USER'S GUIDE

FAN WITH ELECTRONICALLY COMMUTATED EXTERNAL-ROTOR MOTOR

Fan Code:

0310-4-0031

Fan type : R10R-56LPS-ES50B-04A10

📖 **Note :**

Be sure to familiarize yourself with these instructions before working on this unit. Not paying attention to these warnings and instructions may lead to malfunctions and failures or may seriously endanger human life.

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Symbols :

 - important values

 - valuable information

01 SAFETY

When unpacking the unit, grip the blades close to the center (maximum stability) and lift it out very gently and carefully. Shocks have to be avoided by all means! Wear safety shoes and gloves.

This appliance should only be installed or opened by qualified personnel.

This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance.

Cleaning and user maintenance shall not be made by children without supervision.

This appliance is solely intended as a built-in component and should not be operated otherwise. Sufficient protection against accidental contact according to machinery directive 2006/42/CE has to be safeguarded, especially for the rotating parts. Should there be a malfunction, it still has to be safeguarded that the parts breaking off or flying away cannot cause serious damage or bodily harm.

Do not operate this appliance in an explosive atmosphere!

When connecting the unit to the power supply, dangerous voltages occur. Do not open the unit within the first 5 minutes after disconnection from the power supply. Be sure that the unit is being isolated.

Parallel operation of several units can cause dangerous charges of >50µC between AC line terminals and PE after disconnection.

With control voltage fed, the motor will restart automatically after a power failure.

The electronics housing can get hot.

The risk of pulling into rotating part. Do not wear any loose clothing (e.g. tie) or jewellery.
Long hair must be protected with a cap. Risk of injury!

02 PROPER USE AND TYPICAL FEATURES

The fans are only intended for the transfer of air or air-like mixtures. They cannot be used in hazardous areas for the transfer of gas, mix vapours or mixtures. Also cannot be used for transfer of solid components in transfer medium.

R10 axial fans with integrated external rotor ELECTRONICALLY COMMUTATED motor are not ready-to-use products, but designed as components for air-conditioning, air supply and air extraction. The fans may only be operated when they are installed as intended & instructed, and when safety is ensured by safety equipment according to EN 13857 or by other protection measures.

This appliance is not intended to be built as a partition fan (mounting in outside windows or walls) unless it is built into an end-application which is designed for that purpose.

The fan is intended to be permanently connected to fixed wiring.

The fans are only to be operated within the ranges specified on the motor name-plate.

Cycling operating mode: only with cycling via control signal (OFF=0V / ON=10V).

The manufacturer of the end application is responsible for keeping to the Electromagnetic compatibility (EMC) guideline 2004/108/EC.

Typical features

Variable Speed - setting via linear voltage input (0-10V) or PWM signal. One analog input (0-10V or PWM input).

High efficiency throughout the entire speed range.

Sensor power supply 10VDC (max 30mA)

Low-noise operation across the entire speed range.

Integrated EMC filter.

Control circuit is SELV isolated from main power supply (including an external power supply for sensors).

03 OPERATING CONDITIONS

The fans are rated for S1 (IEC 60034-1) continuous operation.

Extreme ON-OFF switching operating must be avoided, because it has negative influence on life expectancy and power consumption.

Cycling operating mode should only with cycling ON/OFF via control signal (0/10V analog input or PWM input).

Do not cycling the power supply for cycling operating mode – use control signal ! High 'In-rush current' can occur during cycling power supply!

Permissible ambient temperature is stated to the specified operating points - see appended 'Performance curves' for actual fan. If actual load deviates from specified operating point, motor temperature-rise should be checked.

Figures on the motor name-plate refer to nominal values according to EN 60335 if not otherwise specified (EN 60335, 'free air', 'max.load', 'max.eff.', cust. unit / cust. spec., UL, IEC 60034-1)

Continuous sound pressure level may exceed 70dBA (depends of fan model).

If an already installed fan is switched OFF for a long period in a humid atmosphere, it should be switched ON for minimum of two hours every month to remove any moisture that may have condensed inside the motor.

Protection (motor & electronics): IP54 according to EN60529.

Power consumption in stand-by mode: les than 1.0W acc. to EN 50561.

