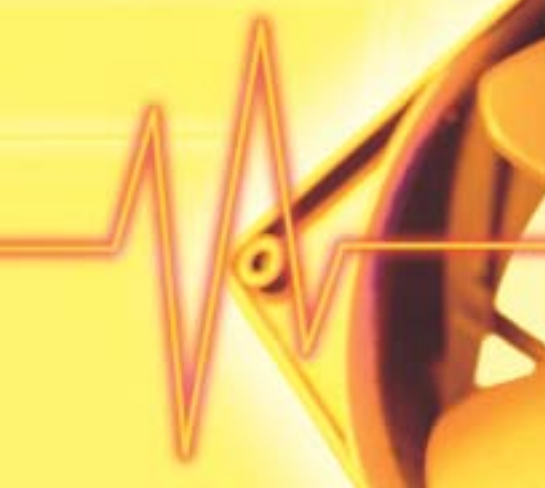


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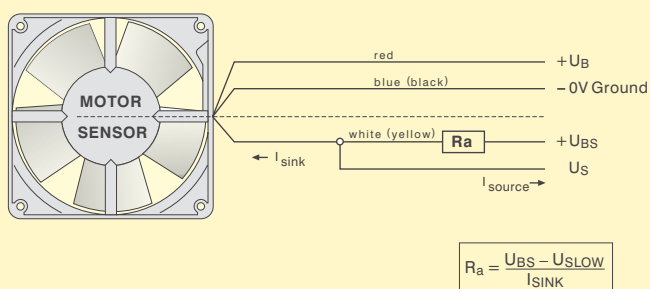
- Speed-proportional rectangular pulse for external speed monitoring of fan motor
- 2 pulses per revolution
- Open-Collector signal output
- Extremely wide operating voltage range (5 ... 60 V)

- Easy adaptation to user interface
- Connection via separate lead
- The sensor signal also serves as a major comparison variable for setting and maintaining the desired speed for interactive or controlled cooling with one or several inter-connected fans.

Sensor Signal / 2

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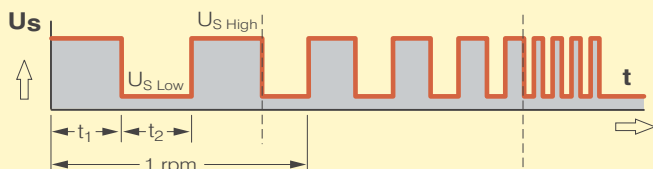
Electrical connection



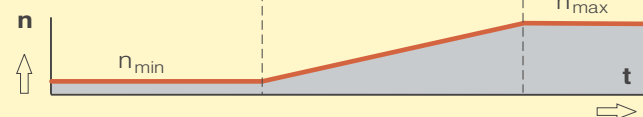
All voltages measured to ground.

External load resistance R_a from U_S to U_{BS} required.

