



TYWENT
WENTYLATORY

ROK ZAŁ. 1972

Original manual

Tyczyn 23-06-2022

Operation and installation manual for explosion-proof bench fans type:

PFPK EX



II 2G Ex h IIB T3 Gb



TYCZYŃSKA FABRYKA URZĄDZEŃ
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1. ENTRY

Please read the manual carefully before proceeding with the installation and use of the device. The instructions should be kept in a place accessible to the operating personnel. In case of doubts regarding use, please contact the manufacturer or its representative. Due to the continuous improvement of our products, Tywent reserves the right to make structural changes. An integral part of this manual is the Electric Motor Operating Manual.

The fans have been designed to operate in potentially explosive atmospheres in accordance with the following essential requirements:

Directive 2014/34/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres - ATEX Directive

and harmonized standards:

- 1) PN-EN ISO 80079-36:2016-07 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Methodology and requirements
- 2) PN-EN 14986:2017-02 Design of fans operating in potentially explosive atmospheres

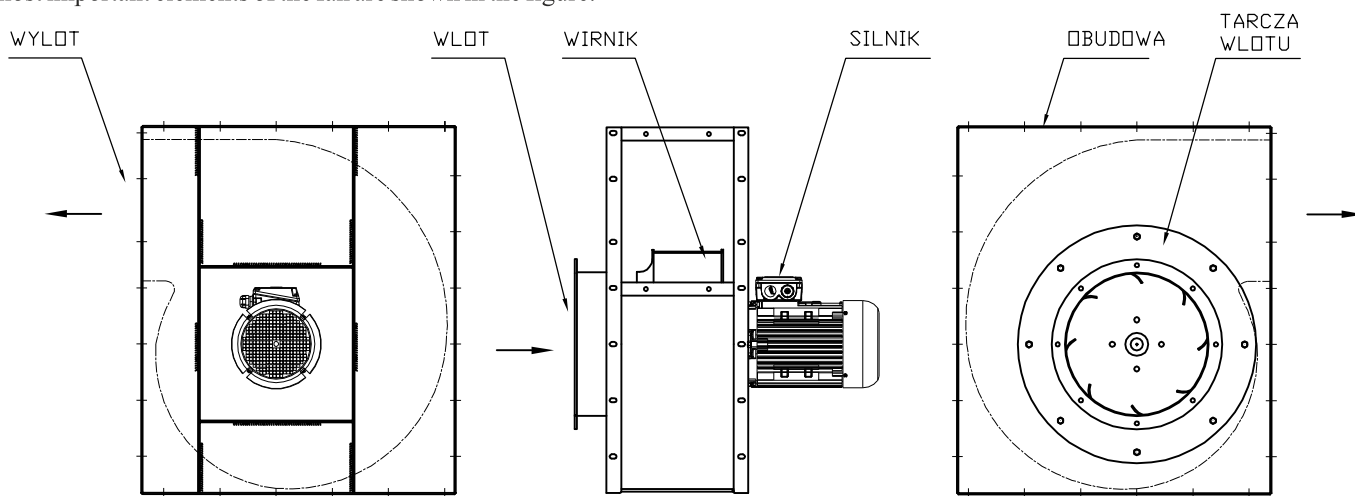
Marking Ex:



II 2G Ex h IIB T3 Gb

2. TECHNICAL DESCRIPTION AND OPERATION

The most important elements of the fan are shown in the figure.



In accordance with PN-EN ISO 80079-37:2016-07, the fans use a type of non-electrical protection through structural protection "c". The elements important for safety are the stationary inlet and the rotating impeller. The minimum distance between the rotating element and the stationary element should be 4mm. The fan housing has a suitably rigid construction and the impeller is secured on the motor shaft against movement.

PFPK EX are explosion-proof centrifugal fans with direct drive, adapted for stationary installation in ventilation systems. These fans are characterized by high efficiency, resistance to pollution and low noise level.

The fans are made of 304 grade chromium-nickel steel. This material minimizes the risk of friction ignition and sparks caused by friction or impact of hot spots or hot surfaces. However, it may ignite an explosive atmosphere in the event of friction. Fan painted with antistatic powder paint.

As a standard, we manufacture fans in the LEFT housing arrangement (sketch above). The arrangement of the RIGHT housing is made to order. Fan impellers dynamically balanced in class G 6.3. Explosion-proof three-phase electric motors with IP protection and voltages according to their own rating plate. Standard not adapted to speed regulation. Fans with the possibility of speed control with an inverter are available on special order.

In the axis of the fan there is a motor which is attached to the casing. Inside the housing, on the motor shaft, a radial impeller is mounted, which sucks in the medium through the inlet. The rotor, rotating, ejects the medium and the spiral directs it to the outlet of the fan. An inlet with a drilled flange is attached to the housing opposite the motor, through which the fan is connected to the ventilation system. The fan has a rectangular shape and can be rotated around its own axis. On the edges of the housing there are mounting holes, through which the fan is mounted to the ground or structure.

In the case of non-standard products, detailed information is provided by the technical department of the TYWENT company.

3. DESTINATION

Workstation fans are part of the ventilation system in industry and construction. In accordance with the ATEX Directive 2014/34/EU and the PN-EN ISO 80079-36 standard, the device is intended for use in spaces where there is a probability of an explosive atmosphere in the air containing gases, vapors, mists, according to the fan's marking. These atmospheres can be inside, outside or inside and outside the fan. These fans have been adapted to pump clean or slightly polluted medium with a temperature from -15°C to + 60°C. Permissible ambient temperature from -15°C to + 40°C.

These fans can be put into operation only when the protection against accidental contact with the impeller complies with PN-EN ISO 13857:2010.

ATTENTION:

The manufacturer is not responsible for damages that may arise as a result of non-compliance with the operating instructions, conditions of use of the product and resulting from unauthorized changes in the design.

