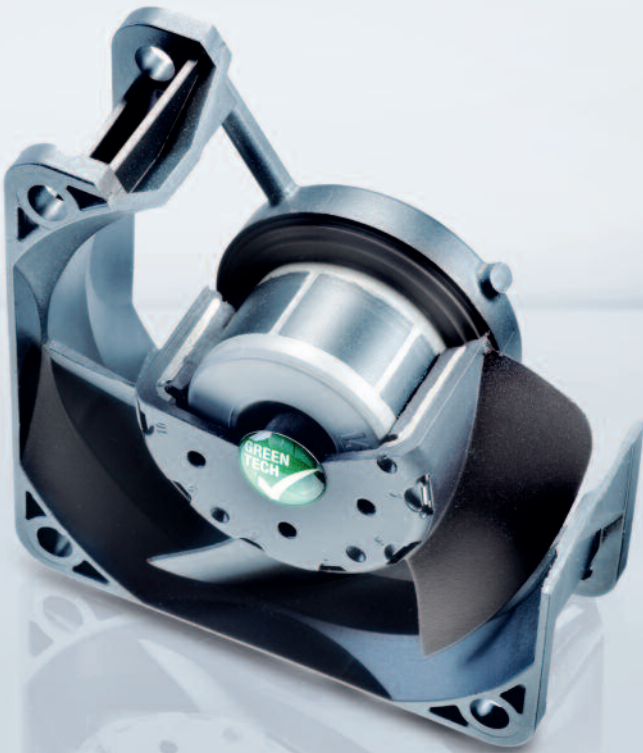


DC fans - specials

Speed signal	168
Alarm signal	172
Vario-Pro / Speed setting / Control input	177
Protected fans, degree of protection: IP 54 / IP 68	181



Technical information



Cooling capacity and efficiency

Greater power density, increasing miniaturization and extreme electronic component density are placing increased demands on the cooling capacity and efficiency of fans. Therefore, intelligent and space-saving integration of the fan in the device configuration is very important:

- Tailor-made cooling adapted to the situation as and when required.
- Programmable cooling by defining speed profiles.
- Transparency of function thanks to complete, interactive monitoring in all operating conditions.

Standard fans in electronics cooling have proven themselves a million times over.

With a constant speed and an appropriate sound level, they continuously provide the air flow required for extreme cases. But these extreme situations occur seldom – if at all – during operation. What is needed is an intelligent fan that adapts automatically to the level of cooling required at the time.

ebm-papst provides intelligent cooling concepts that are optimally adapted to practical requirements. For example:

1. Speed adjustment via temperature sensor

ebm-papst answers with a complete range of DC fans with temperature-controlled speed adjustment via a temperature sensor, available in a variety of standard dimensions.

Installation is very simple. Either an external temperature sensor in the form of an exposed wire that can be placed anywhere, or an internal sensor located directly in the fan hub in the air flow provides continuous and undissipated thermal information to the control electronics for speed adjustment. A range of temperature sensors can be found on page 178.

2. DC fans with separate control input

Open or closed-loop speed control is also possible with DC fans that have a separate control input. So a control voltage or a pulse-width modulated signal can be used to vary the speed. These options are used primarily in devices that have the appropriate standard interfaces and require varied fans depending on the load.

Technical information



3. Speed signal

DC fans with speed signal.

The integrated "electronic tachometer" continuously provides an actual speed signal for external evaluation. A very simple signal evaluation on the customer side informs the user of the current fan speed at all times. The speed signal is provided by a separate wire.

4. Alarm signal

For applications that require monitored fan operation with an alarm signal, ebm-papst offers a number of alarm signals variants. Depending on the type of fan in question, the signal will either be static, already evaluated, or a continuous, interface-compatible, high or low signal. The alarm signal is provided by a separate wire.

5. Turbo drives

Fans with three-phase EC drives and microprocessor-controlled motor electronics. The torque of these three-phase motors, which is virtually independent of the rotor position, allows the fan to run very smoothly. The speed of these fans can be controlled over a very wide speed range by means of PWM, analog voltage, or temperature. Optionally, the fans can be supplied with reversible direction of rotation and active brake operation.

6. Vario-Pro fans

This high-end fan concept by ebm-papst with programmed intelligence and customer-specific integrated functions makes your electronics cooling even more versatile and competitive. Vario-Pro provides greater economy for all demanding cooling tasks – especially those that require greater safety, more flexibility, and intelligent features like an alarm function, speed control, etc.

The key to the success of Vario-Pro is: Tailor-made software instead of permanently installed hardware, because software modules programmed for motor control and application intelligence do the work that used to be performed by analog components in the past. This central control unit of the Vario-Pro comprises a microcontroller and an EEPROM, where all its features are stored.

7. Protection against environmental conditions

Some applications place particular demands on the fans' resistance to environmental conditions, such as dust, moisture, water, and salt. ebm-papst offers solutions for adapting fans to these conditions.

Available on request:

- Electrically isolated speed signal circuit
- Varying voltage potentials for power and logic circuit

