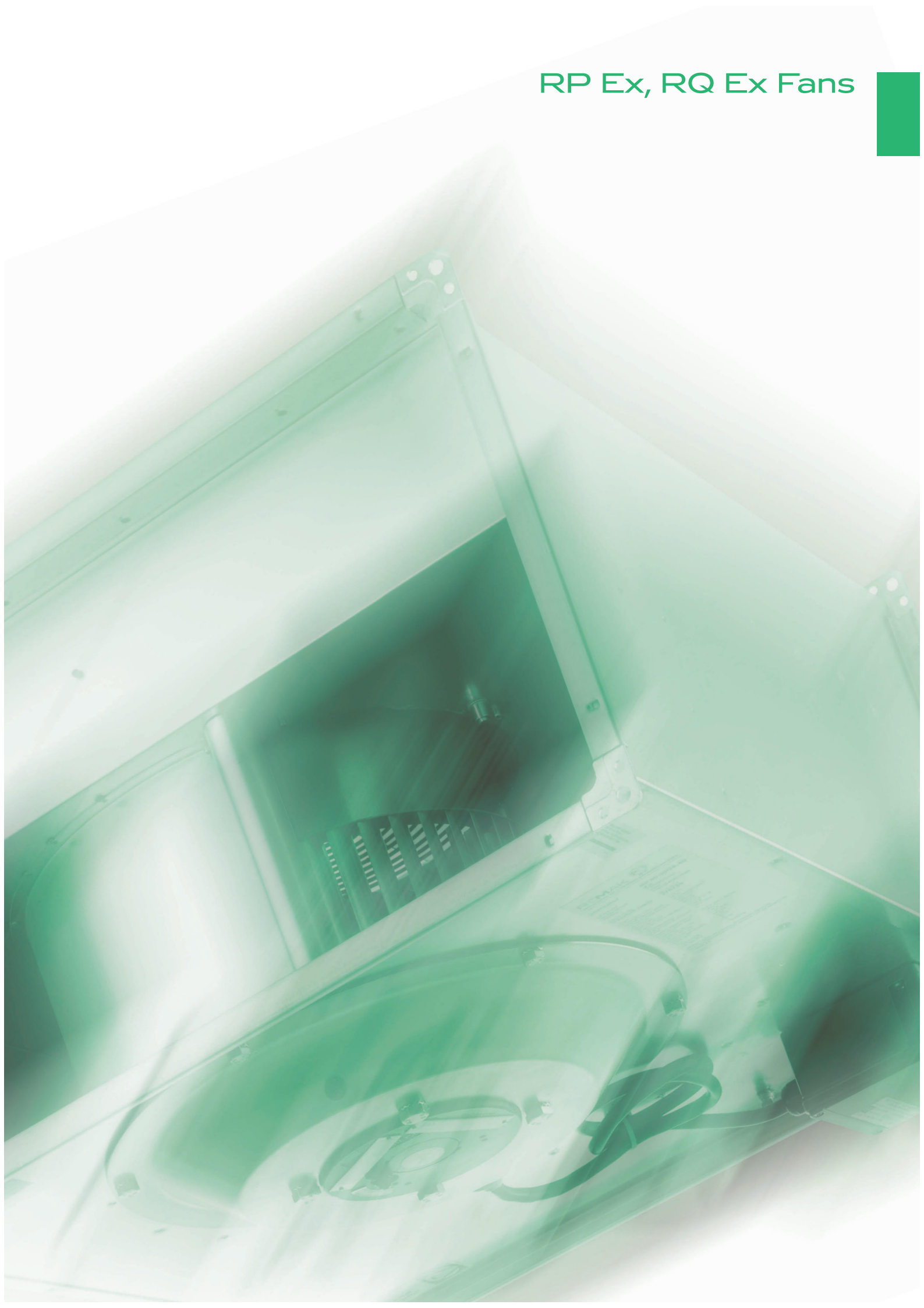


RP Ex, RQ Ex Fans



FAN USE

Ex versions of fully controlled, low-pressure RP and RQ radial Fans can be universally used for complex air-conditioning, from simple venting installations to sophisticated air-handling systems. Thanks to their special design, which in accordance with the EN 13463-1 and 13463-5 standards prevents mechanically generated sparks, and the "e" version of the motor in accordance with the EN 50014 standard, these fans are intended for applications in explosion hazardous areas.

OPERATING CONDITIONS, POSITION

These fans are designed for indoor and outdoor applications, and to transport air without solid, fibrous, sticky or aggressive impurities. The transported air must be free of corrosive chemicals or chemicals aggressive to zinc, copper and/or aluminium. The allowed temperatures of the transported air ranges from -20 °C up to +40 °C. These fans are designed for use in **Zone 1**.

Explosion-proof RP and RQ Ex fans, secure version "e", belong according to EN 60079-0 to Group II ¹⁾ and are labelled with the **II 2G Exe II TX** marks.

The fans themselves are labelled with the **II 2G c IIB+H₂ TX** marks proving their explosion-proof design.

The fans can work in any position.

When positioned under the ceiling, it is advisable to situate the RP Ex fan with its cup directed downwards to ease access to the motor terminal box. However, if transported air is oversaturated with moisture or if the risk of intensive steam condensation inside the fan exists, it is advisable to situate the fan's cup upwards. We recommend adding a 1 to 1.5 m long piece of straight duct to the fan's outlet to reduce pressure losses in the assembly.

RQ Ex fans are mostly installed in the horizontal position of the motor shaft rotation (however, this is not a condition of use). The square sidewalls of the fan serve also as legs to fix the fan onto the base using anchor bolts. The fan can be positioned in four positions turned by 90°.

FIG. 1 – DIMENSIONS

RP Ex fans

A × B [mm]

400-200 40-20

500-250 50-25

500-300 50-30

600-300 60-30

600-350 60-35

700-400 70-40

800-500 80-50

RQ Ex fans

Diameter [mm]

200 20

220 22

280 28

DIMENSIONAL RANGE

RP Ex fans are manufactured in a range of six sizes according to the A x B dimensions of the connecting flange. RQ Ex fans are manufactured in a range of three sizes according to the impeller's diameter, see figure #1. The standard dimensional and performance range of explosion-proof fans enables the designers to optimize all parameters for air flow up to 5,800 m³ per hour.

MATERIALS

The external casing and connecting flanges of RP Ex and RQ Ex fans are made of galvanized sheet steel (Zn 275 g/m²), respectively stainless steel. Impeller blades are made of galvanized sheet steel, diffusers are made of copper, and the motors' casings are made of aluminium alloys. The internal structure of the motors consists of steel, copper and plastic parts. All materials are carefully verified and checked so they ensure long service life and reliability of the fans.

IMPELLERS

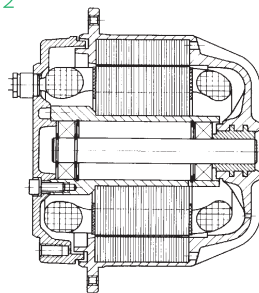
Impellers of RP Ex and RQ Ex fans are equipped with forward curved blades. After connecting the motor to the wiring, the impeller's direction of rotation must be checked. The fans' impellers must always rotate to the left, i.e. counter clockwise (looking through the inspection opening on the motor cup). The inspection opening on the motor cup is sealed with a rubber plug. Impellers along with the motor are perfectly statically and dynamically balanced.

¹⁾ Group II – Electrical equipment for hazardous areas (except underground mines with methane occurrence).

MOTORS

Compact three-phase asynchronous motors with an external rotor and a resistance armature of appropriate output and speed, and approved in accordance with the 94/9/ES (ATEX) Directive are used as drives, see figure #2. The motors are situated inside the impeller, and during operation are optimally cooled by the flowing air. The motor's high quality enclosed ball bearings with permanent lubricant filling enable the fans to reach a service life of more than 40,000 operating hours without maintenance. The motor electrical protection degree is IP 44, insulation class F. The motor windings are impregnated to provide them with additional protection against moisture. The motors feature relatively low build-up current.

FIGURE 2



ELECTRICAL EQUIPMENT

The fan's wiring is terminated in a special explosion-proof terminal box of IP 66 protection degree. For wiring diagrams of motors, refer to the section "Wiring".

MOTOR PROTECTION

As standard, permanent monitoring of the internal motor temperature is used in all motors. The temperature inside the motor is read by temperature-sensitive sensors (thermistors) situated in the motor winding. The thermistors must be connected to the trip relay which, after reaching a temperature of 130 °C, disconnects the protective contactor circuit. This system protects the motor against unfavourable operating conditions, e.g. overloading due to phase failure, forced motor braking, current protection circuit breakdown or excessive temperature of the transported air. This thermal protection is comprehensive and reliable providing it is correctly connected. Thermistor relay must be approved type **Ex II (2) G**. This relay must be located outside the potentially explosive atmospheres.

FIGURE 3 – THERMISTOR



RP Ex and RQ Ex fans have been approved by Notified Body ES 1026, Fyzikálně-technický ústav Ostrava-Radvanice, to be operated only in connection with the prescribed thermal protection (refer to the wiring diagrams in the chapter "Wiring").

Therefore, it is forbidden to protect the fan motors by conventional thermal protection ensured by the motor overcurrent protective elements!

FAN OUTPUT CONTROL

Generally, several types of control can be used with fans; however, voltage control is the most suitable for Vento fans. The fan output can be fully controlled by changing the speed. The fan's speed is changed depending on the voltage at the motor terminals. RP Ex and RQ Ex fans can be steplessly controlled providing the change in voltage is stepless.

In practice, stage voltage controllers are usually used.

Five Stage Voltage Control (transformer type)

The voltage control of Vento fans is the most suitable, technically as well as operationally. There is no interference, humming, squeaking or vibration of the motor; furthermore, voltage controlled motors feature lower warming.

TRN and TRR voltage controllers can control the fan output in five stages in 20 % steps, with which five pressure-airflow relation curves in the working characteristics of each fan comport.