Signal output voltage



Fan speed



Signal symmetry $[t_1, t_2] = 0.8 \dots 1.2$

Signal frequency $[F] = 2 \times n / 60 \text{ Hz}$

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

Type	Signal data		Sensor signal		Condition : Isink		Sensor signal		Condition : Isource		Sensor operating voltage UBS		Perm. sink current Isink max.		Fan description
	V DC	mA	V DC	mA	V DC	mA	V DC	mA	V DC	mA	V DC	mA	V DC	mA	
255 N/2	≤ 0.4	≤ 2	30	0	max. 30	2	16								
255 H/2	≤ 0.4	≤ 2	30	0	max. 30	2	16								
252 N/2	≤ 0.4	≤ 2	30	0	max. 30	2	16								
405 F/2	≤ 0.4	1	30	0	4-30	≤ 2	17								
412 F/2 H	≤ 0.4	1	30	0	4-30	≤ 2	17								
405 /2	≤ 0.4	1	30	0	4-30	≤ 2	17								
412 /2	≤ 0.4	1	30	0	4-30	≤ 2	17								
414 /2	≤ 0.4	1	30	0	4-30	≤ 2	17								
414 /2 H	≤ 0.4	1	30	0	4-30	≤ 2	17								
512 F/2	≤ 0.4	1	30	0	4-30	≤ 2	18								
612 F/2	≤ 0.4	1	30	0	4-30	≤ 2	19								
614 N/2 M	≤ 0.4	2	28	0	4-30	≤ 4	20								
8412 N/2 GL	≤ 0.4	2	28	0	4-30	≤ 4	23								
8412 N/2 GM	≤ 0.4	2	28	0	4-30	≤ 4	23								
8412 N/2 G	≤ 0.4	2	28	0	4-30	≤ 4	23								
8414 N/2 GL	≤ 0.4	2	28	0	4-30	≤ 4	23								
8414 N/2 GM	≤ 0.4	2	28	0	4-30	≤ 4	23								
8414 N/2 G	≤ 0.4	2	28	0	4-30	≤ 4	23								
8414 N/2	≤ 0.4	2	28	0	4-30	≤ 4	23								
8312 /2 HL	≤ 0.4	2	30	0	4-30	≤ 4	25								
8314 /2	≤ 0.4	2	30	0	4-30	≤ 4	25								
8318 /2	≤ 0.4	2	30	0	4-30	≤ 4	25								
8318 /2 HL	≤ 0.4	2	30	0	4-30	≤ 4	25								
3412 N/2 GL	≤ 0.4	2	28	0	4-28	≤ 4	26								
3412 N/2 GM	≤ 0.4	2	28	0	4-28	≤ 4	26								
3412 N/2 G	≤ 0.4	2	28	0	4-28	≤ 4	26								
3412 N/2 GHH	≤ 0.4	2	28	0	4-28	≤ 4	26								
3414 N/2 GH	≤ 0.4	2	28	0	4-28	≤ 4	26								
3312 /2	≤ 0.4	2	30	0	4-30	≤ 4	28								
3318 /2	≤ 0.4	2	30	0	4-30	≤ 4	28								

Available on request:

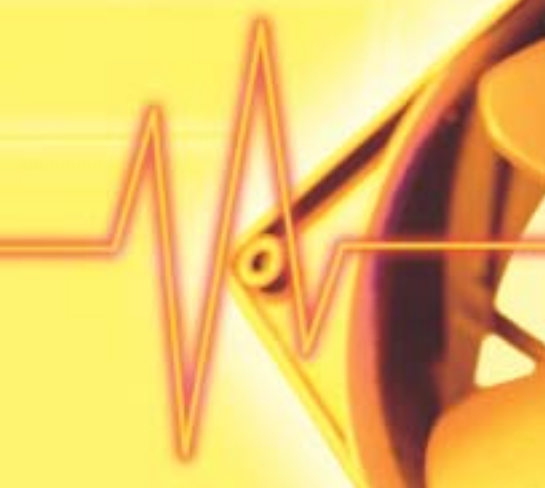
- Galvanically separated sensor signal circuit
- Varying voltage potentials for power and logic circuit.

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Signal data	Sensor signal		Condition:		Sensor signal		Condition:		Sensor operating voltage U_{S}		Perm. sink current $I_{SINK\ max.}$		Fan description
	Type	$U_{S\ Low}$	I_{SINK}		$U_{S\ High}$		I_{SOURCE}		V DC	mA	V DC	mA	Page
4412 F/2 GL		≤ 0.4	2		30	0			4-30	≤ 4			29
4412 F/2 GML		≤ 0.4	2		30	0			4-30	≤ 4			29
4412 F/2 M		≤ 0.4	2		30	0			4-30	≤ 4			29
4412 F/2		≤ 0.4	2		30	0			4-30	≤ 4			29
4414 F/2 L		≤ 0.4	2		30	0			4-30	≤ 4			29
4414 F/2 M		≤ 0.4	2		30	0			4-30	≤ 4			29
4414 F/2 G		≤ 0.4	2		30	0			4-30	≤ 4			29
4414 F/2		≤ 0.4	2		30	0			4-30	≤ 4			29
4418 F/2		≤ 0.4	2		30	0			4-30	≤ 4			29
4312 N/2 H		≤ 0.4	2		30	0			4-30	≤ 4			30
4312 /2		≤ 0.4	2		30	0			4-30	≤ 4			31
4314 /2 G		≤ 0.4	2		30	0			4-30	≤ 4			31
4314 /2		≤ 0.4	2		30	0			4-30	≤ 4			31
4318 /2 G		≤ 0.4	2		30	0			4-30	≤ 4			31
4318 /2 M		≤ 0.4	2		30	0			4-30	≤ 4			31
4318 /2		≤ 0.4	2		30	0			4-30	≤ 4			31
4212 N/2 GN		≤ 0.4	2		30	0			4-30	≤ 4			33
4214 N/2 GN		≤ 0.4	2		30	0			4-30	≤ 4			33
4214 N/2 H		≤ 0.4	2		30	0			4-30	≤ 4			33
4218 N/2 GN		≤ 0.4	2		30	0			4-30	≤ 4			33
4212 /2 M		≤ 0.4	2		30	0			4-30	≤ 4			34
4212 /2		≤ 0.4	2		30	0			4-30	≤ 4			34
4212 /2 H		≤ 0.4	2		30	0			4-30	≤ 4			34
4214 /2		≤ 0.4	2		30	0			4-30	≤ 4			34
4214 /2 H		≤ 0.4	2		30	0			4-30	≤ 4			34
4218 /2		≤ 0.4	2		30	0			4-30	≤ 4			34
4218 /2 H		≤ 0.4	2		30	0			4-30	≤ 4			34
4184 N/2 X		≤ 0.4	2		30	0			4-30	≤ 4			35
4184 N/2 XH		≤ 0.4	2		30	0			4-30	≤ 4			35
5112 N/2		≤ 0.4	2		15	0			≤ 5	≤ 20			38
5114 N/2		≤ 0.4	2		60	0			≤ 60	≤ 20			38
5118 N/2		≤ 0.4	2		60	0			≤ 60	≤ 20			38