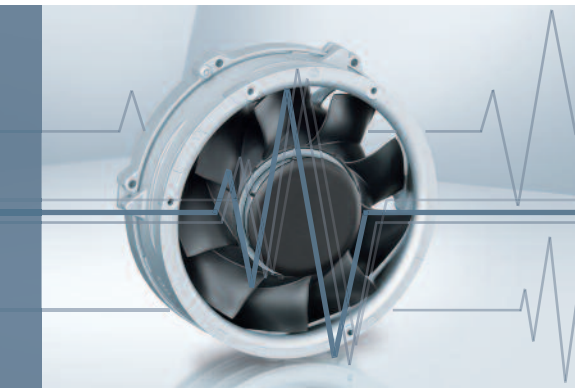
Signal data	Speed signal $U_{S, Low}$	Condition: I_{sink}	Speed signal $U_{S, High}$	Condition: I_{source}	Tach operating voltage $U_{BS, max.}$	Admissible sink current $I_{sink, max.}$	Pulses per revolution	Fan description Basic type
Type	VDC	mA	VDC	mA	VDC	mA		Page
5112 N	≤ 0.4	2	≤ 15	0	5	20	2	66
5114 N / 5118 N	≤ 0.4	2	≤ 60	0	60	20	2	66
5300	≤ 0.4	2	≤ 60	0	60	4	2	67
5300 TD	≤ 0.4	2	≤ 60	0	60	20	6	68
7112 N / 7118 N	≤ 0.4	2	≤ 60	0	60	20	2	69
7114 N	≤ 0.4	2	≤ 30	0	30	20	2	69
7200 N	≤ 0.4	2	≤ 15	0	15	20	2	70
6400	≤ 0.4	2	≤ 60	0	60	20	2	71
6300 TD	≤ 0.4	2	≤ 60	0	60	20	6	75
6300 N	≤ 0.4	2	≤ 60	0	60	20	6	76
6300 NTD	≤ 0.4	2	≤ 60	0	60	20	6	77
6300	≤ 0.4	2	≤ 60	0	60	20	2	78
DV 6300 TD	≤ 0.4	2	≤ 60	0	60	20	6	80
2200 FTD	≤ 0.4	2	≤ 60	0	60	20	6	81
RL 48	≤ 0.4	2	≤ 30	0	30	4	2	97
RL 65	≤ 0.4	2	≤ 30	0	30	4	2	98
RL 90 N	≤ 0.4	2	≤ 30	0	30	4	2	99
RLF 100	≤ 0.4	2	≤ 30	0	30	4	2	100
RG 90 N	≤ 0.4	2	≤ 30	0	30	4	2	101
RG 125 N	≤ 0.4	2	≤ 30	0	30	4	2	102
RG 140 N	≤ 0.4	3	≤ 60	0	60	4	2	103
RG 160 N	≤ 0.4	2	≤ 30	0	30	20	2	104
RG 160 NTD	≤ 0.4	2	≤ 60	0	60	20	6	105
RG 190 TD	≤ 0.4	2	≤ 60	0	60	20	6	106
RG 220 TD	≤ 0.4	2	≤ 60	0	60	20	6	107
RG 225 TD	≤ 0.4	2	≤ 60	0	60	20	6	108
RET 97 TD	≤ 0.4	2	≤ 60	0	60	20	6	109
REF 100	≤ 0.4	2	≤ 30	0	30	4	2	110
RER 120 TD	≤ 0.4	2	≤ 60	0	60	20	6	112
RER 133 TD	≤ 0.4	2	≤ 60	0	60	20	6	117
RER 160 NTD	≤ 0.4	2	≤ 60	0	60	20	6	119
REF 175 TD	≤ 0.4	2	≤ 60	0	60	20	6	120
RER 175 TD	≤ 0.4	2	≤ 60	0	60	20	6	121
RER 190 TD	≤ 0.4	2	≤ 60	0	60	20	6	122
RER 220 TD	≤ 0.4	2	≤ 60	0	60	20	6	128
RER 225 TD	≤ 0.4	2	≤ 60	0	60	20	6	129

Subject to change

Note:

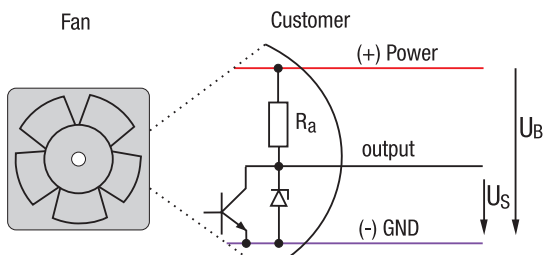
Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

Speed signal /12



- Speed-proportional, square-wave signal for external monitoring of the fan motor speed
- 2, 3, or 6 pulses per revolution
- TTL-compatible
- Integrated pull-up resistor
- Connection via separate cable
- The sensor signal also serves as a major comparison variable for setting and maintaining the setpoint speed for interactive or controlled cooling with one or more interconnected fans.

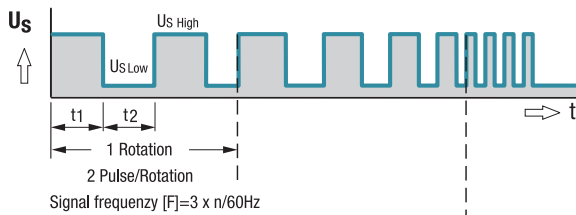
Electrical hookup



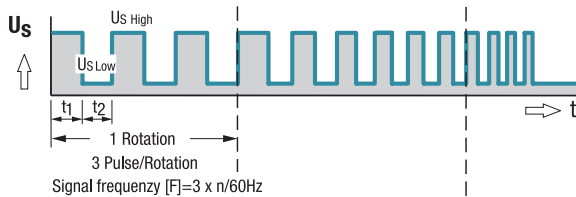
All voltages measured to ground.

Signal output voltage

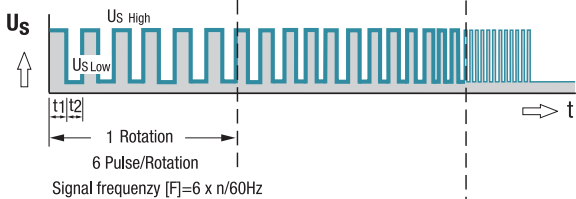
Standard signal for all models (exceptions see below)



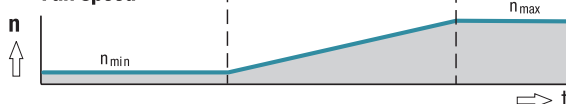
For multi options control input and 4100 NH7 and NH8



All TD Fans e.g. 6300 TD



Fan speed



Signal data	Speed signal $U_{S\text{Low}}$	Condition: I_{sink}	Speed signal $U_{S\text{High}}$	Condition: I_{source}	Admissible sink current $I_{\text{sink max}}$	Fan description Basic type
Type	VDC	mA	VDC	mA	mA	Page
614 N/12 GM	≤ 0.4	1	2.5–5.5	1	1	39
618 N/12 N	≤ 0.4	1	2.5–5.5	1	1	39
8412 N/12 H	≤ 0.4	1	2.5–5.5	1	1	44
4412 F/12 GM	≤ 0.4	1	2.5–5.5	1	1	53
4418 F/12	≤ 0.4	1	2.5–5.5	1	1	53
4312 /12 M	≤ 0.4	1	2.5–5.5	1	1	56
4314 /12	≤ 0.4	1	2.5–5.5	1	1	56
4182 N/12 X	≤ 0.4	1	2.5–5.5	1	1	60

Subject to change

Note:

With these fan options, deviations in regard to temperature range, voltage range and power consumption are possible compared with standard fan data.