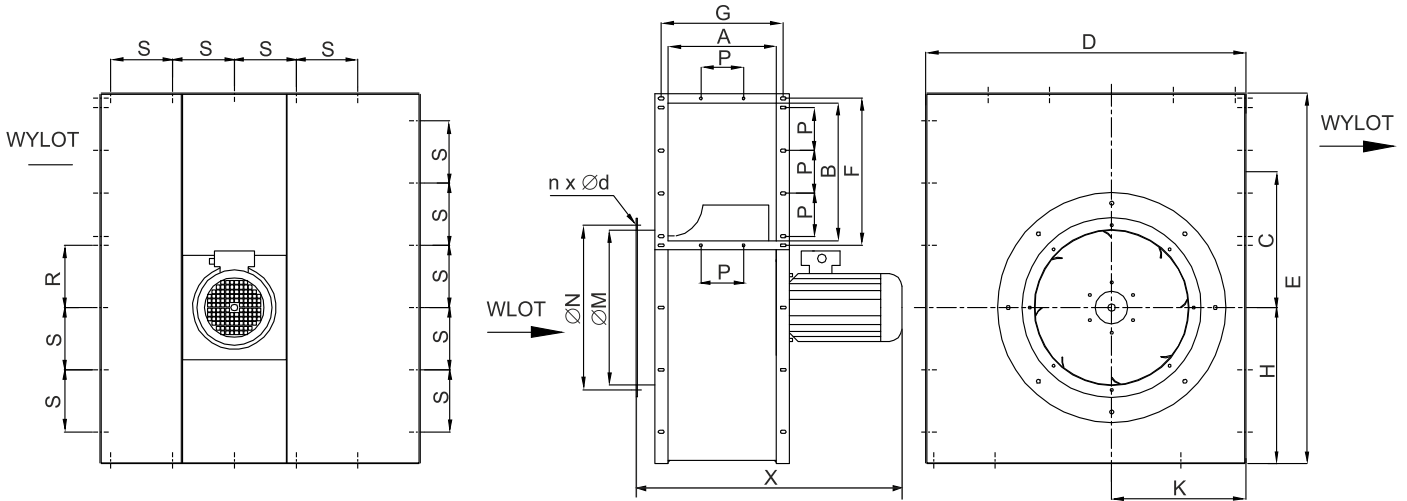
The fan can only be started when ducts with a length of at least 850mm are connected to the fan inlet and outlet.

Fans and in particular their seals (such as the connection of the inlet disc, shaft and motor) may not be completely gas-tight. Hazardous atmospheres can flow from inside the fan to the outside and vice versa. The manufacturer minimizes the amount of leakage by using appropriate sealants.

Provision must also be made to prevent unwanted particles or objects from entering the fan, which could cause ignition.

4. TECHNICAL DATA

DIAGRAM OF THE HOUSING IN THE LEFT ARRANGEMENT



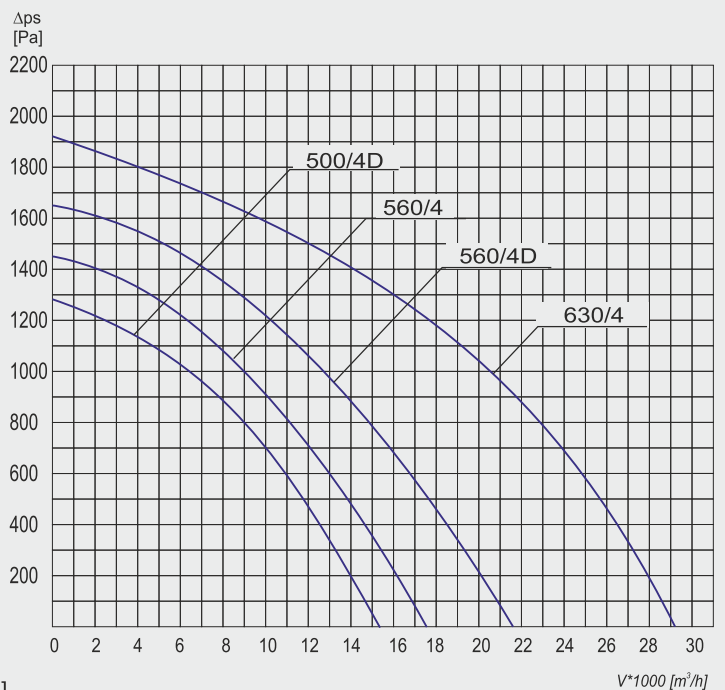
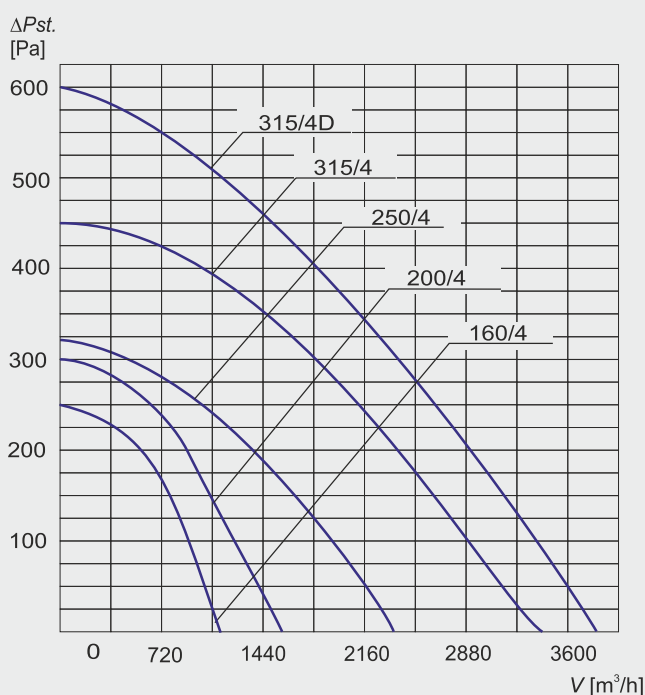
Type	Fan dimensions													Flange dimensions		
	A	B	C	D	E	H	K	S	R	M	N	X	n x d	G	P	F
	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
PFPK EX-160/2	140	150	150	360	430	175	150	120	60	160	185	410	4 x 7	174	-	180
PFPK EX-160/2D	150	160	165	400	470	195	170	140	70	160	185	445	4 x 7	184	-	190
PFPK EX-160/4	200	200	200	480	560	230	200	170	85	160	205	510	4 x 7	234	-	230
PFPK EX-180/2	200	200	200	480	560	230	200	170	85	160	205	510	4 x 7	234	-	230
PFPK EX-200/2	200	200	225	500	600	245	210	110	110	200	225	546	4 x 9,5	236	-	230
PFPK EX-200/4	200	200	225	500	600	245	210	110	110	200	225	485	4 x 9,5	236	-	230
PFPK EX-250/2	200	250	240	550	670	275	230	200	100	250	275	590	4 x 9,5	236	140	280
PFPK EX-250/4	200	250	240	550	670	275	230	200	100	250	275	512	4 x 9,5	236	140	280
PFPK EX-315/2, 2D	250	315	298	700	820	344	300	250	125	315	352	676	8 x 9,5	286	140	345
PFPK EX-315/4	250	315	298	700	820	344	300	250	125	315	352	560	8 x 9,5	286	140	345
PFPK EX-315/4D	250	315	298	700	820	344	300	250	125	315	352	590	8 x 9,5	286	140	345
PFPK EX-355/2	250	315	307	750	850	355	325	135	135	355	392	685	8 x 9,5	296	140	345
PFPK EX-355/4	250	315	307	750	850	355	325	135	135	355	392	580	8 x 9,5	296	140	345
PFPK EX-400/2, 2A	315	355	362	850	980	410	360	170	170	400	438	845	8 x 9,5	361	140	385
PFPK EX-400/4	315	355	362	850	980	410	360	170	170	400	438	686	8 x 9,5	361	140	385
PFPK EX-450/2	315	400	405	940	1080	445	410	190	190	450	488	910	8 x 9,5	361	140	428
PFPK EX-450/4	315	400	405	940	1080	445	410	190	190	450	488	705	8 x 9,5	361	140	428
PFPK EX-500/2	355	450	442	1050	1210	510	440	203	203	500	538	990	8 x 9,5	400	140	480
PFPK EX-500/4	355	450	442	1050	1210	510	440	203	203	500	538	780	8 x 9,5	400	140	480
PFPK EX-500/6	355	450	442	1050	1210	510	440	203	203	500	538	780	8 x 9,5	400	140	480
PFPK EX-500/4D	355	450	442	1050	1210	510	440	203	203	500	538	780	8 x 9,5	400	140	480
PFPK EX-560/4	400	500	511	1200	1350	560	530	247	247	560	600	832	12 x 9,5	443	140	528
PFPK EX-560/4D	400	500	511	1200	1350	560	530	247	247	560	600	832	12 x 9,5	443	140	528
PFPK EX-630/4	450	550	580	1350	1550	650	565	285	285	630	670	946	12 x 9,5	496	140	590