Ex fan motors can be operated within a range from 25% to 100% of the rated voltage. Refer to table # 1 showing the correlation between the input voltage and selected stage of the controller.

TABLE 1
THE INPUT VOLTAGE AND CONTROLLER'S STAGE

MOTOR TYPE	CURVE CHARACTERISTICS – CONTROLLER'S STAGE				
	5	4	3	2	1
1 – phase	230 V	180 V	160 V	130 V	105 V
3 – phase	400 V	280 V	230 V	180 V	140 V

Ex fans are delivered only with three-phase motors. Three-phase TRN or TRRD controllers are used to control speed, respectively output.

Four types of TRN controllers, TRN 2D, TRN 4D, TRN 7N, and TRN 9N, are manufactured according to their current ratings. The option of remote control (by manual switch ORe5, respectively by automatic switching of the five stages of the OXe controller based on an external control signal of 0 - 10 V) is a significant feature of this product line. Four types of simpler TRRD controllers, TRRD 2, TRRD 4, TRRD 7 and TRRD 9, are also manufactured. These controllers cannot be remotely controlled (therefore, they must be situated within reach of the operator), and they do not contain any fan protection (this must be provided by another device).

No other regulation method is allowed!

ACCESSORIES

RP Ex and RQ Ex fans are part of the wide range of Vento modular venting and air-handling system components. Any air-handling set-up, from simple venting to sophisticated comfortable air-conditioning, can be created by selecting suitable elements. When designing a particular air-handling device, it is necessary to keep in mind the environment for which the air-handling device is intended..

For the thermal protection of fans, fans can be ordered with the approved type of thermistor relay.

FAN DESCRIPTION AND DESIGNATION

The key for type designation of RP Ex and RQ Ex fans in projects and orders is defined in figure # 2.

For example, type designation RP 60-30/28-4D Ex specifies the type of fan, impeller and motor.

FIGURE 4 – TYPE DESIGNATION OF FANS

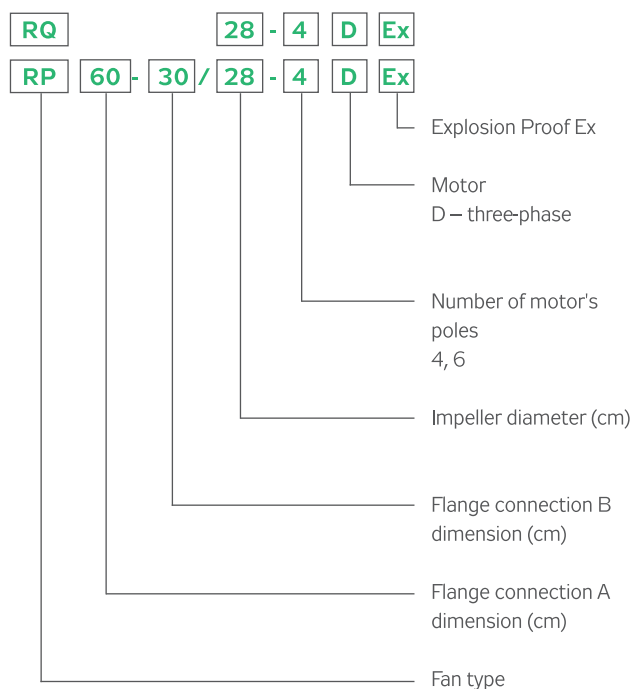
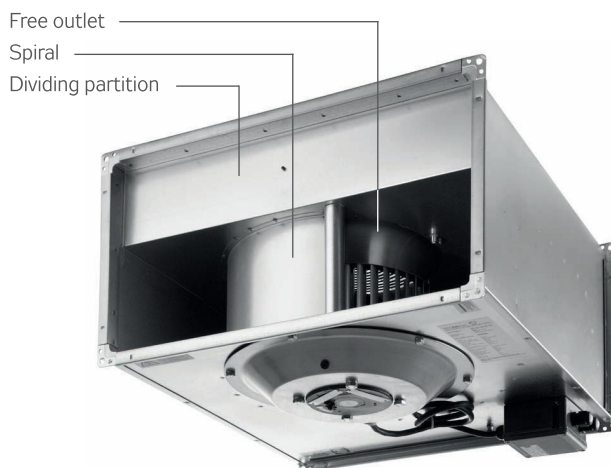


FIGURE 5 – RP EX FAN DESCRIPTION



**DIMENSIONS, WEIGHTS
AND PERFORMANCE**

For important dimensions of RP Ex, RQ Ex, refer to Figure #6, #7 and Table #3, #4. For basic parametrs refer to table #5.

FIGURE 6 – RP EX FAN DIMENSIONAL DIAGRAM

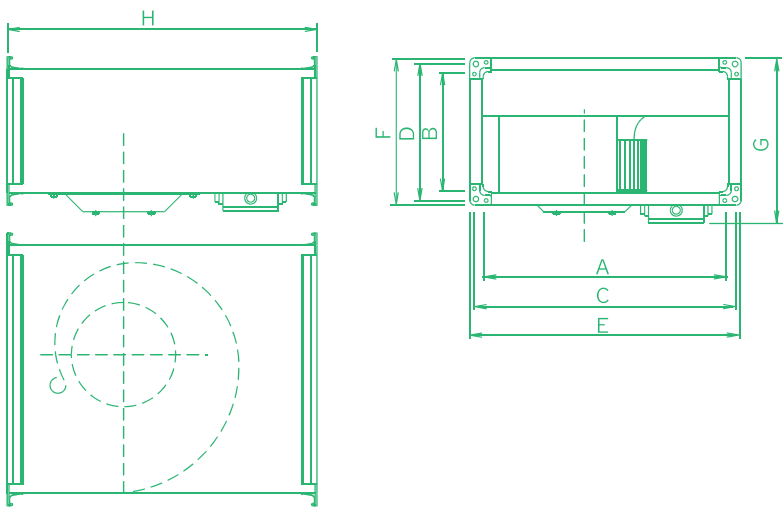


FIGURE 7 – RQ EX FAN DIMENSIONAL DIAGRAM

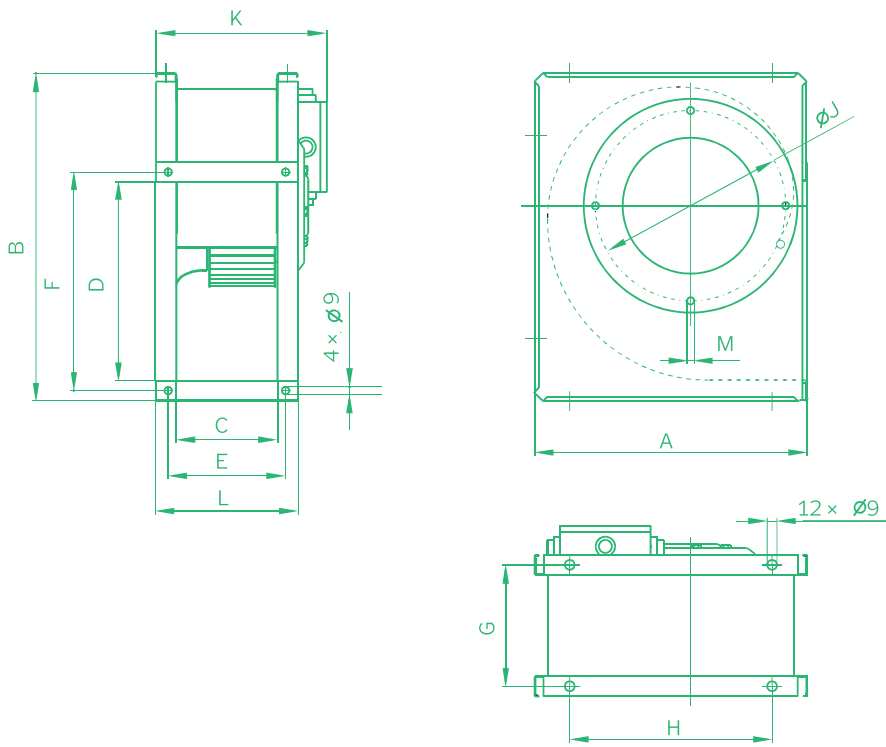


TABLE 3 – RP EX FAN DIMENSIONS

Fan Type	Dimensions in mm							
	A	B	C	D	E	F	G	H
RP 40-20/20-4D Ex	400	200	420	220	440	240	277	500
RP 50-25/22-4D Ex	500	250	520	270	540	290	349	530
RP 60-30/28-4D Ex	600	300	620	320	640	340	399	642
RP 60-35/31-4D Ex	600	350	620	370	640	390	427	720
RP 70-40/35-6D Ex	700	400	720	420	740	440	477	780
RP 80-50/40-6D Ex	800	500	820	520	840	540	577	885

TABLE 3 – RQ EX FAN DIMENSIONS

Fan Type	Dimensions in mm											
	A	B	C	D	E	F	G	H	J	K	L	M
RQ 20-4D Ex	335	405	125	250	145	270	150	250	235	203	173	4× M6
RQ 22-4D Ex	370	445	140	280	160	300	170	300	260	223	193	4× M6
RQ 28-4D Ex	460	545	180	355	200	375	210	350	315	260	230	4× M6

TABLE 5 – BASIC PARAMETERS

Fan Type	V_{max}	$\Delta p_{t,max}$	$\Delta p_{s,min}$	n_{nom}	U_{nom}	P_{max}	I_{max}	t_{max}	Control.	m
	m ³ /h	Pa	W	min ⁻¹	V	W	A	°C	type	kg