Signal data	Sensor signal		Condition:		Sensor signal		Condition:		Sensor operating voltage U_{S}		Perm. sink current $I_{SINK\ max.}$		Fan description
	Type	$U_{S\ Low}$	I_{SINK}		$U_{S\ High}$		I_{SOURCE}		V DC	mA	V DC	mA	Page
7112 N/2		≤ 0.4	2		60	0			≤ 60	≤ 20			39
7114 N/2		≤ 0.4	2		30	0			≤ 30	≤ 20			39
7118 N/2		≤ 0.4	2		60	0			≤ 60	≤ 20			39
6224 N/2		≤ 0.4	8		30	0			≤ 30	≤ 20			41
6248 N/2		≤ 0.4	8		60	0			≤ 30	≤ 20			41
DV 6224 /2		≤ 0.4	2		30	0			≤ 60	≤ 20			43
6448 /2		≤ 0.4	2		60	0			≤ 60	≤ 20			45
6448 /2 T		≤ 0.4	2		60	0			≤ 60	≤ 20			45
RL 90-18/12N/2		≤ 0.4	2		30	0			4-30	≤ 4			46
RL 90-18/14N/2		≤ 0.4	2		30	0			4-30	≤ 4			46
RG 90-18/12N/2		≤ 0.4	2		30	0			4-30	≤ 4			47
RG 90-18/14N/2		≤ 0.4	2		30	0			4-30	≤ 4			47
RG 125-19/14N/2		≤ 0.4	2		30	0			4-30	≤ 4			48
RG 125-19/18N/2		≤ 0.4	2		60	0			4-30	≤ 4			48
RG 160-28/14N/2		≤ 0.4	2		30	0			4-30	≤ 20			49

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



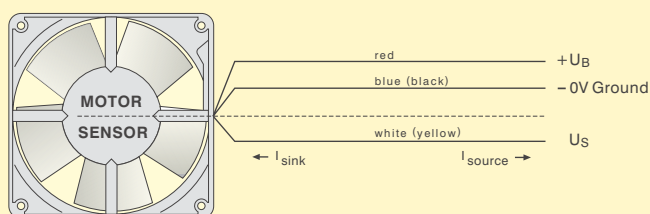
- Speed-proportional rectangular pulse for external speed monitoring of fan motor
- 2 pulses per revolution
- TTL-compatible
- Integrated pull-up resistor
- Connection via separate lead

- The sensor signal also serves as a major comparison variable for setting and maintaining the desired speed for interactive or controlled cooling with one or more interconnected fans.