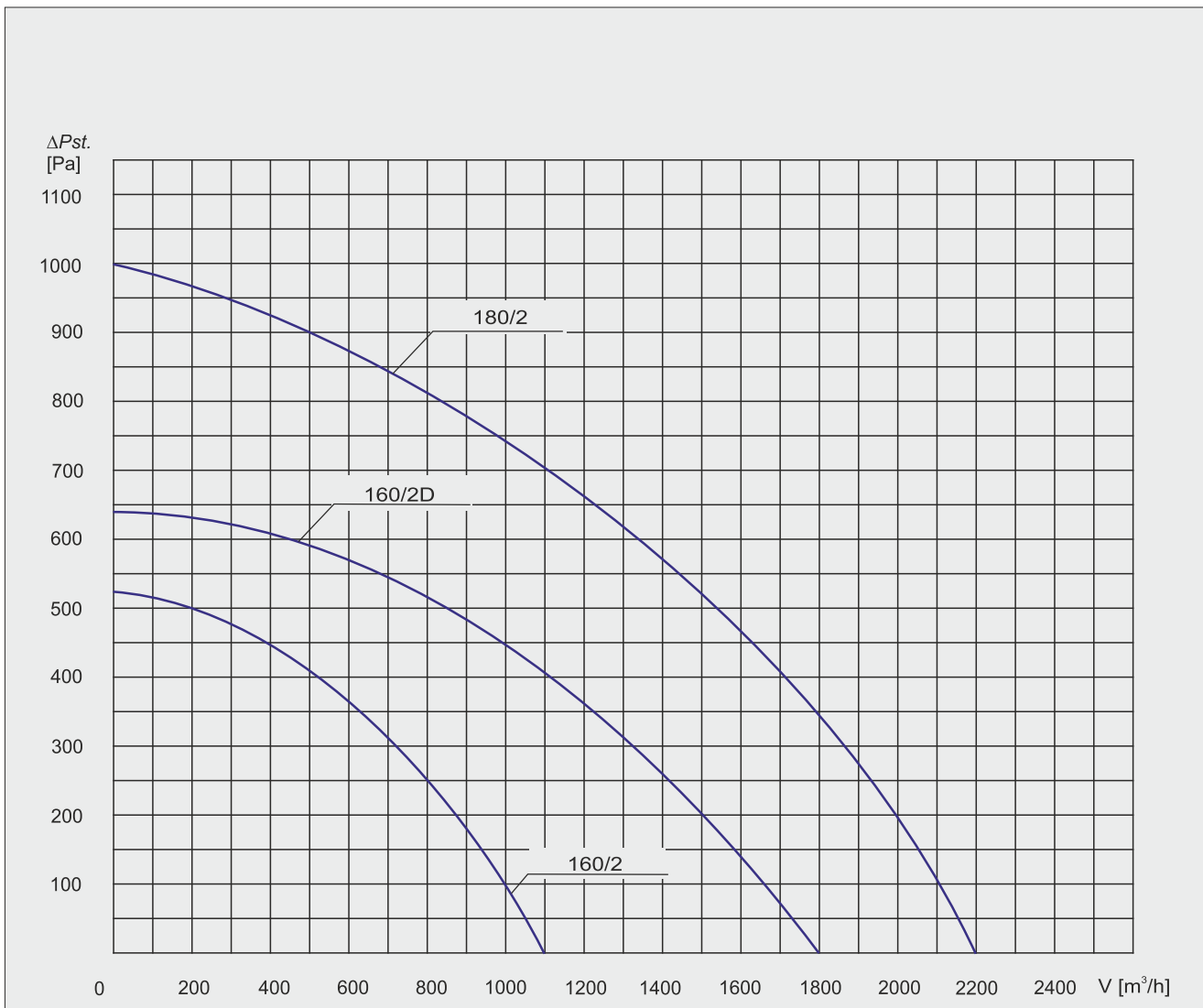
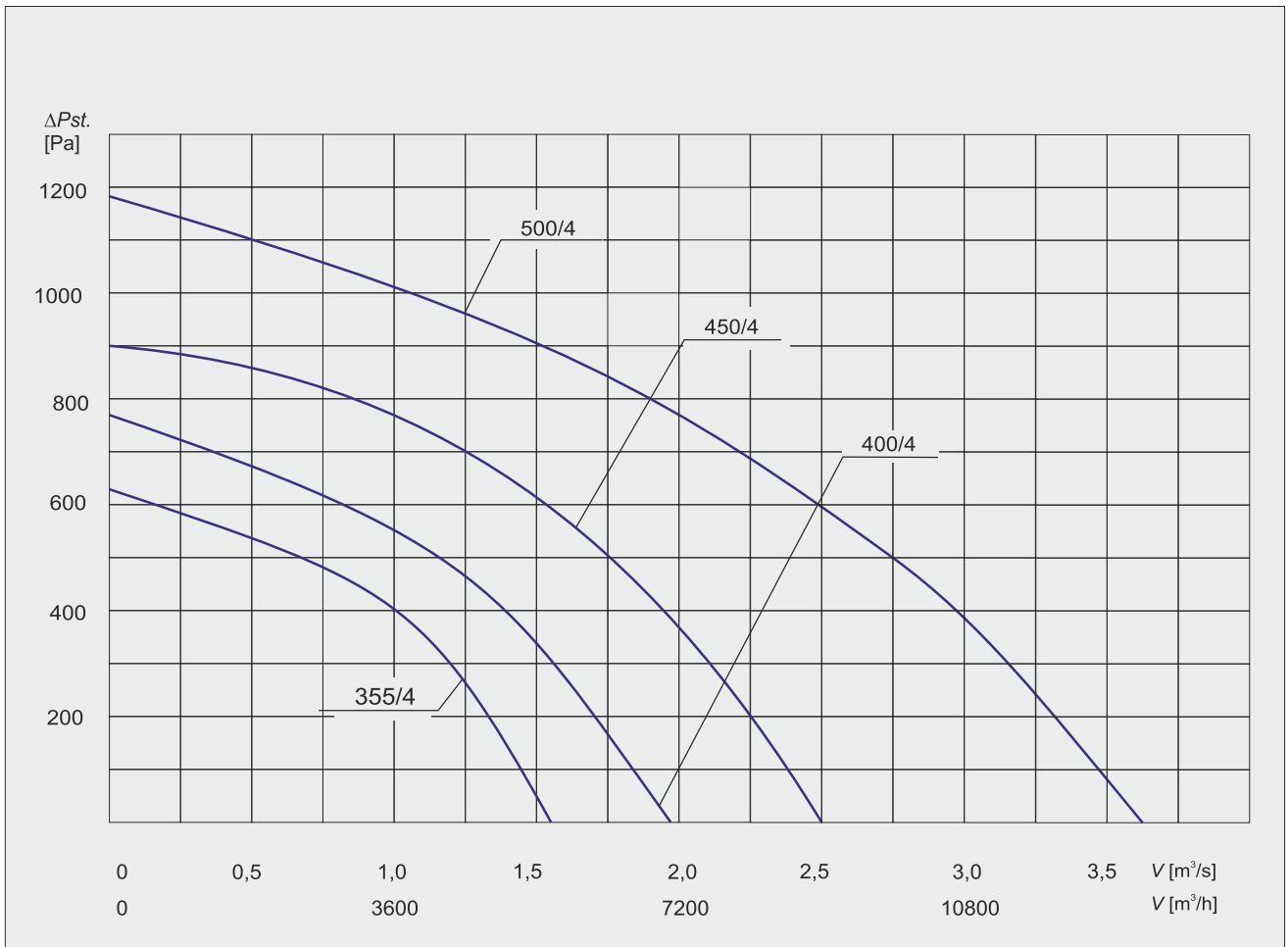
Type	Efficiency MAX	Pressure MAX	Input power	Highest speed	Rated Current** 3x400V 2G	Rated Current** 3x400V 3G/3D	Noise *	Weight
	[m3/h]	[Pa]	[kW]	[obr./min]	[A]	[A]	[dB(A)]	[kg]
PFPK EX-200/4	1540	300	0,18	1400	0,63	0,72	59	33
PFPK EX-250/4	2160	325	0,25	1400	0,71	0,78	60	36
PFPK EX-315/4	3200	450	0,37	1400	0,98	1,1	66	37
PFPK EX-315/4D	3780	600	0,55	1400	1,5	1,55	67	58
PFPK EX-355/4	5800	630	0,75	1400	1,9	1,85	68	62
PFPK EX-400/4	7100	750	1,1	1400	2,7	2,7	71	98
PFPK EX-450/4	9000	900	1,5	1400	3,4	3,5	76	125
PFPK EX-500/4	13000	1200	2,2	1400	4,8	4,7	80	130
PFPK EX-500/4D	14800	1260	3,0	1400	6,5	6,5	80	140
PFPK EX-560/4	17400	1445	4,0	1400	8,1	8,6	81	155
PFPK EX-560/4D	21700	1620	5,5	1400	10,9	11,6	82	168
PFPK EX-630/4	29200	1920	7,5	1400	-	14,4	86	198
PFPK EX-160/2	1100	520	0,18	2800	0,5	0,54	60	25
PFPK EX-160/2D	1800	640	0,25	2800	0,7	0,74	68	26
PFPK EX-180/2	2200	1000	0,55	2800	1,4	1,4	75	28
PFPK EX-200/2	3050	1200	1,1	2800	2,45	2,5	79	30
PFPK EX-250/2	3900	1300	1,5	2800	3,3	3,1	80	43
PFPK EX-315/2	6500	1820	2,2	2800	4,6	4,55	82	52
PFPK EX-315/2D	8600	2180	3,0	2800	6	6,1	83	54
PFPK EX-355/2	9360	2500	4,0	2800	7,8	7,5	85	92
PFPK EX-400/2A	12500	2700	5,5	2800	10,5	10,5	90	122
PFPK EX-400/2	15120	3400	7,5	2800	12,7	14,5	92	128
PFPK EX-450/2	17640	3900	11,0	2800	20	20	95	159
PFPK EX-500/2	22356	5020	18,5	2800	-	33	97	279
PFPK EX-500/6	8100	470	0,75	900	2,1	2,1	71	119