RP EX – THREE-PHASE FANS

RP 40-20/20-4D Ex	1306	260	0	1400	400	281	0,5	40	TRN 2	13
RP 50-25/22-4D Ex	1813	320	60	1430	400	545	0,93	40	TRN 2	18
RP 60-30/28-4D Ex	3195	480	0	1440	400	1300	2,32	40	TRN 4	33
RP 60-35/31-4D Ex	3950	603	220	1440	400	2044	3,9	40	TRN 4	47
RP 70-40/35-6D Ex	4108	360	150	900	400	1100	2	40	TRN 2	44
RP 80-50/40-6D Ex	5829	496	238	930	400	1950	3,7	40	TRN 4	68

RQ EX – THREE-PHASE FANS

RQ 20-4D Ex	1273	246	0	1380	400	278	0,48	40	TRN 2	9
RQ 22-4D Ex	1836	320	8	1420	400	524	0,93	40	TRN 2	11
RQ 28-4D Ex	3202	483	0	1440	400	1254	2,25	40	TRN 4	23

SYMBOLS USED IN TABLE 5:

 V_{max} maximum air flow rate $\Delta p_{t,max}$ maximum total pressure of the fan is the maximum sum of Δp_s and Δp_d ($\Delta p_s + \Delta p_d$) max. $\Delta p_{s,min}$ minimum allowed static pressure (i.e. pressure loss of connected duct) indicates the lowest value to which the fan must be throttled (at nominal voltage at working point 5c) so not to be overloaded and thus activating motor protection n fan speed measured at the highest efficiency working point (5b), rounded to tens U nominal power supply voltage of the motor without control (all values in the table are to this voltage) P_{max} electric motor maximal power output I_{max} maximum phase current at voltage U (this value must be checked) t_{max} maximum permissible transported air temperature at air flow V_{max} . C capacitor capacity with single-phase fans

Control. voltage controller type

 m weight of the fan ($\pm 10\%$)

OPERATING CHARACTERISTICS

Output characteristics of RP Ex and RQ Ex fans are measured in REMAK testing laboratory for aerodynamic and electrical measurements of fans and pressure losses of passive elements within the Czech Republic. A table showing the most important values is situated next to each fan's characteristic in the "Data Section" of the catalogue (see table # 6). These values are also listed on the fan's rating plate.

The meaning of individual lines is as follows:

- 1 Value of nominal power supply voltage
- 2 Maximum power input of the motor at working point 5c.
- 3 Maximum current at nominal voltage at working point 5c.
- 4 Mean speed, rounded to tens, measured at working point 5b.
- 5 Capacitor capacity with single-phase fans.
- 6 Maximum permissible transported air temperature.
- 7 Maximum air flow at working point 5c.
- 8 Maximum total pressure between points 5a–5c
- 9 Minimum permissible static pressure at point 5c.
- 10 Total weight of the fan.
- 11 Recommended fan output controller.
- 12 Recommended protecting relay of the fan without controller and control unit

MARKINGS USED:

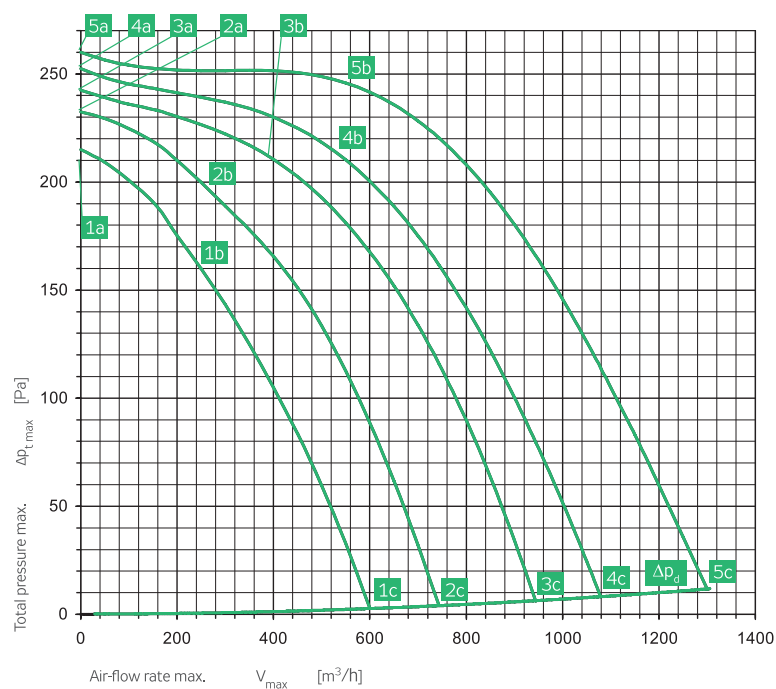
m	weight [kg]
S	area, surface [m ²]
V	air-flow rate [m ³ /h]
n	speed [min ⁻¹]
t	air temperature [°C]
Δp_s	static pressure difference [Pa]
Δp_t	total pressure difference [Pa]
Δp_d	dynamic pressure [Pa]
ρ	air specific density [kg/m ³]
L_w	sound power level [dB]
L_{WA}	hA scale sound power level A [dB(A)]
L_{WAokt}	A scale octave sound power level A [dB(A)]
L_{pA}	A scale sound pressure level [dB(A)]
W	sound power [W]
W_0	reference sound power 10 ⁻¹² W [W]
p	sound pressure [Pa]
p_0	reference sound pressure 2.10 ⁻⁵ Pa [Pa]
c	sound velocity [m/s]
K_A	A weighting filter correction A [dB(A)]
U	voltage [V]
I	current [A]
P	electric input [W]
C	capacity [μF]

TABLE 6 – FAN PARAMETERS

RQ 22-4D Ex

Power supply	Y	3 × 400 V	50 Hz
Max. electric input	P_{max}	[W]	524
Max. current	I_{max}	[A]	0,93
Mean speed	n	[min ⁻¹]	2480
Capacitor	C	[μF]	-
Max. working temp.	t_{max}	[°C]	40
Max. air-flow rate	V_{max}	[m ³ /h]	1836
Max. total pressure	$\Delta p_{t,max}$	[Pa]	320
Min. static pressure (5c)	$\Delta p_{s,min}$	[Pa]	8
Weight	m	[kg]	14
Five-stage controller	type		TRN 2
Protecting relay	type		STE

RP 40-20/20-4D Ex



RP 40-20/20-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{\max}	[W]	281
Max. current (5c)	I_{\max}	[A]	0.50
Mean speed	n	[min ⁻¹]	1400
Capacitor	C	[μF]	–
Max. working temp.	t_{\max}	[°C]	40
Max. air-flow rate	V_{\max}	[m³/h]	1306
Max. total pressure	$\Delta p_{t \max}$	[Pa]	260
Min. static pressure (5c)	$\Delta p_{s \min}$	[Pa]	0
Weight	m	[kg]	13
Five-stage controller	type		TRN 2
Protecting relay	type		therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{\max} [dB(A)]

L_{WA}	67	73	61
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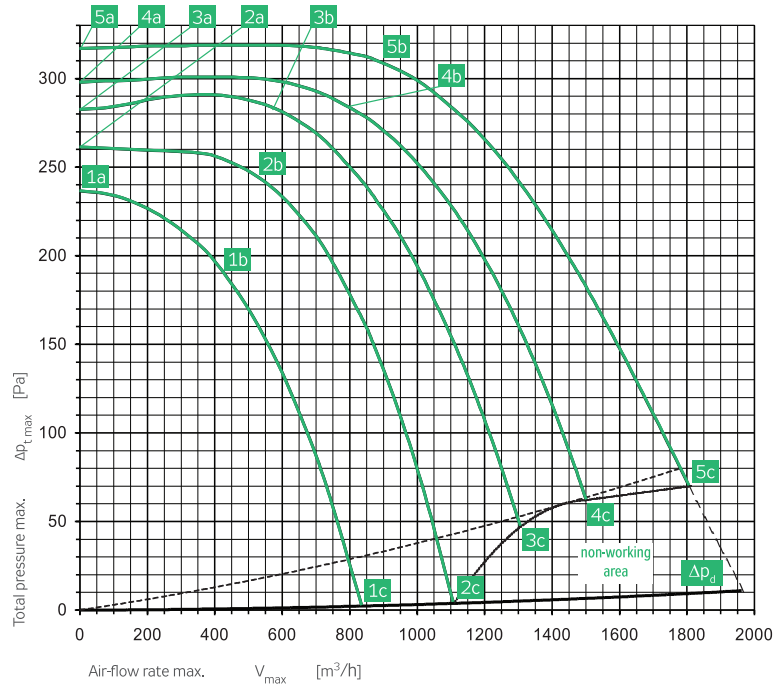
Sound power level L_{WAKort} [dB(A)]

125 Hz	55	51	48
250 Hz	58	59	52
500 Hz	56	64	54
1000 Hz	62	69	56
2000 Hz	61	67	54
4000 Hz	59	65	49
8000 Hz	49	56	42

RP 40-20/20-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	0.32	0.34	0.50	0.20	0.27	0.49	0.17	0.22	0.47	0.15	0.19	0.42	0.14	0.20	0.36
Electric input P [W]	64	123	281	43	103	217	36	71	172	35	50	119	29	44	81
Speed n [min ⁻¹]	1457	1397	1222	1430	1308	1014	1409	1303	895	1346	1265	712	1285	1135	586
Air-flow rate V [m³/h]	0	563	1306	0	556	1078	0	395	945	0	271	744	0	261	600
Static pressure Δp_s [Pa]	260	242	0	252	209	0	242	210	0	232	195	0	215	156	0
Total pressure Δp_t [Pa]	260	244	12	252	211	8	242	211	6	232	196	4	215	157	3

RP 50-25/22-4D Ex



RP 50-25/22-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{max}	[W]	545
Max. current (5c)	I_{max}	[A]	0.93
Mean speed	n	[min ⁻¹]	1430
Capacitor	C	[μF]	–
Max. working temp.	t_{max}	[°C]	40
Max. air-flow rate	V_{max}	[m³/h]	1813
Max. total pressure	$\Delta p_{t max}$	[Pa]	320
Min. static pressure (5c)	$\Delta p_{s min}$	[Pa]	60
Weight	m	[kg]	18
Five-stage controller	type	TRN 2	
Protecting relay	type	therm. relay	