Sensor Signal / 12

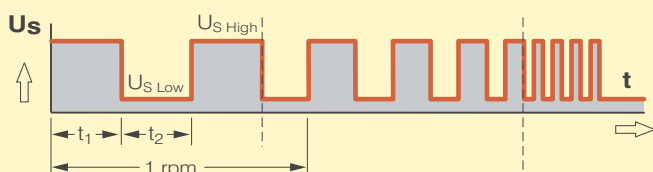
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Electrical connection

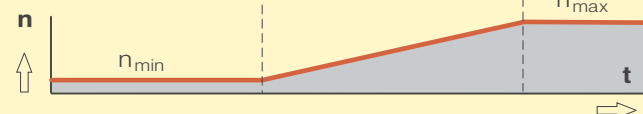


All voltages measured to ground.

Signal output voltage



Fan speed



Signal symmetry $[t_1, t_2] = 0.8 \dots 1.2$
Signal frequency $[F] = 2 \times n/60 \text{ Hz}$

Signal data

Type	Sensor signal $U_{S \text{ Low}}$		Sensor signal $U_{S \text{ High}}$		Perm. sink current $I_{\text{sink max.}}$	Fan description
	V DC	mA	V DC	mA		
614 N/12 GM	≤ 0.4	1	2.5–5.5	1	1	20
618 N/12 N	≤ 0.4	1	2.5–5.5	1	1	20
8312 /12	≤ 0.4	1	2.5–5.5	1	1	25
8314 /12	≤ 0.4	1	2.5–5.5	1	1	25
8314 /12 H	≤ 0.4	1	2.5–5.5	1	1	25
8318 /12 HL	≤ 0.4	1	2.5–5.5	1	1	25
8318 /12 H	≤ 0.4	1	2.5–5.5	1	1	25
3318 /12 H	≤ 0.4	1	2.5–5.5	1	1	28
4412 F/12 GML	≤ 0.4	1	2.5–5.5	1	1	29
4412 F/12 GM	≤ 0.4	1	2.5–5.5	1	1	29
4414 F/12	≤ 0.4	1	2.5–5.5	1	1	29
4418 F/12	≤ 0.4	1	2.5–5.5	1	1	29
4312 /12 L	≤ 0.4	1	2.5–5.5	1	1	31
4312 /12 M	≤ 0.4	1	2.5–5.5	1	1	31
4314 /12	≤ 0.4	1	2.5–5.5	1	1	31
4318 /12	≤ 0.4	1	2.5–5.5	1	1	31
4212 /12 L	≤ 0.4	1	2.5–5.5	1	1	34
4212 /12	≤ 0.4	1	2.5–5.5	1	1	34
4212 /12 H	≤ 0.4	1	2.5–5.5	1	1	34
4214 /12	≤ 0.4	1	2.5–5.5	1	1	34
4214 /12 H	≤ 0.4	1	2.5–5.5	1	1	34
4218 /12	≤ 0.4	1	2.5–5.5	1	1	34
4218 /12 H	≤ 0.4	1	2.5–5.5	1	1	34
4182 N/12 X	≤ 0.4	1	2.5–5.5	1	1	35

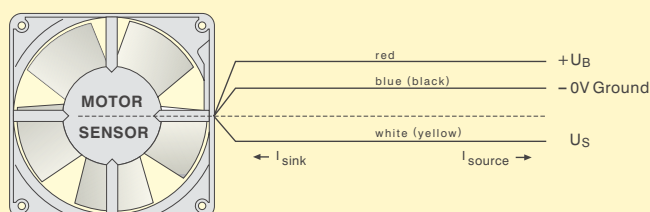
Attention: With these fan options, deviations in regard to temperature range, voltage range and power consumption are possible compared with standard fan data.

Available on request:

- Galvanically separated sensor and signal circuit
- Varying voltage potentials for power and logic circuit.

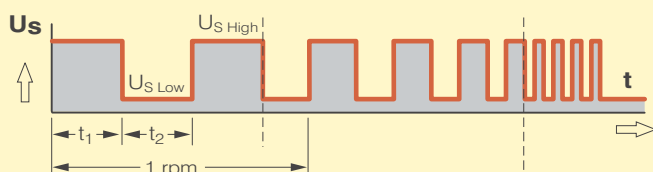
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Electrical connection

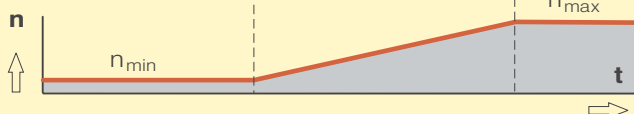


All voltages measured to ground.

