REMAK

RP radial duct fans

Ex design

type: RP * - * / * - ** Ex

INSTALLATION AND OPERATING INSTRUCTIONS 03/2022

REMAK

Content

The current version of the document is available at www.remak.eu

Technical details

Use of Ex fans

Explosion-proof, fully adjustable, low-pressure, centrifugal fans RP * - * / * - ** Ex (**hereinafter only RP Ex**) they can be used universally, from simple ventilation to complex air conditioners for complex air treatment. Due to the special construction preventing the formation of mechanical spark sparks according to the standards ČSN EN ISO 80079-36, ČSN EN ISO 80079-37, ČSN EN IEC 60079-0 and the secured design "e" with the level of protection "eb" of the electric motor according to ČSN EN 60079-7 the fans are intended for use in environments with a risk of explosion of gases and vapors.

Operating conditions, location

RP Ex fans are approved by the Notified Body No. NB 1026, Physical-Technical Testing Institute, sp, Ostrava- Radvanice. The fans are designed for indoor and outdoor use. It is used for air transport without solid, fibrous, sticky, aggressive admixtures. The air must not contain chemicals that cause corrosion of zinc, copper and aluminum. The permissible supply air temperature is in the range of -20 to + 40 º C. From the point of view of the classification of areas with a risk of explosion according to ČSN EN 60079-10-1, the fans are designed for the environment and for the extraction of air from the environment.zone 1 or zone 2. Explosion-proof electric motors of RP Ex fans are in the secured design "eb" according to the standard ČSN EN 60079-7 and belong to the group II according to the standard ČSN EN IEC 60079-0 and are markedby sign of non-explosiveness:

II 2G Ex eb IIC T3 Gb.

RP Ex fans are marked with a non-explosive symbol

II 2 / 2 G Ex h IIB+H_2 T3 Gb / Gb.

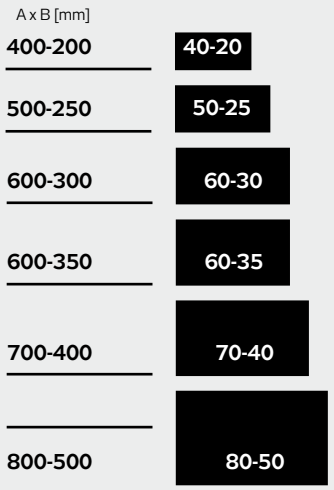
Figure 1 – legend of RP Ex fan explosion mark

Marking according to Directive No. 2014/34 / EU	
Ex	explosion proof symbol
II	equipment group - equipment for surface applications in explosive atmospheres
2/2 G	equipment category - fan extracting from zone 1, located in zone 1
Marking according to standard ČSN EN ISO 80079-36: 2016	
Ex h	non-electrical equipment: – protection by safe construction "c" – air distance between parts, IP
IIB+H_2	subgroup of gases according to the properties of an explosive gas atmosphere
T3	temperature class, maximum surface temperature of the device T ≤ 200 ºC
Gb/Gb	equipment protection level (EPL) for the interior and exterior of the equipment

The fans can work in any position.
When placing RP Ex fans under the ceiling, it is advisable to mount the fan with the motor cup facing downwards for better access to the terminal box and the motor.
If the air is saturated with moisture or there is a risk of intense inside the fan steam condensation, we recommend mounting the fan with the motor cup facing upwards.
To achieve lower pressure losses in the assembly, we recommend designing a straight pipe with a length of 1 ÷ 1.5 m for the fan discharge.

Dimensional range

Figure 2 – dimensional range



RP Ex fans are produced in six sizes, referred to in according to size A x B [cm] connecting flanges, see Figure 2. Manufactured as standard dimensional and performance many non-explosive fans allows designers optimize use all parameters nozzles for air flow up to 5,800 m^3/h.

Materials

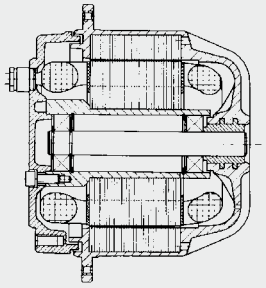
The outer casing of RP Ex fans and the connecting flanges are made of hot - dip galvanized (Zn 275 g / m2) of steel or stainless steel sheet. Impeller blades are made of galvanized sheet steel, copper diffusers, electric motor housing made of aluminum alloys. The internal construction of electric motors consists of steel, copper and plastic parts. All materials are carefully inspected, inspected and guarantee a long service life and reliability of the fans.

Impellers

The impellers of RP Ex fans have forward curved blades. The direction of rotation must be checked after connecting the electric motor. The impellers must always be turned to the left, counterclockwise (from the point of view of the inspection hole on the pan). The inspection hole on the motor bowl is closed with a rubber seal. The impellers, together with the motor, are perfectly statically and dynamically balanced.

Motors

Figure 3



Compact asynchronous ones are used for the drive three-phase motors with external rotor and resistance armature, corresponding to the power and speed approved according to Directive 2014/34 / EU (ATEX 114), see Figure 2. The electric motors are housed inside the impeller and are optimally cooled during operation. women with flowing air. High-quality encapsulated ball bearings with permanently lubricated motors enable a fan life of more than 40,000 operating hours to be achieved without maintenance.

Technical details

The motor protection is IP44, insulation class F. The windings are protected against moisture by additional impregnation. The motors are characterized by a relatively low inrush current.

Electric instalation

The electrical installation of the fan itself is terminated by a special non- explosive terminal block with IP 66 protection. The connection diagrams of the electric motor are in a separate chapter Electrical installation.

Attention! Electric motors must not be connected in a delta. They are always connected only to the star (for nominal voltage 3x400V / 50Hz or reduced voltage).

Figure 4 – thermistor

Electric motor protection

For all motors, continuous monitoring of the internal motor temperature is provided as standard. The internal temperature is sensed by miniature temperature sensors, thermistors, which are stored in the winding of the electric motor. The thermistors must be connected to an ATEX-certified thermistor relay (approved type **II (2) G**), which must be located outside potentially explosive atmospheres. The relay at 130 ºC irreversibly opens the control circuit (contactor switching circuit) meeting the operating conditions in the relevant **zone 1** or **zone 2**. For the design, selection and installation of electrical installations in explosive atmospheres, the specific requirements of the ČSN EN 60079-14 standard must be respected. The method protects the motor against operationally unfavorable influences - for example against overload, failure of one phase of the network or short circuit, firm braking of the motor, interruption or short circuit of the protection circuit, high temperature of the transported air. Thermal protection with proper connection is comprehensive and reliable. Thermistors of up to two fans can be connected to one thermistor relay, but they must be connected in series. In such a combined connection, it must be borne in mind that in the event of a failure of one electric motor, both fans will be stopped.

Attention! It is not permissible to protect the electric motors of the fans with conventional current-dependent protection with motor overcurrent protection elements!

Fan Output Control

For fans, several control methods can generally be used, but for RP Ex fans, voltage control is the most suitable. The fan output can be fully regulated by changing the speed. The speed changes as the voltage at the terminals of the electric motor changes (decreases). RP Ex fans are continuously adjustable if the voltage change is continuous. In practice, step voltage regulators are more often used. The voltage must not increase above the nominal value according to the label value and the current must not exceed the nominal value of the fan electric motor.

Attention! It is not permissible to control the speed of the electric motor of the RP Ex fan with a frequency converter!

5-stage voltage regulation

Voltage regulation of Vento fans is technically and operationally the most advantageous. There is no danger of interference, there is no humming, whistling and vibration of the motor, voltage- regulated motors become less hot. The voltage regulators TRN and TRR can be used to regulate the fan power in 5 stages with a step of about 20%, which corresponds to 5 curves of pressure versus flow in the operating characteristics of each fan. The electric motors of RP Ex fans can be operated in the range of 25% to 100% of the rated voltage. Table 1 shows the relationship between the controller output voltage and the set power stage. Ex fans are only supplied with three-phase electric motors. Three- phase TRN or TRRD controllers are used to regulate their speed or power. TRN controllers are manufactured in four types according to the current value of TRN 2D, TRN 4D, TRN 7D and TRN 9D. An important feature of this series is the possibility of remote control by manual control ORe 5, or automatic switching of 5 stages by control OXe depending on the external control signal 0 to 10 V). The simpler TRRD controllers are also available in four sizes, TRRD 2, TRRD 4, TRRD 7 and TRRD 9. These controllers ncannot be controlled automatically or remotely (therefore they require location within easy reach) and do not include fan protection (must be fully secured by other equipment).