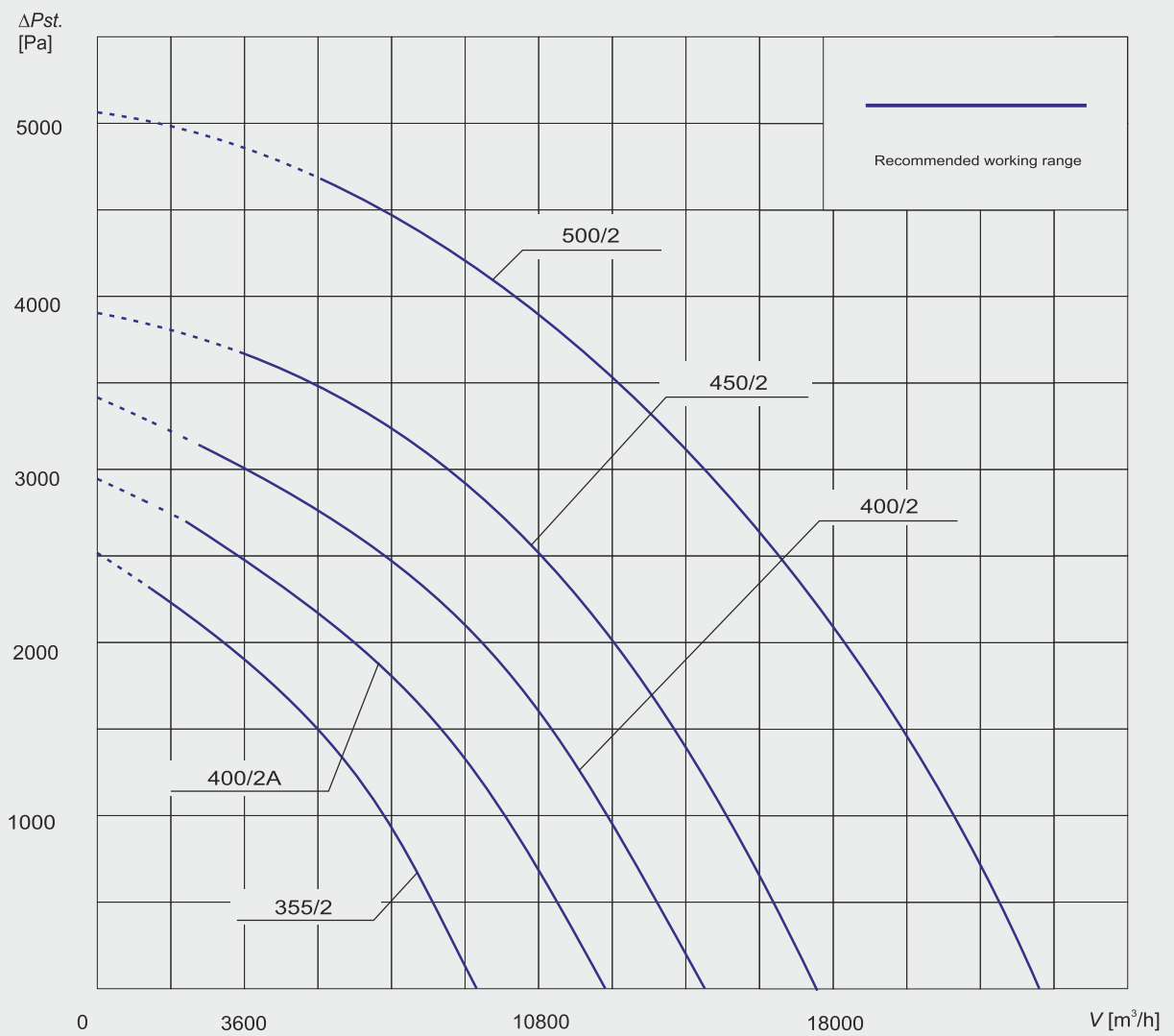
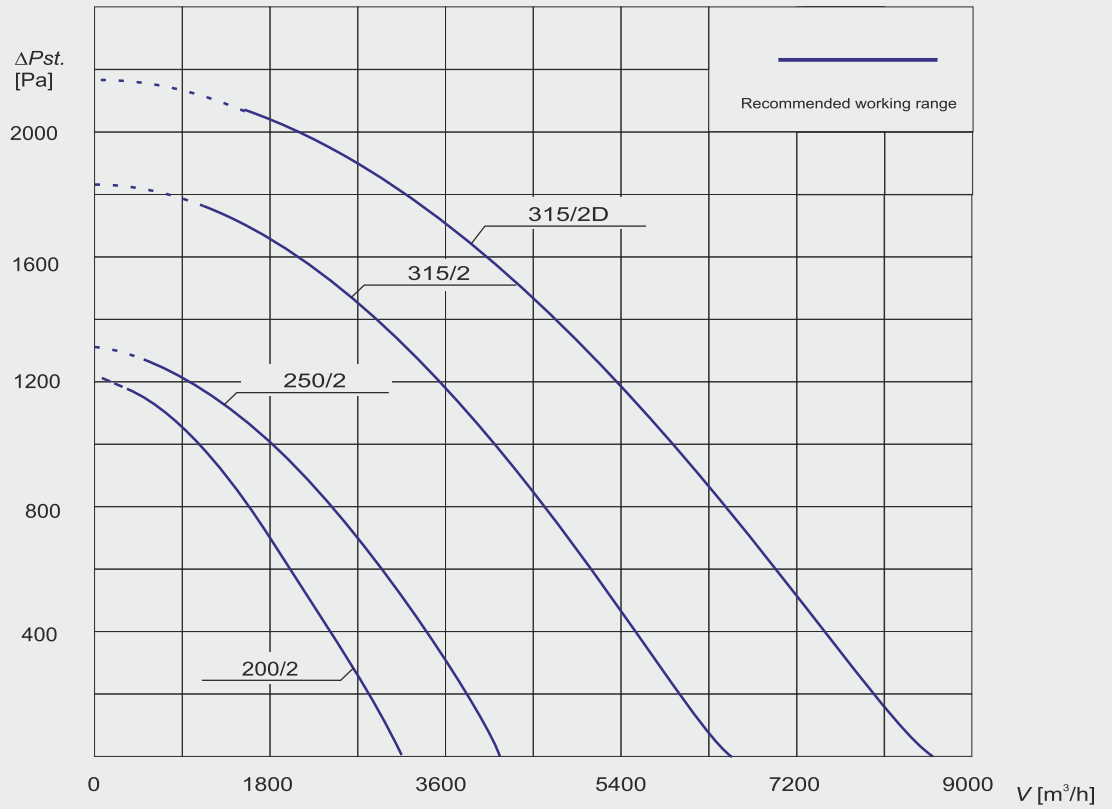
*Distance measurement 4m