Available on request:

- Electrically isolated speed signal circuit
- Varying voltage potentials for power and logic circuit

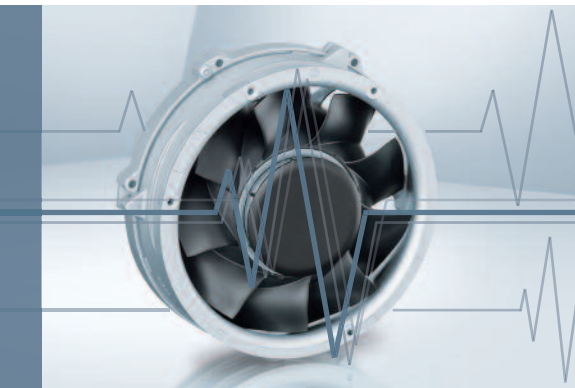
Signal data		Speed signal U _S Low	Condition: I _{sink}	Speed signal U _S High	Condition: I _{source}	Admissible sink current I _{sink} max.	Fan description Basic type
Type	VDC	mA	VDC	mA	mA	Page	
7214 N/12	≤0.4	2	2.5–5.5	1	≤20	70	
6424/12 H	≤0.4	2	2.5–5.5	1	≤20	71	
DV 6424/12	≤0.4	2	4.5–5.25	2	≤12	73	
DV 6448/12	≤0.4	2	4.5–5.25	2	≤12	73	
RG 125-19/12 N/12	≤0.4	1	2.5–5.5	1	≤1	103	
RG 160-28/12 N/12	≤0.4	2	2.5–5.5	1	≤5	104	
RG 160-28/18 N/12	≤0.4	2	2.5–5.5	1	≤20	104	
RER 125-19/12 N/12	≤0.4	1	2.5–5.5	1	≤1	116	
RER 160-28/12 N/12	≤0.4	2	2.5–5.5	1	≤5	118	
RER 160-28/18 N/12	≤0.4	2	2.5–5.5	1	≤20	118	

Subject to change

Note:

Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

Alarm signal /17



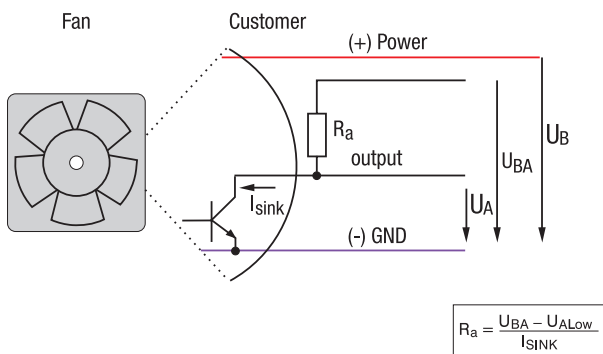
- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a continuous high signal during trouble-free operation within the permissible voltage range.
- Low signal when speed limit is not reached
- After elimination of the fault, the fan returns to its setpoint speed; the alarm signal reverts to high.

Alarm signal data		Alarm output voltage U_A Low	Condition:	Condition: $I_{\text{sink}} =$	Alarm output voltage U_A High	Condition:	Condition: I_{source}	Alarm operating voltage U_{BA} max.	Max. permissible sink current	Alarm startup delay time t_G	Condition:	Speed limit n_G	Fan description Basic type
Type	VDC	mA	VDC	mA	VDC	mA	VDC	mA	s	min^{-1}	Page		
8318 /17	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1500 ± 100	46	
8318 /17 H	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1500 ± 100	46	
4318 /17	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	850 ± 100	56	
4184 N /17 X	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1500 ± 100	60	

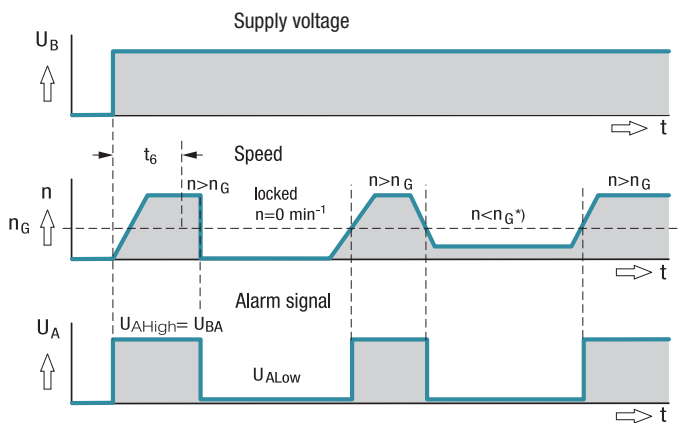
Subject to change

Note: Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

Electrical hookup



All voltages measured to ground.
External load resistor R_a from U_A to U_{BA} required.



t_G = Alarm signal suppression during startup.
* $n < \text{speed limit } n_G$ by braking or locking.

