Bewegung durch Perfektion



Die Königsklasse in Lufttechnik, Regeltechnik und Antriebstechnik



Product documentation

Type
ZN091-ZIL.GL.V5P1

Article number
180681

ZIEHL-ABEGG

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1. Recitals

The Product Specifications contained in this document are final, unless otherwise stated by a separate provision in the "ZIEHL-ABEGG deviation list document" with respect to information provided by the customer (cp. separate Chapter: Attachment).

Other regulations between the parties, regardless of time, form or content, are not part of the subject matter of the contract and the agreement on characteristics/of features (Product Specifications) between the parties.

Compliance with the following specifications is mandatory to ensure the functionality and safety of the product. If the following specifications given especially but not limited for operating conditions, transport, storage, mounting, start-up, maintenance and repair are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

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2. Product specification - Technical data

Article number	180681
Type	ZN091-ZIL.GL.V5P1
Designation	ZAplus axial fan with sickle blades
Rated values	3~380-480V 50/60Hz $P_1$3.20kW 5.20-4.20A 1100 min^{-1} 55°C
Electrical connection	Integrated controller
ErP Data	Measurement category ErP: A Air flow q_v on Eta opt: 22430 m3/h Pressure increase p_{fs} on Eta opt: 283 Pa Input power P_{ed} on Eta opt: 3100 W Efficiency η_{statA}: 62.0 % Efficiency grade: N_{actual} = 65.3 / N_{target} = 40* *ErP 2015
Type of protection	IP55
Thermal class	THCL155
efficiency class	IE5
Connection diagram	AP00001C
Rating plate	2x fixed, Data Matrix Code 1x loose in controller
Fitting position	H/Vu/Vo
Motor protection	integrated active temperaturemanagement
Impregnation	Moisture and hot climate protection
Condensation	Condensation water hole(s) in rotor open
Quality of bearings	ball bearing with long-time lubrication
Material Rotor	Aluminium
Painting rotor	Rotor 1 coat paint resistance class 1 (L-TI-0596)
colour rotor	RAL 5002 (ultramarine blue)
Material blades	Aluminium
Labelling UL/CSA	E213826 ZB-155, MK152-0008
Guard grille type	ring grill
IO-function	BASIC-MODBUS
Colour housing	black
Painting safe. guard	Safety guard powder-coated with safety guard
Guard grill pre.side	Guard grill for pressure side supplied loosely
Client`s loose parts	Connecting elements in the accessories bag supplied loosely.
Weight	44.80 kg

*** Operation mode:
Continuous operation with occasional starts (S1) according to DIN EN 60034-1:2011-02.
Occasional starting between -35 °C and -25 °C is permissible. Continuous operation below -25 °C only with special bearings for refrigeration applications on request.
Permissible minimum and maximum ambient temperature for operation:
Please refer to the technical documentation of the product for the minimum and maximum ambient temperature valid for the respective fan. Operation below -25 °C as well as partial load operation for refrigeration applications is only possible with special bearings for refrigeration applications on request. If special bearings for refrigeration applications are installed in the fan, please observe the permissible maximum temperatures in the technical documentation of the product.

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3. Product specification – Applicable technical standards

Environmental Conditions:

EN 60721-3-4: 1995 „Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 4: Stationary use at non-weatherprotected locations" (IEC 104/799/CDV:2018)
Climatic environmental conditions: class 4K2
Biological environmental conditions: 4B1
Chemical active substances: 4C1
Mechanical active substances: 4S1
Mechanical environmental conditions: 4M1

Corrosion protection:

Powder coating thickness

The total thickness of the standard powder coating as an average value of 10 measurements, distributed evenly over the whole part must be between at least 80 and 160 µm (or 260 µm with double powder coating) and may not drop below 60 µm at any measuring point. A total coating thickness of 160 µm (or 260 µm with double powder coating) must not be exceeded.
The total thickness of a coating may not, however, be used as a measure of corrosion protection. The corrosion protection of a coated part is composed of the pretreatment (e.g. zinc phosphatising), the type of powder (e.g. mixed powder), the coating (single or dual layer), the material (bright / galvanised steel) and the correct execution of the powder coating (cleaning/degreasing of the part)..

Properties of the powder coating

The ZIEHL-ABEGG standard powder coating uses a polyester-epoxy mixed powder.
Due to the polyester component in the mixed powder a medium UV resistance is given.
Generally the functional surfaces of all parts with threads, nuts and bolts or predefined functional surfaces are uncoated to ensure the smooth running of the thread or the function (for example the grounding of the part).

Classification powder-coated components according to L-TI-0585e

Evaluation	Maximum premissible degree of damage	Exposure time of the salt spray test acc. to ISO 9227	Resistance class RC	Recommended / possible pretreatment
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	m0 / g0 Ri0 0 Gt0 none	336 h	1	Iron phosphating
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	m0 / g0 Ri1 1 Gt0 none	504 h	2	Iron phosphating Zinc phosphating
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	m1 / g1 Ri1 2 Gt1 slight	750 h	3	Iron phosphating Fe/Zn 5-7 µm thick layer passivation Cathodic dip coating (CDC layer thickness >15µm)
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	m2 / g2 Ri2 3 Gt2 slight	1000 h	4	Iron phosphating Fe/Zn 5-7 µm thick layer passivation Cathodic dip coating (CDC layer thickness >15µm) Hot dip galvanizing according to DIN EN ISO 1461

ZA uses various powder coating systems from different manufacturers qualified by ZA to meet the above-mentioned resistance classes with their corrosion protection requirements.

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Painting thickness

Depending on the component or the design of the components, there may be deviations in the minimum coating thickness or flaws. As a general rule, however, the total coating thickness should not fall below 20 µm at any point.
The total coating thickness of the standard wet painting as an average value of 10 measurements distributed evenly over the whole component must be between the values specified in the following table.
However, the total coating thickness of wet painting may not be used as a measure of corrosion protection. The corrosion protection of a coated component is made up of the pretreatment (e.g. FEph) of the paint type/paint quality, the coating (one or two coat), the material (bright/galvanized steel) and the correct application of the wet painting (cleaning/degreasing of the component).