Signal output voltage



Fan speed

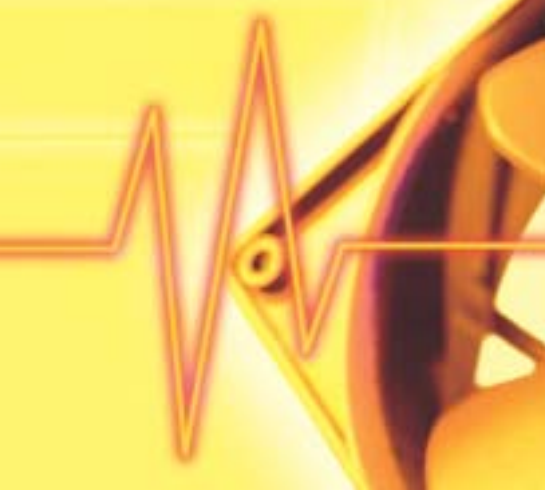


Signal symmetry $[t_1, t_2] = 0.8 \dots 1.2$
Signal frequency $[F] = 2 \times n/60 \text{ Hz}$

Signal data

Type	Sensor signal $U_{S \text{ Low}}$	Condition: I_{sink}	Sensor signal $U_{S \text{ High}}$	Condition: I_{source}	Perm. sink current $I_{\text{sink max}}$	Fan description
	V DC	mA	V DC	mA	mA	Page
5118 N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	38
7118 N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	39
7214 N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	40
6224 N/12 M	≤ 0.4	2	2.5–5.5	1	≤ 20	41
6248 N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	41
6248 N/12 T	≤ 0.4	2	2.5–5.5	1	≤ 5	41
DV 6224 /12	≤ 0.4	2	4.5–5.25	2	≤ 12	43
DV 6248 /12	≤ 0.4	2	4.5–5.25	2	≤ 12	43
6424 /12 H	≤ 0.4	2	2.5–5.5	1	≤ 20	45
RG 125-19/12N/12	≤ 0.4	1	2.5–5.5	1	≤ 1	48
RG 125-19/14N/12	≤ 0.4	1	2.5–5.5	1	≤ 1	48
RG 160-28/12N/12	≤ 0.4	2	2.5–5.5	1	≤ 5	49
RG 160-28/18N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	49
RER 160-28/12N/12	≤ 0.4	2	2.5–5.5	1	≤ 5	53
RER 160-28/18N/12	≤ 0.4	2	2.5–5.5	1	≤ 20	53

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

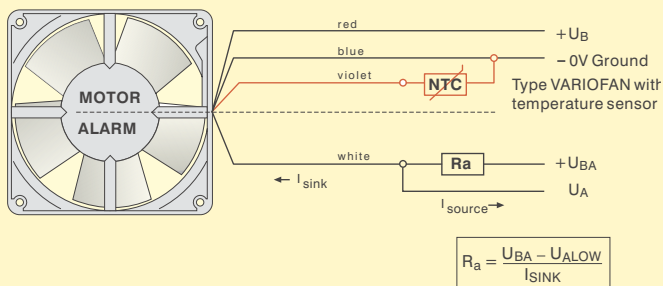


- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a high continuous signal during trouble-free operation within the permissible voltage range
- Low signal when speed limit is not reached.
- After elimination of fault, the fan returns to its desired speed; the alarm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

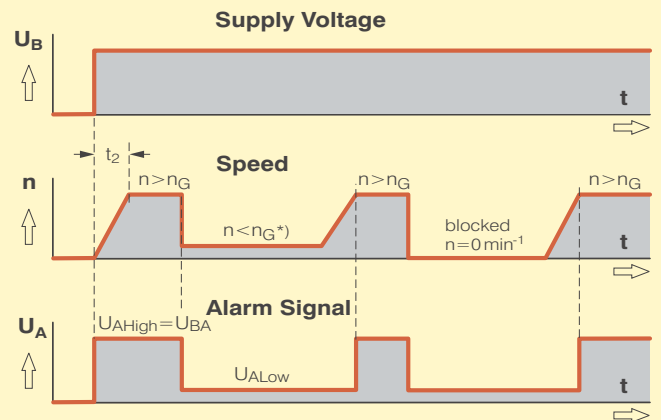
Alarm Signal / 17

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Electrical connection



All voltages measured to ground.
External load resistance R_a from U_A to U_{BA} required.
With VARIOFANS with external temperature sensor for controlling the motor speed, the NTC sensor is not included in the scope of delivery.
Temperature sensor LZ 370, see Accessories.



t_2 = Alarm signal suppression during start-up
* $n < n_G$ by braking or blocking.