Available on request:

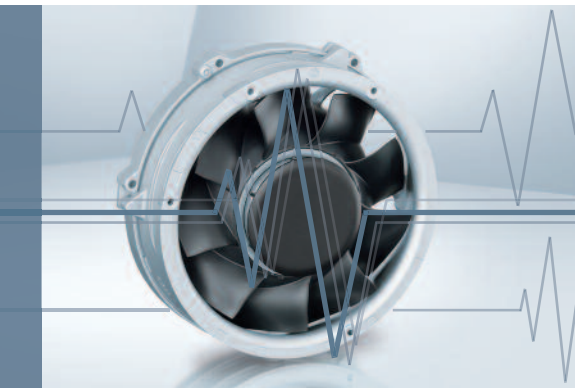
- Integrated signal storage for subsequent recognition of short-term faults (latch).
 - Alarm circuit open collector or TTL.
 - Electrically isolated for maximum device safety
- Defects in the power circuit do not affect the alarm circuit.

Alarm signal data	Alarm output voltage U_A Low	Condition:	Condition: $I_{\text{sink}} =$	Alarm output voltage U_A High	Condition:	Condition: I_{source}	Alarm operating voltage U_{BA} max.	Max. permissible sink current	Alarm startup delay time t_G	Condition:	Speed limit n_G	Fan description Basic type
Type	VDC		mA	VDC		mA	VDC	mA	s		min^{-1}	Page
4312/17 MT VARIOFAN	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1500 ± 100	57
4312/17 T VARIOFAN	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1500 ± 100	57
4314/17 T VARIOFAN	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	1150 ± 100	57
4318/17 T VARIOFAN	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	20	≤ 15	*	850 ± 100	57
7214 N/17	≤ 0.4	$n < n_G$	2	≤ 60	$n > n_G$	0	60	15	≤ 15	*	1330 ± 60	70
Subject to change										* After switching on U_B		

Note:

Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

Alarm signal /19



- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a continuous low signal during trouble-free operation within the permissible voltage range.
- High signal when speed limit is not reached
- After elimination of the fault, the fan returns to its setpoint speed; the alarm signal reverts to low.

Alarm signal data	Alarm output voltage U_A Low	Condition:	Condition: $I_{sink} =$	Alarm output voltage U_A High	Condition:	Condition: I_{source}	Alarm operating voltage U_{BA} max.	Max. permissible sink current	Alarm startup delay time t_G	Condition:	Speed limit n_G	Fan description Basic type
Type	VDC		mA	VDC		mA	VDC	mA	s		min^{-1}	Page
8314/19 H	≤ 0.4	$n > n_G$	2	≤ 60	$n < n_G$	0	60	20	≤ 15	*	1500 ± 100	46
4312/19	≤ 0.4	$n > n_G$	2	≤ 60	$n < n_G$	0	60	20	≤ 15	*	1500 ± 100	56
7214 N/19	≤ 0.4	$n > n_G$	2	≤ 60	$n < n_G$	0	60	10	≤ 15	*	1800 ± 20	70
RLF 100-11/14/19	≤ 0.4	$n > n_G$	2	≤ 28	$n < n_G$	0	28	10	≤ 15	*	1900 ± 100	100
RER 101-36/18N/19 HH	≤ 0.4	$n > n_G$	2	≤ 28	$n < n_G$	0	28	10	≤ 15	*	1900 ± 100	111

Subject to change * After switching on U_B

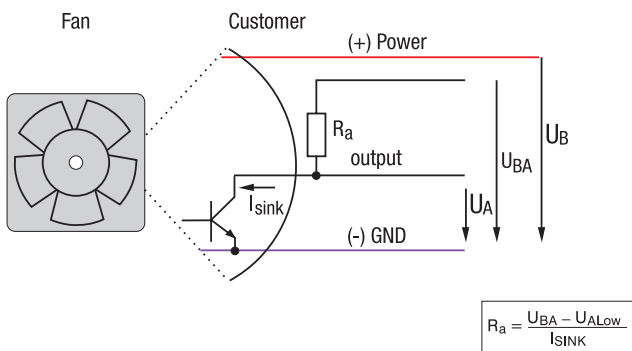
Note:

Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

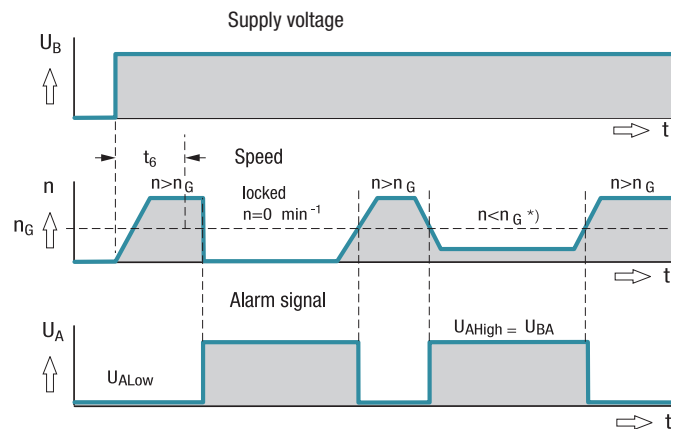
Available on request:

- Integrated signal storage for subsequent recognition of short-term faults (latch).
- Alarm circuit open collector or TTL.
- Electrically isolated for maximum device safety; Defects in the power circuit do not affect the alarm circuit.

Electrical hookup



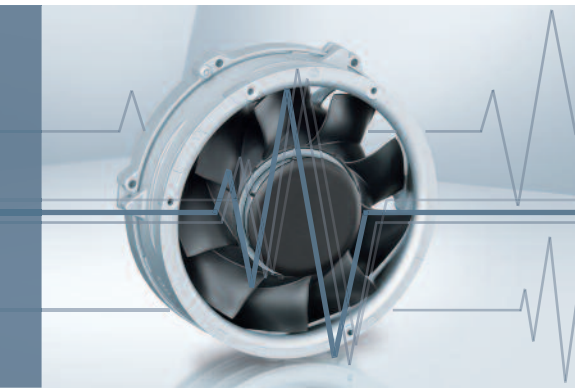
All voltages measured to ground
External load resistor R_a from U_A to U_{BA} required.



t_G = Alarm signal suppression during startup.
* $n < n_G$ by braking or locking.

Alarm signal /37

Go / NoGo alarm



- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a continuous high signal during trouble-free operation within the permissible voltage range.
- Low signal when speed limit is not reached
- After elimination of the fault, the fan returns to its setpoint speed; the alarm signal reverts to high.