Classification wet painted components according to L-TI-0596e

Evaluation	Maximum premissible degree of damage	Exposure time of the salt spray test acc. to ISO 9227	Resistance class RC	Min. recommended paint system	Recommended paint type/layer thickness
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	0 (S0) Ri0-1 1-2 Gt0-1 none	336 h	1	1 coat paint	Top coat 30-60µm
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	0 (S0) Ri0-1 1-2 Gt0-1 slight	504 h	2	2 coat paint	2 coats top coat 60-120µm
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	1 (S1) Ri1 1-2 Gt0-1 slight	750 h	3	2 coat paint	EP primer + top coat 60-110µm
Degree of blistering DIN EN ISO 4628-2 Degree of rusting DIN EN ISO 4628-3 Release of bonding DIN EN ISO 4628-8 Mesh cut DIN EN ISO 2409 Edge rust	2 (S2) Ri1 2 Gt2 slight	1000 h	4	3 coat paint or 2 thick coat paint	2x EP primer + top coat 90-160µm or 2 coats thick coat 90-180µm

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4. Product specification – Lifetime

The maximum fan lifetime is determined by the following factors primarily:

1. Service life of the motor winding
   The insulation material inside the winding is aging due to thermal and electrical stress. This aging is determined by the maximum winding temperatures, duration and amount of the temperature cycles. It is therefore very difficult to quantify the winding service lifetime. Based on long time tests with internal rotor motors with grid supply, an average statistical lifetime of 50.000 - 60.000 operating hours can be assumed.
2. Service life of the motor bearings
   The according to standard calculation methods determined bearing service life expectation of the motor-integrated ball bearings is mainly determined by the grease service life F10h and amounts for standard application to approx. 30.000 – 40.000 operating hours.
   The fan is maintenance-free due to the use of ball bearings with "lifetime lubrication". Once the grease operating life F10h has been reached, it may be necessary to replace the bearing.
   The bearing service life expectation may change compared to the specified value, if operating conditions such as increased vibrations or shocks, increased or too low temperatures, humidity, dirt in the ball bearing or unfavourable control modes are present.
   A service life calculation for special applications can be provided on request.
3. Service lifetime of the electronics
   For the electronics, a full power lifetime expectation of 40.000 operating hours has to be considered.

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5. Product Specification - General product and handling description

Operating conditions:

The product is designed for conveying non-aggressive, non-explosive, non-fluid, non-adherent, non-abrasive, dust and particle-free gaseous media, air-like mixtures und air.
The fans/motors are not ready-to-use products, but are designed as components for refrigeration, air conditioning and ventilation systems. The fans may not be operated until they are installed according to their intended purpose.
Operating conditions, including the installation position of the fan, must be clearly specified by the customer, especially in the case of special operating conditions such as a higher risk of condensate formation and higher humidity or for outdoor use. These customer specifications form the basis for product design including selection and assignment of suitable motors. ZIEHL-ABEGG cannot accept any liability for applications and operating conditions not specified to us; the customer is then responsible for taking precautionary measures against failure or damage to the fan.
To provide error-free operation and prevent damage to the product, the product may only be operated in the admissible operating area according to the mentioned data sheets and air performance curves respectively may only be used for the intended application.
The formation of small rusty spots during usage in accordance with the product specification and this general product and handling description can occur. These do not affect the functionality of the product. In case of sendzimir-galvanized components, corrosion at the cutting edges is possible.
The product must never be used in obviously damaged condition.
External magnetic fields are not allowed if their induced eddy currents would decelerate the fan respectively these may lead to an increase in power consumption or to malfunctions in the electronics.
Temperature change speeds of a maximum of 1 K/min are permissible.
When used below -10 °C, it is a prerequisite that the fans are not subjected to any unusual external influences such as impact-like mechanical loads.

The admissibility of operating the fan near of strong heat radiation sources must be checked and approved by the device manufacturer. It must be ensured that the peak temperature of the radiant heat source does not exceed the maximum ambient temperature of the fan (see rating plate). This applies in particular in the event of a fault or when the fan is at a standstill.
The permissible relative humidity is indicated in the assembly and operating instructions.
Condensation in the drive must be excluded.
In case of longer downtimes in a humid atmosphere, the fans must be put into operation monthly for at least 2 hours, at least 80% of the rated speed, to allow any moisture that may have penetrated them or condensation that has formed inside, to evaporate and to redistribute the bearing grease or to avoid standstill markings / bearing rust respectively.
Applications in which the fan runs through several temperature and humidity phases at intervals must be checked and released by the device manufacturer on a case-by-case basis.

Not permissible:

Blocking or slowing down the fan by inserting objects. The impeller may become unbalanced, be damaged and may burst. Danger to life!
Loosening of the impeller and/or balance weights. The impeller becomes unbalanced and the motor bearing life time decreases. Danger to life!
Continuous intentional change of direction of rotation. The motor and the impeller are overloaded.
Reverse current braking. The motor and impeller are overloaded.

AC fans on mains:
The fan is designed for continuous operation S1 according to DIN EN 60034-1:2011-02.
If switching operation (multiple switching per hour) is required, consult ZIEHL-ABEGG stating the planned switching frequency.
Occasional starting between -40 °C and -25 °C is permissible.
Continuous operation below -25 °C only with special bearings for refrigeration applications on request.
The fan may only be operated within the permissible temperature range. Please refer to the technical documentation of the product for the minimum and maximum ambient temperature valid for the respective

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fan.
The maximum permissible ambient temperature is also indicated on the fan rating plate, with the following exception: If special ball bearings with “cold grease” lubrication are installed in the fan, the maximum permissible ambient temperature in continuous operation is + 20 °C.
Operation below -25 °C and partial load operation on frequency inverters for cold applications is only possible with special bearings for refrigeration applications on request.
Permissible minimum ambient temperature for operation of 1~ fans with built-in operating capacitor: -25 °C.
For fans with protection class IP55 or higher (protection class according to DIN EN 60529 or DIN EN 60034-4), the existing condensation drain hole must be opened at least every six months.