NOMINAL DATA - defined according to ' EN60335 '

Phase : 1~

Voltage : 230 V

Frequency : 50-60 Hz

Input power: 240 W

Nominal current : 1,65 A

Rotational speed : 950 RPM

Max. ambient temperature : 65 °C

Degree of protection provided by enclosures : IP54

Insulation class : 130

Min. ambient temperature : -25 °C

Max. pressure : 90 Pa

ErP DATA

Overall Efficiency , Eff_{es} : 45 %

Installation category : A

Efficiency category : static

Efficiency grade , N : 54,9

Variable speed drive : INTEGRATED

Power Input , P_e : 279,5 W

Airflow volume , q_v : 5269 m³/h

Pressure Increase, p_{sF} : 80 Pa

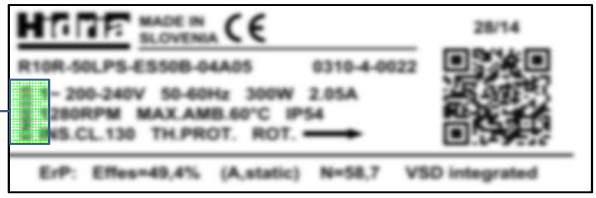
Rotational Speed, n : 953 RPM

Specific ratio : 1,001

Airflow volume max. , q_v : 7754 m³/h

Pressure Increase max., p_{sF} : 189 Pa

Example of nameplate :



EN 60335-1 : Name-plate data are made according to standard EN 60335-1, Household and similar electrical appliances – Safety – Part 1 : 10.1 If an appliance is marked with rated power input, the power input at normal operating temperature shall not deviate from the rated power input by more than: + 20% if Pn<300W or +15% (or 60W whichever is the greater) if Pn>300W.
10.2 If an appliance is marked with rated current, the current at normal operating temperature shall not deviate from the rated current by more than: +20% if In<1.5A or +15% (or 0,30A whichever is the greater) if In>1.5A.

FREE AIR : Data on the nameplate established at a point 0Pa static pressure.

MAX LOAD : Data on the nameplate established at a point of maximal static pressure regarding max. ambient temperature.

MAX. EFF. : Data on the nameplate established at a point of maximal static efficiency.

CUST. UNIT / CUST. SPEC. : Data on the nameplate specified according to customer specifications or at working point in customer's unit .

UL - Data on the nameplate defined according to specifications in UL standards.

IEC 60034-1 - Data on the nameplate defined according to the same name standard.

04 INSTALLATION AND CONNECTION

This unit should only be installed by a qualified technician.

Ensure that the air-gap between the fan impeller and the stationary housing is constant. Distortion due to an uneven surface of basis may lead to a fan failure. Air-gap between blade and cone-inlet (housing) should be of min. 3 mm.

Fan must be fixed to stationary housing 4x M8 at 90° on diameter as indicated on enclosed technical drawing. Use screws with property class of 8.8. Secure all threaded joints with e.g. Loctite or by using self-locking screws.

The system manufacturer or the machine builder is responsible that the inherent installation and security information are harmonized with the valid standards and guidelines (ex. EN 13857). To prevent dangerous situation and possible injuries the height and the diameter of inlet cone must be appropriate dimensions.

Do not install the fan on an unstable surface.

Inspect the motor bearings for proper operation prior to installation.

Main electrical installation be protected against short circuit with fuse of 10A and installation must be constructed properly according to valid national directives.

Recomended cable for connecting fan is at least 5x0.50mm² ordinary PVC cable acc. to IEC 60227-5 (eg. H05V2V2-F, 5 x 0,5 mm²), no longer than 2m, outer diameter max. 6.5mm.
Fan performed with terminal box is as supplied fitted with a sealing plug in the cable glands as a preventive against ingress of water or moisture inside the terminal box. If the cable is not installed through the cable gland, sealing plug must remain in the gland!

Cable-end of the fan must be connected in a dry environment to prevent that water penetrate through cable into motor housing.

Means for disconnection must be incorporated in the fixed wiring in accordance with the wiring rules.

The fan is intended only to be connected to the fixed wiring or application's circuit. An all-pole separating switch which must be incorporated to wiring must disconnect also the fan.

The electrical connection must correspond to the enclosed connection diagram.

Secure connection cable to the fan guard grill or to the motor holder with cable fasteners.

