System protection by Vibration monitoring

for fans

systemair

Vibration monitoring for fans

(standard range, without analysis function)

For machine vibration monitoring

Vibration monitoring concept

Continuous vibration control according to ISO 10816-3, 14694, 14695, 13350

With permanent vibration monitoring changes in operating conditions of fans can be located early and corrected when necessary.
At an early stage possible machine damages can be avoided and necessary maintenance and repair work can be planned economically.

Vibration velocity (actual value) is measured during final inspection.
Appropriate measures need to be taken to reduce the vibrations before exceeding the limit value.
These can be checking of aerodynamic data, for example fan unit maintenance, impeller- / motor-cleaning, if necessary impeller rebalancing, bearing regreasing, etc.

Different versions:

Systemair - **Vibration monitoring**

Code		Description											
Version	Type	motor size	**Position 1:** on motor	**Position 2:** on fan casing	**Position 3:** position 1+2	**Position 4:** on bearing shields	**Number of sensors**	**Sensor type**	**Analysis signal** 4-20 [mA]	**Limit value setting**	**1 Digital switch signal** [3]	**Display** **LED green:** on **LED yellow:** switching status [3]	According to **DIN ISO 10816-3 / 14694**
A	1	160 - 250	X				1	VTV 122	X				yes
	2			X			1	VKV 021	X	X	X	X	[1]
	3				X		1	VTV 122	X				yes
							1	VKV 021	X	X	X	X	[2]
B	4	ab 250				X	2	VTV 122	X				yes

[1] System monitoring
[2] Complete system monitoring
[3] e.g. fan switch off

4 [mA] = 0 [mm/s]
20 [mA] = 25 [mm/s]

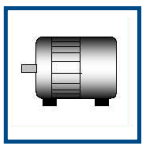
Version A :
VTV122: Signal input by sensor on motor, VKV 021: signal input on fan casing (see type A1-3)
(possible exception A2 of Jet-fan → VTV 122 to ISO 13350, on request)

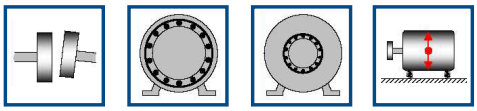
Version B :
VTV 122 : Signal input by sensors on motor bearing shield (Drive End and Non Drive End)
(see type B4)

Vibration causes

Electric motor misalignment, electrical motor defect, unbalanced rotor, bearing defective, lubrication problems

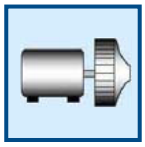
Electric motor

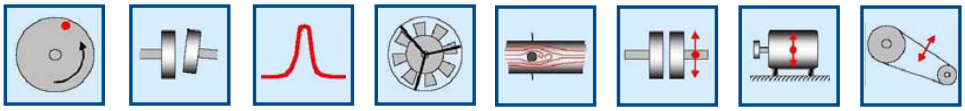




Fans unbalance (wear and tear, pollution) misalignment, blade passing frequenzy, turbulent flow, electric motor, belt drive, natural frequency of belts

Fans





Vibration velocity limits

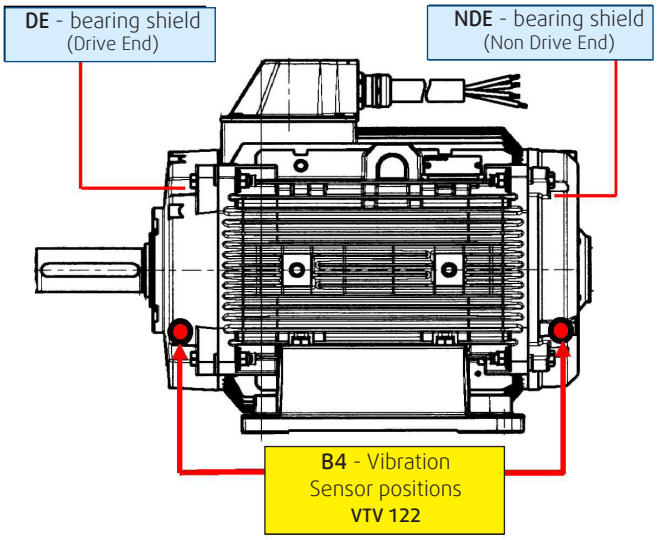
sensor VTV 122 – signal without critical value setting
sensor VKV 021 - signal with critical value setting
switch point RMS 0 – 25 [mm/s]
switch point delay time 1 – 60 [s]
switch out put: opening contact when exceeding critical limit