AC standard fans with frequency converter:
The product only works properly with a suitable frequency converter with integrated all-pole active sine filter. The product can be damaged if it´s used without an all-pole sine filter between the motor and the frequency converter. Voltage peaks and voltage fluctuations can destroy the product. Bearing currents must be avoided.
AC-fans with voltaqe-controllers/phase-cut-controllers:For voltage-regulated motors, note the additional information for the possible current increase with voltage control. With voltage-regulated fans, which are operated at phase cut controllers, an additional current increase occurs due to phase cut control in addition to the current increase due to voltage control. This additional current increase can amount to up to 30% of the rated current and must be added to the normal current increase due to voltage control when selecting and dimensioning the phase cut controller.

EC fans:
The fan is designed for continuous operation S1 according to DIN EN 60034-1:2011-02.
Occasional starting between -35 °C and -25 °C is permissible.
Continuous operation below -25 °C only with special bearings for refrigeration applications on request.
The fan may only be operated within the permissible temperature range. Please refer to the technical documentation of the product for the minimum and maximum ambient temperature valid for the respective fan.
Operation below -25 °C as well as partial load operation for refrigeration applications is only possible with special bearings for refrigeration applications on request. If special bearings for refrigeration applications are installed in the fan, please observe the permissible maximum temperatures in the technical documentation of the product.
For safe operation up to the minimum permissible ambient temperature and to avoid condensation, a continuous power supply must be ensured in refrigeration applications so that the condensation point does not occur due to cooling-down.

Motor protection:
Implement the thermal motor protection depending on the design of the motor and observe the attached wiring diagram.
A) For EC fans:
Relay: Please note the minimum switching voltage of 5 V as well as the minimum current of 100 mA at the relay contact to ensure a reliable switching change.
The maximum voltage at the relay contact must not exceed 380 V AC / 220 V DC. The maximum switching current is 5 A.
B) For AC fans:
The motors can be equipped with temperature sensors "TP" (PTC thermistor), internally connected thermostat switches "TB", outgoing thermostat switches "TB" or can be delivered without thermal protection.
B1) Thermostat switch: Please observe the minimum current of approx. 50 mA at the thermostat switch so that the contact switches permanently and safely. The maximum voltage at the thermostat switch must not exceed 250 V AC or 60 V DC
(Note: all values and especially the maximum switching current of the TB depend on system parameters as cycle of operation and the output current of the monitoring unit. For specific parameters contact our technical support).
B2) PTC thermistor (PTC):
Standard internal rotor motors: Please observe the specifications and application limits, such as maximum voltage, in the operating instructions of the respective motor manufacturer.

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External rotor motors: The maximum voltage at the PTC thermistor must not exceed 2.5 V per PTC element. Thermal motor protection is ensured exclusively by the use of temperature monitors, thermostat switches or PTC thermistors. These motor protection devices must be connected.
If there are no temperature monitors, thermostat switches or PTC thermistors, a motor protection switch must be used. However, motor protection switches do not provide temperature protection for the motors.

Assembly:

The assembly has to meet the requirements of the assembly instructions to enable error-free operation. The fans may not be operated until they are installed according to their intended use. The included or supplied guard grille of ZIEHL-ABEGG fans is usually designed according to EN ISO 13857 Table 4 (for persons with a minimum age of 14 years). If the grilles are of a different design, the device manufacturer must take further structural protective measures to ensure safe operation.

Commissioning:

Commissioning must be done by appropriately qualified technical personnel according to the specifications in the operating and assembly instructions.
During start-up check the following:
1. Check the direction of rotation (see rotation direction arrow on the fan blade, impeller base plate or support plates on suction side or rating plate).
2. Inspect the motor bearings for proper operation prior to installation. Check smooth, noiseless running during commissioning, replace motor bearings if necessary.
3. Check for quiet, low vibration operation. Strong vibrations due to uneven running (imbalance), e.g. caused by transportation damage or improper use, can lead to failure.
4. For variable speed fans: If resonance vibrations occur, it is possible to hide certain speed ranges.
5. A-rated sound power levels of over 80 dB(A) are possible.
6. Fans from ZIEHL-ABEGG SE are delivered balanced in accordance with DIN ISO 21940-11 for the appropriate fan category in accordance with ISO 14694. Check the fan for mechanical vibrations after installation. If the limit values of the corresponding fan category are exceeded in start-up, you must have the motor/impeller unit checked by an expert and rebalanced if necessary before continuous operation is permitted.
During commissioning, unexpected and hazardous conditions can arise in the entire installation due to defective adjustments, defective components or incorrect electrical connections. Remove all persons and objects from the hazardous area.
Do not start up the fan until you have read and understood all the safety instructions (DIN EN 50110, IEC 364), safety distances are observed (DIN EN ISO 13857 / EN 60335) and a hazard is excluded.
Acclimatize the fan to the permissible operating temperature range.
The device manufacturer must ensure low-vibration operation. The relevant standards must be observed e.g. DIN ISO 10816.
In the case of applications with external vibrations, the device manufacturer must decouple the fan from the vibration source.
The complete assembly must be checked for resonance by the device manufacturer when installed. For variable-speed applications, the assembly must be checked for resonances over the entire speed range. If excessive vibrations are detected, it must be avoided that the unit and the fan is operated in this resonance. If the fan is operated with increased vibrations, service life will be considerably reduced or a failure can occur.