Attention! No other type of control is permitted!

Table 1 – correlation of voltage and regulation

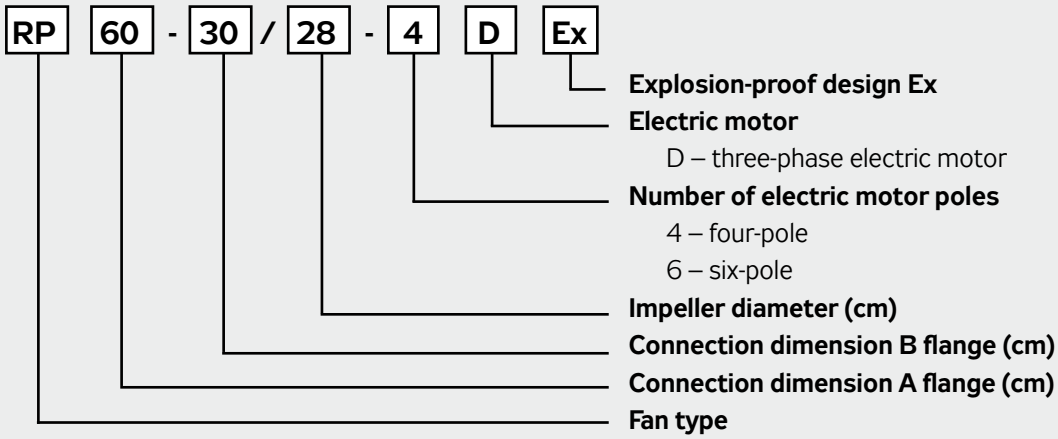
Three-phase electric motor	Characteristic curve - regulator stage				
	5	4	3	2	1
Voltage (V)	400	280	230	180	140

Accessories

RP Ex fans form part of a wide range of elements of the Vento modular ventilation and air conditioning system. By selecting suitable elements, any air handling unit can be assembled for simple ventilation and complex comfort air conditioning. When designing individual devices, it is necessary to keep in mind for which environment the devices are intended. An approved type of thermistor relay can be ordered together with the fan for thermal protection of the fans.

Technical details

Figure 5 – type key for designating Ex fans



Description and designation of fans

Figures 5, 6 and Table 3 contain data on important fan dimensions, Table 4 contains basic parameters and nominal values of RP Ex fans.

Table 2

	RP 40-20/20-4D Ex			
1 -	Power supply	Y	3× 400 V	50 Hz
2 -	Max. electric input	P_{max}	[W]	281
3 -	Max. current (5c)	I_{max}	[A]	0.50
4 -	Mean speed	n	[min^{-1}]	1400
5 -	Capacitor	C	[F]	-
6 -	Max. working temp.	t_{max}	[ºC]	40
7 -	Air flow max.	V_{max}	[m^3/h]	1306
8 -	Total pressure max.	$\Delta p_{t\,max}$	[Pa]	260
9 -	Static pressure min. (5c)	$\Delta p_{s\,min}$	[Pa]	0
10 -	Weight	m	[kg]	13
11 -	Five-stage controller	type		TRN 2
12 -	Protecting relay	type		therm. relay

Working characteristics

The performance characteristics of RP Ex fans are measured in a REMAK test room for aerodynamic and electrical measurements of fans and measurement of pressure losses of passive elements.
In the data part of this catalog, next to the characteristics of each fan, there is a table of the most important values (see eg table 2). These values are also listed on the fan nameplate.

The meaning of the 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

Used designations in fan parameters

m	– hmotnost (±10%)	kg
S	– surface	m^2
V	– volume flow	m^3/h
n	– speed	min^{-1}
t	– air temperature	ºC
Δp_s	– static pressure difference	Pa
Δp_d	– dynamic pressure difference	Pa
Δp_t	– total pressure difference	Pa
ρ	– specific gravity of air	kg/m^3
L_W	– sound power level	dB
L_{WA}	– sound power level weighted	dB(A)
$L_{WA\,rel}$	– relative sound level. ex. weighted	dB(A)
U	– voltage	V
I	– current	A
P	– input power	W

Fan parameters

Dimensions, weights, performance

Figure 6 and Table 3 contain data on the important dimensions of the RP Ex fans.

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

Figure 6 – dimensional drawing of RP Ex fans

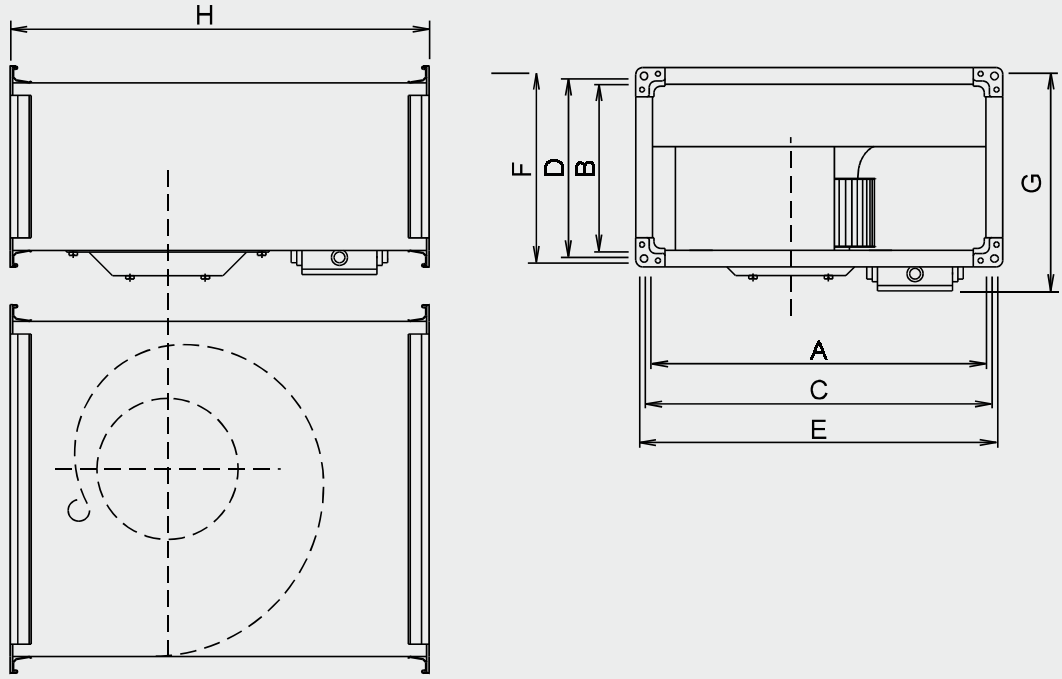


Table 4 - RP Ex fan basic parameters and nominal values

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 – SINGLE-PHASE MOTORS										
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

$V_{max.}$ – maximum air flow at minimum permitted pressure loss

$\Delta p_{t\,max.}$ – the maximum total fan pressure is the maximum of the sum Δp_s and Δp_d $(\Delta p_s + \Delta p_d)_{max.}$

$\Delta p_{s\,min.}$ – the minimum allowed static pressure (pressure loss of the connected pipeline) indicates the lowest value at which the fan must be set choked (at nominal voltage at point 5c) to prevent overloading and protection activation

n – fan speed measured at the operating point with the highest efficiency (5b), rounded to tens

U – nominal supply voltage of the motor without regulation (all values in the table refer to this voltage)

$P_{max.}$ – maximum power of the electric motor at the highest load, i.e. at flow rate $V_{max.}$

$I_{max.}$ – maximum phase current at voltage U and the highest permitted load, i.e. at flow rate $V_{max.}$ in point 5c (after connection, it is necessary to check this value and mark the measured current in the warranty card)

$t_{max.}$ – the highest permitted temperature of the transported air during flow $V_{max.}$

controller – prescribed voltage regulator for fan regulation

m* – fan weight (±10%)