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAX} [dB(A)]

L_{WA}	71	76	63
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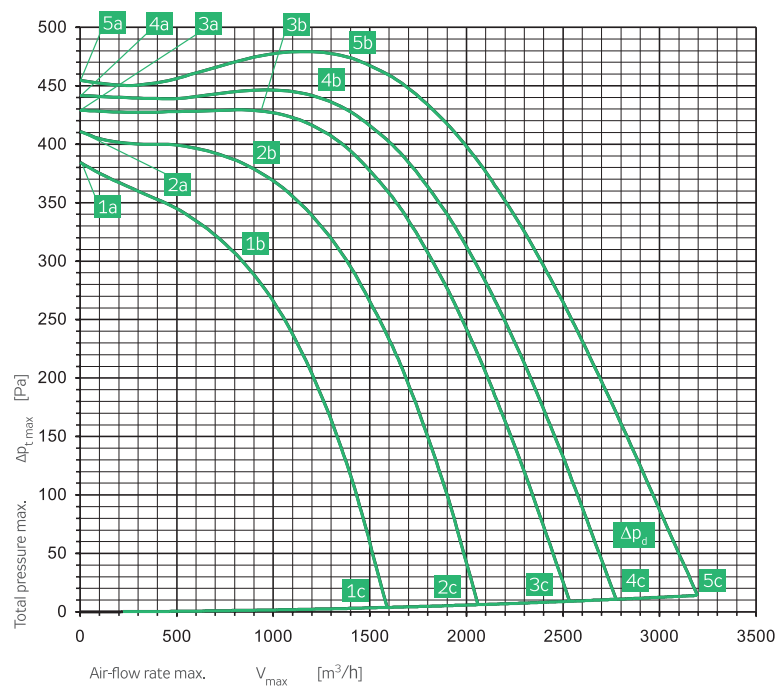
Sound power level L_{WAKOkt} [dB(A)]

125 Hz	60	55	51
250 Hz	62	62	54
500 Hz	60	67	56
1000 Hz	66	72	58
2000 Hz	65	70	56
4000 Hz	63	68	51
8000 Hz	51	57	41

RP 50-25/22-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	0.59	0.62	0.93	0.37	0.48	0.95	0.37	0.44	0.97	0.31	0.45	0.99	0.35	0.48	0.83
Electric input P [W]	164	248	545	105	180	414	113	143	341	76	124	264	75	104	168
Speed n [min ⁻¹]	1458	1425	1300	1432	1371	1120	1384	1348	971	1374	1274	733	1271	1136	567
Air-flow rate V [m³/h]	0	882	1813	0	756	1497	0	587	1295	0	508	1113	0	423	834
Static pressure Δp_s [Pa]	317	307	60	298	288	55	282	275	42	261	245	0	237	189	0
Total pressure Δp_t [Pa]	317	309	70	298	289	62	282	276	47	261	246	4	237	190	2

RP 60-30/28-4D Ex



RP 60-30/28-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{\max}	[W]	1300
Max. current (5c)	I_{\max}	[A]	2.32
Mean speed	n	[min ⁻¹]	1440
Capacitor	C	[μF]	—
Max. working temp.	t_{\max}	[°C]	40
Max. air-flow rate	V_{\max}	[m³/h]	3195
Max. total pressure	$\Delta p_{t \max}$	[Pa]	480
Min. static pressure (5c)	$\Delta p_{s \min}$	[Pa]	0
Weight	m	[kg]	33
Five-stage controller	type		TRN 4
Protecting relay	type		therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{\max} [dB(A)]

L_{WA}	77	83	69
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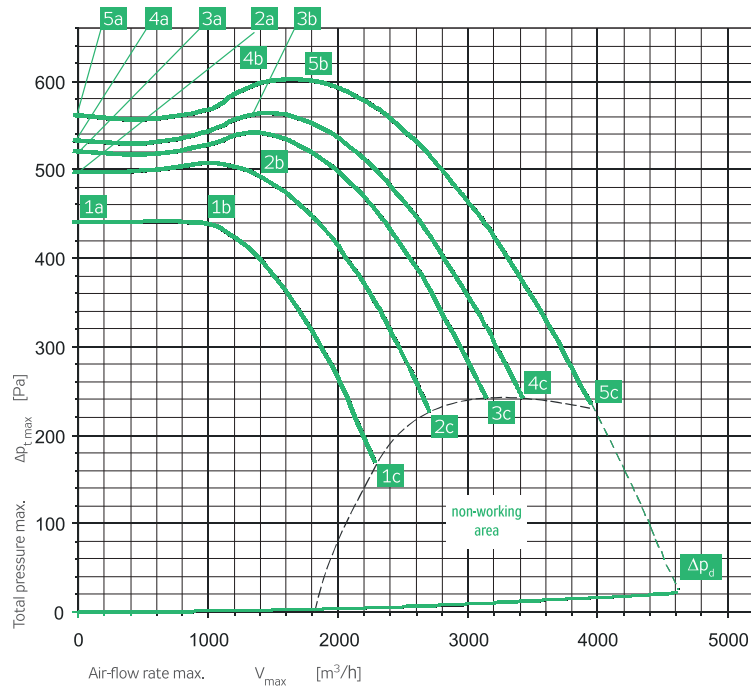
Sound power level L_{WAKort} [dB(A)]

125 Hz	68	66	61
250 Hz	67	67	59
500 Hz	65	75	63
1000 Hz	72	79	64
2000 Hz	71	77	61
4000 Hz	69	75	56
8000 Hz	60	66	46

RP 60-30/28-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	1.29	1.39	2.32	0.77	1.11	2.49	0.68	0.98	2.50	0.67	1.06	2.40	0.72	1.18	2.08
Electric input P [W]	248	502	1300	192	418	1037	175	323	882	170	293	634	150	252	412
Speed n [min ⁻¹]	1476	1440	1326	1453	1385	1152	1437	1376	1056	1395	1297	854	1326	1167	673
Air-flow rate V [m³/h]	0	1400	3195	0	1233	2771	0	964	2528	0	907	2068	0	816	1600
Static pressure Δp_s [Pa]	455	474	0	442	441	0	429	425	0	411	374	0	385	304	0
Total pressure Δp_t [Pa]	455	476	14	442	443	11	429	427	9	411	376	6	385	305	4

RP 60-35/31-4D Ex



RP 60-35/31-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{max}	[W]	2044
Max. current (5c)	I_{max}	[A]	3.90
Mean speed	n	[min ⁻¹]	1440
Capacitor	C	[μF]	–
Max. working temp.	t_{max}	[°C]	40
Max. air-flow rate	V_{max}	[m³/h]	3950
Max. total pressure	$\Delta p_{t max}$	[Pa]	603
Min. static pressure (5c)	$\Delta p_{s min}$	[Pa]	220
Weight	m	[kg]	47
Five-stage controller	type	TRN 4	
Protecting relay	type	therm. relay	

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAX} [dB(A)]

L_{WA}	80	86	71
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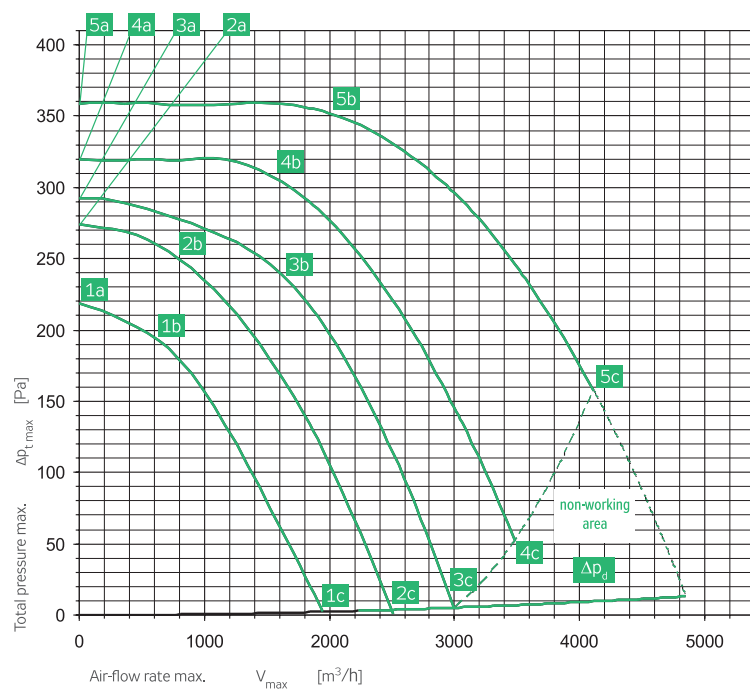
Sound power level L_{WAKort} [dB(A)]

125 Hz	69	67	62
250 Hz	69	71	61
500 Hz	69	78	66
1000 Hz	75	82	65
2000 Hz	74	80	63
4000 Hz	72	78	59
8000 Hz	67	69	49

RP 60-35/31-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	2.64	2.81	3.90	2.08	2.10	3.90	1.73	1.94	3.90	1.71	2.21	3.90	1.86	2.13	3.90
Electric input P [W]	376	682	2044	419	478	1558	499	601	1390	444	610	1089	413	476	858
Speed n [min ⁻¹]	1453	1437	1375	1422	1413	1271	1403	1383	1207	1360	1304	1096	1288	1248	945
Air-flow rate V [m³/h]	0	1765	3950	0	1281	3445	0	1344	3099	0	1436	2707	0	1069	2282
Static pressure Δp_s [Pa]	561	603	220	532	544	222	519	534	241	498	486	216	439	433	164
Total pressure Δp_t [Pa]	562	606	236	533	546	234	520	535	251	500	489	223	440	434	169