There is also the possibility to transfer a signal over a screened line to the DDC-building management system (BMS). Ther limit settings can be set. (DDC-Direct Digital Control)

e.g. ISO 10816-3 Vibration velocity limits

								v r.m.s. in [mm/s]	v r.m.s. in [in/s]	Vibration velocity (10-1000 Hz n> 600 [1/min] (2-1000 Hz n> 120 [1/min])
								11	0,433	
								7,1	0,280	
								4,5	0,177	
								3,5	0,138	
								2,8	0,110	
								2,3	0,091	
								1,4	0,055	
								0,71	0,028	
rigid	soft	rigid	soft	rigid	soft	rigid	soft			Base
pumps > 15kW radial, axial, diagonal				medium sized machines 15 kW < P ≤ 300 kW		large machines 300 kW < P < 50MW				Machine type
direct drive		counter shaft / beld drive		motors 160 mm ≤ H < 315 mm		motors 315 mm ≤ H				
group 4		group 3		group 2		group 1				Group

start up | unlimited long-term operation | short-term operation | vibrations cause damages



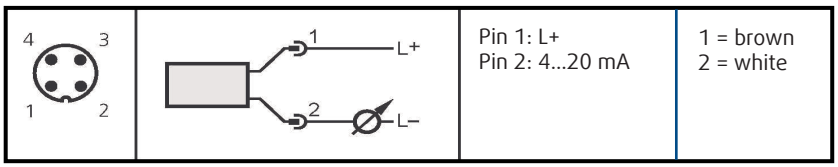
Sensor positions on bearing shields (B4 : VTV 122)

Sensor position on motor center
(A1 : VTV 122)

Sensor VTV 122 – technical data , wiring

Application Electrical design Output	Vibration transmitter Vrms to ISO 10816 DC 4...20 mA analogue
Operating voltage [V]	9,6...32 DC
Load for analogue output [Ω]	max. (Ub = 9,6V) x 50; 720 at Ub = 24V
Frequency range [Hz]	10...1000
Analogue output	4...20 mA
Accuracy [%]	< ± 3
Repeatability	< 0,5 %
Measuring range	4 mA = 0 mm/s...20 mA = 25 mm/s
Ambient temperature [°C]	-30...105
Protection	IP 69K, III
EMC	EN 61000-4-2 ESD: 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated: 10 V/m EN 61000-4-4 Burst: 2 kV EN 61000-4-6 HF conducted: 10 V
Housing materials	V4A (1.4404)
Connection	M8
Weight [kg]	0,125

Sensor VTV 122

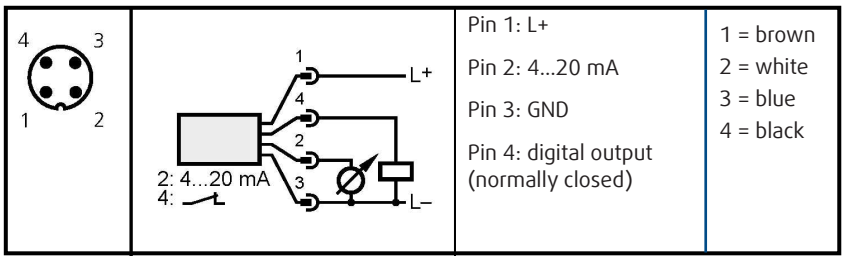


Sensor VKV 121 – technical Data , wiring

Application Output	Vibration monitor Vrms to ISO 10816 1 x normally closed DC PNP / 1 x analogue 4...20 mA
Operating voltage [V]	18...32 DC
Current rating [mA]	500
Short-circuit protection	pulsed
Reverse polarity protection	yes
Overload protection	yes
Voltage drop [V]	< 2
Current consumption [mA]	< 50
Load for analogue output [Ω]	< 500
Accuracy / deviations (in % of the span) Switch point accurancy	< ± 4
Repeatability **)	< 1
Analogue output	4...20 mA
Accuracy [%]	< ± 5
Repeatability	< 0,5 %
Adjustment range	Switch point RMS 0...25 mm/s; Switch point delay time 1...60 s
Ambient temperature [°C]	-25...80
Protection	IP 67K, III
EMC	EN 61000-4-2 ESD: 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated: 10 V/m EN 61000-4-4 Burst: 2 kV EN 61000-4-6 HF conducted: 10 V
Housing materials	PBT (Pocan); PC (Makrolon); FPM (Viton); V4A (1.4404)
Display	Operation: LED green Switching status: LED yellow
Connection	M8
Weight [kg]	0,114

Sensor position on fan casing. (A2 : VKV 021)

Sensor VKV 021



Pin 1: L+

Pin 2: 4...20 mA

Pin 3: GND

Pin 4: digital output (normally closed)

1 = brown
2 = white
3 = blue
4 = black

Terminal box

Sensor signals are readable from the relevant serial terminal in the terminal box by multi functional measuring devices. (wiring diagram in terminal box)