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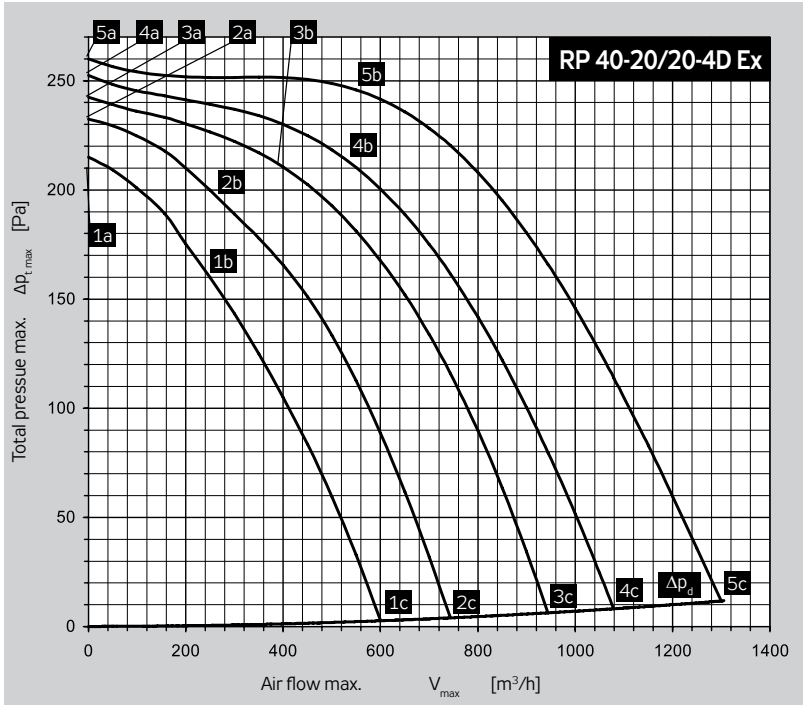
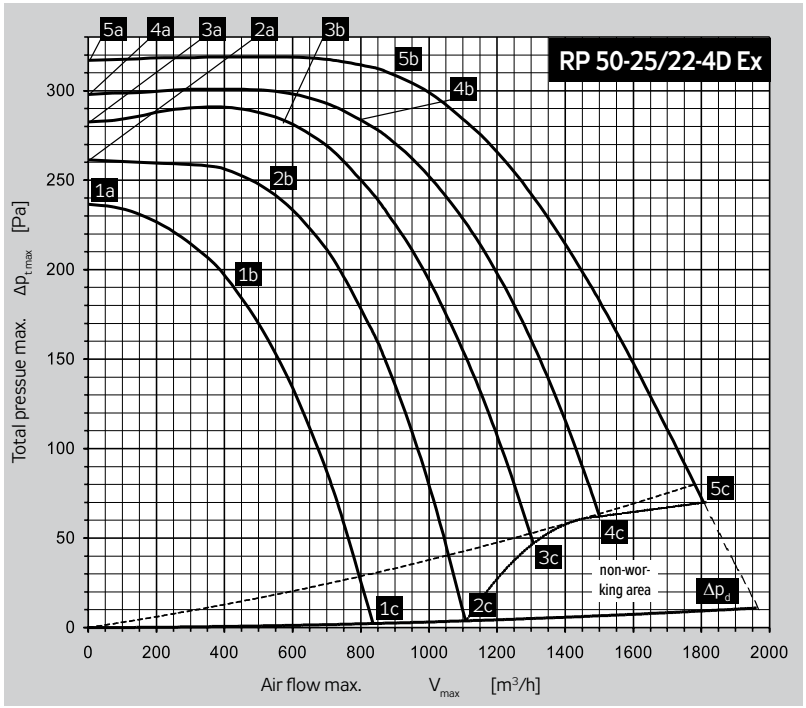


Power supply	Y	3× 400 V	50 Hz
Max. electric input	P_{max}	[W]	281
Max. current (5c)	I_{max}	[A]	0.50
Mean speed	n	[min^{-1}]	1400
Capacitor	C	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m^3/h]	1306
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	260
Static pressure min. (5c)	$\Delta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

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
	Total sound power level LWA [dB(A)]		
L_{WA}	67	73	61
	Sound power level LWAokt [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

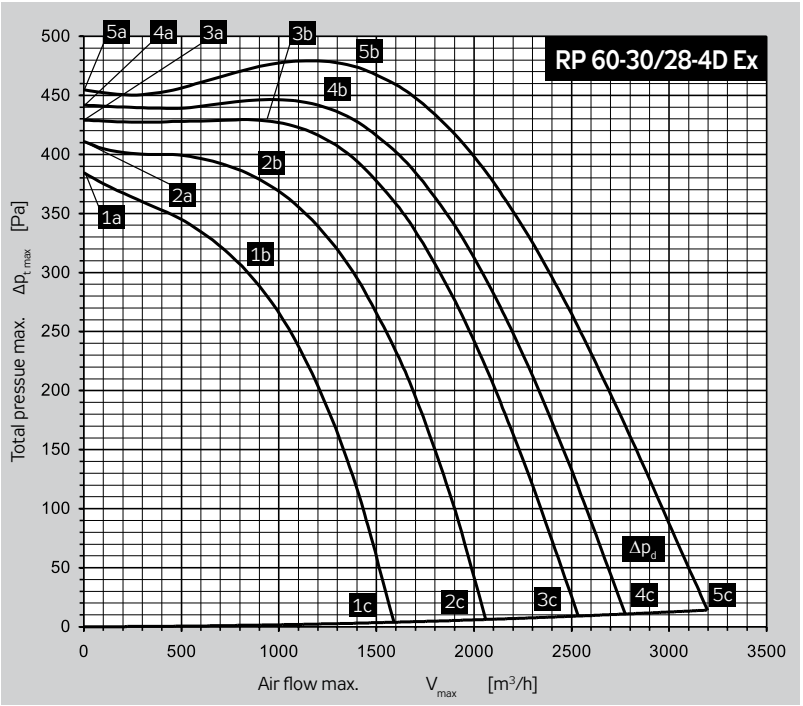
Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]		400			280			230			180			140	
Current I [A]	0.32	0.34	0.50	0.20	0.27	0.49	0.17	0.22	0.47	0.15	0.19	0.42	0.14	0.20	0.36
Input power P [W]	64	123	281	43	103	217	36	71	172	35	50	119	29	44	81
Speed n [min^{-1}]	1457	1397	1222	1430	1308	1014	1409	1303	895	1346	1265	712	1285	1135	586
Air flow V [m^3/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



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	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m^3/h]	1813
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	320
Static pressure min. (5c)	$\Delta p_{s\,min}$	[Pa]	60
Weight	m	[kg]	18
Five-stage controller	type		TRN 2
Protecting relay	type		ATEX therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
	Total sound power level LWA [dB(A)]		
L_{WA}	71	76	63
	Sound power level LWAokt [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

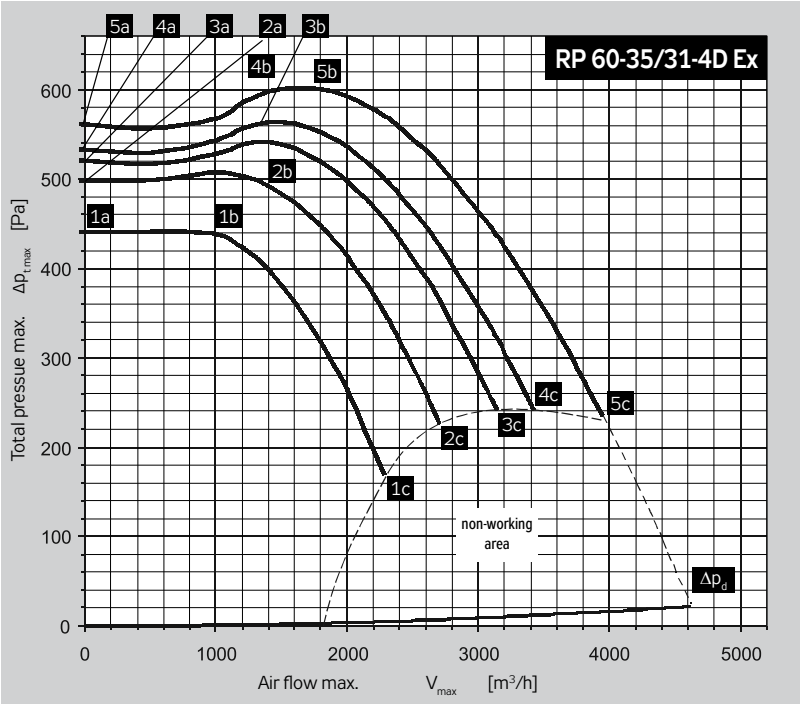
Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]		400			280			230			180			140	
Current I [A]	0.59	0.62	0.93	0.37	0.48	0.95	0.37	0.44	0.97	0.31	0.45	0.99	0.35	0.48	0.83
Input power P [W]	164	248	545	105	180	414	113	143	341	76	124	264	75	104	168
Speed n [min^{-1}]	1458	1425	1300	1432	1371	1120	1384	1348	971	1374	1274	733	1271	1136	567
Air flow V [m^3/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