Alarm signal data		Alarm output voltage U_A Low	Condition:	Condition: $I_{sink} =$	Alarm output voltage U_A High	Condition:	Condition: I_{source}	Alarm operating voltage U_{BA} max.	Max. permissible Sink current I_{sink}	Alarm delay time t_d	Condition:	Speed limit n_G	Fan description Basic type
Type	VDC	mA	VDC	mA	VDC	mA	VDC	mA	s		min^{-1}	Page	
8412 N/37 GMLV	≤ 0.4	$n \leq n_G$	2	≤ 28	$n > n_G$	0	28	10	< 1	*	0	45	
3412 N/37 GV	≤ 0.4	$n \leq n_G$	2	≤ 28	$n > n_G$	0	28	10	< 1	*	0	49	

Subject to change * After switching on U_B

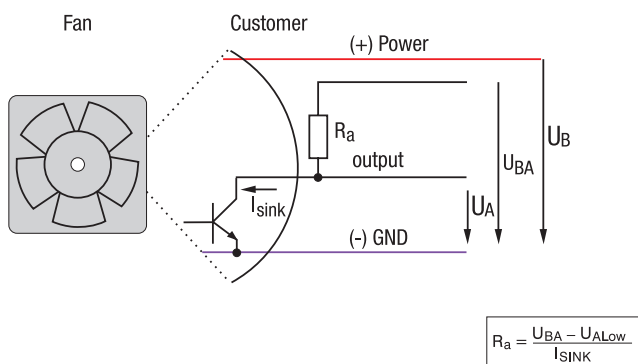
Note:

Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

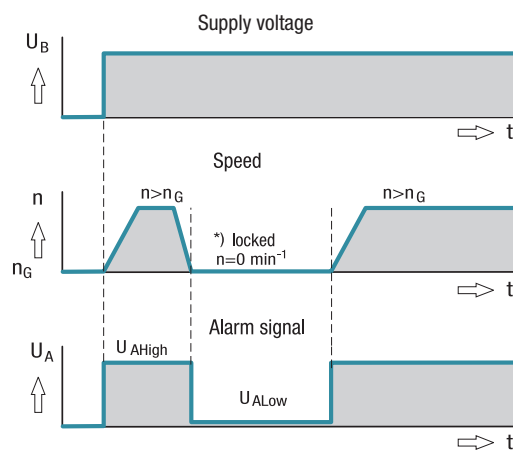
Available on request:

- Alarm circuit TTL compatible.

Electrical hookup



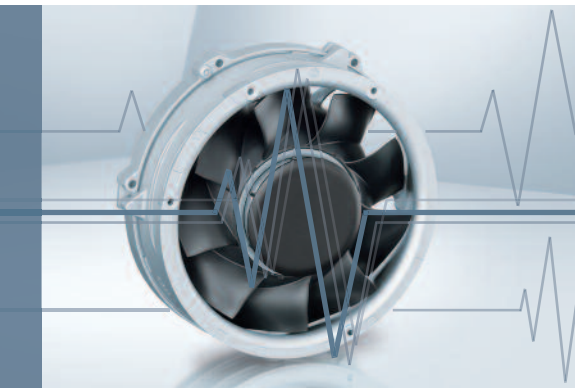
All voltages measured to ground
External load resistor R_a from U_A to U_{BA} required.



* Speed limit $n_G = 0$ rpm

Alarm signal /39

Go / NoGo alarm



- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a continuous low signal during trouble-free operation within the permissible voltage range.
- High signal when speed limit is not reached
- After elimination of the fault, the fan returns to its setpoint speed; the alarm signal reverts to low.

Alarm signal data	Alarm output voltage U_A Low			Alarm output voltage U_A High			Alarm operating voltage U_{BA} max.	Max. permissible Sink current I_{sink}	Alarm delay time t_d	Condition:	Speed limit n_G	Fan description Basic type
	Type	VDC	mA	VDC	mA	Condition: source						
412/39	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	33
612 F/39 H	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	36
614 N/39 M	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	39
618 N/39 N	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	39
3412 N/39 H	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	48
3414 N/39 HH	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	48
4412 F/39 GL	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	53
4412 F/39 M	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	53
4414 F/39	≤ 0.5	$n > n_G$	2	≤ 28	$n = n_G$	0	28	10	< 1	*	0	53
4414 FN/39 H	≤ 0.4	$n > n_G$	2	≤ 30	$n = n_G$	0	30	4	< 1	*	0	55

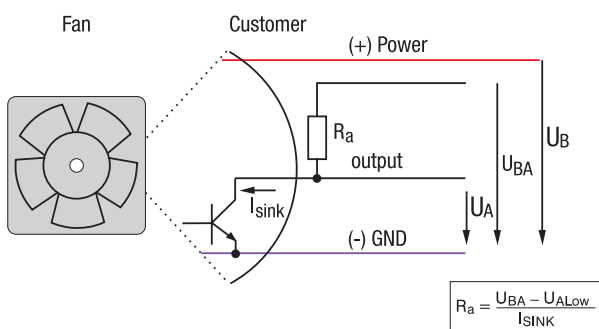
Subject to change

* After switching on U_B

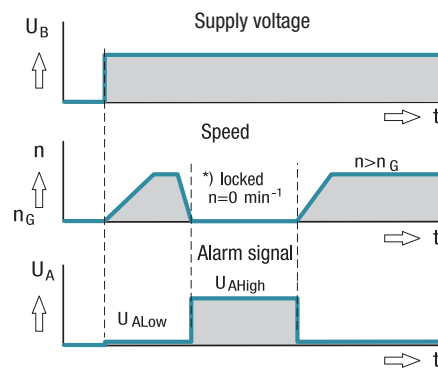
Note:

Fans that come with these fan specials could have variations with respect to the temperature range, voltage range, and power consumption compared to standard fans without specials.