Temporary decommissioning and longer downtimes:

The fan may only be decommissioned by qualified personnel who, due to their training, experience and instruction, have sufficient knowledge of the safety regulations, the accident prevention regulations and the recognized rules of technology (e.g. VDE regulations, IEC, EN, DIN standards).The fan should be protected from the weather.
In case of longer downtimes in a humid atmosphere, the fans must be put into operation monthly for at least 2 hours, at least 80% of the rated speed, to allow any moisture that may have penetrated them or condensation that has formed inside, to evaporate and to redistribute the bearing grease or to avoid standstill markings / bearing rust respectively.

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Only for AC fans: For fans with protection class IP55 or higher (protection class according to DIN EN 60529 or DIN EN 60034-4), the existing condensation drain hole must be opened at least every six months.

Documentation:

In case of defective parts or products or in case of any warranty, it may be necessary to analyses the root cause of the defect.
Therefore, ZIEHL-ABEGG may ask for documentation of proper life-cycle handling according to the operating and assembly instructions and the general product and handling description. ZIEHL-ABEGG may ask for appropriate documentation records in order to assess root cause of the defect.

Maintenance and inspection:

Any maintenance and inspection has to be carried out in accordance with the operating and assembly instructions.
Taking the above mentioned lifetime values into consideration, the fan has to be inspected regularly (see assembly and operating instructions).
The inspection has to include, but is not limited to:

- Inspection for vibration that has not occurred in the past
- Dirt / dust / deposits on the impeller and on the motor
- Integrity of the impeller, firm fixation of the impeller.

If service (e.g. bearing change) is necessary, it has to be considered that the motor-impeller-combination has to be balanced dynamically in two planes according DIN ISO 21940-11.

Packaging, storage and transport:

Packaging, storage and transport must be carried out in accordance with the operating and assembly instructions to avoid product damage.
Avoid impacts and shocks during transport and storage to avoid product damage.
The limit values of ISTA 3E resp. ISTA 3B must be observed during transport. Improper transport can cause damage to fan components such as the motor bearings and accessories which leads to a reduction in product service life and / or functional restrictions.
The device manufacturer must ensure that the vibrations and shocks acting on the fans do not exceed the limit values according to DIN EN 60721-2-2 Category 2M1 when the device is transported with mounted fans.
Observe the weight specifications (see rating plate) and the permissible payloads of the transportation means.
Fans may only be transported protected from the weather, unprotected transport is not permitted. Moisture ingress into the packaging is not permitted.
Transport the fans either originally packed or larger fans using the transport devices provided: holes in support arms, wall ring plates and motor supports.
Pay attention to possible packaging or fan damages.
Store the product in its original packaging and protect it from dirt and weather until final assembly.
When storing, ensure a dry, vibration-free and condensation-free environment. Avoid extreme exposure to heat, cold or humidity. Temperature range for storage and transport see technical data in the assembly instructions. Recommended values: temperature 0 °C to 40 °C, max. relative humidity 60%. Condensate formation inside the product and / or the packaging can lead to product deterioration and must be prevented.
In case of longer storage in a humid atmosphere, the fans must be put into operation monthly for at least 2 hours, at least 80% of the rated speed, to allow any moisture that may have penetrated them or condensation that has formed inside, to evaporate and to redistribute the bearing grease or to avoid standstill markings / bearing rust respectively.
Only for AC fans: For fans with protection class IP55 or higher (protection class according to DIN EN 60529 or DIN EN 60034-4), the existing condensation drain hole must be opened at least every six months. Fans may be stored for a maximum of 1 year. For longer storage periods, the fans must be turned by hand at least 30 revolutions per month to avoid damage to the motor bearing. If this has not been done, a pre-damage of the ball bearings must be expected. In this case ZIEHL-ABEGG cannot assume any warranty for the function of the motor bearings. After 2 years storage at the latest, the ball bearings must be replaced before commissioning.

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Spare parts:

In all warranty cases repairs have to be carried out by ZIEHL-ABEGG. In all other cases spare parts shall meet the specifications of the original installed parts to ensure error-free operation. Use of original ZIEHL-ABEGG spare parts is recommended.

Specific application/Intended purpose:

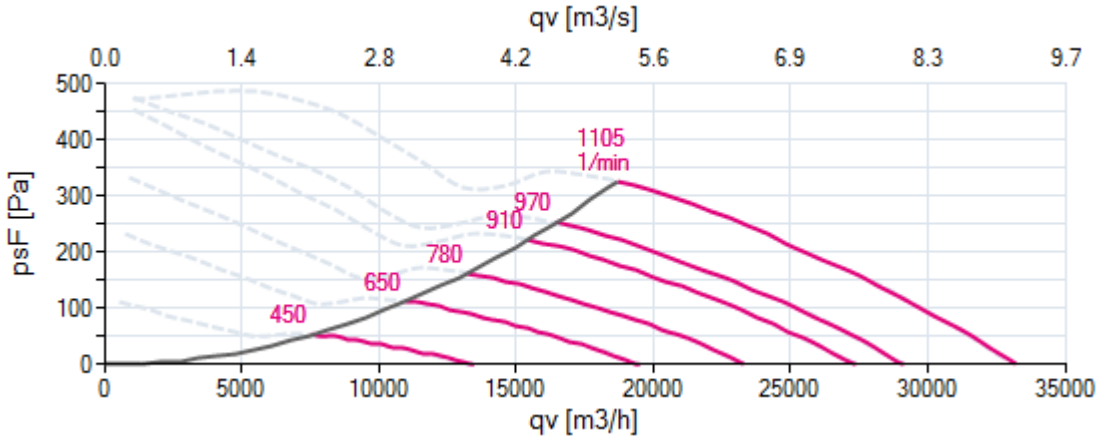
This product was designed with the above-mentioned features.
Suitability of the product for specific application is beyond the control of ZIEHL-ABEGG.
ZIEHL-ABEGG can therefore neither guarantee nor prove the suitability of this product for the specific application or customer's intended purpose.
The customer is responsible for testing and releasing the product for his intended application.