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	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m³/h]	3195
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	480
Static pressure min. (5c)	$\Delta p_{s\,min}$	[Pa]	0
Weight	m	[kg]	33
Five-stage controller	type		TRN 4
Protecting relay	type		ATEX therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
Total sound power level LWA [dB(A)]			
L_{WA}	77	83	69
Sound power level LWAokt [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

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
Input power 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 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

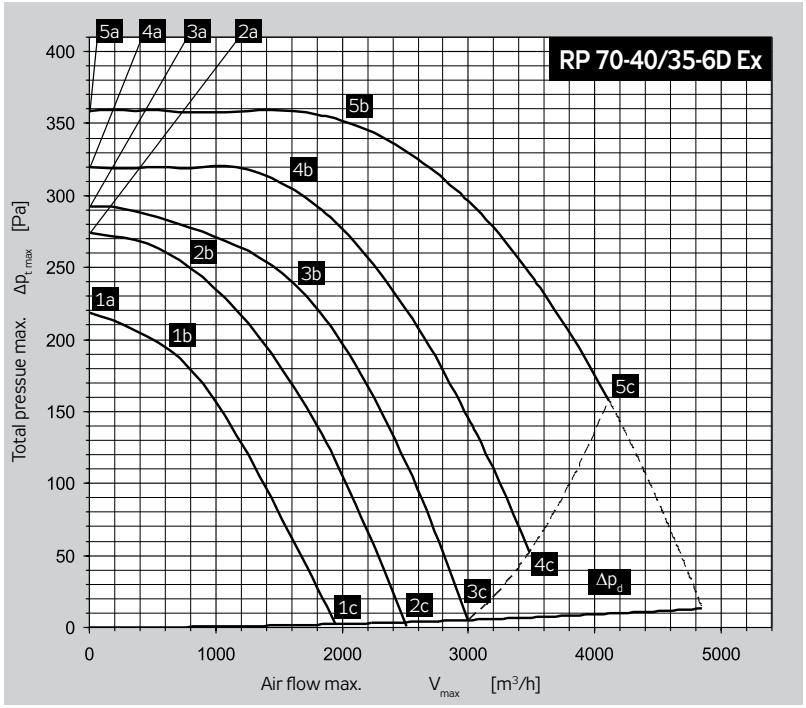


Power supply	Y	3 × 400 V	50 Hz
Max. electric input	P_{max}	[W]	2044
Max. current (5c)	I_{max}	[A]	3.90
Mean speed	n	[min⁻¹]	1440
Capacitor	C	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m³/h]	3950
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	603
Static pressure min. (5c)	$\Delta p_{s\,min}$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

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
Total sound power level LWA [dB(A)]			
L_{WA}	80	86	71
Sound power level LWAokt [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

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
Input power 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 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

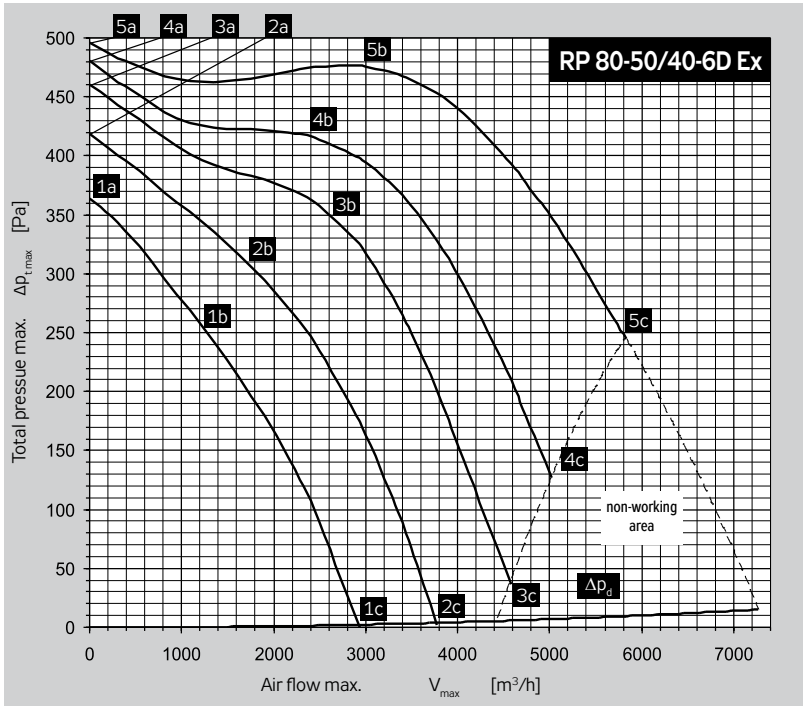
RP fans * - * / * - ** Ex



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	[min⁻¹]	900
Capacitor	C	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m³/h]	4108
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	360
Static pressure min. (5c)	$\Delta p_{s\,min}$	[Pa]	150
Weight	m	[kg]	44
Five-stage controller	type		TRN 2
Protecting relay	type		ATEX therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
Total sound power level LWA [dB(A)]			
L_{WA}	75	81	66
Sound power level LWAokt [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

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
Input power P [W]	316	534	1100	246	374	819	382	422	644	188	188	393	154	154	246
Speed n [min⁻¹]	948	903	763	905	846	563	819	737	436	804	804	359	700	700	278
Air flow V [m³/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



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	[F]	-
Max. working temp.	t_{max}	[°C]	40
Air flow max.	V_{max}	[m³/h]	5829
Total pressure max.	$\Delta p_{t\,max}$	[Pa]	496
Static pressure min. (5c)	$\Delta p_{s\,min}$	[Pa]	238
Weight	m	[kg]	68
Five-stage controller	type		TRN 4
Protecting relay	type		ATEX therm. relay

	Inlet	Outlet	Surrounding
Point	5b	5b	5b
Total sound power level LWA [dB(A)]			
L_{WA}	75	80	67
Sound power level LWAokt [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

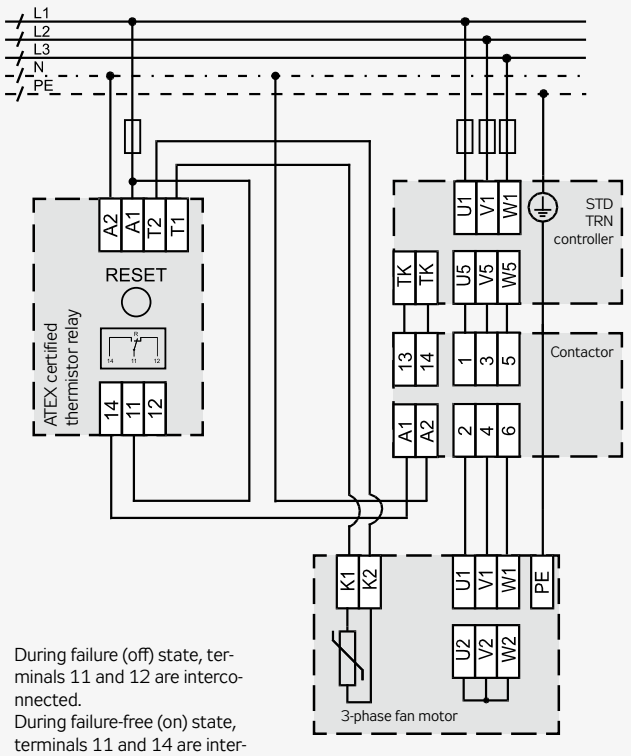
Parameters in selected working points	5a	5b	5c	4a	4b	4c	3a	3b	3c	2a	2b	2c	1a	1b	1c
Voltage U [V]		400			280			230			180			140	
Current I [A]	2.11	2.45	3.70	1.32	1.89	3.70	1.19	2.12	3.70	1.17	1.83	3.27	1.19	1.62	2.66
Input power P [W]	419	951	1950	324	678	1483	300	692	1204	279	474	836	239	331	508
Speed n [min⁻¹]	980	934	835	951	883	659	930	801	518	888	769	394	821	711	308
Air flow 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