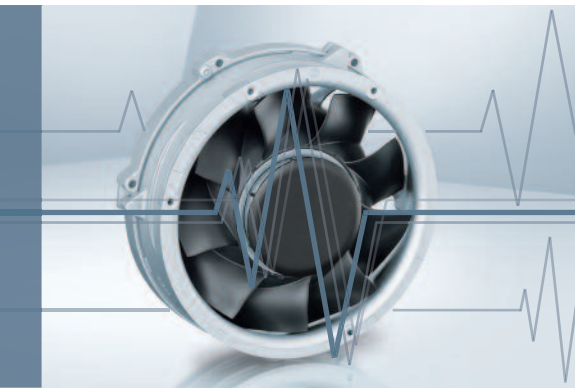
Electrical hookup



All voltages measured to ground
External load resistor R_a from U_A to U_{BA} required.



* Speed limit $n_G = 0$ rpm



- "Software instead of hardware" aptly describes the unique fan concept. Fans come equipped with tailor-made intelligence for cooling electronics.
- The main advantages are flexible configuration based on software, faster availability, sampling from the factory, and the ability to supply customer-specific solutions in any quantity.

Vario-Pro features

External speed setting

- Speed setting via temperature, PWM or analog control voltage
See page 178 (Speed setting)
- Description of speed curve with up to 14 selectable interpolation points.
Linear interpolation between the points.
- 0 rpm speed possible
- Sensor break detection: If the sensor signal is lost, the fan will operate at any programmable speed.

Alarm and tachometer functions

- Optional alarm and/or tachometer function
- Selectable alarm speed limit (with hysteresis) and alarm delay time
- Storing of the alarm signal
- Delay only when starting or permanently active
- "High" or "low" output signal for alarm
- Optional alarm if temperature sensor fails
- Optional alarm in case of overtemperature

Motor management

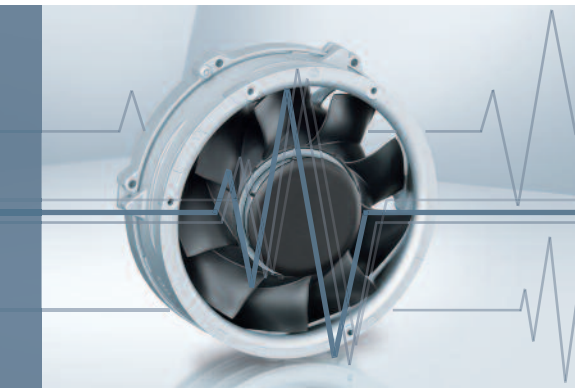
- High control accuracy due to digital motor management
- Increased operating efficiency due to optimum coordination of motor hardware and software

Fan series	Page
620	37
8400 N	44
8300	46
8200 J	47
3400 N	48
3300 N	50
3200 J	51
3250 J	52
4400 FN	55
4300	56
4100 N	60
4100 NH...NH6	61

Fan series	Page
4100 NH 7-8	62
DV 4100	63
5200 N	64
DV 5200	65
5100 N	66
5300	67
7100 N	69
7200 N	70
6400	71
DV 6400	73
6300 N	76
6300 NTD	77

Fan series	Page
6300	78
DV 6300 TD	80
RL 90 N	99
RLF 100	100
RG 90 N	101
RG 125 N	102
RG 140	103
RG 160 N	104
REF 100	110
RER 101 N	111
RER 125 N	116
RER 160 N	118

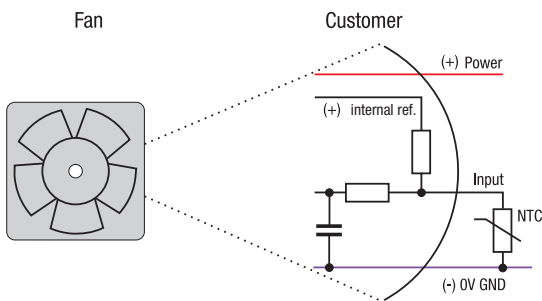
Speed setting via temperature sensor



- The control variable is a temperature sensor that is either integrated in the fan or connected to an additional control cable.

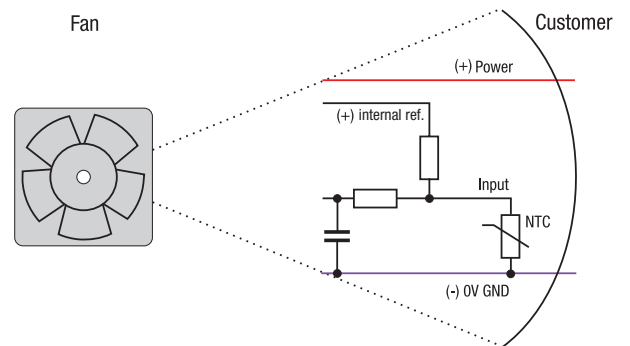
External temperature sensor type T

- Ext. NTC resistor type LZ370 (p. 257) is required (not included in the standard scope of delivery)

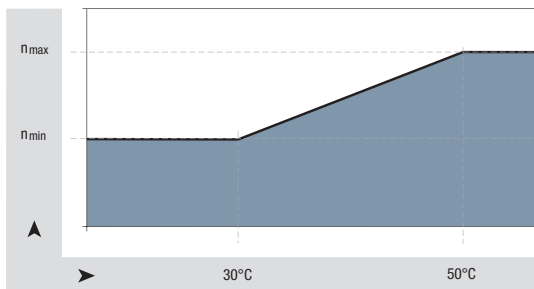


Internal temperature sensor type I

- NTC integrated in the fan hub



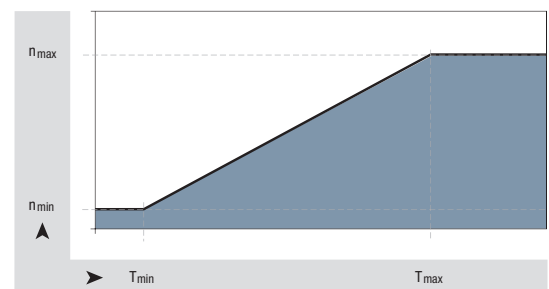
Standard speed/temperature curve for type T and type I



$$n_{\min} \approx \frac{1}{2} n_{\max}$$

$$T_{\min} \approx 30 \text{ }^{\circ}\text{C}; T_{\max} = 50 \text{ }^{\circ}\text{C}$$

