



TURBOFAN

- 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.

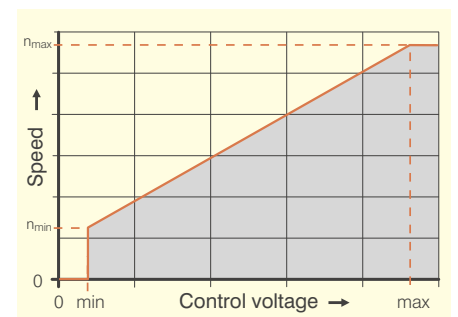
The extremely compact drive unit with microprocessor controlled motor manager and FET power output stage, is equipped with an internal speed controller. This means maximum flexibility for the user as the fan can be either voltage or speed controlled. The output stage can also be de-energized (motor enable)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

Description

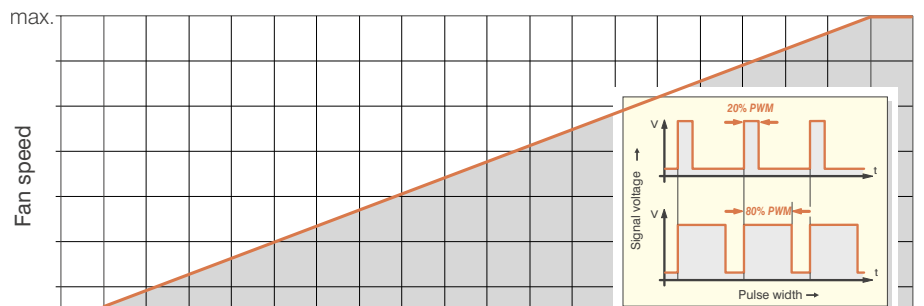
- DC fans with 3-phase, electronically commutated drive
- Extremely efficient motor electronics : Power and control circuit are space-savingsly mounted on only one PCB
- Microprocessor-controlled motor management. High operating efficiency thanks to FET output stage
- Locked rotor protection and peak 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

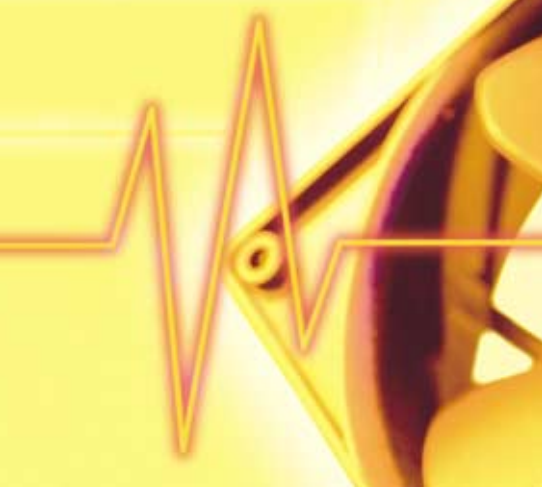
Versions

- 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%).





V a r i o - P r o[®]

- "Software instead of hardware" – aptly describes the worldwide unique new fan concept by PAPST – in other words – fans are equipped at the plant with tailor-made intelligence for cooling electronics.

- Flexible configuration on a software basis, quicker availability and sampling ex factory and readiness to supply customer-specific solutions in every batch size are the major advantages.

The way to your Vario-Pro – easier than you thought

■ You decide which performance profile your fan should have. First, select the hardware on which the customer-specific configuration will be based from the wide range of fans. The most important selection criteria are:

What is the appropriate size for the device?

What nominal voltage is available?

And what is the maximum air flow performance that is required?

Additional functions e.g. alarm signal, temperature/speed, speed limits must also be defined.

■ The second stage is devoted to equipping the fan with its specific intelligence. The desired functionalities e.g. output data and operating parameters are quickly and precisely programmed as software modules in the brain of the fan via a data line.

The software takes over the work that analogue components have performed so far.

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Your Vario-Pro features

Speed profiles

- Description of speed curve with up to 14 freely selectable interpolation points. Linear interpolation between the points.

Temperature as a speed control variable

- Randomly definable speed profile in the temperature range of -20 to +80°C
- Temperature sensor integrated or externally, randomly positionable
- 0 rpm. possible.
- Recognition of sensor tear-off: In case of loss of sensor, the fan operates at freely programmable (fail-safe) speed.