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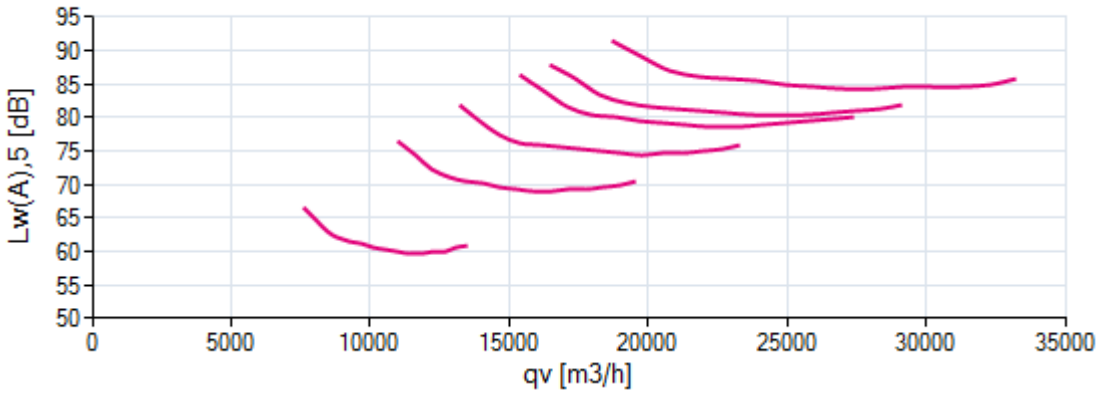
6. Characteristic Curve

ZN091-ZIL.GL.V5P1	Measured in ZAplus with pressure side guard grille in air flow direction V in installation type A according to ISO5801
3~ 400V 50Hz	measurement density 1,16 kg/m³

Air performance



Acoustics

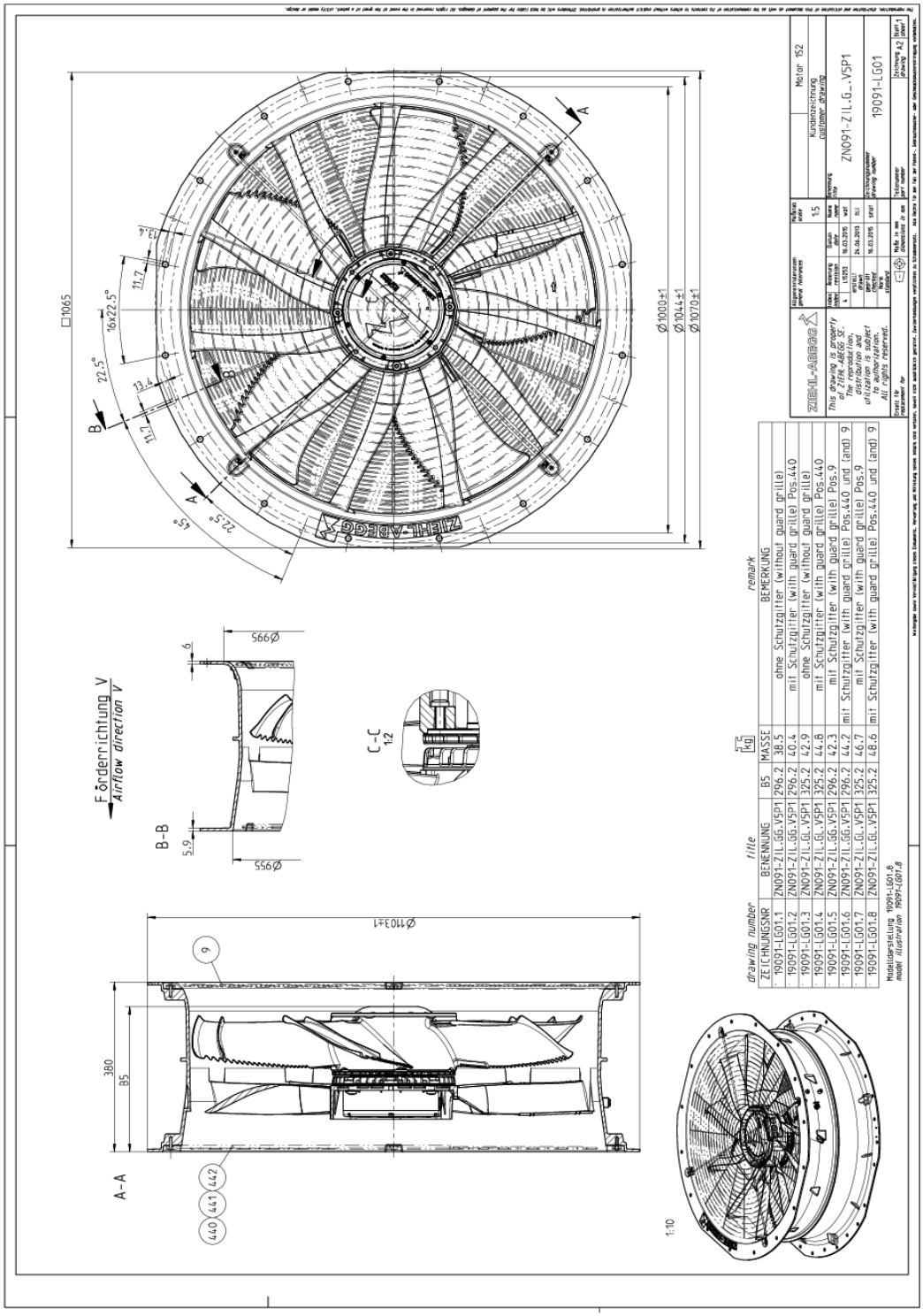


Please note: It's not allowed to use this fan in the stall area!*

*In doubt please ask your responsible ZIEHL-ABEGG sales contact.