The fan is constructed for installation with rotor on bottom or with shaft in horizontal.

Before putting into operation, check the resistance of protective-earth circuit.

Power-supply leads and control leads of this unit should not be routed in parallel (separate cables). Try to maintain as much distance between them as possible (recommended distance > 5cm).

Where the fan is installed in shaft-horizontal position, the cable exit on the motor must be in down position.

CONNECTING DIAGRAM : See page 2 of appended technical drawing 0310-4-0031

Figure 1, terminals

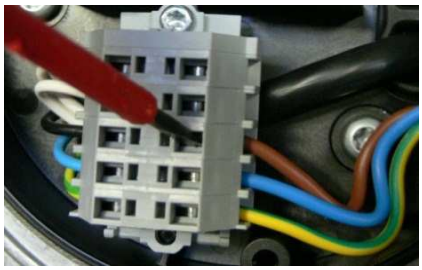
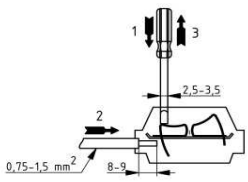


Figure 2, instructions



If the fan is equipped with connection terminals (figure 1), please follow the instructions for inserting the cable into the connection terminal (figure 2):

1. Use screwdriver of 2.5 - 3.5mm width.
2. Push the spring of terminal pin.
3. Push the cable end into terminal.
4. Release the spring - screwdriver.

NOTE: 'Hidria Bus' lead or terminal is useful only to the factory settings. During operation this lead/terminal must be isolated!

Dimensions:

See Appendix - technical drawing : VENTILATOR 0310-4-0031

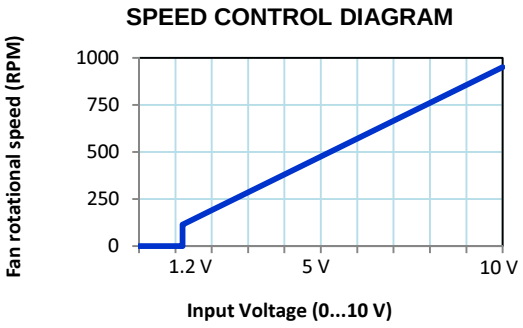
05 SPEED CONTROL

Rotation speed of a variable speed fan can be controlled by various signals, but the most common are:

- linear voltage input (0-10V),
- current input (4-20mA) or
- PWM input (duty cycle: 0-100% - correspond to 0-10V linear voltage input if the amplitude of the PWM voltage is: Vp=10V)

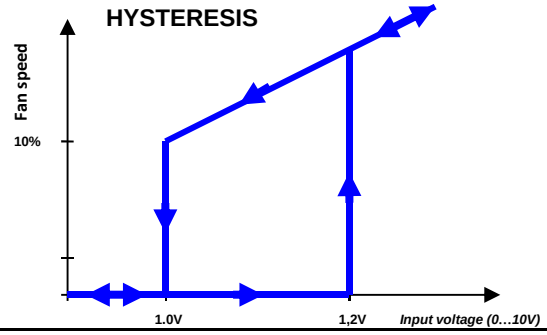
Linear voltage input is the most common and it is described below. The current input is also widely used, where long cables are necessary. PWM input is used for electromagnetic noisy environments. PWM signal must be in square form with polarity the same as for linear voltage input (see connection diagram). Amplitude of PWM signal must not exceed 12Vp.

LINEAR VOLTAGE INPUT:



Speed of a fan increases linearly with input voltage.

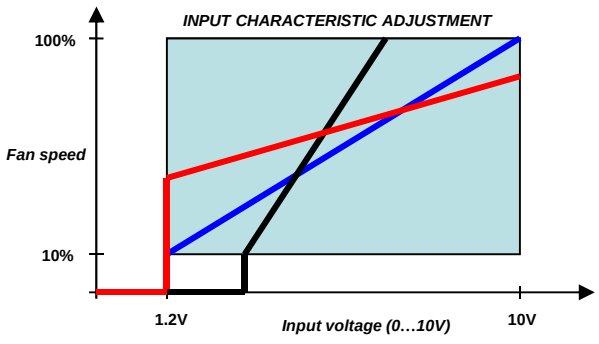
The fan operates in two different modes:
0-1.2 V..... Standby or stop mode
1.2-10 V..... Run mode
1.0-1.2V .....Hysteresis