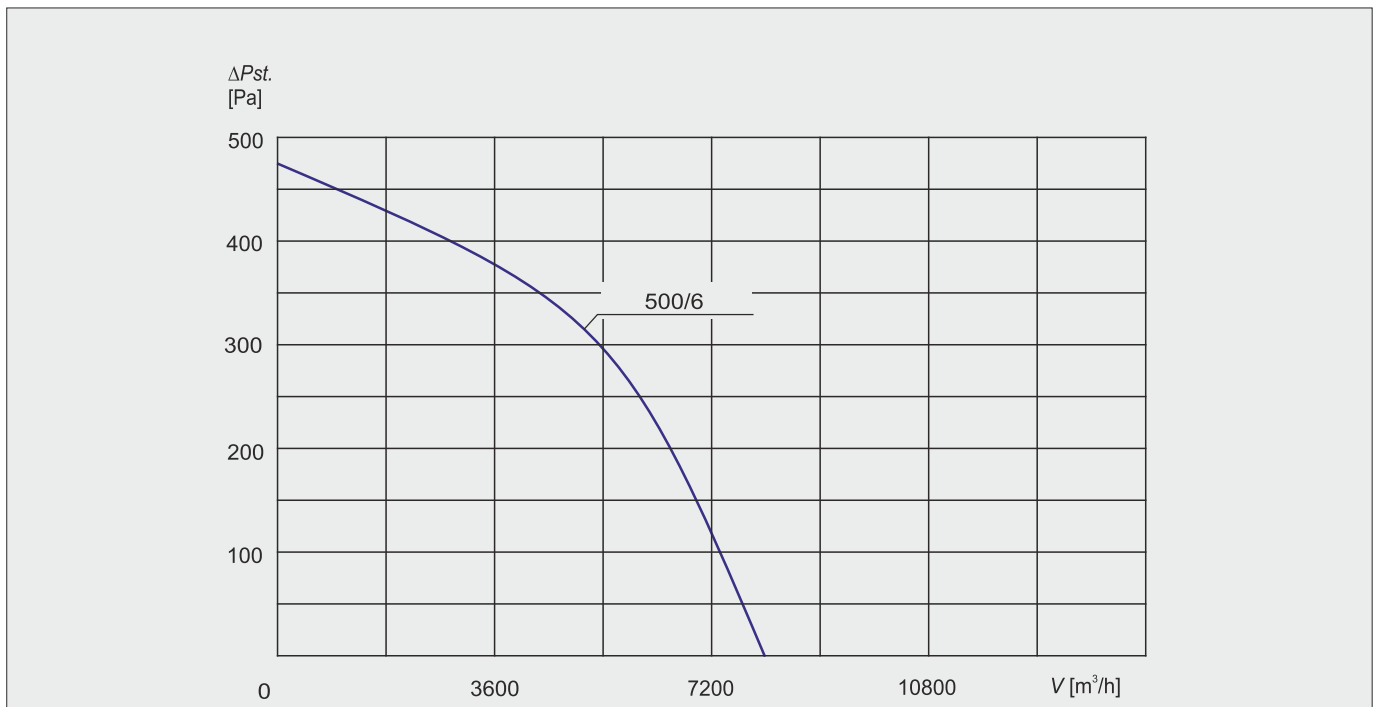
**Approximate values may change depending on the engine used
Rated motor currents are listed on the rating plate and in the operation and maintenance manual.