Type	Alarm signal data												Fan description
	Alarm output voltage $U_{A\text{ Low}}$	Condition:	Condition: $I_{\text{sink}} =$	Alarm output voltage $U_{A\text{ High}}$	Condition:	Condition: I_{source}	Alarm operating voltage $U_{BA\text{ max.}}$	Max. permissible sink current	Alarm delay time t_2	Condition:	Speed limit n_G		
	V DC		mA	V DC		mA	V DC	mA	S		min ⁻¹		Page
8318/17	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	50	≤ 15	*	1500 ± 100		25
3312/17	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100		28
3318/17 H	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100		28
4312/17 L	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	20	≤ 15	*	850 ± 100		31
4314/17	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	20	≤ 15	*	1150 ± 100		31
4318/17	≤ 0.4	$n < n_G$	2	60	$n > n_G$	0	≤ 60	20	≤ 15	*	850 ± 100		31

Attention: With these fan specials, deviations as regards temperature range, voltage range and power consumption are possible compared with standard fans.

* After switching on U_B

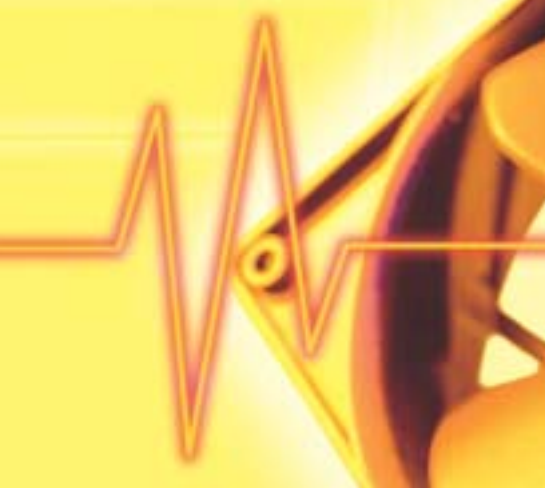
Available on request:

- With integrated signal latching for subsequent recognition of short-time faults
- Alarm circuit open collector or TTL
- Galvanically isolated for maximum device safety; Defects in the power circuit do not affect the alarm circuit.

Type	Alarm signal data												Fan description
	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 delay time t_2	Condition:	Speed limit n_G		
	V DC		mA	V DC		mA	V DC	mA	S		min ⁻¹		Page
4312/17 MV VARIOFAN	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1500 ± 100		32
4312/17 V VARIOFAN	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1500 ± 100		32
4314/17 V VARIOFAN	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1150 ± 100		32
4318/17 V VARIOFAN	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	850 ± 100		32
5112 N/17	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1250 ± 50		38
7114 N/17	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	15	≤ 15	*	1330 ± 60		39
DV 6224/17	≤ 0.4	n < nG	2	60–28	n > nG	0	≤ 60	10	10 ± 4	*	1900 ± 100		43
RG 125-19/14N/17	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1500 ± 100		48
RER 100-25/12/17	≤ 0.4	n < nG	2	60	n > nG	0	≤ 60	20	≤ 15	*	1150 ± 100		51

Attention: With these fan specials, deviations as regards temperature range, voltage range and power consumption are possible compared with standard fans.

* After switching on UB



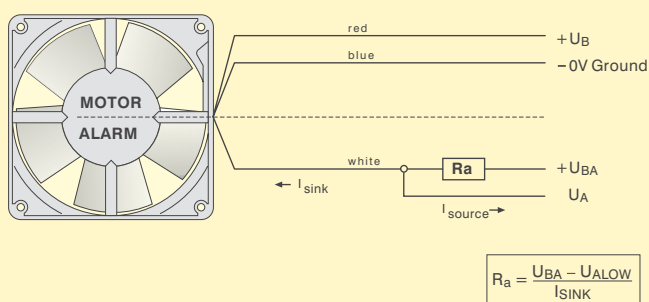
- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a low continuous signal during trouble-free operation within the permissible voltage range.