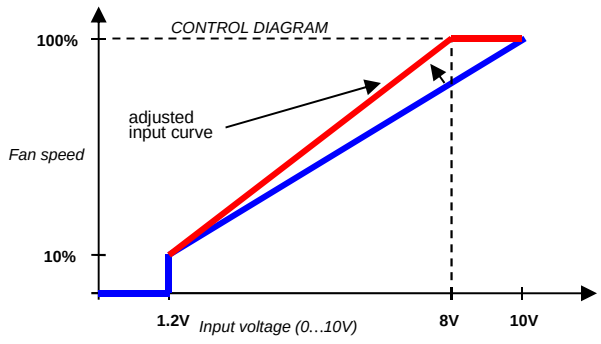


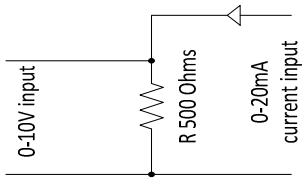
In order to prevent cycling from standby to run mode or run to standby mode a small hysteresis is implemented. The default value is approximately 200mV.
Hysteresis can be factory-adjusted in order to achieve customer requirements.

Linear input is factory adjusted to fit the customer's sensor or other speed control reference. The input characteristic can be factory adjusted in terms of increasing input sensitivity or attenuation.

For example: An air-cooled condenser is using a pressure sensor 0-20Bar => 0-10V, but the highest system pressure reached at maximum load is 16Bar => 8V. For optimal operation of the application the fan mounted on a condenser should run at max speed at 8V of input control voltage. In order to achieve that, we need to adjust the input characteristic in a way the picture shows.







Linear voltage input (0-10V DC) can be used as 0 (4)-20mA current input with an additional resistor of 500 Ohms beetween GND and 0-10V connection.

06 PUTTING INTO OPERATION

Before first start you should check:

a. Appropriate installation and electrical connection.

b. If safety equipment is in place and motor protection device is in function.

c. If the impeller can rotate freely once the unit is mounted and the right direction of rotation is assured.

Only if all dangerous situations are excluded, the fan may be put into operation!

Switch ON the power supply.

Switch ON the device via the control signal and apply the speed setting voltage/signal and check the direction of the rotation and the smoothness of running.

07 PROTECTIVE FEATURES

Short-circuit protection:

The motor and electronic controller are protected against short-circuit by built-in thermal fuse.

Locked-rotor protection:

As soon the rotor is blocked, the motor is switched off electronically. After de-blocking, the motor will restart automatically.

Mains under voltage:

If mains voltage falls below the nominal value the motor will keep running with degraded performance. Below 25V (typical value), the motor will be switched off electronically. If mains voltage returns to correct value, the motor will restart automatically.

Over temperature protection:

Internally connected thermal overload protector to protect electronic and motor against over temperature.

08 EMC

Interference emission acc. to EN 61000-6-3

Interference immunity acc. to EN 61000-6-2

Harmonics acc. to EN 61000-3-2/3

Leakage current: < 3.5 mA acc. to EN 60335

Complying with the EMC standards has to be established on the final appliance, as different mounting situations can result in changed EMC properties.

09 MAINTENANCE, SERVICE AND CLEANING

Before any maintaining or repairing operation is carried out, the unit must be securely disconnected from any power supply source!

This unit should only be opened or maintained or repaired by a manufacturer or by a manufacturer-qualified personnel.

Ensure that the fan is switched off from the supply mains before removing the guard.

Cables of the unit shall only be replaced by a manufacturer or by a manufacturer-qualified personnel to avoid dangerous situations.

Cleaning

Regular inspection, if required, and cleaning when necessary to prevent imbalance due to the build-up of dirt. Clean the fan`s flow area.

Blades must be cleaned carefully to avoid damage to them.

Never use a high-pressure cleaner or water spray for cleaning.

Wet cleaning under voltage may lead to an electric shock.

Do not use any aggressive paint solvent cleaning agents.

For cleaning, use just a moist cloth. You can clean the entire fan with a moist cloth.

If water penetrates into the motor, the motor windings must dry before restarting.