Interface for external speed setting

- Random curve also possible with external set value by PWM signal or control voltage

Alarm and tachometer functions

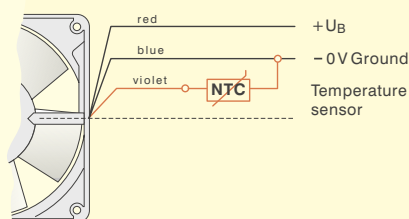
- Optional alarm/or tachometer function
- Freely selectable alarm speed limit (with hysteresis) and alarm delay time

- Storage of alarm signal
- Delay only when starting or permanently active
- Output signal "High" or "Low" in case of alarm
- Optional alarm when temperature sensor torn off.
- Optional alarm in case of excess temperature

Motor management

- High control accuracy thanks to digital motor management
- Higher operating efficiency thanks to optimum adaptation of motor hardware and software.
- Speed calibration during final test in some cases possible.
- 3-stage current limitation for adaptation for L-, N- and H-winding in some cases possible.
- Reduction of power input and operating temperature thanks to digital drive leads to increased service life of the product.

Temperature-dependent speed control



Temperature sensor Type T

- Speed control via external temperature sensor (not included in scope of delivery)
- Temperature range from -20 ... +80°C

Temperature sensor Type I

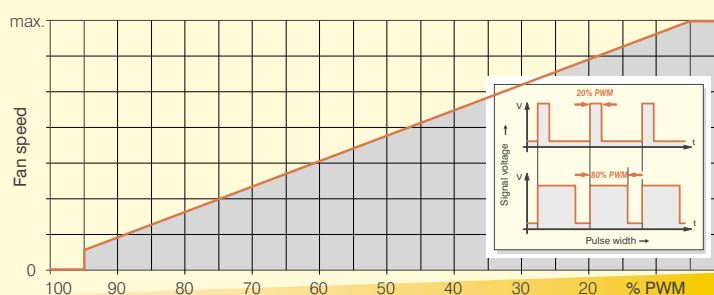
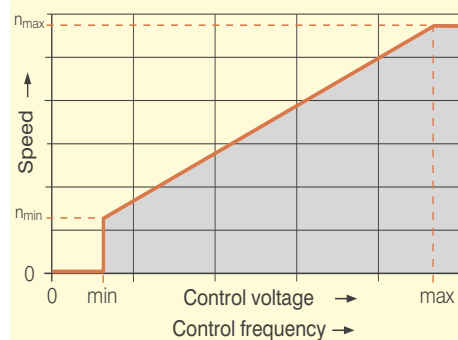
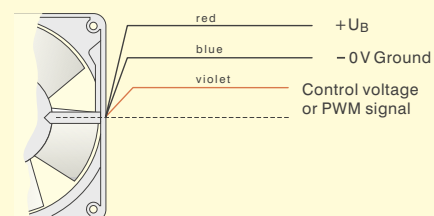
- Speed control via temperature sensor integrated in fan hub
- Temperature range from -20 ... +80°C

Control voltage Type A

- Speed setting via control voltage. Simple speed control via separate DC low voltage interface
- Speed setting via control frequency. Is generated as controlled variable on the user side. Frequency signal: 0...5 kHz. ! Only series 4100, RL90, RG90, RER125, RG125

PWM signal Type P

- Speed setting via PWM signal that is user generated as a controlled variable. PWM signal: 2 KHz (0-100%)