Thermistor Protection of Ex Fans

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

At a maximum, two fans can be connected to the thermistor relay, and they must be connected in series. It is necessary to be aware of the fact that this type of combined connection will cause both fans to be stopped even if only one of the motors fails.

Figure 7 – Example of the thermistor relay's wiring



During failure (off) state, terminals 11 and 12 are interconnected.
During failure-free (on) state, terminals 11 and 14 are interconnected.

Installation

RP 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. The minimum clearance between the rotating parts (impeller) and the fixed parts (copper inlet and fan body) is 1% of the diameter of the impeller. The minimum clearances "U", "V" and "Y" must be checked at least once a year. Minimum clearances between rotating and fixed parts are given in Figure 8 and Table 4.

If the RP Ex fan is designed for installation with free intake or exhaust, it must be protected against the ingress of foreign particles into the space of the rotating impeller by a cover grid with a degree of protection min. IP 20 according to ČSN EN 60529 in order to ensure protection against the ingress of unwanted particles or objects that could cause ignition.

If the fan is designed for operation with additional inlet and/or outlet piping, foreign particles must be prevented from entering the fan space.

On the suction side, the fan is equipped with a cover grille located in front of the suction mouth (diffuser). The cover grille must be conductively connected to the fan housing.

On the outlet side of the fan, the protective grid is mounted up to the pipe route at a minimum distance of 0.5 m from the fan (preferably 1-1.5 m to reduce aerodynamic losses) and is fitted between the flange frames of the metal air duct. The output protective grid must be conductively connected to the pipe and the metal casing of the fan RP Ex.

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.

From Figure 11, 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. (Figure 12).

The fan must always be mounted on separate hinges or foundation so as not to load the elastic connections or the connected piping.

The installation of the RP Ex fan must be carried out in such a way that no additional external forces are applied to its casing that could cause its deformation.

Installation, maintenance, service

Figure 8 – Minimum "U", "V" and "Y" clearances (view of fan section)

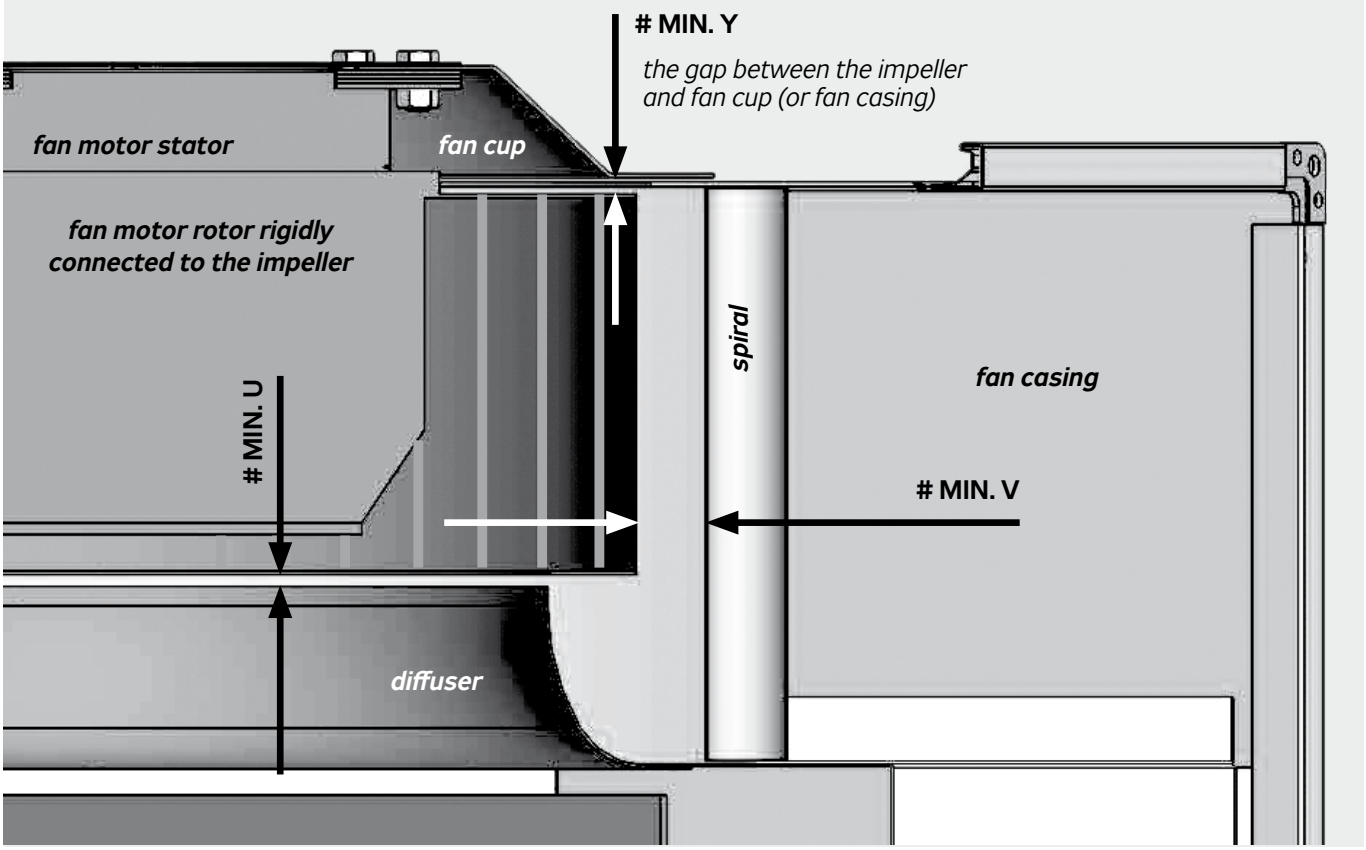
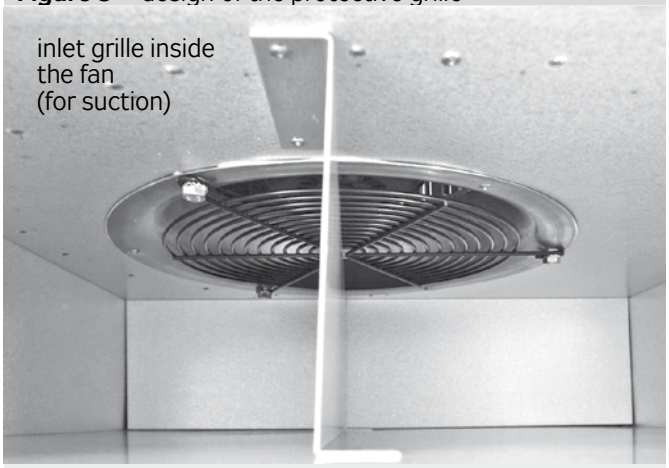


Table 4 – Minimum "U", "V" and "Y" clearances

Fan	Umin	Umax	V	Y
RP 40-20/20-4D Ex	4	8	15	2
RP 50-25/22-4D Ex	4	8	16	2,5
RP 60-30/28-4D Ex	4,5	8,5	20	4
RP 60-35/31-4D Ex	4,5	8,5	25	4
RP 70-40/35-6D Ex	4,5	8,5	27	4
RP 80-50/40-6D Ex	5	9	29	5

- Anchoring to the ceiling with steel anchors and suspension using threaded rods (see figure 13), perforated galvanized strips or ancillary construction (see figure 14) is recommended for RP Ex fans.
- The fans can work in any position. When positioned under the ceiling, it is advisable to situate the fan with its cup directed downwards to ease access to the motor terminal box.
- If transported air is oversaturated with moisture or if the risk of intensive and permanent steam condensation inside the fan exists, it is advisable to situate the fan's motor cap upwards to enable better condensate drainage!
- Before installation, paste self-adhesive sealing onto the connecting flange face.
- To connect individual parts of the Vento system, use galvanized M8 screws and nuts. It is necessary to ensure conductive connection of the flange using fan-washers placed on both sides at least on one flange connection, or use Cu conductor wiring.