RP 70-40/35-6D Ex



RP 70-40/35-6D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{\max}	[W]	1100
Max. current (5c)	I_{\max}	[A]	2.00
Mean speed	n	$[\text{min}^{-1}]$	900
Capacitor	C	[μF]	–
Max. working temp.	t_{\max}	[°C]	40
Max. air-flow rate	V_{\max}	$[\text{m}^3/\text{h}]$	4108
Max. total pressure	$\Delta p_{t \max}$	[Pa]	360
Min. static pressure (5c)	$\Delta p_{s \min}$	[Pa]	150
Weight	m	[kg]	44
Five-stage controller	type		TRN 2
Protecting relay	type		therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAX} [dB(A)]

L_{WA}	75	81	66
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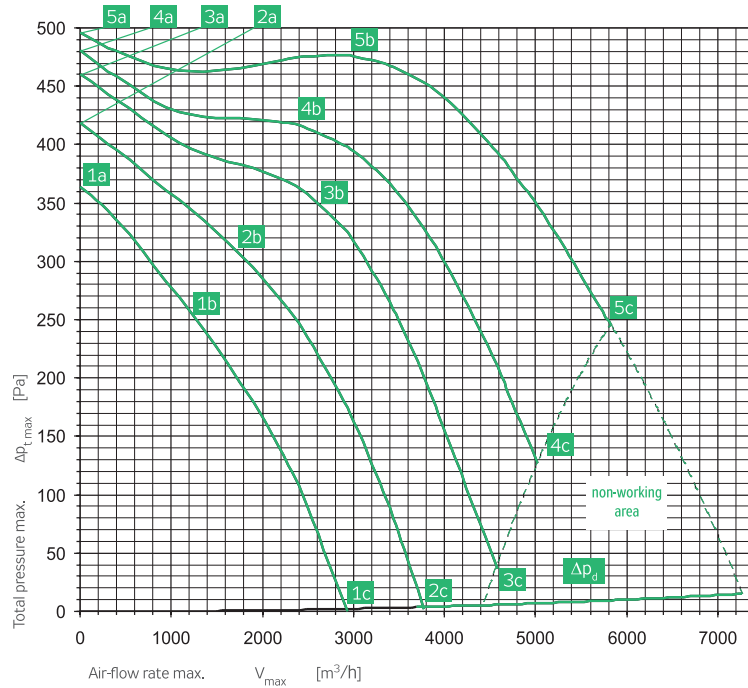
Sound power level L_{WAKOkt} [dB(A)]

125 Hz	65	66	56
250 Hz	63	66	56
500 Hz	66	75	60
1000 Hz	70	76	62
2000 Hz	68	75	56
4000 Hz	67	73	55
8000 Hz	56	63	40

RP 70-40/35-6D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	1.09	1.27	2.00	0.83	1.03	2.00	1.03	1.22	1.90	0.75	0.75	1.55	0.75	0.75	1.27
Electric input P [W]	316	534	1100	246	374	819	382	422	644	188	188	393	154	154	246
Speed n $[\text{min}^{-1}]$	948	903	763	905	846	563	819	737	436	804	804	359	700	700	278
Air-flow rate V $[\text{m}^3/\text{h}]$	0	2035	4108	0	1579	3484	0	1677	2995	0	798	2510	0	706	1943
Static pressure Δp_s [Pa]	360	351	150	321	305	43	292	232	0	274	251	0	219	187	0
Total pressure Δp_t [Pa]	360	354	160	321	306	50	293	234	5	274	251	4	219	187	2

RP 80-50/40-6D Ex



RP 80-50/40-6D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{max}	[W]	1950
Max. current (5c)	I_{max}	[A]	3.70
Mean speed	n	[min ⁻¹]	930
Capacitor	C	[μF]	–
Max. working temp.	t_{max}	[°C]	40
Max. air-flow rate	V_{max}	[m³/h]	5829
Max. total pressure	$\Delta p_{t max}$	[Pa]	496
Min. static pressure (5c)	$\Delta p_{s min}$	[Pa]	238
Weight	m	[kg]	68
Five-stage controller	type	TRN 4	
Protecting relay	type	therm. relay	

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAX} [dB(A)]

L_{WA}	75	80	67
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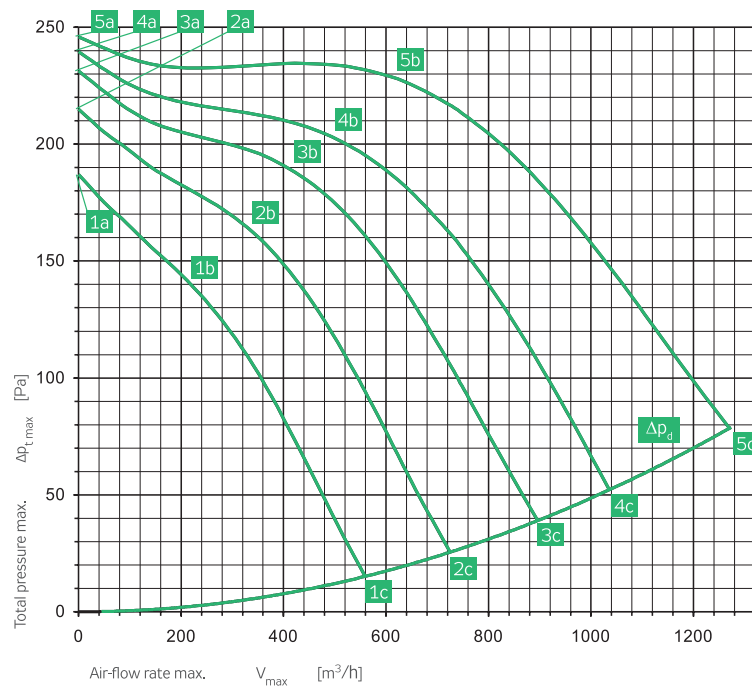
Sound power level L_{WAKOKT} [dB(A)]

125 Hz	69	65	60
250 Hz	64	70	59
500 Hz	67	74	62
1000 Hz	68	74	60
2000 Hz	68	74	57
4000 Hz	64	71	52
8000 Hz	54	61	40

RP 80-50/40-6D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	2.11	2.45	3.70	1.32	1.89	3.70	1.19	2.12	3.70	1.17	1.83	3.27	1.19	1.62	2.66
Electric input P [W]	419	951	1950	324	678	1483	300	692	1204	279	474	836	239	331	508
Speed n [min ⁻¹]	980	934	835	951	883	659	930	801	518	888	769	394	821	711	308
Air-flow rate V [m³/h]	0	3006	5829	0	2403	5020	0	2648	4577	0	1777	3775	0	1249	2932
Static pressure Δp_s [Pa]	496	475	238	482	416	124	461	350	35	418	304	0	364	250	0
Total pressure Δp_t [Pa]	496	477	248	482	417	131	461	352	41	418	305	4	364	251	2

RQ 20-4D Ex



RQ 20-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{max}	[W]	278
Max. current (5c)	I_{max}	[A]	0.48
Mean speed	n	[min ⁻¹]	1380
Capacitor	C	[μF]	–
Max. working temp.	t_{max}	[°C]	40
Max. air-flow rate	V_{max}	[m³/h]	1273
Max. total pressure	$\Delta p_{t max}$	[Pa]	246
Min. static pressure (5c)	$\Delta p_{s min}$	[Pa]	0
Weight	m	[kg]	9
Five-stage controller	type	TRN 2	
Protecting relay	type	therm. relay	

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAX} [dB(A)]

L_{WA}	70	71	61
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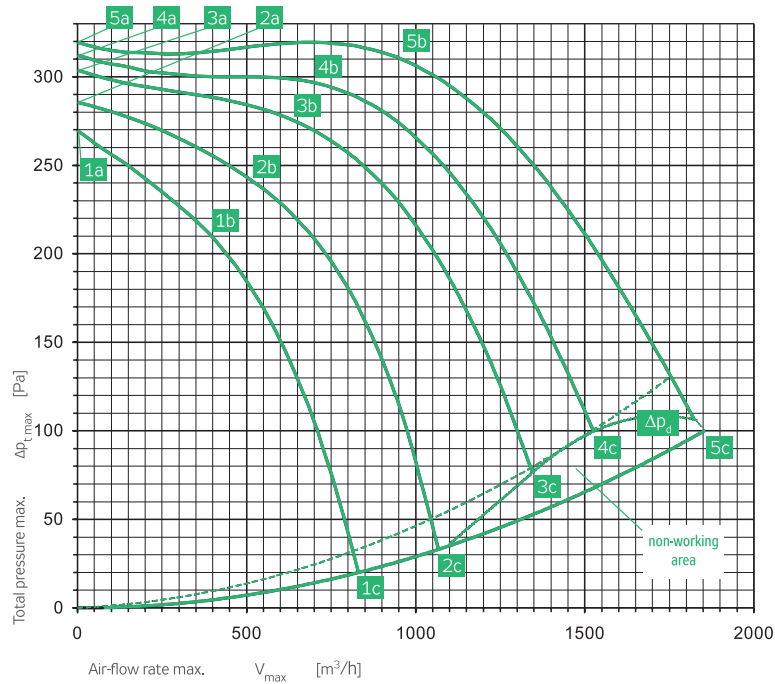
Sound power level L_{WAKOkt} [dB(A)]

125 Hz	49	49	41
250 Hz	64	58	57
500 Hz	62	64	55
1000 Hz	63	66	54
2000 Hz	64	65	53
4000 Hz	61	62	47
8000 Hz	53	56	41

RQ 20-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	0.31	0.34	0.48	0.19	0.26	0.47	0.16	0.24	0.45	0.15	0.23	0.41	0.15	0.20	0.35
Electric input P [W]	68	143	278	46	98	204	40	81	162	35	63	115	30	43	76
Speed n [min ⁻¹]	1457	1384	1224	1427	1313	1013	1399	1261	873	1346	1183	721	1256	1119	567
Air-flow rate V [m³/h]	0	627	1273	0	498	1039	0	425	895	0	340	726	0	217	561
Static pressure Δp_s [Pa]	246	208	0	240	193	0	231	178	0	215	154	0	187	138	0
Total pressure Δp_t [Pa]	246	227	79	240	205	52	231	187	39	215	159	26	187	140	15