Aerodynamic characteristics PFPK EX









4. RISKS AND RECOMMENDATIONS

Rotating elements

The fan is equipped with an impeller, which, in the event of contact, poses a serious health risk to the operator. The fan must not be used if protection against contact with rotating elements has not been applied in accordance with PN-EN ISO 13857. After disconnecting the power supply, the fan wheel continues to rotate for some time. Before starting any work, wait until the rotor stops.

An air inlet

It is forbidden to cover the inlet with your hand while the device is turned on. Air flowing at high speed can snatch the hand of the operator, which will cause a serious health hazard, because the fan wheel is operating near the inlet.

Air outlet

On the outlet side of the fan, the air is expelled at high speed. The elements sucked in by the inlet will be thrown out with high energy, which is a threat. Before starting the fan and during its operation, make sure that there are no elements that can be sucked in near the inlet.

Sharp edges

At the production stage, the sharp edges of individual elements of the fan have been replaced, however, it may still have edges that may be dangerous to touch. It is recommended to use appropriate protective gloves during assembly.

Inertia

Starting a fan that is not permanently attached to the ground may cause its uncontrolled movement due to the inertia force. Do not operate a fan that has not been properly installed.

Noise

The sound pressure level depends on the performance of the fan. If the sound pressure level is too high, use appropriate silencers or equip the personnel with individual noise protection equipment.

Pressure

The running fan creates negative/overpressure in the room. Provide access to fresh air to allow pressure equalization. Especially in rooms where combustion occurs.

Temperature

The flowing medium may have an increased temperature and the fan elements assume the temperature of the flowing medium. The electric motor becomes very hot, especially when overloaded. The heated parts of the fan are still dangerous for some time after the fan has been turned off. Be especially careful.

Electric power

Before starting any work on the fan, including inspection and repair, the fan should be disconnected from the power source in a way that eliminates the possibility of accidental switching on.

Accidental (unexpected) startup

Connecting the fan to the power supply causes it to start immediately. The fan is not equipped with a device that turns it off permanently in the event of a temporary power failure. The fan will restart when power is restored. Electric motors can be equipped with PTC temperature sensors. They cause the motor power supply to be disconnected when the permissible temperature is exceeded (overheating).

If the rotor is locked, unlocking will cause movement. Measures must be taken to prevent start-up in the event of power return, temperature sensor tripping, or tripping.

Usage

A fan forcing even slightly polluted air causes the deposition of impurities on the impeller and its elements. Deposition of dirt causes deterioration of the fan's parameters, impeller vibrations and impairs the possibility of cooling the electric motor. Long-term operation with excessive vibrations may cause, for example, damage to the bearing unit in the motor, damage to the housing or damage to the impeller. Periodic inspections of the fan should be provided.