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7. Drawing



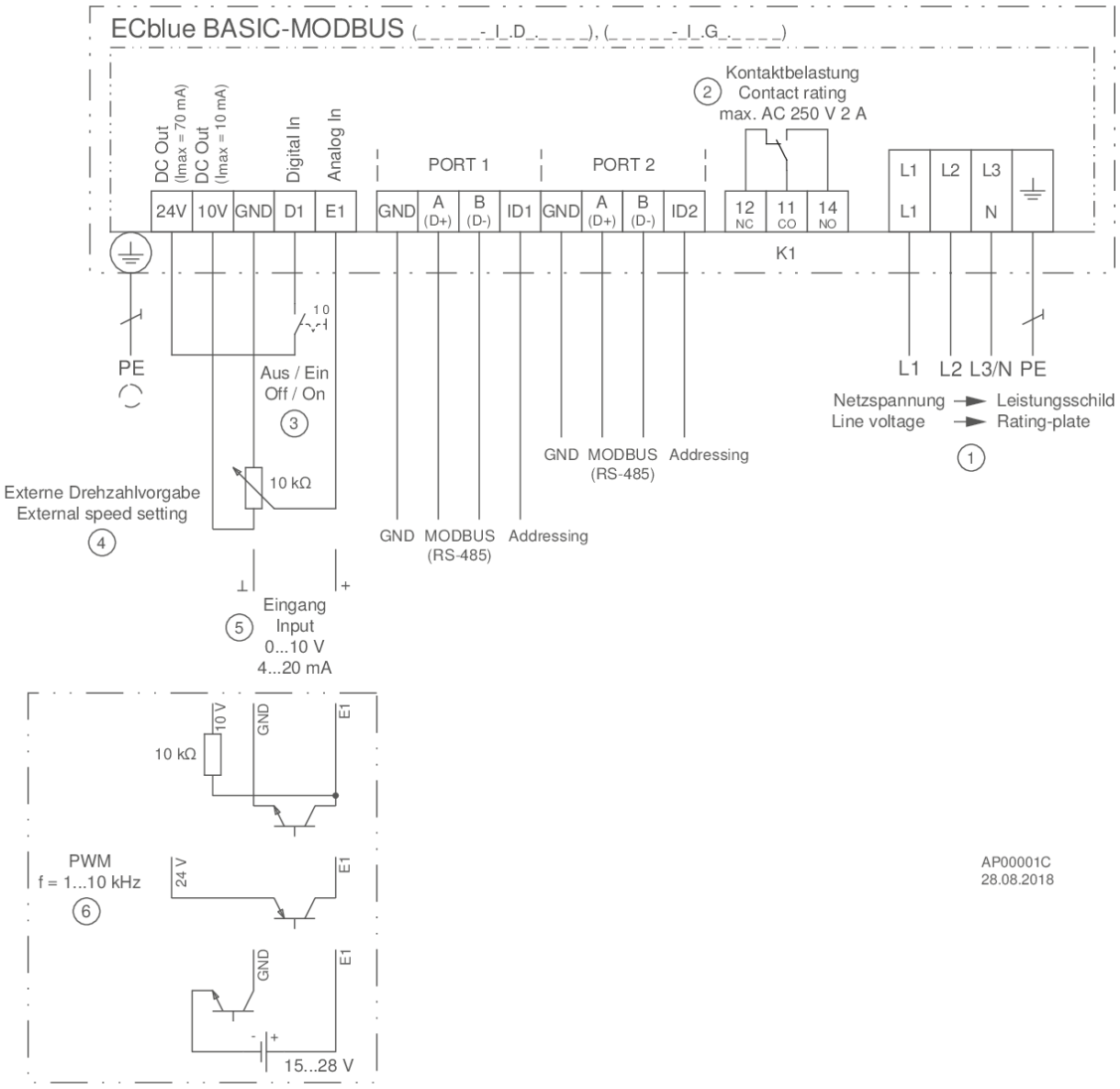
Dimensions in mm

The illustrations shown make no claim to completeness and are for orientation purposes only.

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8. Connection diagram

Connection diagram: AP00001C



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9. Aerodynamics and Acoustics

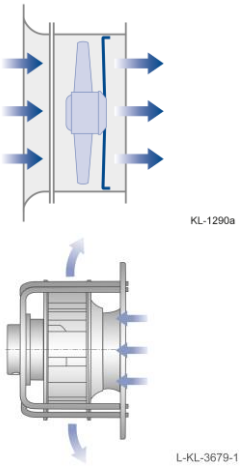
Measurement method

The characteristic map display shows the pressure increase Δp_{sF} in Pa as a function of the volume flow rate q_V in m^3/h.

Technical conditions of supply

The specified performance data meet the respective requirements for accuracy
- AN2 for centrifugal impellers without motor
- AN3 for centrifugal fans with standard motors
- AN2 for centrifugal impellers with ECblue motors (except EC055)
- AN3 for centrifugal impellers with ECblue motor EC055 (see type key)
- AN3 for axial fans with ECblue motors
- AN4 for axial fans with AC external rotor motors

in line with **ISO 13348** and apply to the rated data and air performance curves at the rated voltage. The continuous line in the characteristic curve represents the optimum reliable operating range for fans.



Installation type A according to ISO 5801

Fan test bench

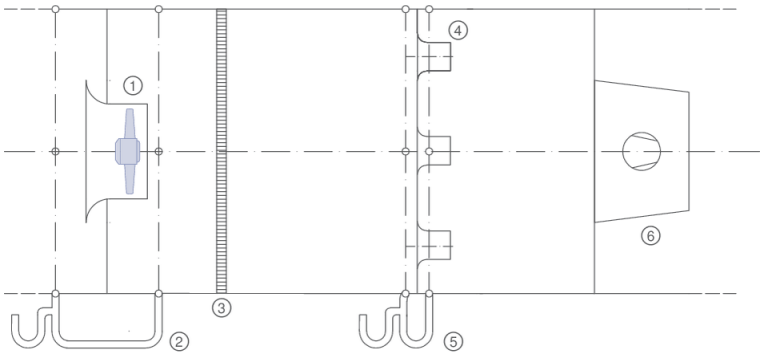
The fan characteristic curves are determined on a combined ventilation and sound test bench.
The characteristic curves are measured in compliance with **DIN EN ISO 5801** and **AMCA 210-99**. The sound power levels are measured in compliance with **DIN EN ISO 3745** and **ISO 13347-3** using the enveloping surface measuring method.