- High signal when speed limit is not reached.
- After elimination of fault, the fan returns to its desired speed; the alarm signal reverts to low.

Alarm Signal / 19

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Electrical connection

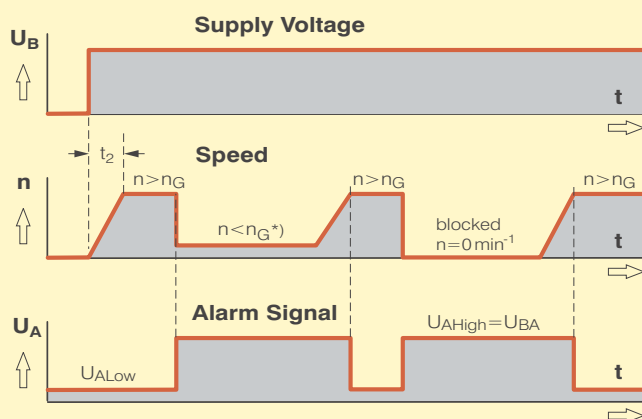


All voltages measured to ground.

External load resistance R_a from U_A to U_{BA} required.

Available on request:

- With integrated signal latching for subsequent recognition of short-term faults
- Alarm circuit open collector or TTL



t_2 = Alarm signal suppression during start-up

* $n < n_G$ by braking or blocking.

- Galvanically separated for max. device safety; defects in power circuit have no effect on the alarm circuit.

Type	Alarm signal data												Page
	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 delay time t_2	Condition:	Speed limit n_G	Fan description	
	V DC		mA	V DC		mA	V DC	mA	S		min ⁻¹		
8314/19 H	≤ 0.4	$n > n_G$	2	60	$n < n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100	25	
4312/19	≤ 0.4	$n > n_G$	2	60	$n < n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100	31	
4212/19 M	≤ 0.4	$n > n_G$	2	60	$n < n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100	34	
4214/19	≤ 0.4	$n > n_G$	2	60	$n < n_G$	0	≤ 60	20	≤ 15	*	1500 ± 100	34	
7214 N/19	≤ 0.4	$n > n_G$	2	60	$n < n_G$	0	4.5–60	10	10 ± 4	*	1800 ± 20	40	
DV 6224/19	≤ 0.4	$n > n_G$	2	≤ 28	$n < n_G$	0	16–28	10	10 ± 4	*	1900 ± 100	43	

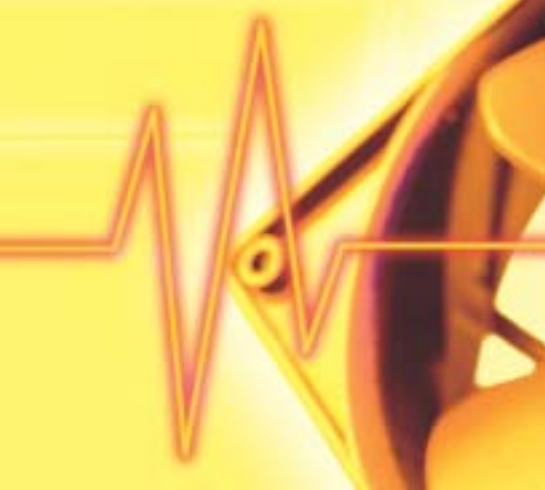
Attention: With these fan specials, deviations as regards temperature range, voltage range and power consumption are possible compared with standard fans.

* After switching on U_B

- ## Alarm Signal / 37

* $n < \text{Speed limit } n_G$ by braking or blocking.