Terminal Box - Vibration control

Vibration velocity measuring

The conversion of the linear current signal is done according to the following formula:
Vibration velocity [mm/s] = (mA – 4) / 0,6399 [in/s] = ((mA – 4) / 0,6399)) / 25,4

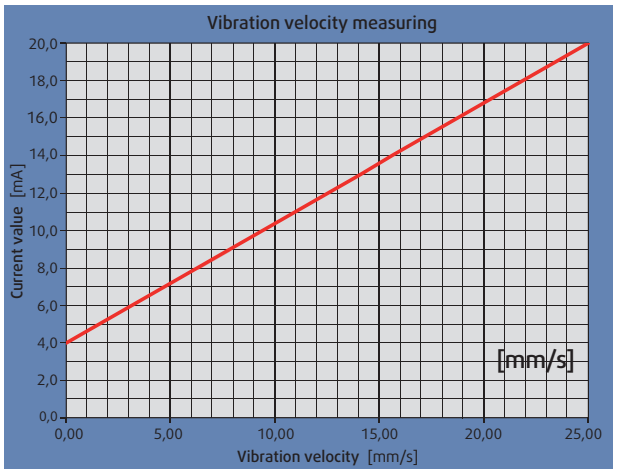


Table: Conversion of [mA] --> [mm/s]

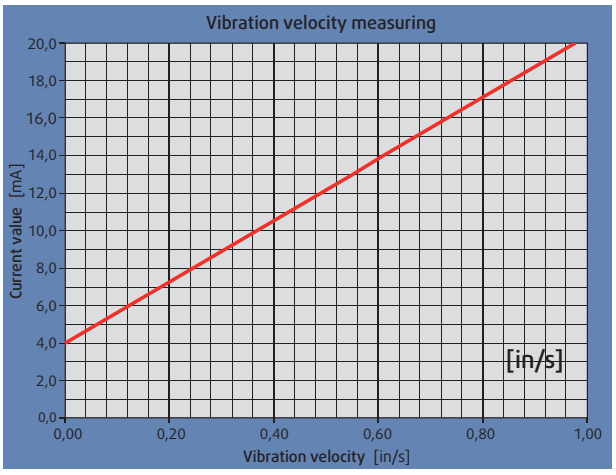


Table: Conversion of [mA] --> [in/s]

Available versions

Vibration monitoring consiting of

Vibration monitoring A1
Art.-no. : 34261

1 pcs. Vibration controller/ sensor VTV 122
10 Hz – 1kHz , Measuring range 25 [mm/s]

1 pcs. Adapter/ turned part

1 pcs. Sensor cable, cable plug 4p
Screened cable grey, 6 mm

1 pcs. Terminal box IP 65
L125 x B 80 x T 57 mm in die cast aluminum
Coated RAL 7035 with cable gland 2x M12x1,5 / 1x M16x1,5

Vibration monitoring A2
Art.-Nr.: 34262

1 pcs. Vibration controller / sensor VKV 021 incl. protection cap
10 Hz – 1kHz , measuring range 25 [mm/s]
2 adjustable switching points and opening contact

1 pcs. Sensor cable, cable plug 4p
Screened cable grey , 6 mm

1 pcs. Terminal box IP 65
L125 x B 80 x T 57 mm in die cast aluminum
Coated RAL 7035 with cable gland 2x M12x1,5 / 1x M16x1,5

Vibration monitoring A3 (1)
Art.-Nr.: 34263

1 pcs. vibration controller / sensor VTV 122
10 Hz – 1kHz , measuring range 25 [mm/s]

1 pcs. Adapter/ turned part

1 pcs. Vibration controller / sensor VKV 021 incl. protection cap
10 Hz – 1kHz , measuring range 25 mm/s
2 adjustable switching points and opening contact

2 pcs. Sensor cable, cable plug 4p
Screened cable grey , 6 mm

1 pcs. Terminal box IP 65
L125 x B 80 x T 57 mm in die cast aluminum
Coated RAL 7035 with cable gland 2x M12x1,5 / 1x M16x1,5

Vibration monitoring B4(1)
Art.-Nr.: 34264

2 pcs. Vibration controller / sensor VTV 122
10 Hz – 1kHz , measuring range 25 [mm/s]

2 pcs. Sensor cable, cable plug 4p
Screened cable grey , 6 mm

1 pcs. Terminal box IP 65
L125 x B 80 x T 57 mm in die cast aluminum
Coated RAL 7035 with cable gland 2x M12x1,5 / 1x M16x1,5

More versions on request.

(1) Only possible when already mentioned with fan inquire!

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