The figure below shows an example of the measuring setup. The fan is installed in the measuring chamber at free inlet and free exhaust (installation type A as per **DIN EN ISO 5801** or **AMCA 210-99**).


Technology Centre (InVent)

Air density

The air density and humidity are conditioned during the measurement using heat exchangers and kept largely constant. The characteristic curves shown refer to the measuring density. The mean measuring density is 1.16 kg/m³.

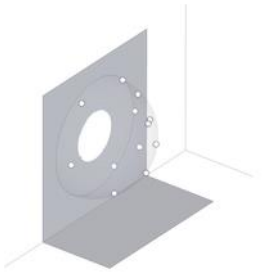


① Test fan
② p_{fs}
③ Flow straightener
④ Nozzles
⑤ Δp Differential pressure
⑥ Auxiliary fan

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Noise level data

The sound power levels are determined by using the enveloping surface method in compliance with **ISO 13347-3**, accuracy class **1** and/or **DIN EN ISO 3745**.



This is done by measuring the sound pressure level L_p of the individual third-octave bands at 12 points on the enveloping surface (Fig. Ia). The measured sound pressure levels for the third-octave bands are initially used to calculate the sound power level for the third-octave bands and then the suction side sound power level L_{W5}. To do this, the fans are installed with a free inlet (from the measuring chamber) and free exhaust (into the surrounding area). The standard measurements are carried out without the need for additional parts, e.g. guard grille. The measuring equipment used complies with **DIN EN 61672**.



Fig. Ib: Fan test-bench

Because of the different weighting of the third-octave sound power level, the A-evaluation, which is typically carried out, takes into account the subjective nature of human sound perception. The A-tested sound power level is the standard variable used to assess the sound characteristics of technical equipment.

Calculation of pressure side sound power level and total sound power level

For axial fans, the pressure side sound power level is approximately equal to the suction side level. The total sound power level is calculated by adding up the power from the sound power levels of both the suction and the pressure side (see **DIN 45 635 Part 1, Appendix F, DIN EN ISO 3745**). Thus, it is approximately 3 dB higher than the suction side sound power level specified.
For centrifugal fans, as a rule, the A-weighted pressure side sound power level LW,DS is about 5 dB higher than for the suction side.The overall sound power level LW,ges is therefore about 6.5 dB higher than the suction side sound power level.

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Determination of total sound power level during the interaction of several sound sources

The total sound power level of several individual sound sources operating concurrently is calculated by adding the power of the individual levels in compliance with **DIN EN ISO 3745**. This equation is the basis for the diagrams in Fig. II and III.

To add up several sound sources with the same level, please see diagram (Fig. II) for complete level information; e.g. 6 identical sound sources operating concurrently results in a total level that is approx. 8 dB higher.

The total sound power level of two sound sources with different levels can be seen in diagram Fig. III. For example, two sound sources whose sound power levels differ by 4 dB produce a total sound power level that is around 1.5 dB higher than that of the louder sound source.

Determination of sound pressure level

The A-tested sound pressure level LpA for rooms with average absorption capacity for a distance of 1m from the fan axle is calculated by subtracting 7 dB from the A sound power level L_{WA}. In most cases, this assumption is correct and provides a sufficient level of accuracy. However, the sound characteristics can be hugely influenced by the individual installation situation.

Absorption of the sound pressure level, depending on the distance with partial reflection, is shown in Fig. IV.

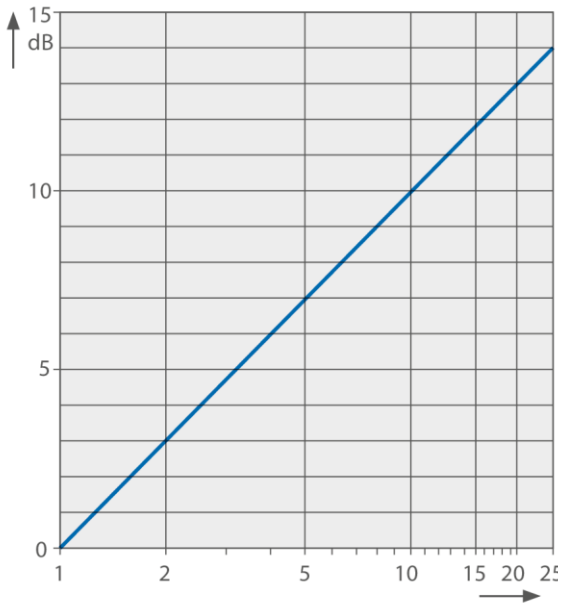


Fig. II: Addition of several sound sources

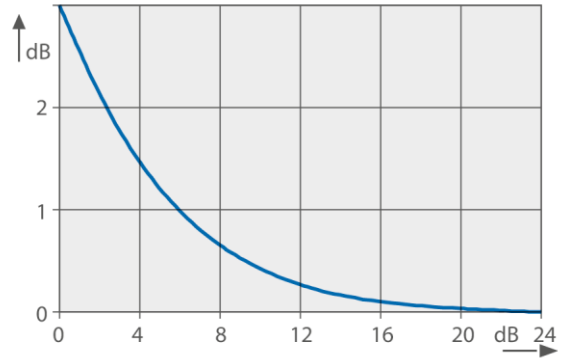


Fig. III: Sound sources of different levels

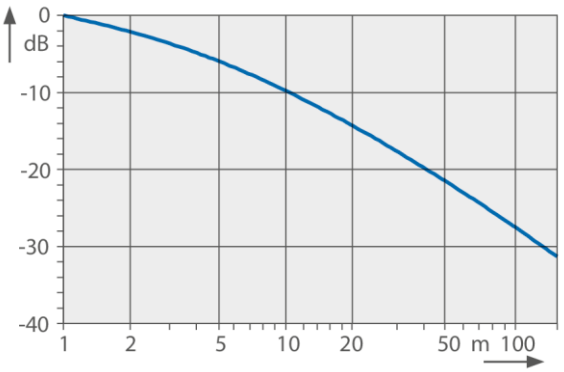


Fig. IV: Reduction of sound pressure level

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10. EU-Declaration of conformity