ATTENTION:

Regardless of the application of the fan and the method of installation, there is a probability of the fan blade detaching or loosening and falling out of the impeller (failure, improper operation of the fan). The manufacturer is not responsible for any damages related to poor protection or lack of protection of the installation in such situations. At the same time, the probability of such a situation is so low that it is not taken into account in the assessment of the ignition hazard.

5. TRANSPORT

The fans can be transported in cardboard boxes, on pallets, etc. During transport and storage, the fans must be protected against mechanical damage and moisture. The load should be stable and secured against shifting while the vehicle is in motion.

6. STORAGE

Fans, especially due to electric motors, should be stored in dry rooms, away from corrosive and harmful substances such as caustic vapours, dusts, gases, etc.

Storage temperature from -15°C to $+40^{\circ}\text{C}$, humidity up to 80%. During the whole period of storage, the fan must be protected against foreign objects getting inside.

7. ASSEMBLY AND INSTALLATION

Before starting the installation, remove temporary protective elements such as cardboard, foil and then check if the fan is not damaged and has not been contaminated during transport or storage.

The fan should be mounted to fixed elements using holes on the edges of the housing acc. recommendations of the installation designer and the technical department of TYWENT. It is the installer's responsibility to ensure adequate rigidity of the structure, damping of vibrations on the installation and safety of use. In the flange at the inlet and outlet of the fan there are mounting holes through which it should be connected to the installation. It is allowed to install intermediate elements such as silencers, flexible connectors. If it is necessary to maintain high tightness of the ventilation system, sealing compounds should be used in the connections.

8. ELECTRICAL CONNECTION

The installation and connection of the fan should be performed by a specialized company or a qualified person familiar with current safety and operation regulations and holding valid SEP qualifications.

Electrical connection of the fan should be made in accordance with applicable regulations and the attached diagram. Before starting work, check:

- that the impeller rotates easily
- whether the rated voltage on the rating plate of the motor and fan corresponds to the mains voltage,
- whether the motor has an appropriate overload protection whose current-time characteristics guarantee that the motor will be disconnected from the supply voltage in a time shorter than the time t_E specified for it
- whether the motor has the correct short-circuit protection
- whether the motor insulation resistance (resistance) is correct
- it is absolutely necessary to connect the grounding conductor and check the effectiveness of the grounding.

In addition:

- motors with built-in PTC temperature sensors should be connected in a way that ensures disconnection of the motor power supply after exceeding the permissible temperature.

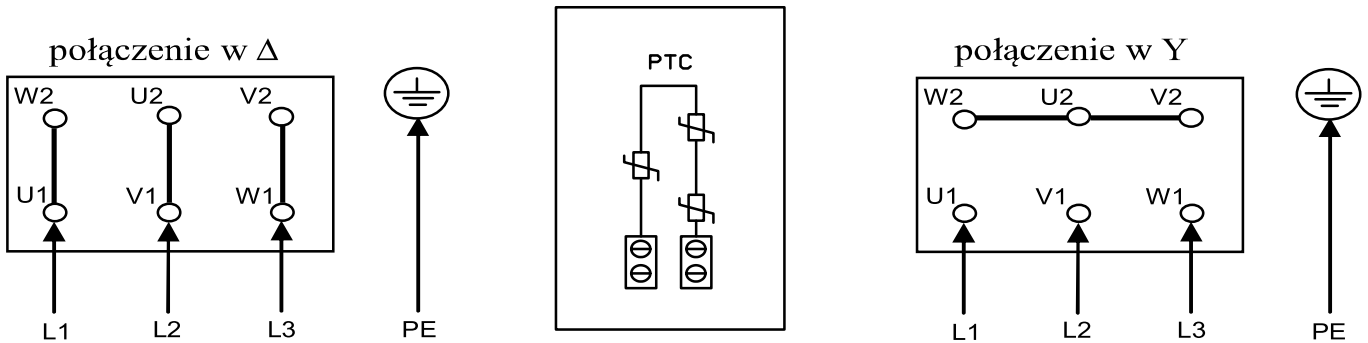
Fans without an outgoing cable should be connected by leading the cable to the motor box through the choke. To connect the fan, use electric wires with appropriate cross-section and insulation in a way that prevents accidental contact with the moving parts of the fan. The fan may only be started after it has been properly installed and connected to the mains with the use of appropriate safeguards.

ATTENTION:

Pay special attention to the type of motor connection (Δ / Y) when working with the inverter. The type of connection depends on the supply voltage of the inverter. The inverter should be configured according to manufacturer's recommendations for use with ventilation applications.

Attention:

For fans with a motor adapted for speed control with an inverter, the permissible range of regulation is from 20 to 50 Hz. A different adjustment range is unacceptable due to the possibility of resonance. It is also mandatory to connect PTC temperature sensors to the inverter through a dedicated EX relay.

**9. COMMISSIONING AND OPERATION**

The first start-up (start-up) should be performed by an authorized electrician.

Before first start-up:

- clean the fan and pipelines and check if the impeller does not rub against the casing. The minimum distance between rotating parts and stationary parts should be 4mm.
- carefully check the screw connections and their protection,
- check whether the start-up will not pose a threat to the safety of the operator and third parties,
- check if the connection to the mains is correct (in accordance with the markings on the rating plate),
- check whether the applied protections are correct.
- check that the electric cable is properly attached to the fan pin with at least two clamps
- check the effectiveness of earthing

During start-up, check whether the direction of rotation of the impeller is consistent with the direction of the arrow on the fan housing. After reaching the rated speed, perform electrical measurements of the motor and complete tables 1.

ATTENTION:

It is forbidden to turn the fan on and off multiple times in a short time, as this may damage the motor. Immediate shutdown must occur in the event of an accident, breakdown, or:

- the appearance of unusual noise,
- the appearance of strong engine or rotor vibrations,
- the appearance of cracks on the housing or fan guards,
- the appearance of smoke from the engine,
- decrease in turnover,
- exceeding the rated current of the fan by more than 10% or significant overheating of the motor,
- damage to the electrical system.

If no irregularities were found during the start-up of the fan, the installer may commission the device.

ATTENTION:

When the device is put into operation, the installer should prepare an acceptance report containing electrical measurements of the device (Table 1) and develop a workplace health and safety manual for the device adapted to the local operating conditions.