Figure 9 – design of the protective grille



outlet grille in the pipeline

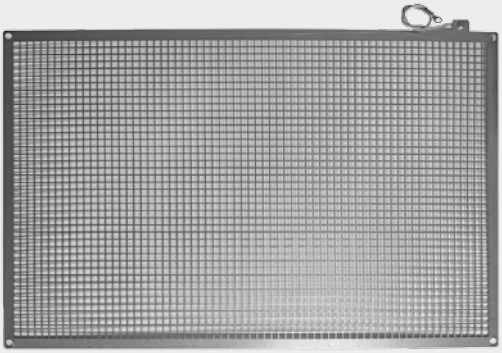


Figure 11 – Fan outlet arrangement

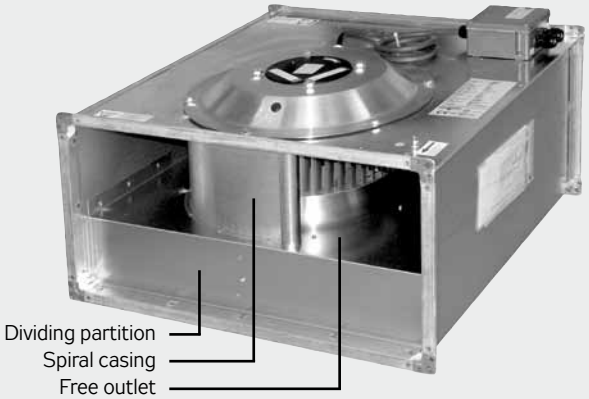


Figure 12 – Application of elastic connections

Figure 13 – Fan anchoring

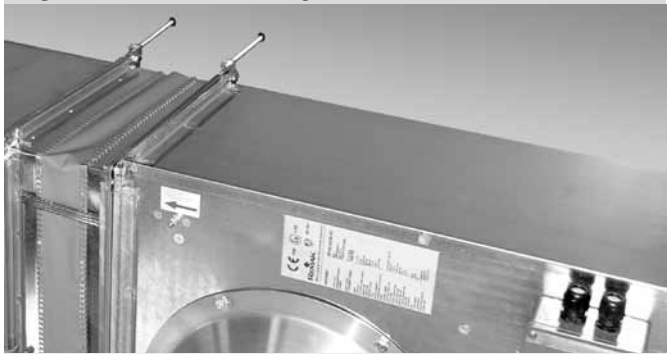
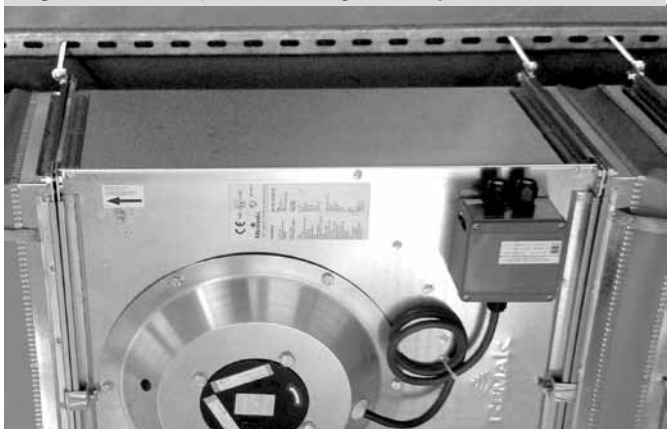
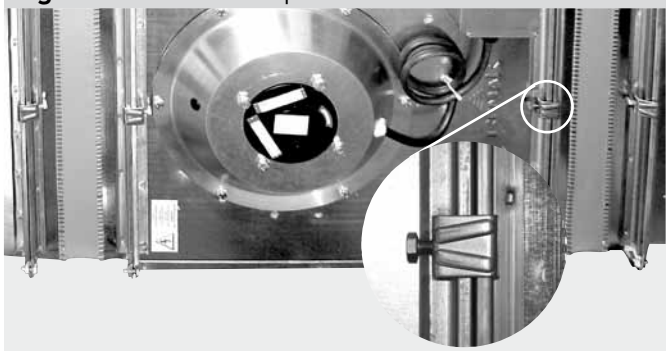


Figure 14 – Suspension using ancillary construction



■ To brace flanges with a side longer than 40 cm, it is advisable to connect them in the middle with another screw clamp which prevents flange bar gappin (Figure 15).

Figure 15 – screw clamps



■ **In the case of applying paint to the outer or inner part of the fan, the thickness of the paint must not be greater than 0.2 mm. When repairing a damaged coating, the existing coating must be completely sanded and then re-applied to a maximum thickness of 0.2 mm. It is strictly forbidden to overlap the existing coating!**

Installation, maintenance, service

The fan basically does not require maintenance. During operation, it is particularly necessary to supervise the proper functioning of the fan, smooth operation, care for the cleanliness of the fan and its surroundings, load the fan only within the range of its performance characteristics.
In the event of a fault, thoroughly check whether the mains voltage is disconnected. Check that there are no foreign objects in the fan and that the fan rotates freely. If the fan does not start again after powering on, perform the following actions depending on the fan protection method:

■ The rotating assembly must be balanced according to the quality levels specified in ČSN ISO 14694.

■ The complete fan must meet the vibration levels recommended in ČSN ISO 14694, corresponding to its size and use (see ČSN ISO 14694:2014, 8.3 and 8.4).

■ Check and adjust the balance at intervals according to the operating conditions of the fan, but at least once a year.

■ If the fan is protected by the STD protection relay, turn the fan off and on using the buttons on the protection relay.

■ If the fan is protected by a TRN controller, turn the fan off and on with the switch on the remote control of the controller.

If the fan does not start, check the wiring and measure the resistance of the electric motor winding. If the motor is burnt, contact your supplier.

Attention! When carrying out maintenance or repairs, always disconnect the device from the mains!

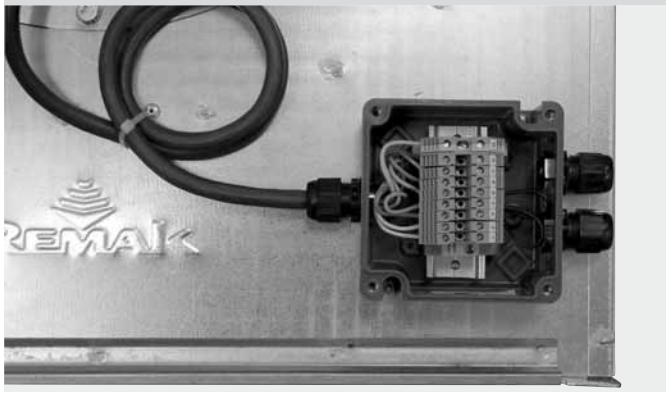
Wiring

■ The wiring can be performed only by a qualified worker licensed in accordance with national regulations.

■ The fans are equipped with a plastic connection terminal block – **Zone 1** environment, Ⓔx **II 2G Ex eb IIC T6 Gb**. The terminal box is screwed onto the fan casing and is equipped with screw terminals with a description (Figure 16).