RQ 22-4D Ex



RQ 22-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{\max}	[W]	524
Max. current (5c)	I_{\max}	[A]	0.93
Mean speed	n	[min ⁻¹]	1420
Capacitor	C	[μF]	–
Max. working temp.	t_{\max}	[°C]	40
Max. air-flow rate	V_{\max}	[m³/h]	1836
Max. total pressure	$\Delta p_{t \max}$	[Pa]	320
Min. static pressure (5c)	$\Delta p_{s \min}$	[Pa]	8
Weight	m	[kg]	14
Five-stage controller	type	TRN 2	
Protecting relay	type	therm. relay	

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{\max} [dB(A)]

L_{WA}	76	77	66
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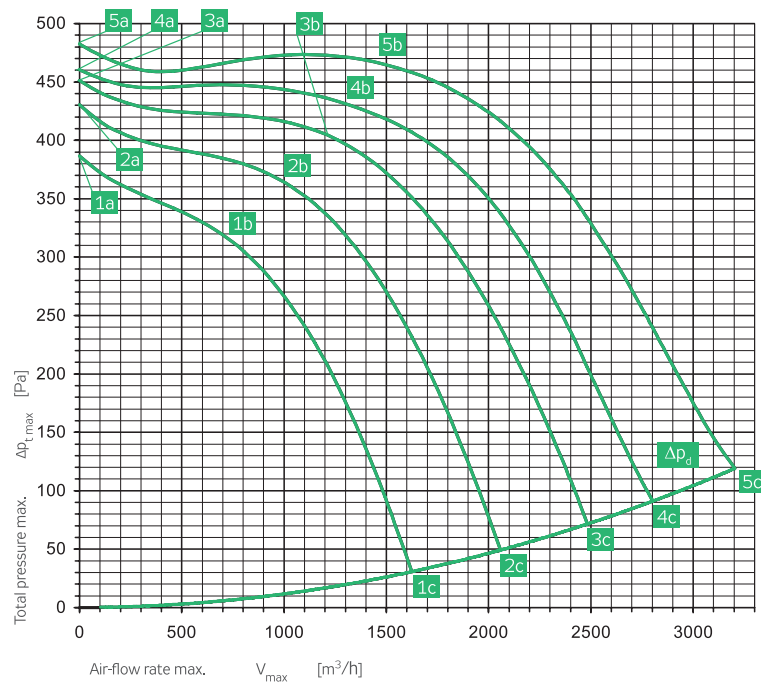
Sound power level L_{WAKort} [dB(A)]

125 Hz	57	53	48
250 Hz	66	66	59
500 Hz	67	70	60
1000 Hz	70	72	61
2000 Hz	71	70	57
4000 Hz	68	69	54
8000 Hz	60	61	43

RQ 22-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	0.57	0.61	0.93	0.33	0.45	0.95	0.29	0.45	0.97	0.27	0.45	0.94	0.27	0.44	0.80
Electric input P [W]	122	253	524	83	169	407	73	149	341	66	123	249	58	96	161
Speed n [min ⁻¹]	1474	1420	1308	1449	1386	1145	1431	1337	1014	1388	1257	753	1332	1178	596
Air-flow rate V [m³/h]	0	962	1836	0	708	1531	0	645	1337	0	534	1072	0	406	831
Static pressure Δp_s [Pa]	320	282	8	312	283	32	304	266	23	286	232	0	270	202	0
Total pressure Δp_t [Pa]	320	309	106	312	298	100	304	278	75	286	241	33	270	206	20

RQ 28-4D Ex



RQ 28-4D Ex

Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{\max}	[W]	1245
Max. current (5c)	I_{\max}	[A]	2.25
Mean speed	n	$[\text{min}^{-1}]$	1440
Capacitor	C	$[\mu\text{F}]$	–
Max. working temp.	t_{\max}	$^{\circ}\text{C}$	40
Max. air-flow rate	V_{\max}	$[\text{m}^3/\text{h}]$	3202
Max. total pressure	$\Delta p_{t \max}$	[Pa]	483
Min. static pressure (5c)	$\Delta p_{s \min}$	[Pa]	0
Weight	m	[kg]	23
Five-stage controller	type		TRN 4
Protecting relay	type		therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b

Total sound power level L_{MAXL} [dB(A)]

L_{WA}	80	83	71
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Sound power level L_{WAKOkt} [dB(A)]


125 Hz	64	58	59
250 Hz	68	70	63
500 Hz	70	75	63
1000 Hz	75	78	66
2000 Hz	75	77	64
4000 Hz	71	75	60
8000 Hz	62	68	46

RQ 28-4D Ex

Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]	400			280			230			180			140		
Current I [A]	1.19	1.37	2.25	0.77	1.12	2.41	0.68	1.16	2.43	0.69	1.16	2.32	0.73	1.12	2.07
Electric input P [W]	235	530	1245	201	432	1027	183	394	829	174	322	611	157	245	411
Speed n $[\text{min}^{-1}]$	1476	1436	1328	1451	1385	1167	1430	1333	1033	1391	1269	861	1328	1189	689
Air-flow rate V $[\text{m}^3/\text{h}]$	0	1485	3202	0	1289	2801	0	1211	2494	0	999	2063	0	742	1624
Static pressure Δp_s [Pa]	483	440	0	461	415	0	451	384	0	430	340	0	387	305	0
Total pressure Δp_t [Pa]	483	465	119	461	434	91	451	401	72	430	363	49	387	311	31

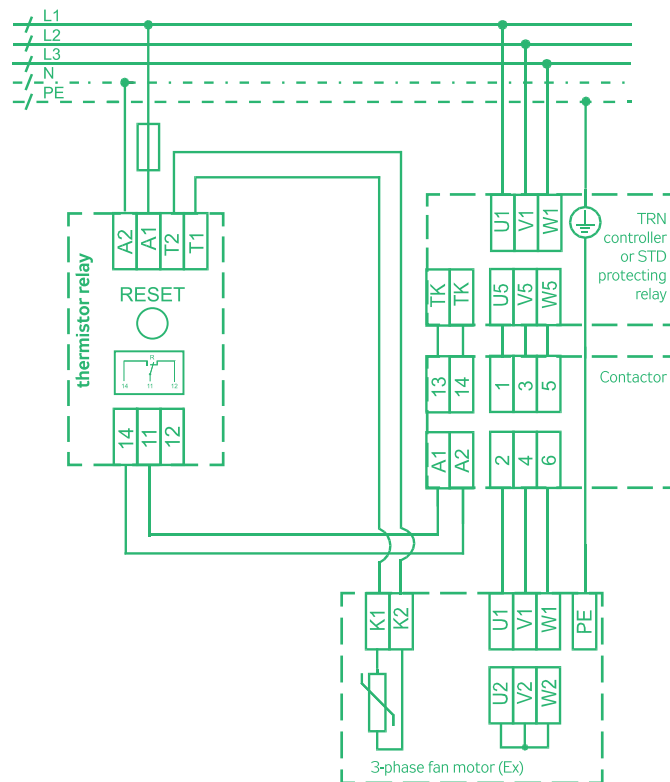
THERMISTOR PROTECTION OF EX FANS

The temperature inside the motors of all RP Ex and RQ Ex fans is permanently read by temperature sensitive sensors (PTC thermistors) situated in the motor winding. The thermistors must be connected to the thermistor relay, which disconnects the protective circuit of the contactor.

Thermistor relay must be approved type  II (2) G.

This relay must be located outside the potentially explosive atmospheres.


FIGURE 8 – EXAMPLE OF THERMISTOR RELAY CONNECTION



During failure-free (on) state, terminals 11 and 14 of thermistor relay are interconnected.

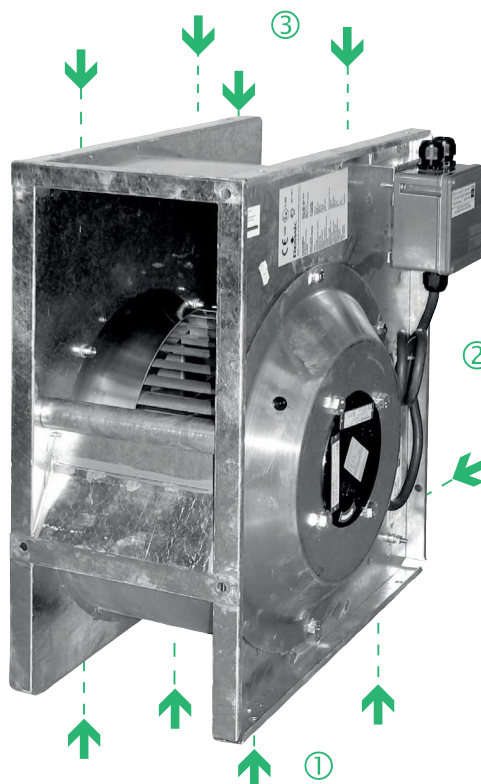
During failure (off) state, only terminals 11 and 12 are interconnected, terminals 11 and 14 of thermistor relay are disconnected.