EU declaration of conformity

- Translation -
(english)

ZA75-GB 2044 Index 016

Manufacturer: **ZIEHL-ABEGG SE**
Heinz-Ziehl-Straße
74653 Künzelsau
Germany

The manufacturer is solely responsible for issuance of the declaration of conformity.

The products:

- External rotor motor MK.., MW..
- Axial fan DN.., FA.., FB.., FC.., FE.., FF.., FG.., FH.., FL.., FN.., FS.., FT.., FV.., VN.., VR.., ZC.., ZF.., ZG.., ZN..
- Centrifugal fan ER.., GR.., HR.., RA.., RD.., RE.., RF.., RG.., RH.., RK.., RM.., RR.., RZ.., WR..
- Cross-flow fan QG.., QK.., QR.., QT..

The motor type:

- Asynchronous internal or external rotor motor
- Asynchronous internal or external rotor motor with integrated frequency inverter
- Electronically commutated internal or external rotor motor
- Electronically commutated internal or external rotor motor with integrated EC controller

These products comply with the following EU directives:

- EMC Directive 2014/30/EU
- Low Voltage Directive 2014/35/EU
- ErP Directive 2009/125/EC, in conjunction with Regulation (EU) no. 327/2011

The following harmonised standards have been used:

- EN 60034-1:2010 + AC:2010
- EN 60204-1:2006 + A1:2009 + AC:2010
- EN 60529:1991 + A1:2000 + A2:2013 + AC:1993 + AC:2016 + AC:2019
- EN 61000-6-2:2005 + AC:2005
- EN 61000-6-3:2007 + A1:2011 + AC:2012

Compliance with the ErP Directive 2009/125/EC does not refer to external rotor motors MK.., MW..

All ErP-relevant information comprises measurements which are determined using a standardised measurement set-up. More details can be obtained from the manufacturer.

Compliance with the EMC Directive 2014/30/EU refers only to those products when they are connected by mounting / operating instructions. If these products are integrated into a system or supplemented with other components (e.g. sensing controls) and operated, the manufacturer or operator is responsible of the overall system for compliance with the EMC Directive 2014/30/EU.

Künzelsau, 28.10.2020
(location, date of issue)

ZIEHL-ABEGG SE
Dr. W. Angelis
Head of Technics Ventilation Technology
(name, function)

i. V. W. Angelis

(signature)

ZIEHL-ABEGG SE
Dr. D. Kappel
Head of Electrical Systems
(name, function)

i. V. David Kappel

(signature)

ZIEHL-ABEGG

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EC Declaration of Incorporation

- Translation -
(english)

ZA87-GB 2044 Index 009

as defined by the EC Machinery Directive 2006/42/EC, Annex II B

The design of the incomplete machine:

- Axial fan DN.., FA.., FB.., FC.., FE.., FF.., FG.., FH.., FL.., FN.., FS.., FT.., FV.., VN.., VR.., ZC.., ZF.., ZG.., ZN..
- Centrifugal fan ER.., GR.., HR.., RA.., RD.., RE.., RF.., RG.., RH.., RK.., RM.., RR.., RZ.., WR..
- Cross-flow fan QD.., QG.., QK.., QR.., QT..,

Motor type:

- Asynchronous internal or external rotor motor (also with integrated frequency inverter)
- Electronically commutated internal or external rotor motor (also with integrated EC controller)

complies with the requirements in Appendix I, Articles 1.1.2, 1.1.5, 1.4.1, 1.5.1 in EG Machinery Directive 2006/42/EG.

The manufacturer is

ZIEHL-ABEGG SE
Heinz-Ziehl-Strasse
D-74653 Künzelsau

The following harmonised standards have been used:

EN 60204-1:2006 + A1:2009 + AC:2010	Safety of machinery; electrical equipment of machines; Part 1: General requirements
EN ISO 12100:2010	Safety of machinery - General principles for design - Risk assessment and risk reduction
EN ISO 13857:2008	Safety of machinery; safety distances to prevent danger zones being reached by the upper limbs
Note:	The maintenance of the EN ISO 13857:2008 relates only to the installed accidental contact protection, provided that it is part of the scope of delivery.

The specific technical documentation in accordance with Appendix VII B has been written and is available in its entirety.

The person authorised for compiling the specific technical documentation is: Dr. W. Angelis, address see above.

The specific documentation will be transmitted to the official authorities on justified request. The transmission can be electronic, on data carriers or on paper. All industrial property rights remain with the above-mentioned manufacturer.

It is prohibited to commission this incomplete machine until it has been secured that the machine into which it was incorporated complies with the stipulations of the EC Machinery Directive.

Künzelsau, 28.10.2020
(location, date of issue)

ZIEHL-ABEGG SE
Dr. W. Angelis
Head of Technics Ventilation Technology
(name, function)

i.V. W. Angelis

(signature)

ZIEHL-ABEGG SE
Dr. D. Kappel
Head of Electrical Systems
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i. V. David Kappel

(signature)

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11. Deviation list

No customer specification was available. Please note that ZIEHL-ABEGG does not confirm technical requirements beyond this specification if they are not listed in a list of deviations.

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