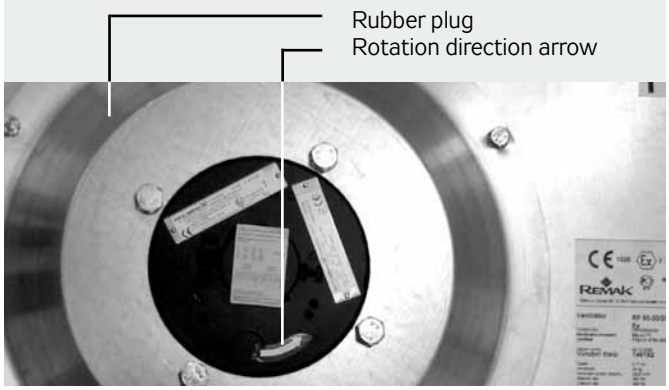
Installation, maintenance, service

Figure 16 – All-plastic terminal box on the casing



- Open the terminal box only in a de-energized state.
- Connection to the terminals is carried out according to the description on the electric motor cables in the terminal box or according to the description of the terminals or according to the picture on the terminal box cover.
- Cables approved for this purpose must be used to connect the fan's electric motor. See Table 6 for a detailed list of recommended cables. The fan must be properly grounded.
- After starting, it is necessary to check the correct direction of rotation. The direction of rotation of the mounted fan impeller can be checked by removing the rubber plug of the inspection hole on the fan bowl, see Figure 17.

Figure 17



- After starting the fan, it is necessary to measure the current, which must not exceed the maximum permitted current indicated on the production label (I_{max}). If the current values are higher, check the regulation of the pipe network.
- The fan is started after being mounted on the pipe network for which it is designed, or choked with closed suction or discharge so as not to overload the fan!

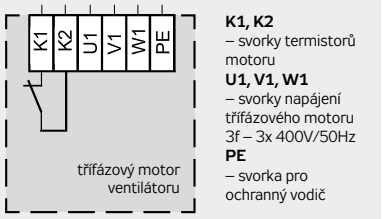
Attention! The fan is loaded by increasing the flow rate, i.e. by releasing the throttle.

- The installation must comply with the regulations according to the standard ČSN EN 60079-14 Explosive atmospheres - Part 14: Design, selection and establishment of electrical installations. When designing the installation, take into account the requirements arising from the Fire Safety Solution report and the report on the determination of external influences.

Table 6 – Recommended cables

Marking	Connection	Cable Type	Voltage
w 01	Controller power supply	XXXX 4 x 1,5	3x400V / 50Hz
w 02	Fan's motor power supply	XXXX 4 x 1,5	3x400V / 50Hz
w 03	Remote controller	XXXX 2 x 5 x 0,35	24V =
w 04	Motor's thermistors (K1, K2)	XXXX 2 x 1,5	2,5V =
w 05	External start (PT1, PT2)	XXXX 2 x 0,75	24V =
w 06	Thermistor relay power supply	XXXX 2 x 1,5	230V / 50Hz
w 07	Connection of the thermistor relay with protection	XXXX 2 x 1,5	24V =
w 08	Control unit power supply	XXXX 5 x 2,5	3x400V / 50Hz

Figure 18



The wiring diagram of the fan with upstream elements (protective relays, regulators, control units) are part of the assembly instructions, or project from AeroCAD.

- **RP Ex fans are not intended for direct sale to consumers or to users. They are sold exclusively in commercial relations to professional assembly companies.**
- RP Ex fans are manufactured in accordance with valid Czech and European regulations and European standards. RP Ex fans must be installed and used only in accordance with this documentation. Other uses do not correspond to the intended purpose.
- The manufacturer is not responsible for damages caused by other use and all risks are borne by the user. Installation and operating documentation must be accessible to operators and service personnel and it is advisable to place it near the installation. During handling, assembly, electrical connection, commissioning, as well as repairs and maintenance of the device, it is necessary to respect the applicable safety regulations, standards and generally recognized technical rules.
- **In particular, it is necessary to use personal protective work equipment (gloves) during any manipulation, assembly, disassembly, repair or inspection due to the presence of sharp edges and corners.**
- All equipment connections must comply with relevant safety standards and regulations.
- Changes and modifications that could affect safety are prohibited. During operation, it is necessary to ensure the safe and environmentally friendly disposal of all exchangeable parts, operating and auxiliary materials. When disposing of materials, it is necessary to comply with the relevant environmental and waste disposal regulations. In the case of final disposal, it is necessary to proceed according to the principles of differentiated collection. We recommend handing over metal parts to metal waste collection centers for scrapping, dispose of other parts according to the rules of separate collection.
- Familiarize yourself before installation and use and respect the following instructions and recommendations.

A

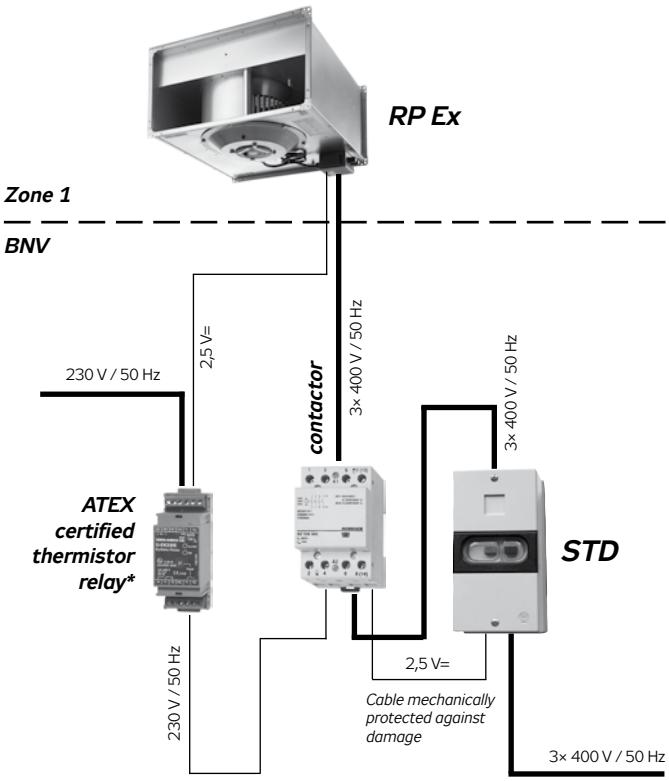
Fan equipped with thermal protection, without output control

Figure 19 shows the connection of the RP Ex fan in a simple ventilation device without fan power regulation. This connection method ensures full thermal protection of the fan by means of thermistors, ATEX certified thermistor relay* and STD protection relay. The wiring shown in the pictures also allows the fan to be switched on and off manually using the buttons on the STD protection relay.

After pressing the black button marked "I" on the STD protection relay, the fan will start and the button will remain in the pressed position, which signals the operation of the fan. Pressing the red button marked "0" stops the fan.
When the motor overheats above 130 ºC due to overloading, the resistance of the thermistors K1, K2 in the motor winding increases several times. ATEX certified thermistor relay* increased resistance detects and opens contacts 11, 14. Opening contacts 11 and 14 opens the control coil of the contactor, which disconnects the power supply of the overheated fan RP Ex and disconnects the control coil of the STD protection relay circuit TB1, TB2. The STD reacts to this state by turning off the power supply. After cooling down, the engine will not start by itself. The operator must confirm the fault by resetting the thermistor relay and then pressing the black button marked "I" on the STD protection relay.