INSTALLATION


- RP Ex and RQ Ex fans, including other Vento elements and equipment, are not intended, due to their concept, for direct sale to end customers. Each installation must be performed in accordance with a professional project created by a qualified air-handling designer who is responsible for proper selection of the fan. The installation and commissioning may be performed only by a specialized assembling company licensed in accordance with generally valid regulations.
- The fan must be checked carefully prior its installation. In particular, it is necessary to check the parts and cable insulation for damage, and to see whether the rotating parts can rotate freely. Minimum clearance between rotating and fixed parts is 1% of impeller diameter.
- It is recommended to insert elastic connections in front of and behind the fan.
- It is advisable to place appropriate  air filter in front of the fan to protect it and the duct against dirtying and dust fouling .
- **f the fans draw in air from the open space, respectively if the suction of foreign objects cannot be eliminated, the fans' inlets must be provided with a protecting grid of IP 20 protection.**
- Protecting grid must be electrically connected to the fan casing.
- On the inlet side, the fan is equipped with a cover grid positioned in front of the suction mouth (diffuser).
- We recommend adding a 1.5 m long piece of straight duct to the fan's outlet to get optimal pressure conditions. In cramped spaces, it is advisable to consider the necessity to situate directly behind the fan's outlet the duct adapting piece, attenuator, heat exchanger, heater, etc. Figure # 5 shows the fan's outlet design and arrangement. From this figure, it is obvious that from the entire cross-section (e.g. 500 x 250), only about 1/4 of the outlet cross-section is free. This means that the airflow velocities close behind the fan can be as much as four times higher than, for example, in the inlet. Therefore, the greater the distance of the attenuators (or other resistant elements) from the outlet, the better. On the inlet side, an elastic connection will be sufficient as a distance piece in most cases.

- The fan must be suspended by separate suspensions, or fixed to the foundations, so that no loading can be transferred to the elastic connections or connected duct.
- RQ Ex fans are provided on three sides with anchoring holes to be anchored to the foundation in one of three possible positions ① ② ③ see figure # 9.

FIGURE 9 – RQ EX FANS ANCHORING HOLES



WIRING

- The wiring can be performed only by a qualified worker licensed in accordance with national regulations.
- The fans are equipped with a plastic terminal box  II 2G EEx e T6/T5. The terminal box is fixed with screws to the fan casing, and equipped with labelled screw terminals (see figure # 10).
- To connect the fan motor, approved cables for this purpose have to be used
- The fan must be adequately grounded.
- Installation must conform to ČSN EN 60079-14 Explosive atmospheres Part 14 Design, selection and erection of el. installation.
- For fan wiring diagram refer to figure # 11.

Attention!

Electric motors must not be connected in the triangle. They always engage only star connection.

FIGURE 10 – ALL-PLASTIC TERMINAL BOX ON THE CASING

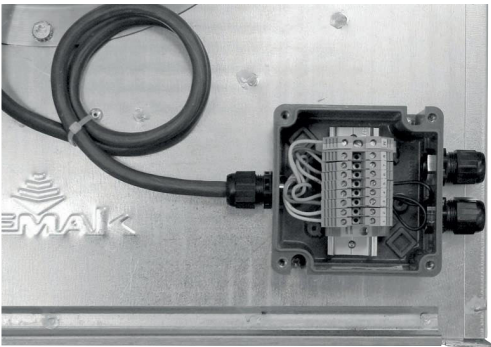
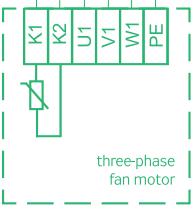


FIGURE 11 – WIRING DIAGRAM



K1, K2

– thermistor terminals of the motor

U1, V1, W1

– three-phase motor power supply terminals 400 V / 50 Hz

PE

– protective conductor terminal

The wiring diagrams with front-end elements (protective relays, controllers, control units) are included in the installation manual, respectively in the AeroCAD project.

On the following pages you will find some basic examples of the fan connection to output controllers and control units. AeroCAD software is available for precise design of the wiring.

Fans
RP

Fans
RQ

Fans
RO

Fans
RE

Fans
RF

Fans
RPH

Fans
EX

Controllers
..

EXAMPLES,
RP EX, RQ EX FANS

Controllers
..

Fans
EX

Fans
RPH

Fans
RF

Fans
RE

Fans
RO

Fans
RQ

Fans
RP

EXAMPLE A**FAN EQUIPPED WITH THERMAL PROTECTION,
WITHOUT OUTPUT CONTROL**

An RP (RQ) Ex fan connection in a simple venting system without output control is shown in figures # 12. This type of connection ensures full thermal protection of the fan using thermistors, thermistor relay and protecting relay STD. The connection shown in the figures enables manual turning of the fan on/off using the buttons on the protecting relay.

After pressing the button marked "I" on the STD protecting relay, the fan starts and the button will stay in the depressed position, signalling the fan's operation. The fan can be stopped by pressing the button marked "O".

If the motor is overheated above 130°C due to overloading, the impedance of the K1 and K2 thermistors in the motor winding will be increased several times.

The thermistor relay will detect the increased impedance and open contacts 11 and 14. Upon opening contacts 11 and 14, the STD protecting relay circuit TK, TK will be disconnected. As a reaction to this state, the STD relay will disconnect the power supply to the overheated motor. After cooling down, the motor is not automatically started. The failure must be confirmed (unblocked) by the operator by pressing the black "I" button.

EXAMPLE B**FAN WITH OUTPUT CONTROL
AND PROTECTION CONTROLLER**

An RP (RQ) Ex fan connection in a venting system with output control using the TRN controller equipped with an ORe5 control unit is shown in figure # 13. In addition to the selection of the fan output within the stage range "0" - "5", this type of connection also ensures its protection via thermistors, thermistor relay and the protection integrated into the TRN controller. The connection shown in the pictures also enables the fan to be switched on/off manually, by the ORe5 remote controller or any other switch (like room thermostat, gas detector, pressostat, hygrostat, etc.) on the PT1 and PT2 terminals.

After turning the selector to position "1" to "5", the fan will start at the corresponding output (1 to 5), and an indicator signalling the fan's operation will light up. The closed switch connected to PT1, PT2 terminals and closed terminals 11 and 14 of the thermistor relay connected to TK, TK terminals of the controller are essential for fan operation. The switch connected to PT1, PT2 terminals is used to stop and start the fan without other relations so that the fan after being started runs at the output preset on ORe5. If this possibility is not used, it will be necessary to interconnect terminals PT1 and PT2. If the fan is overloaded, contacts 11 and 14 of the tripping device will open due to overheating of the motor. As a reaction to this state, the controller will disconnect the power supply to the motor, and turn off the fan operation signalling indicator. After cooling down, the motor is not automatically started. First, it is necessary to confirm (unblock) the failure removal by turning the selector to position "0". After turning the selector to position "1" to "5", the fan will start at the corresponding output. In this arrangement, position "0" on the ORe5 control unit must not be blocked

FIGURE 12 – FAN CONNECTION

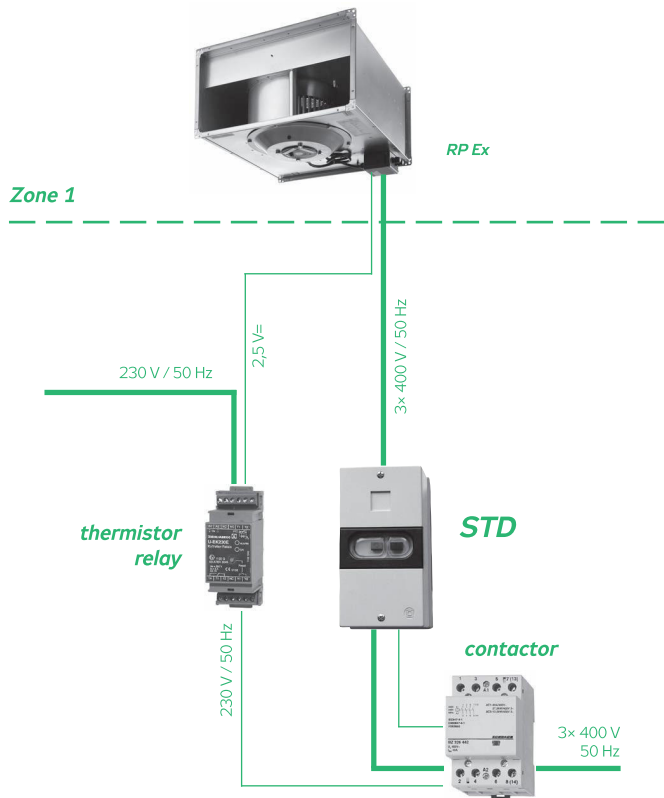
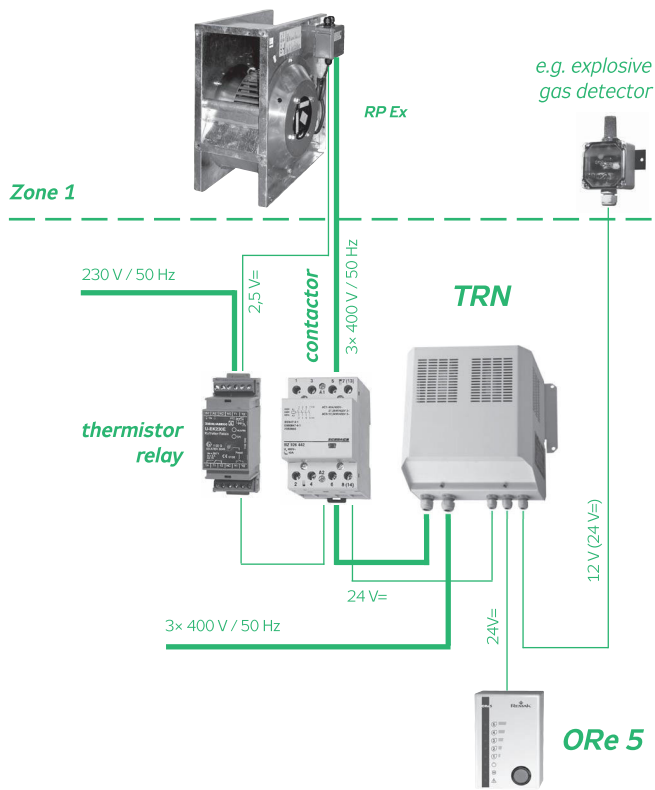


FIGURE 13 – FAN CONNECTION



Fans
RP

Fans
RQ

Fans
RO

Fans
RE

Fans
RF

Fans
RPH

Fans
EX

Controllers
..