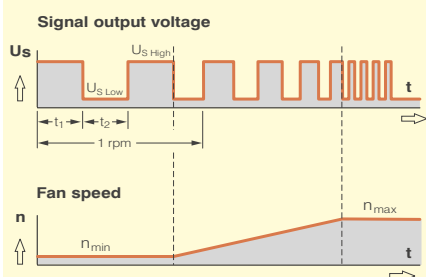




Vario-Pro®

Sensor Signal

Sensorsignals



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

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

Slew rate of sensor output voltage $[t_r, t_f] = 0.5 \text{ V}/\mu\text{s}$, TTL

$t_r = \text{Low/high edge}$, $t_f = \text{High/low edge}$

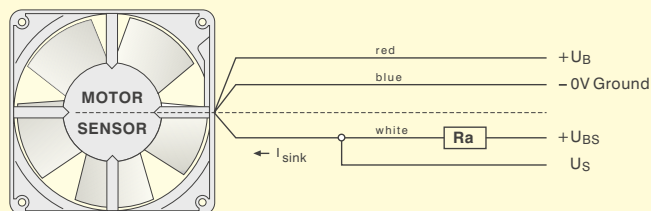
Sensor signal Type /2

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

Sensor signal Type /12

- Speed-proportional rectangular pulse for externally monitoring the speed of the fan motor.
- 2 pulses per r.p.m.
- TTL compatible, signal already processed for TTL interface. Integrated pull-up resistor

Electrical connection



All voltages measured to ground
Sensor signal type /12: external load resistance R_a from U_S to U_{BS} required

$$R_a = \frac{U_{BS} - U_{SLOW}}{I_{SINK}}$$

Sensor signal data

Sensor signal	Fan	Sensor signal $U_{S\text{Low}}$		Sensor signal $U_{S\text{High}}$		Sensor operating voltage U_{BS}	Permissible sink current I_{SINK}	Fan description
		Condition	Condition	Condition	Condition			
Type		V DC	mA	V DC	mA	V DC	mA	Page
/2	Series: 4100N	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 4	35
	Series: 5200N / DV5200	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 4	36 / 37
	Series: RL90N / RG90N	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 4	46 / 47
	Series: RG125N/ RER125N	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 4	48 / 49
	Series: 6200N / DV6200	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 20	41 / 43
	Series: 7200 / 6400	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 20	40 / 45
	Series: RG160N/ RER160N	≤ 0.4	2.0	$= U_{BS}$	0	x ...60	max. 20	49 / 53
/12	Series: 4100N	≤ 0.4	2.0	2.5...5.5	max. 1	—	max. 1	35
	Series: 5200N / DV5200	≤ 0.4	2.0	2.5...5.5	max. 1	—	max. 1	36 / 37
	Series: RL90N / RG90N	≤ 0.4	2.0	2.5...5.5	max. 1	—	max. 1	46 / 47
	Series: RG125N/ RER125N	≤ 0.4	2.0	2.5...5.5	max. 1	—	max. 1	48 / 49

Alarm signals

Alarm signal Type /17

Alarm signal Type /19

- Alarm signal with integrated speed monitoring
- Signal output via open collector
- The fan emits a low continuous signal during trouble-free operation within the permissible voltage range.
- Low signal when fan speed does not reach the defined speed limit.

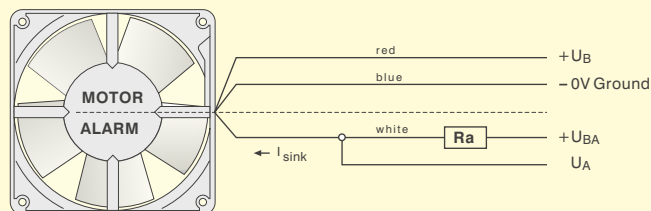
- Alarm signal description as Type /17 – however with low continuous signal during trouble-free operation
- High signal when fan speed does not reach the defined speed limit.

Electrical connection

All voltages measured to ground

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

$$R_a = \frac{U_{BA} - U_{ALOW}}{I_{SINK}}$$



Sensor signal data

Sensor signal	Fan	Sensor signal U_A Low		Sensor signal U_A High		Sensor operating voltage U_{BA}	Permissible sink current I_{sink}	Fan description
		V DC	mA	V DC	mA			
/17	Series: 4100N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	35
	Series: 5200N / DV5200	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	36 / 37
	Series: RL90N / RG90N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	46 / 47
	Series: RG125N/ RER125N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	48 / 49
	Series: 6200N / DV6200	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	41 / 43
	Series: 7200 / 6400	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	40 / 45
	Series: RG160N/ RER160N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	49 / 53
/19	Series: 4100N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	35
	Series: 5200N / DV5200	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	36 / 37
	Series: RL90N / RG90N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	46 / 47
	Series: RG125N/ RER125N	≤ 0.4	2.0	= U_{BA}	0	x...60	max. 20	48 / 49