** ATEX certified thermistor relay, e.g. manufacturer type U-EK230E Ziehl-Abegg. The suitability of using a different type must be consulted with the manufacturer.*

Figure 19 – Fan connection



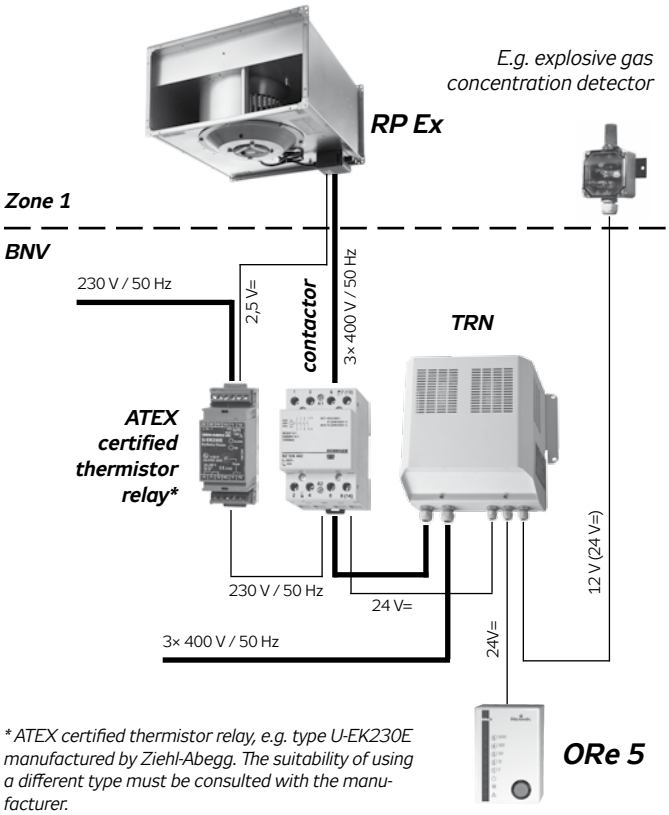
B

Fan with output control and protection controller

Figure 20 shows the connection of an RP Ex fan in a ventilation device with air output regulation using a TRN controller with an ORe 5 controller.
This connection method ensures, in addition to fan power options in levels "0" to "5", also its protection by means of thermistors, ATEX certified thermistor relay and contactor. The wiring shown in the pictures also allows the fan to be turned off and on manually from the ORe 5 remote controller, as well as externally with any switch (explosive gas detector, room thermostat, pressure switch, hygrostat, etc. in Ex design - terminals PT1, PT2).

By pressing the button on the ORe 5 controller, the fan starts at the selected power (1 to 5) and the light indicating the operation of the fan lights up. The condition for the operation of the fan is a closed switch connected to terminals PT1, PT2 and closed terminals 11 and 14 of the ATEX certified thermistor relay* connected to the control coil of the contactor. With the switch on terminals PT1, PT2, the fan is stopped and started without further connections, so that after starting it runs at the power set to ORe 5. If this option is not used, it is necessary to connect terminals PT1, PT2. When the fan is overloaded, as a result of the motor overheating, contacts 11, 14 of the thermistor relay open, then the contactor drops out and the power supply to the motor is interrupted. The controller reacts to this condition by turning off the engine power supply and turning off the fan operation light. After cooling down, the engine will not start by itself. First, you need to reset the thermistor relay, then by switching the controller to the "0" position, confirm that the fault has been removed (unblocking). Then, by switching to position "1" to "5", the fan will start at the set power. With this connection, the "0" position must not be blocked on the ORe 5 remote controller.

Figure 20 – Fan connection



** ATEX certified thermistor relay, e.g. type U-EK230E manufactured by Ziehl-Abegg. The suitability of using a different type must be consulted with the manufacturer.*

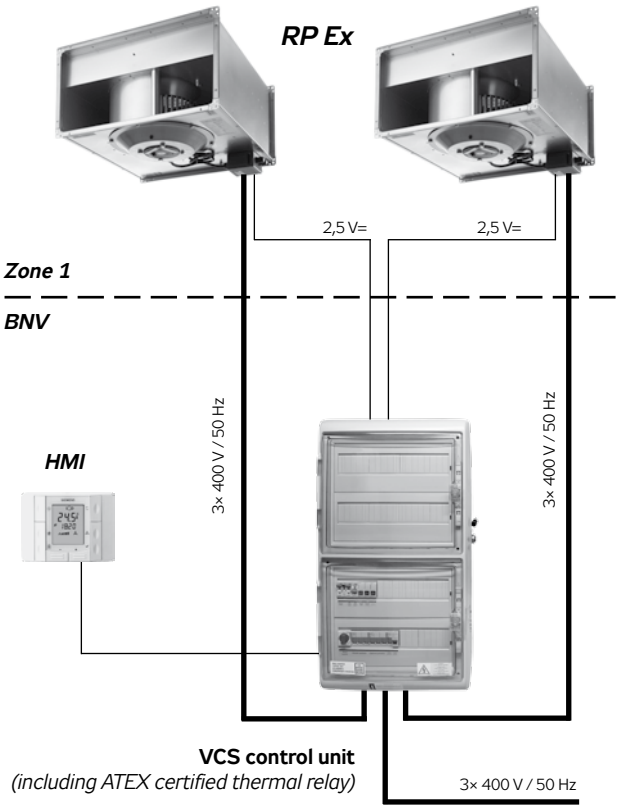
C

Fan with control unit without output control

Figure 21 shows the connection of an RP Ex fan without air output regulation in a more complex air conditioner with a VCS-type control unit (e.g. with air heating).
This connection method ensures full thermal protection of the fan through thermistors and the VCS control unit, which is already equipped with an ATEX certified thermistor relay from the factory. The fans are always turned off and on by the control unit. Motor protection must be ensured by the control unit by connecting the thermistor terminals K1 and K2 to terminals 5a, 5a, 5b, 5b in the control unit.

The air handling unit is started by the control unit. All protective and safety functions of the fans and the entire system are provided by the VCS control unit.

Figure 21 – Fan connection



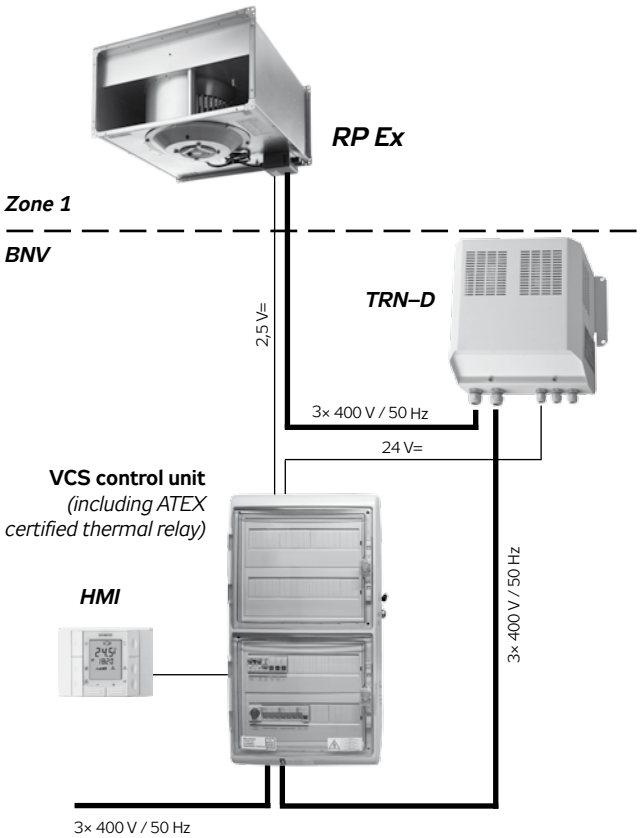
D

Fan with control unit and output regulation

Figure 22 shows the connection of the RP Ex fan including the fan power regulator in a more complex air conditioning device with a VCS type control unit (e.g. with air heating).
This connection method ensures full thermal protection of the fan through thermistors and the VCS control unit, which is already equipped with a thermistor relay (with ATEX certification) from the factory. The fans are always turned off and on by the control unit. The protection of the motors must be ensured by the control unit by connecting the thermistor terminals K1 and K2 to terminals 5a, 5a in the control unit. The internal fan power control is already built into the control unit (configured) during its manufacture. The connection of the speed controller mentioned allows the selection of the fan power in stages "1" to "5".
In connection according to example D (or with a control unit), all additional functions of the controller must be blocked by connecting terminals PT2 and E48 in the controller.

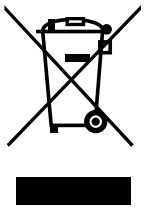
The air handling unit is started by the control unit. The regulator control is built into the control unit. All protective and safety functions of the fans and the entire system are provided by the VCS control unit.

Figure 22 – Fan connection



Disposal and recycling

Disposal and recycling



For users from EU countries
When disposing of components and materials, observe the 2012/19/EU Directive, applicable national and local environmental protection and waste disposal regulations.

For users outside the EU
Observe the applicable local environmental protection and waste disposal regulations.

Always observe local laws and regulations.

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Notes

Notes

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