* After switching on UB

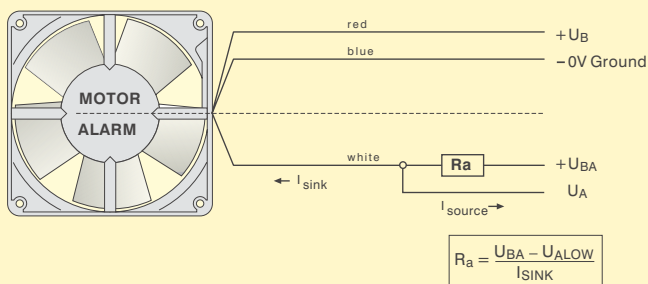


- Alarm signal for speed monitoring
- Signal output via open collector
- The fan emits a low continuous signal during trouble-free operation within the permissible voltage range.
- High signal when speed limit is not reached.
- After elimination of fault, the fan returns to its desired speed; the alarm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

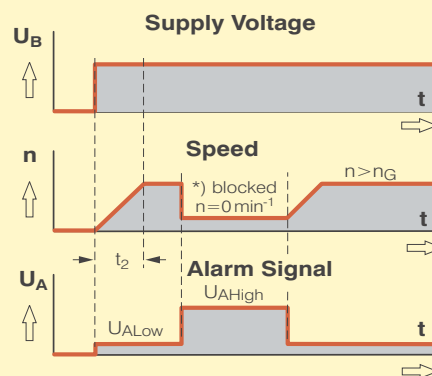
Alarm Signal / 39

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Electrical connection



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



t_2 = Alarm signal suppression during start-up
* $n < \text{Speed limit } n_G$ by braking or blocking

Type	Alarm signal data			Alarm output voltage U_A Low			Alarm output voltage U_A High			Alarm delay time t_2			Fan description
	Alarm output voltage U_A Low	Condition:	Condition: $I_{\text{sink}} =$	Alarm output voltage U_A Low	Condition:	Condition: $I_{\text{source}} =$	Alarm output voltage U_A High	Condition:	Condition: $I_{\text{source}} =$	Alarm output voltage U_A High	Condition:	Speed limit n_G	
	V DC		mA	V DC		mA	V DC		mA	S		min^{-1}	Page
3412N/39 H	≤ 0.5	$n > n_G$	2	28	$n = n_G$	0	≤ 28	10	≤ 28	10	<1	*	26
4418F/39	≤ 0.5	$n > n_G$	2	28	$n = n_G$	0	≤ 28	10	≤ 28	10	<1	*	29

* After switching on U_B

Attention: With these fan specials, deviations as regards temperature range, voltage range and power consumption are possible compared with standard fans.

TURBOFAN

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- TD motors with excellent control response and high speed range for air and pressure demands.
- Speed control and drive electronics fully integrated in the fan hub.

- For load-dependent speed control
- With highly intelligent motor management and with higher power and speed ranges for sophisticated high-end cooling applications.

TD fan drive

The motor technology of the PAPST TURBOFAN is treading new paths in fan construction. With TD motors, the fans can be operated within an extremely wide speed range with high precision speed control.

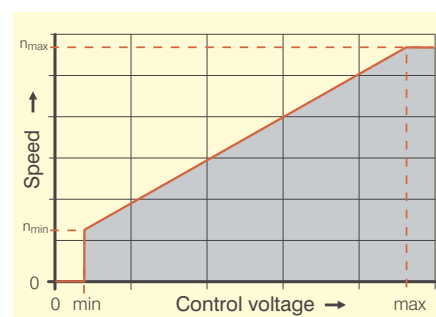
The extremely compact drive unit with microprocessor controlled motor manager and FET power output stage, is equipped with an internal speed controller. This means maximum flexibility for the user as the fan can be either voltage or speed controlled. The output stage can also be de-energized (motor enable) or the actual speed monitored via an open collector frequency output.

Description

- DC fans with 3-phase, electronically commutated drive
- Extremely efficient motor electronics : Power and control circuit are space-savingsly mounted on only one PCB
- Microprocessor-controlled motor management. High operating efficiency thanks to FET output stage
- Locked rotor protection and peak current limiter.
- Designed for maintenance-free, long-term continuous operation
- With NTC connection for temperature-controlled fan operation
- Available on request: Selectable direction. In reverse operation the fan reaches speed-dependent 75% of its maximum fan performance
- Available on request: Additional motor control input for braking

Versions

- Type T with external NTC connection for temperature-controlled fan operation
- Type I with NTC connection integrated in the rotor hub for temperature-controlled fan operation.
- Type A: Speed setting via control voltage. Simple speed control via separate DC low voltage interface (0-10 VDC).



- Type P: Speed setting via PWM signal which is user generated via a standard interface as a control variable.
PWM signal: 2 kHz (0-100%).