Optionally available with selectable temperature/speed curve

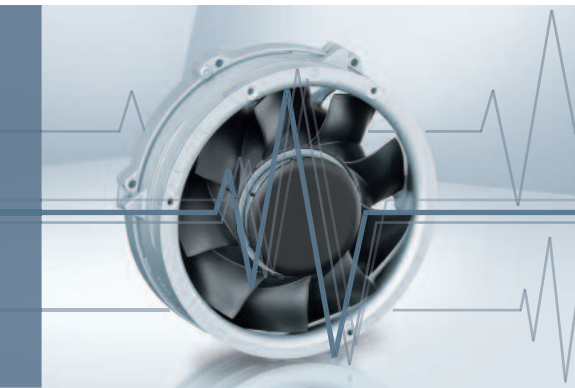


$$n_{\min} \approx 800 \text{ }^1/\text{min} \quad n_{\max} \text{ based on model}$$

$$T_{\min} \approx 5 \text{ }^{\circ}\text{C} \quad T_{\max} \leq 85 \text{ }^{\circ}\text{C, based on model}$$

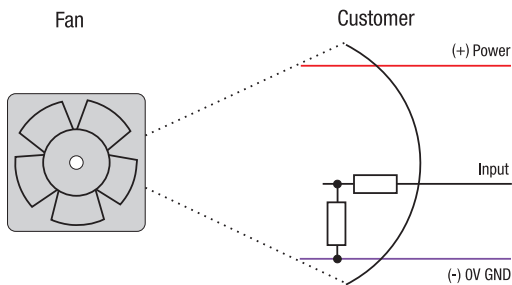
Speed setting via control voltage or PWM signal

– The control variable is a PWM signal or analog control voltage.



Speed setting via analog control voltage type A

– Standard control range 0 ... 10 V

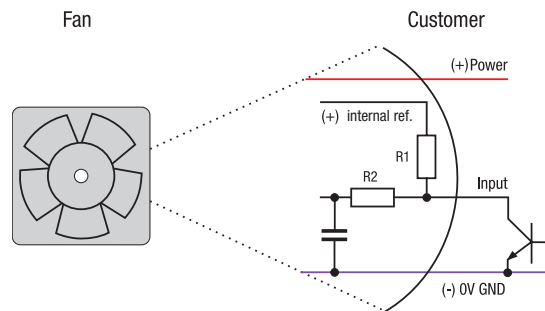


Typical input resistance > 10 k

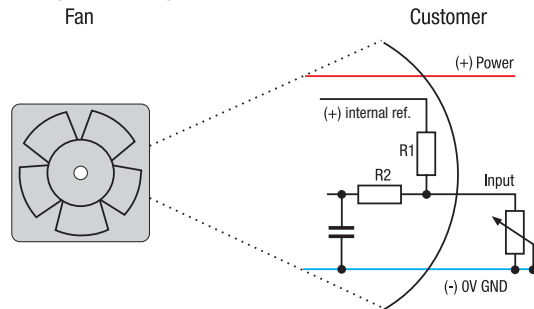
Speed setting via PWM type P

– Standard PWM signal in two versions

- a) PWM frequency, mainly 1 ... 10 kHz (0-100%), Open-collector input
- b) Four-wire interface according to Intel specifications for 12 VDC fans, PWM frequency 25 kHz, incl. speed signal /2