EXAMPLE C
FANS WITH CONTROL UNIT
WITHOUT OUTPUT CONTROL

An RP (RQ) Ex fan without output control connection in a more sophisticated venting system equipped with a VCS control unit (e.g. with air heating) is shown in figure # 14.

This type of connection ensures full thermal protection of the fan using thermistors and VCS control unit which already contains a thermistor relay installed in the factory. Fan switching on/off is ensured by the control unit. The motor protection must always be ensured by the control unit by connecting the TK, TK thermistor terminals to the 5a, 5a, 5b and 5b terminals in the control unit.

The air-handling system is started by the control unit. All protection and safety functions of the fan as well as the entire system are ensured by the VCS control unit.

EXAMPLE D
FAN WITH CONTROL UNIT
AND OUTPUT CONTROL

An RP (RQ) Ex fan equipped with an output controller in a more sophisticated venting system with a VCS control unit (e.g. with air heating) is shown in figure # 15.

This type of connection ensures full thermal protection of the fan using thermistors and VCS control unit which already contains a thermistor relay installed in the factory. Fan switching on/off is ensured by the control unit. The motor protection must always be ensured by the control unit by connecting the TK, TK thermistor terminals to the 5a, 5a, 5b and 5b terminals in the control unit. Internal fan output control is installed (configured) in the control unit during production. This connection of the speed controller enables the option of fan output in the range from stage "1" to stage "5".

In the D connection example (respectively with control unit), all additional functions of the controller must always be blocked by interconnecting the PT2 and E48 terminals in the controller.

The air-handling system is started by the VCS control unit. An internal control is integrated into the control unit. All protection and safety functions of the fan as well as the entire system are ensured by the control unit.

FIGURE 14 – FAN CONNECTION

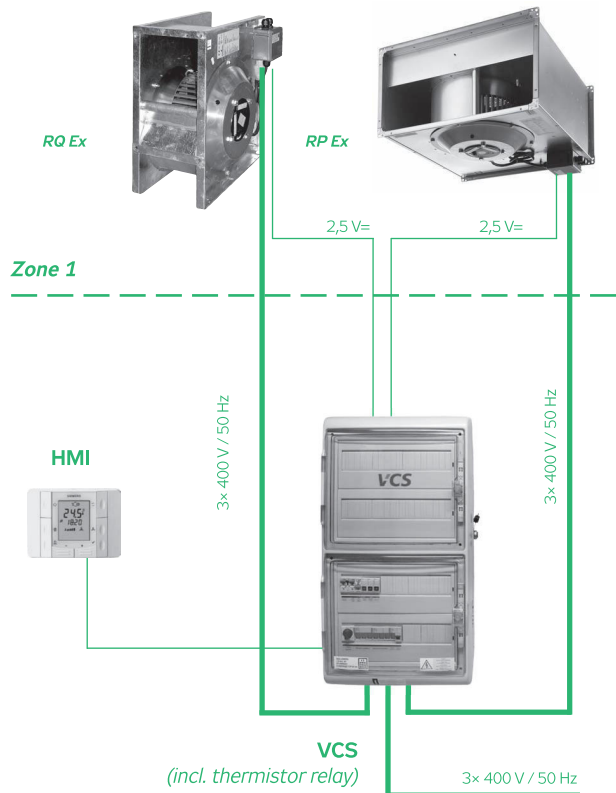
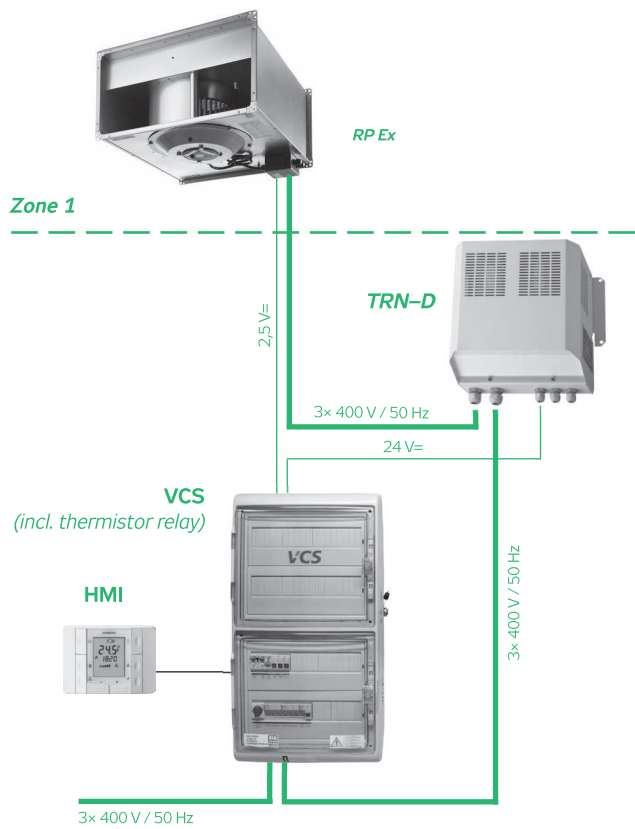


FIGURE 15 – FAN CONNECTION



Fans
RP

Fans
RQ

Fans
RO

Fans
RE

Fans
RF

Fans
RPH

Fans
EX

Controllers
..

EXAMPLE E**FAN WITH AUTOMATIC OUTPUT CONTROL
FOR SPECIAL APPLICATIONS**

An RP (RQ) Ex fan connection in a special venting system with automatic output control using the TRN controller equipped with an OXe controller integrated into the OSX control unit is shown in figure # 16.

Two TRN controllers can be controlled by the OSX control unit. In addition to automatic fan output control within the stage range "0" - "5", this type of connection also ensures fan protection via thermistors, thermostat relay and the protection integrated into the TRN controller. This type of connection enables the fan to be switched on/off manually, by any other switch (like room thermostat, gas detector, pressostat, hygrostat, etc.) on terminals PT1, PT2.

Automatic selection of the controller output stage is ensured by the OXe controller in relation to any physical quantity which is read by the active sensor equipped with an analogue output (signal source 0-10V). Ex fans use mostly an explosion gas concentration sensor.

The fan in the picture is started, controlled and protected by the TRN controller. An automatic driver of the OXe controller evaluates the continuous 0-10V signal from a converter (signal source), and in five adjustable levels switches stages "1" to "5" of the controller. Thermal or pressure converters, converters for the measurement of relative or absolute humidity, concentration of gases, vapours or explosives in air, sensors of air quality and many other converters of different physical quantities can be used as sources of the control signal.

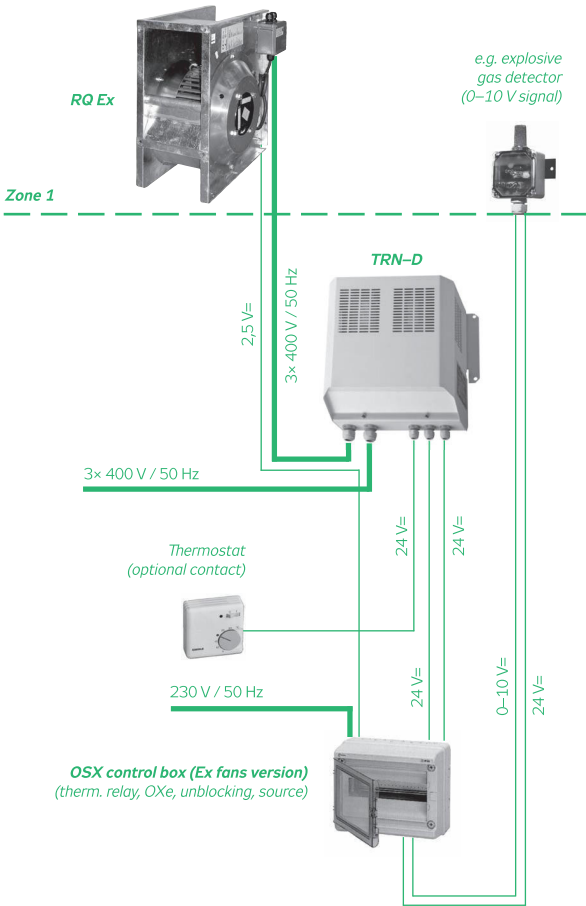
The closed electrical circuit between TK, TK terminals situated in the control unit and closed external switch connected to PT1, PT2 terminals are essential for the fan's operation.

The switch connected to PT1, PT2 terminals can be used to stop and start the fan separately without other relations. The PT1, PT2 terminals in the controller can also be interconnected with analogous terminals in the OSX control unit, and thus enable the fan to be stopped by the button from the control unit. If this possibility is not used, it will be necessary to interconnect terminals PT1 and PT2.

If the fan is overloaded, contacts TK, TK in the OSX control unit will be disconnected due to overheating of the motor. As a reaction to this state, the controller will turn the overheated motor off. After cooling down, the motor is not automatically started. The failure must be confirmed by pressing the separate unblocking button which is situated inside the OSX control unit. As most similar special installations can vary from case to case, it is advisable to consult the specific connection with the manufacturer. The manufacturer will deliver an OSX control unit adapted according to the disposition, modification and number of individual devices. The following specification must be attached to your order:

- Type of fan No. 1
- Type of fan No. 2
- Type of controller No. 1
- Type of controller No. 2
- Type and manufacturer of the sensor (converter) provided with a 0-10V output.
- Specification of the physical quantity read by the sensor (converter) and its range.
- Specification of the sensor (converter) power supply

FIGURE 16 – FAN CONNECTION



Fans
RP

Fans
RQ

Fans
RO

Fans
RE

Fans
RF

Fans
RPH

Fans
EX

Controllers
..