Tab. 1

	Current [A]	Voltage [V]	Data	Signature
L1				
L2				
L3				

10. INSPECTIONS AND REPAIRS

Industrial fans are subject to periodic inspections in accordance with the requirements of PN-EN 60079-17 and repairs in accordance with PN-EN 60079-19. Any work on the device may only be carried out when the device is immobilized, i.e. the fan impeller is not rotating and the motor is disconnected from the power supply in a way that eliminates the possibility of accidental switching on. Work on the device should be carried out with extreme caution and with the use of personal protective equipment.

During operation, impurities will accumulate on the impeller and casing as well as on the motor. This leads to reduced efficiency, impeller unbalance and motor damage. Sufficient inspections should be provided to prevent contamination build-up. The frequency of inspections is determined by the user individually for each fan, depending on the intensity of use of the installation and operating conditions. However, it is recommended to carry out a review at least once a year.

During fan operation, pay special attention to:

- whether the device is working properly,
- that the impeller does not rub against the housing,
- that there is no unusual noise coming from the device,
- whether the device does not cause too much vibration,
- that the current consumed by the motor does not exceed the rated current by more than 10%.

To easily inspect the rotor and clean it, unscrew the motor shields from the housing (diagram on page 2). Then pull the complete motor and impeller assembly out of the housing.

When parked, pay special attention to:

- that the impeller does not rub against the housing, the distance between the impeller and the inlet should be at least 4mm,
- whether the motor impeller and the housing are not contaminated,
- whether the rotor blades do not have any visible cracks in the place of welding,
- whether the bearings in the motor do not have excessive play,
- whether the fasteners are properly tightened,
- whether the painting coats of the fan are not damaged,
- that the electric wires are not damaged,

Due to the electric motor, it must be ensured that the fan is started at least once every three months for at least one hour. The replacement of bearings and other repairs must be carried out by a competent specialist or workshop. If the repair falls within the warranty period, it is performed by the manufacturer at the user's expense. During the warranty period, the user is not allowed to make repairs or modifications without the manufacturer's knowledge. This will void the warranty.

After reassembling the fan, follow the instructions in section 9 of the Manual.

When pumping oil mist, condensate may collect in the housing, this is a natural phenomenon. Too infrequent inspection and cleaning may cause permanent damage to the impeller or motor, which is not subject to warranty repairs and is provided by the TYWENT Factory as a paid service.

11. FINAL REMARKS

Technical data and dimensions of the fan may change in the course of production, for which T.F.U.W. TYWENT Sp. z o. o. reserves the right. In the event of technical problems during the start-up or operation of the fans, follow the warranty card. Before making a decision about a possible shipment to the manufacturer, it should be consulted with the T.F.U.W. complaint department. "TYWENT". The device under complaint must have complete documentation (warranty card, copy of proof of purchase, completed complaint application). Complaint notification can be downloaded from www.tywent.pl.

The installer and the user are responsible for the installation and use in accordance with the safety regulations.

ATTENTION!

Parcels sent at the expense of "TYWENT" without prior agreement will not be collected.

12. DISASSEMBLY AND DISPOSAL

The device must be disconnected from the mains and then dismantled. The protective elements, such as cardboard boxes, foils, should be returned to the appropriate recycling containers. The used fan should be handed over to a waste disposal company.



Declaration of Conformity WE/UE

Producer: Tyczyńska Fabryka Urządzeń Wentylacyjnych „TYWENT” Sp. z o. o.

Address: 36-020 Tyczyn, ul. Orkana 1, Polska

Declares that the product described below:

Product: Wentylator przeciwybuchowy

Type/Model: PFPK EX-160/2, PFPK EX-160/2D, PFPK EX-160/4, PFPK EX-180/2, PFPK EX-200/2, PFPK EX-200/4, PFPK EX-250/2, PFPK EX-250/4, PFPK EX-315/2, PFPK EX-315/2D, PFPK EX-315/4, PFPK EX-315/4D, PFPK EX-355/2, PFPK EX-355/4, PFPK EX-400/2, PFPK EX-400/2A, PFPK EX-400/4, PFPK EX-450/2, PFPK EX-450/4, PFPK EX-500/2, PFPK EX-500/4, PFPK EX-500/6, PFPK EX-500/4D, PFPK EX-560/4, PFPK EX-560/4D, PFPK EX-630/4

Designation:



II 2G Ex h IIB T3 Gb

complies with the requirements contained in :

Dyrektywa 2006/42/WE - Dyrektywa maszynowa.

Dyrektywa 2014/30/UE - Dyrektywa kompatybilności elektromagnetycznej.

Dyrektywa 2014/34/UE - Dyrektywa urządzeń pracujących w atmosferze wybuchowej. "Rozporządzenie Ministra Rozwoju z dnia 06.06.2016r. Dz.U. 2016 poz. 817".

Deklarowany produkt spełnia wymagania dyrektywy maszynowej 2006/42/WE pod warunkiem użytkowania zgodnie z przeznaczeniem.

In addition, the requirements of harmonized standards were taken into account in the design and manufacture of products:

PN-EN 60204-1:2010 Bezpieczeństwo maszyn. Wyposażenie elektryczne maszyn Część 1: Wymagania ogólne

PN-EN ISO 12100:2012 Bezpieczeństwo maszyn. Ogólne zasady projektowania Ocena ryzyka i zmniejszanie ryzyka

PN-EN 14986:2017-02 Projektowanie wentylatorów pracujących w atmosferach potencjalnie wybuchowych

PN EN ISO 80079-37:2016-07 Atmosfery wybuchowe -- Część 37: Urządzenia nieelektryczne do atmosfer wybuchowych -- Rodzaj zabezpieczenia nieelektrycznego: bezpieczeństwo konstrukcyjne „c”, nadzorowanie źródeł zapłonu „b”, zanurzenie w cieczy „k”

PN EN ISO 80079-36:2016-07 Atmosfery wybuchowe -- Część 36: Urządzenia nieelektryczne do atmosfer wybuchowych. Metodyka wymagania

PN-EN ISO 13857:2010 Bezpieczeństwo maszyn. Odległości bezpieczeństwa uniemożliwiające sięganie kończynami górnymi i dolnymi do stref niebezpiecznych.

and technical standards (in part or in full):

PN-ISO 5801:2002 Wentylatory przemysłowe. Badanie charakterystyk pracy na stanowiskach znormalizowanych.

PN-N-01359:1993 Drgania mechaniczne. Wyważanie wirników sztywnych. Wyznaczanie dopuszczalnego niewyważenia resztkowego.

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