– Optional with potentiometer

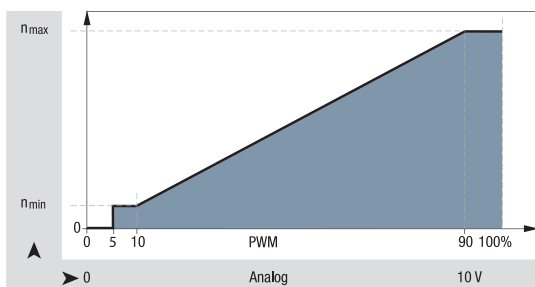


Internal reference = + 5 V

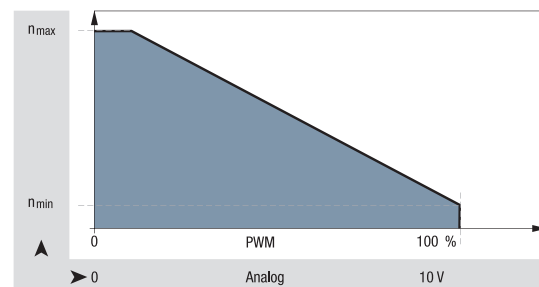
R1 typical 4.7...10 k Ω

R2 typical 100 k Ω

Standard P / A curve

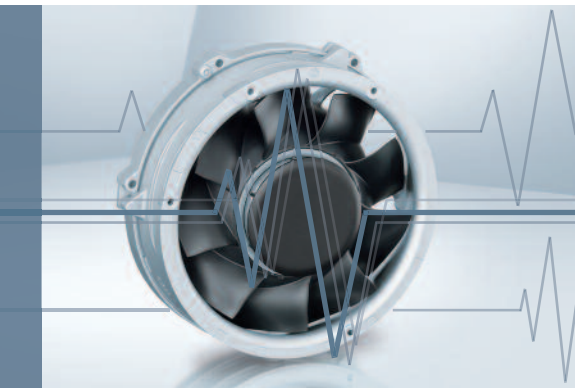


Optionally available with selectable P / A speed curve

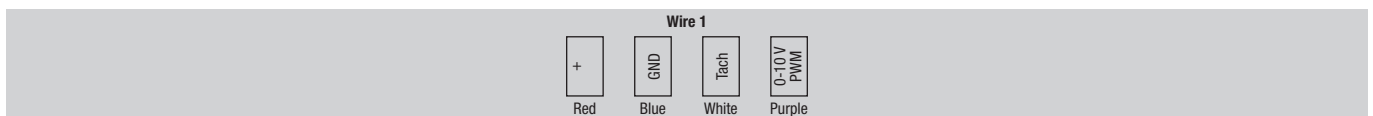
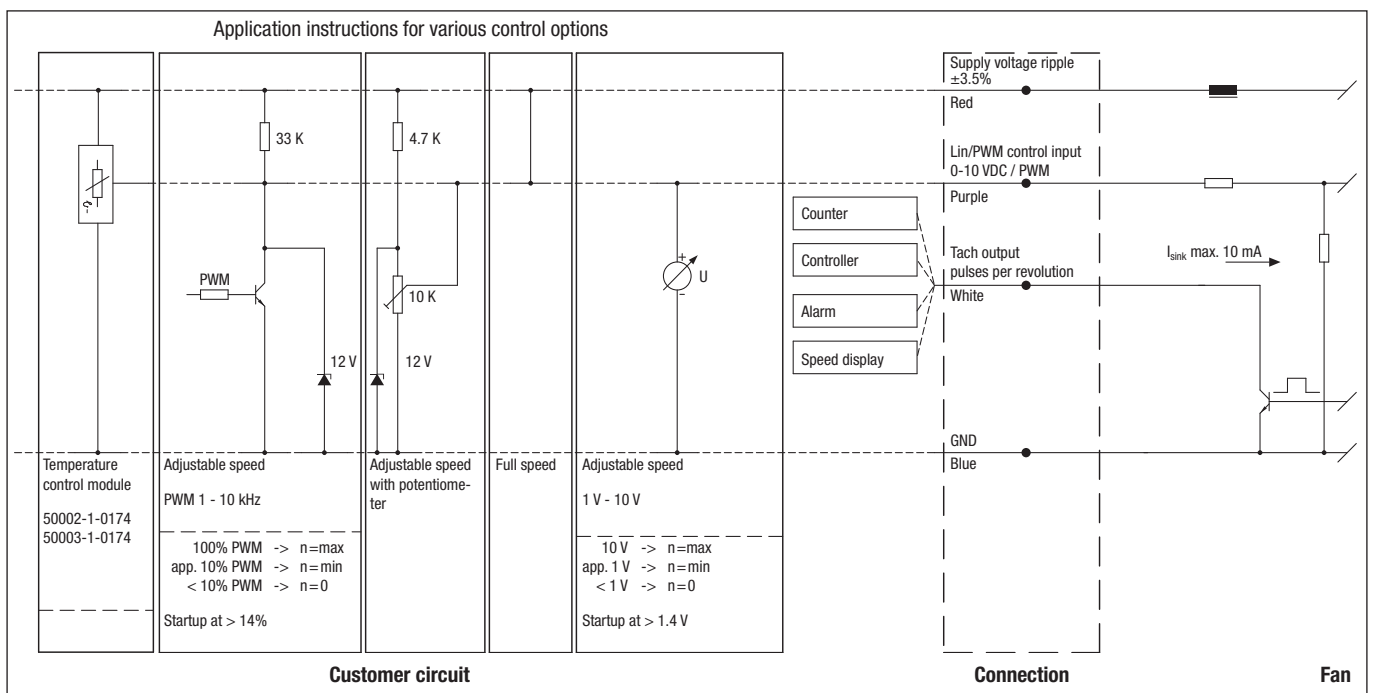


Speed setting via Control input

- Customer can operate input either with PWM signal, analog voltage, external temperature control module, or resistor.
- The control signal speed characteristics of the fan differ from the standard curve of the A and P inputs (see p. 179).
- To reach the maximum speed, the control cable must be connected to the U_B .
- The control input is usually combined with an open collector tachometer (type /2, see page 168).



Speed setting via multi-option control input type 0



Wire	Connection	Color	Assignment/function	Wire	Connection	Color	Assignment/function
1	+	Red	Supply voltage ripple ±3.5%	1	Tach	White	Tach output: 3 Impulse/revolution
	GND	Blue	GND				
					0-10 V / PWM	Purple	Control input (impedance 100 kV)

Protected fans

against environmental conditions

- Capable of satisfying special requirements for a broad range of applications
- Resistance of fans to environmental conditions such as dust, splashing water, humidity, spray water, and salt spray.
- Competent solutions to adapt fans to environmental conditions.



Moisture protection

A coat of paint over the motor and circuit board protect the fans against spray water and condensation.

Degree of protection IP 54 / IP 68*

In the degree of protection IP 54, the motor and circuit boards are coated and therefore protected against spray water and moisture.

The degree of protection IP 68 is important for ebm-papst products, as it ensures a high degree of protection for the encapsulated motor and electronics against foreign bodies and water, while protecting the user against potential hazards upon contact. Degrees of protection higher than IP 68 are possible on request.

Solutions that are available and are used may differ depending on the fan size. We would be glad to develop solutions tailored to the demands of your application.

Salt spray protection

Salt spray represents one of the most difficult requirements for product durability. ebm-papst has the technology to protect fans and blowers from salt spray reliably and for the long term.

Stainless steel bearings

Special bearings made of stainless steel provide additional protection.

Degree of protection – IP code*

Protection against foreign bodies and accidental contact (first digit)		Water protection (second digit)	
X	No protection	X	No protection
1	Protection against foreign objects > 50 mm (back of the hand)	1	Protection against dripping water or condensation
2	Protection against foreign objects > 12 mm (finger)	2	Protection against dripping water, fans tilted 15° from vertical
3	Protection against foreign objects > 2.5 mm (tool)	3	Protection against sprayed water up to 60° from vertical
4	Protection against foreign objects > 1 mm (wire)	4	Protection against sprayed water from all sides
5	Protection against dust in harmful quantities	5	Protection against low-pressure water jets
6	Dust-proof	6	Protection against high-pressure water jets
		7	Protection against temporary submersion (15 cm - 1 m)
		8	Protection against continuous submersion

* IP = International degree of protection marking

For AC-fans max. IP 65 available