Cleaning and user maintenance shall not be made by children without supervision.

10 TRANSPORT AND STORAGE

Unit must be transported only in its original package.

When the fan's transported with wood spacer on pallet, take care with the cables (in the situation that fan has connection cables). When unpacking fans, transported in such a way, grip the fan to protection grill. Do not apply any force for the cable(s).

When transporting fans mounted on final units (apparatus), take care that they are properly secured and don`t touch other devices which are transported near or on to.

Store the fans in the original packaging in a dry area protected from the weather. Do not store fans in extreme heat and cold.

We recommend a maximum of one year of storage. After a long period of storage we recommend that you inspect the bearings for proper operation before installation.

11 ErP AND ROHS DIRECTIVES

Fan must be mounted in appropriate way to achieve optimal efficiency and life expectancy. We suggest assembling fan in long inlet cone, with fan blade trailing edge aligned with outlet edge of inlet cone.

Only environment friendly, recyclable materials according to RoHS2 (2011/65/EU) and REACH (EC1907/2006) directive are used in the product.

Disposal must be carried out professionally and environmentally friendly in compliance with regulations applicable in your country.

Design of the product enables simple decomposition of all components. Main components are appropriate marked for easy further handling at product end-of-life.

12 SERVICE ADDRESSES AND ADDITIONAL DATA

Please refer to the homepage at www.hidria.com for a list of our subsidiaries worldwide.

Hidria reserves the right to change any specifications or data without notice.

IZJAVA O SKLADNOSTI

EC DECLARATION OF CONFORMITY

Proizvajalec / *Manufacturer* :

Hidria Rotomatika d.o.o., Spodnja Kanomlja 23, 5281 Spodnja Idrija, SLOVENIA

S polno odgovornostjo izjavlja, da proizvod / *We declare under our sole responsibility that product designation* :

Aksialni in centrifugalni ventilator z vgrajenim EC motorjem z zunanjim rotorjem
Axial and centrifugal fan with integrated external rotor electronically-commutated motor

Tip / *Type* :

R10R-56LPS-ES50B-04A10

Koda / *Part number* :

0310-4-0031

ustreza zahtevam naslednjih direktiv / *is in conformity with with the provisions of the following directives* :

- Direktivi 2006/95/ES o električni opremi, konstruirani za uporabo znotraj določenih napetostnih mej (Uradni list EU št. L374/10).
- *Low Voltage Directive 2006/95/CE.*

- Direktivi 2004/108/ES o elektromagnetni kompatibilnosti (Uradni list EU št. L390/24).
- *EMC directive 2004/108/CE.*

- Uredbi komisije EU št. 327/2011 o izvajanju direktive 2009/125/ES glede zahtev za okoljsko primerno zasnovo ventilatorjev, ki jih poganjajo elektromotorji z električno vhodno močjo med 125W in 500kW (Uradni list EU št. L90/8).
- *Commission regulation (EU) No. 327/2011 implementing directive 2009/125/EC with regard to ecodesign requirements for fans driven by motors with an electric input power between 125 W and 500 kW.*

- Direktivi 2011/65/EU o omejevanju uporabe nekaterih nevarnih snovi v električni in elektronski opremi (Uradni list EU št.174/88).
- *Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment .*

in zadovoljuje tudi zahteve naslednjih standardov / *and also complies with the following standards* :

EN 60204-1, EN60335-1, EN 61800-5-1, EN 61800-2, EN ISO13857
EN 61000-3-2/3, EN 61000-6-2, EN 61000-6-3

Dokler končna naprava ali sestav ni v skladu z direktivami 2006/95/ES, 2004/108/ES in 2006/42/ES, je uporaba navedenega proizvoda, na katerega se nanaša ta izjava o skladnosti, prepovedana.

It is forbidden to operate the machine referred to in this declaration before the finished product in which it will be incorporated or assembled has been declared to be in conformance with EEC Directives 2006/95/CE, 2004/108/CE and 2006/42/CE.

Kraj in datum izdaje / *Place and date of issue* :
Spodnja Idrija, 21. 11. 2014

Ime in priimek ter podpis pooblaščene osebe
Name, surname and signature of authorized person

Glavni direktor HIDRIA Rotomatika
Managing Director HIDRIA Rotomatika